WOVOdat 1.1

User Manual

By:

WOVOdat developer team

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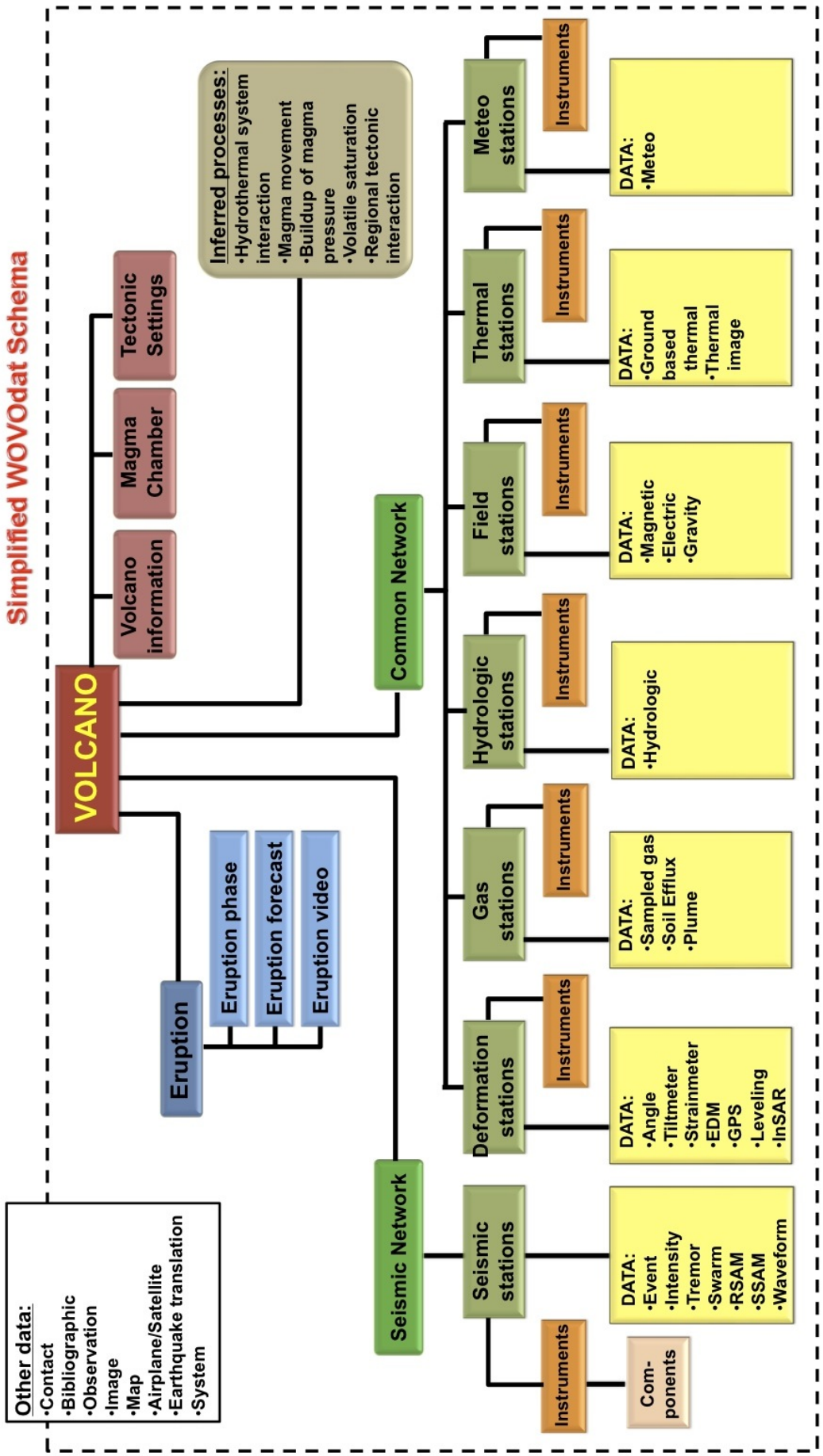
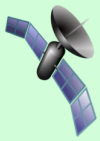
What type of data stored in the WOVOdat?

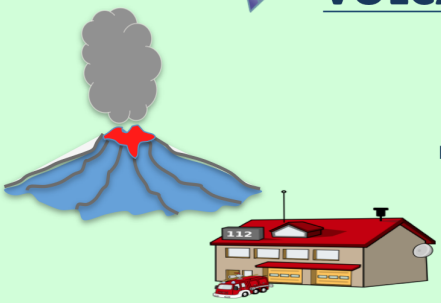


Where come from the data?

DATA SOURCES

All historical monitoring data related to volcanic unrest, ≥ 2 yrs.





VOLCANO OBSERVATORY:

- Monitoring database
- reports, log-book
- Documentary: images, videos,maps. etc.

PARTNER (OPEN DATABASE):

- Smithsonian Institution – GVP
- National volcano database: GeoNet(NZ), NIED (Japan), USGS(USA), etc.
- Seismological database: USGS, IRIS, ISC, PNSN, NCEDC, etc.
- Hydrology database: NWIS-USGS
- Deformation database: UNAVCO-PBO, USGS
- Remote sensing database: NASA, ERSDAC

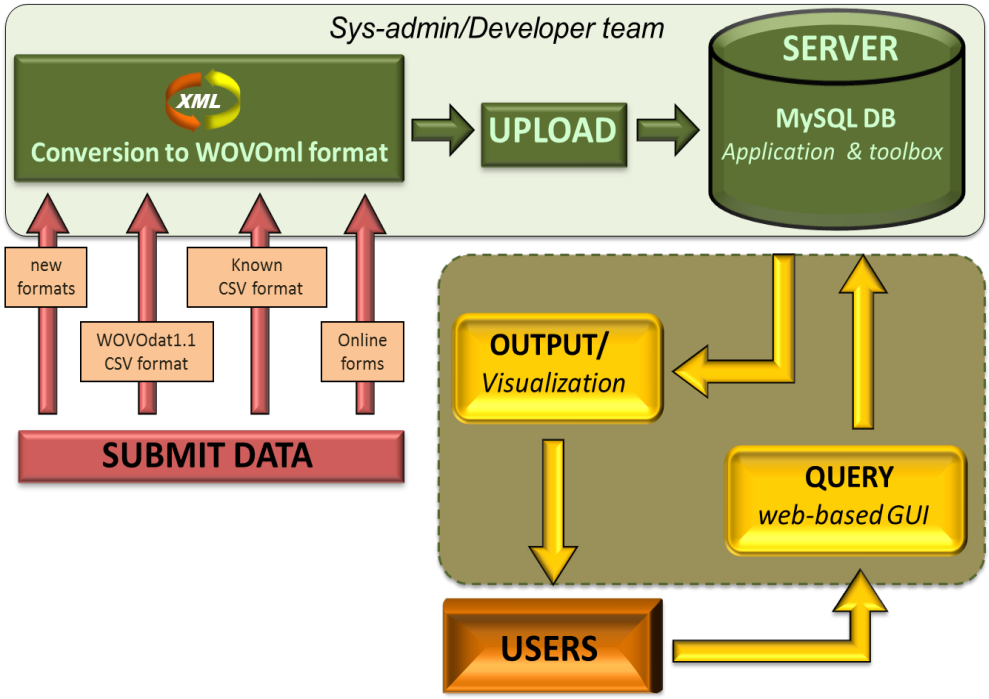
etc.

PUBLISHED REFERENCES:

- Journal papers
- Reports
- Books

etc.

How will the data handled and stored?



Why using MySQL?

WOVOdat choose a relational database for storing and accessing the large amounts of data of volcanic unrest. A relational database is a collection of tables that are related by common fields.

MySQL is an Open Source database, using Structured Query Language (SQL) which capable on handling relational database and also able to integrate with common web languages.

See Appendix-5 for more information about relational database terminology and concepts.

What is WOVOML?

Data inside WOVOdat are stored in a MySQL database, where data tables organized and formatted following the WOVOdat 1.0/1.1 structure (Venezky and Newhall, 2007).
There are several ways to input data into WOVOdat database:

1. Manual input under MySQL server (not practical when we have many data to feed in)
2. Generate an XML format file which is compatible with WOVOdat SQL structure. *WOVOML* was therefore created as *WOVOdat standard reference XML format file, to facilitate data inputting/importing into the database*.

Detail information/documentation about WOVOdat data handling and formatting can be found at http://www.wovodat.org/doc/

Various scripts/tools to convert different data format into WOVOML will be made available online, so that the user able to import their data into WOVOdat database interactively.

File to Import:

File may be compressed (gzip, bzip2, zip) or uncompressed.
A compressed file's name must end in **.[format].[compression]**. Example: **.sql.zip**

Browse your computer: Browse... (Max: 32MiB)

Select from the web server upload directory **/var/lib/phpMyAdmin/upload/**: *There are no files to upload*

Character set of the file: utf-8

Partial Import:

Allow the interruption of an import in case the script detects it is close to the PHP timeout limit. *(This might be good way to import large files, however it can break transactions.)*

Number of rows to skip, starting from the first row: 0

Format:

CSV

- CSV
- CSV using LOAD DATA
- Open Document Spreadsheet
- SQL
- Excel 97-2003 XLS Workbook
- Excel 2007 XLSX Workbook
- XML

, they will be combined into one

ith file

Do not abort on INSERT error

Columns separated with: ,

Columns enclosed with: "

Columns escaped with: \

Lines terminated with: auto

Column names:

Go

WOVOdat tables

Overview on WOVOdat, original schema, table structures are described in WOVOdat version 1.0 (Venezky and Newhall, 2007). The current version is WOVOdat1.1. The overall structure was retained from v1.0 to v1.1; most changes are in the details of parameters.

Reference: Venezky, D. Y., and Newhall, C. G., 2007, WOVOdat design document; the schema, table descriptions, and create table statements for the database of worldwide volcanic unrest (WOVOdat version 1.0): U.S. Geological Survey Open File Report 2007-1117, 184 p. [http://pubs.usgs.gov/of/2007/1117]

Here is the list of tables used in the database, sorted by field:

Volcano

- Volcano - vd
- Volcano information - vd_inf
- Magma chamber - vd_mag
- Tectonic setting - vd_tec

Eruption

- Eruption - ed
- Eruption video - ed_vid
- Eruption phase - ed_phs
- Eruption forecast - ed_for

Deformation

Monitoring system

- Common network - cn
- Deformation station - ds
- Deformation instrument (general) - di_gen
- Tiltmeter/Strainmeter - di_tlt

Data

- Angle - dd_ang
- EDM - dd_edm
- GPS - dd_gps
- GPS vector - dd_gpv
- Leveling - dd_lev
- Strain - dd_str
- Electronic tilt - dd_tlt
- Tilt vector - dd_tlv
- InSAR image - dd_sar
- InSAR pixel - dd_srd

Fields

Monitoring system

- Common network - cn
- Fields station - fs
- Fields instrument - fi

Data

- Electric fields - fd_ele
- Gravity - fd_gra
- Magnetic fields - fd_mag
- Magnetic vector - fd_mgv

Gas

Monitoring system

- Common network - cn
- Gas station - gs
- Gas instrument - gi

Data

- Directly sampled gas - gd
- Plume - gd_plu
- Soil efflux - gd_sol

Hydrologic

Monitoring system

- Common network - cn
- Hydrologic station - hs
- Hydrologic instrument - hi

Data

- Hydrologic data - hd

Seismic

Monitoring system

- Seismic network - sn
- Seismic station - ss
- Seismic instrument - si
- Seismic component - si_cmp

Data

- Event recorded by a network - sd_evn
- Event recorded by a single station - sd_evs
- Tremor - sd_trm
- Intensity - sd_int
- Interval - sd_ivl
- Waveform - sd_wav
- RSAM-SSAM - sd_sam
- RSAM data - sd_rsm
- SSAM data - sd_ssm

Thermal

Monitoring system

- Common network - cn
- Thermal station - ts
- Thermal instrument - ti

Data

- Ground-based thermal data - td
- Thermal image - td_img
- Thermal pixel - td_pix

Meteo

Monitoring system

- Common network - cn
- Meteo station – ms
- Meteo instrument - mi

Data

- Meteo data - med

Inferred processes

- Hydrothermal system interaction - ip_hyd
- Magma movement - ip_mag
- Buildup of magma pressure - ip_pres
- Volatile saturation - ip_sat
- Regional tectonics interaction - ip_tec

Common or shared

- Contact - cc
- Bibliographic - cb
- Observation - co
- Image - cm
- Map - md
- Airplane/Satellite - cs
- Earthquake terminology translation - st_eqt

System

Links

- Users to users permissions - jj_concon
- Image related to data - jj_imgx
- Contacts for volcanoes - jj_volcon
- Networks monitoring volcanoes - jj_volnet
- InSAR images created by satellites - j_sarsat

Database administration

- Registry - cr
- Temporary registry - cr_tmp
- Permission - cp
- Upload history - cu
- Change - ch

TABLE OF CONTENT

A. VOLCANO

A.1. vd – Volcano

The volcano table is one of the fundamental tables of WOVOdat. In this table ***vd_id*** (the volcano identifier), which links to almost every table, is defined. Main data (Volcano name and CAVW number) for this table will mostly refer to the Smithsonian Global Volcanism Program (SI-GVP). More information about volcano data can be found in the Appendix-3 or at http://www.volcano.si.edu/world/volcanocriteria.cfm.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comment
1	vd_id	mediumint(8)		UNSIGNED	No	None	AUTO_IN-CREMENT		Volcano identifier (Index)
2	**vd_cavw**	varchar(15)	latin1_swedish_ci		Yes	NULL			the current CAVW number for this volcano
3	**vd_name**	varchar(255)	latin1_swedish_ci		Yes	NULL			Volcano name (first)
4	**vd_name2**	varchar(255)	latin1_swedish_ci		Yes	NULL			Volcano name (second)
5	**vd_tzone**	float			Yes	NULL			time zone (relative to UTC)
6	**vd_mcont**	char(1)	latin1_swedish_ci		Yes	NULL			multiple contact for this volcano
7	**vd_com**	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments
8	cc_id	smallint(5)		UNSIGNED	Yes	NULL			First Contact ID
9	cc_id2	smallint(5)		UNSIGNED	Yes	NULL			Second Contact ID
10	cc_id3	smallint(5)		UNSIGNED	Yes	NULL			Third Contact ID
11	cc_id4	smallint(5)		UNSIGNED	Yes	NULL			Fourth Contact ID
12	cc_id5	smallint(5)		UNSIGNED	Yes	NULL			Fifth Contact ID
13	**vd_loaddate**	datetime			Yes	NULL			the date the data was entered (in UTC)
14	**vd_pubdate**	datetime			Yes	NULL			the date the data become public
15	cc_id_load	smallint(5)		UNSIGNED	Yes	NULL			contact ID for the person who entered the data

A.2. vd_inf - Volcano information

This table contains information about the volcano that could possibly change over the life of the database, such as the CAVW number, geomorphology, and other descriptive information. Much of the information will be loaded from the Smithsonian Global Volcanism Program *'Volcano reference File (VRF)'. Fields highlighted in light blue are specific descriptions for Philippines volcanoes (PHIVOLCS).*

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	vd_inf_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCRE-MENT		Volcano information identifier (Index)
2	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
3	**vd_inf_cavw**	varchar(15)	*latin1_swedish_ci*		Yes	*NULL*			the current CAVW number for this volcano
4	**vd_inf_status**	enum('Anthropology', 'Ar/Ar', 'Dendrochronology', etc.)			No	Unknown			Volcano status
5	**vd_inf_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Short narrative
6	**vd_inf_slat**	double			Yes	*NULL*		°	Summit latitude
7	**vd_inf_slon**	double			Yes	*NULL*		°	Summit longitude
8	**vd_inf_selev**	float			Yes	*NULL*		m	Summit elevation
9	**vd_inf_type**	enum('Caldera', 'Cinder cone', 'Complex			No	Un-			Type

		volcano',etc.)				known			
10	**vd_inf_loc**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Geographic location
11	**vd_inf_rtype**	enum('Basalt', 'Tephrit/Trachybasalt', 'Andesite/Basaltic-andesite', etc.)			No	Unknown			Dominant rock type
12	**vd_inf_evol**	float			Yes	*NULL*		m^3	Volume of edifice
13	**vd_inf_numcald**	tinyint(4)		UNSIGNED	Yes	*NULL*			Number of calderas
14	**vd_inf_lcald_dia**	float			Yes	*NULL*		km	Diameter of largest caldera
15	**vd_inf_ycald_lat**	double			Yes	*NULL*		°	Latitude of youngest caldera
16	**vd_inf_ycald_lon**	double			Yes	*NULL*		°	Longitude of youngest caldera
17	**vd_inf_stime**	datetime			No	0000-00-00 00:00:00			Start time
18	**vd_inf_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
19	**vd_inf_etime**	datetime			No	9999-12-31 23:59:00			End time
20	**vd_inf_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
21	**vd_inf_com**	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments
22	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Contact ID
23	**vd_inf_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
24	**vd_inf_pubdate**	datetime			Yes	*NULL*			the date the data become public
25	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

vd_inf_status => *'Anthropology', 'Ar/Ar', 'Dendrochronology', 'Fumarolic', 'Historical', 'Holocene', 'Holocene?', 'Hot Springs', 'Hydration Rind', 'Hydrophonic', 'Ice Core', 'Lichenometry', 'Magnetism', 'Pleistocene', 'Potassium Argon', 'Radiocarbon', 'Seismicity', 'Surface Exposure', 'Tephrochronology', 'Thermoluminescence', 'Uncertain', 'Uranium-series', 'Varve Count', 'Unknown'*

vd_inf_type => *'Caldera', 'Cinder cone', 'Complex volcano', 'Compound volcano', 'Cone', 'Crater rows', 'Explosion craters', 'Fissure vent', 'Hydrothermal field', 'Lava cone', 'Lava dome', 'Maar', 'Pumice cone', 'Pyroclastic cone', 'Pyroclastic shield', 'Scoria cone', 'Shield volcano', 'Somma volcano', 'Stratovolcano', 'Subglacial volcano', 'Submarine volcano', 'Tuff cone', 'Tuff ring', 'Unknown', 'Volcanic complex', 'Volcanic field'*

vd_inf_rtype => 'Basalt', 'Tephrit/Trachybasalt', 'Andesite/Basaltic-andesite', 'Trachyandesite', 'Dacite', 'Rhyolite', 'Trachyte', 'Phonolite', 'Phonotephrite', 'Foidite', 'Unknown')

A.3. vd_mag - Magma chamber

This table contains information about the magma chamber such as its composition(s) and minimum size (based on the largest eruption volume). The information will obtain from various sources.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	vd_mag_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Volcano magma chamber identifier (Index)
2	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
3	**vd_mag_lvz_dia**	float			Yes	*NULL*		km	Diameter of low velocity zone
4	**vd_mag_lvz_vol**	float			Yes	*NULL*		km^3	Volume of low velocity zone
5	**vd_mag_tlvz**	float			Yes	*NULL*		km	Depth to top of low velocity zone
6	**vd_mag_lerup_vol**	double			Yes	*NULL*		km^3	Volume of largest eruption, DRE

7	**vd_mag_drock**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Dominant rock type
8	**vd_mag_orock**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Outlier rock type
9	**vd_mag_orock2**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Second outlier rock type
10	**vd_mag_orock3**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Third outlier rock type
11	**vd_mag_minsio2**	float			Yes	*NULL*			Minimum SiO2 content of whole rocks erupted
12	**vd_mag_maxsio2**	float			Yes	*NULL*			Maximum SiO2 content of whole rocks erupted
13	**vd_mag_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
14	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Owner ID
15	**vd_mag_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
16	**vd_mag_pubdate**	datetime			Yes	*NULL*			the date the data become public
17	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
18	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

A.4. vd_tec - Tectonic setting

This table contains information about the local tectonic settings, such as rates of movement either along a plate or over a hotspot.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**vd_tec_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Tectonic setting identifier (Index)
2	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
3	**vd_tec_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
4	**vd_tec_strslip**	float			Yes	*NULL*		cm/a	Rate of strike-slip
5	**vd_tec_ext**	float			Yes	*NULL*		cm/a	Rate of extension
6	**vd_tec_conv**	float			Yes	*NULL*		cm/a	Rate of convergence
7	**vd_tec_travhs**	float			Yes	*NULL*		cm/a	Travel rate across hotspot
8	**vd_tec_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
9	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Contact ID
10	**vd_tec_loaddate**	datetime			Yes	*NULL*			the date the data was entered
11	**vd_tec_pubdate**	datetime			Yes	*NULL*			the date the data become public
12	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
13	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

B. ERUPTION

B.1. ed – Eruption

This table stores general information about an eruption, in general can be classified in different ways based on the style or eruption, composition, duration, and location. The SI-GVP will be a source for most of the data in the eruption table. More additional information on eruption data can be found in Appendix-4 or at http://www.volcano.si.edu/world/eruptioncriteria.cfm.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	ed_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Eruption identifier (index)
2	ed_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Eruption code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	ed_name	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Eruption name
5	ed_nar	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Narrative
6	ed_stime	datetime			Yes	*NULL*			Eruption start time
7	ed_stime_bc	smallint(6)			Yes	*NULL*			BC year start time
8	ed_stime_unc	datetime			Yes	*NULL*			Start time uncertainty
9	ed_etime	datetime			Yes	*NULL*			Eruption end time
10	ed_etime_bc	smallint(6)			Yes	*NULL*			BC year end time
11	ed_etime_unc	datetime			Yes	*NULL*			End time uncertainty
12	ed_climax	datetime			Yes	*NULL*			Onset of climax
13	ed_climax_bc	smallint(6)			Yes	*NULL*			BC year of eruption climax
14	ed_climax_unc	datetime			Yes	*NULL*			Onset of climax uncertainty
15	ed_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	ed_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
20	ed_pubdate	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

B.2. ed_phs - Eruption phase

This table stores specific information about the eruption such as the size of the phase and composition of magma.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	ed_phs_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Eruption phase identifier
2	ed_phs_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Eruption phase code
3	ed_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Eruption identifier
4	ed_phs_phsnum	float			Yes	*NULL*			Phase number
5	ed_phs_stime	datetime			Yes	*NULL*			Start time
6	ed_phs_stime_bc	smallint(6)			Yes	*NULL*			Year of start time before Christ
7	ed_phs_stime_unc	datetime			Yes	*NULL*			Start time uncertainty

8	**ed_phs_etime**	datetime			Yes	*NULL*			End time
9	**ed_phs_etime_bc**	smallint(6)			Yes	*NULL*			Year of end time before Christ
10	**ed_phs_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
11	**ed_phs_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
12	**ed_phs_vei**	mediumint(9)			Yes	*NULL*			VEI (Volcanic Explosivity Index)
13	**ed_phs_max_lext**	float			Yes	*NULL*		m^3/s	Maximum lava extrusion rate
14	**ed_phs_max_expdis**	float			Yes	*NULL*		kg/s × 10^6	Maximum explosive mass discharge rate
15	**ed_phs_dre**	float			Yes	*NULL*		m^3 × 10^6	DRE (Dense-Rock Equivalent)
16	**ed_phs_mix**	enum('Y', 'N', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Evidence of magma mixing: Y=Yes, N=No, U=Unknown
17	**ed_phs_col**	float			Yes	*NULL*		km	Column height
18	**ed_phs_coldet**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Column height determination
19	**ed_phs_minsio2_mg**	float			Yes	*NULL*		%	Minimum SiO_2 of matrix glass
20	**ed_phs_maxsio2_mg**	float			Yes	*NULL*		%	Maximum SiO_2 of matrix glass
21	**ed_phs_minsio2_wr**	float			Yes	*NULL*		%	Minimum SiO_2 of whole rock
22	**ed_phs_maxsio2_wr**	float			Yes	*NULL*		%	Maximum SiO_2 of whole rock
23	**ed_phs_totxtl**	float			Yes	*NULL*		%	Total crystallinity
24	**ed_phs_phenc**	float			Yes	*NULL*		%	Phenocryst content
25	**ed_phs_phena**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Phenocryst assemblage
26	**ed_phs_h2o**	float			Yes	*NULL*			Pre-eruption water content
27	**ed_phs_h2o_xtl**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description of phenocryst and melt inclusion
28	**ed_phs_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
29	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
30	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			second owner ID
31	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
32	**ed_phs_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
33	**ed_phs_pubdate**	datetime			Yes	*NULL*			the date the data become public
34	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
35	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

B.3. ed_vid - Eruption video

This table stores information about a video clip of the eruption.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ed_vid_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Eruption video identifier
2	**ed_vid_code**	varchar(30)	*latin1_swedish_c*		Yes	*NULL*			Eruption video code

			i						
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			volcano identifier
4	ed_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Eruption identifier
5	ed_phs_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Eruption phase identifier
6	**ed_vid_link**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the file or info where to find the clip
7	**ed_vid_stime**	datetime			Yes	*NULL*			Start time
8	**ed_vid_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
9	**ed_vid_length**	time			Yes	*NULL*			Length of the clip
10	**ed_vid_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
11	**ed_vid_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
12	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
13	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			second owner ID
14	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
15	**ed_vid_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
16	**ed_vid_pubdate**	datetime			Yes	*NULL*			the date the data become public
17	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
18	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

B.4. ed_for - Eruption forecast

This table stores information about forecasts made for a phase of the eruption, such as an overview of the forecast and the times forecasted.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	ed_for_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Eruption forecast identifier
2	**ed_for_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Eruption forecast code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	ed_phs_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Eruption phase identifier
5	**ed_for_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
6	**ed_for_open**	datetime			Yes	*NULL*			Earliest expected start time of eruption
7	**ed_for_open_unc**	datetime			Yes	*NULL*			Earliest expected start time of eruption uncertainty
8	**ed_for_close**	datetime			Yes	*NULL*			Latest expected start time of eruption
9	**ed_for_close_unc**	datetime			Yes	*NULL*			Latest expected start time of eruption uncertainty
10	**ed_for_time**	datetime			Yes	*NULL*			Issue date
11	**ed_for_time_unc**	datetime			Yes	*NULL*			Issue date uncertainty
12	**ed_for_tsucc**	enum('Y', 'N', 'P')	*latin1_swedish_ci*		Yes	*NULL*			Success on time: Y=Yes, N=No, P=Partly
13	**ed_for_msucc**	enum('Y', 'N', 'P')	*latin1_swedish_ci*		Yes	*NULL*			Success on magnitude: Y=Yes, N=No, P=Partly
14	**ed_for_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
15	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID

16	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			second owner ID
17	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
18	ed_for_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
19	ed_for_pubdate	datetime			Yes	*NULL*			the date the data become public
20	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
21	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

C. SEISMIC MONITORING SYSTEM

C.1. sn - Seismic network

This table contains information about the seismic network such as the velocity model used for computing the event locations and a general overview of the types of instruments used.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	sn_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Seismic network identifier
2	sn_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic Network code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	sn_name	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic Network name
5	sn_vmodel	varchar(511)	*latin1_swedish_ci*		Yes	*NULL*			Description of velocity model
6	sn_vmodel_detail	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to a file containing additional details about velocity model
7	sn_zerokm	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*		m	Elevation of zero km "depth"
8	sn_fdepth_flag	enum('Y', 'N', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Depth is fixed: Y=Yes, N=No, U=Unknown
9	sn_fdepth	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Fixed depth description
10	sn_stime	datetime			No	0000-00-00 00:00:00			Start date
11	sn_stime_unc	datetime			Yes	*NULL*			Start date uncertainty
12	sn_etime	datetime			No	1999-12-31 23:59:00			End date
13	sn_etime_unc	datetime			Yes	*NULL*			End date uncertainty
14	sn_tot	tinyint(3)		UNSIGNED	Yes	*NULL*			Total number of seismometers
15	sn_bb	tinyint(3)		UNSIGNED	Yes	*NULL*			Number of broadband seismometers
16	sn_smp	tinyint(3)		UNSIGNED	Yes	*NULL*			Number of short- and mid-period seismometers
17	sn_digital	tinyint(3)		UNSIGNED	Yes	*NULL*			Number of digital seismometers
18	sn_analog	tinyint(3)		UNSIGNED	Yes	*NULL*			Number of analog seismometers
19	sn_tcomp	tinyint(3)		UNSIGNED	Yes	*NULL*			Number of 3 component seismometers
20	sn_micro	tinyint(3)		UNSIGNED	Yes	*NULL*			Number of microphones

21	**sn_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
22	**sn_utc**	float			Yes	*NULL*			Difference from UTC
23	**sn_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
24	**sn_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
25	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
26	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
27	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
28	**sn_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
29	**sn_pubdate**	datetime			Yes	*NULL*			the date the data become public
30	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
31	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

C.2. ss - Seismic station

This table stores information such as a location, name, system gain, and comments about the seismic stations where the data are collected.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ss_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCRE-MENT		Seismic station identifier
2	**ss_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic station code
3	**sn_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Seismic network identifier
4	**ss_name**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic station name
5	**ss_lat**	double			Yes	*NULL*		°	Station Latitude
6	**ss_lon**	double			Yes	*NULL*		°	Station longitude
7	**ss_elev**	float			Yes	*NULL*		m	Station elevation
8	**ss_depth**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*		m	Depth of instruments
9	**ss_stime**	datetime			No	0000-00-00 00:00:00			Start date
10	**ss_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
11	**ss_etime**	datetime			No	1999-12-31 23:59:00			End date
12	**ss_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
13	**ss_utc**	float			Yes	*NULL*			Difference from UTC
14	**ss_instr_type**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Instrument types
15	**ss_sgain**	float			Yes	*NULL*			System gain
16	**ss_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
17	**ss_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
18	**ss_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
19	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
20	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
21	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
22	**ss_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)

23	**ss_pubdate**	datetime			Yes	*NULL*			the date the data become public
24	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
25	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

C.3. si - Seismic instrument

This table stores information such as the instrument name, model, number of components and response time.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**si_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Seismic instrument identifier
2	**si_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic instrument code
3	**ss_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			seismic station identifier
4	**si_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The name, model, and manufacturer of the seismic instrument (recorder)
5	**si_type**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Instrument type
6	**si_range**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Dynamic range of seismic instrument
7	**si_igain**	float			Yes	*NULL*			the instrument gain
8	**si_filter**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Filters, if applied
9	**si_ncomp**	tinyint(3)		UNSIGNED	Yes	*NULL*			Number of components
10	**si_resp**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Response overview
11	**si_resp_file**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			link to file containing response
12	**si_stime**	datetime			No	0000-00-00 00:00:00			Start date
13	**si_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
14	**si_etime**	datetime			No	1999-12-31 23:59:00			End date
15	**si_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
16	**si_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
17	**si_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
18	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
19	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
20	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
21	**si_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
22	**si_pubdate**	datetime			Yes	*NULL*			the date the data become public
23	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
24	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

C.4. si_cmp - Seismic component

This table stores information about an individual component (geophone) that sends data to the instrument or recorder such as the component name, model, orientation, band type, and sampling rate.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	si_cmp_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Seismic component identifier
2	**si_cmp_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic component code
3	si_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Seismic instrument identifier
4	**si_cmp_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The name, model, and manufacturer of the geophone
5	**si_cmp_type**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Seismic component type
6	**si_cmp_resp**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description of response
7	**si_cmp_band**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Band type (SEED convention)
8	**si_cmp_samp**	float			Yes	*NULL*		Hz	Sampling rate
9	**si_cmp_icode**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Instrument code (SEED convention)
10	**si_cmp_orient**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Orientation code (SEED convention)
11	**si_cmp_sens**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Sensitivity
12	**si_cmp_depth**	float			Yes	*NULL*		m	Depth
13	**si_cmp_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
14	**si_cmp_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
15	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
16	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
17	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
18	**si_cmp_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
19	**si_cmp_pubdate**	datetime			Yes	*NULL*			the date the data become public
20	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
21	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

D. SEISMIC DATA

D.1. sd_evn - Seismic event data from a network

This table contains seismic data that were collected from several stations in a network and then processed to give a location.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	sd_evn_id	mediumint(8)		UNSIGNED	No	None	AUTO_INCREMENT		Seismic event identifier
2	**sd_evn_code**	varchar(30)	latin1_swedish_ci		Yes	NULL			Seismic event code
3	sn_id	smallint(5)		UNSIGNED	Yes	NULL			Seismic network identifier

4	**sd_evn_arch**	varchar(255)	latin1_swedish_ci		Yes	NULL			Location of the seismogram archive
5	**sd_evn_time**	datetime			Yes	NULL			Origin time
6	**sd_evn_timecsec**	decimal(2,2)			Yes	NULL			Centisecond precision for origin time
7	**sd_evn_time_unc**	datetime			Yes	NULL			Origin time uncertainty
8	**sd_evn_timecsec_unc**	decimal(2,2)			Yes	NULL			Centisecond precision for origin time uncertainty
9	**sd_evn_dur**	float			Yes	NULL		s	Average duration of the earthquake as recorded at stations <15 km from the volcano
10	**sd_evn_dur_unc**	float			Yes	NULL		s	Uncertainty in average duration of the earthquake
11	**sd_evn_tech**	varchar(255)	latin1_swedish_ci		Yes	NULL			The technique used to locate the event
12	**sd_evn_picks**	enum('A', 'R', 'H', 'U')	latin1_swedish_ci		Yes	NULL			Determination of picks: A=Automatic picker, R=Ruler, H=Human using a computer-based picker, U=Unknown
13	**sd_evn_elat**	double			Yes	NULL		°	Estimated latitude
14	**sd_evn_elon**	double			Yes	NULL		°	Estimated longitude
15	**sd_evn_edep**	float			Yes	NULL		km	Estimated depth
16	**sd_evn_fixdep**	enum('Y', 'N', 'U')	latin1_swedish_ci		Yes	NULL			Fixed depth: Y=Yes, N=No, U=Unknown
17	**sd_evn_nst**	tinyint(3)		UNSIGNED	Yes	NULL			The total number of seismic stations that reported arrival times for this earthquake
18	**sd_evn_nph**	tinyint(3)		UNSIGNED	Yes	NULL			The total number of P and S arrival-time observations used to compute the hypocenter location
19	**sd_evn_gp**	float			Yes	NULL		°	The largest azimuthal gap between azimuthally adjacent stations
20	**sd_evn_dcs**	float			Yes	NULL		km	Horizontal distance from the epicenter to the nearest station
21	**sd_evn_rms**	float			Yes	NULL		s	RMS travel time residual
22	**sd_evn_herr**	float			Yes	NULL		km	The horizontal location error defined as the length of the largest projection of the three principal errors on a horizontal plane
23	**sd_evn_xerr**	float			Yes	NULL		km	The maximum x (longitude) error for cases where the horizontal error is not given
24	**sd_evn_yerr**	float			Yes	NULL		km	The maximum y (latitude) error for cases where the horizontal error is not given
25	**sd_evn_derr**	float			Yes	NULL		km	The depth error defined as the largest projection of the three principal errors on a vertical line
26	**sd_evn_locqual**	varchar(255)	latin1_swedish_ci		Yes	NULL			The quality of the calculated location
27	**sd_evn_pmag**	float			Yes	NULL			The primary magnitude
28	**sd_evn_pmag_type**	varchar(30)	latin1_swedish_ci		Yes	NULL			The primary magnitude type, e.g., Ms, Mb, Mw, Md (see Appendix 8 for more

									info)
29	**sd_evn_smag**	float			Yes	NULL			A secondary magnitude
30	**sd_evn_smag_type**	varchar(30)	latin1_swedish_ci		Yes	NULL			Secondary magnitude type
31	**sd_evn_eqtype**	enum('R', 'Q', 'V', 'VT', 'VT_D', 'VT_S', 'H', 'H_HLF', 'H_LHF', 'LF', 'LF_LP', 'LF_T', 'LF_ILF', 'VLP', 'E', 'U', 'O', 'X')			Yes	NULL			WOVOdat classification for the earthquake type (see Appendix 8 for more info)
32	**sd_evn_mtscale**	float			Yes	NULL			The scale of the following moment tensor data. Please store as a multiplier for the moment tensor data
33	**sd_evn_mxx**	float			Yes	NULL			Moment tensor m_xx stored as +/- x.xx
34	**sd_evn_mxy**	float			Yes	NULL			Moment tensor m_xy stored as +/- x.xx
35	**sd_evn_mxz**	float			Yes	NULL			Moment tensor m_xz stored as +/- x.xx
36	**sd_evn_myy**	float			Yes	NULL			Moment tensor m_yy
37	**sd_evn_myz**	float			Yes	NULL			Moment tensor m_yz
38	**sd_evn_mzz**	float			Yes	NULL			Moment tensor m_zz
39	**sd_evn_strk1**	float			Yes	NULL		°	Strike 1 of best double couple
40	**sd_evn_strk1_err**	float			Yes	NULL		°	The uncertainty in the value of strike 1
41	**sd_evn_dip1**	float			Yes	NULL		°	Dip 1 of best double couple
42	**sd_evn_dip1_err**	float			Yes	NULL		°	The uncertainty in the value of dip 1
43	**sd_evn_rak1**	float			Yes	NULL		°	Rake 1 of best double couple
44	**sd_evn_rak1_err**	float			Yes	NULL		°	The uncertainty in the value of rake 1
45	**sd_evn_strk2**	float			Yes	NULL		°	Strike 2 of best double couple
46	**sd_evn_strk2_err**	float			Yes	NULL		°	The uncertainty in the value of strike 2
47	**sd_evn_dip2**	float			Yes	NULL		°	Dip 2 of best double couple
48	**sd_evn_dip2_err**	float			Yes	NULL		°	The uncertainty in the value of dip 2
49	**sd_evn_rak2**	float			Yes	NULL		°	Rake 2 of best double couple
50	**sd_evn_rak2_err**	float			Yes	NULL		°	The uncertainty in the value of rake 2
51	**sd_evn_foc**	varchar(255)	latin1_swedish_ci		Yes	NULL			The focal plane solution (beachball, w/ arrivals) stored as a .gif for well defined events
52	**sd_evn_samp**	float			Yes	NULL		Hz	The sampling rate
53	**sd_evn_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
54	**sd_evn_com**	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments
55	**cc_id**	smallint(5)		UNSIGNED	Yes	NULL			First owner ID
56	**cc_id2**	smallint(5)		UNSIGNED	Yes	NULL			Second owner ID
57	**cc_id3**	smallint(5)		UNSIGNED	Yes	NULL			Third owner ID
58	**sd_evn_loaddate**	datetime			Yes	NULL			the date the data was entered (in UTC)
59	**sd_evn_pubdate**	datetime			Yes	NULL			the date the data become public
60	**cc_id_load**	smallint(5)		UNSIGNED	Yes	NULL			contact ID for the person

									who entered the data
61	cb_ids	varchar(255)	latin1_swedish_ci		Yes	NULL			Link to the bibliography table

D.2. sd_evs - Seismic event data from a single station

This table contains seismic data that were collected from a single station and therefore no location can be calculated.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	sd_evs_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Seismic event identifier
2	sd_evs_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic event code
3	ss_id	mediumint(8)		UNSIGNED	Yes	*NULL*			seismic station identifier
4	sd_evs_time	datetime			Yes	*NULL*			Start time
5	sd_evs_time_ms	decimal(2,2)			Yes	*NULL*			Centisecond precision for start time
6	sd_evs_time_unc	datetime			Yes	*NULL*			Start time uncertainty
7	sd_evs_time_unc_ms	decimal(2,2)			Yes	*NULL*			Centisecond precision for start time uncertainty
8	sd_evs_picks	enum('A', 'R', 'H', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Determination of picks: A=Automatic picker, R=Ruler, H=Human using a computer-based picker, U=Unknown
9	sd_evs_spint	float			Yes	*NULL*		s	S-P interval
10	sd_evs_dur	float			Yes	*NULL*		s	Duration
11	sd_evs_dur_unc	float			Yes	*NULL*		s	Duration uncertainty
12	sd_evs_dist_actven	float			Yes	*NULL*		km	Distance from active vent
13	sd_evs_maxamptrac	float			Yes	*NULL*			Maximum amplitude of trace
14	sd_evs_samp	float			Yes	*NULL*		Hz	Sampling rate
15	sd_evs_eqtype	enum('R', 'Q', 'V', 'VT', 'VT_D', 'VT_S', 'H', 'H_HLF', 'H_LHF', 'LF', 'LF_LP', 'LF_T', 'LF_ILF', 'VLP', 'E', 'U', 'O', 'X')			Yes	NULL			WOVOdat classification for the earthquake type (see Appendix 8 for more info)
16	sd_evs_ori	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
17	sd_evs_com	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments
18	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
19	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
20	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
21	sd_evs_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
22	sd_evs_pubdate	datetime			Yes	*NULL*			the date the data become public
23	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
24	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

D.3. sd_int - Intensity

This table was created to store information about the intensities of events that may or may not have been recorded by a station.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	sd_int_id	smallint(5)		UNSIGNED	No	*None*	AUTO_IN-CREMENT		Sismic intensity identifier
2	sd_int_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic intensity code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	sd_evn_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Seismic network event identifier
5	sd_evs_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Single station event identifier
6	sd_int_time	datetime			Yes	*NULL*			Time
7	sd_int_time_unc	datetime			Yes	*NULL*			Time uncertainty
8	sd_int_city	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			City
9	sd_int_maxdist	float			Yes	*NULL*		km	Maximum distance felt
10	sd_int_maxrint	float			Yes	*NULL*			Maximum reported intensity
11	sd_int_maxrint_dist	float			Yes	*NULL*		km	Distance at maximum reported intensity
12	sd_int_ori	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
13	sd_int_com	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments
14	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
15	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
16	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
17	sd_int_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
18	sd_int_pubdate	datetime			Yes	*NULL*			the date the data become public
19	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
20	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

D.4. sd_trm - Tremor

This table contains information about tremor such as the time interval, qualitative depth, dominant frequency, amplitude range, and reduced displacement.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	sd_trm_id	mediumint(8)		UN-SIGNED	No	*None*	AUTO_IN-CREMENT		Seismic tremor identifier
2	sd_trm_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic tremor code
3	sn_id	smallint(5)		UN-SIGNED	Yes	*NULL*			Seismic network identifier
4	ss_id	mediumint(8)		UN-SIGNED	Yes	*NULL*			Seismic station identifier
5	sd_trm_stime	datetime			Yes	*NULL*			Start time
6	sd_trm_stime_unc	datetime			Yes	*NULL*			Start time uncertainty
7	sd_trm_etime	datetime			Yes	*NULL*			End time

8	**sd_trm_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
9	**sd_trm_dur_day**	float			Yes	*NULL*		min	Duration per day
10	**sd_trm_dur_day_unc**	float			Yes	*NULL*		min	Duration per day uncertainty
11	**sd_trm_type**	enum('G', 'M', 'H', 'C')			Yes	*NULL*			WOVOdat classification for the earthquake type (see Appendix 8 for more info)
12	**sd_trm_qdepth**	enum('D', 'I', 'S', 'U')	*latin1_swedish_ci*		Yes	*NULL*			WOVOdat classification for the earthquake type (see Appendix 8 for more info)
13	**sd_trm_domfreq1**	float			Yes	*NULL*		Hz	Dominant frequency
14	**sd_trm_domfreq2**	float			Yes	*NULL*		Hz	Second dominant frequency
15	**sd_trm_maxamp**	float			Yes	*NULL*			Maximum amplitude
16	**sd_trm_noise**	float			Yes	*NULL*			Background noise level
17	**sd_trm_reddis**	float			Yes	*NULL*			Reduced displacement (as estimated using a station >5km from source)
18	**sd_trm_rderr**	float			Yes	*NULL*			Reduced displacement error
19	**sd_trm_visact**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description of associated visible activity
20	**sd_trm_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
21	**sd_trm_com**	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments
22	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
23	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
24	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
25	**sd_trm_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
26	**sd_trm_pubdate**	datetime			Yes	*NULL*			the date the data become public
27	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
28	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

D.5. sd_ivl - Interval (swarm)

This table contains data about earthquakes that occur in specified time intervals, e.g., as seismic swarms.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**sd_ivl_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Seismic interval identifier
2	**sd_ivl_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic interval code
3	**sn_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Seismic network identifier
4	**ss_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Seismic station identifier
5	**sd_ivl_eqtype**	enum('R', 'Q', 'V', 'VT', 'VT_D', 'VT_S', 'H', 'H_HLF', 'H_LHF', 'LF', 'LF_LP', 'LF_T', 'LF_ILF', 'VLP', 'E', 'U', 'O', 'X')			Yes	*NULL*			Earthquake type (see Appendix 8 for more info)
6	**sd_ivl_stime**	datetime			Yes	*NULL*			Start time
7	**sd_ivl_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
8	**sd_ivl_etime**	datetime			Yes	*NULL*			End time

9	**sd_ivl_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
10	**sd_ivl_hdist**	float			Yes	*NULL*		km	Horizontal distance from summit to swarm center
11	**sd_ivl_avgdepth**	float			Yes	*NULL*		m	Mean depth of the swarm earthquakes
12	**sd_ivl_vdispers**	float			Yes	*NULL*		km	Vertical dispersion(range) of depth over which the swarm earthquakes occurred
13	**sd_ivl_hmigr_hyp**	float			Yes	*NULL*		km	Horizontal migration of hypocenters from/to the summit (outward=positive; inward=negative)
14	**sd_ivl_vmigr_hyp**	float			Yes	*NULL*		km	Vertical migration of hypocenters (up=positive, down=negative)
15	**sd_ivl_patt**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Temporal pattern (defined pattern)
16	**sd_ivl_data**	enum('L', 'C', 'H', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Data type: L=Located earthquakes, C=Detected by computer trigger algorithm, H=Hand counted, U=Unknown
17	**sd_ivl_picks**	enum('A', 'R', 'H', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Determination of picks: A=Automatic picker, R=Ruler, H=Human using a computer-based picker, U=Unknown
18	**sd_ivl_felt_stime**	datetime			Yes	*NULL*			Felt earthquake counts start time
19	**sd_ivl_felt_stime_unc**	datetime			Yes	*NULL*			Felt earthquake counts start time uncertainty
20	**sd_ivl_felt_etime**	datetime			Yes	*NULL*			Felt earthquake counts end time
21	**sd_ivl_felt_etime_unc**	datetime			Yes	*NULL*			felt earthquake counts end time uncertainty
22	**sd_ivl_nrec**	mediumint(6)		UNSIGNED	Yes	*NULL*			Number of recorded earthquakes
23	**sd_ivl_nfelt**	smallint(4)		UNSIGNED	Yes	*NULL*			Number of felt earthquakes
24	**sd_ivl_etot_stime**	datetime			Yes	*NULL*			Total seismic energy release (seismic moment) measurement start time
25	**sd_ivl_etot_stime_unc**	datetime			Yes	*NULL*			Total seismic energy release measurement start time uncertainty
26	**sd_ivl_etot_etime**	datetime			Yes	*NULL*			Total seismic energy release measurement end time
27	**sd_ivl_etot_etime_unc**	datetime			Yes	*NULL*			Total seismic energy release measurement end time uncertainty
28	**sd_ivl_etot**	float			Yes	*NULL*		$erg^{-0.5}$	Total seismic energy release
29	**sd_ivl_fmin**	float			Yes	NULL		Hz	Minimum frequency of recorded earthquake
30	**sd_ivl_fmax**	float			Yes	NULL		Hz	Maximum frequency of recorded earthquake
31	**sd_ivl_amin**	float			Yes	*NULL*			Minimum amplitude of recorded earthquake
32	**sd_ivl_amax**	float			Yes	*NULL*			Maximum amplitude of recorded earthquake
33	**sd_ivl_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
34	**sd_ivl_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory

			ci						
35	**sd_ivl_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			comments
36	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
37	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
38	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
39	**sd_ivl_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
40	**sd_ivl_pubdate**	datetime			Yes	*NULL*			the date the data become public
41	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
42	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

D.6. sd_sam - RSAM-SSAM

This table stores information of the Real-time Seismic Amplitude Measurements (RSAM) and Seismic Spectral Amplitude measurements (SSAM); needed to define the boundaries of the RSAM/SSAM images/graph. The time series data needed to create the graph/image are stored in the individual RSAM(sd_rsm) and SSAM(sd_ssm) tables.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**sd_sam_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Seismic RSAM-SSAM identifier
2	**sd_sam_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Seismic RSAM-SSAM code
3	**ss_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Seismic station identifier
4	**sd_sam_stime**	datetime			Yes	*NULL*			Start time
5	**sd_sam_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
6	**sd_sam_etime**	datetime			Yes	*NULL*			End time
7	**sd_sam_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
8	**sd_sam_int**	float			Yes	*NULL*		s	Counting interval
9	**sd_sam_int_unc**	float			Yes	*NULL*		s	Counting interval uncertainty
10	**sd_sam_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
11	**sd_sam_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			comments
12	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
13	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
14	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
15	**sd_sam_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
16	**sd_sam_pubdate**	datetime			Yes	*NULL*			the date the data become public
17	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
18	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

D.6.a. sd_rsm - RSAM data

This table stores the RSAM time series data needed to create an RSAM image/graph defined in sd_sam table.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**sd_rsm_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		RSAM data identifier

2	sd_sam_id	mediumint(8)		UNSIGNED	Yes	*NULL*			RSAM-SSAM image/graph identifier
3	**sd_rsm_stime**	datetime			Yes	*NULL*			Start time
4	**sd_rsm_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
5	**sd_rsm_count**	float			Yes	*NULL*			RSAM count during this interval
6	**sd_rsm_calib**	float			Yes	*NULL*			Reduced displacement per 100 RSAM counts
7	**sd_rsm_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			comments
8	**sd_rsm_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
9	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

D.6.b. sd_ssm - SSAM data

This table stores the SSAM time series data needed to create an SSAM image/graph defined in sd_sam table.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	sd_ssm_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		SSAM data identifier
2	sd_sam_id	mediumint(8)		UNSIGNED	Yes	*NULL*			RSAM-SSAM image/graph identifier
3	**sd_ssm_stime**	datetime			Yes	*NULL*			Start time
4	**sd_ssm_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
5	**sd_ssm_lowf**	float			Yes	*NULL*		Hz	Low frequency limit
6	**sd_ssm_highf**	float			Yes	*NULL*		Hz	High frequency limit
7	**sd_ssm_count**	float			Yes	*NULL*			SSAM count during this interval
8	**sd_ssm_calib**	float			Yes	*NULL*			Reduced displacement per 100 SSAM counts
9	**sd_ssm_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			comments
10	**sd_ssm_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
11	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

D.7. sd_wav - Waveform

This table contains sample of waveforms to highlight common and uncommon events (network event or single-station event or tremor event) at different volcanoes. This waveform table links to the event table.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	sd_wav_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Waveform identifier
2	**sd_wav_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Waveform code
3	ss_id	mediumint(8)		UNSIGNED	Yes	*NULL*			seismic station identifier
4	sd_evn_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Seismic event identifier
5	sd_evs_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Single event identifier
6	sd_trm_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Seismic tremor identifier
7	**sd_wav_arch**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Location of seismogram archive (institutional address)
8	**sd_wav_link**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to archive (path/link to the image file)
9	**sd_wav_dist**	enum('P', 'I',	*latin1_swedish_c*		Yes	*NULL*			Distance from summit:

		'D', 'U')	*i*						P=Proximal (< 2 km), I=Intermediate (2-5 km), D=Distal (> 5 km), U=Unknown
10	**sd_wav_img**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Image/file format of the waveform
11	**sd_wav_info**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Background information
12	**sd_wav_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description of the waveform
13	**sd_wav_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
14	**sd_wav_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			comments
15	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
16	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
17	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
18	**sd_wav_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
19	**sd_wav_pubdate**	datetime			Yes	*NULL*			the date the data become public
20	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
21	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

E. DEFORMATION MONITORING SYSTEM

E.1. cn - Common network (for Deformation network)

This table contains information about the (non-seismic) network of stations that collect data at a particular site, in general at one volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**cn_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Common network identifier
2	**cn_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Common network code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	**cn_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Common network name
5	**cn_type**	enum('Deformation','Fields','Gas','Hydrologic','Thermal','Meteo','Unknown')			No	Unknown			Common network type
6	**cn_area**	float			Yes	*NULL*		km^2	Network area coverage
7	**cn_map**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link to the Map of the network (from observatory)
8	**cn_stime**	datetime			No	0000-00-00 00:00:00			Start time
9	**cn_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
10	**cn_etime**	datetime			No	9999-12-31 23:59:59			End time
11	**cn_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
12	**cn_utc**	float			Yes	*NULL*			Difference from UTC
13	**cn_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
14	**cn_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory

15	**cn_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	**cn_loaddate**	datetime			No	*None*			the date the data was entered (in UTC)
20	**cn_pubdate**	datetime			Yes	*NULL*			the date the data become public
21	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

E.2. ds - Deformation station

This table stores information such as a location, name, and description for stations where deformation or geodetic data are collected.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ds_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Deformation station identifier
2	**ds_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Deformation station code
3	**ds_name**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Deformation station name
4	**cn_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Deformation network identifier
5	**ds_perm**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			List of permanent instruments
6	**ds_nlat**	double			Yes	*NULL*		°	Station latitude
7	**ds_nlon**	double			Yes	*NULL*		°	Station longitude
8	**ds_nelev**	float			Yes	*NULL*		m	Station elevation
9	**ds_herr_loc**	float			Yes	*NULL*			Horizontal precision of station location
10	**ds_stime**	datetime			No	0000-00-00 00:00:00			Start time
11	**ds_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
12	**ds_etime**	datetime			No	9999-12-31 23:59:59			End time
13	**ds_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
14	**ds_utc**	float			Yes	*NULL*			Difference from UTC
15	**ds_rflag**	enum('Y', 'N')	*latin1_swedish_ci*		Yes	*NULL*			Reference station: Y=Yes, N=No
16	**ds_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
17	**ds_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
18	**ds_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			comments
19	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
20	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
21	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
22	**ds_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
23	**ds_pubdate**	datetime			Yes	*NULL*			the date the data become public
24	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
25	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

E.3. di_gen - General deformation instrument

This table stores information about each individual instrument.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	di_gen_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Deformation instrument identifier
2	di_gen_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Deformation instrument code
3	ds_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Deformation station identifier
4	di_gen_name	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Deformation instrument name
5	di_gen_type	enum('Angle', 'CGPS', 'EDM', 'EDM_Reflector', 'GPS', 'Total_Station', 'OtherTypes')			Yes	*NULL*			Deformation instrument type
6	di_gen_units	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Units measured
7	di_gen_res	float			Yes	*NULL*			instrument resolution
8	di_gen_stn	float			Yes	*NULL*			Signal to noise
9	di_gen_stime	datetime			No	0000-00-00 00:00:00			Start time
10	di_gen_stime_unc	datetime			Yes	*NULL*			Start time uncertainty
11	di_gen_etime	datetime			No	9999-12-31 23:59:59			End time
12	di_gen_etime_unc	datetime			Yes	*NULL*			End time uncertainty
13	di_gen_ori	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
14	di_gen_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
15	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
16	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
17	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
18	di_gen_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
19	di_gen_pubdate	datetime			Yes	*NULL*			the date the data become public
20	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
21	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

E.4. di_tlt - Tilt/Strain instrument

This table stores information about each individual instrument and provides the necessary data to process raw data from the tilt and strain data tables.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	di_tlt_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Tilt/strain instrument identifier
2	di_tlt_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Tilt/Strain instrument code
3	ds_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Deformation station identifier
4	di_tlt_name	varchar(255	*latin1_sw*		Yes	*NULL*			Tilt/Strain instrument

		)	*edish_ci*						name
5	**di_tlt_type**	enum('Tilt', 'Strain')	*latin1_swedish_ci*		Yes	*NULL*			Tilt/strain instrument type
6	**di_tlt_depth**	float			Yes	*NULL*		m	Depth
7	**di_tlt_units**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Units measured
8	**di_tlt_res**	float			Yes	*NULL*			Resolution
9	**di_tlt_dir1**	float			Yes	*NULL*		°	Azimuth of direction 1 (or X for tiltmeter) 0-360°
10	**di_tlt_dir2**	float			Yes	*NULL*		°	Azimuth of direction 2 (or Y for tiltmeter) 0-360°
11	**di_tlt_dir3**	float			Yes	*NULL*		°	Azimuth of direction 3 (0-360°)
12	**di_tlt_dir4**	float			Yes	*NULL*		°	Azimuth of direction 4 (0-360°)
13	**di_tlt_econv1**	float			Yes	*NULL*		µrad/mV or µstrain/mV	Electronic conversion for component 1
14	**di_tlt_econv2**	float			Yes	*NULL*		µrad/mV or µstrain/mV	Electronic conversion for component 2
15	**di_tlt_econv3**	float			Yes	*NULL*		µrad/mV or µstrain/mV	Electronic conversion for component 3
16	**di_tlt_econv4**	float			Yes	*NULL*		µrad/mV or µstrain/mV	Electronic conversion for component 4
17	**di_tlt_stime**	datetime			No	0000-00-00 00:00:00			Start time
18	**di_tlt_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
19	**di_tlt_etime**	datetime			No	9999-12-31 23:59:59			End time
20	**di_tlt_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
21	**di_tlt_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
22	**di_tlt_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
23	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
24	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
25	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
26	**di_tlt_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
27	**di_tlt_pubdate**	datetime			Yes	*NULL*			the date the data become public
28	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
29	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F. DEFORMATION DATA

F.1. dd_tlt - Electronic tilt

This table contains tilt data that are either raw or processed. Most modern tilt data are collected electronically and continuously.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**dd_tlt_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Tilt data identifier
2	**dd_tlt_code**	varchar(30)	*latin1_swe*		Yes	*NULL*			Tilt data code

			dish_ci						
3	**ds_id**	mediumint(8)		UN-SIGNED	Yes	*NULL*			Deformation station identifier
4	**di_tlt_id**	smallint(5)		UN-SIGNED	Yes	*NULL*			Tilt/Strain instrument identifier
5	**dd_tlt_time**	datetime			Yes	*NULL*			Measurement time
6	**dd_tlt_timecsec**	decimal(2,2)			Yes	*NULL*			Centisecond precision for measurement time
7	**dd_tlt_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
8	**dd_tlt_timecsec_unc**	decimal(2,2)			Yes	*NULL*			Centisecond precision for measurement time uncertainty
9	**dd_tlt_srate**	double			Yes	*NULL*		sec	Sampling rate
10	**dd_tlt1**	double			Yes	*NULL*		µrad	Tilt measurement 1 or X (positive is down to the north)
11	**dd_tlt2**	double			Yes	*NULL*		µrad	Tilt measurement 2 or Y (postive is down to the east)
12	**dd_tlt_err1**	double			Yes	*NULL*			Tilt 1 error
13	**dd_tlt_err2**	double			Yes	*NULL*			Tilt 2 error
14	**dd_tlt_proc_flg**	enum('P', 'R')	*latin1_swedish_ci*		Yes	*NULL*			Flag: P=Processed, R=Raw
15	**dd_tlt_temp**	Double			Yes	*NULL*			temperature
16	**dd_tlt_bat**	double			Yes	*NULL*			battery
17	**dd_tlt_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
18	**dd_tlt_com**	Varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			comments
19	**cc_id**	smallint(5)		UN-SIGNED	Yes	*NULL*			First owner ID
20	**cc_id2**	smallint(5)		UN-SIGNED	Yes	*NULL*			Second owner ID
21	**cc_id3**	smallint(5)		UN-SIGNED	Yes	*NULL*			Third owner ID
22	**dd_tlt_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
23	**dd_tlt_pubdate**	datetime			Yes	*NULL*			the date the data become public
24	**cc_id_load**	smallint(5)		UN-SIGNED	Yes	*NULL*			contact ID for the person who entered the data
25	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.2. dd_tlv - Tilt vector

This table stores tilt information from sources where we do not have the raw or semi-processed data (i.e. the original data are no longer available) and only have access to tilt vectors.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**dd_tlv_id**	mediumint(8)		UN-SIGNED	No	*None*	AUTO_INCREMENT		Tilt vector data identifier
2	**dd_tlv_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Tilt vector data code
3	**ds_id**	mediumint(8)		UN-SIGNED	Yes	*NULL*			Deformation station identifier
4	**di_tlt_id**	smallint(5)		UN-SIGNED	Yes	*NULL*			Tilt/Strain instrument identifier

5	**dd_tlv_stime**	datetime			Yes	*NULL*			Start time
6	**dd_tlv_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
7	**dd_tlv_etime**	datetime			Yes	*NULL*			End time
8	**dd_tlv_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
9	**dd_tlv_mag**	float			Yes	*NULL*		µrad	Magnitude of the
10	**dd_tlv_azi**	float			Yes	*NULL*		°	Azimuth
11	**dd_tlv_magerr**	float			Yes	*NULL*		µrad	Magnitude error
12	**dd_tlv_azierr**	float			Yes	*NULL*		°	Azimuth error
13	**dd_tlv_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
14	**dd_tlv_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
15	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
16	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
17	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
18	**dd_tlv_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
19	**dd_tlv_pubdate**	datetime			Yes	*NULL*			the date the data become public
20	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
21	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.3. dd_str - Strain

This table stores both raw and processed strainmeter data. The raw strain data are stored by component, as microstrain with a positive value for contraction and negative value for dilatation. The processed data i.e. volumetric strains are stored in this table in microstrain, shear strains is stored.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**dd_str_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Strain data identifier
2	**dd_str_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Strain data code
3	**ds_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Deformation station identifier
4	**di_tlt_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Deformation instrument identifier
5	**dd_str_time**	datetime			Yes	*NULL*			Measurement time in UTC
6	**dd_str_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
7	**dd_str_comp1**	double			Yes	*NULL*		µstrain	Strainmeter component 1 (positive for contraction; negative for dilatation)
8	**dd_str_comp2**	double			Yes	*NULL*		µstrain	Strainmeter component 2 (positive for contraction; negative for dilatation)
9	**dd_str_comp3**	double			Yes	*NULL*		µstrain	Strainmeter component 3 (positive for contraction; negative for dilatation)
10	**dd_str_comp4**	double			Yes	*NULL*		µstrain	Strainmeter component 4 (positive for contraction; negative for dilatation)
11	**dd_str_err1**	double			Yes	*NULL*		µstr	Strainmeter component 1

								ain	error
12	**dd_str_err2**	double			Yes	*NULL*		µstrain	Strainmeter component 2 error
13	**dd_str_err3**	double			Yes	*NULL*		µstrain	Strainmeter component 3 error
14	**dd_str_err4**	double			Yes	*NULL*		µstrain	Strainmeter component 4 error
15	**dd_str_vdstr**	double			Yes	*NULL*		µstrain	Volumetric strain change (positive for contraction; negative for dilatation)
16	**dd_str_vdstr_err**	double			Yes	*NULL*		µstrain	Volumetric strain change error
17	**dd_str_sstr_ax1**	double			Yes	*NULL*		µstrain	Shear strain of axis 1 (gamma-1)
18	**dd_str_azi_ax1**	float			Yes	*NULL*		°	Azimuth of axis 1 (gamma-1) in degrees (0-360°); measured from North with clockwise rotation as positive
19	**dd_str_sstr_ax2**	double			Yes	*NULL*		µstrain	Shear strain of axis 2 (gamma-2)
20	**dd_str_azi_ax2**	float			Yes	*NULL*		°	Azimuth of axis 2 (gamma-2) in degrees (0-360°); measured from North with clockwise rotation as positive
21	**dd_str_sstr_ax3**	double			Yes	*NULL*		µstrain	Shear strain of axis 3 (gamma-3)
22	**dd_str_azi_ax3**	float			Yes	*NULL*		°	Azimuth of axis 3 (gamma-3) in degrees (0-360°); measured from North with clockwise rotation as positive
23	**dd_str_stderr1**	double			Yes	*NULL*		µstrain	Strain for axis 1 uncertainty
24	**dd_str_stderr2**	double			Yes	*NULL*		µstrain	Strain for axis 2 uncertainty
25	**dd_str_stderr3**	double			Yes	*NULL*		µstrain	Strain for axis 3 uncertainty
26	**dd_str_pmax**	double			Yes	*NULL*		µstrain	Maximum principal strain
27	**dd_str_pmaxerr**	double			Yes	*NULL*		µstrain	Maximum principal strain uncertainty
28	**dd_str_pmin**	double			Yes	*NULL*		µstrain	Minimum principal strain
29	**dd_str_pminerr**	double			Yes	*NULL*		µstrain	Minimum principal strain uncertainty
30	**dd_str_pmax_dir**	float			Yes	*NULL*		°	Maximum principal strain direction
31	**dd_str_pmax_direrr**	float			Yes	*NULL*		°	Maximum principal strain direction uncertainty
32	**dd_str_pmin_dir**	float			Yes	*NULL*		°	Minimum principal strain direction
33	**dd_str_pmin_direrr**	float			Yes	*NULL*		°	Minimum principal strain direction uncertainty
34	**dd_str_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
35	**dd_str_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
36	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID

37	cc_id2	smallint(5)		UN-SIGNED	Yes	*NULL*			Second owner ID
38	cc_id3	smallint(5)		UN-SIGNED	Yes	*NULL*			Third owner ID
39	**dd_str_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
40	**dd_str_pubdate**	datetime			Yes	*NULL*			the date the data become public
41	cc_id_load	smallint(5)		UN-SIGNED	Yes	*NULL*			contact ID for the person who entered the data
42	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.4. dd_edm - EDM

This table contains Electronic Distance measurement (EDM) data that were collected between two stations, an instrument station and a target or reflector station. EDM is generally collected as part of a campaign but is also possible collected continuously.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	dd_edm_id	mediumint(8)		UN-SIGNED	No	*None*	AUTO_INCRE-MENT		EDM data identifier
2	**dd_edm_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			EDM data code
3	di_gen_id	mediumint(8)		UN-SIGNED	Yes	*NULL*			General deformation instrument identifier
4	ds_id1	mediumint(8)		UN-SIGNED	Yes	*NULL*			EDM instrument station identifier
5	ds_id2	mediumint(8)		UN-SIGNED	Yes	*NULL*			Target (refector/mirror) station identifier
6	**dd_edm_time**	datetime			Yes	*NULL*			Measurement time
7	**dd_edm_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
8	**dd_edm_line**	double			Yes	*NULL*		m	Measured line length
9	**dd_edm_cerr**	float			Yes	*NULL*		m	Constant error (indicator of instrument and reflector error)
10	**dd_edm_serr**	float			Yes	*NULL*		ppm	Scale error (indicator of error in line length due to temperature and pressure)
11	**dd_edm_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
12	**dd_edm_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
13	cc_id	smallint(5)		UN-SIGNED	Yes	*NULL*			First owner ID
14	cc_id2	smallint(5)		UN-SIGNED	Yes	*NULL*			Second owner ID
15	cc_id3	smallint(5)		UN-SIGNED	Yes	*NULL*			Third owner ID
16	**dd_edm_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
17	**dd_edm_pubdate**	datetime			Yes	*NULL*			the date the data become public
18	cc_id_load	smallint(5)		UN-SIGNED	Yes	*NULL*			contact ID for the person who entered the data
19	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.5. dd_ang - Angle

This table contains a few angles from early geodetic surveys where someone would stand on a high point (on top of a mountain) and measure the horizontal and vertical angles to prominent features in the area.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	dd_ang_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_IN-CREMENT		Deformation angle data
2	dd_ang_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Deformation angle code
3	di_gen_id	mediumint(8)		UNSIGNED	Yes	*NULL*			General deformation instrument identifier
4	ds_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Theodolite/total station instrument identifier
5	ds_id1	mediumint(8)		UNSIGNED	Yes	*NULL*			Target station 1 ID
6	ds_id2	mediumint(8)		UNSIGNED	Yes	*NULL*			Target station 2 ID
7	dd_ang_time	datetime			Yes	*NULL*			Measurement time
8	dd_ang_time_unc	datetime			Yes	*NULL*			Measurement time uncertainty
9	dd_ang_hort1	float			Yes	*NULL*		°	Horizontal angle to target 1, as measured by theodolite/total-station (0-360°)
10	dd_ang_hort2	float			Yes	*NULL*		°	Horizontal angle to target 2, as measured by theodolite/total-station (0-360°)
11	dd_ang_vert1	float			Yes	*NULL*		°	Vertical angle to target 1, as measured by theodolite/total-station (0-360°)
12	dd_ang_vert2	float			Yes	*NULL*		°	Vertical angle to target 2, as measured by theodolite/total-station (0-360°)
13	dd_ang_herr1	float			Yes	*NULL*		°	Error on horizontal angle to target-1
14	dd_ang_herr2	float			Yes	*NULL*		°	Error on horizontal angle to target-2
15	dd_ang_verr1	float			Yes	*NULL*		°	Error on vertical angle to target-1
16	dd_ang_verr2	float			Yes	*NULL*		°	Error on vertical angle to target-2
17	dd_ang_ori	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
18	dd_ang_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
19	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
20	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
21	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
22	dd_ang_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
23	dd_ang_pubdate	datetime			Yes	*NULL*			the date the data become public
24	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
25	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.6. dd_gps - GPS

This table contains continuous and periodic data of GPS positions, collected at a single station and referenced to other station(s).

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	dd_gps_id	mediumint(8)		UN-SIGNED	No	*None*	AUTO AUTOINCRE		GPS data identifier
2	**dd_gps_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			GPS data code
3	di_gen_id	mediumint(8)		UN-SIGNED	Yes	*NULL*			General deformation instrument ID
4	ds_id	mediumint(8)		UN-SIGNED	Yes	*NULL*			GPS station identifier
5	ds_id_ref1	mediumint(8)		UN-SIGNED	Yes	*NULL*			GPS reference station-1 identifier
6	ds_id_ref2	mediumint(8)		UN-SIGNED	Yes	*NULL*			GPS reference station-2 identifier
7	**dd_gps_time**	datetime			Yes	*NULL*			Measurement time
8	**dd_gps_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
9	**dd_gps_lat**	double			Yes	*NULL*		°	GPS latitude measurement (+/- xx.xxxxxxxxx)
10	**dd_gps_lon**	double			Yes	*NULL*		°	GPS longitude measurement (+/- xx.xxxxxxxxx)
11	**dd_gps_elev**	double			Yes	*NULL*		m	Elevation above sea level
12	**dd_gps_nserr**	double			Yes	*NULL*		°	N-S error
13	**dd_gps_ewerr**	double			Yes	*NULL*		°	E-W error
14	**dd_gps_verr**	float			Yes	*NULL*		m	Vertical error
15	**dd_gps_software**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			The software used to determine the position (e.g. GIPSY, BERNESE, GAMIT, etc.)
16	**dd_gps_orbits**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Orbits used to determine the positions
17	**dd_gps_dur**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*		min	Duration of the solution (frequency of measurement and duration of time used to calculate each position)
18	**dd_gps_qual**	enum('E', 'G', 'P', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Quality: E=Excellent, G=Good, P=Poor, U=Unknown
19	**dd_gps_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
20	**dd_gps_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
21	cc_id	smallint(5)		UN-SIGNED	Yes	*NULL*			First owner ID
22	cc_id2	smallint(5)		UN-SIGNED	Yes	*NULL*			Second owner ID
23	cc_id3	smallint(5)		UN-SIGNED	Yes	*NULL*			Third owner ID
24	**dd_gps_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
25	**dd_gps_pubdate**	datetime			Yes	*NULL*			the date the data become public
26	cc_id_load	smallint(5)		UN-	Yes	*NULL*			contact ID for the person

				SIGNED					who entered the data
27	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.7. dd_gpv - GPS vector

This table contains displacement vectors that were computed from GPS data, processed from the actual position data. The displacement vector can be described in terms of North-, East-, and Vertical displacement (mm). But it can be also described by displacement magnitude (mm), azimuth (0-360°), and vector inclination (0-90°).

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	dd_gpv_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		GPS vector data identifier
2	**dd_gpv_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			GPS vector data code
3	di_gen_id	mediumint(8)		UNSIGNED	Yes	*NULL*			General deformation instrument ID
4	ds_id	mediumint(8)		UNSIGNED	Yes	*NULL*			GPS station identifier
5	**dd_gpv_stime**	datetime			Yes	*NULL*			Start time
6	**dd_gpv_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
7	**dd_gpv_etime**	datetime			Yes	*NULL*			End time
8	**dd_gpv_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
9	**dd_gpv_dmag**	float			Yes	*NULL*		mm	Displacement magnitude
10	**dd_gpv_daz**	float			Yes	*NULL*		°	Displacement azimuth (0-360°)
11	**dd_gpv_vincl**	float			Yes	*NULL*		°	Inclination of displacement vector (0-90°)
12	**dd_gpv_N**	float			Yes	*NULL*		mm	North displacement
13	**dd_gpv_E**	float			Yes	*NULL*		mm	East displacement
14	**dd_gpv_vert**	float			Yes	*NULL*		mm	Vertical displacement
15	**dd_gpv_dherr**	float			Yes	*NULL*		mm	horizontal uncertainty
16	**dd_gpv_dnerr**	float			Yes	*NULL*		mm	North displacement uncertainty
17	**dd_gpv_deerr**	float			Yes	*NULL*		mm	East displacement uncertainty
18	**dd_gpv_dverr**	float			Yes	*NULL*		mm	Vertical uncertainty
19	**dd_gpv_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
20	**dd_gpv_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
21	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
22	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
23	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
24	**dd_gpv_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
25	**dd_gpv_pubdate**	datetime			Yes	*NULL*			the date the data become public
26	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
27	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.8. dd_lev - Leveling

This table contains data of elevation changes between successive benchmarks on a leveling line.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	dd_lev_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Leveling data identifier
2	**dd_lev_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Leveling data code
3	di_gen_id	mediumint(8)		UNSIGNED	Yes	*NULL*			General deformation instrument ID
4	ds_id_ref	mediumint(8)		UNSIGNED	Yes	*NULL*			Reference benchmark ID
5	ds_id1	mediumint(8)		UNSIGNED	Yes	*NULL*			First benchmark (n) ID
6	ds_id2	mediumint(8)		UNSIGNED	Yes	*NULL*			Second benchmark (n+1) ID
7	**dd_lev_ord**	mediumint(9)			Yes	*NULL*			the order of the survey
8	**dd_lev_class**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			the class of the survey
9	**dd_lev_time**	datetime			Yes	*NULL*			Survey date
10	**dd_lev_time_unc**	datetime			Yes	*NULL*			Survey date uncertainty
11	**dd_lev_delev**	float			Yes	*NULL*		mm	Elevation change from the first benchmark to the second benchmark
12	**dd_lev_herr**	float			Yes	*NULL*		mm	Elevation change uncertainty
13	**dd_lev_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
14	**dd_lev_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
15	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
16	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
17	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
18	**dd_lev_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
19	**dd_lev_pubdate**	datetime			Yes	*NULL*			the date the data become public
20	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
21	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.9. dd_sar - InSAR image

This table contains information about radar interferograms that show deformation of volcanoes. Only select, processed interferograms are included in WOVOdat. A separate InSAR-Satellite (j_sarsat) relationship table is available for cases where different satellite were used. The data used to create the interferogram are stored in the InSAR data table (dd_srd).

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	dd_sar_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		InSAR image identifier
2	**dd_sar_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			InSAR image code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier

4	di_gen_id	mediumint(8)		UNSIGNED	Yes	*NULL*			General deformation instrument ID
5	cs_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Satellite ID
6	**dd_sar_slat**	double			Yes	*NULL*		°	The latitude in the starting corner
7	**dd_sar_slon**	double			Yes	*NULL*		°	The longitude in the starting corner
8	**dd_sar_spos**	enum('BLC', 'TLC')	*latin1_swedish_ci*		Yes	*NULL*			Starting position: BLC=Bottom Left Corner, TLC=Top Left Corner
9	**dd_sar_rord**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			the order of the row (e.g. left to right)
10	**dd_sar_nrows**	smallint(5)		UNSIGNED	Yes	*NULL*			The number of rows in the image
11	**dd_sar_ncols**	smallint(5)		UNSIGNED	Yes	*NULL*			The number of columns in the image
12	**dd_sar_units**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			The units used in the image (e.g. mm)
13	**dd_sar_ndata**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Null data value
14	**dd_sar_loc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Location name of the image (e.g. Yellow-stone)
15	**dd_sar_pair**	enum('P', 'S', 'U')	*latin1_swedish_ci*		Yes	*NULL*			A flag indicating if th eimage is composed of: P=Pair, S=Stacked, U=Un-known
16	**dd_sar_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
17	**dd_sar_dem**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			The DEM used
18	**dd_sar_dord**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			The order in which the bytes are stored (e.g. big endian or little en-dian)
19	**dd_sar_img1_time**	datetime			Yes	*NULL*			Date-time of the im-age 1 was taken
20	**dd_sar_img1_time_unc**	datetime			Yes	*NULL*			Date of image 1 un-certainty
21	**dd_sar_img2_time**	datetime			Yes	*NULL*			Date-time of the im-age 2 was taken
22	**dd_sar_img2_time_unc**	datetime			Yes	*NULL*			Date of image 2 un-certainty
23	**dd_sar_pixsiz**	float			Yes	*NULL*		m	Pixel size
24	**dd_sar_spacing**	float			Yes	*NULL*		°	Spacing of rows and columns (in decimal degrees)
25	**dd_sar_lookang**	float			Yes	*NULL*		°	the look angle
26	**dd_sar_limb**	enum('ASC', 'DES')	*latin1_swedish_ci*		Yes	*NULL*			Limb: ASC=Ascend-ing, DES=Descending
27	**dd_sar_img_path**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link where the in-terferogram image is stored
28	**dd_sar_geotiff**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link where the GeoTIFF of interfero-gram is stored
29	**dd_sar_prometh**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Processing method
30	**dd_sar_softwr**	varchar(255)	*latin1_swedish_c*		Yes	*NULL*			Software used

			i						
31	**dd_sar_dem_qual**	enum('E', 'G', 'F', 'U')	*latin1_swedish_ci*		Yes	*NULL*			DEM quality: E=Excellent (1m), G=Good (10m), F=Fair (100m), U=Unknown
32	**dd_sar_ori**	enum('D', 'O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
33	**dd_sar_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
34	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
35	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
36	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
37	**dd_sar_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
38	**dd_sar_pubdate**	datetime			Yes	*NULL*			the date the data become public
39	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
40	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

F.9.a. j_sarsat - InSAR-satellite junction

This table was created for the many-to-many relationship between the satellite data and the InSAR data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**j_sarsat_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		InSAR satellite junction ID
2	**dd_sar_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			InSAR image ID
3	**cs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Satellite identifier
4	**j_sarsat_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
5	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

F.9.b. dd_srd - InSAR Data pixel

This table contains the data collected by two satellites to create an InSAR image.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**dd_srd_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		InSAR data ID
2	**dd_sar_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			InSAR image ID
3	**dd_srd_numb**	int(10)		UNSIGNED	Yes	*NULL*			pixel number
4	**dd_srd_dchange**	float			Yes	*NULL*		mm	Range of change
5	**dd_srd_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
6	**dd_srd_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
7	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

G. FIELDS MONITORING SYSTEM

G.1. cn - Common network (for Fields network)

This table contains information about the (non-seismic) network of stations that collect data at a particular site, in general at one volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cn_id	smallint(5)		UNSIGNED	No	*None*	AUTO_IN-CREMENT		Common network identifier
2	cn_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Common network code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	cn_name	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Common network name
5	cn_type	enum('Deformation','Fields','Gas','Hydrologic','Thermal','Meteo','Unknown')			No	Unknown			Common network type
6	cn_area	float			Yes	*NULL*		km^2	Network area coverage
7	cn_map	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link to the Map of the network (from observatory)
8	cn_stime	datetime			No	0000-00-00 00:00:00			Start time
9	cn_stime_unc	datetime			Yes	*NULL*			Start time uncertainty
10	cn_etime	datetime			No	9999-12-31 23:59:59			End time
11	cn_etime_unc	datetime			Yes	*NULL*			End time uncertainty
12	cn_utc	float			Yes	*NULL*			Difference from UTC
13	cn_desc	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
14	cn_ori	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			Source of data (**D**=digitized from references **O**=original from observatory)
15	cn_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	cn_loaddate	datetime			No	*None*			the date the data was entered (in UTC)
20	cn_pubdate	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

G.2. fs - Fields station

This table stores information and description of the stations where fields data are collected.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	fs_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_IN-		Fields satation identifier

							CREMENT		
2	**fs_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Fields station code
3	**cn_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Fields network ID
4	**fs_name**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Fields station name
5	**fs_lat**	double			Yes	*NULL*		°	Latitude
6	**fs_lon**	double			Yes	*NULL*		°	Longitude
7	**fs_elev**	float			Yes	*NULL*		m	Elevation
8	**fs_inst**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			List of instruments
9	**fs_utc**	float			Yes	*NULL*			Difference from UTC
10	**fs_stime**	datetime			No	0000-00-00 00:00:00			Start date
11	**fs_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
12	**fs_etime**	datetime			No	1999-12-31 23:59:00			End date
13	**fs_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
14	**fs_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
15	**fs_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			Source of data (**D**=digitized from references **O**=original from observatory)
16	**fs_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
17	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
18	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
19	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
20	**fs_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
21	**fs_pubdate**	datetime			Yes	*NULL*			the date the data become public
22	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
23	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

G.3. fi - Fields instrument

This table stores information about the instruments used to collect magnetic, electric, and gravity data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**fi_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_IN-CREMENT		Fields instrument identifier
2	**fi_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Fields instrument code
3	**fs_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields station identifier
4	**fi_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The name, model, and manufacturer of the field instrument (recorder)
5	**fi_type**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The type of instrument(s)
6	**fi_res**	float			Yes	*NULL*			The resolution of each individual instrument in the instrument package
7	**fi_units**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The units each instrument measures
8	**fi_rate**	float			Yes	*NULL*			The sampling rate for the instrument(s)
9	**fi_filter**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The filter type, if applicable
10	**fi_orient**	varchar(255)	*latin1_swedish_c*		Yes	*NULL*			The orientation of the instru-

			i						ment, if applicable
11	**fi_calc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Any processing used to convert, clean or correct te raw data. Please note the correctios made.
12	**fi_stime**	datetime			No	0000-00-00 00:00:00			Start time
13	**fi_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
14	**fi_etime**	datetime			No	1999-12-31 23:59:00			End time
15	**fi_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
16	**fi_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			Source of data (**D**=digitized from references **O**=original from observatory)
17	**fi_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
18	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
19	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
20	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
21	**fi_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
22	**fi_pubdate**	datetime			Yes	*NULL*			the date the data become public
23	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
24	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

H. FIELDS DATA

H.1. fd_ele - Electric fields

This table contains electric data in digital form. There are two reference stations used for self potential (SP) observation, and single field instrument for all campaign data. If the bandpass filter used, enter the high value in the fd_ele_lpass and the low value in the fd_ele_hpass.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**fd_ele_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Electric data identifier
2	**fd_ele_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Electric data code
3	**fs_id1**	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields station identifier (reference station in which the electrode is subtracted, station A in the equation A-B)
4	**fs_id2**	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields station identifier (reference station in which the electrode being subtracted, station B in the equation A-B)
5	**fi_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields instrument identifier (for non-permanent/campaign)
6	**fd_ele_time**	datetime			Yes	*NULL*			Measurement time
7	**fd_ele_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
8	**fd_ele_field**	float			Yes	*NULL*		mV	The electric field measurement
9	**fd_ele_ferr**	float			Yes	*NULL*		mV	electric field measurement uncertainty
10	**fd_ele_dir**	float			Yes	*NULL*		°	The direction from station-1

									to station-2 (0-360° from North)
11	**fd_ele_hpass**	float			Yes	*NULL*		Hz	High pass filter frequency
12	**fd_ele_lpass**	float			Yes	*NULL*		Hz	Low pass filter frequency
13	**fd_ele_spot**	float			Yes	*NULL*		mV	Self potential between station A and B (1-2 or A-B)
14	**fd_ele_spot_err**	float			Yes	*NULL*		mV	Self potential uncertainty
15	**fd_ele_ares**	float			Yes	*NULL*		Ω m	Apparent resistivity
16	**fd_ele_ares_err**	float			Yes	*NULL*		Ω m	Apparent resistivity uncertainty
17	**fd_ele_dres**	float			Yes	*NULL*		Ω m	Direct resistivity
18	**fd_ele_dres_err**	float			Yes	*NULL*		Ω m	Direct resistivity uncertainty
19	**fd_ele_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			Source of data (**D**=digitized from references **O**=original from observatory)
20	**fd_ele_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			First owner ID
21	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
22	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
23	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			the date the data was entered (in UTC)
24	**fd_ele_loaddate**	datetime			Yes	*NULL*			the date the data become public
25	**fd_ele_pubdate**	datetime			Yes	*NULL*			contact ID for the person who entered the data
26	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			Link to the bibliography table
27	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to bibliography table

H.2. fd_gra - Gravity

This table contains gravity data such as field strength and associated vertical displacement.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**fd_gra_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Gravity data identfier
2	**fd_gra_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			gravity data code
3	**fs_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields station identifier
4	**fs_id_ref**	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields reference station ID for gravity measurement
5	**fi_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Gravity fields instrument ID
6	**fd_gra_time**	datetime			Yes	*NULL*			Measurement time
7	**fd_gra_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
8	**fd_gra_fstr**	double			Yes	*NULL*		Gal	Field strength
9	**fd_gra_ferr**	double			Yes	*NULL*		Gal	Strength uncertainty
10	**fd_gra_vdisp**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Associated vertical displacement: Y=Yes, N=No, U=Unknown
11	**fd_gra_gwater**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Associated change in groundwater level: Y=Yes, N=No, U=Unknown
12	**fd_gra_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			Source of data (**D**=digitized from references **O**=original from observatory)
13	**fd_gra_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments

14	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
15	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
16	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
17	**fd_gra_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
18	**fd_gra_pubdate**	datetime			Yes	*NULL*			the date the data become public
19	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
20	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

H.3. fd_mag - Magnetic fields

This table contains magnetic data that were collected digitally.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	fd_mag_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Magnetic field trength ID
2	**fd_mag_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Magnetic field data code
3	fs_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields station identifier
4	fs_id_ref	mediumint(8)		UNSIGNED	Yes	*NULL*			Magnetic reference station ID
5	fi_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Magnetic fields instrument ID
6	**fd_mag_time**	datetime			Yes	*NULL*			Measurement time
7	**fd_mag_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
8	**fd_mag_f**	double			Yes	*NULL*		nT	The total magnetic field strength (F)
9	**fd_mag_compx**	double			Yes	*NULL*		nT	The X-component of magnetic field strength
10	**fd_mag_compy**	double			Yes	*NULL*		nT	The Y-component of magnetic field strength
11	**fd_mag_compz**	double			Yes	*NULL*		nT	The Z-component of magnetic field strength
12	**fd_mag_ferr**	float			Yes	*NULL*		nT	Total field strength uncertainty
13	**fd_mag_errx**	float			Yes	*NULL*		nT	uncertainty in the X-component
14	**fd_mag_erry**	float			Yes	*NULL*		nT	uncertainty in the Y-component
15	**fd_mag_errz**	float			Yes	*NULL*		nT	uncertainty in the Z-component
16	**fd_mag_highpass**	float			Yes	*NULL*		Hz	High pass filter frequency
17	**fd_mag_lowpass**	float			Yes	*NULL*		Hz	Low pass filter frequency
18	**fd_mag_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			Source of data (**D**=digitized from references **O**=original from observatory)
19	**fd_mag_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
20	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID

21	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
22	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
23	**fd_mag_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
24	**fd_mag_pubdate**	datetime			Yes	*NULL*			the date the data become public
25	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
26	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

H.4. fd_mgv - Magnetic vector

This table contains magnetic vector data for which the data for the individual components is unavailable.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	fd_mgv_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Magnetic vector identifier
2	**fd_mgv_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Magnetic vector code
3	fs_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Fields station identifier
4	fi_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Magnetic field instrument identifier
5	**fd_mgv_time**	datetime			Yes	*NULL*			Measurement time
6	**fd_mgv_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
7	**fd_mgv_dec**	float			Yes	*NULL*		°	Measured declination (0-360°)
8	**fd_mgv_incl**	float			Yes	*NULL*		°	Measured inclination (0-360°)
9	**fd_mgv_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			Source of data (**D**=digitized from references **O**=original from observatory)
10	**fd_mgv_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
11	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
12	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
13	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
14	**fd_mgv_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
15	**fd_mgv_pubdate**	datetime			Yes	*NULL*			the date the data become public
16	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
17	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

I. GAS MONITORING SYSTEM

I.1. cn - Common network (gas network)

This table contains information about the (non-seismic) network of stations that collect data at a particular site, in general at one volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cn_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Common network identifier
2	cn_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Common network code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	cn_name	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Common network name
5	cn_type	enum('Deformation','Fields','Gas','Hydrologic','Thermal','Meteo','Unknown')			No	Unknown			Common network type
6	cn_area	float			Yes	*NULL*		km^2	Network area coverage
7	cn_map	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link to the Map of the network (from observatory)
8	cn_stime	datetime			No	0000-00-00 00:00:00			Start time
9	cn_stime_unc	datetime			Yes	*NULL*			Start time uncertainty
10	cn_etime	datetime			No	9999-12-31 23:59:59			End time
11	cn_etime_unc	datetime			Yes	*NULL*			End time uncertainty
12	cn_utc	float			Yes	*NULL*			Difference from UTC
13	cn_desc	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
14	cn_ori	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
15	cn_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	cn_loaddate	datetime			No	*None*			the date the data was entered (in UTC)
20	cn_pubdate	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

I.2. gs - Gas station

This table stores information such as a location, type of gas body monitored, and a description of the stations where gas data are collected.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	gs_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Gas station identifier

2	**gs_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Gas station code
3	**gs_name**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Gas station name
4	**cn_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas network index
5	**gs_lat**	double			Yes	*NULL*		°	Latitude
6	**gs_lon**	double			Yes	*NULL*		°	Longitude
7	**gs_elev**	float			Yes	*NULL*		m	Elevation
8	**gs_inst**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			List of permanent instruments installed in this site
9	**gs_type**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Type of gas body found at the station (fumarole, diffuse soil degassing, remote plume)
10	**gs_utc**	float			Yes	*NULL*			Difference from UTC
11	**gs_stime**	datetime			No	0000-00-00 00:00:00			
12	**gs_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
13	**gs_etime**	datetime			No	9999-12-31 23:59:59			
14	**gs_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
15	**gs_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
16	**gs_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
16	**gs_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
17	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
18	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
19	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
20	**gs_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
21	**gs_pubdate**	datetime			Yes	*NULL*			the date the data become public
22	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
23	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

I.3. gi - Gas instrument

This table stores information about the instruments used to collect ground-based and remote gas data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	gi_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		gas instrument identifier
2	**gi_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Gas instrument code
3	**cs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Satellite ID, if the instrument is mounted on a satellite or airplane.
4	**gs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas station identifier
5	**gi_type**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Type of instrument
6	**gi_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The name, model, and manufacturer of the gas instrument (recorder)
7	**gi_units**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Measured units

8	**gi_pres**	float			Yes	*NULL*			Resolution
9	**gi_stn**	float			Yes	*NULL*			Signal to noise
10	**gi_calib**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Calibration
11	**gi_stime**	datetime			No	0000-00-00 00:00:00			Start date
12	**gi_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
13	**gi_etime**	datetime			No	9999-12-31 23:59:59			End date
14	**gi_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
15	**gi_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
16	**gi_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
17	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
18	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
19	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
20	**gi_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
21	**gi_pubdate**	datetime			Yes	*NULL*			the date the data become public
22	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
23	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

J. GAS DATA

J.1. gd - Directly sampled gas

This table stores gas concentration data collected from a point source at ground sites. The type of point source is defined in the station table. Data include the gas temperature, concentrations, and environmental factors. Directly sampled gas can be collected either continuously or periodically. The species of gas reported can be from one of these possibilities:

- CO_2, SO_2, H_2S, HCl, HF, CH_4, H_2, CO, O_2 (in %w or %vol)
- $^3He/^4He$, $\delta^{13}C$, $\delta^{34}S$, $\delta^{18}O$, δD (in “per mil”)

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**gd_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Directly sampled gas ID
2	**gd_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Directly sampled gas code
3	**gs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas station identifier
4	**gi_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas instrument identifier
5	**gd_time**	datetime			Yes	*NULL*			Sampling/Measurement time
6	**gd_time_unc**	datetime			Yes	*NULL*			Sampling/Measurement time uncertainty
7	**gd_gtemp**	float			Yes	*NULL*		°C	Gas temperature
8	**gd_bp**	float			Yes	*NULL*		mbar	Atmospheric pressure at the time of the measurement
9	**gd_flow**	float			Yes	*NULL*			Measured gas emision rate
10	**gd_species**	enum('CO2', 'SO2', enum('CO2','SO2','H2S','HCl','HF','CH4','H2','CO','3He4He','d13C','d34S','d18O','dD','O2')			Yes	*NULL*		%w or %vol or per mil	Species or ratio of gas reported (CO_2, SO_2, H_2S, HCl, HF, CH_4, H_2, CO, O_2, $^3He/^4He$, $d^{13}C$, $d^{34}S$, $d^{18}O$, dD)
11	**gd_waterfree_flag**	enum('Y', 'N')	*latin1_swedish_*		Yes	*NULL*			Water free gas: Y=Yes, N=No

			ci						
12	**gd_units**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Reported units
13	**gd_concen-tration**	float			Yes	*NULL*			Gas concentration
14	**gd_concen-tration_err**	float			Yes	*NULL*			Gas concentration uncertainty
15	**gd_recalc**	enum('O', 'R')	*latin1_swedish_ci*		Yes	*NULL*			Recalculated value: O=Original, R=Recalculated
16	**gd_envir**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Environmental factors
17	**gd_submin**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Information on sublimate minerals
18	**gd_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
19	**gd_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
20	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
21	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
22	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
23	**gd_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
24	**gd_pubdate**	datetime			Yes	*NULL*			the date the data become public
25	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
26	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

J.2. gd_plu - Plume

This table stores gas data collected (continuously or periodically) from a plume including the location of the vent, the height of the plume, and the gas emission rates.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**gd_plu_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCRE-MENT		Gas plume data identifier
2	**gd_plu_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Gas plume data code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
4	**cs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Satellite ID
5	**gs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas station ID
6	**gi_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas instrument ID
7	**gd_plu_lat**	double			Yes	*NULL*		°	Latitude of the vent in decimal degrees
8	**gd_plu_lon**	double			Yes	*NULL*		°	Longitude of the vent in decimal degrees
9	**gd_plu_height**	float			Yes	*NULL*		km	Height of the plume in km above the vent
10	**gd_plu_hdet**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			the method used to measure the height
11	**gd_plu_time**	datetime			Yes	*NULL*			Measurement time in UTC
12	**gd_plu_time_**	datetime			Yes	*NULL*			Measurement time uncertainty

	unc								
13	**gd_plu_species**	enum('CO2', 'SO2', 'H2S', 'HCl', 'HF', 'CO')	*latin1_swedish_ci*		Yes	*NULL*			Species of gas reported (CO_2, SO_2, H_2S, HCl, HF, and CO)
14	**gd_plu_units**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*		t/d or kg/s	Reported units
15	**gd_plu_emit**	float			Yes	*NULL*			Gas emision rate
16	**gd_plu_emit_err**	float			Yes	*NULL*			Emission rate uncertainty
17	**gd_plu_recalc**	enum('O', 'R')	*latin1_swedish_ci*		Yes	*NULL*			Recalculated value flag: O=Original(value directly from measurement), R=Recalculated(value recalculated from other parameter)
18	**gd_plu_wind**	float			Yes	*NULL*		m/s	Wind speed
19	**gd_plu_ws-min**	Float			Yes	*NULL*		m/s	Minimum wind speed
20	**gd_plu_ws-max**	Float			Yes	*NULL*		m/s	Maximum wind speed
21	**gd_plu_wdir**	Varchar(30)	*latin1_swedish_ci*		Yes	*NULL*		°	Dominant wind direction
22	**gd_plu_weth**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Weather notes
23	**gd_plu_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
24	**gd_plu_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
25	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
26	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
27	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
28	**gd_plu_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
29	**gd_plu_pubdate**	datetime			Yes	*NULL*			the date the data become public
30	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
31	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

J.3. gd_sol - Soil efflux

This table stores a daily total flux value for an individual gas species.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**gd_sol_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Soil Efflux data ID
2	**gd_sol_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Soil Efflux code
3	**gs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas station ID
4	**gi_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Gas instrument ID
5	**gd_sol_time**	datetime			Yes	*NULL*			Measurement time
6	**gd_sol_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
7	**gd_sol_species**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Mesured species (CO_2, Radon, etc.)
8	**gd_sol_tflux**	float			Yes	*NULL*		t/d	Total flux
9	**gd_sol_flux_err**	float			Yes	*NULL*		t/d	Total flux uncertainty

10	**gd_sol_pts**	smallint(5)		UNSIGNED	Yes	*NULL*			Number of points
11	**gd_sol_area**	float			Yes	*NULL*		m^2	The area measured
12	**gd_sol_high**	float			Yes	*NULL*		$g/m^2/d$	Highest individual flux
13	**gd_sol_htemp**	float			Yes	*NULL*		°C	Highest temperature
14	**gd_sol_units**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Reported units
15	**gd_sol_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
16	**gd_sol_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
17	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
18	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*		m/s	Second owner ID
19	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
20	**gd_sol_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
21	**gd_sol_pubdate**	datetime			Yes	*NULL*			the date the data become public
22	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
23	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

K. HYDROLOGIC MONITORING SYSTEM

The hydrology section of WOVOdat contains water monitoring data that are collected from water wells, springs, or crater lakes, all broadly indicative of groundwater conditions and possible role of groundwater in volcanic unrest.

K.1. cn - Common network (Hydrologic network)

This table contains information about the (non-seismic) network of stations that collect data at a particular site, in general at one volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**cn_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Common network identifier
2	**cn_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Common network code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	**cn_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Common network name
5	**cn_type**	enum('Deformation','Fields','Gas','Hydrologic','Thermal','Meteo','Unknown')			No	Unknown			Common network type
6	**cn_area**	float			Yes	*NULL*		km^2	Network area coverage
7	**cn_map**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link to the Map of the network (from observatory)
8	**cn_stime**	datetime			No	0000-00-00 00:00:00			Start time
9	**cn_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
10	**cn_etime**	datetime			No	9999-12-31 23:59:59			End time
11	**cn_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
12	**cn_utc**	float			Yes	*NULL*			Difference from UTC
13	**cn_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
14	**cn_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
15	**cn_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID

17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	**cn_loaddate**	datetime			No	*None*			the date the data was entered (in UTC)
20	**cn_pubdate**	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

K.2. hs - Hydrologic station

This table stores information such as location, type of water body, and descriptions for stations where hydrologic data are collected. There are often multiple instruments at a station and some observatories may use an instrument at multiple stations; therefore the instrument will be linked directly to the hydrologic data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	hs_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Hydrologic station ID
2	**hs_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Hydrologic station code
3	cn_id	smallint(5)		UNSIGNED	Yes	*NULL*			Hydrologic network ID
4	**hs_lat**	double			Yes	*NULL*		°	Latitude
5	**hs_lon**	double			Yes	*NULL*		°	Longitude
6	**hs_elev**	float			Yes	*NULL*		m	Elevation
7	**hs_perm**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			List of permanent instruments
8	**hs_name**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Hydrologic station name
9	**hs_type**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Type of water body (well, lake, spring, etc.)
10	**hs_utc**	float			Yes	*NULL*			Difference from UTC
11	**hs_tscr**	float			Yes	*NULL*		m	Top of screen (top of the interval open to inflow in meter below the surface)
12	**hs_bscr**	float			Yes	*NULL*		m	Bottom of screen (top of the interval open to inflow in meter below the surface)
13	**hs_tdepth**	double			Yes	*NULL*		m	Total depth of well
14	**hs_stime**	datetime			No	0000-00-00 00:00:00			Start date
15	**hs_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
16	**hs_etime**	datetime			No	9999-12-31 23:59:59			End date
17	**hs_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
18	**hs_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
19	**hs_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
20	**hs_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
21	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
22	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
23	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
24	**hs_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
25	**hs_pubdate**	datetime			Yes	*NULL*			the date the data become public

26	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
27	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

K.3. hi - Hydrologic instrument

This table stores information about each individual hydrologic instrument.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	hi_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Hydrologic instrument identifier
2	**hi_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Hydrologic instrument code
3	hs_id	smallint(5)		UNSIGNED	Yes	*NULL*			Hydrologic station identifier
4	**hi_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The name, model, and manufacturer of the hydrologic instrument (recorder)
5	**hi_type**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Type of the instrument (float, pressure transducer, bubbler, rain gauge, barometer, flow meter, pH or conductivity meter)
6	**hi_meas**	enum('A', 'V')	*latin1_swedish_ci*		Yes	*NULL*			Pressure measurement type: A=Absolute, V=Vented(gauge)
7	**hi_units**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Measured units
8	**hi_res**	float			Yes	*NULL*			Measurement resolution/precission
9	**hi_stime**	datetime			No	0000-00-00 00:00:00			Start date
10	**hi_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
11	**hi_etime**	datetime			No	9999-12-31 23:59:59			End date
12	**hi_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
13	**hi_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
14	**hi_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
15	**hi_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	**hi_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
20	**hi_pubdate**	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

L. HYDROLOGIC DATA

L.1. hd - Hydrologic data

This table stores all of the water data including temperature, water depth, and concentrations. The data are collected either continuously or periodically as part of a campaign. The most common campaign data are water levels, temperature, pH, and conductance, but but chemical concentrations can also be included.
Type of compound, kation, anion or ratio could have one of the following possibilities: SO_4, H_2S for total sulfide, Cl^-, F^-, HCO_3^-, Mg, Fe, Ca, Na, K, R_2O_3, SiO_2, Free CO_2, B, As, Li, Ba, Al (in mg/L), $^3He/^4He$, $^3He/^4He$ corrected, for corrected ratio from air contamination, $\delta^{13}C$, $\delta^{34}S$, δD, $\delta^{18}O$ (in per mil).

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	hd_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Hydrologic data ID
2	**hd_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Hydrologic data code
3	hs_id	smallint(5)		UNSIGNED	Yes	*NULL*			Hydrologic station ID
4	hi_id	smallint(5)		UNSIGNED	Yes	*NULL*			Hydrologic instrument ID
5	**hd_time**	datetime			Yes	*NULL*			Measurement time
6	**hd_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
7	**hd_temp**	float			Yes	*NULL*		°C	Water temperature
8	**hd_welev**	double			Yes	*NULL*		m	The elevation of the water level above sea level
9	**hd_wdepth**	double			Yes	*NULL*		m	Water depth below the ground surface
10	**hd_dwlev**	double			Yes	*NULL*		m	Change in water level (if the water depth and water elevation are not available)
11	**hd_bp**	float			Yes	*NULL*		mbar	Barometric pressure at the time of measurement
12	**hd_sdisc**	double			Yes	*NULL*		L/s	Spring discharge rate
13	**hd_prec**	float			Yes	*NULL*		mm	measured precipitation (daily)
14	**hd_dprec**	float			Yes	*NULL*		mm	Daily precipitation of preceeding day
15	**hd_tprec**	enum('R', 'FR', 'S', 'H', 'R-FR', 'R-S', 'R-H', 'FR-R', 'FR-S', 'FR-H', 'S-R', 'S-FR', 'S-H', 'H-R', 'H-FR', 'H-S')			Yes	*NULL*			Type of precipitation: R=Rain, FR=Freezing Rain, S=Snow, H=Hail, or any combination
16	**hd_ph**	float			Yes	*NULL*			pH of the water
17	**hd_ph_err**	float			Yes	*NULL*			pH standard error
18	**hd_cond**	float			Yes	*NULL*		µmhos/cm or µSiemens/cm	Conductivity
19	**hd_cond_err**	float			Yes	*NULL*		µmhos/cm or µSiemens/cm	Conductivity standard error
20	**hd_comp_species**	enum('SO4', 'H2S', 'Cl', 'F', 'HCO3', 'Mg', 'Fe', 'Ca', 'Na', 'K', '3He4He', 'c3He4He', 'd13C', 'd34S', 'dD', 'd18O')			Yes	*NULL*			Type of compound, kation, anion or ratio (SO_4, H_2S for total sulfide, Cl^-, F^-, HCO_3^-, Mg, Fe, Ca, Na, K, $^3He/^4He$, $^3He/^4He$ corrected, $d^{13}C$, $d^{34}S$, dD, $d^{18}O$)
21	**hd_comp_units**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*		mg/L or per mil	Reported units (concentrations of common ions in mg/L or per mil)

22	**hd_comp_content**	float			Yes	*NULL*			Content of compound, kation, anion or ratio
23	**hd_comp_content_err**	float			Yes	*NULL*			Content of compound, kation, anion or ratio error
24	**hd_atemp**	Float			Yes	*NULL*		°C	Air temperture
25	**hd_tds**	Float			Yes	*NULL*		mg/L	Total dissolved solids (TDS)
26	**hd_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
27	**hd_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
28	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
29	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
30	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
31	**hd_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
32	**hd_pubdate**	datetime			Yes	*NULL*			the date the data become public
33	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
34	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

M. THERMAL MONITORING SYSTEM

Thermal tables contain ground-based data collected at the thermal site or image data collected remotely. These data can be collected continuously or periodically.

M.1. cn - Common network (Thermal network)

This table contains information about the (non-seismic) network of stations that collect data at a particular site, in general at one volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**cn_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Common network identifier
2	**cn_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Common network code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	**cn_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Common network name
5	**cn_type**	enum('Deformation','Fields','Gas','Hydrologic','Thermal','Meteo','Unknown')			No	Unknown			Common network type
6	**cn_area**	float			Yes	*NULL*		km^2	Network area coverage
7	**cn_map**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link to the Map of the network (from observatory)
8	**cn_stime**	datetime			No	0000-00-00 00:00:00			Start time
9	**cn_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
10	**cn_etime**	datetime			No	9999-12-31 23:59:59			End time
11	**cn_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
12	**cn_utc**	float			Yes	*NULL*			Difference from UTC
13	**cn_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
14	**cn_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
15	**cn_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID

17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	cn_loaddate	datetime			No	*None*			the date the data was entered (in UTC)
20	cn_pubdate	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

M.2. ts - Thermal station

This table stores information such as a location, name, and a description for stations where thermal data are collected.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	ts_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Thermal station ID
2	ts_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Thermal station code
3	cn_id	smallint(5)		UNSIGNED	Yes	*NULL*			Thermal network ID
4	ts_name	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Thermal station or benchmark name
5	ts_type	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Type of thermal feature at the site (e.g. soil, fumarole, surface or crack in a dome, spring, crater lake, etc.) or if the station is used to collect remote image data.
6	ts_ground	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Soil or ground type
7	ts_lat	float			Yes	*NULL*		°	Latitude
8	ts_lon	float			Yes	*NULL*		°	Lontitude
9	ts_elev	float			Yes	*NULL*		m	Elevation
10	ts_perm	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			List of permanent instruments
11	ts_utc	float			Yes	*NULL*			Difference from UTC (- for hours before or ahead of GMT)
12	ts_stime	datetime			No	0000-00-00 00:00:00			Start date
13	ts_stime_unc	datetime			Yes	*NULL*			Start date uncertainty
14	ts_etime	datetime			No	9999-12-31 23:59:59			End date
15	ts_etime_unc	datetime			Yes	*NULL*			End date uncertainty
16	ts_desc	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
17	ts_ori	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
18	ts_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
19	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
20	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
21	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
22	ts_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
23	ts_pubdate	datetime			Yes	*NULL*			the date the data become

									public
24	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
25	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

M.3. ti - Thermal instrument

This table was created to store information about the instruments used to collect ground-based and remote thermal data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	ti_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Thermal instrument ID
2	ti_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Thermal instrument code
3	cs_id	smallint(5)		UNSIGNED	Yes	*NULL*			Satellite identifier (for isntrument mounted on a satellite or airplane)
4	ts_id	smallint(5)		UNSIGNED	Yes	*NULL*			Thermal station ID (for instruments installed at a station)
5	ti_type	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Type of instrument
6	ti_name	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The name, manufacturer, and model of th einstrument.
7	ti_units	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			the units the instrument measures
8	ti_pres	float			Yes	*NULL*			typical instrumental measuring precission
9	ti_stn	float			Yes	*NULL*			Signal to noise ratio of the instrument
10	ti_stime	datetime			No	0000-00-00 00:00:00			Start date
11	ti_stime_unc	datetime			Yes	*NULL*			Start date uncertainty
12	ti_etime	datetime			No	9999-12-31 23:59:59			End date
13	ti_etime_unc	datetime			Yes	*NULL*			End date uncertainty
14	ti_ori	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
15	ti_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	ti_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
20	ti_pubdate	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

N. THERMAL DATA

Thermal image data can be collected from an instrument mounted to a moving object e.g. satellite or airplane (thermal image table link to cs_id) or mounted to a stationary object e.g. caldera rim, observatory roof, etc. (thermal image table link to ts_id).

N.1. td - Ground-based thermal data

This table stores all non-image of the thermal data collected on the ground. This data can be collected continuously or periodically.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	td_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Ground-based thermal data
2	td_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Ground based thermal code
3	ts_id	smallint(5)		UNSIGNED	Yes	*NULL*			Thermal station ID
4	ti_id	smallint(5)		UNSIGNED	Yes	*NULL*			Thermal instrument ID
5	td_mtype	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Measurement type (e.g. thermocouple, thermal IR, etc.)
6	td_time	datetime			Yes	*NULL*			Measurement time
7	td_time_unc	datetime			Yes	*NULL*			Measurement time uncertainty
8	td_depth	float			Yes	*NULL*		m	Depth of measurement below the ground surface (to derive geothermal gradients and/or heat flux)
9	td_distance	float			Yes	*NULL*		m	Distance from instrument to the measured object
10	td_calc_flag	enum('O', 'R')	*latin1_swedish_ci*		Yes	*NULL*			Recalculated value flag: O=Original/directly measured, R=Recalculated from other parameter
11	td_temp	float			Yes	*NULL*		°C	Measured temperature
12	td_terr	float			Yes	*NULL*		°C	Temperature standard error
13	td_aarea	float			Yes	*NULL*		m^2	Approximate area of the body measured
14	td_flux	float			Yes	*NULL*		W/m^2	Heat flux
15	td_ferr	float			Yes	*NULL*		W/m^2	Heat flux standard error
16	td_bkgg	float			Yes	*NULL*		°C/km	Background geothermal gradient
17	td_tcond	float			Yes	*NULL*		$W/(m^2$ °C)	Thermal conductivity at the station/measurement point, inferred from the soil type or measured intrinsically.
18	td_ori	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
19	td_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
20	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
21	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
22	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
23	td_loaddate	datetime			Yes	*NULL*			the date the data was entered (in UTC)
24	td_pubdate	datetime			Yes	*NULL*			the date the data become public
25	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
26	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

N.2. td_img - Thermal image

This table contains data collected from space, the air, or the ground that are used to create thermal images. The actual pixel-by-pixel data of the image are stored in the Thermal image data table (td_pix).

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	td_img_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Thermal image ID
2	td_img_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Thermal image code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
4	cs_id	smallint(5)		UNSIGNED	Yes	*NULL*			Satellite ID
5	ts_id	smallint(5)		UNSIGNED	Yes	*NULL*			Thermal station ID
6	ti_id	smallint(5)		UNSIGNED	Yes	*NULL*			Thermal instrument ID
7	td_img_iplat	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description of instrument platform (e.g. airplane, satellite, crater rim, etc.)
8	td_img_ialt	float			Yes	*NULL*		m	Instrument altitude
9	td_img_ilat	float			Yes	*NULL*		°	Instrument latitude
10	td_img_ilon	float			Yes	*NULL*		°	Instrument longitude
11	td_img_idatum	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Datum used for latitude or longitude
12	td_img_desc	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description of the image
13	td_img_time	datetime			Yes	*NULL*			Time of the image was taken
14	td_img_time_unc	datetime			Yes	*NULL*			Time uncertainty
15	td_img_bname	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Band name (each band separated by coma)
16	td_img_hbwave	float			Yes	*NULL*		µm	High band wavelength
17	td_img_lbwave	float			Yes	*NULL*		µm	Low band wavelength
18	td_img_path	blob		BINARY	Yes	*NULL*			Directory path/link where the image is stored
19	td_img_psize	float			Yes	*NULL*		m	Pixel size of the image
20	td_img_maxrad	float			Yes	*NULL*		$W/(m^2\text{-}m) \times 10^7$	Maximum radiance of any pixel in the frame
21	td_img_maxrrad	float			Yes	*NULL*		$W/(m^2\text{-}m \times sr) \times 10^7$	Maximum relative radiance (sr is spectral radiance, wavelength dependent)
22	td_img_maxtemp	float			Yes	*NULL*		°C	Temperature of the hottest pixel
23	td_img_totrad	float			Yes	*NULL*		$W/(m^2\text{-}m) \times 10^7$	Total radiance in the whole surface of the frame (integration of all pixel radiances)
24	td_img_maxflux	float			Yes	*NULL*		W/m^2	Maximum heat flux
25	td_img_ntres	float			Yes	*NULL*		°C	Nominal temperature resolution (per pixel)
26	td_img_atmcorr	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Atmospheric correction procedure/method applied
27	td_img_thmcorr	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Thermal correction procedure/method

									applied using ground truth points
28	**td_img_ortho**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Type of orthorectification procedure used
29	**Td_img_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
30	**td_img_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
31	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
32	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
33	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
34	**td_img_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
35	**td_img_pubdate**	datetime			Yes	*NULL*			the date the data become public
36	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
37	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

N.3. td_pix - Thermal pixel data

This table contains data for each pixel of a thermal image.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**td_pix_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Image data ID
2	**td_img_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Thermal image ID
3	**td_pix_elev**	float			Yes	*NULL*		m	Elevation of the pixel center
4	**td_pix_lat**	float			Yes	*NULL*		°	Latitude of the pixel center
5	**td_pix_lon**	float			Yes	*NULL*		°	Longitude of the pixel center
6	**td_pix_rad**	float			Yes	*NULL*		$W/(m^2\text{-}m) \times 10^7$	Pixel radiance
7	**td_pix_flux**	float			Yes	*NULL*		W/m^2	Pixel heat flux
8	**td_pix_temp**	float			Yes	*NULL*		°C	Pixel temperature
9	**td_pix_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
10	**td_pix_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
11	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

O. METEOROLOGICAL MONITORING SYSTEM

This section of WOVOdat contains meteorological monitoring data that are collected from available meteorological station around the volcano, to support other monitoring data and possible indication of volcanic unrest.

O.1. cn - Common network (Meteo network)

This table contains information about the (non-seismic) network of stations that collect data at a particular site, in general at one volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cn_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCRE-MENT		Common network identifier
2	cn_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Common network code
3	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano identifier
4	cn_name	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Common network name
5	cn_type	enum('Deformation','Fields','Gas','Hydrologic','Thermal','Meteo','Unknown')			No	Unknown			Common network type
6	cn_area	float			Yes	*NULL*		km^2	Network area coverage
7	cn_map	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Path/link to the Map of the network (from observatory)
8	cn_stime	datetime			No	0000-00-00 00:00:00			Start time
9	cn_stime_unc	datetime			Yes	*NULL*			Start time uncertainty
10	cn_etime	datetime			No	9999-12-31 23:59:59			End time
11	cn_etime_unc	datetime			Yes	*NULL*			End time uncertainty
12	cn_utc	float			Yes	*NULL*			Difference from UTC
13	cn_desc	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
14	cn_ori	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
15	cn_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
16	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	cn_loaddate	datetime			No	*None*			the date the data was entered (in UTC)
20	cn_pubdate	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

N.2. ms - Meteo station

This table stores information such as location, and descriptions for stations where meteorological data are collected.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	ms_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Meteorological station ID
2	ms_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Meteorological station code
3	cn_id	smallint(5)		UNSIGNED	Yes	*NULL*			Meteorology network ID
4	ms_name	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Meteorology station name
5	ms_lat	double			Yes	*NULL*		°	Latitude
6	ms_lon	double			Yes	*NULL*		°	Longitude
7	ms_elev	float			Yes	*NULL*		m	Elevation
8	ms_perm	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			List of permanent instruments
9	ms_type	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Type of station (airport, local, regional, observat-

									ory, etc.)
10	**ms_stime**	datetime			No	0000-00-00 00:00:00			Start date
11	**ms_stime_unc**	datetime			Yes	*NULL*			Start date uncertainty
12	**ms_etime**	datetime			No	9999-12-31 23:59:59			End date
13	**ms_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
14	**ms_utc**	float			Yes	*NULL*			Difference from UTC
15	**ms_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
16	**ms_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
17	**ms_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
18	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
19	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
20	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
21	**ms_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
22	**ms_pubdate**	datetime			Yes	*NULL*			the date the data become public
23	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
24	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

O.3. mi - Meteo instrument

This table stores information about each individual meteorological instrument. The instruments are either permanently or temporarily installed as part of a campaign.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**mi_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Meteorological instrument identifier
2	**mi_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Meteorological instrument code
3	**ms_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Meteorological station identifier
4	**mi_name**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			The name, model, and manufacturer of the meteorological instrument (recorder)
5	**mi_type**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Type of the instrument (rain gauge, windvane, anemometer, barometer or air pressure sensor, thermometer, soil thermometer, etc.)
6	**mi_units**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Measured units
7	**mi_res**	float			Yes	*NULL*			Measurement resolution/precision
8	**mi_stime**	datetime			No	0000-00-00 00:00:00			Start date
9	**mi_stime_un**	datetime			Yes	*NULL*			Start date uncertainty

	c								
10	**mi_etime**	datetime			No	9999-12-31 23:59:59			End date
11	**mi_etime_unc**	datetime			Yes	*NULL*			End date uncertainty
12	**mi_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
13	**mi_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
14	**mi_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
15	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
16	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
17	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
18	**mi_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
19	**mi_pubdate**	datetime			Yes	*NULL*			the date the data become public
20	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
21	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

P. METEOROLOGICAL DATA

P.1. med - Meteo data

This table stores all of the meteo data including precipitation, wind speed, wind direction, air temperature, soil temperature, barometric pressure, and humidity. The data are collected either continuously or periodically as part of a campaign.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**med_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Meteo data ID
2	**med_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Meteo data code
3	**ms_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Meteo station ID
4	**mi_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Meteo instrument ID
5	**med_time**	datetime			Yes	*NULL*			Measurement time
6	**med_time_unc**	datetime			Yes	*NULL*			Measurement time uncertainty
7	**med_temp**	float			Yes	*NULL*		°C	air temperature
8	**med_stemp**	float			Yes	*NULL*		°C	soil temperature
9	**med_bp**	float			Yes	*NULL*		mbar	Barometric pressure at the time of measurement
10	**med_prec**	float			Yes	*NULL*		mm	measured precipitation (daily)
11	**med_tprec**	enum('R', 'FR', 'S', 'H', 'R-FR', 'R-S', 'R-H', 'FR-R', 'FR-S', 'FR-H', 'S-R', 'S-FR', 'S-H', 'H-R', 'H-FR', 'H-S')			Yes	*NULL*			Type of precipitation: R=Rain, FR=Freezing Rain, S=Snow, H=Hail, or any combination
12	**med_hd**	float			Yes	*NULL*		%	humidity
13	**med_wind**	float			Yes	*NULL*		m/s	Wind speed
14	**med_wsmin**	float			Yes	*NULL*		m/s	Minimum wind speed
15	**med_wsmax**	float			Yes	*NULL*		m/s	Maximum wind speed
16	**med_wdir**	varchar(30)			Yes	*NULL*			Wind direction
17	**med_obs**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Observer (person reporting)

18	**med_clc**	float			Yes	*NULL*			Cloud coverage
19	**med_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
20	**med_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
21	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
21	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
22	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
23	**med_load-date**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
24	**med_pubdate**	datetime			Yes	*NULL*			the date the data become public
25	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
26	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

Q. INFERRED PROCESSES

This tables were created to store historical inferences about processes causing volcanic unrest, based mostly on published references. Each of the inferred process fields should express in a one-character flag (Y for yes, N for no, M for maybe, and U for unknown or no information).

Q.1. ip_hyd - Hydrothermal system interaction

This table stores information about magmatic interactions with the hydrothermal system.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ip_hyd_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Hydrothermal data ID
2	**ip_hyd_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Hdrothermal data code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
4	**ip_hyd_time**	datetime			Yes	*NULL*			The date and time the inference was made.
5	**ip_hyd_time_unc**	datetime			Yes	*NULL*			Inference time uncertainty
6	**ip_hyd_start**	datetime			Yes	*NULL*			Start time, the time at which the inferred process began
7	**ip_hyd_start_unc**	datetime			Yes	*NULL*			Start time uncertainty
8	**ip_hyd_end**	datetime			Yes	*NULL*			End time, the time at which the inferred process ended
9	**ip_hyd_end_unc**	datetime			Yes	*NULL*			End time uncertainty
10	**ip_hyd_gwater**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Convective heating of ground-water: Y=Yes, N=No, M=Maybe, U=Unknown
11	**ip_hyd_ipor**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Destabilization of edifice by pore pressure increase: Y=Yes, N=No, M=Maybe, U=Unknown
12	**ip_hyd_edef**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Elastic deformation induced by pore pressure change Y=Yes, N=No, M=Maybe, U=Unknown
13	**ip_hyd_hfrac**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Hydrofracturing: Y=Yes, N=No, M=Maybe, U=Unknown
14	**ip_hyd_btr-em**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Boiling induced tremor: Y=Yes, N=No, M=Maybe, U=Unknown
15	**ip_hyd_ab-**	enum('Y', 'N',	*latin1_sw*		Yes	*NULL*			Absorption of soluble gases:

	gas	'M', 'U')	*edish_ci*						Y=Yes, N=No, M=Maybe, U=Unknown
16	**ip_hyd_species**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Change in equilibrium species: Y=Yes, N=No, M=Maybe, U=Unknown
17	**ip_hyd_chim**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Boiling until dry chimneys are formed: Y=Yes, N=No, M=Maybe, U=Unknown
18	**ip_hyd_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
19	**ip_hyd_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
20	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
21	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
22	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
23	**ip_hyd_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
24	**ip_hyd_pubdate**	datetime			Yes	*NULL*			the date the data become public
25	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
26	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

Q.2. ip_mag - Magma movement

This table stores information about processes related to the movement of magma.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ip_mag_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Magma movement ID
2	**ip_mag_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Magma movement code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
4	**ip_mag_time**	datetime			Yes	*NULL*			The date and time the inference was made.
5	**ip_mag_time_unc**	datetime			Yes	*NULL*			Inference time uncertainty
6	**ip_mag_start**	datetime			Yes	*NULL*			Start time, the time at which the inferred process began
7	**ip_mag_start_unc**	datetime			Yes	*NULL*			Start time uncertainty
8	**ip_mag_end**	datetime			Yes	*NULL*			End time, the time at which the inferred process ended
9	**ip_mag_end_unc**	datetime			Yes	*NULL*			End time uncertainty
10	**ip_mag_deepsupp**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			New or renewed supply of magma from depth: Y=Yes, N=No, M=Maybe, U=Unknown
11	**ip_mag_asc**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Magma ascent, up from reservoir: Y=Yes, N=No, M=Maybe, U=Unknown
12	**ip_mag_convb**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Magma conection/overturn induced from below by an intrusion at the base: Y=Yes, N=No, M=Maybe, U=Unknown
13	**ip_mag_conva**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Magma convection/overturn induced from above, by settling of a dense crystal-rich mass:

									Y=Yes, N=No, M=Maybe, U=Unknown
14	**ip_mag_mix**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Magma mixing: Y=Yes, N=No, M=Maybe, U=Unknown
15	**ip_mag_dike**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Dike intrusion: Y=Yes, N=No, M=Maybe, U=Unknown
16	**ip_mag_pipe**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Intrusion through a pipe-like cylindrical conduit: Y=Yes, N=No, M=Maybe, U=Unknown
17	**ip_mag_sill**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Sill intrusion: Y=Yes, N=No, M=Maybe, U=Unknown
18	**ip_mag_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
19	**ip_mag_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
20	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
21	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
22	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
23	**ip_mag_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
24	**ip_mag_pubdate**	datetime			Yes	*NULL*			the date the data become public
25	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
26	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

Q.3. ip_pres - Buildup of magma pressure

This table stores information about processes related to an increase in magmatic pressure.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ip_pres_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Magma pressure ID
2	**ip_pres_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Magma pressure code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
4	**ip_pres_time**	datetime			Yes	*NULL*			The date and time the inference was made.
5	**ip_pres_time_unc**	datetime			Yes	*NULL*			Inference time uncertainty
6	**ip_pres_start**	datetime			Yes	*NULL*			Start time, the time at which the inferred process began
7	**ip_pres_start_unc**	datetime			Yes	*NULL*			Start time uncertainty
8	**ip_pres_end**	datetime			Yes	*NULL*			End time, the time at which the inferred process ended
9	**ip_pres_end_unc**	datetime			Yes	*NULL*			End time uncertainty
10	**ip_pres_gas**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Gas-induced overpressure: Y=Yes, N=No, M=Maybe, U=Unknown
11	**ip_pres_tec**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Magma or tectonically induced overpressure: Y=Yes, N=No, M=Maybe, U=Unknown
12	**ip_pres_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
13	**ip_pres_co**	varchar(255)	*latin1_sw*		Yes	*NULL*			Comments

	m		*edish_ci*						
14	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
15	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
16	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
17	**ip_pres_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
18	**ip_pres_pubdate**	datetime			Yes	*NULL*			the date the data become public
19	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
20	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

Q.4. ip_sat - Volatile saturation

This table stores information about processes related to volatiles in the magma.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ip_sat_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Volatile saturation ID
2	**ip_sat_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Volatile saturation code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
4	**ip_sat_time**	datetime			Yes	*NULL*			The date and time the inference was made.
5	**ip_sat_time_unc**	datetime			Yes	*NULL*			Inference time uncertainty
6	**ip_sat_start**	datetime			Yes	*NULL*			Start time, the time at which the inferred process began
7	**ip_sat_start_unc**	datetime			Yes	*NULL*			Start time uncertainty
8	**ip_sat_end**	datetime			Yes	*NULL*			End time, the time at which the inferred process ended
9	**ip_sat_end_unc**	datetime			Yes	*NULL*			End time uncertainty
10	**ip_sat_co2**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Magma became saturated with CO2 before an eruption and contributed to preeruption unrest: Y=Yes, N=No, M=Maybe, U=Unknown
11	**ip_sat_h2o**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Magma became saturated with H2O before an eruption: Y=Yes, N=No, M=Maybe, U=Unknown
12	**ip_sat_decomp**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Volatile saturation by decompression: Y=Yes, N=No, M=Maybe, U=Unknown
13	**ip_sat_dfo2**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Volatile saturation by a change in f)2 Fugacity: Y=Yes, N=No, M=Maybe, U=Unknown
14	**ip_sat_add**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Volatile saturation by volatile addition: Y=Yes, N=No, M=Maybe, U=Unknown
15	**ip_sat_xtl**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Volatile saturation by Crystallization or second boiling: Y=Yes, N=No, M=Maybe, U=Unknown
16	**ip_sat_ves**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Subsurface, preeruptive increases in vesiculation, thereby decreasing density. Y=Yes, N=No, M=Maybe, U=Unknown
17	**ip_sat_deve**	enum('Y', 'N',	*latin1_sw*		Yes	*NULL*			Subsurface, preeruptive de-

	s	'M', 'U')	*edish_ci*						crease in vesiculation, thereby increasing density: Y=Yes, N=No, M=Maybe, U=Unknown
18	**ip_sat_degas**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Deep and near-surface degassing include gas explosion events: Y=Yes, N=No, M=Maybe, U=Unknown
19	**ip_sat_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
20	**ip_sat_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
21	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
22	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
23	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
24	**ip_sat_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
25	**ip_sat_pubdate**	datetime			Yes	*NULL*			the date the data become public
26	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
27	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

Q.5. ip_tec - Regional tectonics interaction

This table stores information about processes related to regional tectonic events.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**ip_tec_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Reginal tectonic ID
2	**ip_tec_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Regional tectonic code
3	**vd_id**	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
4	**ip_tec_time**	datetime			Yes	*NULL*			The date and time the inference was made.
5	**ip_tec_time_unc**	datetime			Yes	*NULL*			Inference time uncertainty
6	**ip_tec_start**	datetime			Yes	*NULL*			Start time, the time at which the inferred process began
7	**ip_tec_start_unc**	datetime			Yes	*NULL*			Start time uncertainty
8	**ip_tec_end**	datetime			Yes	*NULL*			End time, the time at which the inferred process ended
9	**ip_tec_end_unc**	datetime			Yes	*NULL*			End time uncertainty
10	**ip_tec_change**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Tectonically induced changes in magma/hydrothermal system: Y=Yes, N=No, M=Maybe, U=Unknown
11	**ip_tec_sstress**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Changes in static stress after large regional earthquake (include viscoelastic process): Y=Yes, N=No, M=Maybe, U=Unknown
12	**ip_tec_dstrain**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Dynamic strain, associated with passage of earthquake waves from distal source: Y=Yes, N=No, M=Maybe, U=Unknown
13	**ip_tec_fault**	enum('Y', 'N',	*latin1_sw*		Yes	*NULL*			Local fault shear or other de-

		'M', 'U')	*edish_ci*						formation of the cone: Y=Yes, N=No, M=Maybe, U=Unknown
14	**ip_tec_seq**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Slow earthquake, as recorded by GPS or strain: Y=Yes, N=No, M=Maybe, U=Unknown
15	**ip_tec_press**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Pressurization of magma or hydrothermal reservoir located several km (include Distal VT earthquake): Y=Yes, N=No, M=Maybe, U=Unknown
16	**ip_tec_depress**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Depressurization of magma or hydrothermal reservoir located several km or more(include distal VT): Y=Yes, N=No, M=Maybe, U=Unknown
17	**ip_tec_hpress**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Increase hydrothermal pore pressurs(lubrication) along faults beneath or near the volcano: Y=Yes, N=No, M=Maybe, U=Unknown
18	**ip_tec_etide**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Earth-tide interaction with magma/hydrothermal systems: Y=Yes, N=No, M=Maybe, U=Unknown
19	**ip_tec_atmp**	enum('Y', 'N', 'M', 'U')	*latin1_swedish_ci*		Yes	*NULL*			Interaction of th evolcanic system with changes in atmospheric pressure, rainfall, wind, etc.: Y=Yes, N=No, M=Maybe, U=Unknown
20	**ip_tec_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
21	**ip_tec_com**	char(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
22	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
23	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
24	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
25	**ip_tec_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
26	**ip_tec_pubdate**	datetime			Yes	*NULL*			the date the data become public
27	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
28	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

R. Common or Shared

The common or shared tables store data from within the Volcano > Network > Station > Instrument hierarchy that are used by almost all of the monitoring tables.

R.1. cc - Contact

This table provides all of the contact information for a person, observatory, or institution.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**cc_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Contact ID
2	**cc_code**	varchar(15)	*latin1_swedish_ci*		Yes	*NULL*			Contact Code

3	**cc_code2**	varchar(15)	*latin1_swedish_ci*		Yes	*NULL*			Contact Code alias
4	**cc_fname**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			First name
5	**cc_lname**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Last name
6	**cc_obs**	varchar(150)	*latin1_swedish_ci*		Yes	*NULL*			Observatory
7	**cc_add1**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Address 1
8	**cc_add2**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Address 2
9	**cc_city**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			City
10	**cc_state**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			State
11	**cc_country**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Country
12	**cc_post**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Postal code
13	**cc_url**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Web address
14	**cc_email**	varchar(320)	*latin1_swedish_ci*		Yes	*NULL*			Email
15	**cc_phone**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Phone
16	**cc_phone2**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Phone 2
17	**cc_fax**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Fax
18	**cc_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
19	**cc_loaddate**	datetime			Yes	*NULL*			the date the data was entered

R.2. cb - Bibliographic

This table stores information about articles, papers, books, and web sites, with information that is related to the data in WOVOdat.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cb_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Bibliographic ID
2	**cb_auth**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Authors/Editors
3	**cb_year**	year(4)			Yes	*NULL*			Publication year
4	**cb_title**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Title
5	**cb_journ**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Journal
6	**cb_vol**	varchar(20)	*latin1_swedish_ci*		Yes	*NULL*			Volume
7	**cb_pub**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Publisher
8	**cb_page**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Pages
9	**cb_doi**	varchar(20)	*latin1_swedish_ci*		Yes	*NULL*			Digital Object Identifier
10	**cb_isbn**	varchar(13)	*latin1_swedish_ci*		Yes	*NULL*			International Standard Book Number
11	**cb_url**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Info on the web
12	**cb_labadr**	varchar(320)	*latin1_swedish_ci*		Yes	*NULL*			Email address of observatory
13	**cb_keywords**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Keywords
14	**cb_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
15	**cb_loaddate**	datetime			Yes	*NULL*			the date the data was entered
16	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

R.3. co - Observation

This table provides storage for observations about volcanic activity.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	co_id	mediumint(8)		UNSIGNED	No	None	AUTO_INCREMENT		Observation ID
2	co_code	varchar(30)	latin1_swedish_ci		Yes	NULL			Observation Code
3	vd_id	mediumint(8)		UNSIGNED	Yes	NULL			Volcano ID
4	co_observe	text	latin1_swedish_ci		Yes	NULL			Description
5	co_stime	datetime			Yes	NULL			Start time
6	co_stime_unc	datetime			Yes	NULL			Start time uncertainty
7	co_etime	datetime			Yes	NULL			End time
8	co_etime_unc	datetime			Yes	NULL			End time uncertainty
9	co_com	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments
10	cc_id	smallint(5)		UNSIGNED	Yes	NULL			First owner ID
11	cc_id2	smallint(5)		UNSIGNED	Yes	NULL			Second owner ID
12	cc_id3	smallint(5)		UNSIGNED	Yes	NULL			Third owner ID
13	co_loaddate	datetime			Yes	NULL			the date the data was entered
14	co_pubdate	datetime			Yes	NULL			the date the data become public
15	cc_id_load	smallint(5)		UNSIGNED	Yes	NULL			contact ID for the person who entered the data
16	cb_ids	varchar(255)	latin1_swedish_ci		Yes	NULL			Link to the bibliography table

R.4. cm - Image

This table stores images that support other WOVOdat data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cm_id	smallint(5)		UNSIGNED	No	None	AUTO_INCREMENT		Image ID
2	cm_code	varchar(30)	latin1_swedish_ci		Yes	NULL			Image Code
3	vd_id	mediumint(8)		UNSIGNED	Yes	NULL			Volcano ID
4	cm_lat	double			Yes	NULL			Latitude
5	cm_lon	double			Yes	NULL			Longitude
6	cm_location	varchar(255)	latin1_swedish_ci		Yes	NULL			Location
7	cm_description	varchar(255)	latin1_swedish_ci		Yes	NULL			Description (including the scale)
8	cm_format	varchar(10)	latin1_swedish_ci		Yes	NULL			Image format
9	cm_date	datetime			Yes	NULL			Date
10	cm_date_unc	datetime			Yes	NULL			Date uncertainty
11	cm_image	varchar(255)	latin1_swedish_ci		Yes	NULL			Link/path where the image store
12	cm_usage	varchar(255)	latin1_swedish_ci		Yes	NULL			Usage of image (copyright)
13	cm_keywords	varchar(255)	latin1_swedish_ci		Yes	NULL			Keywords (for searches)
14	cm_ori	enum('D','O')	latin1_swedish_ci		Yes	NULL			A flag for reference data. **D**=digitized, **O**= original from observatory
15	cm_com	varchar(255)	latin1_swedish_ci		Yes	NULL			Comments

16	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
17	cc_id2	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
18	cc_id3	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
19	cm_loaddate	datetime			Yes	*NULL*			the date the data was entered
20	cm_pubdate	datetime			Yes	*NULL*			the date the data become public
21	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
22	cb_ids	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

R.5. md - Map

This table stores information about maps that cover areas where WOVOdat data is collected.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	md_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Map ID
2	md_code	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Map Code
3	vd_id	mediumint(8)			Yes	*NULL*			Volcano ID
4	md_name	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Map Name
5	md_type	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Map Type (topo, DEM, etc.)
6	md_srtm	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to DEM stored on the WOVOdat server.
7	md_scale	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Scale of the map
8	md_contour	float			Yes	*NULL*		m	Contour interval
9	md_date	date			Yes	*NULL*			Publication date
10	md_date_unc	date			Yes	*NULL*			Publication date uncertainty
11	md_proj	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Projection
12	mp_map_datum	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Datum
13	md_west	float			Yes	*NULL*		°	West bounding coordinate
14	md_east	float			Yes	*NULL*		°	East bounding coordinate
15	md_north	float			Yes	*NULL*		°	North bounding coordinate
16	md_south	float			Yes	*NULL*		°	South bounding coordinate
17	md_elev_max	float			Yes	*NULL*		m	Maximum elevation
18	md_elev_min	float			Yes	*NULL*		m	Minimum elevation
19	md_use	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Intended use of the map
20	md_restrictions	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Restrictions on the use
21	md_quality	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Quality of the map
22	md_image	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to image
23	md_desc	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
24	md_ori	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
25	md_com	char(255)	*latin1_swedish_c*		Yes	*NULL*			Comments

			i						
26	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
27	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
28	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
29	**md_loaddate**	datetime			Yes	*NULL*			the date the data was entered
30	**md_pubdate**	datetime			Yes	*NULL*			the date the data become public
31	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
32	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

R.6. cs - Satellite/Airplane

This table stores information about satellites and airplanes that are used for collecting data from above the surface of the earth.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**cs_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Satellite/airplane ID
2	**cs_code**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Satellite/airplane code
3	**cs_type**	enum('S', 'A')	*latin1_swedish_ci*		Yes	*NULL*			Type (A=Airplane, S=Satellite)
4	**cs_name**	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Satellite/airplane name
5	**cs_stime**	datetime			No	0000-00-00 00:00:00			Start time
6	**cs_stime_unc**	datetime			Yes	*NULL*			Start time uncertainty
7	**cs_etime**	datetime			No	9999-12-31 23:59:59			End time
8	**cs_etime_unc**	datetime			Yes	*NULL*			End time uncertainty
9	**cs_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
10	**cs_ori**	enum('D','O')	*latin1_swedish_ci*		Yes	*NULL*			A flag for reference data. **D**=digitized, **O**= original from observatory
11	**cs_com**	char(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
12	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			First owner ID
13	**cc_id2**	smallint(5)		UNSIGNED	Yes	*NULL*			Second owner ID
14	**cc_id3**	smallint(5)		UNSIGNED	Yes	*NULL*			Third owner ID
15	**cs_loaddate**	datetime			Yes	*NULL*			the date the data was entered
16	**cs_pubdate**	datetime			Yes	*NULL*			the date the data become public
17	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data
18	**cb_ids**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Link to the bibliography table

R.7. st_eqt – Earthquake translation

The Earthquake Translation table (st_eqt, for Seismic Translation - Earthquake Types) allows users to translate an earthquake type defined by one observatory to the WOVOdat earthquake type. Some observatories refer to different earthquake types by the same name or similar earthquake types by different names.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**st_eqt_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_IN-CREMENT		Earthquake translation identifier

2	**st_eqt_org**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Original terminology used by the observatory
3	**st_eqt_wovo**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			WOVOdat terminology
4	**cc_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Owner identifier
5	**st_eqt_load-date**	datetime	*latin1_swedish_ci*		Yes	*NULL*			the date the data was entered (in UTC)
6	**cc_id_load**	smallint(5)	*latin1_swedish_ci*	UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

S. SYSTEM

S.1. jj_concon - User to user permissions

This table stores information about the permissions (upload, update, view their data or manage their account) given by a user to another.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**jj_concon_id**	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		User to user permission ID
2	**cc_id**	smallint(5)		UNSIGNED	No	*None*			Granting user ID (granter)
3	**cc_id_granted**	smallint(5)		UNSIGNED	No	*None*			Granted user ID
4	**jj_concon_view**	tinyint(1)			No	0			Permission to view unpublished data: 0=No, 1=Yes
5	**jj_concon_upload**	tinyint(1)			No	0			Permission to upload data: 0=No, 1=Yes
6	**jj_concon_update**	tinyint(1)			No	0			Permission to update data: 0=No, 1=Yes
7	**jj_concon_admin**	tinyint(1)			No	0			Permission to manage account: 0=No, 1=Yes
8	**jj_concon_loaddate**	datetime			Yes	*NULL*			the date the data was entered (in UTC)
9	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

S.2. jj_imgx - Image junction

This table was created to link images to other known data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	**jj_imgx_id**	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Image junction ID
2	**cm_id**	smallint(5)		UNSIGNED	No	*None*			Image ID
3	**jj_idname**	enum('cb', 'cc', 'ch', 'cm', 'cn', 'co', 'cp', 'cr', 'cr_tmp', 'cs', 'cu', 'dd_ang', 'dd_edm', 'dd_gps', 'dd_gpv', 'dd_lev', 'dd_sar', 'dd_srd', 'dd_str', 'dd_tlt', 'dd_tlv', 'di_gen', 'di_tlt', 'ds', 'ed', 'ed_for', 'ed_phs', 'ed_vid', 'fd_ele', 'fd_gra', 'fd_mag', 'fd_mgv', 'fi', 'fs', 'gd', 'gd_plu', 'gd_sol', 'gi', 'gs', 'hd', 'hi', 'hs', 'ip_hyd', 'ip_mag', 'ip_pres', 'ip_sat', 'ip_tec', 'jj_concon', 'jj_imgx', 'jj_volcon', 'jj_volnet', 'j_sarsat', 'md', 'sd_evn', 'sd_evs', 'sd_int', 'sd_ivl', 'sd_rsm',			Yes	*NULL*			The name of the other table of interest

		'sd_sam', 'sd_ssm', 'sd_trm', 'sd_wav', 'si', 'si_cmp', 'sn', 'ss', 'st_eqt', 'td', 'td_img', 'td_pix', 'ti', 'ts', 'vd', 'vd_inf', 'vd_mag', 'vd_tec')							
4	jj_x_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Linking table ID
5	jj_imgx_loaddate	datetime			Yes	*NULL*			the date the data was entered
6	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

S.3. jj_volcon - Volcano-contact junction

This table was created for the many-to-many relationship between the volcano and the observatories that monitor the volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	jj_volcon_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Volcano-contact junction ID
2	vd_id	mediumint(8)		UNSIGNED	No	*None*			Volcano ID
3	cc_id	smallint(5)			Yes	*NULL*			User/Owner ID
4	jj_volcon_loaddate	datetime		UNSIGNED	Yes	*NULL*			the date the data was entered
5	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

S.4. jj_volnet - Volcano-network junction

This table was created for the many-to-many relationship between the volcano and the observatories that monitor the volcano.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	jj_volnet_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Volcano-network junction ID
2	vd_id	mediumint(8)		UNSIGNED	Yes	*NULL*			Volcano ID
3	jj_net_id	smallint(5)		UNSIGNED	Yes	*NULL*			Network ID
4	jj_net_flag	enum('C', 'S')	*latin1_swedish_ci*		Yes	*NULL*			Network type: C=Common, S=Seismic
5	jj_volnet_loaddate	datetime			Yes	*NULL*			the date the data was entered
6	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

S.5. j_sarsat - InSAR-satellite junction

This table was created for the many-to-many relationship between the satellite data and the InSAR data.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	j_sarsat_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		InSAR-satellite junction ID
2	dd_sar_id	mediumint(8)		UNSIGNED	Yes	*NULL*			InSAR image ID

3	**cs_id**	smallint(5)		UNSIGNED	Yes	*NULL*			Satellite ID
4	**j_sarsat_loaddate**	datetime			Yes	*NULL*			the date the data was entered
5	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

Database Administration:

S.6. cr - Registry

This table provides username and password information for people who registered to WOVOdat.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cr_id	tinyint(3)		UNSIGNED	No	*None*	AUTO_INCREMENT		Registry ID
2	cc_id	smallint(5)		UNSIGNED	Yes	*NULL*			User ID
3	cr_uname	varchar(30)	*latin1_swedish_ci*		No	*None*			Username for login
4	cr_pwd	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Password for login
5	cr_regdate	datetime			Yes	*NULL*			Registration date
6	cr_update	datetime			Yes	*NULL*			Last update

S.7. cr_tmp - Temporary registry

This table stores information about users who wish to register to WOVOdat while waiting for them to confirm registration by clicking the link provided in a confirmation email.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cr_tmp_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Temporary registry ID
2	cr_tmp_time	datetime			No	*None*			Time when the registry made
3	cr_tmp_email	varchar(320)	*latin1_swedish_ci*		No	*None*			Email
4	cr_tmp_fname	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			First name
5	cr_tmp_lname	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Last name
6	cr_tmp_obs	varchar(150)	*latin1_swedish_ci*		Yes	*NULL*			Observatory
7	cr_tmp_add1	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Address 1
8	cr_tmp_add2	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Address 2
9	cr_tmp_city	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			City
10	cr_tmp_state	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			State/Province
11	cr_tmp_country	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Country
12	cr_tmp_post	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Postal code
13	cr_tmp_url	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Web address
14	cr_tmp_phone	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Phone
15	cr_tmp_phone2	varchar(50)	*latin1_swedish_ci*		Yes	*NULL*			Phone 2
16	cr_tmp_fax	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Fax
17	cr_tmp_com	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
18	cr_tmp_uname	varchar(30)	*latin1_swedish_ci*		No	*None*			Username

19	**cr_tmp_pwd**	varchar(60)	*latin1_swedish_ci*		Yes	*NULL*			Password

S.8. cp - Permission

This table provides the access information for each registered user.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
	cp_id	tinyint(3)		UNSIGNED	No	*None*	AUTO_INCREMENT		Permission ID
2	cr_id	tinyint(3)		UNSIGNED	Yes	*NULL*			Registry ID
3	**cp_access**	enum('0','1','2','3','4','5','6','7','8','9')			No	9			Access level: 0=Developer, 9=Minimum access
4	**cp_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
5	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

S.9. cu - Upload history

This table stores information about all uploads made to the database, including those which failed.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	cu_id	mediumint(8)		UNSIGNED	No	*None*	AUTO_INCREMENT		Upload history ID
2	**cu_file**	varchar(255)	*latin1_swedish_ci*		No	*None*			Original uploaded file name
3	**cu_type**	enum('P', 'PE', 'TBP', 'T', 'TE', 'TBT', 'U', 'O')	*latin1_swedish_ci*		Yes	*NULL*			Type of upload: I=In database, N=Not in database (test), U=Undone, T=Temporary (to be treated later), W=translated to WOVOML , F=Failed
4	**cu_com**	text	*latin1_swedish_ci*		Yes	*NULL*			Comments or error message
5	**cu_loaddate**	datetime			Yes	*NULL*			the date the data was entered
6	cc_id_load	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

S.10. ch - Change

This table stores information about any changes that have been made in the database.

#	Column	Type	Collation	Attributes	Null	Default	Extra	Unit	Comments
1	ch_id	smallint(5)		UNSIGNED	No	*None*	AUTO_INCREMENT		Change ID
2	**ch_linkname**	enum('cb', 'cc', 'ch', 'cm', 'cn', 'co', 'cp', 'cr', 'cr_tmp', 'cs', 'cu', 'dd_ang', 'dd_edm', 'dd_gps', 'dd_gpv', 'dd_lev', 'dd_sar', 'dd_srd', 'dd_str', 'dd_tlt', 'dd_tlv', 'di_gen', 'di_tlt', 'ds', 'ed', 'ed_for', 'ed_phs', 'ed_vid', 'fd_ele', 'fd_gra', 'fd_mag', 'fd_mgv', 'fi', 'fs', 'gd', 'gd_plu', 'gd_sol', 'gi', 'gs', 'hd', 'hi', 'hs', 'ip_hyd', 'ip_mag', 'ip_pres', 'ip_sat', 'ip_tec', 'jj_concon', 'jj_imgx', 'jj_volcon', 'jj_volnet', 'j_sarsat', 'md', 'sd_evn', 'sd_evs', 'sd_int', 'sd_ivl', 'sd_rsm', 'sd_sam', 'sd_ssm', 'sd_trm', 'sd_wav', 'si', 'si_cmp', 'sn', 'ss', 'st_eqt', 'td', 'td_img', 'td_pix', 'ti', 'ts', 'vd', 'vd_inf', 'vd_mag', 'vd_tec')			Yes	*NULL*			The name of the table where the change has been made.
3	ch_link_id	mediumint(8)		UNSIGNED	Yes	*NULL*			The ID-number of the set of data where the change has been made.

4	**ch_atname**	varchar(30)	*latin1_swedish_ci*		Yes	*NULL*			Field/attribute name where the change has been made
5	**ch_desc**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Description
6	**ch_com**	varchar(255)	*latin1_swedish_ci*		Yes	*NULL*			Comments
7	**ch_loaddate**	datetime			Yes	*NULL*			the date the data was entered
8	**cc_id_load**	smallint(5)		UNSIGNED	Yes	*NULL*			contact ID for the person who entered the data

NOTE

1. element of the table that highlighted by light-gray shade: filled automatically by the system when the data uploaded
2. element written in "**red**": link to other table
3. Standard datetime format: YYYY-MM-DD HH:MM:SS.SS (in UTC)
4. Standard origin time format: YYYY-MM-DD HH:MM:SS (in UTC)

Appendix-1 WOVOdat XML-format

WOVOdat XML template

Class, attributes, and elements

```
<?xml version="1.0" encoding="UTF-8"?>
<wovoml owner1="…" owner2="…" owner3="…" pubDate="…" v="…" version="…" xmlns="http://www.wovodat.org"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wovodat.org wovoml_schema.xsd ">
        <Observations>...</Observations>
        <InferredProcesses>...</InferredProcesses>
        <Eruptions>...</Eruptions>
        <MonitoringSystems>...</MonitoringSystems>
        <Data>...</Data>
</wovoml>
```

Observations: This class contains information for observations about volcanic activity.

```
<?xml version="1.0" encoding="UTF-8"?>
<wovoml owner1="…" owner2="…" owner3="…" pubDate="…" v="…" version="…"
xmlns="http://www.wovodat.org" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.wovodat.org wovoml_schema.xsd ">

  <Observations owner1="…" owner2="…" owner3="…" pubDate="…" v="…">
      <Observation code="…" owner1="…" owner2="…" owner3="…" pubDate="…" v="…">
          <description>description</description>
          <startTime>YYYY-MM-DD HH:MM:SS</startTime>
          <startTimeUnc>startTimeUnc</startTimeUnc>
          <endTime>endTime</endTime>
          <endTimeUnc>endTimeUnc</endTimeUnc>
      </Observation>
  </Observations>
```

Inferred Processes: **This class contains information about historical (in most cases, published) inferences about processes causing volcanic unrest.**

```
<InferredProcesses owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
    <MagmaMovement code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="..."volcano="...">
        ...
    </MagmaMovement>
    <VolatileSat code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        ...
    </VolatileSat>
    <MagmaPressure code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        ...
    </MagmaPressure>
    <Hydrothermal code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        ...
    </Hydrothermal>
    <RegionalTectonics code="..." owner1="..." owner2="..." owner3="..." pubDate="..."v="..."volcano="...">
        ...
    </RegionalTectonics>
</InferredProcesses>
```

Eruption: **This class contains information about volcano eruption.**

```
<Eruptions owner1="..." owner2="..." owner3="..." pubDate="..." v="..." volcano="...">
    <Eruption code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="..." volcano="...">
        ...
        <Video code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
        </Video>
        <Phase code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
            <Video code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </Video>
            <Forecast code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </Forecast>
        </Phase>
    </Eruption>
    <Phases eruption="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <Phase code="..." eruption="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
            <Video code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </Video>
            <Forecast code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </Forecast>
        </Phase>
    </Phases>
    <Video code="..." eruption="..." owner1="..." owner2="..." owner3="..." phase="..." pubDate="..."  v="..." volcano="...">
        ...
    </Video>
    <Forecast code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="..." volcano="...">
        ...
    </Forecast>
</Eruptions>
```

Monitoring system: **This class contains information about all monitoring systems (network, stations, instruments, components) in a volcano.**

```
<MonitoringSystems owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
    <Airplane code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        ...
        <GasInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
        </GasInstrument>
        <ThermalInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
        </ThermalInstrument>
    </Airplane>
```

```
    <DeformationNetwork code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <Volcanoes>
            <volcanoCode>volcanoCode</volcanoCode>
        </Volcanoes>
        <DeformationStation code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
            <DeformationInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </DeformationInstrument>
            <TiltStrainInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </TiltStrainInstrument>
        </DeformationStation>
    </DeformationNetwork>
    <DeformationStations network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <DeformationStation code="..." network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
            <DeformationInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </DeformationInstrument>
            <TiltStrainInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
            </TiltStrainInstrument>
        </DeformationStation>
    </DeformationStations>
    <DeformationInstruments owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
        <DeformationInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
            ...
        </DeformationInstrument>
        <TiltStrainInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
            ...
        </TiltStrainInstrument>
    </DeformationInstruments>
```

```
<GasNetwork code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <Volcanoes>
                <volcanoCode>volcanoCode</volcanoCode>
        </Volcanoes>
        <GasStation code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <GasInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                </GasInstrument>
        </GasStation>
</GasNetwork>
<GasStations network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <GasStation code="..." network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <GasInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                </GasInstrument>
        </GasStation>
</GasStations>
<GasInstruments airplane="..." owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
        <GasInstrument airplane="..." code="..." owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
                ...
        </GasInstrument>
</GasInstruments>
```

```
<FieldsNetwork code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <Volcanoes>
                <volcanoCode>volcanoCode</volcanoCode>
        </Volcanoes>
        <FieldsStation code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <FieldsInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                </FieldsInstrument>
        </FieldsStation>
</FieldsNetwork>
<FieldsStations network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <FieldsStation code="..." network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <FieldsInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                </FieldsInstrument>
        </FieldsStation>
</FieldsStations>
<FieldsInstruments owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
        <FieldsInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
                ...
        </FieldsInstrument>
</FieldsInstruments>
```

```
<ThermalNetwork code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <Volcanoes>
                <volcanoCode>volcanoCode</volcanoCode>
        </Volcanoes>
        <ThermalStation code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <ThermalInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                </ThermalInstrument>
        </ThermalStation>
</ThermalNetwork>
<ThermalStations network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <ThermalStation code="..." network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <ThermalInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                </ThermalInstrument>
        </ThermalStation>
</ThermalStations>
<ThermalInstruments airplane="..." owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
        <ThermalInstrument airplane="..." code="..." owner1="..." owner2="..." owner3="..." pubDate="..." station="..." v="...">
                ...
        </ThermalInstrument>
</ThermalInstruments>

<SeismicNetwork code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <Volcanoes>
                <volcanoCode>volcanoCode</volcanoCode>
        </Volcanoes>
        <SeismicStation code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <SeismicInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                        <SeismicComponent code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                                ...
                        </SeismicComponent>
                </SeismicInstrument>
        </SeismicStation>
</SeismicNetwork>
<SeismicStations network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
        <SeismicStation code="..." network="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                ...
                <SeismicInstrument code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                        ...
                        <SeismicComponent code="..." owner1="..." owner2="..." owner3="..." pubDate="..." v="...">
                                ...
                        </SeismicComponent>
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Data: This class contains information about all type of volcano monitoring data obtained/recorded by "Monitoring system".

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</wovoml>

WOVOdat XML-format (version: October 2012)

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Appendix-2 WOVOML 1.1.0 Schema

WOVOml_schema.xsd (version: October 2012)

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<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema" targetNamespace="http://www.wovodat.org" xmlns="http://www.wovodat.org" elementFormDefault="qualified">

	<!-- ================================================================= -->
	<!-- Comments on this XSD file -->
	<!-- ================================================================= -->
	<xs:annotation>
	  <xs:documentation xml:lang="en">
			WOVOML schema for uploading data to WOVOdat (www.wovodat.org).
			Version 1.1.0
			Last update: October 2012.
			For more information on how to use WOVOML, please refer to: www.wovodat.org/doc
	  </xs:documentation>
	</xs:annotation>


	<!-- ================================================================= -->
	<!-- Simple types -->
	<!-- ================================================================= -->

	<!-- Decimal 2,2  -->
	<xs:simpleType name="decimal">
	  <xs:restriction base="xs:decimal">
			<xs:minExclusive value="-0.99"/>
			<xs:maxExclusive value="0.99"/>
	  </xs:restriction>
	</xs:simpleType>

	<!-- Double without NaN -Inf +Inf -->
	<xs:simpleType name="double">
	  <xs:restriction base="xs:double">
			<xs:minExclusive value="-INF"/>
			<xs:maxExclusive value="INF"/>
	  </xs:restriction>
	</xs:simpleType>

	<!-- Float without NaN -Inf +Inf -->
	<xs:simpleType name="float">
	  <xs:restriction base="xs:float">
			<xs:minExclusive value="-INF"/>
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	  </xs:restriction>
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	<!-- String 10 -->
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	  <xs:restriction base="xs:string">
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			<xs:maxLength value="10"/>
	  </xs:restriction>
	</xs:simpleType>

	<!-- String 15 -->
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			<xs:whiteSpace value="collapse"/>
```

```
            <xs:minLength value="1"/>
            <xs:maxLength value="15"/>
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</xs:simpleType>

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</xs:simpleType>

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<!-- Degrees 0-90 -->
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<!-- Degrees 0-360 -->
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<!-- Degrees -90 +90 -->
<xs:simpleType name="deg-90-90">
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<!-- Degrees -180 +180 -->
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</xs:simpleType>

<!-- Yes No enumeration -->
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        <xs:enumeration value="N"/>
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<!-- Success enumeration -->
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```

```
            <xs:enumeration value="N"/>
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<!-- Yes No Unknown enumeration -->
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<!-- Continuous periodically enumeration -->
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<!-- Processed raw enumeration -->
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<!-- Pressure measurement type enumeration -->
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    <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="A"/>
            <xs:enumeration value="V"/>
    </xs:restriction>
</xs:simpleType>

<!-- Pair stacked enumeration -->
```

```
<xs:simpleType name="pairStackedEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="P"/>
            <xs:enumeration value="S"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>

<!-- Picks determination enumeration -->
<xs:simpleType name="picksDeterminationEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="A"/>
            <xs:enumeration value="H"/>
            <xs:enumeration value="R"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>

<!-- Qualitative depth enumeration -->
<xs:simpleType name="qualitativeDepthEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="D"/>
            <xs:enumeration value="I"/>
            <xs:enumeration value="S"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>

<!-- Data type enumeration -->
<xs:simpleType name="dataTypeEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="C"/>
            <xs:enumeration value="H"/>
            <xs:enumeration value="L"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>

<!-- Distance enumeration -->
<xs:simpleType name="distEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="D"/>
            <xs:enumeration value="I"/>
            <xs:enumeration value="P"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>

<!-- Quality enumeration -->
<xs:simpleType name="qualityEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="E"/>
            <xs:enumeration value="G"/>
            <xs:enumeration value="P"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>
```

```
<!-- DEM quality enumeration -->
<xs:simpleType name="DEMQualityEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="E"/>
            <xs:enumeration value="F"/>
            <xs:enumeration value="G"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>

<!-- Start position enumeration -->
<xs:simpleType name="startPositionEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="BLC"/>
            <xs:enumeration value="TLC"/>
  </xs:restriction>
</xs:simpleType>

<!-- Limb enumeration -->
<xs:simpleType name="limbEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="ASC"/>
            <xs:enumeration value="DES"/>
  </xs:restriction>
</xs:simpleType>

<!-- Precipitation type enumeration -->
<xs:simpleType name="precipitationTypeEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="R"/>
            <xs:enumeration value="FR"/>
            <xs:enumeration value="S"/>
            <xs:enumeration value="H"/>
            <xs:enumeration value="R-FR"/>
            <xs:enumeration value="R-S"/>
            <xs:enumeration value="R-H"/>
            <xs:enumeration value="FR-R"/>
            <xs:enumeration value="FR-S"/>
            <xs:enumeration value="FR-H"/>
            <xs:enumeration value="S-R"/>
            <xs:enumeration value="S-FR"/>
            <xs:enumeration value="S-H"/>
            <xs:enumeration value="H-R"/>
            <xs:enumeration value="H-FR"/>
            <xs:enumeration value="H-S"/>
  </xs:restriction>
</xs:simpleType>

<!-- Earthquake type enumeration -->
<xs:simpleType name="eqTypeEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="R"/>
            <xs:enumeration value="Q"/>
            <xs:enumeration value="V"/>
            <xs:enumeration value="VT"/>
            <xs:enumeration value="VT_D"/>
            <xs:enumeration value="VT_S"/>
```

```
            <xs:enumeration value="H"/>
            <xs:enumeration value="H_HLF"/>
            <xs:enumeration value="H_LHF"/>
            <xs:enumeration value="LF"/>
            <xs:enumeration value="LF_LP"/>
            <xs:enumeration value="LF_T"/>
            <xs:enumeration value="LF_ILF"/>
            <xs:enumeration value="VLP"/>
            <xs:enumeration value="E"/>
            <xs:enumeration value="U"/>
            <xs:enumeration value="O"/>
            <xs:enumeration value="X"/>
  </xs:restriction>
</xs:simpleType>

<!-- Tremor type enumeration -->
<xs:simpleType name="trmTypeEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="G"/>
            <xs:enumeration value="M"/>
            <xs:enumeration value="H"/>
            <xs:enumeration value="C"/>
  </xs:restriction>
</xs:simpleType>

<!-- Gas species enumeration -->
<xs:simpleType name="gasSpeciesEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="CO2"/>
            <xs:enumeration value="SO2"/>
            <xs:enumeration value="H2S"/>
            <xs:enumeration value="HCl"/>
            <xs:enumeration value="HF"/>
            <xs:enumeration value="CH4"/>
            <xs:enumeration value="H2"/>
            <xs:enumeration value="CO"/>
            <xs:enumeration value="3He4He"/>
            <xs:enumeration value="d13C"/>
            <xs:enumeration value="d34S"/>
            <xs:enumeration value="d18O"/>
            <xs:enumeration value="dD"/>
  </xs:restriction>
</xs:simpleType>


<!-- Waveform distance enumeration -->
<xs:simpleType name="wavefromdistanceEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="P"/>
            <xs:enumeration value="I"/>
            <xs:enumeration value="D"/>
            <xs:enumeration value="U"/>
  </xs:restriction>
</xs:simpleType>

<!-- Plume species enumeration -->
<xs:simpleType name="plumeSpeciesEnum">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="CO2"/>
```

```
            <xs:enumeration value="SO2"/>
            <xs:enumeration value="H2S"/>
            <xs:enumeration value="HCl"/>
            <xs:enumeration value="HF"/>
            <xs:enumeration value="CO"/>
    </xs:restriction>
</xs:simpleType>

<!-- Hydrologic species enumeration -->
<xs:simpleType name="hydroSpeciesEnum">
    <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="SO4"/>
            <xs:enumeration value="H2S"/>
            <xs:enumeration value="Cl"/>
            <xs:enumeration value="F"/>
            <xs:enumeration value="HCO3"/>
            <xs:enumeration value="Mg"/>
            <xs:enumeration value="Fe"/>
            <xs:enumeration value="Ca"/>
            <xs:enumeration value="Na"/>
            <xs:enumeration value="K"/>
            <xs:enumeration value="3He4He"/>
            <xs:enumeration value="c3He4He"/>
            <xs:enumeration value="d13C"/>
            <xs:enumeration value="d34S"/>
            <xs:enumeration value="d18O"/>
            <xs:enumeration value="dD"/>
    </xs:restriction>
</xs:simpleType>

<!-- Original recalculated enumeration -->
<xs:simpleType name="oriRecalEnum">
    <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="O"/>
            <xs:enumeration value="R"/>
    </xs:restriction>
</xs:simpleType>

<!-- Digitize Original enumeration -->
<xs:simpleType name="orgDigEnum">
    <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="D"/>
            <xs:enumeration value="O"/>
    </xs:restriction>
</xs:simpleType>

<!-- General Deformation Instrument enumeration -->
<xs:simpleType name="diGenTypeEnum">
    <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:enumeration value="Angle"/>
            <xs:enumeration value="CGPS"/>
            <xs:enumeration value="EDM"/>
            <xs:enumeration value="EDM_Reflector"/>
            <xs:enumeration value="GPS"/>
            <xs:enumeration value="Total_Station"/>
            <xs:enumeration value="OtherTypes"/>
    </xs:restriction>
</xs:simpleType>
```

```
<!-- Deformation Tilt/Strain instrument enumeration -->
<xs:simpleType name="diTltTypeEnum">
  <xs:restriction base="xs:string">
        <xs:whiteSpace value="collapse"/>
        <xs:enumeration value="Tilt"/>
        <xs:enumeration value="Strain"/>
  </xs:restriction>
</xs:simpleType>

<!-- Time -->
<xs:simpleType name="time">
  <xs:restriction base="xs:string">
        <xs:whiteSpace value="collapse"/>
        <xs:length value="8"/>
        <xs:pattern value="[0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
  </xs:restriction>
</xs:simpleType>

<!-- Date time (BC accepted) -->
<xs:simpleType name="dateTimeBC">
  <xs:restriction base="xs:string">
        <xs:whiteSpace value="collapse"/>
        <xs:pattern value=""/>
        <xs:pattern value="([ ])*"/>
        <xs:pattern value="[0-9]{1}-0[0-9]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-0[0-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-1[0-2]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-0[0-9]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-0[0-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-1[0-2]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{1}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-0[0-9]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-0[0-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-1[0-2]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-0[0-9]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-0[0-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-1[0-2]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{1}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-0[0-9]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-0[0-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-1[0-2]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-0[0-9]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-0[0-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-1[0-2]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="[0-9]{2}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{2}-0[0-9]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
        <xs:pattern value="-[0-9]{2}-0[0-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
```

```
<xs:pattern value="-[0-9]{2}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{2}-1[0-2]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{2}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
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<xs:pattern value="-[0-9]{2}-0[0-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{2}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{2}-1[0-2]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
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<xs:pattern value="[0-9]{4}-1[0-2]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="[0-9]{4}-0[0-9]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="[0-9]{4}-0[0-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="[0-9]{4}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="[0-9]{4}-1[0-2]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
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<xs:pattern value="-[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{4}-0[0-9]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{4}-0[0-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{4}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{4}-1[0-2]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{4}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{5}-0[0-9]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{5}-0[0-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{5}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{5}-1[0-2]-0[0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
<xs:pattern value="-[0-9]{5}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
```

```
            <xs:pattern value="-[0-9]{5}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="-[0-9]{5}-0[0-9]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="-[0-9]{5}-0[0-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="-[0-9]{5}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="-[0-9]{5}-1[0-2]-0[0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="-[0-9]{5}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="-[0-9]{5}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
  </xs:restriction>
</xs:simpleType>

<!-- Date time -->
<xs:simpleType name="dateTime">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
  </xs:restriction>
</xs:simpleType>

<!-- Date time (can be empty) -->
<xs:simpleType name="dateTimeEmpty">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:pattern value=""/>
            <xs:pattern value="([ ])*"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
  </xs:restriction>
</xs:simpleType>

<!-- Date time with microseconds -->
<xs:simpleType name="dateTimemsec">
  <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
```

```
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[1-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-0[1-9] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[1-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
    </xs:restriction>
</xs:simpleType>

<!-- Date time uncertainty -->
<xs:simpleType name="dateTimeUnc">
    <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
    </xs:restriction>
</xs:simpleType>

<!-- Date time uncertainty with microseconds -->
<xs:simpleType name="dateTimeUncmsec">
    <xs:restriction base="xs:string">
            <xs:whiteSpace value="collapse"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9]"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] [0-1][0-9]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-[0-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-0[0-9]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
```

```
            <xs:pattern value="[0-9]{4}-1[0-2]-[0-2][0-9] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
            <xs:pattern value="[0-9]{4}-1[0-2]-3[0-1] 2[0-3]:[0-5][0-9]:[0-5][0-9].([0-9])*"/>
  </xs:restriction>
</xs:simpleType>


<!-- ================================================================= -->
<!-- Attribute groups -->
<!-- ================================================================= -->
<!-- Owners + publish date -->
<xs:attributeGroup name="OwnersPubDateGroup">
  <xs:attribute name="owner1" type="string15NE"/>
  <xs:attribute name="owner2" type="string15NE"/>
  <xs:attribute name="owner3" type="string15NE"/>
  <xs:attribute name="pubDate" type="dateTime"/>
  <xs:attribute name="v" type="xs:string"/>
</xs:attributeGroup>

  <!-- ================================================================= -->
<!-- Groups -->
<!-- ================================================================= -->
<!-- Common network -->
<xs:group name="CommonNetworkGroup">
  <xs:sequence>
            <xs:element name="Volcanoes" type="VolcanoesType"/>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="area" type="float" minOccurs="0"/>
            <xs:element name="commonNetMap" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
    <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
</xs:group>

<!-- Latitude longitude group -->
<xs:group name="latLonGroup">
  <xs:sequence>
            <xs:element name="lat" type="deg-90-90"/>
            <xs:element name="lon" type="deg-180-180"/>
  </xs:sequence>
</xs:group>

<!-- Instrument latitude longitude group -->
<xs:group name="instLatLonGroup">
  <xs:sequence>
            <xs:element name="instLat" type="deg-90-90"/>
            <xs:element name="instLon" type="deg-180-180"/>
  </xs:sequence>
</xs:group>

<!-- Start latitude longitude group -->
<xs:group name="startLatLonGroup">
  <xs:sequence>
            <xs:element name="startLat" type="deg-90-90"/>
            <xs:element name="startLon" type="deg-180-180"/>
  </xs:sequence>
</xs:group>
```

```
<!-- Moment tensor -->
<xs:group name="momentTensorGroup">
  <xs:sequence>
        <xs:element name="momentTensorScale" type="float"/>
        <xs:element name="momentTensorXX" type="float"/>
        <xs:element name="momentTensorXY" type="float"/>
        <xs:element name="momentTensorXZ" type="float"/>
        <xs:element name="momentTensorYY" type="float"/>
        <xs:element name="momentTensorYZ" type="float"/>
        <xs:element name="momentTensorZZ" type="float"/>
  </xs:sequence>
</xs:group>


<!-- ================================================================= -->
<!-- Complex types -->
<!-- ================================================================= -->
<!-- wovoml (root) -->
<xs:complexType name="wovomlType">
  <xs:sequence>
        <!-- Observations -->
        <xs:element name="Observations" type="ObservationsType" minOccurs="0" maxOccurs="unbounded"/>
        <!-- Inferred processes -->
        <xs:element name="InferredProcesses" type="InferredProcessesType" minOccurs="0" maxOccurs="unbounded"/>
        <!-- Eruptions -->
        <xs:element name="Eruptions" type="EruptionsType" minOccurs="0" maxOccurs="unbounded"/>
        <!-- Monitoring systems -->
        <xs:element name="MonitoringSystems" type="MonitoringSystemsType" minOccurs="0" maxOccurs="unbounded"/>
        <!-- Data -->
        <xs:element name="Data" type="DataType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="version" type="xs:string" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Observations -->
<xs:complexType name="ObservationsType">
  <xs:sequence>
        <!-- Observation -->
        <xs:element name="Observation" type="ObservationType" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="volcano" type="string12NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Observation -->
<xs:complexType name="ObservationType">
  <xs:sequence>
        <xs:element name="description" type="xs:string"/>
        <xs:element name="startTime" type="dateTime" minOccurs="0"/>
        <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="volcano" type="string12NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Inferred processes -->
<xs:complexType name="InferredProcessesType">
  <xs:sequence>
```

```
            <!-- Magma movement -->
            <xs:element name="MagmaMovement" type="MagmaMovementType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Volatile saturation -->
            <xs:element name="VolatileSat" type="VolatileSatType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Magma pressure -->
            <xs:element name="MagmaPressure" type="MagmaPressureType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Hydrothermal -->
            <xs:element name="Hydrothermal" type="HydrothermalType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Regional tectonics -->
            <xs:element name="RegionalTectonics" type="RegionalTectonicsType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="volcano" type="string12NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Magma movement -->
<xs:complexType name="MagmaMovementType">
  <xs:sequence>
            <xs:element name="inferTime" type="dateTime" minOccurs="0"/>
            <xs:element name="inferTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="deepSupp" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="ascent" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="convecBelow" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="convecAbove" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="magmaMix" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="dikeIntru" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="pipeIntru" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="sillIntru" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="volcano" type="string12NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Volatile saturation -->
<xs:complexType name="VolatileSatType">
  <xs:sequence>
            <xs:element name="inferTime" type="dateTime" minOccurs="0"/>
            <xs:element name="inferTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="CO2Sat" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="H2OSat" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="decompress" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="fugacity" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="volatileAdd" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="crystalOr2ndBoil" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="vesicul" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="devesicul" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="degas" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="volcano" type="string12NE"/>
```

```
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Magma pressure -->
<xs:complexType name="MagmaPressureType">
    <xs:sequence>
            <xs:element name="inferTime" type="dateTime" minOccurs="0"/>
            <xs:element name="inferTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="gasInduced" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="tectInduced" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="volcano" type="string12NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Hydrothermal -->
<xs:complexType name="HydrothermalType">
    <xs:sequence>
            <xs:element name="inferTime" type="dateTime" minOccurs="0"/>
            <xs:element name="inferTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="heatGwater" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="poreDestab" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="poreDeform" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="hydrofract" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="boilTremor" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="absorSolGas" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="speciesEqbChange" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="boilDryChimneys" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="volcano" type="string12NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Regional tectonics -->
<xs:complexType name="RegionalTectonicsType">
    <xs:sequence>
            <xs:element name="inferTime" type="dateTime" minOccurs="0"/>
            <xs:element name="inferTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="tectonicChanges" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="staticStress" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="dynamicStrain" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="localShear" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="slowEarthquake" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="distalPressure" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="distalDepressure" type="yesNoMaybeUnkEnum" minOccurs="0"/>
```

```
            <xs:element name="hydrothermalLubrication" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="earthTide" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="atmosInfluence" type="yesNoMaybeUnkEnum" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="volcano" type="string12NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Eruptions -->
<xs:complexType name="EruptionsType">
    <xs:sequence>
            <!-- Eruption -->
            <xs:element name="Eruption" type="EruptionType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Phase alone -->
            <xs:element name="Phases" type="PhasesType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Video alone -->
            <xs:element name="Video" type="VideoAloneType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Forecast alone -->
            <xs:element name="Forecast" type="ForecastAloneType" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="volcano" type="string12NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Eruption -->
<xs:complexType name="EruptionType">
    <xs:sequence>
            <!-- Eruption information -->
            <xs:element name="name" type="string60" minOccurs="0"/>
            <xs:element name="narrative" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTimeBC"/>
            <xs:element name="startTimeBC" type="xs:integer" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeBC" minOccurs="0"/>
            <xs:element name="endTimeBC" type="xs:integer" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="climaxTime" type="dateTimeBC" minOccurs="0"/>
            <xs:element name="climaxTimeBC" type="xs:integer" minOccurs="0"/>
            <xs:element name="climaxTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Video -->
            <xs:element name="Video" type="VideoType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Phase -->
            <xs:element name="Phase" type="PhaseType" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="volcano" type="string12NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Phase -->
<xs:complexType name="PhaseType">
    <xs:sequence>
            <!-- Phase information -->
            <xs:element name="phaseNumber" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTimeBC"/>
            <xs:element name="startTimeBC" type="xs:integer" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeBC" minOccurs="0"/>
            <xs:element name="endTimeBC" type="xs:integer" minOccurs="0"/>
```

```
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="vei" type="xs:integer" minOccurs="0"/>
            <xs:element name="maxLavaExtru" type="float" minOccurs="0"/>
            <xs:element name="maxExpMassDis" type="float" minOccurs="0"/>
            <xs:element name="dre" type="float" minOccurs="0"/>
            <xs:element name="magmaMix" type="yesNoUnkEnum" minOccurs="0"/>
            <xs:element name="maxColHeight" type="float" minOccurs="0"/>
            <xs:element name="colHeightDet" type="string255" minOccurs="0"/>
            <xs:element name="minSiO2MatrixGlass" type="float" minOccurs="0"/>
            <xs:element name="maxSiO2MatrixGlass" type="float" minOccurs="0"/>
            <xs:element name="minSiO2WholeRock" type="float" minOccurs="0"/>
            <xs:element name="maxSiO2WholeRock" type="float" minOccurs="0"/>
            <xs:element name="totCrystal" type="float" minOccurs="0"/>
            <xs:element name="phenoContent" type="float" minOccurs="0"/>
            <xs:element name="phenoAssemb" type="string255" minOccurs="0"/>
            <xs:element name="preErupH2OContent" type="float" minOccurs="0"/>
            <xs:element name="phenoMeltInclusion" type="string255" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Video -->
            <xs:element name="Video" type="VideoType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Forecast -->
            <xs:element name="Forecast" type="ForecastType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Phases -->
<xs:complexType name="PhasesType">
  <xs:sequence>
            <!-- Phase alone -->
            <xs:element name="Phase" type="PhaseAloneType" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="eruption" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Phase alone -->
<xs:complexType name="PhaseAloneType">
  <xs:sequence>
            <!-- Phase information -->
            <xs:element name="phaseNumber" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTimeBC"/>
            <xs:element name="startTimeBC" type="xs:integer" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeBC" minOccurs="0"/>
            <xs:element name="endTimeBC" type="xs:integer" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="vei" type="xs:integer" minOccurs="0"/>
            <xs:element name="maxLavaExtru" type="float" minOccurs="0"/>
            <xs:element name="maxExpMassDis" type="float" minOccurs="0"/>
            <xs:element name="dre" type="float" minOccurs="0"/>
            <xs:element name="magmaMix" type="yesNoUnkEnum" minOccurs="0"/>
            <xs:element name="maxColHeight" type="float" minOccurs="0"/>
            <xs:element name="colHeightDet" type="string255" minOccurs="0"/>
            <xs:element name="minSiO2MatrixGlass" type="float" minOccurs="0"/>
            <xs:element name="maxSiO2MatrixGlass" type="float" minOccurs="0"/>
            <xs:element name="minSiO2WholeRock" type="float" minOccurs="0"/>
            <xs:element name="maxSiO2WholeRock" type="float" minOccurs="0"/>
            <xs:element name="totCrystal" type="float" minOccurs="0"/>
            <xs:element name="phenoContent" type="float" minOccurs="0"/>
```

```
            <xs:element name="phenoAssemb" type="string255" minOccurs="0"/>
            <xs:element name="preErupH2OContent" type="float" minOccurs="0"/>
            <xs:element name="phenoMeltInclusion" type="string255" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Video -->
            <xs:element name="Video" type="VideoType" minOccurs="0" maxOccurs="unbounded"/>
            <!-- Forecast -->
            <xs:element name="Forecast" type="ForecastType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="eruption" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Video -->
<xs:complexType name="VideoType">
  <xs:sequence>
            <xs:element name="link" type="string255"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="length" type="time" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Video alone -->
<xs:complexType name="VideoAloneType">
  <xs:sequence>
            <xs:element name="link" type="string255"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="length" type="time" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="volcano" type="string12NE"/>
  <xs:attribute name="eruption" type="string30NE"/>
  <xs:attribute name="phase" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Forecast -->
<xs:complexType name="ForecastType">
  <xs:sequence>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="earliestStartTime" type="dateTime" minOccurs="0"/>
            <xs:element name="earliestStartTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="latestStartTime" type="dateTime" minOccurs="0"/>
            <xs:element name="latestStartTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="issueTime" type="dateTime"/>
            <xs:element name="issueTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="timeSuccess" type="successEnum" minOccurs="0"/>
            <xs:element name="magniSuccess" type="successEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>
```

```
        <!-- Forecast alone -->
        <xs:complexType name="ForecastAloneType">
          <xs:sequence>
                    <xs:element name="description" type="string255" minOccurs="0"/>
                    <xs:element name="earliestStartTime" type="dateTime" minOccurs="0"/>
                    <xs:element name="earliestStartTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="latestStartTime" type="dateTime" minOccurs="0"/>
                    <xs:element name="latestStartTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="issueTime" type="dateTime"/>
                    <xs:element name="issueTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="timeSuccess" type="successEnum" minOccurs="0"/>
                    <xs:element name="magniSuccess" type="successEnum" minOccurs="0"/>
                    <xs:element name="comments" type="string255" minOccurs="0"/>
          </xs:sequence>
          <xs:attribute name="code" type="string30NE" use="required"/>
          <xs:attribute name="volcano" type="string12NE"/>
          <xs:attribute name="phase" type="string30NE"/>
          <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Monitoring systems -->
        <xs:complexType name="MonitoringSystemsType">
          <xs:sequence>
                    <!-- Airplane -->
                    <xs:element name="Airplane" type="AirplaneType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Satellite -->
                    <xs:element name="Satellite" type="SatelliteType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Deformation network -->
                    <xs:element name="DeformationNetwork" type="DeformationNetworkType" minOccurs="0" maxOccurs="unboun-
ded"/>
                    <!-- Deformation stations -->
                    <xs:element name="DeformationStations" type="DeformationStationsType" minOccurs="0" maxOccurs="unboun-
ded"/>
                    <!-- Deformation instruments -->
                    <xs:element name="DeformationInstruments" type="DeformationInstrumentsType" minOccurs="0" maxOccurs="un-
bounded"/>
                    <!-- Gas network -->
                    <xs:element name="GasNetwork" type="GasNetworkType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Gas stations -->
                    <xs:element name="GasStations" type="GasStationsType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Gas instruments -->
                    <xs:element name="GasInstruments" type="GasInstrumentsType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Hydrologic network -->
                    <xs:element name="HydrologicNetwork" type="HydrologicNetworkType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Hydrologic stations -->
                    <xs:element name="HydrologicStations" type="HydrologicStationsType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Hydrologic instruments -->
                    <xs:element name="HydrologicInstruments" type="HydrologicInstrumentsType" minOccurs="0" maxOccurs="un-
bounded"/>
                    <!-- Fields network -->
                    <xs:element name="FieldsNetwork" type="FieldsNetworkType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Fields stations -->
                    <xs:element name="FieldsStations" type="FieldsStationsType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Fields instruments -->
                    <xs:element name="FieldsInstruments" type="FieldsInstrumentsType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Thermal network -->
                    <xs:element name="ThermalNetwork" type="ThermalNetworkType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Thermal stations -->
                    <xs:element name="ThermalStations" type="ThermalStationsType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Thermal instruments -->
                    <xs:element name="ThermalInstruments" type="ThermalInstrumentsType" minOccurs="0" maxOc-
curs="unbounded"/>
                    <!-- Meteo network -->
```

```
                <xs:element name="MeteoNetwork" type="MeteoNetworkType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Meteo stations -->
                <xs:element name="MeteoStations" type="MeteoStationsType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Meteo instruments -->
                <xs:element name="MeteoInstruments" type="MeteoInstrumentsType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Seismic network -->
                <xs:element name="SeismicNetwork" type="SeismicNetworkType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Seismic stations -->
                <xs:element name="SeismicStations" type="SeismicStationsType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Seismic instruments -->
                <xs:element name="SeismicInstruments" type="SeismicInstrumentsType" minOccurs="0" maxOc-
curs="unbounded"/>
                <!-- Seismic components -->
                <xs:element name="SeismicComponents" type="SeismicComponentsType" minOccurs="0" maxOccurs="unboun-
ded"/>
            </xs:sequence>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Airplane -->
        <xs:complexType name="AirplaneType">
            <xs:sequence>
                <xs:element name="name" type="string50" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="description" type="string255" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
                <!-- Gas instrument -->
                <xs:element name="GasInstrument" type="GasInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Thermal instrument -->
                <xs:element name="ThermalInstrument" type="ThermalInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="code" type="string30NE" use="required"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>


        <!-- Satellite -->
        <xs:complexType name="SatelliteType">
            <xs:sequence>
                <xs:element name="name" type="string50" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="description" type="string255" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
            </xs:sequence>
            <xs:attribute name="code" type="string30NE" use="required"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>


        <!-- Deformation network -->
        <xs:complexType name="DeformationNetworkType">
            <xs:sequence>
                <xs:group ref="CommonNetworkGroup"/>
                <!-- Deformation station -->
                <xs:element name="DeformationStation" type="DeformationStationType" minOccurs="0" maxOccurs="unbounded"/>
```

```
      </xs:sequence>
      <xs:attribute name="code" type="string30NE" use="required"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Deformation station -->
    <xs:complexType name="DeformationStationType">
      <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="horizPrecision" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="refStation" type="yesNoEnum" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>

            <!-- Deformation instrument -->
            <xs:element name="DeformationInstrument" type="DeformationInstrumentType" minOccurs="0" maxOccurs="un-
bounded"/>
            <!-- Tilt/Instrument instrument -->
            <xs:element name="TiltStrainInstrument" type="TiltStrainInstrumentType" minOccurs="0" maxOc-
curs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="code" type="string30NE" use="required"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Deformation stations -->
    <xs:complexType name="DeformationStationsType">
      <xs:sequence>
            <!-- Deformation station -->
            <xs:element name="DeformationStation" type="DeformationStationAloneType" minOccurs="0" maxOccurs="unboun-
ded"/>
      </xs:sequence>
      <xs:attribute name="network" type="string30NE"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Deformation station alone -->
    <xs:complexType name="DeformationStationAloneType">
      <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="horizPrecision" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="refStation" type="yesNoEnum" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Deformation instrument -->
```

```
                <xs:element name="DeformationInstrument" type="DeformationInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Tilt/Instrument instrument -->
                <xs:element name="TiltStrainInstrument" type="TiltStrainInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="code" type="string30NE" use="required"/>
            <xs:attribute name="network" type="string30NE"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Deformation instrument -->
        <xs:complexType name="DeformationInstrumentType">
            <xs:sequence>
                <xs:element name="name" type="string255" minOccurs="0"/>
                <xs:element name="type" type="diGenTypeEnum" />
                <xs:element name="units" type="string30" minOccurs="0"/>
                <xs:element name="resolution" type="float" minOccurs="0"/>
                <xs:element name="signalToNoise" type="float" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
            </xs:sequence>
            <xs:attribute name="code" type="string30NE" use="required"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Tilt/Strain instrument -->
        <xs:complexType name="TiltStrainInstrumentType">
            <xs:sequence>
                <xs:element name="name" type="string255" minOccurs="0"/>
                <xs:element name="type" type="diTltTypeEnum"/>
                <xs:element name="depth" type="float" minOccurs="0"/>
                <xs:element name="units" type="string30" minOccurs="0"/>
                <xs:element name="resolution" type="float" minOccurs="0"/>
                <xs:element name="direction1" type="deg0-360" minOccurs="0"/>
                <xs:element name="direction2" type="deg0-360" minOccurs="0"/>
                <xs:element name="direction3" type="deg0-360" minOccurs="0"/>
                <xs:element name="direction4" type="deg0-360" minOccurs="0"/>
                <xs:element name="electroConv1" type="float" minOccurs="0"/>
                <xs:element name="electroConv2" type="float" minOccurs="0"/>
                <xs:element name="electroConv3" type="float" minOccurs="0"/>
                <xs:element name="electroConv4" type="float" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
            </xs:sequence>
            <xs:attribute name="code" type="string30NE" use="required"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Deformation instruments -->
        <xs:complexType name="DeformationInstrumentsType">
            <xs:sequence>
                <!-- Deformation instrument -->
                <xs:element name="DeformationInstrument" type="DeformationInstrumentAloneType" minOccurs="0" maxOccurs="unbounded"/>
```

```
                <!-- Tilt/Strain instrument -->
                <xs:element name="TiltStrainInstrument" type="TiltStrainInstrumentAloneType" minOccurs="0" maxOccurs="un-
bounded"/>
            </xs:sequence>
            <xs:attribute name="station" type="string30NE"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Deformation instrument alone -->
        <xs:complexType name="DeformationInstrumentAloneType">
            <xs:sequence>
                <xs:element name="name" type="string255" minOccurs="0"/>
                <xs:element name="type" type="diGenTypeEnum" />
                <xs:element name="units" type="string30" minOccurs="0"/>
                <xs:element name="resolution" type="float" minOccurs="0"/>
                <xs:element name="signalToNoise" type="float" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
            </xs:sequence>
            <xs:attribute name="code" type="string30NE" use="required"/>
            <xs:attribute name="station" type="string30NE"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Tilt/Strain instrument alone -->
        <xs:complexType name="TiltStrainInstrumentAloneType">
            <xs:sequence>
                <xs:element name="name" type="string255" minOccurs="0"/>
                <xs:element name="type" type="diTltTypeEnum"/>
                <xs:element name="depth" type="float" minOccurs="0"/>
                <xs:element name="units" type="string30" minOccurs="0"/>
                <xs:element name="resolution" type="float" minOccurs="0"/>
                <xs:element name="direction1" type="deg0-360" minOccurs="0"/>
                <xs:element name="direction2" type="deg0-360" minOccurs="0"/>
                <xs:element name="direction3" type="deg0-360" minOccurs="0"/>
                <xs:element name="direction4" type="deg0-360" minOccurs="0"/>
                <xs:element name="electroConv1" type="float" minOccurs="0"/>
                <xs:element name="electroConv2" type="float" minOccurs="0"/>
                <xs:element name="electroConv3" type="float" minOccurs="0"/>
                <xs:element name="electroConv4" type="float" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
            </xs:sequence>
            <xs:attribute name="code" type="string30NE" use="required"/>
            <xs:attribute name="station" type="string30NE"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Gas network -->
        <xs:complexType name="GasNetworkType">
            <xs:sequence>
                <xs:group ref="CommonNetworkGroup"/>
                <!-- Gas station -->
                <xs:element name="GasStation" type="GasStationType" minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
```

```
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas station -->
<xs:complexType name="GasStationType">
  <xs:sequence>
        <xs:element name="name" type="string50" minOccurs="0"/>
        <xs:group ref="latLonGroup" minOccurs="0"/>
        <xs:element name="elev" type="float" minOccurs="0"/>
        <xs:element name="permInst" type="string255" minOccurs="0"/>
        <xs:element name="type" type="string255" minOccurs="0"/>
        <xs:element name="diffUTC" type="float" minOccurs="0"/>
        <xs:element name="startTime" type="dateTime"/>
        <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="description" type="string255" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
        <!-- Gas instrument -->
        <xs:element name="GasInstrument" type="GasInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas instrument -->
<xs:complexType name="GasInstrumentType">
  <xs:sequence>
        <xs:element name="type" type="string255" minOccurs="0"/>
        <xs:element name="name" type="string255" minOccurs="0"/>
        <xs:element name="units" type="string50" minOccurs="0"/>
        <xs:element name="resolution" type="float" minOccurs="0"/>
        <xs:element name="signalToNoise" type="float" minOccurs="0"/>
        <xs:element name="calibration" type="string255" minOccurs="0"/>
        <xs:element name="startTime" type="dateTime"/>
        <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas stations -->
<xs:complexType name="GasStationsType">
  <xs:sequence>
        <!-- Gas station -->
        <xs:element name="GasStation" type="GasStationAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas station alone -->
<xs:complexType name="GasStationAloneType">
  <xs:sequence>
        <xs:element name="name" type="string50" minOccurs="0"/>
        <xs:group ref="latLonGroup" minOccurs="0"/>
        <xs:element name="elev" type="float" minOccurs="0"/>
```

```
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:element name="type" type="string255" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Gas instrument -->
            <xs:element name="GasInstrument" type="GasInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas instruments -->
<xs:complexType name="GasInstrumentsType">
  <xs:sequence>
            <!-- Gas instrument -->
            <xs:element name="GasInstrument" type="GasInstrumentAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="airplane" type="string30NE"/>
  <xs:attribute name="satellite" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas instrument alone -->
<xs:complexType name="GasInstrumentAloneType">
  <xs:sequence>
            <xs:element name="type" type="string255" minOccurs="0"/>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="units" type="string50" minOccurs="0"/>
            <xs:element name="resolution" type="float" minOccurs="0"/>
            <xs:element name="signalToNoise" type="float" minOccurs="0"/>
            <xs:element name="calibration" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="airplane" type="string30NE"/>
  <xs:attribute name="satellite" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Hydrologic network -->
<xs:complexType name="HydrologicNetworkType">
  <xs:sequence>
            <xs:group ref="CommonNetworkGroup"/>
            <!-- Hydrologic station -->
            <xs:element name="HydrologicStation" type="HydrologicStationType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>
```

```
        <!-- Hydrologic station -->
        <xs:complexType name="HydrologicStationType">
          <xs:sequence>
                    <xs:group ref="latLonGroup" minOccurs="0"/>
                    <xs:element name="elev" type="float" minOccurs="0"/>
                    <xs:element name="permInst" type="string255" minOccurs="0"/>
                    <xs:element name="name" type="string30" minOccurs="0"/>
                    <xs:element name="waterBodyType" type="string255" minOccurs="0"/>
                    <xs:element name="diffUTC" type="float" minOccurs="0"/>
                    <xs:element name="screenTop" type="float" minOccurs="0"/>
                    <xs:element name="screenBottom" type="float" minOccurs="0"/>
                    <xs:element name="wellDepth" type="double" minOccurs="0"/>
                    <xs:element name="startTime" type="dateTime"/>
                    <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                    <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="description" type="string255" minOccurs="0"/>
                    <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                    <xs:element name="comments" type="string255" minOccurs="0"/>
                    <!-- Hydrologic instrument -->
                    <xs:element name="HydrologicInstrument" type="HydrologicInstrumentType" minOccurs="0" maxOccurs="unboun-
ded"/>
          </xs:sequence>
          <xs:attribute name="code" type="string30NE" use="required"/>
          <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Hydrologic instrument -->
        <xs:complexType name="HydrologicInstrumentType">
          <xs:sequence>
                    <xs:element name="name" type="string255" minOccurs="0"/>
                    <xs:element name="type" type="string50" minOccurs="0"/>
                    <xs:element name="pressureMeasType" type="pressureMeasTypeEnum" minOccurs="0"/>
                    <xs:element name="units" type="string50" minOccurs="0"/>
                    <xs:element name="resolution" type="float" minOccurs="0"/>
                    <xs:element name="startTime" type="dateTime"/>
                    <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                    <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="description" type="string255" minOccurs="0"/>
                    <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                    <xs:element name="comments" type="string255" minOccurs="0"/>
          </xs:sequence>
          <xs:attribute name="code" type="string30NE" use="required"/>
          <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Hydrologic stations -->
        <xs:complexType name="HydrologicStationsType">
          <xs:sequence>
                    <!-- Hydrologic station alone -->
                    <xs:element name="HydrologicStation" type="HydrologicStationAloneType" maxOccurs="unbounded"/>
          </xs:sequence>
          <xs:attribute name="network" type="string30NE"/>
          <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Hydrologic station alone -->
        <xs:complexType name="HydrologicStationAloneType">
          <xs:sequence>
                    <xs:group ref="latLonGroup" minOccurs="0"/>
                    <xs:element name="elev" type="float" minOccurs="0"/>
```

```
                <xs:element name="permInst" type="string255" minOccurs="0"/>
                <xs:element name="name" type="string30" minOccurs="0"/>
                <xs:element name="waterBodyType" type="string255" minOccurs="0"/>
                <xs:element name="diffUTC" type="float" minOccurs="0"/>
                <xs:element name="screenTop" type="float" minOccurs="0"/>
                <xs:element name="screenBottom" type="float" minOccurs="0"/>
                <xs:element name="wellDepth" type="double" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="description" type="string255" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
                <!-- Hydrologic instrument -->
                <xs:element name="HydrologicInstrument" type="HydrologicInstrumentType" minOccurs="0" maxOccurs="unboun-
ded"/>
        </xs:sequence>
        <xs:attribute name="code" type="string30NE" use="required"/>
        <xs:attribute name="network" type="string30NE"/>
        <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Hydrologic instruments -->
    <xs:complexType name="HydrologicInstrumentsType">
        <xs:sequence>
                <!-- Hydrologic instrument -->
                <xs:element name="HydrologicInstrument" type="HydrologicInstrumentAloneType" maxOccurs="unbounded"/>
        </xs:sequence>
        <xs:attribute name="station" type="string30NE"/>
        <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Hydrologic instrument alone -->
    <xs:complexType name="HydrologicInstrumentAloneType">
        <xs:sequence>
                <xs:element name="name" type="string255" minOccurs="0"/>
                <xs:element name="type" type="string50" minOccurs="0"/>
                <xs:element name="pressureMeasType" type="pressureMeasTypeEnum" minOccurs="0"/>
                <xs:element name="units" type="string50" minOccurs="0"/>
                <xs:element name="resolution" type="float" minOccurs="0"/>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="description" type="string255" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
        </xs:sequence>
        <xs:attribute name="code" type="string30NE" use="required"/>
        <xs:attribute name="station" type="string30NE"/>
        <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Fields network -->
    <xs:complexType name="FieldsNetworkType">
        <xs:sequence>
                <xs:group ref="CommonNetworkGroup"/>
                <!-- Fields station -->
                <xs:element name="FieldsStation" type="FieldsStationType" minOccurs="0" maxOccurs="unbounded"/>
        </xs:sequence>
        <xs:attribute name="code" type="string30NE" use="required"/>
        <xs:attributeGroup ref="OwnersPubDateGroup"/>
```

```
</xs:complexType>

<!-- Fields station -->
<xs:complexType name="FieldsStationType">
  <xs:sequence>
        <xs:element name="name" type="string50" minOccurs="0"/>
        <xs:group ref="latLonGroup" minOccurs="0"/>
        <xs:element name="elev" type="float" minOccurs="0"/>
        <xs:element name="permInst" type="string255" minOccurs="0"/>
        <xs:element name="diffUTC" type="float" minOccurs="0"/>
        <xs:element name="startTime" type="dateTime"/>
        <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="description" type="string255" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>

        <!-- Fields instrument -->
        <xs:element name="FieldsInstrument" type="FieldsInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Fields instrument -->
<xs:complexType name="FieldsInstrumentType">
  <xs:sequence>
        <xs:element name="name" type="string255" minOccurs="0"/>
        <xs:element name="type" type="string255" minOccurs="0"/>
        <xs:element name="resolution" type="float" minOccurs="0"/>
        <xs:element name="units" type="string255" minOccurs="0"/>
        <xs:element name="sampleRate" type="float" minOccurs="0"/>
        <xs:element name="filterType" type="string255" minOccurs="0"/>
        <xs:element name="orientation" type="string255" minOccurs="0"/>
        <xs:element name="calculation" type="string255" minOccurs="0"/>
        <xs:element name="startTime" type="dateTime"/>
        <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Fields stations -->
<xs:complexType name="FieldsStationsType">
  <xs:sequence>
        <!-- Fields station alone -->
        <xs:element name="FieldsStation" type="FieldsStationAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Fields station alone -->
<xs:complexType name="FieldsStationAloneType">
  <xs:sequence>
        <xs:element name="name" type="string50" minOccurs="0"/>
        <xs:group ref="latLonGroup" minOccurs="0"/>
        <xs:element name="elev" type="float" minOccurs="0"/>
```

```
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Fields instrument -->
            <xs:element name="FieldsInstrument" type="FieldsInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Fields instruments -->
<xs:complexType name="FieldsInstrumentsType">
  <xs:sequence>
            <!-- Fields instrument alone -->
            <xs:element name="FieldsInstrument" type="FieldsInstrumentAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Fields instrument alone -->
<xs:complexType name="FieldsInstrumentAloneType">
  <xs:sequence>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="type" type="string255" minOccurs="0"/>
            <xs:element name="resolution" type="float" minOccurs="0"/>
            <xs:element name="units" type="string255" minOccurs="0"/>
            <xs:element name="sampleRate" type="float" minOccurs="0"/>
            <xs:element name="filterType" type="string255" minOccurs="0"/>
            <xs:element name="orientation" type="string255" minOccurs="0"/>
            <xs:element name="calculation" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal network -->
<xs:complexType name="ThermalNetworkType">
  <xs:sequence>
            <xs:group ref="CommonNetworkGroup"/>
            <!-- Thermal station -->
            <xs:element name="ThermalStation" type="ThermalStationType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal station -->
<xs:complexType name="ThermalStationType">
```

```
  <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:element name="thermalFeatType" type="string255" minOccurs="0"/>
            <xs:element name="groundType" type="string255" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Thermal instrument -->
            <xs:element name="ThermalInstrument" type="ThermalInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal stations -->
<xs:complexType name="ThermalStationsType">
  <xs:sequence>
            <!-- Thermal station -->
            <xs:element name="ThermalStation" type="ThermalStationAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal station alone -->
<xs:complexType name="ThermalStationAloneType">
  <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:element name="thermalFeatType" type="string255" minOccurs="0"/>
            <xs:element name="groundType" type="string255" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Thermal instrument -->
            <xs:element name="ThermalInstrument" type="ThermalInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal instrument -->
<xs:complexType name="ThermalInstrumentType">
  <xs:sequence>
            <xs:element name="type" type="string255" minOccurs="0"/>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="units" type="string50" minOccurs="0"/>
```

```
            <xs:element name="resolution" type="float" minOccurs="0"/>
            <xs:element name="signalToNoise" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal instruments -->
<xs:complexType name="ThermalInstrumentsType">
    <xs:sequence>
            <!-- Thermal instrument -->
            <xs:element name="ThermalInstrument" type="ThermalInstrumentAloneType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="airplane" type="string30NE"/>
    <xs:attribute name="satellite" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal instrument alone -->
<xs:complexType name="ThermalInstrumentAloneType">
    <xs:sequence>
            <xs:element name="type" type="string255" minOccurs="0"/>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="units" type="string50" minOccurs="0"/>
            <xs:element name="resolution" type="float" minOccurs="0"/>
            <xs:element name="signalToNoise" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="airplane" type="string30NE"/>
    <xs:attribute name="satellite" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo network -->
<xs:complexType name="MeteoNetworkType">
    <xs:sequence>
            <xs:group ref="CommonNetworkGroup"/>
            <!-- Meteo station -->
            <xs:element name="MeteoStation" type="MeteoStationType" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo station -->
<xs:complexType name="MeteoStationType">
    <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
```

```
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:element name="waterBodyType" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Meteo instrument -->
            <xs:element name="MeteoInstrument" type="MeteoInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo instrument -->
<xs:complexType name="MeteoInstrumentType">
  <xs:sequence>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="type" type="string50" minOccurs="0"/>
            <xs:element name="units" type="string50" minOccurs="0"/>
            <xs:element name="resolution" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo stations -->
<xs:complexType name="MeteoStationsType">
  <xs:sequence>
            <!-- Meteo station alone -->
            <xs:element name="MeteoStation" type="MeteoStationAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo station alone -->
<xs:complexType name="MeteoStationAloneType">
  <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="permInst" type="string255" minOccurs="0"/>
            <xs:element name="waterBodyType" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
```

```
            <!-- Meteo instrument -->
            <xs:element name="MeteoInstrument" type="MeteoInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="network" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo instruments -->
<xs:complexType name="MeteoInstrumentsType">
    <xs:sequence>
            <!-- Meteo instrument -->
            <xs:element name="MeteoInstrument" type="MeteoInstrumentAloneType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo instrument alone -->
<xs:complexType name="MeteoInstrumentAloneType">
    <xs:sequence>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="type" type="string50" minOccurs="0"/>
            <xs:element name="units" type="string50" minOccurs="0"/>
            <xs:element name="resolution" type="float" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Seismic network -->
<xs:complexType name="SeismicNetworkType">
    <xs:sequence>
            <xs:element name="Volcanoes" type="VolcanoesType" minOccurs="0"/>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:element name="velocityModel" type="string511" minOccurs="0"/>
            <xs:element name="velocityModelDetail" type="string511" minOccurs="0"/>
            <xs:element name="zeroDepth" type="string255" minOccurs="0"/>
            <xs:element name="fixedDepth" type="yesNoUnkEnum" minOccurs="0"/>
            <xs:element name="fixedDepthDesc" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime" minOccurs="0"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="numberOfSeismo" type="xs:integer" minOccurs="0"/>
            <xs:element name="numberOfBBSeismo" type="xs:integer" minOccurs="0"/>
            <xs:element name="numberOfSMPSeismo" type="xs:integer" minOccurs="0"/>
            <xs:element name="numberOfDigiSeismo" type="xs:integer" minOccurs="0"/>
            <xs:element name="numberOfAnaSeismo" type="xs:integer" minOccurs="0"/>
            <xs:element name="numberOf3CompSeismo" type="xs:integer" minOccurs="0"/>
            <xs:element name="numberOfMicro" type="xs:integer" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
```

```
            <!-- Seismic station -->
            <xs:element name="SeismicStation" type="SeismicStationType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Seismic station -->
<xs:complexType name="SeismicStationType">
  <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="instDepth" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="instType" type="string255" minOccurs="0"/>
            <xs:element name="systemGain" type="float" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>

            <!-- Seismic instrument -->
            <xs:element name="SeismicInstrument" type="SeismicInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Seismic stations -->
<xs:complexType name="SeismicStationsType">
  <xs:sequence>
            <!-- Seismic station alone -->
            <xs:element name="SeismicStation" type="SeismicStationAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="network" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Seismic station alone -->
<xs:complexType name="SeismicStationAloneType">
  <xs:sequence>
            <xs:element name="name" type="string30" minOccurs="0"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="elev" type="float" minOccurs="0"/>
            <xs:element name="instDepth" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="diffUTC" type="float" minOccurs="0"/>
            <xs:element name="instType" type="string255" minOccurs="0"/>
            <xs:element name="systemGain" type="float" minOccurs="0"/>
            <xs:element name="description" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Seismic instrument -->
            <xs:element name="SeismicInstrument" type="SeismicInstrumentType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
```

```
      <xs:attribute name="network" type="string30NE"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Seismic instrument -->
    <xs:complexType name="SeismicInstrumentType">
      <xs:sequence>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="type" type="string255" minOccurs="0"/>
            <xs:element name="dynamicRange" type="string255" minOccurs="0"/>
            <xs:element name="gain" type="float" minOccurs="0"/>
            <xs:element name="filters" type="string255" minOccurs="0"/>
            <xs:element name="numberOfComp" type="xs:integer" minOccurs="0"/>
            <xs:element name="respOverview" type="string255" minOccurs="0"/>
            <xs:element name="respFile" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Seismic component -->
            <xs:element name="SeismicComponent" type="SeismicComponentType" minOccurs="0" maxOc-
curs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="code" type="string30NE" use="required"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Seismic instruments -->
    <xs:complexType name="SeismicInstrumentsType">
      <xs:sequence>
            <!-- Seismic instrument alone -->
            <xs:element name="SeismicInstrument" type="SeismicInstrumentAloneType" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="station" type="string30NE"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Seismic instrument alone -->
    <xs:complexType name="SeismicInstrumentAloneType">
      <xs:sequence>
            <xs:element name="name" type="string255" minOccurs="0"/>
            <xs:element name="type" type="string255" minOccurs="0"/>
            <xs:element name="dynamicRange" type="string255" minOccurs="0"/>
            <xs:element name="gain" type="float" minOccurs="0"/>
            <xs:element name="filters" type="string255" minOccurs="0"/>
            <xs:element name="numberOfComp" type="xs:integer" minOccurs="0"/>
            <xs:element name="respOverview" type="string255" minOccurs="0"/>
            <xs:element name="respFile" type="string255" minOccurs="0"/>
            <xs:element name="startTime" type="dateTime"/>
            <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
            <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
            <!-- Seismic component -->
            <xs:element name="SeismicComponent" type="SeismicComponentType" minOccurs="0" maxOc-
curs="unbounded"/>
      </xs:sequence>
      <xs:attribute name="code" type="string30NE" use="required"/>
      <xs:attribute name="station" type="string30NE"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
```

```
</xs:complexType>

<!-- Seismic component -->
<xs:complexType name="SeismicComponentType">
  <xs:sequence>
        <xs:element name="name" type="string255" minOccurs="0"/>
        <xs:element name="type" type="string255" minOccurs="0"/>
        <xs:element name="respDesc" type="string255" minOccurs="0"/>
        <xs:element name="seedBandCode" type="string30" minOccurs="0"/>
        <xs:element name="sampleRate" type="float" minOccurs="0"/>
        <xs:element name="seedInstCode" type="string30" minOccurs="0"/>
        <xs:element name="seedOrientCode" type="string30" minOccurs="0"/>
        <xs:element name="sensitivity" type="string255" minOccurs="0"/>
        <xs:element name="depth" type="float" minOccurs="0"/>
        <xs:element name="startTime" type="dateTime"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Seismic components -->
<xs:complexType name="SeismicComponentsType">
  <xs:sequence>
        <!-- Seismic component -->
        <xs:element name="SeismicComponent" type="SeismicComponentAloneType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Seismic component alone -->
<xs:complexType name="SeismicComponentAloneType">
  <xs:sequence>
        <xs:element name="name" type="string255" minOccurs="0"/>
        <xs:element name="type" type="string255" minOccurs="0"/>
        <xs:element name="respDesc" type="string255" minOccurs="0"/>
        <xs:element name="seedBandCode" type="string30" minOccurs="0"/>
        <xs:element name="sampleRate" type="float" minOccurs="0"/>
        <xs:element name="seedInstCode" type="string30" minOccurs="0"/>
        <xs:element name="seedOrientCode" type="string30" minOccurs="0"/>
        <xs:element name="sensitivity" type="string255" minOccurs="0"/>
        <xs:element name="depth" type="float" minOccurs="0"/>
        <xs:element name="startTime" type="dateTime"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Volcanoes list -->
<xs:complexType name="VolcanoesType">
  <xs:sequence>
        <xs:element name="volcanoCode" maxOccurs="unbounded">
              <xs:complexType>
                    <xs:simpleContent>
                          <xs:extension base="string30">
                                <xs:attribute name="number" type="xs:integer"/>
```

```
                                        </xs:extension>
                                    </xs:simpleContent>
                                </xs:complexType>
                            </xs:element>
                    </xs:sequence>
                </xs:complexType>

                <!-- Volcano code -->
                <xs:complexType name="VolcanoCodeType">
                    <xs:sequence>
                            <xs:element name="volcanoCode" type="string30" maxOccurs="unbounded"/>
                    </xs:sequence>
                </xs:complexType>

                <!-- Data -->
                <xs:complexType name="DataType">
                    <xs:sequence>
                            <!-- Deformation -->
                            <xs:element name="Deformation" type="DeformationType" minOccurs="0"/>
                            <!-- Gas -->
                            <xs:element name="Gas" type="GasType" minOccurs="0"/>
                            <!-- Hydrologic -->
                            <xs:element name="Hydrologic" type="HydrologicType" minOccurs="0"/>
                            <!-- Fields -->
                            <xs:element name="Fields" type="FieldsType" minOccurs="0"/>
                            <!-- Thermal -->
                            <xs:element name="Thermal" type="ThermalType" minOccurs="0"/>
                            <!-- Meteo -->
                            <xs:element name="Meteo" type="MeteoType" minOccurs="0"/>
                            <!-- Seismic -->
                            <xs:element name="Seismic" type="SeismicType" minOccurs="0"/>
                    </xs:sequence>
                </xs:complexType>

                <!-- Deformation -->
                <xs:complexType name="DeformationType">
                    <xs:sequence>
                            <!-- Electronic tilt dataset -->
                            <xs:element name="ElectronicTiltDataset" type="ElectronicTiltDatasetType" minOccurs="0" maxOccurs="unboun-
ded"/>
                            <!-- Tilt vector dataset -->
                            <xs:element name="TiltVectorDataset" type="TiltVectorDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                            <!-- Strain dataset -->
                            <xs:element name="StrainDataset" type="StrainDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                            <!-- EDM dataset -->
                            <xs:element name="EDMDataset" type="EDMDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                            <!-- Angle dataset -->
                            <xs:element name="AngleDataset" type="AngleDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                            <!-- GPS dataset -->
                            <xs:element name="GPSDataset" type="GPSDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                            <!-- GPS vector dataset -->
                            <xs:element name="GPSVectorDataset" type="GPSVectorDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                            <!-- Leveling dataset -->
                            <xs:element name="LevelingDataset" type="LevelingDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                            <!-- InSAR image dataset -->
                            <xs:element name="InSARImageDataset" type="InSARImageDatasetType" minOccurs="0" maxOccurs="unboun-
ded"/>
                    </xs:sequence>
                    <xs:attributeGroup ref="OwnersPubDateGroup"/>
                </xs:complexType>

                <!-- Electronic tilt dataset -->
                <xs:complexType name="ElectronicTiltDatasetType">
```

```
  <xs:sequence>
        <!-- Electronic tilt -->
        <xs:element name="ElectronicTilt" type="ElectronicTiltType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Electronic tilt -->
<xs:complexType name="ElectronicTiltType">
  <xs:sequence>
        <xs:element name="measTime" type="dateTimemsec"/>
        <xs:element name="measTimeCsec" type="decimal" minOccurs="0"/>
        <xs:element name="measTimeUnc" type="dateTimeUncmsec" minOccurs="0"/>
        <xs:element name="measTimeCsecUnc" type="decimal" minOccurs="0"/>
        <xs:element name="sampleRate" type="double" minOccurs="0"/>
        <xs:element name="tilt1" type="double" minOccurs="0"/>
        <xs:element name="tilt2" type="double" minOccurs="0"/>
        <xs:element name="tilt1Unc" type="double" minOccurs="0"/>
        <xs:element name="tilt2Unc" type="double" minOccurs="0"/>
        <xs:element name="processed" type="processedEnum" minOccurs="0"/>
        <xs:element name="temperature" type="double" minOccurs="0"/>
        <xs:element name="battery" type="double" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Tilt vector dataset -->
<xs:complexType name="TiltVectorDatasetType">
  <xs:sequence>
        <!-- Tilt vector -->
        <xs:element name="TiltVector" type="TiltVectorType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Tilt vector -->
<xs:complexType name="TiltVectorType">
  <xs:sequence>
        <xs:element name="startTime" type="dateTime"/>
        <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
        <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="magnitude" type="float" minOccurs="0"/>
        <xs:element name="azimuth" type="deg0-360" minOccurs="0"/>
        <xs:element name="magnitudeUnc" type="float" minOccurs="0"/>
        <xs:element name="azimuthUnc" type="float" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>
```

```
<!-- Strain dataset -->
<xs:complexType name="StrainDatasetType">
  <xs:sequence>
        <!-- Strain -->
        <xs:element name="Strain" type="StrainType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Strain -->
<xs:complexType name="StrainType">
  <xs:sequence>
        <xs:element name="measTime" type="dateTime"/>
        <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="component1" type="double" minOccurs="0"/>
        <xs:element name="component2" type="double" minOccurs="0"/>
        <xs:element name="component3" type="double" minOccurs="0"/>
        <xs:element name="component4" type="double" minOccurs="0"/>
        <xs:element name="component1Unc" type="double" minOccurs="0"/>
        <xs:element name="component2Unc" type="double" minOccurs="0"/>
        <xs:element name="component3Unc" type="double" minOccurs="0"/>
        <xs:element name="component4Unc" type="double" minOccurs="0"/>
        <xs:element name="volumetricStrain" type="double" minOccurs="0"/>
        <xs:element name="volumetricStrainUnc" type="double" minOccurs="0"/>
        <xs:element name="shearStrainAxis1" type="double" minOccurs="0"/>
        <xs:element name="azimuthAxis1" type="deg0-360" minOccurs="0"/>
        <xs:element name="shearStrainAxis2" type="double" minOccurs="0"/>
        <xs:element name="azimuthAxis2" type="deg0-360" minOccurs="0"/>
        <xs:element name="shearStrainAxis3" type="double" minOccurs="0"/>
        <xs:element name="azimuthAxis3" type="deg0-360" minOccurs="0"/>
        <xs:element name="shearStrainAxis1Unc" type="double" minOccurs="0"/>
        <xs:element name="shearStrainAxis2Unc" type="double" minOccurs="0"/>
        <xs:element name="shearStrainAxis3Unc" type="double" minOccurs="0"/>
        <xs:element name="maxPrincipalStrain" type="double" minOccurs="0"/>
        <xs:element name="maxPrincipalStrainUnc" type="double" minOccurs="0"/>
        <xs:element name="minPrincipalStrain" type="double" minOccurs="0"/>
        <xs:element name="minPrincipalStrainUnc" type="double" minOccurs="0"/>
        <xs:element name="maxPrincipalStrainDir" type="deg0-360" minOccurs="0"/>
        <xs:element name="maxPrincipalStrainDirUnc" type="float" minOccurs="0"/>
        <xs:element name="minPrincipalStrainDir" type="deg0-360" minOccurs="0"/>
        <xs:element name="minPrincipalStrainDirUnc" type="float" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- EDM dataset -->
<xs:complexType name="EDMDatasetType">
  <xs:sequence>
        <!-- EDM -->
        <xs:element name="EDM" type="EDMType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="targetStation" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
```

```
</xs:complexType>

<!-- EDM -->
<xs:complexType name="EDMType">
  <xs:sequence>
        <xs:element name="measTime" type="dateTime"/>
        <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="lineLength" type="double" minOccurs="0"/>
        <xs:element name="constantErr" type="float" minOccurs="0"/>
        <xs:element name="scaleErr" type="float" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="targetStation" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Angle dataset -->
<xs:complexType name="AngleDatasetType">
  <xs:sequence>
        <!-- Angle -->
        <xs:element name="Angle" type="AngleType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="targetStation1" type="string30NE"/>
  <xs:attribute name="targetStation2" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Angle -->
<xs:complexType name="AngleType">
  <xs:sequence>
        <xs:element name="measTime" type="dateTime"/>
        <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="hAngle1" type="deg0-360" minOccurs="0"/>
        <xs:element name="hAngle2" type="deg0-360" minOccurs="0"/>
        <xs:element name="vAngle1" type="deg-90-90" minOccurs="0"/>
        <xs:element name="vAngle2" type="deg-90-90" minOccurs="0"/>
        <xs:element name="hAngle1Unc" type="float" minOccurs="0"/>
        <xs:element name="hAngle2Unc" type="float" minOccurs="0"/>
        <xs:element name="vAngle1Unc" type="float" minOccurs="0"/>
        <xs:element name="vAngle2Unc" type="float" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="targetStation1" type="string30NE"/>
  <xs:attribute name="targetStation2" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- GPS dataset -->
<xs:complexType name="GPSDatasetType">
  <xs:sequence>
        <!-- GPS -->
        <xs:element name="GPS" type="GPSType" maxOccurs="unbounded"/>
  </xs:sequence>
```

```
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="refStation1" type="string30NE"/>
    <xs:attribute name="refStation2" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- GPS -->
<xs:complexType name="GPSType">
    <xs:sequence>
                <xs:element name="measTime" type="dateTime"/>
                <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:group ref="latLonGroup" minOccurs="0"/>
                <xs:element name="elev" type="double" minOccurs="0"/>
                <xs:element name="N-SErr" type="double" minOccurs="0"/>
                <xs:element name="E-WErr" type="double" minOccurs="0"/>
                <xs:element name="verticalErr" type="float" minOccurs="0"/>
                <xs:element name="software" type="string50" minOccurs="0"/>
                <xs:element name="orbits" type="string255" minOccurs="0"/>
                <xs:element name="duration" type="string255" minOccurs="0"/>
                <xs:element name="quality" type="qualityEnum" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="refStation1" type="string30NE"/>
    <xs:attribute name="refStation2" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- GPS vector dataset -->
<xs:complexType name="GPSVectorDatasetType">
    <xs:sequence>
                <!-- GPS vector -->
                <xs:element name="GPSVector" type="GPSVectorType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- GPS vector -->
<xs:complexType name="GPSVectorType">
    <xs:sequence>
                <xs:element name="startTime" type="dateTime"/>
                <xs:element name="startTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="endTime" type="dateTimeEmpty" minOccurs="0"/>
                <xs:element name="endTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="magnitude" type="float" minOccurs="0"/>
                <xs:element name="azimuth" type="deg0-360" minOccurs="0"/>
                <xs:element name="inclination" type="deg0-90" minOccurs="0"/>
                <xs:element name="northDispl" type="float" minOccurs="0"/>
                <xs:element name="eastDispl" type="float" minOccurs="0"/>
                <xs:element name="vertDispl" type="float" minOccurs="0"/>
                <xs:element name="magnitudeErr" type="float" minOccurs="0"/>
                <xs:element name="northDisplErr" type="float" minOccurs="0"/>
                <xs:element name="eastDisplErr" type="float" minOccurs="0"/>
                <xs:element name="vertDisplErr" type="float" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
```

```
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
  </xs:complexType>

  <!-- Leveling dataset -->
  <xs:complexType name="LevelingDatasetType">
    <xs:sequence>
                <!-- Leveling -->
                <xs:element name="Leveling" type="LevelingType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="refStation" type="string30NE"/>
    <xs:attribute name="firstBMStation" type="string30NE"/>
    <xs:attribute name="secondBMStation" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
  </xs:complexType>

  <!-- Leveling -->
  <xs:complexType name="LevelingType">
    <xs:sequence>
                <xs:element name="order" type="xs:integer" minOccurs="0"/>
                <xs:element name="class" type="string30" minOccurs="0"/>
                <xs:element name="measTime" type="dateTime"/>
                <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
                <xs:element name="elevChange" type="float" minOccurs="0"/>
                <xs:element name="elevChangeUnc" type="float" minOccurs="0"/>
                <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="refStation" type="string30NE"/>
    <xs:attribute name="firstBMStation" type="string30NE"/>
    <xs:attribute name="secondBMStation" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
  </xs:complexType>

  <!-- InSAR image dataset -->
  <xs:complexType name="InSARImageDatasetType">
    <xs:sequence>
                <!-- InSAR image -->
                <xs:element name="InSARImage" type="InSARImageType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="satellite" type="string30NE"/>
    <xs:attribute name="volcano" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
  </xs:complexType>

  <!-- InSAR image -->
  <xs:complexType name="InSARImageType">
    <xs:sequence>
                <xs:group ref="startLatLonGroup" minOccurs="0"/>
                <xs:element name="startPosition" type="startPositionEnum" minOccurs="0"/>
                <xs:element name="rowOrder" type="string30" minOccurs="0"/>
                <xs:element name="numbOfRows" type="xs:integer" minOccurs="0"/>
                <xs:element name="numbOfCols" type="xs:integer" minOccurs="0"/>
                <xs:element name="units" type="string30" minOccurs="0"/>
                <xs:element name="nullValue" type="string30" minOccurs="0"/>
                <xs:element name="location" type="string255" minOccurs="0"/>
                <xs:element name="pair" type="pairStackedEnum" minOccurs="0"/>
```

```
                    <xs:element name="description" type="string255" minOccurs="0"/>
                    <xs:element name="DEM" type="string50" minOccurs="0"/>
                    <xs:element name="bytesOrder" type="string30" minOccurs="0"/>
                    <xs:element name="img1Time" type="dateTime"/>
                    <xs:element name="img1TimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="img2Time" type="dateTime"/>
                    <xs:element name="img2TimeUnc" type="dateTimeUnc" minOccurs="0"/>
                    <xs:element name="metersPixelSize" type="float" minOccurs="0"/>
                    <xs:element name="degreesPixelSize" type="float" minOccurs="0"/>
                    <xs:element name="lookAngle" type="float" minOccurs="0"/>
                    <xs:element name="limb" type="limbEnum" minOccurs="0"/>
                    <xs:element name="imagepath" type="string255" minOccurs="0"/>
                    <xs:element name="geotiff" type="string255" minOccurs="0"/>
                    <xs:element name="processMethod" type="string255" minOccurs="0"/>
                    <xs:element name="software" type="string255" minOccurs="0"/>
                    <xs:element name="DEMQuality" type="DEMQualityEnum" minOccurs="0"/>
                    <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
                    <xs:element name="comments" type="string255" minOccurs="0"/>
                    <!-- InSAR image pixels -->
                    <xs:element name="InSARPixels" type="InSARPixelsType" minOccurs="0"/>
      </xs:sequence>
      <xs:attribute name="code" type="string30NE" use="required"/>
      <xs:attribute name="instrument" type="string30NE"/>
      <xs:attribute name="satellite" type="string30NE"/>
      <xs:attribute name="volcano" type="string30NE"/>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- InSAR pixels -->
    <xs:complexType name="InSARPixelsType">
      <xs:sequence>
                    <!-- InSAR image pixel -->
                    <xs:element name="InSARPixel" type="InSARPixelType" maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:complexType>

    <!-- InSAR pixel -->
    <xs:complexType name="InSARPixelType">
      <xs:sequence>
                    <xs:element name="rangeOfChange" type="float"/>
                    <xs:element name="comments" type="string255" minOccurs="0"/>
      </xs:sequence>
      <xs:attribute name="number" type="xs:integer" use="required"/>
    </xs:complexType>

    <!-- Gas -->
    <xs:complexType name="GasType">
      <xs:sequence>
                    <!-- Gas sample dataset -->
                    <xs:element name="GasSampleDataset" type="GasSampleDatasetType" minOccurs="0" maxOc-
curs="unbounded"/>
                    <!-- Soil efflux dataset -->
                    <xs:element name="SoilEffluxDataset" type="SoilEffluxDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                    <!-- Plume dataset -->
                    <xs:element name="PlumeDataset" type="PlumeDatasetType" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
      <xs:attributeGroup ref="OwnersPubDateGroup"/>
    </xs:complexType>

    <!-- Gas sample dataset -->
    <xs:complexType name="GasSampleDatasetType">
      <xs:sequence>
                    <!-- Gas sample -->
```

```
            <xs:element name="GasSample" type="GasSampleType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas sample -->
<xs:complexType name="GasSampleType">
    <xs:sequence>
            <!-- Gas species -->
            <xs:element name="GasSpecies" type="GasSpeciesType" maxOccurs="unbounded"/>
            <xs:element name="measTime" type="dateTime"/>
            <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="temperature" type="float" minOccurs="0"/>
            <xs:element name="atmosPress" type="float" minOccurs="0"/>
            <xs:element name="emissionRate" type="float" minOccurs="0"/>
            <xs:element name="environFactors" type="string255" minOccurs="0"/>
            <xs:element name="sublimateMinerals" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gas species -->
<xs:complexType name="GasSpeciesType">
    <xs:sequence>
            <xs:element name="concentration" type="float" minOccurs="0"/>
            <xs:element name="concentrationUnc" type="float" minOccurs="0"/>
            <xs:element name="units" type="string30" minOccurs="0"/>
            <xs:element name="recalculated" type="oriRecalEnum" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="type" type="gasSpeciesEnum" use="required"/>
    <xs:attribute name="waterFree" type="yesNoEnum" use="required"/>
</xs:complexType>

<!-- Soil efflux dataset -->
<xs:complexType name="SoilEffluxDatasetType">
    <xs:sequence>
            <!-- Gas sample -->
            <xs:element name="SoilEfflux" type="SoilEffluxType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Soil efflux -->
<xs:complexType name="SoilEffluxType">
    <xs:sequence>
            <xs:element name="measTime" type="dateTime"/>
            <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="species" type="string30" minOccurs="0"/>
            <xs:element name="totalFlux" type="float" minOccurs="0"/>
            <xs:element name="totalFluxUnc" type="float" minOccurs="0"/>
            <xs:element name="numberOfPoints" type="xs:integer" minOccurs="0"/>
            <xs:element name="area" type="float" minOccurs="0"/>
            <xs:element name="highestFlux" type="float" minOccurs="0"/>
            <xs:element name="highestTemp" type="float" minOccurs="0"/>
```

```
            <xs:element name="reportedUnits" type="string30" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Plume dataset -->
<xs:complexType name="PlumeDatasetType">
    <xs:sequence>
            <!-- Plume -->
            <xs:element name="Plume" type="PlumeType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="volcano" type="string12NE"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="airplane" type="string30NE"/>
    <xs:attribute name="satellite" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Plume -->
<xs:complexType name="PlumeType">
    <xs:sequence>
            <!-- Plume species -->
            <xs:element name="PlumeSpecies" type="PlumeSpeciesType" maxOccurs="unbounded"/>
            <xs:group ref="latLonGroup" minOccurs="0"/>
            <xs:element name="height" type="float" minOccurs="0"/>
            <xs:element name="heightDetermination" type="string255" minOccurs="0"/>
            <xs:element name="measTime" type="dateTime"/>
            <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="windSpeed" type="float" minOccurs="0"/>
            <xs:element name="minWindSpeed" type="float" minOccurs="0"/>
            <xs:element name="maxWindSpeed" type="float" minOccurs="0"/>
            <xs:element name="windDirection" type="string30" minOccurs="0"/>
            <xs:element name="weatherNotes" type="string255" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="volcano" type="string12NE"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="airplane" type="string30NE"/>
    <xs:attribute name="satellite" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Plume species -->
<xs:complexType name="PlumeSpeciesType">
    <xs:sequence>
            <xs:element name="emissionRate" type="float" minOccurs="0"/>
            <xs:element name="emissionRateUnc" type="float" minOccurs="0"/>
            <xs:element name="units" type="string30" minOccurs="0"/>
            <xs:element name="recalculated" type="oriRecalEnum" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="type" type="plumeSpeciesEnum" use="required"/>
</xs:complexType>

<!-- Hydrologic -->
```

```
<xs:complexType name="HydrologicType">
  <xs:sequence>
    <!-- Hydrologic sample dataset -->
    <xs:element name="HydrologicSampleDataset" type="HydrologicSampleDatasetType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Hydrologic sample dataset -->
<xs:complexType name="HydrologicSampleDatasetType">
  <xs:sequence>
    <!-- Hydrologic sample -->
    <xs:element name="HydrologicSample" type="HydrologicSampleType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Hydrologic sample -->
<xs:complexType name="HydrologicSampleType">
  <xs:sequence>
    <!-- Hydrologic species -->
    <xs:element name="HydrologicSpecies" type="HydrologicSpeciesType" maxOccurs="unbounded"/>
    <xs:element name="measTime" type="dateTime"/>
    <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
    <xs:element name="temperature" type="float" minOccurs="0"/>
    <xs:element name="elev" type="double" minOccurs="0"/>
    <xs:element name="depth" type="double" minOccurs="0"/>
    <xs:element name="waterLevelChange" type="double" minOccurs="0"/>
    <xs:element name="atmosPress" type="float" minOccurs="0"/>
    <xs:element name="springDischRate" type="double" minOccurs="0"/>
    <xs:element name="precipitation" type="float" minOccurs="0"/>
    <xs:element name="dailyPrecipitation" type="float" minOccurs="0"/>
    <xs:element name="precipitationType" type="precipitationTypeEnum" minOccurs="0"/>
    <xs:element name="pH" type="float" minOccurs="0"/>
    <xs:element name="pHUnc" type="float" minOccurs="0"/>
    <xs:element name="conductivity" type="float" minOccurs="0"/>
    <xs:element name="conductivityUnc" type="float" minOccurs="0"/>
    <xs:element name="airTemp" type="float" minOccurs="0"/>
    <xs:element name="totalDisolvedSolid" type="float" minOccurs="0"/>
    <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
    <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Hydrologic species -->
<xs:complexType name="HydrologicSpeciesType">
  <xs:sequence>
    <xs:element name="content" type="float" minOccurs="0"/>
    <xs:element name="contentUnc" type="float" minOccurs="0"/>
    <xs:element name="units" type="string30" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="type" type="hydroSpeciesEnum" use="required"/>
</xs:complexType>

<!-- Fields -->
<xs:complexType name="FieldsType">
```

```
    <xs:sequence>
        <!-- Magnetic dataset -->
        <xs:element name="MagneticDataset" type="MagneticDatasetType" minOccurs="0" maxOccurs="unbounded"/>
        <!-- Magnetic vector dataset -->
        <xs:element name="MagneticVectorDataset" type="MagneticVectorDatasetType" minOccurs="0" maxOccurs="un-
bounded"/>
        <!-- Electric dataset -->
        <xs:element name="ElectricDataset" type="ElectricDatasetType" minOccurs="0" maxOccurs="unbounded"/>
        <!-- Gravity dataset -->
        <xs:element name="GravityDataset" type="GravityDatasetType" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>

<!-- Magnetic dataset -->
<xs:complexType name="MagneticDatasetType">
    <xs:sequence>
        <!-- Magnetic -->
        <xs:element name="Magnetic" type="MagneticType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="refStation" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Magnetic -->
<xs:complexType name="MagneticType">
    <xs:sequence>
        <xs:element name="measTime" type="dateTime"/>
        <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="F" type="double" minOccurs="0"/>
        <xs:element name="X" type="double" minOccurs="0"/>
        <xs:element name="Y" type="double" minOccurs="0"/>
        <xs:element name="Z" type="double" minOccurs="0"/>
        <xs:element name="FUnc" type="float" minOccurs="0"/>
        <xs:element name="XUnc" type="float" minOccurs="0"/>
        <xs:element name="YUnc" type="float" minOccurs="0"/>
        <xs:element name="ZUnc" type="float" minOccurs="0"/>
        <xs:element name="highPass" type="float" minOccurs="0"/>
        <xs:element name="lowPass" type="float" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
    </xs:sequence>
    <xs:attribute name="code" type="string30NE" use="required"/>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attribute name="refStation" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Magnetic vector dataset -->
<xs:complexType name="MagneticVectorDatasetType">
    <xs:sequence>
        <!-- Magnetic vector -->
        <xs:element name="MagneticVector" type="MagneticVectorType" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="instrument" type="string30NE"/>
    <xs:attribute name="station" type="string30NE"/>
    <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Magnetic vector -->
<xs:complexType name="MagneticVectorType">
```

```
  <xs:sequence>
            <xs:element name="measTime" type="dateTime"/>
            <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="declination" type="deg0-360" minOccurs="0"/>
            <xs:element name="inclination" type="deg0-90" minOccurs="0"/>
            <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Electric dataset -->
<xs:complexType name="ElectricDatasetType">
  <xs:sequence>
            <!-- Electric -->
            <xs:element name="Electric" type="ElectricType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="refStation1" type="string30NE"/>
  <xs:attribute name="refStation2" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Electric -->
<xs:complexType name="ElectricType">
  <xs:sequence>
            <xs:element name="measTime" type="dateTime"/>
            <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
            <xs:element name="field" type="float" minOccurs="0"/>
            <xs:element name="fieldUnc" type="float" minOccurs="0"/>
            <xs:element name="direction" type="deg0-360" minOccurs="0"/>
            <xs:element name="highPass" type="float" minOccurs="0"/>
            <xs:element name="lowPass" type="float" minOccurs="0"/>
            <xs:element name="selfPotential" type="float" minOccurs="0"/>
            <xs:element name="selfPotentialUnc" type="float" minOccurs="0"/>
            <xs:element name="apparentResistivity" type="float" minOccurs="0"/>
            <xs:element name="apparentResistivityUnc" type="float" minOccurs="0"/>
            <xs:element name="directResistivity" type="float" minOccurs="0"/>
            <xs:element name="directResistivityUnc" type="float" minOccurs="0"/>
     <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
            <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="refStation1" type="string30NE"/>
  <xs:attribute name="refStation2" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Gravity dataset -->
<xs:complexType name="GravityDatasetType">
  <xs:sequence>
            <!-- Gravity -->
            <xs:element name="Gravity" type="GravityType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="refStation1" type="string30NE"/>
  <xs:attribute name="refStation2" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>
```

```
<!-- Gravity -->
<xs:complexType name="GravityType">
  <xs:sequence>
    <xs:element name="measTime" type="dateTime"/>
    <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
    <xs:element name="fieldStrength" type="double" minOccurs="0"/>
    <xs:element name="fieldStrengthUnc" type="double" minOccurs="0"/>
    <xs:element name="assocVertDispl" type="string255" minOccurs="0"/>
    <xs:element name="assocGWaterLevel" type="string255" minOccurs="0"/>
    <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
    <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="refStation" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal -->
<xs:complexType name="ThermalType">
  <xs:sequence>
    <!-- Ground-based dataset -->
    <xs:element name="Ground-basedDataset" type="GroundBasedDatasetType" minOccurs="0" maxOccurs="unboun-
ded"/>
    <!-- Thermal image dataset -->
    <xs:element name="ThermalImageDataset" type="ThermalImageDatasetType" minOccurs="0" maxOccurs="un-
bounded"/>
  </xs:sequence>
</xs:complexType>

<!-- Ground-based dataset -->
<xs:complexType name="GroundBasedDatasetType">
  <xs:sequence>
    <!-- Ground-based -->
    <xs:element name="Ground-based" type="GroundBasedType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Ground-based -->
<xs:complexType name="GroundBasedType">
  <xs:sequence>
    <xs:element name="measType" type="string255" minOccurs="0"/>
    <xs:element name="measTime" type="dateTime"/>
    <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
    <xs:element name="measDepth" type="float" minOccurs="0"/>
    <xs:element name="distance" type="float" minOccurs="0"/>
    <xs:element name="recalculated" type="oriRecalEnum" minOccurs="0"/>
    <xs:element name="temperature" type="float" minOccurs="0"/>
    <xs:element name="temperatureUnc" type="float" minOccurs="0"/>
    <xs:element name="area" type="float" minOccurs="0"/>
    <xs:element name="heatFlux" type="float" minOccurs="0"/>
    <xs:element name="heatFluxUnc" type="float" minOccurs="0"/>
    <xs:element name="bgGeothermGradient" type="float" minOccurs="0"/>
    <xs:element name="conductivity" type="float" minOccurs="0"/>
    <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
    <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
```

```
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal image dataset -->
<xs:complexType name="ThermalImageDatasetType">
  <xs:sequence>
        <!-- Thermal image -->
        <xs:element name="ThermalImage" type="ThermalImageType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="volcano" type="string12NE"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="airplane" type="string30NE"/>
  <xs:attribute name="satellite" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal image -->
<xs:complexType name="ThermalImageType">
  <xs:sequence>
        <xs:element name="instPlatform" type="string255" minOccurs="0"/>
        <xs:element name="instAlt" type="float" minOccurs="0"/>
        <xs:group ref="instLatLonGroup" minOccurs="0"/>
        <xs:element name="datum" type="string30" minOccurs="0"/>
        <xs:element name="description" type="string255" minOccurs="0"/>
        <xs:element name="time" type="dateTime"/>
        <xs:element name="timeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="bandName" type="string255" minOccurs="0"/>
        <xs:element name="highBandWavelength" type="float" minOccurs="0"/>
        <xs:element name="lowBandWavelength" type="float" minOccurs="0"/>
        <xs:element name="imagepath" type="string255" minOccurs="0"/>
        <xs:element name="pixelSize" type="float" minOccurs="0"/>
        <xs:element name="maxRadiance" type="float" minOccurs="0"/>
        <xs:element name="maxRelativeRadiance" type="float" minOccurs="0"/>
        <xs:element name="hottestPixelTemp" type="float" minOccurs="0"/>
        <xs:element name="totRadiance" type="float" minOccurs="0"/>
        <xs:element name="maxHeatFlux" type="float" minOccurs="0"/>
        <xs:element name="nominalTempRes" type="float" minOccurs="0"/>
        <xs:element name="atmosCorrection" type="string255" minOccurs="0"/>
        <xs:element name="thermCorrection" type="string255" minOccurs="0"/>
        <xs:element name="orthorecProc" type="string255" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
        <!-- Thermal image pixels -->
        <xs:element name="ThermalPixels" type="ThermalPixelsType" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="volcano" type="string12NE"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attribute name="satellite" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Thermal pixels -->
<xs:complexType name="ThermalPixelsType">
  <xs:sequence>
        <!-- Thermal image pixel -->
        <xs:element name="ThermalPixel" type="ThermalPixelType" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

```
<!-- Thermal pixel -->
<xs:complexType name="ThermalPixelType">
  <xs:sequence>
        <xs:element name="elev" type="float" minOccurs="0"/>
        <xs:group ref="latLonGroup"/>
        <xs:element name="radiance" type="float" minOccurs="0"/>
        <xs:element name="heatFlux" type="float" minOccurs="0"/>
        <xs:element name="temperature" type="float" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
</xs:complexType>

<!-- Meteo -->
<xs:complexType name="MeteoType">
  <xs:sequence>
        <!-- Meteo dataset -->
        <xs:element name="MeteoDataset" type="MeteoDatasetType" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>


<!-- Meteo dataset -->
<xs:complexType name="MeteoDatasetType">
  <xs:sequence>
        <!-- Meteo -->
        <xs:element name="MeteoData" type="MeteoDataType" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Meteo -->
<xs:complexType name="MeteoDataType">
  <xs:sequence>
        <xs:element name="measTime" type="dateTime"/>
        <xs:element name="measTimeUnc" type="dateTimeUnc" minOccurs="0"/>
        <xs:element name="airTemp" type="float" minOccurs="0"/>
        <xs:element name="soilTemp" type="float" minOccurs="0"/>
        <xs:element name="baroPress" type="float" minOccurs="0"/>
        <xs:element name="dailyPrecipitation" type="float" minOccurs="0"/>
        <xs:element name="precipitationType" type="precipitationTypeEnum" minOccurs="0"/>
        <xs:element name="humidity" type="float" minOccurs="0"/>
        <xs:element name="windSpeed" type="float" minOccurs="0"/>
        <xs:element name="minWindSpeed" type="float" minOccurs="0"/>
        <xs:element name="maxWindSpeed" type="float" minOccurs="0"/>
        <xs:element name="windDirection" type="string30" minOccurs="0"/>
        <xs:element name="cloudCoverage" type="float" minOccurs="0"/>
        <xs:element name="orgDigitize" type="orgDigEnum" minOccurs="0"/>
        <xs:element name="comments" type="string255" minOccurs="0"/>
  </xs:sequence>
  <xs:attribute name="code" type="string30NE" use="required"/>
  <xs:attribute name="instrument" type="string30NE"/>
  <xs:attribute name="station" type="string30NE"/>
  <xs:attributeGroup ref="OwnersPubDateGroup"/>
</xs:complexType>

<!-- Seismic -->
<xs:complexType name="SeismicType">
  <xs:sequence>
        <!-- Network event dataset -->
```

```
                <xs:element name="NetworkEventDataset" type="NetworkEventDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Single station event dataset -->
                <xs:element name="SingleStationEventDataset" type="SingleStationEventDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Intensity dataset -->
                <xs:element name="IntensityDataset" type="IntensityDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Tremor dataset -->
                <xs:element name="TremorDataset" type="TremorDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- Interval dataset -->
                <xs:element name="IntervalDataset" type="IntervalDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- RSAM-SSAM dataset -->
                <xs:element name="RSAM-SSAMDataset" type="RSAM-SSAMDatasetType" minOccurs="0" maxOccurs="unbounded"/>
                <!-- WAVEFORM dataset -->
                <xs:element name="WaveformDataset" type="WaveformDatasetType" minOccurs="0" maxOccurs="unbounded"/>
            </xs:sequence>
        </xs:complexType>

        <!-- Network event dataset -->
        <xs:complexType name="NetworkEventDatasetType">
            <xs:sequence>
                <!-- Network event -->
                <xs:element name="NetworkEvent" type="NetworkEventType" maxOccurs="unbounded"/>
            </xs:sequence>
            <xs:attribute name="network" type="string30NE"/>
            <xs:attributeGroup ref="OwnersPubDateGroup"/>
        </xs:complexType>

        <!-- Network event -->
        <xs:complexType name="NetworkEventType">
            <xs:sequence>
                <xs:element name="seismoArchive" type="string255" minOccurs="0"/>
                <xs:element name="originTime" type="dateTimemsec"/>
                <xs:element name="originTimeCsec" type="decimal" minOccurs="0"/>
                <xs:element name="originTimeUnc" type="dateTimeUncmsec" minOccurs="0"/>
                <xs:element name="originTimeCsecUnc" type="decimal" minOccurs="0"/>
                <xs:element name="duration" type="float" minOccurs="0"/>
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Appendix-3 Volcano Data Criteria (SI-GVP)

Volcano Data Criteria

(source: http://www.volcano.si.edu/world/volcanocriteria.cfm)

Contents

Volcano Name

With few exceptions, we have used the names listed by the compilers of the Catalog of Active Volcanoes of the World (CAVW), the contributors to the International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) post-Miocene data sheets, and individual volcanologists reporting on additional volcanoes. In the case of volcanoes that comprise islands, we have preferred broader island names, locatable on standard maps, rather than crater names locally used to identify the full island volcano, and we have dropped modifiers, such as "Mount," when they seemed unnecessary. We have used square brackets, however, to indicate alternative names that are widely encountered in the literature (e.g. "Cerro Azul [Quizapu]" in Chile). For Japanese volcanoes we have listed the more widely used Hepburn style of spelling. Readers familiar with older spellings of Indonesian names will note that newer official names are used here, so that "TJ", "DJ", "J" and "OE" appear as "C", "J", "Y", and "U", respectively. Diacritical marks have recently been added to mixed-case volcano names. Because of software issues, however, they have not been added to volcano names, synonyms, or subsidiary feature names in all caps.

A few names have also been changed from the Catalog of Active Volcanoes of the World to reflect the broader time coverage of this compilation. Historically active features that are clearly part of a larger feature active in Holocene time have been listed under the larger feature. For example, the Catalog of Active Volcanoes of the World lists volcano number 0603-31= as Bromo; however, Bromo is but one of several youthful features in Tengger caldera, so we have used the caldera name and listed Bromo as a subsidiary feature. An extension of the time-coverage problem is the grouping problem mentioned above. Amboy, a solitary cinder cone 200 km east of Los Angeles, is entered as a single volcano, and so is the Michoacán-Guanajuato Field, made up of nearly 1,000 cinder cones dotting a 200 x 200 km area in Mexico. Clearly not all "volcanoes" are equal, and caution must be used in any serious counting of them.

Country / Location

Scientists typically view volcanoes in their geologic context, but their political setting is also significant. Although the hazards posed by volcanoes do not respect political boundaries, the attention devoted to mitigating those hazards is a function both of national priorities and the availability of economic resources. In this field we list the country with political jurisdiction for each volcano. In some cases these may be territories. For example, one of the world's most active volcanoes, Piton de la Fournaise, is under the administration of France, although it is located on island of Reunion in the Indian Ocean. It should be noted that although we make an attempt to be current, country names periodically change, and we are not an official source of country names. In some cases a volcano's summit will straddle political boundaries; in this situation both countries will be listed. Some volcanoes lie outside the jurisdiction of any country. In these cases a general location or subregion name will be listed and identified as a location rather than a country.

Volcano Number

The volcano numbering system, developed by the Catalog of Active Volcanoes of the World in the late 1930s and used in all their volumes, is geographic and hierarchical. The Catalog of Active Volcanoes of the World (CAVW) is a regional series of publications by IAVCEI. The first (Indonesia) was published in 1951, and the current set of 22 volumes has been an invaluable reference source for all volcanologists as well as the initial source of information for our data file. Volumes for Alaska and Iceland will soon complete the first editions of the CAVW. Although seriously dated, the catalogs remain an valuable source for maps, photographs, early bibliographies, and the petrochemistry of eruptive products.

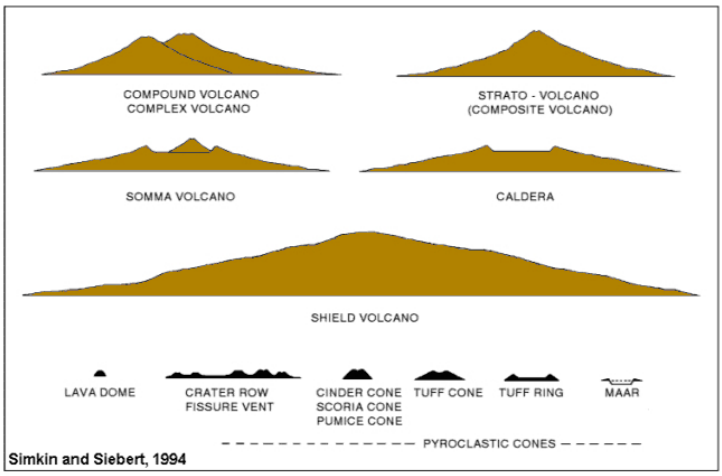
The first two numerals identify region, the next two identify subregion, and the last two or three (after the hyphen) identify individual volcanoes in that subregion. Original CAVW volcano numbers have been retained, where possible, to aid cross-referencing, but this has required, for the many volcanoes added since CAVW publication, the interpolation of 3-digit volcano numbers between 2-digit CAVW numbers. Volcanoes bearing numbers identical to those used by the CAVW carry an "=" symbol at the end of the number to facilitate reference to the CAVW for fuller descriptions.

When we have added a volcano between those already numbered, we have added a third numeral. Thus Lipari, between Stromboli (0101-04=) and Vulcano (0101-05-), is given the number 0101-041 rather than the next available two-digit number at the end of the Italian subregion. This scheme permits natural geographic sequencing of volcanoes while retaining original CAVW numbering.

When adding numbers in regions not previously numbered by the CAVW, and when renumbering in regions such as the Canary Islands and the western United States, we have used only two numerals for the individual volcano number but have designated the fact that it cannot be found under this number in the CAVW by adding a "-" in the last place. Crater Lake, in the Cascade Range of Oregon, for example, is numbered 1202-16- here, but was not included in the CAVW.

Volcano Type (Morphology)

Volcanoes come in a variety of shapes and sizes. Under the heading of type, we have attempted to characterize the morphology of each volcano. An individual volcano may be composed of a variety of landforms, such as when a stratovolcano is truncated by a caldera that is itself filled by lava domes and pyroclastic cones--but we show only the most common feature on the main volcano page and in the One-Line Summary section. Additional landform types, generally listed in order of decreasing size, can be found following the volcano name after clicking on the Synonyms and Subsidiary Features button on the main volcano page. We have followed the CAVW entry in most cases, although little attempt has been made to standardize usage. Profiles are illustrated here, but the reader should consult a volcanological textbook for further description (and recognize that different volcanologists have used different terms for the same features). Interest in the landforms of other planets has prompted a more quantitative approach to the morphology of Earth's volcanoes. Lacking a standardized nomenclature, however, we have generally listed the volcano types as given in the various sources used in our compilation.



Types of volcanoes (Simkin and Siebert, 1994). Schematic profiles are vertically exaggerated by 2:1 (shaded) and 4:1 (dark) from the data of Pike (1978). Relative sizes are only approximate, as dimensions vary within each group.

Volcano Status

This element states, essentially, the most persuasive reason for including each volcano in this compilation. A "**Historical**" eruption, documented during or shortly after observation, is the best evidence for inclusion. We list more than 540 volcanoes with historical eruptions, the criterion used by many people terming a volcano "active." However, we have tried to provide more even coverage of the globe's volcanoes, many of which carry no written record until 80 centuries after the first historically documented eruption in our file (Central Turkey, in 6200 BC). To do this we have included 183 volcanoes with dated eruptions during the last 10,000 years, as determined by techniques such as "**Radiocarbon**" dating. For volcanoes with different eruptions dated by different techniques, we have entered the technique that seemed to confirm Holocene activity most certainly. We should mention, however, that the "**Anthropology**" status covers volcanoes with undated (but recent) activity described in native legends as well as activity dated by buried artifacts.

The remaining categories cover the many volcanoes (about half of our file) for which Holocene eruptions have not been dated, but are either likely or possible. These categories will be discussed in order of decreasing certainty.

Holocene

First in certainty for undated eruptions comes the variety of general evidence lumped together under "**Holocene**" status. These locations, though without dated products, are virtually certain to have been active in postglacial time. Evidence includes: (1) volcanic products overlying latest Pleistocene glacial debris, (2) youthful volcanic landforms in areas where erosion should have been pronounced in many thousands of years, and (3) vegetation patterns that would have been far richer if the volcanic substrates were more than a few thousand (or hundred) years old. We have included in this category volcanoes mapped by original authors simply as "Holocene" or "postglacial." Some subjectivity is involved in this assignment, and the compiler is dependent upon the field experience of the original author. Many early investigators, unaware of slow erosion rates in arid regions, described lava flows as "extremely fresh, probably erupted within the last few hundred or few thousand years," but later radiometric dating has shown them to be Pleistocene or even older. Capulin volcano in New Mexico (part of the Raton-Clayton volcanic field) and the Lunar Crater volcanic field in Nevada, for example, were once thought to be Holocene, but now have been dated at about 59,000 and 18,000 years before present, respectively.

We have generally required strong evidence for "**Holocene**" age assignments, but nearly 500 volcanoes have this status in our file, and roughly another 170 (with distinctly less certainty) are identified as "**Holocene?**" (marked with a query symbol). We have similarly required strong evidence such as explicit Pleistocene age dates for removal of volcanoes from our Holocene file; we have reclassified volcanoes as "**Holocene?**" where age criteria are more ambiguous.

The "**Holocene?**" group includes locations for which equally reliable sources disagree over the existence of Holo-

cene volcanism. Also included are those for which uncertainty is expressed by the original author (e.g., "perhaps Holocene age"), and line straddlers (e.g., "late Pleistocene or early Holocene").

The Pleistocene/Holocene boundary was defined as 10,000 years BP (before present) at the 1969 INQUA Congress. More recent work with precise tree-ring chronologies has confirmed the ^{14}C 10,000-year boundary and we use it as the time period covered by our data file.

Thermal Features

Many volcanoes with obviously recent, but undated, eruptions are still visibly hot, as evidenced by surface thermal features. "**Fumarolic**" locations are those characterized by steam and volcanic gas, or fume, reaching the surface. Temperatures are near the boiling point of water and a substantial supply of groundwater is necessary. Previously we used the word "Solfataric" when sulfur dominated the volcanic gases, but we have since encountered inconsistencies with this usage and have combined it with "**Fumarolic**" here. When the volume of water is large compared to steam and gas, however, the words "Hot springs" are used. A "**Fumarolic**" or "**Hot springs**" status is assigned, however, only where we have seen no explicit evidence for Holocene eruptive activity.

N.H. Fisher, in the introduction to his 1957 CAVW Melanesia catalog, described difficulty in distinguishing between "fumarolic" and "solfataric" on the basis of temperature or gases, but felt that the former indicated a higher degree of activity and closer association with magma. Other workers have noted strong fluctuation in sulfur production through time. We believe that usage has been too inconsistent to merit retaining the two terms. "Solfatara" is the name of a tuff ring at Campi Flegrei that erupted in 1198.

Three deep-sea sites with "**Hot springs**" status were included in an earlier compilation. These sea-floor springs, which reached temperatures of 350°C, were on oceanic rift zones at the divergence of lithospheric plates. As marine exploration has continued, however, these hot springs are found to be common, and we now restrict our inclusion of deep-sea centers to those with dated eruptive activity.

Uncertain

Our least certain category, "**Uncertain**," is used for volcanoes with possible Holocene activity, but with sufficiently questionable documentation that we wanted to draw attention to that uncertainty. These entries include mariner's equivocal reports of submarine volcanism and volcanoes known only by uncertain reports of historical activity (with no other evidence of Holocene eruptions).

Pleistocene

One additional element must also be mentioned here as uncertain. We have followed the CAVW in including some thermal features, such as fumarolic fields, despite absence of other evidence for their Holocene volcanism. In fact, some areas, such as the Valles and Long Valley calderas in the western United States, show good evidence precluding eruptions in the last 10,000 years (but equally good evidence of still-molten magma below the surface). For about two dozen such volcanoes the word "**Pleistocene-**" precedes the appropriate thermal feature listed above, including the designation "**Pleistocene-Geysers**" used to identify uncommon variations of hot springs from which steam and water are periodically erupted. Although many thermal features require only a high local heat flow and groundwater, we have not included such features unless they are clearly related to volcanism.

There are some "youthful" volcanoes that we have not included. A volcano mapped as "Quaternary" would not be entered unless more specific Holocene age data were available. When a group of volcanoes is listed in a region of "Pleistocene-Holocene volcanism", we have entered only those for which Holocene evidence is available. Volcanoes listed as Holocene, or "active", in previous compilations, but later found to be Pleistocene or older, have also been excluded, as have a few "volcanoes", well established in the literature, but later found to be misidentifications.

Pleistocene time, covering the recent ice ages, is the geologic epoch starting roughly 1.6 million years ago and ending at the start of the Holocene, or "post-glacial time," around 10,000 years ago. The larger time unit, the Quaternary period, includes both Pleistocene and Holocene epochs.

Summary of Status Categories

In summary, the **Status** category conveys the following hierarchical progression from high to low certainty of Holocene volcanism: (1) "**Historical**," (2) dated eruptions based on a spectrum of techniques from "**Hydrophonic**" through "**Radiocarbon**" to "**Anthropology**", which is transitional to (3) "**Holocene**," (4) thermal features such as "**Fumarolic**", (5) "**Uncertain**", and (6) thermal features preceded by the word "**Pleistocene-**." Any entry can (and probably does) carry evidence to be found under lower levels of this hierarchy, but we have entered the highest **Status** category indicated by the data known to us. Furthermore, the **Status** listed is that of the *most recent eruptive* activity. A major Pleistocene center with only a single Holocene flank vent, for example, would have a "**Holocene**" status.

Last Known Eruption

The date of the last known confirmed eruption is listed here as a quick reference. Many additional details about this and other eruptions are provided in the Eruptive History section for the volcano. Discredited or uncertain eruptions are not shown here but are included in the complete Eruptive History list for each volcano. Note that eruptions are updated annually, and new eruptions may have occurred after this list was generated.

Elevation

Elevation of each volcano's highest point is listed in meters above or below sea level. Elevation for the same volcano may differ because of different surveying techniques or because of volcanological changes (e.g. the 400-m change in Mount St. Helens' summit height in 1980). As with latitude and longitude, when separate values for the same feature appear in different references we display here the one that seems to be most reliable. When unable to resolve a difference any other way, we normally display the more recent figure. Some topographic maps do not list spot elevations for the summits of volcanoes; in this case the elevation of the last contour is used, followed by a "+". Most elevations, both in the CAVW and original references, are given in meters, but when we have had to convert from other units we have attempted to retain a measure of the original's accuracy by rounding the conversion to the same number of significant figures as in the original. Thus a 2,600 ft elevation, apparently rounded to the nearest 100 ft, is listed here as 790 m rather than the 792 m figure that is the exact metric equivalent (but implies more accuracy than in the original measurement). Volcano elevations in feet displayed to the right of the elevation in meters are calculated from data rounded to the nearest meter and thus have an accuracy of ± 2 feet.

Less than 4% of the listed volcanoes, most of them submarine, have elevations unknown to us. Submarine volcano elevations (or depths) are particularly unreliable because changes are often rapid, dramatic, and unrecorded. We normally list the most recent elevation when several are given, but caution should be used with *all* submarine volcano elevations.

Roughly 30% of the volcanoes in our list are within 1,000 m of sea level, roughly 60% are within 2,000 m and about four-fifths are within 3,000 m of sea level. Less than 100 volcanoes have elevations above 5,000 m (16,400 ft): most of these are in the South American Andes and nearly two-thirds of the total are in that chain's central segment (15-28°S).

The highest volcano with historical eruptions is Llullaillaco in the northern Chilean Andes. Its elevation is 6,739 m and three eruptions were recorded there in the second half of the last century. Active fumaroles, however, mark the summit crater of Nevado Ojos del Salado, 267 km to the south of, and 148 m higher than, Llullaillaco. The

youthful nature of Nevado Ojos del Salado suggests that its lack of historical eruptions stems only from its remote location, and it is rightfully the world's highest volcano. The only higher mountain in the Americas, Argentina's Aconcagua at 7,021 m, was listed as active by Darwin during the voyage of the Beagle, but Chilean colleagues tell us that the mountain is not a volcano and its height results from imbricate thrust faulting.

The deepest submarine volcano in our list has less significance because the record is so poor. Seawater not only hides eruptions from view, but its weight also provides enormous pressure on the deep-sea floor, inhibiting (and often prohibiting) the explosive release of volcanic gases that frequently calls attention to shallow submarine eruptions. A few historical reports, however, give some credence to explosive volcanism on the deep-sea floor: 1955 activity at 4,000 m near Hawaii, 1865 activity at 4,200 m west of the Azores, uncertain 1852 activity at 5,300 m in the central mid-Atlantic, and an 1850 event at about 6,000 m depth off Taiwan. Non-explosive volcanism regularly takes place at great depths on the ocean floor, as shown by photography of fresh volcanic features at depths of ~5 km in the Cayman Trough, Caribbean Sea, but our record of it is exceedingly scanty.

Latitude and Longitude

Geographic coordinates are listed in decimal parts of a degree. This facilitates both computer manipulation of data and rapid estimation of distances between points (one degree of latitude being equal to 111 km). To retain some indication of the accuracy of original locations, when converting from minutes and seconds we have listed three digits to the right of the decimal point only where seconds were originally specified. We list two digits if only degrees and minutes were given in the original (e.g., 71°41' = 71.68° whereas 71°41' 01" = 71.684°). Readers should also beware of obviously generalized locations such as X.00° or Y.50°. When different references give different positions for the same volcano, we attempt to determine which is most reliable, and list that location here. For some regions, where our archive of topographic maps permits, we have obtained more precise locations than given in older sources. Maps for the Kurils and Kamchatka, for example, have permitted correction of deliberately mislocated volcano positions that were a cold war artifact. Note that some locations are the center point of broad volcanic fields; these are flagged by an "*" after the latitude. Furthermore, even at individual volcanoes the coordinates given do not necessarily match the eruption site. Tens of kilometers may separate eruptive centers of a single volcano, particularly in large caldera complexes and rift settings.

Distribution of the world's volcanoes with respect to latitude has gained wide interest because of the relationship between large volcanic eruptions and climate. Major explosive eruptions drive volcanic ash and gas tens of kilometers into the stratosphere where, because fine ash and aerosol particles settle slowly and are not washed out by rain, they may be distributed around the globe by stratospheric circulation. For months or years before settling back to Earth, then, this layer of volcanic aerosol acts as a solar radiation filter, lowering temperatures on the Earth below it. The extent to which this process has affected global climate in the past is a matter of considerable scientific debate, but the fact that individual eruptions can affect climate is established (the catastrophic eruption of Indonesia's Tambora in 1815, for example, contributed to a lowering of global temperatures that brought June snow-storms to New England and widespread crop failure to northern latitudes). The Earth's rotation strongly influences stratospheric circulation patterns and therefore any concentration of the world's volcanoes by latitude is important in assessing their effect on global climate.

Two thirds of the volcanoes are in the northern hemisphere and only about one fifth are between 10°S and the South Pole. The northern hemisphere concentration reflects the fact that two-thirds of the world's land area is also north of the equator, but nevertheless indicates the greater vulnerability of the northern hemisphere to volcanically induced climate change.

The most northerly volcano in our list is an unnamed submarine volcano in the Arctic Ocean only 192 km from the North Pole. Three eruptions have been attributed to this site. The next most northerly volcano, on Jan Mayen is-

land and 2,104 km from the pole, has been recently quite active with vigorous eruptions in 1970 and early 1985.

The southernmost historically active volcano is Mount Erebus, 1,387 km from the South Pole on Ross Island, Antarctica. This volcano was erupting violently when first seen by Ross, in 1841, and is active today with a molten lava lake that has been circulating in its summit crater since at least 1972. The many young cinder cones of the Royal Society Range, 80 km closer to the pole are probably Holocene, and local ash layers have been found in glaciers, but no eruptions have been dated.

No significant concentration of volcanoes by longitude is obvious, but over 1,000 volcanoes (or two-thirds of those listed) lie around the Pacific Ocean margin forming the well known "Ring of Fire." Linear belts of volcanoes are a striking feature of the planet and they reflect, in most cases, convergence of the major tectonic plates that make up the Earth's outer shell.

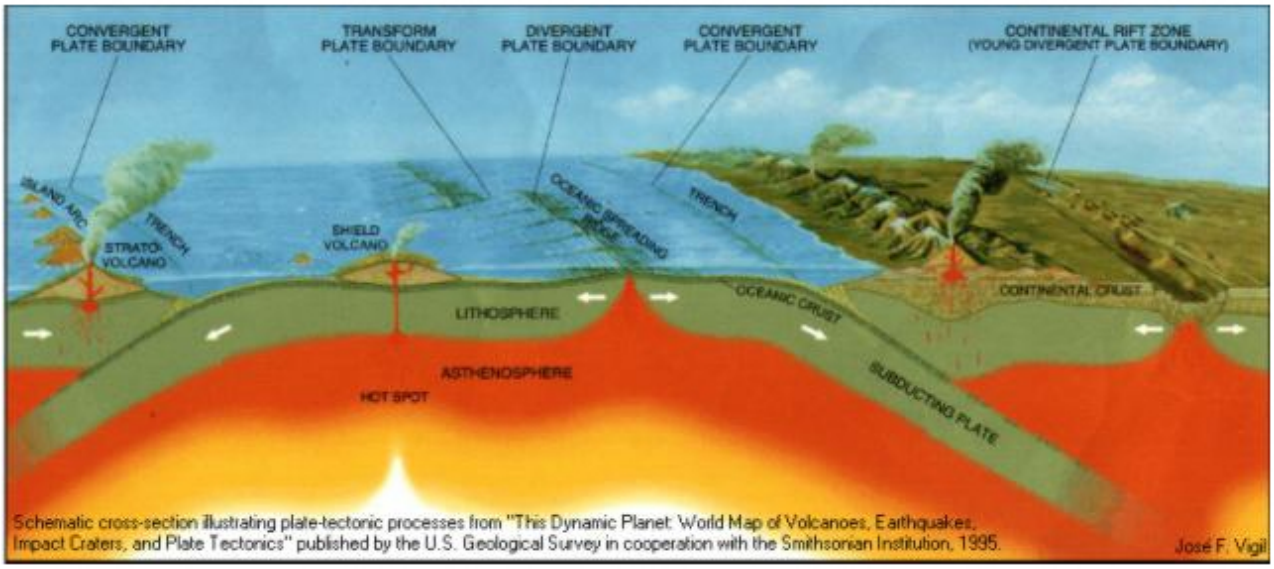
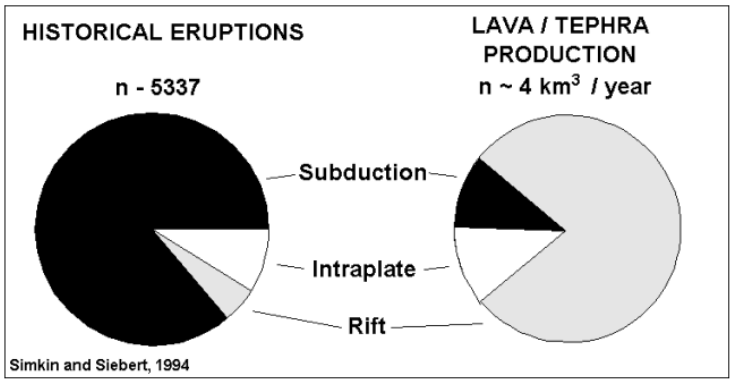


Plate Tectonics: schematic cross-section illustrating processes (Simkin and others, 1994). Artist José F. Vigil.

These vast plates, moving at speeds of only a few centimeters per year, form a shifting jig-saw puzzle with the major earthquake and volcano belts marking the unrest at plate boundaries. Where plates converge, with the thinner plate normally being thrust down under the thicker, a line of volcanoes grows above (and as a result of) the under-thrusting. Because this type of volcanism is normally both explosive and near (if not on) land, we have a reasonably complete listing of these volcanoes (approximately two-thirds of this file). The spreading apart of major plates, however, is characterized by the relatively nonexplosive outpouring of fluid lava and commonly takes place one or more kilometers below the surface of the ocean. Consequently we have a very incomplete record of this important type of volcanism. Rift volcanism forms only 5% of our eruption file and is dominated by those few regions, such as East Africa and Iceland, where the spreading apart of plates takes place above sea level. The remainder of our file--less than a tenth of the total--represents volcanism within major plates rather than at their boundaries. This takes place when deep "hot spots" penetrate the overlying crust and old volcanic products are carried slowly away from the volcanic center by the moving plate. Although our record of intraplate volcanism is probably better than that for the volcanism of spreading ocean ridges, we no doubt miss many examples, particularly from the sea floor.



Pie diagrams contrasting the volcanism that we see with that we don't (Simkin and Siebert, 1994). Left diagram shows proportion of documented historical eruptions from subduction zones (black), mid-ocean ridges (stipple), and hotspot settings (white). Right diagram shows proportion of annual magma budget in the same settings (with same symbols).

Geological Summaries

A brief background paragraph summarizes the geological history of each volcano. The text length was designed to fit in a single on-screen display in the interactive computer program in the Natural History Museum's Geology, Gems, and Minerals exhibit hall. References thus are kept to a minimum and are usually restricted to those pertinent to the volcano's age assignment (Status). Complete references for the volcano and eruption data in the Volcanoes of the World portion of this website can be found under "Data Sources."

Synonyms and Subsidiary Features

Synonym names appearing here may include older terms that are no longer in use. Subsidiary features of a volcano are divided into four categories: Cones (constructional features that can range in size from cinder cones to stratovolcanoes or shield volcanoes), Craters (vents or destructional features), Domes, and Thermal Features. There is obvious overlap between Cones and Craters, but a single entry appears under the topographically dominant feature. Two names may appear on the same line; the first name is a synonym of the name in brackets. Alternatively, a second name in parentheses is an alternate spelling of the first name. We caution users that subsidiary feature listings may be far from comprehensive, but we considered the inclusion of available data to be potentially useful despite its incompleteness.

In recent years we have begun adding location coordinates and elevation data to subsidiary feature data, but note that this remains incomplete for most earlier entries. Latitude-Longitude data mirror those for the volcano itself in that the presence of 1-2 decimal places indicates data accurate to the nearest degree and minute, while 3 decimal places marks entries with data to the nearest degree, minute, and second. Note, however, that some 3-decimal entries represent data rounded to the nearest 30 seconds (half minute).

Data Sources

The volcano and eruption data of this digital version of *Volcanoes of the World* (Siebert and Simkin, 2002-) are updated from its hardcopy predecessor (Simkin and Siebert, 1994) and originate from more than 3500 references. These references are accessible in this website through both regional and volcano-specific listings. The basic building block of the Smithsonian's volcano database is the *Catalog of Active Volcanoes of the World* (CAVW), a series of regional volcano catalogs published by IAVCEI beginning in 1951. In order to more easily locate these important compilations (which contain many primary references not listed in our compilation), these IAVCEI regional catalog references are bolded in our regional and volcano-specific listings.

The listings appearing here are not intended to be a comprehensive bibliography of references for a particular vol-

cano or region, but represent those references that are cited as the sources of the volcano and eruption data in *Volcanoes of the World*. Several other global compilations have been helpful: among them are IAVCEI data sheets of post-Miocene volcanoes (1975-80), Volcano Letter reports of the U S Geological Survey from 1926-1955 (compiled in Fiske et al., 1987), independent compilations by Latter (1975) and Gushchenko (1979), and a caldera compilation by Newhall and Dzurisin (1988). Major sources of eruption data subsequent to or supplementing the CAVW can be found in a series of annual summaries by Gustav Hantke published between 1939 and 1962 (mostly in the IAVCEI publication Bulletin of Volcanology), and annual eruption compilations by the Volcanological Society of Japan (1960-96) and Smithsonian Institution reports (since 1968) in various formats, compiled in McClelland et al., (1985) and in the Activity Reports section of this website (Venzke et al., 2002-). The data sources referenced focus almost exclusively on Holocene volcanism and emphasize papers on volcanic stratigraphy and physical volcanology. Abstracts are typically not referenced unless they contain significant data not in other sources. As with the Georef bibliographic database, diacritical marks are not used.

References are linked directly to data in our Volcano Reference File. This sometimes results in apparently incorrect citations in lists of data sources for a volcano or a region. Discussion of another volcano or eruption (sometimes far from the one that is the subject of the manuscript) may produce a citation that is not at all apparent from the title. Alert readers will note a backlog of uncited references for publications in recent years, which we will continue to address.

Regional Maps

Volcano locations are shown in two symbol sizes, with the smaller triangles representing volcanoes with uncertain Holocene eruptions. Red triangles on each map mark volcanoes of that region; yellow triangles indicate volcanoes of other regions. The physiology of the world and regional maps on this web site originates from two data sets, plotted using ER Mapper. Subaerial topography uses the GTOPO30 data set of the U S Geological Survey, and submarine topography originates from satellite altimetry data (Smith and Sandwell, 1997) of sea-surface topography, which mimics that of the sea floor.

Volcano Images

Volcano photos by Smithsonian scientists are supplemented by many other images by volcanologists from the U.S. Geological Survey and other organizations around the world. Photographers are acknowledged with individual photo credits, and their collective contributions have greatly helped to give a visual footprint to the world's volcanoes and their eruptions. Photo galleries for volcanoes show volcano morphology images first, followed by eruption images linked to the start date of the eruption. For each eruption (which may have lasted for multiple years), an image with a summary caption appears first, followed by additional images for that eruption in chronological order.

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Appendix-4 Eruption Data Criteria (SI-GVP)

Eruption Data Criteria

(source: http://www.volcano.si.edu/world/eruptioncriteria.cfm)

Contents

Introduction and Cautions

Any attempt to assess the distribution of volcanism through time must take into account the variable definitions of the word eruption. We consider an eruption to consist of the arrival of solid volcanic products at the Earth's surface. This can be in the form of either the explosive ejection of fragmental material or the effusion of initially liquid lava. This definition excludes energetic, but non-ash-bearing steam eruptions. The ejection of fragmental material, however, does not require magmatic explosions producing fresh (juvenile) pyroclastics; phreatic explosions of greatly variable intensity are produced by the interaction of volcanically generated heat and near-surface water and can eject significant amounts of old material. Most eruptions in fact result from a combination of magmatic and non-magmatic processes and are referred to as phreatomagmatic.

The duration of eruptive events also influences eruption documentation. The word eruption has variously been applied to events ranging from an individual explosion to eruptive periods lasting up to hundreds of years. Quiescent periods are common during eruptions, and we have attempted to standardize eruption data by considering clearly linked events separated by surface quiet of up to three months to be part of the same eruption. This distinction is possible at volcanoes in more populated areas, but can be problematical in the case of scattered observations from travelers who witness an ongoing eruption from a remote volcano at separate times. Furthermore, the end of an eruption is often less dramatic than its start and therefore is often not documented; consequently many eruptions have only a start date. Further discussion of the uncertainties of eruption reporting and documentation can be found in Simkin and Siebert (1994).

Eruptions are documented in a wide variety of ways. The initial IAVCEI volcano catalogs were almost entirely restricted to historical eruptions documented at or near the time of their occurrence. Even historically documented eruptions are subject to vagaries such as the extent of monitoring, the proximity (and experience) of observers, and inclement weather that can inhibit observations. Tabular compilations are devoid of essential caveats and explanatory words and underscore the cautions necessary in interpreting these events.

Eruptions preceding human observation have been documented with a variety of techniques. These are shown by an alphabetical code in the table below. The dating methods range from radiometric procedures such as radiocarbon or fission track to tephrochronology, the careful study of the stratigraphic relationships of dated and undated

tephra layers. Users should note in particular the distinction between uncorrected radiocarbon dates (**C**) and dates corrected for past variations in carbon isotopic ratios of atmospheric carbon dioxide (**G**). These dates are comparable (<100-150 years) for the last 2500 years, but begin to diverge to as much as 700-900 years for the last 4000 years of the Holocene. Some eruption reports, established in the volcanological literature such as the Catalog of Active Volcanoes of the World, have subsequently been found to be incorrect. Rather than delete these events, which could appear to be mistaken omissions, they have been flagged with an "X" to note that they have been discredited. These events (further distinguished by the fact that the eruption year is unbolded) should not be included in any eruption totals. Bolding is visible using most browsers when style sheets are enabled.

Caution is also necessary in the interpretation of historical eruption dates. In sparsely populated regions, reported eruption dates (even in recent years) may be that of major eruptive events likely to be noticed by distant observers, and minor preceding eruptive activity may go unreported. Even in populated regions, the likelihood that only major events are reported increases for events prior to the past few centuries.

Earlier historical eruption reports are further complicated by the great temporal and spatial variability in useage of calendars to document time. The Roman Julian calendar (referred to as the Old Style calendar) used in western Europe for more than 1500 years was surplanted by Papal decree in 1528 by the more precise Gregorian calendar (referred to as the New Style calendar). However, adoption of the New Style calendar was regionally variable and in some cases did not take place until the first part of the 20th century. The type of calendar used is rarely specified in the literature, and consequently it is often not known whether eruption dates are reported using Julian or Gregorian calendars (or even using regionally adopted lunar calendars). Japanese eruption dates from the Catalog of Active Volcanoes of the World have been converted to New Style dates, even for pre-1528 eruptions (Hayakawa 1996, pers. comm.); however, elsewhere the type of calendar used is often not known. Consequently we have not attempted to convert dates to the New Style calendar, but have accepted the dates used in earlier published papers or compilations. Users should note that Gregorian dates progressively diverge from Julian dates beginning with the adoption of the Julian calendar in the mid-1st century BC. Old-Style (Julian) dates are 3 days earlier during the 7th century, for example, and increase to 10 days earlier at the time of the adoption of the New-Style (Gregorian) calendar in the 16th century.

Area of Activity

The area of activity is listed for eruptions originating from known locations other than the central summit conduit. The names of flank vents and/or their location on the edifice are listed here when known. Comments (enclosed in parentheses) sometimes denote uncertainties in eruption validity or are used to identify the designated labels of specific tephra deposits.

Code Before Date (Eruption Uncertainty and Dating Techniques)

Volcanologists have used a wide range of procedures to date the prehistorical eruptions that are critical in determining the geologic history of a volcano. When an eruption date in this compilation is not historical, the dating technique used is shown by a letter code immediately preceding the start year. By far the most commonly used techniques are radiocarbon dating (corrected and uncorrected) and tephrochronology. These and other techniques are shown in the table below and then briefly described, along with associated age uncertainties.

A "**?**" before the eruption date denotes uncertainty about the validity of the eruption. This is applied, for example, to common reports that a volcano was "smoking," which could denote either simple steam emission or ash-bearing eruption plumes. The year columns of valid eruptions are bolded (visible using most browser settings) to distinguish them from the unbolded dates of both uncertain and discredited eruption reports. In some cases eruptive activity was observed from a distance, without clear indication of which volcano it originated from. These events are attached to the most probable volcanic source, but a "**@**" precedes the date to indicate uncertainty about the

source of the eruption.

Some events--although once established in the volcanological literature, such as the CAVW--have since been discredited. These are included in none of our eruption totals, but great effort is often invested in proving a reported eruption to be false, and we thought it better to retain these "non-events"--in a form that allows easy identification (and removal)--rather than have them appear to readers of earlier compilations as mistaken omissions. Discredited eruptions are flagged by an "X" before the event date. Both discredited and uncertain eruptions can be further distinguished in the eruption table by the absence of bolding of dates.

Code Before the Date

- = BC date	**H** = hydration rind - glass
? = eruption itself uncertain	**I** = ice core
@ = eruption locality uncertain	**K** = K-Ar
X = discredited eruption	**L** = lichenometry
	M = magnetism
A = anthropology	**N** = thermoluminescence
C = carbon-14 (uncorrected)	**R** = Ar-Ar
D = dendrochronology (tree ring)	**S** = SOFAR (hydrophonic)
E = surface exposure	**T** = tephrochronology
F = fission track	**U** = Uranium-Series
G = carbon-14 (corrected)	**V** = varve count

Dating Techniques

A = "ANTHROPOLOGY." Eruption dates carrying this designation include native legend (or "traditional" dates) or dates obtained from the age of human artifacts or structures buried or entrained in tephra layers or lava flows. Some are entered without a date uncertainty code (e.g., Bedouin legends of a 640 AD Arabian eruption), while other uncertainties range to 50 years (the "11th century" eruption of Mexico's Michoacán-Guanajuato), but all should be treated with some caution, recognizing the human ability to misremember an undocumented date. Still other dates have been obtained by anthropologists but entered in our file under the dating technique used (commonly 14C).

C = "^{14}C," or UNCORRECTED RADIOCARBON. This is the most common dating technique used for prehistorical eruptions. The technique is based upon the 1951 discovery that wood and other organic matter contains minute amounts of carbon's radioactive isotope (of atomic weight 14). When the organism dies, however, its radioactive carbon is no longer replenished and the proportion of ^{14}C in its carbon begins to decrease by radioactive decay. Because this decay rate is accurately known, careful laboratory measurement of the ^{14}C/^{12}C ratio in prehistoric wood can accurately date that wood's death. Although the half-life of ^{14}C is about 5568 years and its initial concentration is only one part in a trillion (10^{12}) parts of ^{12}C, ages to 100,000 years are now being successfully measured.

Radiocarbon dates are normally expressed in years BP ("before present"), and we have followed the standard

convention of treating 1950 as "present" (unless otherwise stated) in converting to calendar year dates. Some uncertainty in radiocarbon dates is guaranteed by analytical error and the fact that the ^{14}C decay rate is known only to within 30 years. Most authors combine these and other factors in a single uncertainty, or "±" value, after each radiocarbon date presented. We then accept the author's reported date and attach the appropriate uncertainty code upon entry to our file. Many eruptions' radiocarbon dates in this compilation would have been "historical" if they had taken place in southern Italy where the written record extends to 1500 BC. The "uncorrected" adjective applied to this technique is important: note the distinction between uncorrected radiocarbon dates (C) from corrected radiocarbon ages (G) discussed below under "corrected radiocarbon."

D = "DENDROCHRONOLOGY." The annual character of tree rings was first noticed by the ancient Greeks, and precise chronologies have been developed from comparison of tree-ring growth patterns. Eruptions frequently perturb the growth cycle of nearby trees, and comparison of narrowed tree ring intervals from affected trees with regional tree-ring chronologies allows the precise dating of volcanic eruptions. Distant but long-lived trees bear frost rings from known historical eruptions, and the hope is strong that tree-ring chronologies will help establish a detailed record of the planet's largest eruptions.

Other paleobotanical techniques can also be useful to volcanology. The famous eruption resulting in Oregon's Crater Lake, for example, is dated only to 50 years (nearly 6000 years ago), but careful study of pollen associated with its volcanic ash in a far-away Montana bog shows that the eruption began in the autumn and apparently continued for at least 3 years. Analysis of annual layers in Irish peat bogs is revealing detailed records (including fine particles of volcanic ash) from Icelandic eruptions, and leaf impressions under Japanese ash layers are dating prehistoric eruptions to the exact season of the year. In New Zealand, insect remains preserved by the famous Taupo eruption of the second century AD have shown that the eruption took place in the early afternoon. The application of biology to eruptive deposits holds great promise for unraveling the recent histories of many volcanoes.

E = "SURFACE EXPOSURE" This relatively new technique measures the exposure ages of rocks at the earth's surface to cosmic-ray production. Cosmic-ray production rates are dependent on both altitude and latitude, but if local cosmogenic helium (3He) production rates can be determined, helium isotopes can be used to determine the ages of rocks exposed to the surface since their formation. Chlorine isotopes (^{36}Cl) have also been used to date young volcanic rocks. Careful sampling is required, but surface exposure procedures such as these have been used to date late-Pleistocene and Holocene lava flows. The technique has somewhat larger uncertainties (many hundreds to more than a thousand years) than ages from calibrated radiocarbon dating (see below). It has been relatively infrequently used but is useful where organic material for radiocarbon dating is unavailable and correlates fairly well with radiocarbon ages where both techniques have been used.

F = "FISSION TRACK." Another relatively new technique depends upon the natural spontaneous fission decay of uranium. The resulting heavy fission particles leave minute damage tracks in volcanic glass that can be revealed by chemical etching of a cut and polished surface. The number of tracks per unit area, counted microscopically, is proportional to the age of the glass (for any given uranium content) and can therefore provide eruption dates. Although the technique is capable of better accuracy, one fission track date included here--1000 BP from Canada's Mount Edziza--carries the largest uncertainty in the VRF: 6000 years!

G - ^{14}C, or "CORRECTED RADIOCARBON." Careful radiocarbon dating has been done on selected portions of long-lived bristlecone pine trees that can be independently dated by tree-ring techniques. This work shows generally close agreement between the two methods for the last 2,500 years, but they then start to diverge until "true" tree-ring dates exceed radiocarbon dates by about 900 years for specimens at the limit of the tree-ring time scale (about 7500 years ago). The reason for this divergence is apparent variation in past content of atmospheric radiocarbon. When a corrected date is available we have proceeded it by the letter G (which can be thought of, mnemonically, as a slightly altered C), but many published dates are not accompanied by all the information required for an accurate correction, and we have not applied a correction factor to uncorrected dates in our file. The mixing of uncorrected radiocarbon dates with a growing number of calendar dates can be very misleading to readers who do not pay attention to the letter code in front prehistorical dates. It is imperative that readers be aware of the significant age difference between C and G dates: to 100-150 years during the last 2500 years rising to 900

years in the early Holocene.

H = "HYDRATION RIND." Obsidian flows are formerly-molten liquids that cooled too quickly to permit growth of the crystals that make up most volcanic rocks. The resulting glass is unstable and gradually decomposes by the addition of moisture from the atmosphere. The thickness of the hydration rind on an obsidian flow surface is proportional to the time that it has been exposed to the atmosphere, and this thickness has been used to date 10 flows in our file, mainly from Oregon's Newberry Caldera and California's Mono Craters. Uncertainties are large (several hundred to more than a thousand years) for this technique.

I = "ICE CORE." The far-traveled aerosol of major eruptions eventually settles to the earth's surface, leaving a chemical trace in glaciers and ice caps that grow by annual accumulation of snow. Cores through these annual layers then provide an important record of past volcanism that can extend, as with the new cores from Greenland, over 250,000 years. Whereas tree ring studies give unequivocal link to volcanism only if close to the source, strong sulphate layers are formed in the ice of both polar regions by major historical eruptions, and similar [even larger] layers in prehistoric portions of the core point clearly to volcanism with global distribution as the sulphate source. This gives the exciting potential of establishing a complete chronology of large eruptions, but the difficulty lies in determining what volcano was the source of a specific sulphate layer.

K = "K-Ar", Potassium-Argon dating. One of the most widely used methods of geochronometry. Like radiocarbon dating, it depends upon the relative proportions of parent (40K) to daughter (40A) isotopes, and the well-established half-life of that constant decay. It has been used to date rocks approaching the age of the earth [4.5 x 109 years], but is rarely used on materials younger than 100,000 years. The technique has been applied to some Holocene dates, but the associated uncertainties are large (often several thousand years).

L = "LICHENOMETRY." The slow but rather regular growth rate of lichens on a lava flow surface has been used to date two eruptions on Penguin Island, Antarctica [1683 and 1905 AD]. The technique is useful for establishing relative ages on young lava flows, but absolute ages require accurate baseline growth rates, under comparable conditions of-- climate and substrate, that are rarely available over more than a century.

M = "MAGNETISM." When lava cools from its molten state, it often retains an accurate "memory" of the earth's magnetic field at that time. Secular variation, or historical wander of the earth's magnetic poles, has been large enough that careful study of -a lava's magnetic "memory" may reveal its approximate date of cooling. Most dates carry uncertainties in the 25-150-year range. The accuracy of the technique decreases greatly for events older than a few thousand years, and the oldest eruption in this compilation dated by magnetics--Oregon's Mount Bachelor around 5800 BC--carries a ~750-year uncertainty.

N = "THERMOLUMINESCENCE" dating depends on the effects of radioactive decay (like the Fission Track technique) rather than direct counts of isotopic ratios. Some electrons freed during decay are trapped in crystal defects, and laboratory heating frees them, with light being produced in the process. The amount of light depends, in part, on the age of the crystal. This technique is much used by archeologists, but has uncertainties often larger than those from radiocarbon dating. This dating technique was referred to in previous compilations by the dating method code "U," a letter now used for Uranium-series dating.

R = "ARGON-ARGON" (^{40}Ar/^{39}Ar) dating was first developed in the late 1980s. It offers greater precision than typical K-Ar and requires much smaller amounts of material. During stepwise heating, a spectrum of apparent ages is shown by changing isotopic ratios (reflecting contamination) until reaching a plateau representing the crystal's true age. The technique is particularly useful for relatively young materials, and is bringing new order to geologic time scales over the past few tens of millions of years. Holocene dates can have uncertainties of several thousand years, but stratigraphically consistent ^{40}Ar/^{39}Ar ages have successfully been obtained for Holocene volcanic rocks.

S = SOFAR, or submarine "Hydrophone" detection. Explosive eruptions on the sea floor send out shock waves through the water in much the same way that earthquakes send shock waves through the solid earth's crust. The velocities are slower, about 5300 km/hr, but they travel for long distances through the SOFAR channel

(a layer of water within 1200 m of the surface) and their arrival times at submarine hydrophones can be used to locate the eruption in the same way that seismologists locate earthquake epicenters. Study of hydrophone records from observed submarine eruptions has shown features characteristic of volcanism, and when these features appear on records from more remote parts of the sea floor they have been used to locate and to date (often to the hour and minute) volcanism that would otherwise have been completely missed.

Although the quiet, nonexplosive effusion of lava that typifies most seafloor volcanism is difficult to detect by hydrophones, earthquake swarms commonly accompany these more gentle eruptions in places such as Hawaii and Iceland, and such swarms from submerged seamounts have been interpreted as submarine eruptions. We have included several volcanoes because of earthquake swarms (STATUS entered as "Seismicity") and the fresh glass dredged from their submerged summits. However, the earthquake swarms might represent magma movement without eruption, so we have preceded these dates with a question mark rather than a symbol representing a "seismic" dating technique.

T = "TEPHROCHRONOLOGY." Aristotle used the Greek word for ash, "tephra," in describing an eruption on the island of Vulcano. Because modern volcanologists define "ash" as particles smaller than 2 mm in diameter, a broader term is useful for describing material of all sizes explosively ejected by volcanoes. In 1944, Sigurdur Thorarinsson proposed the word "tephra" for this purpose and it is widely accepted today. Tephra from large explosive eruptions may be distributed over enormous distances, forming a distinctive layer that later proves useful as a "marker" horizon dating nearby layers of sediment. Careful mapping of layers throughout a volcanic area can develop a relative sequence of overlapping ash layers. When some of these ash layers are dated, either historically or by some other technique, then dates (generally with large uncertainty) can be assigned to the intervening layers in this relative sequence. The technique is a broad one, embracing a variety of field geologic and stratigraphic methods, and we have used this designation to cover prehistoric dates for which our source specified no technique. Uncertainties are often large (hundreds to a few thousand years), and those dates without listed uncertainties should likewise be treated with caution.

U = "URANIUM-SERIES." Several dating techniques utilize Uranium-series disequilibrium ratios. The Uranium-Thorium disequilibrium series is often used to date carbonate materials such as speleothems, travertines, corals, deep sea sediments, bones, teeth, peat, or evaporites. More complex applications of this technique have also been applied to volcanic rocks. ^{230}Thorium, part of the ^{238}Uranium decay series, has a half-life of about 75,000 years, in comparison to the half-life of ^{238}Uranium of 4,470,000,000 years. When the amounts of Uranium and Thorium isotopes are compared, an estimation of the age of an object can be obtained. This technique has been applied to volcanic rocks as young as the end of the Pleistocene and the beginning of the Holocene and has relatively large uncertainties (from hundreds to a few thousand years) during these time intervals. Other Uranium-series nuclides have shorter half-lives. ^{226}Ra-^{230}Th ratios have been used to date eruptions during the mid-Holocene, and ^{210}Po-^{210}Pb ratios have been applied to eruptions as young as a few decades or less.

V = "VARVE COUNT." Seasonal changes affect the sediment accumulation in many small lakes, particularly where the spring melting of ice provides an annual layer of coarse sandy particles to the lake floor in alternation with the finer clay deposited through the rest of the year. These layers, or varves, can later be counted to establish the date for a layer of volcanic ash in their midst. Like tree rings and ice-core layers, these annual layers provide very accurate dates under ideal conditions and careful work, but uncertainty increases with age and non-ideal conditions. Few dates in the file carry stated uncertainties (up to several hundred years). The sediments of Turkey's Lake Van provide a remarkable record--16 eruptions since 8104 BC--of nearby Nemrut volcano, but uncertainties are not listed.

Code After the Date (Date Uncertainty)

Codes after dates denote uncertainties about the date itself. When the date is known only to the year or month, the following columns are left blank. Letter codes are used when the size of the dating uncertainty is known. This allows us to deal with eruption dates known only between two observations ("after July 10 but before July 24"

would be shown as 0717**g**). Frequently used codes include a "**t**" in the year column (± 50); a 17th century eruption would appear as 1650**t**. A "**p**" in the month column (± 30) likewise would be used for an eruption known only to have begun in July or August. Larger uncertainties (such as those accompanying radiocarbon dates) may not exactly match one of the codes below; in these cases the closest available letter is used.

A "**>**" symbol after the year or the day indicates that the eruption was continuing as of that date. There is substantially less interest in documenting the end of an eruption than either its beginning or its most vigorous phases; consequently many eruptions (even in recent years) are listed as "continuing." The waning stages of an eruption are often not considered noteworthy, and unreported eruptive activity may occur after the departure of observers from an isolated volcano. When an eruption is reported to be continuing on one date, and on a later date activity is observed to have ceased, the mid-point of the range is entered as the stop date (along with the appropriate uncertainty range). If the time between these observations is long, however, the eruption is generally listed as continuing on the date of the last observation. All these factors emphasize the substantial caution necessary when interpreting eruption stop dates.

Code	±Years	±Days
a	1	1
b	2	2
c	3	3
d	4	4
e	5	5
f	6	6
g	7	7
h	8	8
i	9	9
j	10	10
k	12	12
m	14	15
n	16	20
>	After date listed	

Code	±Years	±Days
o	18	25
p	20	30 (1 mo)
q	25	45
r	30	60 (2 mo)
s	40	75
t	50	90 (3 mo)
u	75	120
v	100	150
w	150	180 (6 mo)
x	200	270
y	300	365 (1 yr)
z	500	545
*	1000	730 (2 yr)
?	Date uncertain (no data)	
<	Before date listed	

EXAMPLES:

```
1731<        = on or before 1731
1731a        = between 1730 & 1732
1731  1105d = between Nov 1 & 9
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1750t        = 18th century
1790j        = late 18th century
1778 02 ?    = February (?) 1778
```

Eruptive Characteristics

Twenty common eruptive characteristics designated by the IAVCEI originators of the Catalog of Active Volcanoes of the World are shown in these tables. The reported presence of a particular characteristic is shown by an "**X**" in the appropriate column, a "**?**" marks uncertain occurrence, and a "-" indicates that this characteristic was not reported. This tabular format allows quick visual inspection of the occurrence of a particular eruptive characteristic, but the quality of eruption reporting is highly variable, and the absence of an "**X**" does not necessarily mean that this characteristic did not occur.

Eruptive characteristics are shown in five groups of four. The first four characteristics relate to vent location, and note activity originating from the central vent and/or from flank vent(s). Some eruptions may originate from long fissures cutting the summit or flanks of the volcano. These may be either radial to the central conduit or parallel to regional tectonic trends. The second four characteristics relate to interaction with water, and document submarine eruptions (and their occasional formation of new islands), subglacial eruptions, and those from crater lakes. The third group covers tephra-related processes, such as explosive eruptions, the formation of pyroclastic flows and surges (hot glowing avalanches--sometimes referred to as nuées ardentes--that can move down slopes at hurricane velocities), phreatic explosions, and fumarolic activity. The fourth group documents processes related to lava extrusion, and includes lava flows, lava lakes (molten lakes over submerged vents that may keep lava circulating for years), lava domes (the extrusion of viscous lava that accumulates around the vent), and lava spines. The last group documents the impact of eruptions on humans, and notes the occurrence of fatalities, damage to land, property, etc., as well as the formation of often destructive mudflows (also referred to by the Indonesian term lahar) and tsunamis. Mudflows directly associated with glacier outbursts (often known by the Icelandic term jökulhlaups) are identified by a "**J**" rather than the "**X**" used to indicate other characteristics.

Place
C = Central crater eruption
E = Flank (excentric) vent
R = Radial fissure eruption
F = Regional fissure eruption

Water
S = Submarine eruption
I = New island formation
G = Subglacial eruption
C = Crater lake eruption

Tephra
E = Explosive
N = Pyroclastic flows
P = Phreatic explosions
F = Fumarolic activity

Lava
F = Lava flow(s)
L = Lava lake eruption
D = Dome extrusion
S = Spine extrusion

Damage
F = Fatalities
D = Damage (land, property, etc)
M = Mudflows (lahars)
T = Tsunami (giant sea waves)

Symbol Key
X = recorded
? = uncertain
- = not recorded

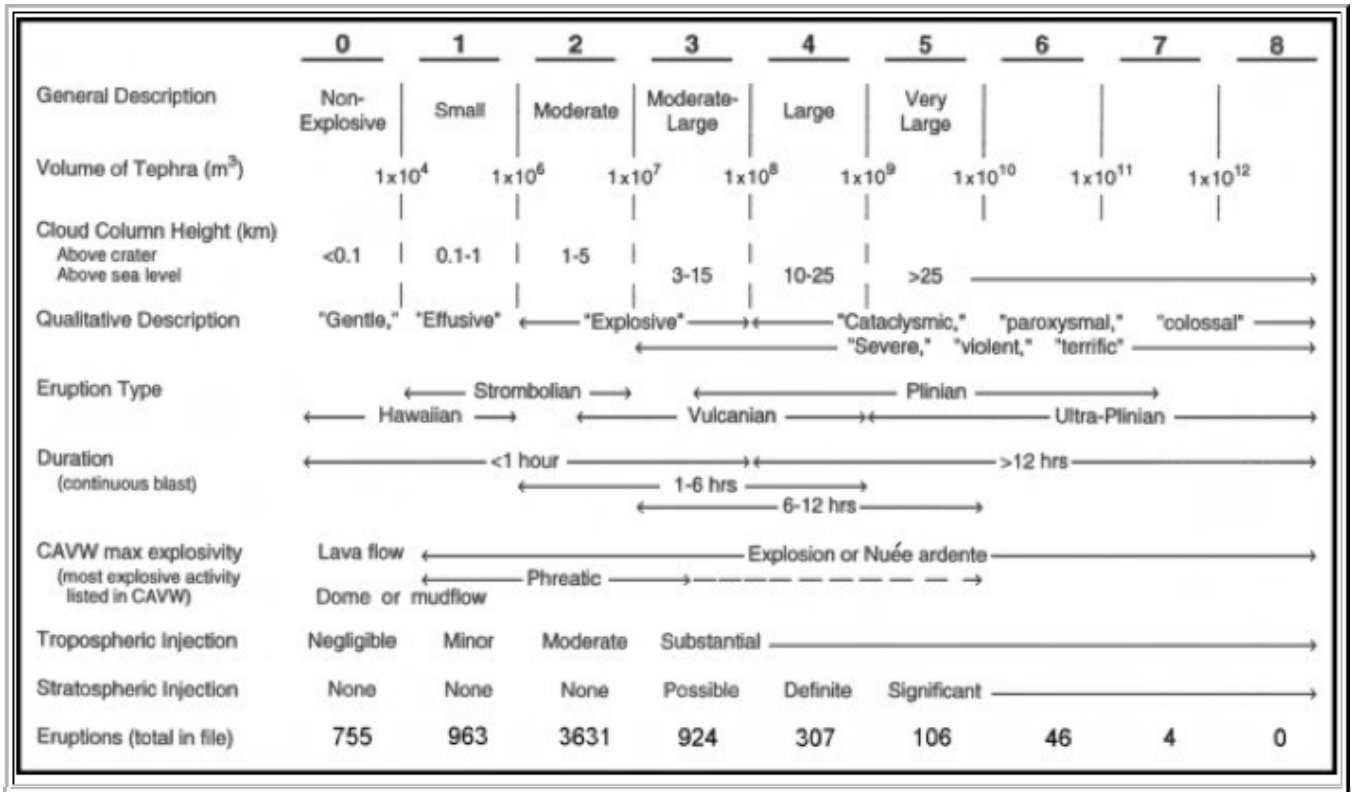
The 20 standardized eruptive characteristics of the IAVCEI volcano catalog displayed in the "Eruptive History (table)" format are supplemented by three additional eruptive characteristics in the "Eruptive History (expanded)" format. These are "Caldera collapse," "Evacuation," and "Debris avalanche(s)." Caldera collapse is restricted to caldera formation by magma chamber collapse and is not used for large horseshoe-shaped avalanche calderas formed by sector collapse of the volcanic edifice. The latter can often be distinguished by the occurrence of the "Debris avalanche(s) characteristic that accompanies these edifice failures, although sometimes this characteristic is attached to smaller slope failures.

Particular caution should be used in the interpretation of several eruptive characteristics. Although the Catalog of Active Volcanoes of the World volumes distinguished phreatic explosions from "normal" explosions, many historical reports are inadequate to distinguish magmatic from phreatic explosions, and the presence of an "**X**" in the Explosive column should not be taken as an indication of magmatic eruptions. Solfataric or fumarolic activity accompanies most eruptions, but the Fumarolic column has been mostly restricted to cases where original accounts are unclear as to whether explosive activity or only fumarolic activity occurred. The formation of lava spines was in-

cluded by the Catalog of Active Volcanoes of the World compilers in part as a response to the spectacular 311-m-high spine that temporarily formed during the 1902 Pelée eruption in the West Indies. However, this typically minor process accompanying the growth of lava domes is often not documented, and this column does not reflect the actual frequency of spine formation.

VEI (Volcanic Explosivity Index)

The reported size, or "bigness," of historical eruptions depends very much on both the experience and vantage point of the observer. To meet the need for a meaningful magnitude measure that can be easily applied to eruption sizes, Newhall and Self (1982) integrated quantitative data with the subjective descriptions of observers, resulting in the Volcanic Explosivity Index (VEI). It is a simple 0-to-8 index of increasing explosivity, with each successive integer representing about an order of magnitude increase. Criteria for VEI assignments are shown in the table below, which is followed by examples of eruptions in different VEI size classes. VEI assignments have been updated from those in Newhall and Self (1982) and Simkin and Siebert (1994).



VEI	Tephra Volume (km3)	Example
0	Effusive	Masaya (Nicaragua), 1570
1	>0.00001	Poás (Costa Rica), 1991
2	>0.001	Ruapehu (New Zealand), 1971
3	>0.01	Nevado del Ruiz (Colombia), 1985
4	>0.1	Pelée (West Indies), 1902
5	>1	Mount St. Helens (United States), 1980
6	>10	Krakatau (Indonesia), 1883
7	>100	Tambora (Indonesia), 1815
8	>1000	Yellowstone (United States), Pleistocene

Codes associated with the VEI

A "*****" following a VEI indicates that there are two or more VEI assignments for that eruption, as in the common example of one or more short, paroxysmal eruptions preceded by lower level activity. The "*****" follows the maximum VEI recorded between the indicated start and stop dates, and alerts the user to the fact that more information on the eruption exists.

A "**?**" accompanies those VEIs that were particularly difficult to assign, and those that are based on purely circumstantial evidence. For example, a VEI of 1? might have been assigned to an undescribed eruption because a nearby contemporaneous eruption received sufficient historical comment to confidently assign a VEI of 2. When there was simply no evidence on which to base a VEI, this column has normally been left empty (20% of the eruptions in our file).

A "**+**" following a VEI indicates an eruption volume in the upper third of the range for that particular VEI designation. It shows those eruptions known to be larger than most others sharing the same VEI numeral, but its absence does not necessarily indicate a relatively small event. The designation is used only for VEIs > 4, volume data permit adding it to only 22 events globally, but it is helpful to identify the obviously larger events in volume ranges that span a full order of magnitude.

A very few eruptions, mostly before 1500 AD, have been upgraded by one VEI unit with the assumption that early in the historical record only relatively large eruptions would have been documented. These are shown by a "**^**" following the VEI.

Eruptions associated with caldera collapse are normally large (probably VEI >4), and those for which data are lacking to assign a specific VEI are indicated by a "**C**" in the VEI column. Likewise, Plinian eruptions in the absence of more quantitative data are marked with a "**P**" in the VEI column.

Eruptions that were definitely explosive, but lack other descriptive information to assess their magnitude, have been assigned a default VEI of 2, that of "moderate" eruptions. Conversely, other eruptions in which substantial tephra volumes were accumulated over long periods of time and/or much of the tephra volume was in near-vent cone construction, have been downgraded by one VEI unit.

Eruptive Volumes

Accurate measurement of eruptive volumes requires careful field work and is often subject to unresolvable uncertainties. Consequently, volume information is available for only a small proportion of eruptions. Volume data is displayed in two different formats. Because of space constraints in the *Eruptive History* table view, only the order of magnitude (in cubic meters) of calculated lava and/or tephra volumes is displayed. An entry of 8/9 under the L/T header, for example, indicates an eruption with 10^8 m^3 of lava and 10^9 m^3 of tephra. Because only the exponent is displayed, this means that the eruption volume may be nearly 10 times larger than shown. The *Eruptive History* expanded view, in contrast, has room to display the full volume data, including in some cases uncertainty ranges. It is important to note that tephra and lava volumes are listed without correction for vesicularity (the void space occupied by air bubbles, or vesicles), the extraneous fragments of older rock included accidentally in the deposit, or compaction of ash layers with time. The tephra volumes displayed, therefore, are bulk tephra volumes, and not Dense Rock Equivalents (DRE), or volumes of new magma erupted.

Data Sources

The volcano and eruption data of this digital version of *Volcanoes of the World* (Siebert and Simkin, 2002-) are updated from its hardcopy predecessor (Simkin and Siebert, 1994) and originate from more than 3500 references.

These references are accessible in this website through both regional and volcano-specific listings. The basic building block of the Smithsonian's volcano database is the *Catalog of Active Volcanoes of the World* (CAVW), a series of regional volcano catalogs published by IAVCEI beginning in 1951. In order to more easily locate these important compilations (which contain many primary references not listed in our compilation), these IAVCEI regional catalog references are bolded in our regional and volcano-specific listings.

The listings appearing here are not intended to be a comprehensive bibliography of references for a particular volcano or region, but represent those references that are cited as the sources of the volcano and eruption data in *Volcanoes of the World*. Several other global compilations have been helpful: among them are IAVCEI data sheets of post-Miocene volcanoes (1975-80), Volcano Letter reports of the U S Geological Survey from 1926-1955 (compiled in Fiske et al., 1987), independent compilations by Latter (1975) and Gushchenko (1979), and a caldera compilation by Newhall and Dzurisin (1988). Major sources of eruption data subsequent to or supplementing the CAVW can be found in a series of annual summaries by Gustav Hantke published between 1939 and 1962 (mostly in the IAVCEI publication Bulletin of Volcanology), and annual eruption compilations by the Volcanological Society of Japan (1960-96) and Smithsonian Institution reports (since 1968) in various formats, compiled in McClelland et al., (1985) and in the Activity Reports section of this website (Venzke et al., 2002-). The data sources referenced focus almost exclusively on Holocene volcanism and emphasize papers on volcanic stratigraphy and physical volcanology. Abstracts are typically not referenced unless they contain significant data not in other sources. As with the Georef bibliographic database, diacritical marks are not used.

References are linked directly to data in our Volcano Reference File. This sometimes results in apparently incorrect citations in lists of data sources for a volcano or a region. Discussion of another volcano or eruption (sometimes far from the one that is the subject of the manuscript) may produce a citation that is not at all apparent from the title. Alert readers will note a backlog of uncited references for publications in recent years, which we will continue to address.

Regional Maps

Volcano locations are shown in two symbol sizes, with the smaller triangles representing volcanoes with uncertain Holocene eruptions. Red triangles on each map mark volcanoes of that region; yellow triangles indicate volcanoes of other regions. The physiology of the world and regional maps on this web site originates from two data sets, plotted using ER Mapper. Subaerial topography uses the GTOPO30 data set of the U S Geological Survey, and submarine topography originates from satellite altimetry data (Smith and Sandwell, 1997) of sea-surface topography, which mimics that of the sea floor.

Volcano Images

Volcano photos by Smithsonian scientists are supplemented by many other images by volcanologists from the U.S. Geological Survey and other organizations around the world. Photographers are acknowledged with individual photo credits, and their collective contributions have greatly helped to give a visual footprint to the world's volcanoes and their eruptions. Photo galleries for volcanoes show volcano morphology images first, followed by eruption images linked to the start date of the eruption. For each eruption (which may have lasted for multiple years), an image with a summary caption appears first, followed by additional images for that eruption in chronological order.

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Appendix-5 Relational Database Terminology and Concepts

Databases: Terminology and Relational Database Concepts

Taken from: http://pubs.logicalexpressions.com/pub0009/LPMArticle.asp?ID=73

by Beth Melton

This article covers database terminology and is an introduction to *Relational Database Concepts.*

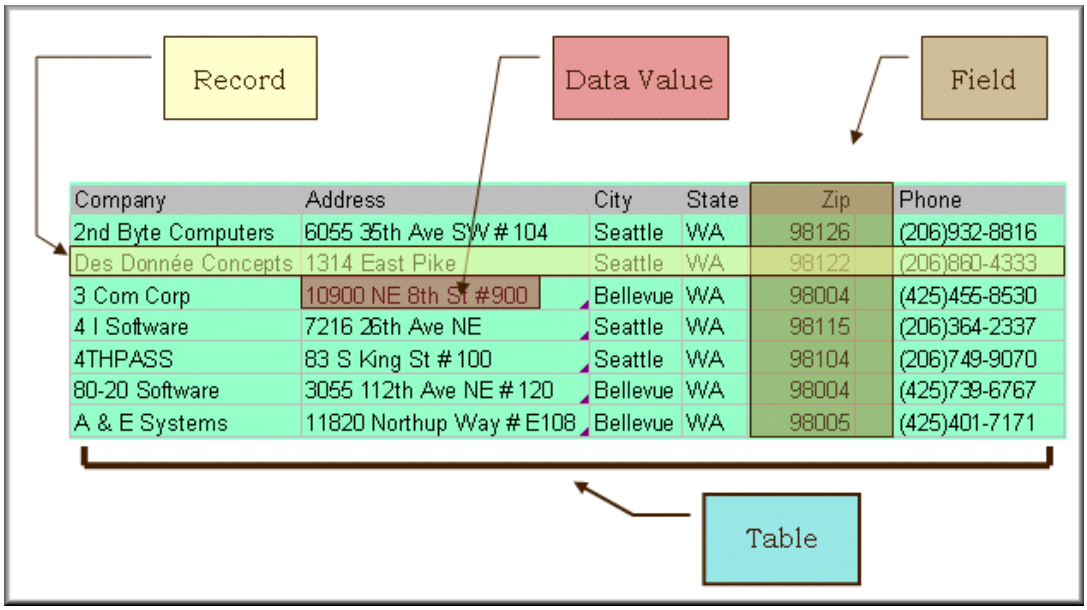
So what is a database? A database is an organized collection of information. Common examples of a database would be a telephone book, mailing list, recipe book, or a check book.

Database Terminology The first term to become familiar with is a **Table**. An Access table is a list of related information presented in a *column/row* format.

A table is broken down into additional components such as a row in a table. Each **row** is referred to as a **Record**. So if you look up your information in a telephone book you are reviewing your record.

Each **column** in a table is a category of information referred to as a **Field**. In a telephone book the column of phone numbers would be considered the Phone Number field.

One item of data, such as a single phone number, is called a **Data Value**.



Relational Database Concepts Prior to understanding the concept of a *Relational Database* you should first understand the concept of a *Flat File Database.* A spreadsheet would be considered a Flat File database.

Let's use a mail-order Book company for example. If using a Flat File database one item ordered would equal one record:

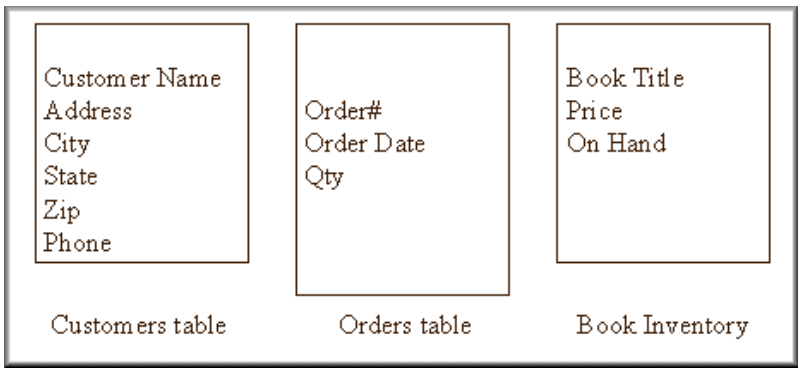
Customer	Address	City	State	Zip	Order Date	Quantity	Book Title	Price
Des Données Concepts	1314 East Pike	Seattle	WA	98122	8/1/2001	150	The Art Data Management	$19.95

No problem, right? But what happens if the customer orders several books? In a flat file database the result would be multiple records and the majority of the fields would contain duplicate data values:

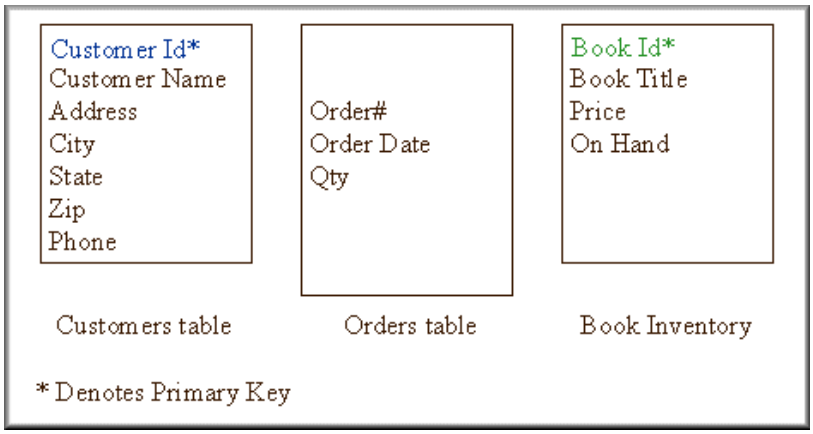
Customer	Order#	Order Date	Quantity	Book Title	Price
Des Donnée Concepts	1002	8/1/2000	150	The Art of Data Management	$19.95
Des Donnée Concepts	1002	8/1/2000	90	Ships in a Bottle	$32.50
Des Donnée Concepts	1002	8/1/2000	100	Introduction to Databases	$14.50
Des Donnée Concepts	1002	8/1/2000	100	Low Fat Recipes	$29.95
Des Donnée Concepts	1002	8/1/2000	100	The Fast Track	$18.95
Des Donnée Concepts	1002	8/1/2000	150	High Fat Recipies	$9.95

This is not an efficiently designed database!

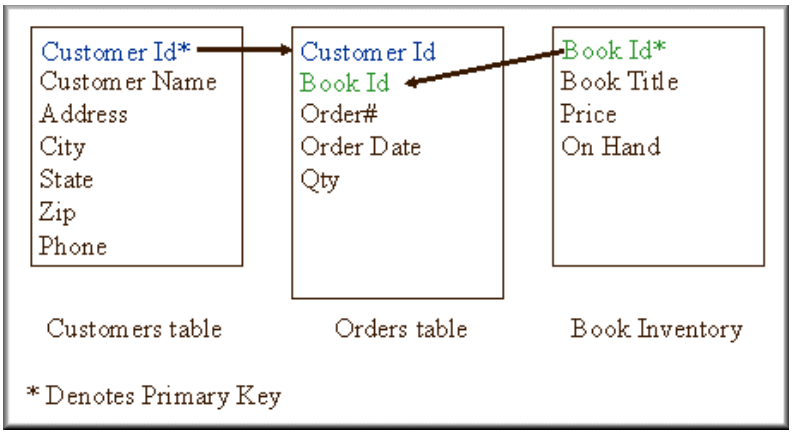
Now let's look at the same data stored in a relational database. An Access **relational** database is comprised of *multiple tables* each pertaining to a *specific topic:*



Another key piece to the relational database concept is each table contains a field, or a combination of fields, in which the data value uniquely identifies the record and Access will ensure that the data values remain unique to each record. This field is referred to as the **Primary Key**. A **Customer Id** field would be added to the **Customers** table and **Book Id** would be added to **Book Inventory** table:



If each customer is assigned a unique value—their Customer Id—which is then referenced when placing an order. The same would be true for Book Inventory. Each Book is assigned a unique value that is referenced in the Orders table when a book is purchased:



Thus the tables are *related* to each other by a common field.

A table that contains the "parent" or "primary" information can be linked to the appropriate row(s) in a table that contains "child" or "related" information based on common key field of the two tables.

Relationships Each relationship will have a **Primary** (parent) table and a **Related** (child) table as previously described.

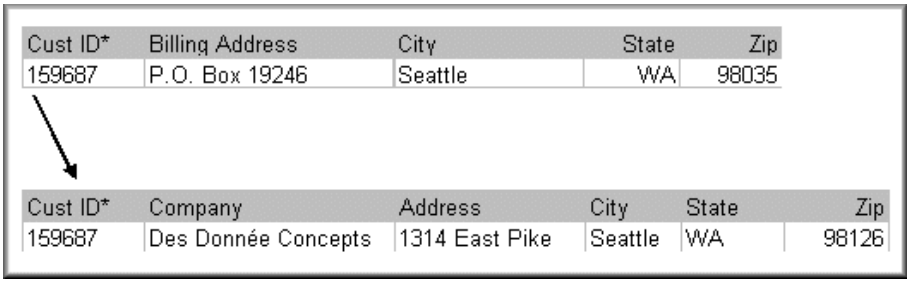
An easy way to determine the Primary table in the relationship is to note the Primary key. Typically the Primary table is the table that holds the Primary key field in the relationship.

In the above image, the Customers table is the Primary table and the Orders table would be the Related table.

How each table is related to each other is another key concept in a relational database.

There are two main types of Relationships: **One-to-One** and **One-to-Many**. There is a third relationship type called a **Many-to-Many** relationship, but I'll cover that type of relationship in a future article.

One-to-One Relationship A one-to-one relationship exists when the primary record will have only one related record. Another determining factor is both fields used the relationship are Primary Key fields:



Cust ID*	Billing Address	City	State	Zip
159687	P.O. Box 19246	Seattle	WA	98035

Cust ID*	Company	Address	City	State	Zip
159687	Des Donnée Concepts	1314 East Pike	Seattle	WA	98126

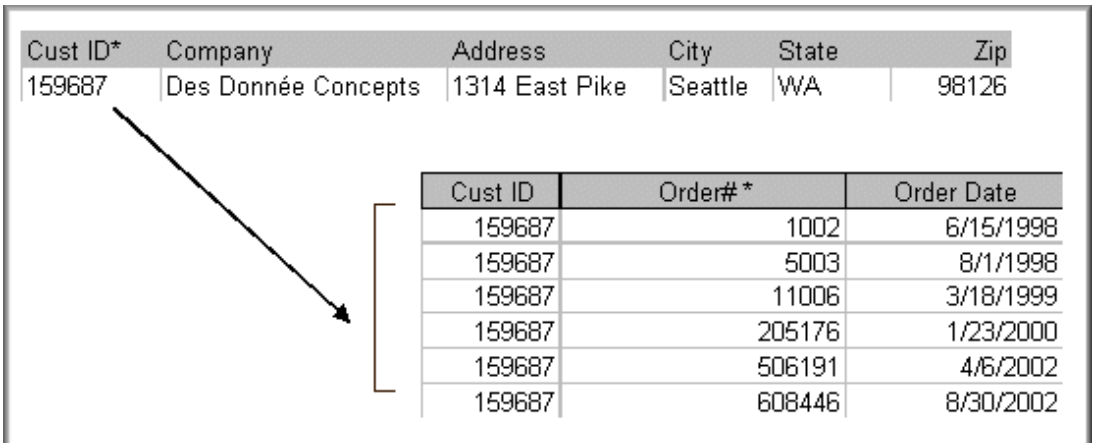
In the above image, you wouldn't want to assign the Customer ID to more than one customer; therefore, the Primary Key field would be Cust ID. The same is true for the Billing table.

Each Customer should have only one Billing Address so the Cust ID field would be designated as a Primary Key.

If the related data value in both tables must be unique then there can only be one matching record, thus a one-to-one relationship.

One-to-Many Relationship

A one-to-many relationship is the most common type of relationship. A one-to-many relationship exists when the primary record can have many related records.



Cust ID*	Company	Address	City	State	Zip
159687	Des Donnée Concepts	1314 East Pike	Seattle	WA	98126

Cust ID	Order#*	Order Date
159687	1002	6/15/1998
159687	5003	8/1/1998
159687	11006	3/18/1999
159687	205176	1/23/2000
159687	506191	4/6/2002
159687	608446	8/30/2002

In this image, you can see that one customer can place many orders; therefore, the Cust ID field in the Orders table can not be a Primary Key. This being the case, many occurrences of the same Cust ID can be entered.

Of course this all sounds good on paper, but how to you begin to determine how many tables you need? What fields you need? How to prevent redundant data?

Definition:

1. The **primary key** of a relational table uniquely identifies each record in the table. It can either be a normal attribute that is guaranteed to be unique (such as Social Security Number in a table with no more than one record per person) or it can be generated by the DBMS (such as a globally unique identifier, or GUID, in Microsoft SQL Server). Primary keys may consist of a single attribute or multiple attributes in combination.

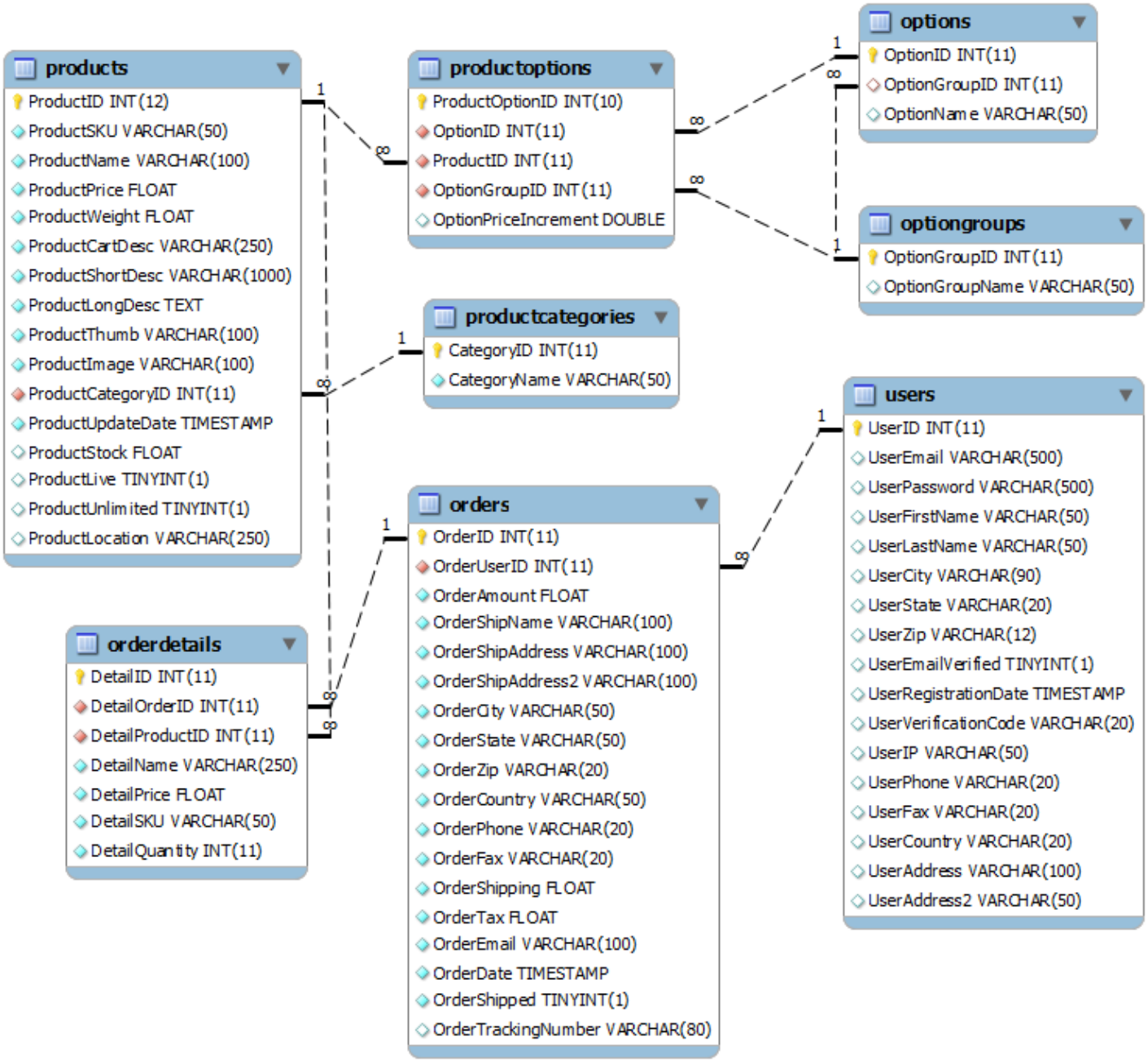
Examples:

Imagine we have a STUDENTS table that contains a record for each student at a university. The student's unique student ID number would be a good choice for a primary key in the STUDENTS table. The student's first and last name would not be a good choice, as there is always the chance that more than one student might have the same name.

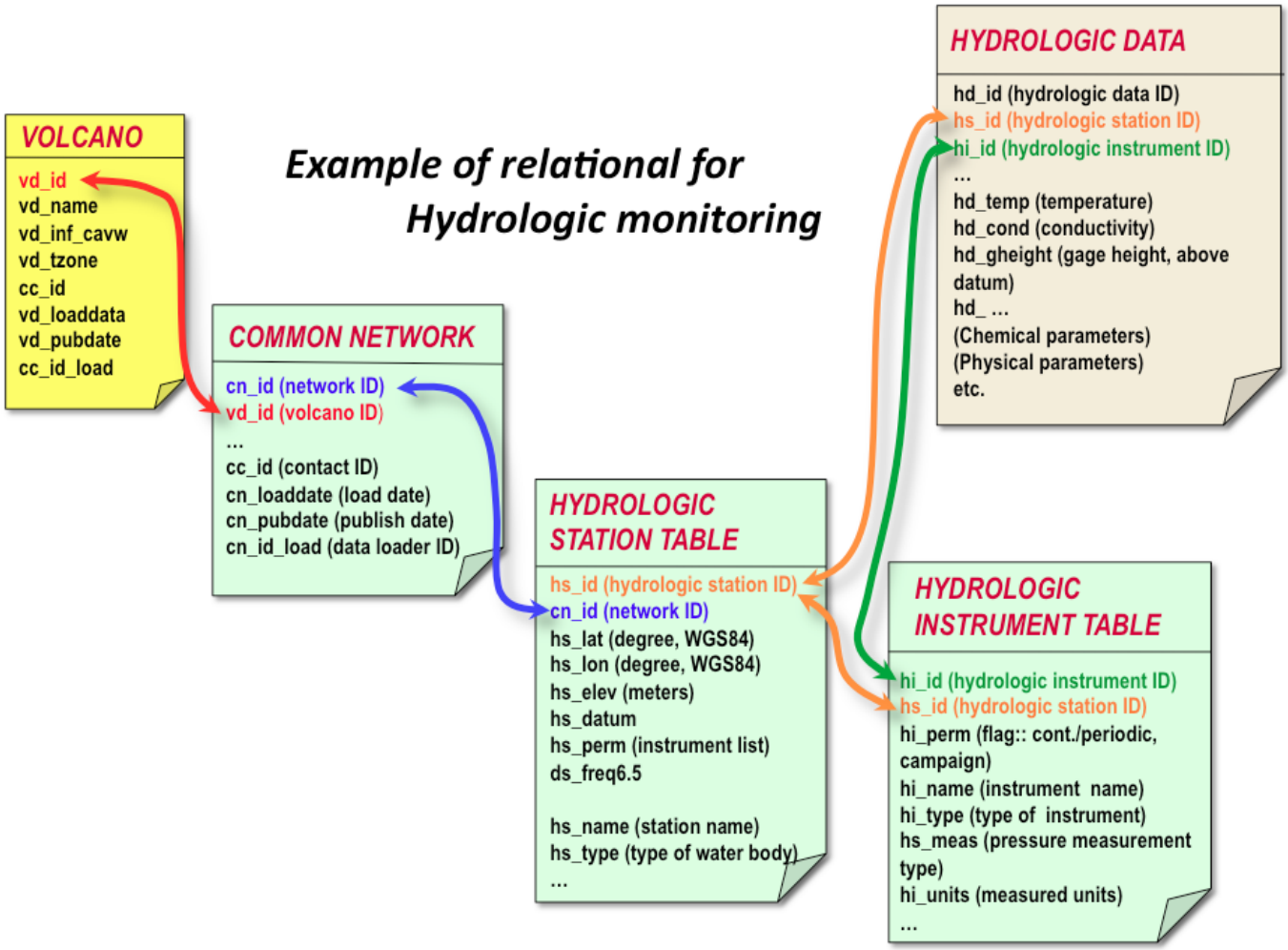
2. A **foreign key** is a field in a relational table that matches the primary key column of another table. The foreign key can be used to cross-reference tables.

Example of relational database diagram.

Some example on visualization of database design using MySQL Workbench software, help to see the relations, indexes, tables of the MySQL database.



Appendix-6 Relational Database in WOVOdat



Appendix-7 MySQL Field Type

MySQL Field Types

MySQL supports a number of column types, which may be grouped into three categories: numeric types, date and time types, and string (character) types. This section first gives an overview of the types available. Please refer to the MySQL manuals for more details.

Type	Use for	Size
TINYINT	A very small integer	The signed range is –128 to 127. The unsigned range is 0 to 255.
SMALLINT	A small integer	The signed range is –32768 to 32767. The unsigned range is 0 to 65535
MEDIUMINT	A medium-size integer	The signed range is –8388608 to 8388607. The unsigned range is 0 to 16777215
INT or INTEGER	A normal-size integer	The signed range is –2147483648 to 2147483647. The unsigned range is 0 to 4294967295
BIGINT	A large integer	The signed range is –9223372036854775808 to 9223372036854775807. The unsigned range is 0 to 18446744073709551615
FLOAT	A small (single-precision) floating-point number. Cannot be unsigned	Ranges are –3.402823466E+38 to –1.175494351E-38, 0 and 1.175494351E-38 to 3.402823466E+38. If the number of Decimals is not set or <= 24 it is a single-precision floating point number
DOUBLE, DOUBLE PRECISION, REAL	A normal-size (double-precision) floating-point number. Cannot be unsigned	Ranges are -1.7976931348623157E+308 to -2.2250738585072014E-308, 0 and 2.2250738585072014E-308 to 1.7976931348623157E+308. If the number of Decimals is not set or 25 <= Decimals <= 53 stands for a double-precision floating point number
DECIMAL, NUMERIC	An unpacked floating-point number. Cannot be unsigned	Behaves like a CHAR column: “unpacked” means the number is stored as a string, using one character for each digit of the value. The decimal point, and, for negative numbers, the ‘-‘ sign is not counted in Length. If Decimals is 0, values will have no decimal point or fractional part. The maximum range of DECIMAL values is the same as for DOUBLE, but the actual range for a given DECIMAL column may be constrained by the choice of Length and Decimals. If Decimals is left out it’s set to 0. If Length is left out it’s set to 10. Note that in MySQL 3.22 the Length includes the sign and the decimal point
DATE	A date	The supported range is ‘1000-01-01’ to ‘9999-12-31’. MySQL displays DATE values in ‘YYYY-MM-DD’ format
DATETIME	A date and time combination	The supported range is ‘1000-01-01 00:00:00’ to ‘9999-12-31 23:59:59’. MySQL displays DATETIME values in ‘YYYY-MM-DD HH:MM:SS’ format
TIMESTAMP	A timestamp	The range is ‘1970-01-01 00:00:00’ to sometime in the year 2037. MySQL displays TIMESTAMP values in YYYYMMDDHHMMSS, YYMMDDHHMMSS, YYYYMMDD or YYMMDD format, depending on whether M is 14 (or missing), 12, 8 or 6, but allows you to assign values to TIMESTAMP columns using either strings or numbers. A TIMESTAMP column is useful for recording the date and time of an INSERT or UPDATE operation because it is automatically set to the date and time of the most recent operation if you don’t give it a value yourself
TIME	A time	The range is ‘-838:59:59’ to ‘838:59:59’. MySQL displays TIME values in ‘HH:MM:SS’ format, but allows you to assign values to TIME columns using either strings or numbers

YEAR	A year in 2- or 4- digit formats (default is 4-digit)	The allowable values are 1901 to 2155, and 0000 in the 4 year format and 1970-2069 if you use the 2 digit format (70-69). MySQL displays YEAR values in YYYY format, but allows you to assign values to YEAR columns using either strings or numbers. (The YEAR type is new in MySQL 3.22.)
CHAR	A fixed-length string that is always right-padded with spaces to the specified length when stored	The range of Length is 1 to 255 characters. Trailing spaces are removed when the value is retrieved. CHAR values are sorted and compared in case-insensitive fashion according to the default character set unless the BINARY keyword is given
VARCHAR	A variable-length string. Note: Trailing spaces are removed when the value is stored (this differs from the ANSI SQL specification)	The range of Length is 1 to 255 characters. VARCHAR values are sorted and compared in case-insensitive fashion unless the BINARY keyword is given
TINYBLOB, TINY-TEXT		A BLOB or TEXT column with a maximum length of 255 (2^8 - 1) characters
BLOB, TEXT		A BLOB or TEXT column with a maximum length of 65535 (2^16 - 1) characters
MEDIUMBLOB, MEDIUMTEXT		A BLOB or TEXT column with a maximum length of 16777215 (2^24 - 1) characters
LONGBLOB, LONGTEXT		A BLOB or TEXT column with a maximum length of 4294967295 (2^32 - 1) characters
ENUM	An enumeration	A string object that can have only one value, chosen from the list of values 'value1', 'value2', ..., or NULL. An ENUM can have a maximum of 65535 distinct values.
SET	A set	A string object that can have zero or more values, each of which must be chosen from the list of values 'value1', 'value2', ... A SET can have a maximum of 64 members

Appendix-8 Earthquake information

Earthquake Classification

There are 7 types of earthquake for WOVOdat (sd_evn_eqtype):

1. VT : volcano-tectonics
2. H : hybrid
3. LF : low frequency
4. VLF : very-low frequency
5. E : eruption quake
6. V : generic volcanic quake without any further classification
7. R : regional tectonic earthquake
8. Q : query blasts
9. U : unknown origin
10. O : Other, non-volcanic origin
11. X : Undefined

Description of the 8 types of earthquake classifications occurring in and at surrounding volcanoes:

1. **VT-type**
   VT-type is uses for volcanic earthquake that results from faulting failure mechanism. It is similar to regional seismic event except that it happens inside or underneath volcanic body. Many observatories might use different terminology, such as high-frequency event (HF). In the former time A-Type of Minakami's classification is more widely used. As this type of event is generated by faulting process, when the source-receiver distance is quite far (more than 2 km from Minakami's term), P and S phases could be clearly distinguished in seismogram. With a modern instrument, digital seismic record could identify VT-type that might be at a closer distance. Thus it is possible to identify VT-type of closer source. Faulting process generates a high frequency signal of more than 5 Hz. Thus, a term of "HF- event" is usually used in place of VT-type.
2. **H-type**
   H-type is used to name Hybrid seismic event. It is an events containing a combination of high and low frequency. B-Type from Minakami is based on that there is no clear S arrival, which could be similar to shallow VT (shallow VT). However it could be also related to a dome growth. Event-accompanying dome growth is in a form of Hybrid (St. Helens) (= or MP (Merapi)). Hybrid events usually consist of HF part (first onset) and LF part (coda) (Redoubt, Monserrat), whereas LHF is another hybrid with inverse order (LF first then HF).
3. **LF-type**
   Low frequency event is related to the volcanic process inside volcano. Fluid and gas play role in creating such an event. It frequency is about 0.5-5 Hz. There is no indication of P-S distinction because it is not from faulting mechanism.
4. **VLP**
   Installation of broadband seismograph in many volcanoes could have revealed the presence of VLP events. Its signal period ranges from 2 to 30 second. (in Hachijo island T=20s; Erebus T=8-20s; Stromboli T=2-30s). Some recent studies conclude that VLP is related to a movement of a gas slug inside volcano conduit. (O'Brien and Bean, GRL 35, 2008)
5. **E (for Explosion)**
   Explosion event is seismic signal that accompany eruption process.
6. **T (for Tremor)**
   Tremor is a continuous seismic signal with a duration from several minutes to days. Many volcanoes produce tremor with only single dominant frequency (monochromatic tremor), or tremor with two or harmonic peaks (harmonic tremor). Some tremors, from record observation have wider frequency content (non-harmonic

tremor). Earthquake swarm with dense event population, commonly happen prior to eruption, (=short interval between events) could produce non-harmonic tremor, or a “dense- events” tremor

7. **R**
   R-type, or regional type uses for tectonic earthquakes occurring close to the volcano. For individual volcanic cone, the term “close” refers to distance of less than 30 km (?) from the volcano edifice. For a volcanic zone, such as Campi Flegrei and Auckland volcanic zones, it refers to distance of 30 km (?) from the outer boundary of the zone. Storing data about tectonic earthquakes near volcano in the WOVOdat is important as in several cases that volcanic activity could be affected or re-awaked by tectonic earthquakes.

8. **Q-type**
   Quary blast occuring on volcanic region

R and Q is non-volcanic earthquake, however it may have a relation to volcanic activity or occured in volcanic area. V is used when the type is not specified.

To store more detail classification, earthquake subtypes are added.

Earthquake general classification	Type of earthquake	Subtype of earthquake
Regional Tectonic	Regional Tectonic (R)	
Query blast	Query blast (Q)	
Volcanic	General volcanic (V)	
	Volcano tectonic (VT)	General or non specified (VT)
		Deep (VT_D)
		Shallow (VT_S)
	Hybrid (H)	General or non specified (H)
		High- then follow by low frequency (H_HLF)
		Low- then follow by high frequency (H_LHF)
	Low frequency (LF)	Long period (LF_LP)
		Tornillo 0.7-8Hz 0.5-5min (LF_T)
		Intermediate low frequency (LF_ILF)
	Very long period (VLP)	
	Explosion (E)	
	Unknown origin (U)	
	Other, non volcanic origin (O)	
	Undefined (X)	

sd_evn_eqtype =>
'R','Q','V','VT','VT_D','VT_S','H','H_HLF','H_LHF','LF','LF_LP','LF_T','LF_ILF','VLP','E','U','O','X'

Earthquake general classification	Type of tremor	Subtype of tremor
Volcanic	Tremor (T)	General or non specified (T)
		Harmonic (H)
		Monochromatic (M)
		Close-events tremor (C)

sd_trm_type => 'T','H','M','C'

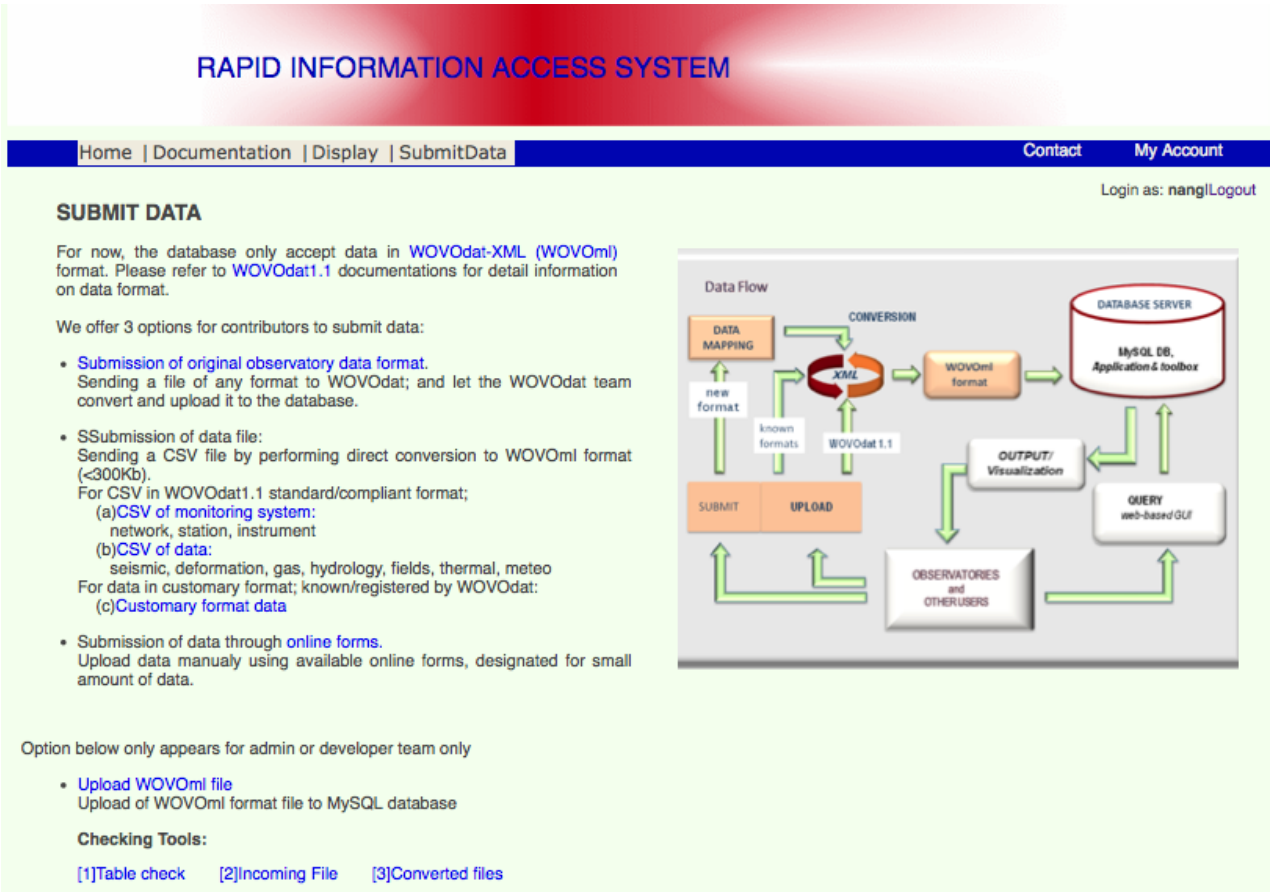
Magnitude Types

The identifying factor for the magnitudes is the magnitude type, sd_evn_pmag_type and sd_evn_smag_type. The magnitude types are limited to the following:

- **duration (Md)**
  The duration magnitude is based on the duration of shaking as measured by the time decay of the amplitude of the seismogram. This magnitude (also known as coda magnitude) is often used to compute magnitude from seismograms with "clipped" waveforms due to limited dynamic recording range of analog instrumentation.
- **local (ML)**
  The local magnitude (ML) is the original magnitude relationship defined by Richter and Gutenberg for local earthquakes and is based on the maximum amplitude of a seismogram recorded on a Wood-Anderson torsion seismograph (appropriate adjustments are made for modern instrumentation).
- **surface wave (Ms)**
  The surface wave magnitude (Ms) is used for distant earthquakes based on the amplitude of Rayleigh surface waves measured at a period near 20 sec.
- **moment (Mw)**
  The moment magnitude (Mw) is based on the moment of the earthquake, which is equal to the rigidity of the earth times the average amount of slip on the fault times the amount of fault area that slipped.
- **body (Mb)**
  The body magnitude (Mb) is based on the amplitude of P body- waves and is most appropriate for deep-focus earthquakes.

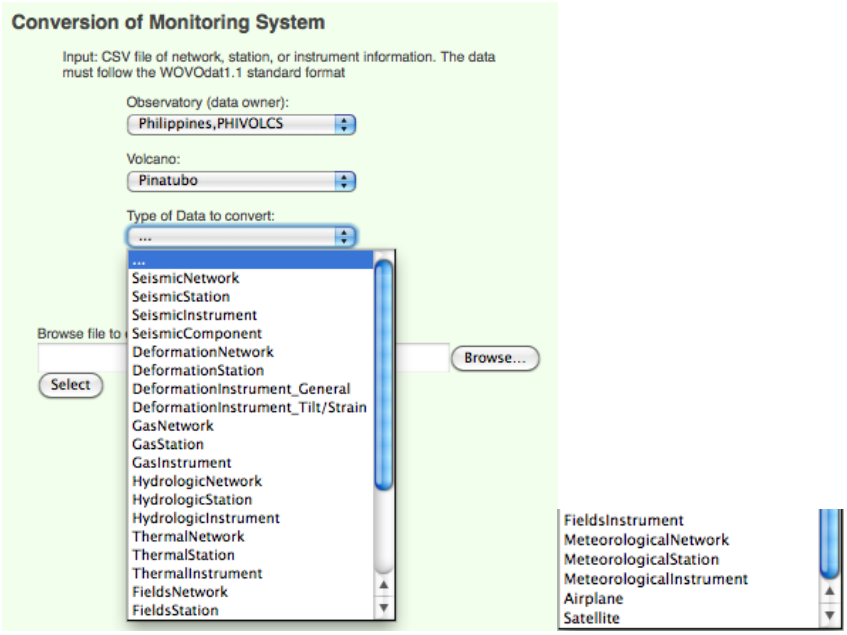
Appendix-9 Submit Data

Submit data: conversion and upload (version: October 2012)

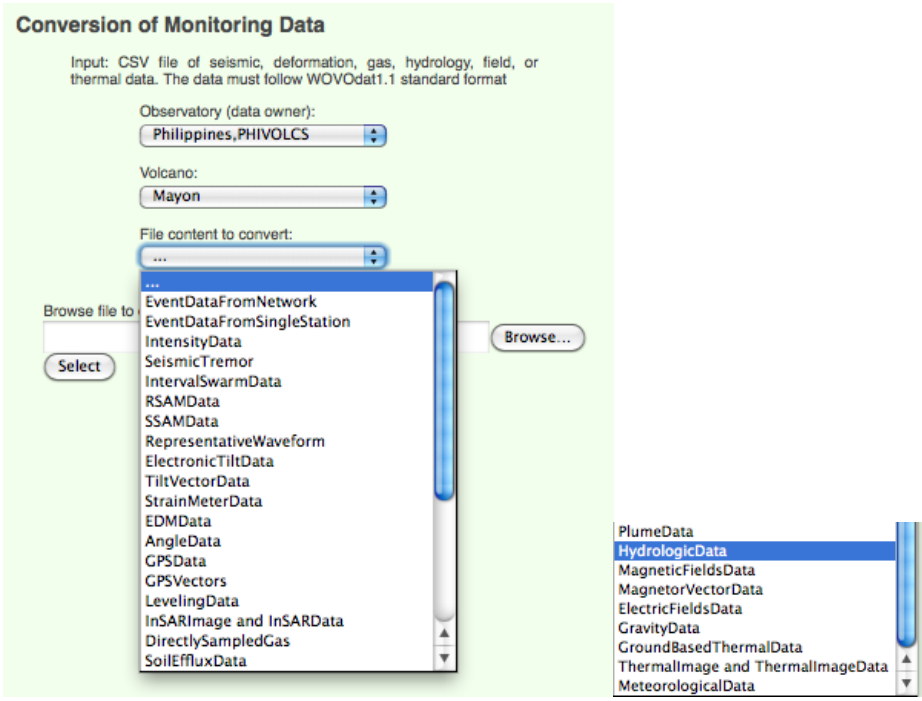


Submiting data through online conversion

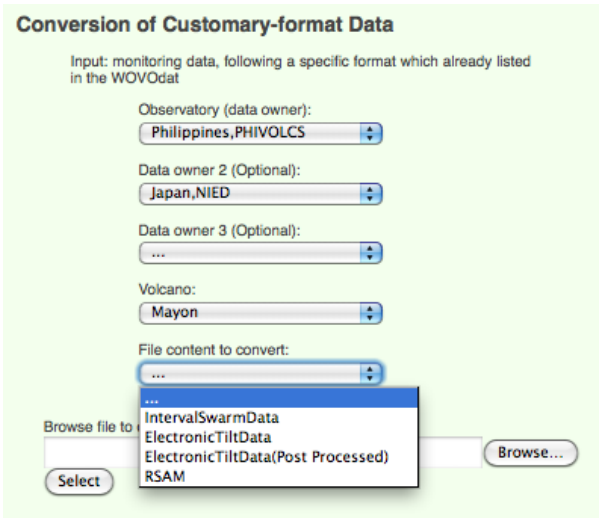
(a) CSV of monitoring system



(b) CSV of data

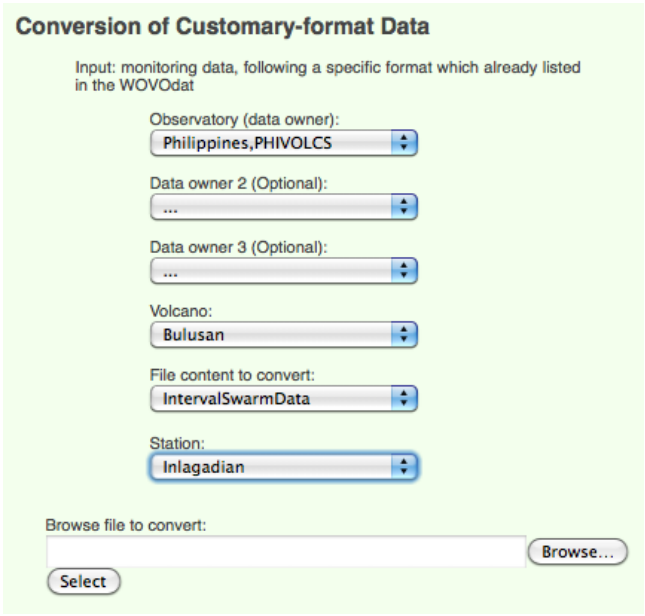


(c) Customary format data

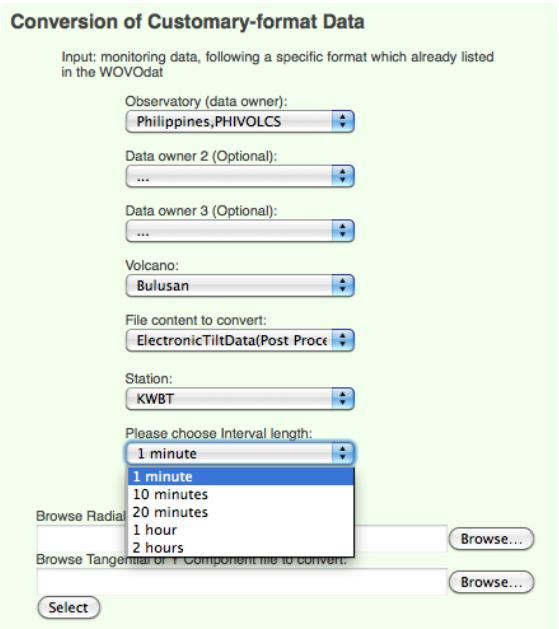


As of July 2012, there are 4 different data conversions customary made for PHIVOLCS:

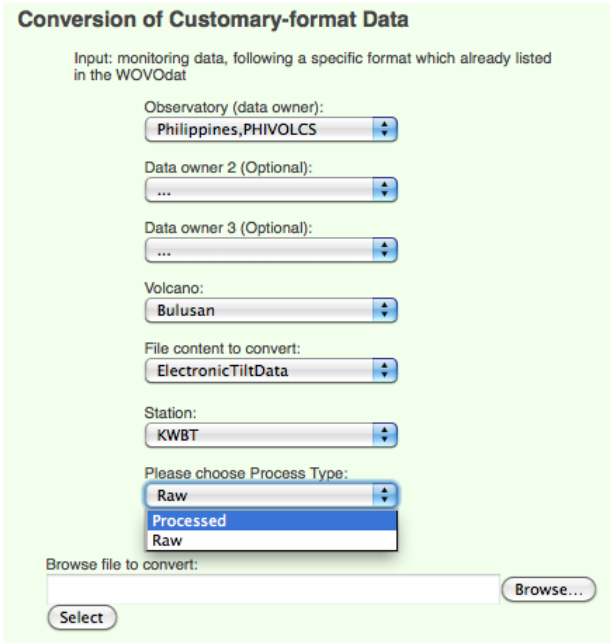
a. Interval Swarm Data



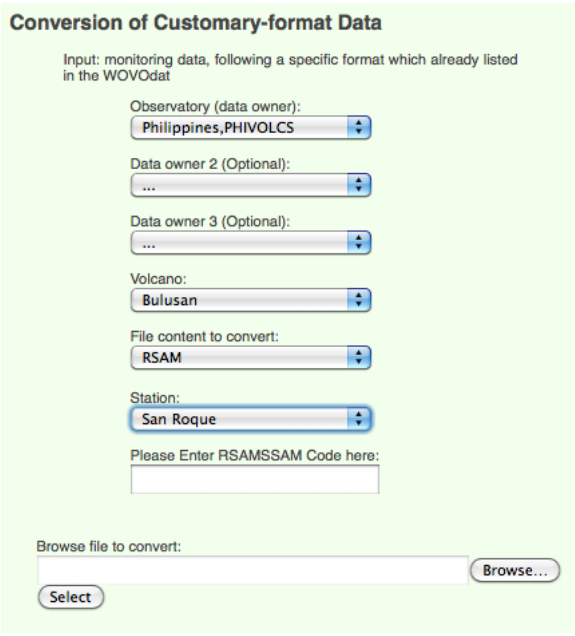
c. Electronic tilt data (post processed)



b. Electronic Tilt Data

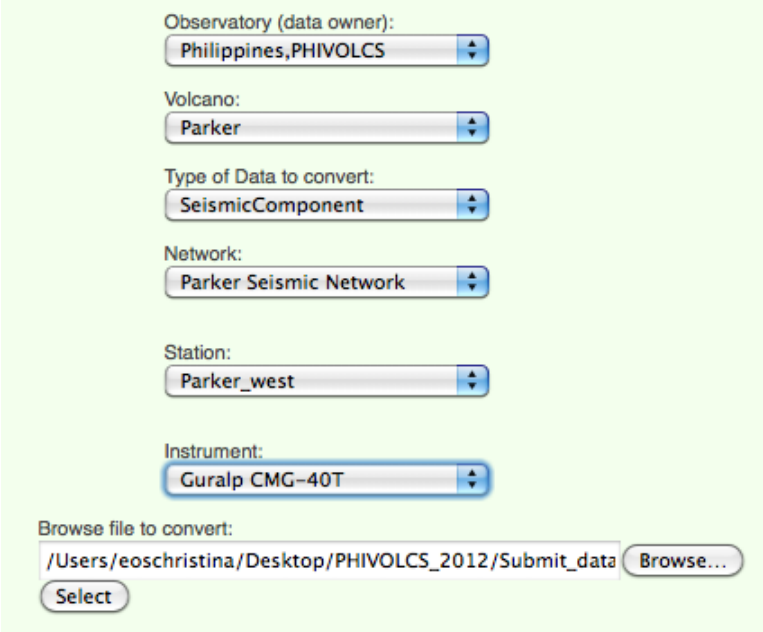


d. RSAM



Example of conversion: *conversion of seismic-component information*

1. **User input: online form and CSV file *(following WOVOdat standard format)***



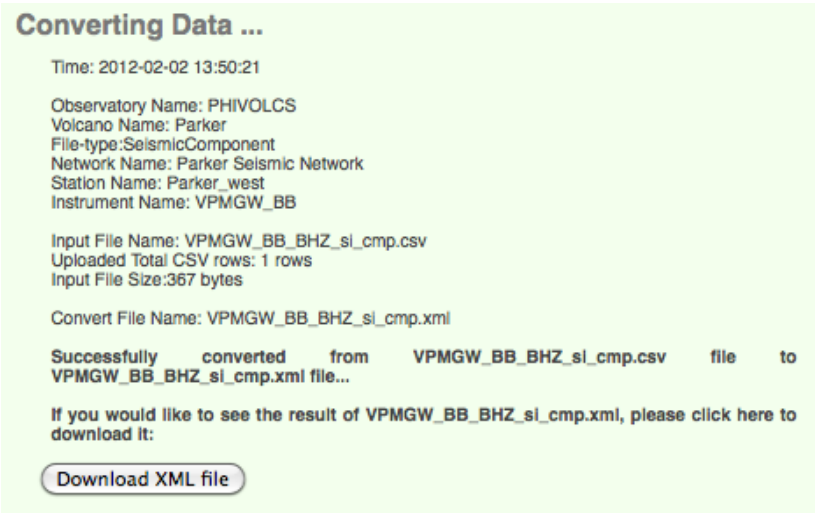
Input CSV format: si_cmp table

si_cmp_id	si_cmp_code	si_id	si_cmp_name	si_cmp_type	si_cmp_resp
	VPMGW_BB_BHE		GuralpBroadband Horizontal N-S component	horizontal E-W	frequency range: 0.04-25 Hz

si_cmp_band	si_cmp_samp	si_cmp_icode	si_cmp_orient	si_cmp_sens
Broadband	50	BHE	Clockwise,E=90,reversed=270	4.378540e+09 @ 1.000e+00 Hz (SEED Stage 0)

si_cmp_depth	si_cmp_com	cc_id	cc_id2	cc_id3	di_tlt_loaddate	di_tlt_pubdate	cc_id_load	cb_ids
2	comments					2010-01-31 12:00:00		

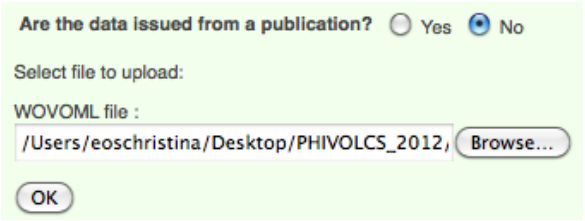
2. **Converting data, download the XML file**

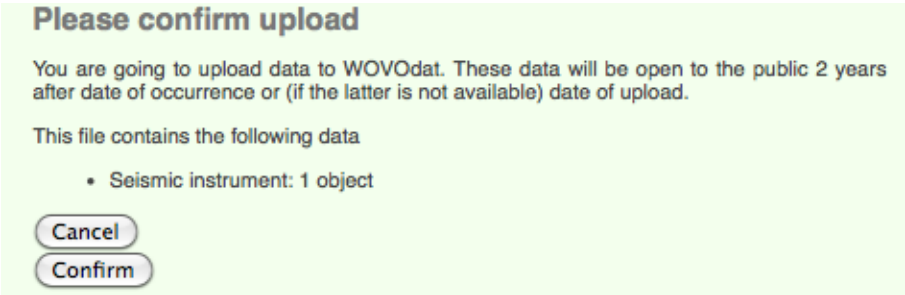


XML format: *si_cmp (seismic component)*

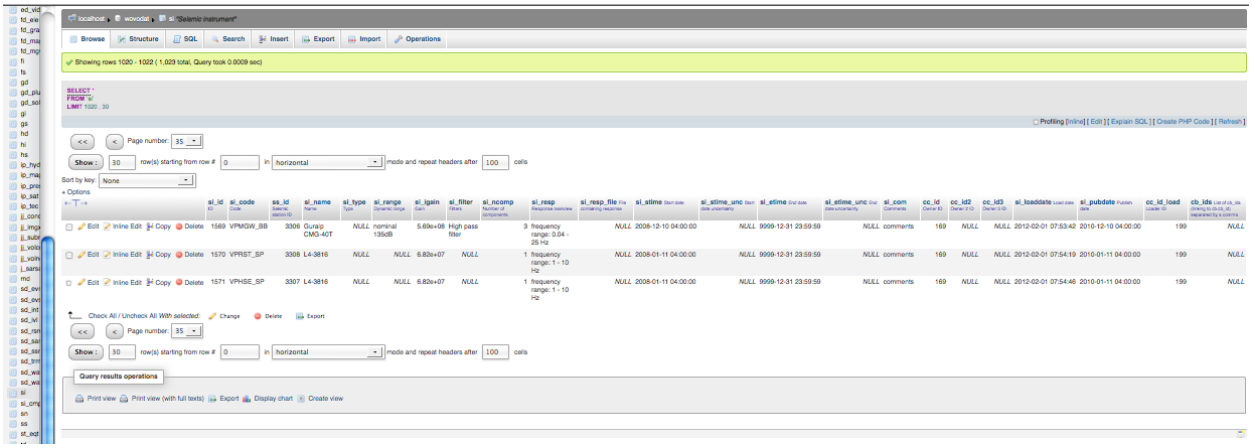
```
<?xml version="1.0" encoding="UTF-8" ?>
<wovoml xmlns="http://www.wovodat.org" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
version="1.1.0" xsi:schemaLocation="http://www.wovodat.org/WOVOdatV1.xsd">
  <MonitoringSystems>
  <SeismicComponents instrument="VPMGW_BB" owner1="PHIVOLCS">
          <SeismicComponent code="VPMGW_BB_BHE" instrument="VPMGW_BB" owner1="PHIVOLCS">
                  <name>GuralpBroadband Horizontal N-S component</name>
                  <type>horizontal E-W</type>
                  <comments>comments</comments>
                  <respDesc>frequency range: 0.04-25 Hz</respDesc>
                  <sampleRate>50</sampleRate>
                  <seedBandCode>Broadband</seedBandCode>
                  <seedInstCode>BHE</seedInstCode>
                  <seedOrientCode>Clockwise,E=90,reversed=270</seedOrientCode>
                  <sensitivity>4.378540e+09 @ 1.000e+00 Hz (SEED Stage 0)</sensitivity>
                  <depth>2</depth>
        <startTime>2010-06-01 12:00:00</startTime>
          </SeismicComponent>
  </SeismicComponents>
  </MonitoringSystems>
  </wovoml>
```

3. Upload XML file to MySQL database, and confirm upload.





4. Data stored in the database.



Submiting data through online form

Upload Data with Form

Data type selection

Click on the type of data that you wish to upload:

- Bibliographic information
- Inferred processes
  - Hydrothermal system interaction
  - Magma movement
  - Buildup of magma pressure
  - Volatile saturation
  - Regional tectonics interaction
- Intensity
- Observation about volcanic activity
- Observatory

⇨ Bibliography table

Upload form

for Table : cb (the fields preceded by * are required)

Authors:		The authors or editors of the paper or article
Publication year:		The year this paper or article was published
Title:		The title of this paper
Journal:		The name of the journal
Volume:		The journal volume
Publisher:		The name of the publisher (if book)
Pages:		The page numbers
DOI:		The Digital Object Identifier
ISBN:		The International Standard Book Number
Web info:		Information about this article on the web
Laboratory email address:		Email address of observatory or laboratory
Keywords:		Please separate each group of keywords with a comma

OK and go home | OK and new data

⇨ Hydrothermal system interaction

Upload form for Hydrologic. Table : ip_hyd (the fields preceded by * are required)

***Code:**		A unique ID which you can use for finding these data in the future
Volcano CAVW:		The CAVW number of the volcano
Inferrence time:		The time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Inferrence time uncertainty:		The uncertainty in the time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Start time:		The time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
Start time uncertainty:		The uncertainty in the time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
End time:		The time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
End time uncertainty:		The uncertainty in the end time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
Heated groundwater:	○ Yes ○ Maybe ○ No ◉ Unknown	Convective heating of groundwater
Pore destabilization:	○ Yes ○ Maybe ○ No ◉ Unknown	Destabilization of edifice by pore pressure increase
Pore deformation:	○ Yes ○ Maybe ○ No ◉ Unknown	Elastic deformation induced by pore pressure change
Hydrofracturing:	○ Yes ○ Maybe ○ No ◉ Unknown	Hydrofracturing
Boiling-induced tremor:	○ Yes ○ Maybe ○ No ◉ Unknown	Boiling-induced tremor
Soluble gases:	○ Yes ○ Maybe ○ No ◉ Unknown	Absorption of soluble gases
Equilibrium species:	○ Yes ○ Maybe ○ No ◉ Unknown	Change in the equilibrium species
Boiling until dry:	○ Yes ○ Maybe ○ No ◉ Unknown	Boiling until dry chimneys are formed
Comments:		Comments on interaction with the hydrothermal system
***Interpreter:**	Myself (Christina Widiwijayanti)	The interpreter
Publish date:		The date these data can become public (format: YYYY-MM-DD hh:mm:ss)

OK and back to the main page | OK and write new data

⇨ Magma movement

Upload form for Magma Movement. Table : ip_mag (the fields preceded by * are required)

*Code:		A unique ID which you can use for finding these data in the future
Volcano CAVW:		The CAVW number of the volcano
Inferrence time:		The time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Inferrence time uncertainty:		The uncertainty in the time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Start time:		The time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
Start time uncertainty:		The uncertainty in the time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
End time:		The time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
End time uncertainty:		The uncertainty in the end time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
Deep supply:	○ Yes ○ Maybe ○ No ◉ Unknown	New or renewed supply of magma from depth
Ascent:	○ Yes ○ Maybe ○ No ◉ Unknown	Magma ascent, up from reservoir
Convection below:	○ Yes ○ Maybe ○ No ◉ Unknown	Magma convection induced from below by an intrusion at the base
Convection above:	○ Yes ○ Maybe ○ No ◉ Unknown	Magma convection induced from above, by settling of a dense crystal-rich mass
Magma mixing:	○ Yes ○ Maybe ○ No ◉ Unknown	Magma mixing
Dike intrusion:	○ Yes ○ Maybe ○ No ◉ Unknown	Dike intrusion
Pipe intrusion:	○ Yes ○ Maybe ○ No ◉ Unknown	Intrusion through a pipe-like cylindrical conduit
Sill intrusion:	○ Yes ○ Maybe ○ No ◉ Unknown	Sill intrusion
Comments:		Comments on interaction with the hydrothermal system
*Interpreter:	Myself (Christina Widiwijayanti)	The interpreter
Publish date:		The date these data can become public (format: YYYY-MM-DD hh:mm:ss)

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⇨ Buildup of magma pressure

Upload form for Buildup of Magma Pressure. Table : ip_pres (the fields preceded by * are required)

*Code:		A unique ID which you can use for finding these data in the future
Volcano CAVW:		The CAVW number of the volcano
Inferrence time:		The time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Inferrence time uncertainty:		The uncertainty in the time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Start time:		The time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
Start time uncertainty:		The uncertainty in the time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
End time:		The time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
End time uncertainty:		The uncertainty in the end time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
Gas-induced overpressure:	○ Yes ○ Maybe ○ No ◉ Unknown	Gas-induced overpressure
Tectonic overpressure:	○ Yes ○ Maybe ○ No ◉ Unknown	Tectonic overpressure
Comments:		Comments on interaction with the hydrothermal system
*Interpreter:	Myself (Christina Widiwijayanti)	The interpreter
Publish date:		The date these data can become public (format: YYYY-MM-DD hh:mm:ss)

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⇨ Volatile saturation

Upload form for Volatile Saturation. Table : ip_sat (the fields preceded by * are required)

*Code:		A unique ID which you can use for finding these data in the future
Volcano CAVW:		The CAVW number of the volcano
Inferrence time:		The time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Inferrence time uncertainty:		The uncertainty in the time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Start time:		The time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
Start time uncertainty:		The uncertainty in the time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
End time:		The time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
End time uncertainty:		The uncertainty in the end time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
CO_2 saturation:	○ Yes ○ Maybe ○ No ◉ Unknown	Magma became saturated with CO_2 before an eruption and contributed to preeruption unrest. Saturation induced by any cause
H_2O saturation:	○ Yes ○ Maybe ○ No ◉ Unknown	Magma became saturated with H_2O before an eruption and contributed to preeruption unrest. Saturation induced by any cause
Decompression:	○ Yes ○ Maybe ○ No ◉ Unknown	Volatile saturation by decompression
Fugacity:	○ Yes ○ Maybe ○ No ◉ Unknown	Volatile saturation by change in fO_2
Volatile addition:	○ Yes ○ Maybe ○ No ◉ Unknown	Volatile saturation by volatile addition
Crystallization or 2nd boiling:	○ Yes ○ Maybe ○ No ◉ Unknown	Volatile saturation by crystallization or second boiling
Vesiculation:	○ Yes ○ Maybe ○ No ◉ Unknown	Subsurface, preeruptive increases in vesiculation, thereby decreasing density. This would include extreme vesiculation to permeable foam
Devesiculation:	○ Yes ○ Maybe ○ No ◉ Unknown	Subsurface, preeruptive decreases in vesiculation, thereby increasing density. This would include collapse of newly-degassed foam
Degassing:	○ Yes ○ Maybe ○ No ◉ Unknown	Deep and near-surface degassing including gas explosion events
Comments:		Comments on interaction with the hydrothermal system
*Interpreter:	Myself (Christina Widiwijayanti)	The interpreter
Publish date:		The date these data can become public (format: YYYY-MM-DD hh:mm:ss)

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⇨ Regional tectonics interaction

Upload form for Regional Tectonic Interaction. Table : ip_tec (the fields preceded by * are required)

*Code:		A unique ID which you can use for finding these data in the future
Volcano CAVW:		The CAVW number of the volcano
Inferrence time:		The time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Inferrence time uncertainty:		The uncertainty in the time the inferrence was made (format: YYYY-MM-DD hh:mm:ss)
Start time:		The time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
Start time uncertainty:		The uncertainty in the time the inferred process started (format: YYYY-MM-DD hh:mm:ss)
End time:		The time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
End time uncertainty:		The uncertainty in the end time the inferred process stopped (format: YYYY-MM-DD hh:mm:ss)
Tectonic changes:	○ Yes ○ Maybe ○ No ◉ Unknown	Tectonically induced changes in magma/hydrothermal system (any mechanism)
Static stress:	○ Yes ○ Maybe ○ No ◉ Unknown	Changes induced by changes in static stress after large regional earthquakes (including viscoelastic processes)
Dynamic strain:	○ Yes ○ Maybe ○ No ◉ Unknown	Changes induced by dynamic strain, associated with passage of earthquake waves from distal sources
Local shear:	○ Yes ○ Maybe ○ No ◉ Unknown	Changes induced by local fault shear or other deformation of the cone
Slow earthquake:	○ Yes ○ Maybe ○ No ◉ Unknown	Changes induced by "slow earthquake," as recorded in a GPS or other strain network
Distal pressurization:	○ Yes ○ Maybe ○ No ◉ Unknown	Changes induced by pressurization of magma or hydrothermal reservoir located several kilometers or more from the apparent center of unrest. May include distal VT earthquakes
Distal depressurization:	○ Yes ○ Maybe ○ No ◉ Unknown	Changes induced by depressurization of magma or hydrothermal reservoir located several kilometers or more from the apparent center of unrest. May include distal VT earthquakes
Hydrothermal lubrication:	○ Yes ○ Maybe ○ No ◉ Unknown	Changes induced by increased hydrothermal pore pressures ("lubrication") along faults beneath or near the volcano
Earth-tide:	○ Yes ○ Maybe ○ No ◉ Unknown	Earth tide interaction with magma/hydrothermal systems. Typically inferred from correlations between unrest and semi-diurnal or fortnightly earth tides
Atmospheric influence:	○ Yes ○ Maybe ○ No ◉ Unknown	Interaction of the volcanic system with changes in atmospheric pressure, rainfall, wind, etc.
Comments:		Comments on interaction with the hydrothermal system
*Interpreter:	Myself (Christina Widiwijayanti)	The interpreter
Publish date:		The date these data can become public (format: YYYY-MM-DD hh:mm:ss)

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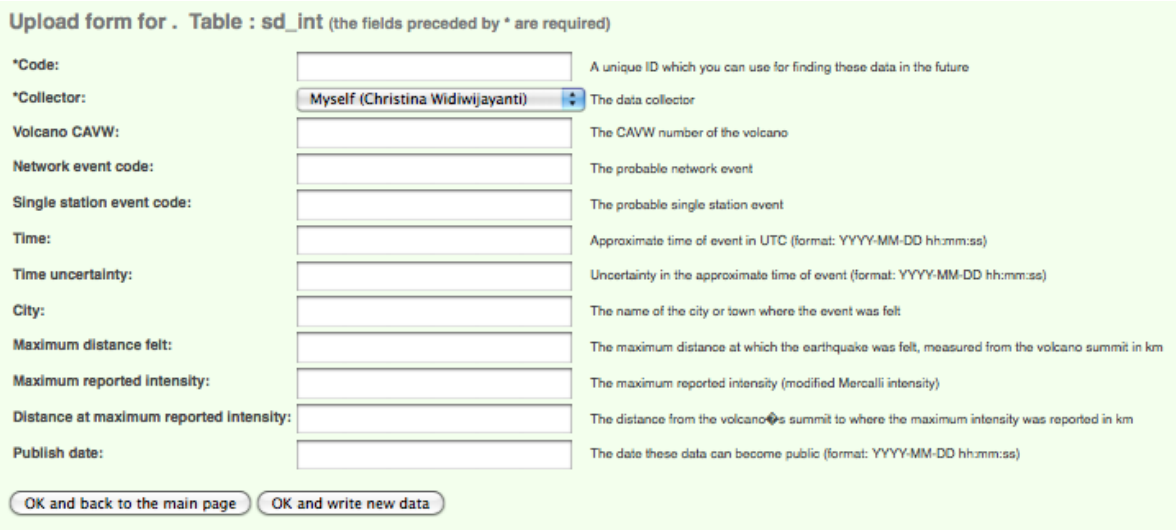
⇨ Seismic Intensity

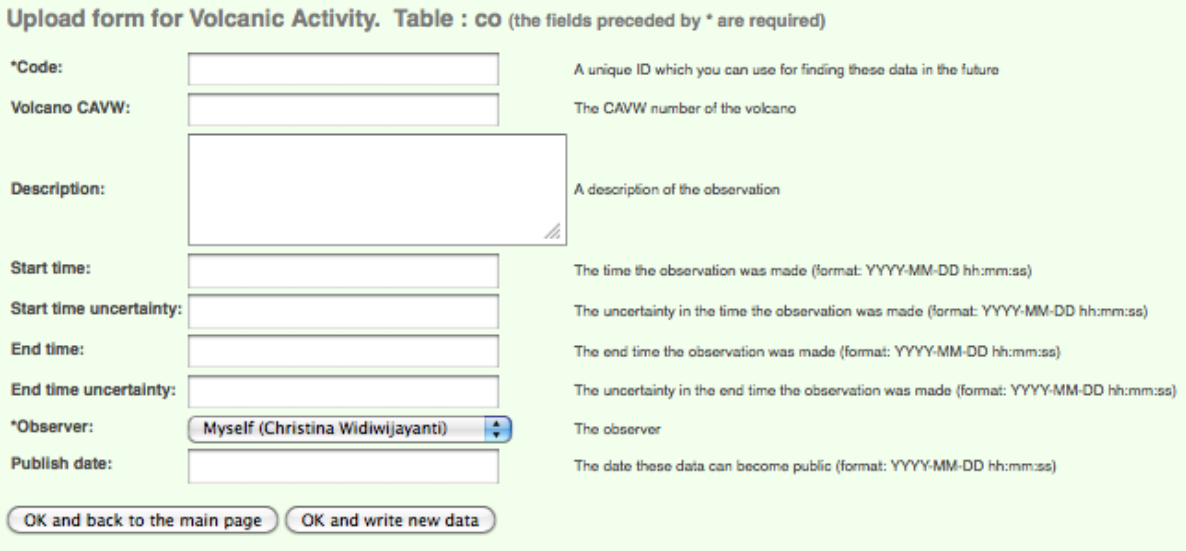


Upload form for . Table : sd_int (the fields preceded by * are required)

*Code:		A unique ID which you can use for finding these data in the future
*Collector:	Myself (Christina Widiwijayanti)	The data collector
Volcano CAVW:		The CAVW number of the volcano
Network event code:		The probable network event
Single station event code:		The probable single station event
Time:		Approximate time of event in UTC (format: YYYY-MM-DD hh:mm:ss)
Time uncertainty:		Uncertainty in the approximate time of event (format: YYYY-MM-DD hh:mm:ss)
City:		The name of the city or town where the event was felt
Maximum distance felt:		The maximum distance at which the earthquake was felt, measured from the volcano summit in km
Maximum reported intensity:		The maximum reported intensity (modified Mercalli intensity)
Distance at maximum reported intensity:		The distance from the volcano's summit to where the maximum intensity was reported in km
Publish date:		The date these data can become public (format: YYYY-MM-DD hh:mm:ss)

OK and back to the main page | OK and write new data

⇨ Observation about volcanic activity

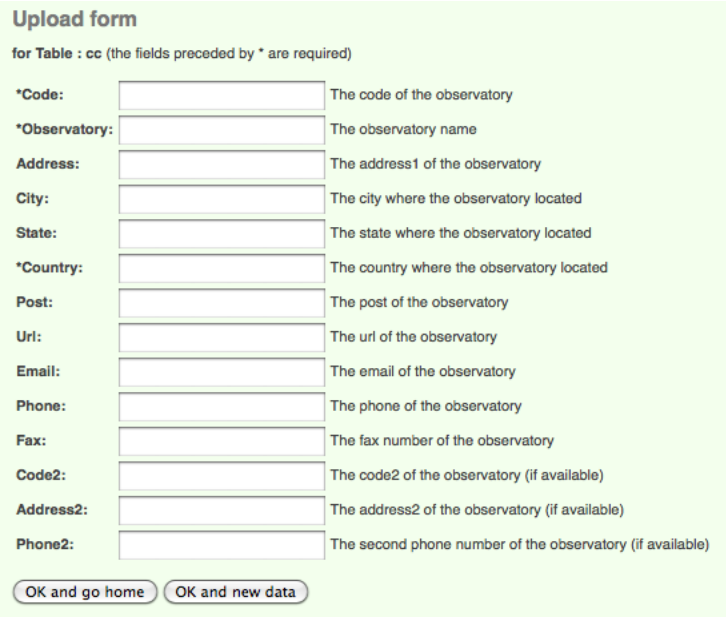


Upload form for Volcanic Activity. Table : co (the fields preceded by * are required)

*Code:		A unique ID which you can use for finding these data in the future
Volcano CAVW:		The CAVW number of the volcano
Description:		A description of the observation
Start time:		The time the observation was made (format: YYYY-MM-DD hh:mm:ss)
Start time uncertainty:		The uncertainty in the time the observation was made (format: YYYY-MM-DD hh:mm:ss)
End time:		The end time the observation was made (format: YYYY-MM-DD hh:mm:ss)
End time uncertainty:		The uncertainty in the end time the observation was made (format: YYYY-MM-DD hh:mm:ss)
*Observer:	Myself (Christina Widiwijayanti)	The observer
Publish date:		The date these data can become public (format: YYYY-MM-DD hh:mm:ss)

OK and back to the main page | OK and write new data

⇨ Observatory contact



Upload form

for Table : cc (the fields preceded by * are required)

*Code:		The code of the observatory
*Observatory:		The observatory name
Address:		The address1 of the observatory
City:		The city where the observatory located
State:		The state where the observatory located
*Country:		The country where the observatory located
Post:		The post of the observatory
Url:		The url of the observatory
Email:		The email of the observatory
Phone:		The phone of the observatory
Fax:		The fax number of the observatory
Code2:		The code2 of the observatory (if available)
Address2:		The address2 of the observatory (if available)
Phone2:		The second phone number of the observatory (if available)

OK and go home | OK and new data