Copernicus Climate Change Service - 311a Lot 2 Defining a Common Data Model

David I. Berry
National Oceanography Centre, UK

July 3, 2017

Summary

This document describes background information and a summary of initial steps taken towards defining a common data model for the representation of in situ observations as part of the C3S 311a activity.

An overview of the preferred data model from Lot 2 is given and participants on the call are invited to:

- Review the background information and proposed data model presented in this document
- Endorse the proposed data model or propose an alternative model for use within C3S 311a.

Contents

List of Tables

1 Introduction

The Copernicus Climate Change Service (C3S), through its "Collection and Processing of In Situ Observations (C3S 311a)" tender, seeks to harmonise both data formats and metadata (discovery and observational) conventions. The first step of this process, as noted within the invitation to tender, is the development or adoption of a common data model[1] for the data and metadata. Within this document, when complete, we will describe the common data model developed within Lot(s) 1 - 4 of the C3S 311a tender in consultation with ECMWF. The themes for the Lots 1 - 4 are:

- Lot 1 - Coordination of data rescue activities
- Lot 2 - Access to observations from global climate data archives
- Lot 3 - Access to observations from baseline and reference networks
- Lot 4 - Climate monitoring products for Europe based on in situ observations.

Lot 1 (C3S DRS) are building a new data portal, led by the WMO I-DARE portal lead from KNMI, that will be melded together with a much enhanced EU FP 7 ERA-CLIM 2 data registry, led by that project's Portuguese lead, plus new and enhanced data tools and techniques led by the University of Bern group. Data rescue accounts for only 10 - 15% of the Lot 1 budget, and is focused on three regions in the Southern Hemisphere in and around Argentina, South Africa and in the New Zealand to Drake Passage sector, but will link closely to the larger data rescue efforts of ACRE, IEDRO, ICA&D and similar. As with Lot 2, Lot 1 will deal with the full range of historical terrestrial and marine surface weather observations plus upper air data, serving the various international repositories these data are held in, plus having the capacity to deal with their metadata (including a compendium of all data forms/templates these data are recorded on), scanned images of hard copy data, and weather and analogue (pluviograms, thermograms, barograms etc) charts etc.

Within Lot 2, observations and metadata from land stations and marine platforms will be harmonised into a common data model and a web based service developed to serve the data through the C3S Climate Data Store (CDS). The observations include instantaneous / point observations, such as those from SYNOP weather reports, as well as daily and monthly summaries (CLIMAT DAILY and CLIMAT). A single report may contain observations of multiple parameters, e.g. air temperature, humidity, wind speed etc. The stations range from stationary land stations to mobile merchant ships, drifting buoys and other marine platforms.

Lot 3 are creating a harmonized observational dataset of measurements from the Global Baseline and Reference radiosounding networks. Within the first year observations are restricted to temperature and humidity measurements, in future years this will be expanded to include other essential climate variables (surface temperature, wind, ozone, trace gases, GPS IWV). Observations from the GRUAN and GUAN networks will be the main focus, but with potential extension to the broader RAOB program. Annual updates will be provided. Integrated physical and statistical corrections will be used to improve the quality of the baseline observations using the data from the reference networks. Lot 3 intend to be fully compliant with ODB version 2 (ODB2), noting that some changes will be necessary to ODB2 to report the full range of information required. Discovery metadata are planned to be compliant with ISO 19115 and observational metadata reported using the CF conventions. Compliance with the WIGOS metadata standard is also expected.

Lot 4 will build on and extend the European Climate Assessment and Dataset (ECA&D) project and E-OBS daily dataset for Europe. The gridded E-OBS dataset was initially developed as part of the ENSEMBLES project for statistical comparisons with Regional Climate Model output

[1] From the ITT: A common data model is different from a file format, which defines how information is encoded in a file. The purpose of a data model is to provide a well-defined data structure that can be used to represent data records from a variety of sources, in such a way that the information contained in those records can be unambiguously accessed using a common set of tools. Development of a common data model for observations involves specification of data attributes and their symbolic names, including, for example, identifiers for different instruments, observed parameters, geolocation and timing, etc. A governance structure is required to manage such specifications, ensure consistency with standards where they exist, and to ensure a controlled evolution of the data model.

(Haylock et al., 2008). More recently European research projects EURO4M, UERRA, EUPORIAS, EUSTACE, and CLIPc led to further improvements and applications, and ECA&D/E-OBS has now become reference datasets for a larger user community, also outside climate research. Funding by EUMETNET and KNMI supported the developments of additional functionality, and the close collaboration with EUMETNET members has led to strongly improved ECA&D station coverage over Europe in recent years. Within C3S_311a lot 4, the ECA&D and E-OBS will be transformed into an operational system for the Copernicus Climate Change Service (C3S), delivering regularly updated gridded products based on European in-situ data for many Essential Climate Variables (ECVs). The underlying station data that include surface air temperature, precipitation, humidity, wind speed and direction, will be made available as well, pending permission by the owners of these data. To serve climate change monitoring and climate impact assessments a large number of user-oriented climate indices will be provided, both as time series at station sites and as gridded products. No preference has been specified for the data models to be used.

Section 2 of this report provides background information on joint activities between Lots 2 and 3 so far, the ECMWF Observations DataBase (ODB) data model and relevant WMO data models. Section 3 gives an overview of the preferred data model from Lot 2 and proposes a list of elements for the observations table. Auxiliary tables are also proposed in Section 3 but left empty for future discussion once the principles of the type of data model have been agreed across lots. Section 4 proposes a governance mechanism for the common data model across lots and next steps required.

2 Background and existing standards

2.1 ODB and tenders for Lots 2 and 3

Both Lots 2 and 3 have proposed using data models based on the data model developed by ECMWF as part of the Observations DataBase (ODB) software. Within the ODB type data model each observation of a single parameter is stored as a separate record, with a single report spanning multiple records. Within each record the station / report information is repeated. A simplified example is shown in Table 1.

Table 1: Simplified example of records in ODB type data model, with observations from reports 1 and 2 spanning multiple records. For simplicity, the z coordinate has been omitted but profile data would be represented with each layer / height as a separate record

header information					**observation information**		
record id	**report id**	**obs id**	**date**	**location**	**parameter**	**value**	**units**
1	1	1	2012-01-01 12:00+0.0	POINT(-40 40)	air temperature	300.0	K
2	1	2	2012-01-01 12:00+0.0	POINT(-40 40)	sea level pressure	1013.0	hPa
3	2	3	2012-01-01 18:00+0.0	POINT(-40.1 40.2)	air temperature	300.3	K
4	2	4	2012-01-01 18:00+0.0	POINT(-40.1 40.2)	sea level pressure	1013.2	hPa

End of table

The implementation of the ODB model at ECMWF, that proposed in Lots 2 and 3 all have differing requirements. For example, the existing observations table columns defined within ODB[2] contain many parameters that are of little relevance to the In Situ observations but are relevant to the assimilation of data from many different sources into the numerical models. Conversely, there are many parameters included in the data from Lots 2 and 3 that are required to correctly

[2] http://apps.ecmwf.int/odbgov/column/

interpret the observations but that are not included in ODB.

In order to facilitate the development of the data model there have been two initial teleconferences between Lots 2 and 3 discussing the CDM and collating information on the parameters required . Each parameter and report type has its own unique set of fields and metadata fields. For example, surface air temperature observations are typically made in a screen or shelter that can influence the quality of the measurements. As a result, it is desirable to include information on the screen type, material and dimensions alongside the observation. For upper air temperature observations this metadata information is not relevant but other parameters will be required, such as the type of balloons used, instrument type and burstpoint.

In order to represent the wide variety of metadata required across (and within) Lots three different solutions are possible:

- The observations table is expanded to include all possible metadata fields, with new columns added when a new data / report type is included.
- Each report (and possibly parameter) type has a separate observations table, with a minimum set of common parameters defined across the different tables.
- The observations table is defined to include the minimum set of information required for each observation and the metadata is then linked via a series of Entity-Attribute-Value (EAV) based tables (e.g. see Table 2).

Within this document we are proposing to use solution (3), defining a minimum set of parameters to be included in the observations table and linking to the metadata in auxiliary tables. Solution (1) has been discounted as being impractical from an implementation perspective and from the perspective of adding new data types at a future date. Option (2) has not been discounted but will result in a series of data models being defined rather than a single unified data model.

Table 2: Simplified example for EAV type table for profile (atmospheric and oceanic) data.

report id	report type	field	value coded	value numeric
4	GRUAN	Ascent Balloon Number	1	NA
4	GRUAN	Ascent Balloon Type	1	NA
4	GRUAN	Ascent balloon weight (g)	NA	100.0

End of table

2.2 BUFR and WIGOS Metadata Standard

Prior to defining the data model it is useful to refer to both the WMO Binary Universal Form for the Representation of meteorological data (BUFR) (WMO, 2015a) and the WMO Integrated Observing System Metadata Standard (WMDS) (WMO, 2015b).

The BUFR format is a flexible and efficient table driven format for reporting weather observations on the WMO Global Telecommunications System (GTS) in binary. The tables defined as part of the BUFR format include many of the parameters that will be included in the CDM. For example, Common code table C6 (WMO 2015a) includes all the measurement units reportable in BUFR (and other WMO codes). Similarly, code tables are defined for reporting instrument types and methods, station types etc. Where possible, these code tables should be referenced and used in preference to defining new code tables.

In recognition of the increasing importance of observational metadata the WMDS is currently under development and undergoing a phased implementation (WMO, 2015b). The WMDS forms an extension of the ISO19115 metadata standard, with additional mandatory elements

describing both the station level and discovery metadata as well as specific information on the instrumentation used and processing steps. As part of the process simplified versions of BUFR and other tables have been included in the standard. As with BUFR these tables should be referenced, where appropriate, in preference to defining new code tables. Additionally, for compatibility with WIGOS the CDM should contain all mandatory elements of the WMDS.

3 Common Data Model

As noted above, we are proposing a data model based on the ODB type data model, but with the metadata linked through a series of auxiliary / configuration tables. A schematic of this is shown in Figure 1. The observations table is described fully below (Table 3) and contains the geospatial (xyz) and temporal (t) locations of both the station making the report and the observed parameter, unique identifying information for the station, source data (i.e. dataset) information, observed values and data licencing / usage rights. In Table 3 below, where we list the proposed elements for the observations table, we also identify where there is overlap with the elements required by the WMDS. It should be noted that not all elements from the WMDS will appear in the observations table but will be included in the auxiliary tables.

Simplified CDM schematic here

To enable flexibility and accommodate the diverse data types and metadata the additional tables are proposed to be EAV based (see Table 2 above for example). This also gives the flexibility of adding a new metadata field by simply adding a new row rather than column. Within the following tables the following syntax has been used to indicate the data type for the different elements:

- numeric: Any numeric value (integer or floating point).
- int: An integer value.
- varchar: A variable length character string.
- timestamp: A timestamp, e.g. ”2017-07-01 00:00:0.0+00”.
- []: An array of the indicated type.
- (fk) The indicated value is also a foreign key linking to another table.

3.1 Observations table

Preamble text ...

Table 3: observations_table

element_number	element_name	kind	external_table	description
1	report_id	bigint (pk)		Unique ID for report (unique ID given by combination of RecordID and ObservationID)
2	region	int (fk)	region	Region (WMO region / Ocean basin)
3	sub_region	int (fk)	sub_region	Country / regional sea
4	application_area	int[] (fk)	application_area	WMO application area(s)
5	observing_programme	int[] (fk)	observing_programme	Observing programme, e.g. VOS
6	report_type	int (fk)	report_type	e.g. SYNOP, TEMP, CLIMAT, etc
7	station_name	varchar		e.g. GRUAN station name, ship name, site name etc
8	station_type	int (fk)	station_type	Type of station, e.g. land station, sea station etc
9	platform_type	int (fk)	platform_type	Structure upon which sensor is mounted, e.g. ship, drifting buoy, tower etc
10	platform_sub_type	int (fk)	platform_sub_type	Sub-type for platform, e.g. 3m discuss buoy
11	primary_station_id	varchar		Primary station identifier, e.g. WIGOS ID
12	primary_station_id_scheme	int (fk)	id_scheme	Scheme used for unique station ID
13	secondary_station_id	varchar		Alternate (local) ID for station
14	secondary_station_id_scheme	int (fk)	id_scheme	Alternate ID Scheme, e.g. Network ID
15	station_location_longitude	numeric		Longitude of station, -180.0 to 180.0 (or other as defined by station_crs)
16	station_location_latitude	numeric		Latitude of station, -90 to 90 (or other as defined by station_crs)
17	station_location_accuracy	numeric		Accuracy to which station location recorded (radius in km)
18	station_location_method	int(fk)	location_method	Method by which location determined
19	station_location_quality	int (fk)	location_quality	Quality flag for station location
20	station_crs	int (fk)	crs	Coordinate reference scheme for station location
21	station_speed	numeric		Station speed over ground if mobile (m/s)
22	station_course	numeric		Station course over ground if mobile (degree true)
23	station_heading	numeric		Station heading if mobile
24	surface_type	int (fk)	surface_type	e.g. rolling hills

Continued on next page

Table 3 observations_table (cont.)

element_number	element_name	kind	external_table	description
25	surface_type_scheme	int (fk)	surface_type_scheme	Scheme used to classify surface cover
26	site_topography	int (fk)	site_topography	Description of local topography and broader context
27	station_configuration	int (fk)	station_configuration	Link to station metadata / configuration
28	height_of_station_above_local_ground	numeric		Height of station above local ground (m)
29	height_of_station_above_sea_level	numeric		Height of station above mean sea level (m), negative values for below sea level.
30	height_of_station_above_sea_level_accuracy	numeric		Accuracy to which height of station known (m)
31	sea_level_datum	int (fk)	sea_level_datum	Datum used for sea level
32	report_meaning_of_time_stamp	int (fk)	meaning_of_time_stamp	Report time - beginning, middle or end of reporting period
33	report_year	int		Year of report (UTC)
34	report_month	int		Month of report (UTC)
35	report_day	int		Day of report (UTC)
36	report_hour	int		Hour of report (UTC)
37	report_minutes	int		Minute of report (UTC)
38	report_seconds	int		Seconds of report (UTC)
39	report_duration	int		Report duration (s), e.g. 86400 = daily obs, 3600 hourly etc
40	report_time_accuracy	numeric		Precision to which time was recorded (s)
41	report_time_quality	int (fk)	time_quality	Quality flag for ReportDateTime
42	report_time_reference	int (fk)	time_reference	Reference Time (e.g. referenced to time server, atomic clock, radio clock etc)
43	profile_configuration	int (fk)	profile_configuration	Information on profile (atmospheric / oceanographic) configuration. Set to Record ID for profile data or missing (NULL) otherwise.
44	events_at_station	int[] (fk)	events_at_station	e.g. ship hove to, crop burning etc.
45	report_quality	int (fk)	quality_flag	Overall quality of report

Continued on next page

Table 3 observations_table (cont.)

element_number	element_name	kind	external_table	description
46	duplicate_status	int (fk)	duplicate_status	E.g. no duplicates, best duplicate, duplicate, not checked.
47	duplicates	int[] (fk)	observations_table	Array of report_id's for duplicates
48	maintenance_and_update_frequency	int (fk)	update_frequency	Frequency with which modifications and deletions are made to the data after it is first produced
49	history	varchar		Sequence of processing steps. Free text with timestamp 1 : history 1; timestamp 2 : history 2 etc.
50	record_year	int		Year of revision of this record (UTC)
51	record_month	int		Month of revision of this record (UTC)
52	record_day	int		Day of revision of this record (UTC)
53	record_hour	int		Hour of revision of this record (UTC)
54	record_minute	int		Minute of revision of this record (UTC)
55	record_seconds	int		Seconds of revision of this record (UTC)
56	processing_level	int (fk)	report_processing_level	Level of processing applied to this report
57	processing_code	int[] (fk)	report_processing_code	Processing applied to this report
58	source_id	int (fk)	source_configuration	Original source of data link to table
59	source_record_id	varchar		Record ID in source data, e.g. ID of event from GRUAN meta database
60	data_policy_licence	int (fk)	data_policy_licence	WMOessential, WMOadditional, WMOother
61	observation_id	int (pk)		Together with RecordID forms unique ID for observation / record
62	observed_variable	int (fk)	observed_variable	The variable being observed / measured
63	units	int (fk)	units	Units for the observed variable
64	code_table	int (fk)	observation_code_table	Encode / decode table for variable (if encoded)
65	observation_value	numeric		The observed value
66	observation_value_significance	int (fk)	observation_value_significance	e.g. min, max, mean, sum
67	observation_timestamp_meaning	int (fk)	meaning_of_time_stamp	beginning, middle, end
68	observation_year	int		Year ofobservation (UTC)

Continued on next page

Table 3 observations_table (cont.)

element_number	element_name	kind	external_table	description
69	observation_month	int		Month of observation (UTC)
70	obvservation_day	int		Day of observation (UTC)
71	observation_hour	int		Hour of observation (UTC)
72	observation_minute	int		Minutes of observation (UTC)
73	observation_seconds	int		Seconds of observation (UTC)
74	observation_duration	int		Duration/period over which observation was made (s)
75	observation_longitude	numeric		Longitude of the observed value, -180 to 180 (or other as defined by CRS)
76	observation_latitude	numeric		Latitude of the observed value, -90 to 90 (or other as defined by CRS)
77	observation_location_method	int (fk)	location_method	Method of determining location,
78	observation_location_precision	numeric		Precision to which location is reported (radius km)
79	observation_bounding_box_min_longitude	numeric		Bounding box for observation, valid range given by CRS
80	observation_bounding_box_max_longitude	numeric		Bounding box for observation, valid range given by CRS
81	observation_bounding_box_min_latitude	numeric		Bounding box for observation, valid range given by CRS
82	observation_bounding_box_max_latitude	numeric		Bounding box for observation, valid range given by CRS
83	observation_spatial_representativeness	int (fk)	spatial_representativeness	Spatial representativeness of observation
84	observation_height_above_station_surface	numeric		Height of sensor above local ground or sea surface. Positive values for above surface (e.g. sondes), negative for below (e.g. xbt). For visual observations, height of the visual observing platform.
85	observation_z_coordinate	numeric		z coordinate of observation
86	observation_z_coordinate_type	int (fk)	z_coordinate_type	Type of z coordinate

Continued on next page

Table 3 observations_table (cont.)

element_number	element_name	kind	external_table	description
87	observation_z_coordinate_method	int (fk)	z_coordinate_method	Method of determining z coordinate
88	quality_flag	int (fk)	quality_flag	Quality flag for observation
89	numerical_precision	int		Reporting precision of observation in units given by 'units' variable. Equivalent to BUFR scale factor
90	standard_uncertainty	numeric		Standard uncertainty in reported value
91	method_of_estimating_standard_uncertainty	int (fk)	method_of_estimating_uncertainty	Method of estimating the standard uncertainty
92	uncertainty_due_to_correlated_errors	numeric		Uncertainty due to errors in the observation that are correlated between observations
93	method_of_estimating_uncertainty_due_to_correlated_errors	int (fk)	method_of_estimating_uncertainty	NA
94	uncertainty_due_to_uncorrelated_errors	numeric		Uncertainty due to errors in the observation that are uncorrelated between observations
95	method_of_estimating_uncertainty_due_to_uncorrelated_errors	int (fk)	method_of_estimating_uncertainty	NA
96	uncertainty_due_to_systematic_errors	numeric		Uncertainty due to errors in the observations that are correlated under similar observing conditions
97	method_of_estimating_uncertainty_due_to_systematic_errors	int (fk)	method_of_estimating_uncertainty	NA
98	total_uncertainty	numeric		NA
99	method_of_estimating_total_uncertainty	int (fk)	method_of_estimating_uncertainty	NA
100	sensor_id	int (fk)	sensor_configuration	NA
101	sensor_automation_status	int (fk)	automation_status	Automated, manual, mixed or visual observation
102	exposure_of_sensor	int (fk)	instrument_exposure_quality	Whether the exposure of the instrument will impact on the quality of the measurement
103	original_precision	int		Original reporting precision in units given by 'original_units'
104	original_units	int (fk)	units	Original units

Continued on next page

Table 3 observations_table (cont.)

element_number	element_name	kind	external_table	description
105	original_value	numeric		Original value as reported or recorded in log book.
106	conversion_factor	int (fk)	conversion_factor	Link to table describing conversion process
107	processing_code	int[] (fk)	processing_code	e.g. TRC (temperature radiation corrections) etc. Encoded in table.
108	processing_level	int (fk)	processing_level	Level of processing applied to observation.
109	adjustment_id	int (fk)	adjustment	Adjustment applied to observation reported in observation value (observation_value = original + adjustment)
110	traceability	int (fk)	traceability	Whether observation can be traced to international standards.

End of table

3.2 Station configuration table

Table 4: station_configuration

element_number	element_name	type	external_table	description
0	station_primary_id	varchar		Primary (WMO) ID for station
1	station_primary_id_scheme	int (fk)	id_scheme	Scheme used for primary ID
2	station_record_number	int	NA	Record number for this station entry
3	station_secondary_id	varchar		Secondary (local) ID for station
4	station_secondary_id_scheme	int (fk)	id_scheme	Scheme used for secondary ID
5	station_name	varchar		Name of station (e.g. Tateno)
6	station_abbreviation	varchar		Abbreviation of station name (e.g. TAT)
7	start_date	timestamp		Date that the station first started reporting in this configuration
8	end_date	timestamp		Last data the station reported in this configuration
9	station_type	int (fk)	station_type	Type of reporting station
10	platform_type	int (fk)	platform_type	Generic type of observing platform
11	platform_sub_type	int (fk)	platform_sub_type	Specific type of observing platform
12	operating_institute	int (fk)	institute	Institute operating the station
13	operating_territory	int (fk)	sub_region	Sub-region where station is located or country of registry for mobile station
14	observing_frequency		observing_frequency	Typical frequency of observations for this station
15	telecommunication_method	int (fk)	communication_method	Method used to report observations
16	station_automation	int (fk)	automation_status	Whether station is automated, manual or mixed
17	measuring_system_model	int (fk)	measuring_system_model	Station / AWS model type
18	measuring_system_id	varchar		ID or serial number of measuring system
19	field_numeric	int[] (fk)	station_configuration_fields	Field to which following values correspond
20	value_numeric	numeric[]		Values for specified fields
21	field_coded	int[] (fk)	station_configuration_fields	Field to which following values correspond
22	value_coded	int[] (fk)	station_configuration_codes	Values for specified fields
23	field_character	int[] (fk)	station_configuration_fields	Field to which following values correspond
24	value_character	varchar[]		Values for specified fields
25	field_timestamp	int[] (fk)	station_configuration_fields	Field to which following values correspond
26	value_timestamp	timestamp[]		Values for specified fields

Continued on next page

Table 4 station_configuration (cont.)

element_number	element_name	type	external_table	description
27	comment	varchar		Any other comments / footnotes

End of table

3.3 Source configuration table

Table 5: source_configuration

element_number	element_name	type	external_table	description
0	source_id	int		Unique record ID for dataset
1	product_id	varchar		ID for product
2	product_name	varchar		Name of source, e.g. International Comprehensive Ocean Atmosphere Data Set, RS92 GRUAN Data Product
3	product_code	varchar		Abbreviations / product code, e.g. ICOADS, RS92-GDP
4	product_version	varchar		Version number for dataset, e.g. Release 3.0.0
5	product_level	int (fk)	product_level	Level of product
6	description	varchar		Description of dataset / comments
7	product_references	varchar[]		References describing the dataset
8	product_citation	varchar[]		Citation to use when using this product
9	product_status	int (fk)	product_status	Status of product, draft, pre-release, release
10	source_format	int (fk)	source_format	Original format for data
11	source_format_version	varchar		Version of original data format
12	source_file	varchar		Filename for data from source
13	source_file_checksum	varchar		Checksum of source datafile
14	data_centre	int (fk)	institute	Data centre from which data sourced
15	data_centre_url	varchar		URL for data centre
16	data_policy_licence	int (fk)	data_policy_licence	Data policy / licence
17	pi_name	varchar		Name of PI responsible for dataset
18	pi_email	varchar		Email address of PI
19	pi_url	varchar		URL for PI
21	field_numeric	int[] (fk)	source_configuration_fields	Fields to which following values apply
22	value_numeric	numeric[]	NA	additional values
21	field_coded	int[] (fk)	source_configuration_fields	Fields to which following values apply
22	value_coded	int[] (fk)	source_configuration_codes	additional values
21	field_character	int[] (fk)	source_configuration_fields	Fields to which following values apply
22	value_character	varchar[]	NA	additional values

Continued on next page

Table 5 source_configuration (cont.)

element_number	element_name	type	external_table	description
21	field_timestamp	int[] (fk)	source_configuration_fields	Fields to which following values apply
22	value_timestamp	timestamp[]	NA	additional values
23	history	varchar		History of source
24	comments	varchar		Additional comments / footnotes
25	timestamp			Date record created

End of table

3.4 Profile configuration table

Table 6: profile_configuration

element_number	element_name	kind	external_table	description
0	profile_id	varchar	NA	NA
1	report_id	varchar	NA	NA
2	entry_number	int	NA	Entry number for this profile
3	standard_time	int (fk)	standard_time	e.g. Standard / scheduled time for launch or report, e.g. 00, 06, 12, 18 UTC
4	actual_time	timestamp		Actual report / launch time
5	profile_number	numeric		e.g. Balloon Number
6	field_numeric	int[] (fk)	profile_configuration_fields	Fields to which the following values apply
7	value_numeric	numeric	NA	Values for the additional fields
8	field_coded	int[] (fk)	profile_configuration_fields	Fields to which the following values apply
9	value_coded	int[] (fk)	profile_configuration_codes	Values for the additional fields
10	field_character	int[] (fk)	profile_configuration_fields	Fields to which the following values apply
11	value_character	varchar[]	NA	Values for the additional fields
12	field_timestamp	int[] (fk)	profile_configuration_fields	Fields to which the following values apply
13	value_timestamp	timestamp[]	NA	Values for the additional fields
14	comments	varchar	NA	Any additional comments / footnotes

End of table

3.5 Sensor configuration table

Table 7: sensor_configuration

element_number	element_name	type	external_table	description
0	instrument_id	varchar		Unique ID for this instrument in combination with entry_number
1	station_id	varchar	station_configuration	Station associated with this instrument
2	observing_method	int (fk)	observing_method	Method (instrumental, estimated / visual, computed) by which observation made
3	sampling_strategy	int (fk)	sampling_strategy	Sampling strategy used by instrument
4	calibration_status	int (fk)	calibration_status	Whether the sensor is in / out of calibration
5	calibration_date	timestamp	NA	Date of last calibration
6	field_numeric	int[] (fk)	sensor_configuration_fields	fields for which this entry is applicable
7	value_numeric	numeric[]	NA	Numeric value for this entry (if numeric)
8	field_coded	int[] (fk)	sensor_configuration_fields	fields for which this entry is applicable
9	value_coded	int[] (fk)	sensor_configuration_codes	coded value for this entry
10	field_character	int[] (fk)	sensor_configuration_fields	fields for which this entry is applicable
11	value_character	varchar[]	NA	Value for entry if not coded or numeric
12	field_timestamp	int[] (fk)	sensor_configuration_fields	fields for which this entry is applicable
13	value_timestamp	timestamp[]	NA	time stamp entry
14	date_start	timestamp	NA	start date for period of validity associated with this entry
15	date_end	timestamp	NA	end date for period of validity associated with this entry

End of table

4 References

WMO, 2015a: Manual On Codes (WMO-No 306), Volume I.2, Part B - Binary Codes, WMO, Geneva.
WMO, 2015b: Manual on the WMO Integrated Global Observing System: Annex VIII to the Technical Regulations (WMO-No 1160), WMO, Geneva.

5 Appendix

5.1 Code tables

Table 8: adjustment

value	report_id	observation_id	adjustment	reason	reference
0	0	0	-0.123	Test value	DOI of paper / document describing adjustment methodology

End of table

Table 9: application_area

value	description
1	Global numerical weather prediction (GNWP)
2	High-resolution numerical weather prediction (HRNWP)
3	Nowcasting and very short range forecasting (NVSRF)
4	Seasonal and inter-annual forecasting (SIAF)
5	General weather forecasting
6	Aeronautical meteorology
7	Ocean applications
8	Agricultural meteorology
9	Hydrology
10	Climate monitoring (as undertaken through the Global Climate Observing System, GCOS)
11	Climate applications
12	Space weather
13	Cryosphere applications
14	Energy sector
15	Transportation sector
16	Health sector
17	Terrestrial ecology
18	Operational air quality forecasting
19	Atmospheric composition forecasting
20	Atmospheric composition monitoring and analysis
21	Large urban complexes

End of table

Table 10: automation_status

value	description
0	Automatic observation.
1	Automatic, always supplemented by manual input.
2	Automatic, occasionally supplemented by manual input.
3	Automatic, supplemented by manual observations.
4	Manual observation.
5	Unknown.
6	Visual observation.

End of table

Table 11: calibration_status

value	description
0	No changes - in calibration.
1	No changes - out of calibration.
2	No changes - calibration unknown.
3	Recalibrated - in calibration.

End of table

Table 12: communication_method

value	description
0	Cellular (unspecified)
1	Meteosat DCP
2	Iridium (unspecified)
3	GOES DCP
4	VSAT (unspecified)
5	Landline telephone
6	Radio modem
7	E-mail (unspecified)
8	Voice (ship). The observation is sent to a NMS through the telephone network. The communication may use Inmarsat, Iridium, Vsat, VHF
9	Email (ship). The observation is sent to a NMS through an email. The WMO message is attached to this email. The satellite communication provider may be Inmarsat, Iridium, Vsat
10	Web (ship). The observation is sent through the Web (example: TurboWeb). The satellite communication provider may be Inmarsat, Iridium, Vsat
11	Inmarsat-C (FM13, SAC41). Standard procedure used to report observations (FM13 messages) from conventional VOS for many years. Collect call system: the NMS which receives the observations pays the communication costs
12	Inmarsat-C (FM13, other SAC). FM13 messages are sent to a dedicated SAC (other than SAC41) established at one, or more LES. In general, communications are paid by the country who recruited the ship
13	Inmarsat-C (EUHC). Text messages containing compressed data (E-SURFMAR format) are sent ashore through Inmarsat-C to a dedicated SAC and LES. Communications are paid by the country who recruited the ship
14	Inmarsat-C (SEAS). SEAS binary messages sent through Inmarsat-C Data Mode to a dedicated SAC and LES. Communications are paid by NOAA/NWS
15	Automated Identification System (direct or through satellite)
16	Argos system
17	Cellular (Dial-up). Dial-up communication using terrestrial wireless networks (GSM, GPRS)
18	Cellular (SMS). SMS sent through terrestrial wireless networks (GSM, GPRS)
19	Globalstar communication system
20	GMS (DCP). Data Collecting Platform of Geostationary Meteorological Satellites
21	Iridium (SBD). Short Burst Data service of Iridium communication system
22	Iridium (Email). Email sent through Iridium (e.g. Easymail)
23	Iridium (Dial-up). Dial-up communication using Iridium

Continued on next page

Table 12 communication_method (cont.)

value	description
24	Inmarsat-C (Data Mode). Data Mode service of Inmarsat-C used by S-AWS. See above for SEAS which also uses this service for conventional VOS
25	Inmarsat-C (Email). Email sent through Inmarsat-C
26	Orbcomm communication system
27	Vsat (Email). Email sent through Vsat
28	Vsat (Dial-up). Dial-up communication using Vsat
29	Delayed Mode only
30	Other (specify in footnote).

End of table

Table 13: conversion_factor

value	description	implementation	reference
0	Farenheit to degrees Celsius	T_Celsius = (T_Farenheit - 32) / 1.8	NA

End of table

Table 14: crs

value	description
0	WGS84
1	ETRS89
2	NAD83
3	DHDN
4	Ellipsoidal datum using International Reference Meridian maintained by the International Earth Rotation and Reference System Services (IERS)

End of table

Table 15: data_policy_licence

value	name	description
1	WMOessential	WMO Essential Data: free and unrestricted international exchange of basic data and products.
2	WMOadditional	WMO Additional Data: free and unrestricted access to data and products exchanged under the auspices of WMO to the research and education communities for non-commercial activities. A more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider which may necessitate dialogue with the data publisher for confirmation of terms and conditions.

Continued on next page

Table 15 data_policy_licence (cont.)

value	name	description
3	WMOother	Data identified for global distribution via WMO infrastructure (GTS / WIS) that is not covered by WMO Resolution 25 neither WMO Resolution 40 e.g. aviation OPMET data. Data marked with WMOOther data policy shall be treated like WMOAdditional where a more precise definition of the data policy may be additionally supplied within the metadata. In all cases it shall be the responsibility of the data consumer to ensure that they understand the data policy specified by the data provider which may necessitate dialogue with the data publisher for confirmation of terms and conditions.

End of table

Table 16: duplicate_status

value	description
0	Unique observation, no known duplicates
1	Best duplicate
2	Worst duplicate
3	Unchecked

End of table

Table 17: events_at_station

value	description
1	Grass-cutting
2	Snow clearing
3	Tree removal
4	Construction activity
5	Road work
6	Biomass burning
7	Dust storm
8	Storm damage
9	Wind storm
10	Flood
11	Fire
12	Earthquake
13	Land slide
14	Storm surge or tsunami
15	Lightning
16	Vandalism

End of table

Table 18: id_scheme

value	description
0	ICOADS: ID present, but unknown type
1	ICOADS: ship, Ocean Station Vessel (OSV), or ice station callsign
2	ICOADS: generic ID (e.g., SHIP, BUOY, RIGG, PLAT)

Continued on next page

Table 18 id_scheme (cont.)

value	description
3	ICOADS: WMO 5-digit buoy number
4	ICAODS: other buoy number (e.g., Argos or national buoy number)
5	ICOADS: Coastal-Marine Automated Network (C-MAN) ID (assigned by US NDBC or other organizations)
6	ICOADS: station name or number
7	ICOADS: oceanographic platform/cruise number
8	ICOADS: fishing vessel psuedo-ID
9	ICOADS: national ship number
10	ICOADS: composite information from early ship data
11	ICOADS: 7-digit buoy ID (proposed)
12	WIGOS ID
13	GRUAN ID
14	IMO Number
15	National ID
16	WMO buoy / station number

End of table

Table 19: institute

value	name	region	sub_region	address	contact	contact_email	URL
0	NationalOceanographyCentre	6	76	European Way, Southampton, UK, SO14 3ZH	Dr David I. Berry	dyb@noc.ac.uk	www.noc.ac.uk

End of table

Table 20: instrument_exposure_quality

value	description
1	Class 1 - Exposure of instrument allows reference level measurements
2	Class 2 - Exposure of instrument has small or infrequent influence on measurement
3	Class 3 - Exposure of instrument leads to increased uncertainty or occasional invalid measurements
4	Class 4 - Exposure of instruemnt leads to high uncertainty or regular invalid measurements
5	Class 5 - Exposure of instrument leads to invalid measurements

End of table

Table 21: location_method

value	description
0	Argos
1	ARGOS DOPPLER
2	ARGOS Kalman
3	Argos-3
4	Argos-4
5	From map
6	GALILEO
7	GOES DCP
8	GPS
9	INMARSAT
10	Iridium
11	Iridium and GPS
12	IRIDIUM DOPPLER
13	LORAN
14	Meteosat DCP
15	Orbcomm
16	Reserved
17	Surveyed

End of table

Table 22: location_quality

value	description
0	Good - location consistent with other reports from this station
1	Doubtful
2	Bad - Track check failed
3	Unchecked

End of table

Table 23: meaning_of_time_stamp

value	name	description
1	beginning	Date / time specified indicates the start of the period over which the observation was made.

Continued on next page

Table 23 meaning_of_time_stamp (cont.)

value	name	description
2	end	Date / time specified indicates the end of the period over which the observation was made.
3	middle	Date / time specified indicates the middle of the period over which the observation was made.

End of table

Table 24: observed_variable

value	parameter_ group	domain	sub_domain	abbreviation	name	units	description
0	cloud	atmospheric	upper-air	ch	high_cloud_type	coded	type of high clouds (ch)
1	cloud	atmospheric	upper-air	cm	middle_cloud_type	coded	type of middle clouds (cm)
2	cloud	atmospheric	upper-air	cl	low_cloud_type	coded	type of low clouds (cl)
3	cloud	atmospheric	upper-air	nh	cloud_base _height	m	cloud base height (nh)
4	cloud	atmospheric	upper-air	nl	low_cloud_amount	Okta	low cloud amount (n)
5	cloud	atmospheric	upper-air	tcc	total_cloud_ amount	Okta	total amount of clouds
6	cloud	atmospheric	upper-air	n	cloud_cover	Okta	Total cloud cover
7	humidity	atmospheric	surface; upper-air	rh	relative_humidity	1	NA
8	humidity	atmospheric	surface; upper-air	q	specific_humidity	1	specific means per unit mass. Specific humidity is the mass fraction of water vapor in (moist) air.
9	humidity	atmospheric	surface; upper-air	dep_dew	dew_point_de pression	K	Dew point depression is also called dew point deficit. It is the amount by which the air temperature exceeds its dew point temperature. Dew point temperature is the temperature at which a parcel of air reaches saturation upon being cooled at constant pressure and specific humidity.
10	humidity	atmospheric	surface; upper-air	t_dew	dew_point_te mperature	K	Dew point temperature is the temper- ature at which a parcel of air reaches saturation upon being cooled at constant pressure and specific humidity.
11	humidity	atmospheric	surface; upper-air	t_wet	wet_bulb_tem perature	K	NA
12	humidity	atmospheric	surface; upper-air	t_ice_bulb	ice_bulb_tem perature	K	NA
13	pressure	atmospheric	surface	a	pressure_tendanc y_characteristics	coded	characteristic of pressure tendency (used in synoptic maps)

Continued on next page

Table 24 observed_variable (cont.)

value	parameter_group	domain	sub_domain	abbreviation	name	units	description
14	pressure	atmospheric	surface	p	air_pressure	Pa	NA
15	pressure	atmospheric	surface	mslp	air_pressure_at_sea_level	Pa	sea_level means mean sea level, which is close to the geoid in sea areas. Air pressure at sea level is the quantity often abbreviated as MSLP or PMSL.
16	pressure	atmospheric	surface	ppp	pressure_tendancy	Pa	pressure tendency
18	salinity	oceanic	surface; sub-surface	sal	salinity	psu	ocean salinity (PSU)
19	temperature	atmospheric	surface; upper-air	t_air	air_temperature	K	Air temperature is the bulk temperature of the air, not the surface (skin) temperature.
20	temperature	oceanic	surface; sub-surface	t_water	water_temperature	K	Water (sea, river, lake) temperature at depth indicated
21	visibility	atmospheric	surface	vv	horizontal_visibility_in_air	m	The visibility is the distance at which something can be seen.
22	weather	atmospheric	surface	w1	past_weather_1	coded	past weather (w)
23	weather	atmospheric	surface	ww	present_weather	coded	present weather (ww)
24	weather	atmospheric	surface	w2	past_weather_2	coded	past weather 2 (used in synoptic maps)
26	wind	atmospheric	surface; upper-air	d	wind_from_direction	degree	direction from which the wind is blowing
27	wind	atmospheric	surface; upper-air	u	eastward_wind_speed	m s-1	Eastward indicates a vector component which is positive when directed eastward (negative westward). Wind is defined as a two-dimensional (horizontal) air velocity vector, with no vertical component. (Vertical motion in the atmosphere has the standard name upward_air_velocity.)

Continued on next page

Table 24 observed_variable (cont.)

value	parameter_group	domain	sub_domain	abbreviation	name	units	description
28	wind	atmospheric	surface; upper-air	v	northward_wind_speed	m s-1	Northward indicates a vector component which is positive when directed northward (negative southward). Wind is defined as a two-dimensional (horizontal) air velocity vector, with no vertical component. (Vertical motion in the atmosphere has the standard name upward_air_velocity.)
29	wind	atmospheric	surface; upper-air	w	wind_speed	m s-1	Speed is the magnitude of velocity. Wind is defined as a two-dimensional (horizontal) air velocity vector, with no vertical component. (Vertical motion in the atmosphere has the standard name upward_air_velocity.) The wind speed is the magnitude of the wind velocity.
30	wind	atmospheric	surface	w_gust	wind_speed_of_gust	m s-1	Speed is the magnitude of velocity. Wind is defined as a two-dimensional (horizontal) air velocity vector, with no vertical component. (Vertical motion in the atmosphere has the standard name upward_air_velocity.) The wind speed is the magnitude of the wind velocity. A gust is a sudden brief period of high wind speed. In an observed timeseries of wind speed, the gust wind speed can be indicated by a cell_methods of maximum for the time-interval. In an atmospheric model which has a parametrised calculation of gustiness, the gust wind speed may be separately diagnosed from the wind speed.

End of table

Table 25: observation_value_significance

value	description
0	Maximum value over indicated period
1	Minimum value over indicated period
2	Mean value over indicated period
3	Median value over indicated period
4	Modal value over indicated period
5	Mean absolute error over indicated period
6	Best estimate of standard deviation (N-1) of observed parameter over indicated period
7	Standard deviation (N) of observed parameter over indicated period
8	Harmonic mean of observed parameter over indicated period
9	Root mean square vector error of observed parameter over indicated period
10	root mean square of observed parameter over indicated period
11	Vector mean of observed parameter over indicated period
12	Instantaneous value of observed parameter
13	Observed tendancy: Increasing, then decreasing; Observed parameter the same or higher than three hours ago
14	Observed tendancy: Increasing, then steady; or increasing, then increasing more slowly
15	Observed tendancy: Increasing (steadily or unsteadily)
16	Observed tendancy: Decreasing or steady, then increasing; or increasing, then increasing more rapidly
17	Observed tendancy: Steady; Observed parameter the same as three hours ago
18	Observed tendancy: Decreasing, then increasing; Observed parameter the same or lower than three hours ago
19	Observed tendancy: Decreasing, then steady; or decreasing, then decreasing more slowly
20	Observed tendancy: Decreasing (steadily or unsteadily)
21	Observed tendancy: Steady or increasing, then decreasing; or decreasing, then decreasing more rapidly
22	Accumulation over specified period

End of table

Table 26: observing_frequency

value	abbreviatione	description
0	opd	One observation per day (24 hour intervals).
1	tpd	Two observations per day (12 hour intervals).
2	fpd	Four observations per day (6 hour intervals).
3	epd	Eight observations per day (3 hour intervals).
4	hly	Hourly observations.
5	irr	Irregular observations.

End of table

Table 27: observing_method

value	description
0	Measured
1	Estimated
2	Computed

End of table

Table 28: observing_programme

value	abbreviation	description	sponsor
1	AMDAR	Global Aircraft Meteorological DAta Relay	WMO/GOS
2	EPA	Environmental Protection Agency	NA
3	EUMETNET	Grouping of European National Meteorological Services	WMO/GOS
4	WMO/GAW	World Meteorological Organization/Global Atmospheric Watch	NA
5	GCOS	Global Climate Observing System	NA
6	GCW	Global Cryosphere Watch	NA
7	GOOS	Global Ocean Observing System	NA
8	IPA	International Permafrost Association	NA
9	JCOMM	Joint Technical Commission for Oceanography and Marine Meteorology	WMO/GOS
10	WMO/GOS	World Meteorological Organization/Global Observing System	NA
11	GTOS	Global Terrestrial Observing System	NA
12	IAGOS	In-service Aircraft for a Global Observing System	NA
13	WHYCOS	World Hydrological Cycle Observing System	NA
14	WMO/CLW	World Meteorological Office/Climate and Water Department	NA
15	ADNET	Asian dust and aerosol lidar observation network	GALION ; WMO/GAW
16	Aeronet	AErosol RObotic NETwork	NASA?
17	ANTON	Antarctic Observing Network	WMO/GOS
18	ASAP	Automated Shipboard Aerological Program	WMO/GOS
19	BSRN	Baseline Surface Radiation Network	WMO/GAW & GCOS

Continued on next page

Table 28 observing_programme (cont.)

value	abbreviation	description	sponsor
20	CASTNET	Clean Air Status and Trends Network	(National - USA)
21	CIS-LiNet	Lidar network for monitoring atmosphere over CIS regions	GALION ; WMO/GAW
22	CLN	CREST Lidar Network	GALION ; WMO/GAW
23	DART	Deep-ocean Assessment and Reporting of Tsunamis	NOAA Centre for Tsunamis Research
24	E-AMDAR	European - Aircraft Meteorological DAta Relay	EUMETNET ; WMO/GOS
25	E-ASAP	European - Automated Shipboard Aerological Program	EUMETNET ; WMO/GOS
26	E-GVAP	European - GNSS water vapour programme	EUMETNET ; WMO/GOS
27	E-PROFILE	European - wind profiles from radar	EUMETNET ; WMO/GOS
28	E-SURFMAR	European - Surface Marine Operational Service	EUMETNET ; WMO/GOS
29	EARLINET	European Aerosol Research Lidar Network	GALION ; WMO/GAW
30	GALION	GAW Aerosol Lidar Observation Network	WMO/GAW
31	GAW-PFR	GAW-Precision Filter Radiometers	WMO/GAW
32	German AOD Network	German Aerosol Optical Depth Network	WMO/GAW
33	GLOSS	Global Sea Level Observing System	JCOMM ; WMO/GOS
34	GRUAN	GCOS Reference Upper Air Network	GCOS
35	GSN	GCOS Surface Network	GCOS
36	GTN-G	Global Terrestrial Network - Glaciers	GCOS
37	GTN-H	Global Terrestrial Network - Hydrology	WMO/CLW ; GCOS ; GTOS
38	GTN-P	Global Terrestrial Network - Permafrost	IPA ; GCOS ; GTOS
39	GUAN	GCOS Upper Air Network	GCOS
40	IAGOS-MOZAIC	Measurement of Ozone and Water Vapour on Airbus in-service Aircraft	IAGOS
41	LALINET	Latin America Lidar Network	GALION; WMO/GAW
42	MPLNET	Micro Pulse Lidar Network	GALION; WMO/GAW
43	NDACC	Network for the Detection of Atmospheric Composition Change	GALION; WMO/GAW
44	OPERA	European Weather Radar Project	EUMETNET; (WMO/GOS)

Continued on next page

Table 28 observing_programme (cont.)

value	abbreviation	description	sponsor
45	PIRATA	Prediction and Research Moored Array in the Atlantic	GOOS; WMO/GOS
46	PolarAOD	Polar Aerosol Optical Depth Measurement Network Project	WMO/GAW
47	RAMA	Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction	NOAA
48	RBCN	Regional Basic Climatological Network	WMO/GOS
49	RBON	Regional Basic Observing Network	WMO/GOS
50	RBSN	Regional Basic Synoptic Network	WMO/GOS
51	TAO	Tropical Atmosphere and Ocean Array	NOAA; GCOS
52	SKYNET	Aerosol -cloud-radiation interaction in the atmosphere project	WMO/GAW
53	SibRad	NA	WMO/GAW
54	SOOP	Ship of Opportunity	JCOMM ; WMO/GOS
55	U.S. IOOS	United States Integrated Ocean Observing System	(National - USA)
56	VOS	Voluntary Observing Fleet	JCOMM ; WMO/GOS
57	VOSCLIM	Voluntary Observing Fleet (VOS) Climate Project	JCOMM ; WMO/GOS
58	WRAP	Worldwide Recurring ASAP Project	JCOMM ; WMO/GOS

End of table

Table 29: platform_sub_type

value	platform_type	abbreviation	description
0	Ship	BA	Barge
1	Ship	BC	Bulk Carrier
2	Ship	CA	Cable ship
3	Ship	CG	Coast Guard Ship
4	Ship	CS	Container Ship
5	Ship	DR	Dredger
6	Ship	FE	Passenger ferries
7	Ship	FP	Floating production and storage units
8	Ship	FV	Other Fishing Vessel
9	Ship	GC	General Cargo
10	Ship	GT	Gas Tanker
11	Ship	IC	Icebreaking vessel
12	Ship	IF	Inshore Fishing Vessel
13	Ship	LC	Livestock carrier
14	Ship	LT	Liquid Tanker
15	Ship	LV	Light Vessel
16	Ship	MI	Mobile installation including mobile offshore drill ships, jack-up rigs and semi-submersibles

Continued on next page

Table 29 platform_sub_type (cont.)

value	platform_type	abbreviation	description
17	Ship	MS	Military Ship
18	Ship	OT	Other
19	Ship	MW	Ocean Weather Ship
20	Ship	PI	Pipe layer
21	Ship	PS	Passenger ships and cruise liners
22	Ship	RF	Ro/Ro Ferry
23	Ship	RR	Ro/Ro Cargo
24	Ship	RS	Refrigerated cargo ships including banana ships
25	Ship	RV	Research Vessel
26	Ship	SA	Large sailing vessels
27	Ship	SV	Support Vessel
28	Ship	TR	Trawler
29	Ship	TU	Tug
30	Ship	VC	Vehicle carriers
31	Ship	YA	Yacht / Pleasure Craft
32	Ship	BA	Barges, including crane barges and tank barges.
33	Ship	BC	Bulk Carriers, including Ore/Bulk/Oil (OBO) carriers and Ore/Oil carriers.
34	Ship	CA	Cable ships.
35	Ship	CG	Coastguard cutters, patrol ships and launches.
36	Ship	CS	Container ships, including open and closed container ships and refrigerated container ships.
37	Ship	DR	Dredgers including bucket, hopper, grab and suction dredgers.
38	Ship	FE	Passenger ferries (carrying passengers only).
39	Ship	FP	Floating Production and Storage Units.
40	Ship	FV	Fishing Vessels including purse seiners, long liners etc., but excluding trawlers.
41	Ship	GC	General Cargo ships with one or more holds.
42	Ship	GT	Liquefied gas carriers/tankers including LNG and LPG carriers.
43	Ship	IC	Icebreaking vessels (dedicated vessel). If the vessel fits in another category and is ice strengthened
44	Ship	LC	Livestock Carrier (dedicated ship for the carriage of livestock).
45	Ship	LT	Liquid tankers including oil product tankers, chemical tankers and crude oil tankers (including VLCC's and ULCC's).
46	Ship	LV	Light vessels.
47	Ship	MI	Mobile installations, including mobile offshore drill ships, jack-up rigs, semi-submersibles.
48	Ship	MS	Military ships.
49	Ship	OW	Ocean Weather Ships (dedicated weather ship).
50	Ship	PI	Pipe Layers.
51	Ship	PS	Passenger ships and Cruise liners.
52	Ship	RF	Ro Ro ferries (carrying passengers and laden vehicles).
53	Ship	RR	Ro Ro cargo ships for carriage of road and/or rail vehicles and cargo, including containerised cargo.
54	Ship	RS	Refrigerated cargo ships including banana ships.
55	Ship	RV	Research Vessels, including oceanographic, meteorological and hydrographic research ships and seismographic research ships.

Continued on next page

Table 29 platform_sub_type (cont.)

value	platform_type	abbreviation	description
56	Ship	SA	Large sailing vessels, including sail training vessels.
57	Ship	SV	Support vessels including offshore support vessels, offshore supply vessels, stand-by vessels, pipe carriers, anchor handling vessels, buoy tenders (including coastguard vessels engaged solely on buoy tending duties), diving support vessels, etc.
58	Ship	TR	Trawler fishing vessels.
59	Ship	TU	Tugs, including fire-fighting tugs, salvage tugs, pusher tugs, pilot vessels, tenders etc.
60	Ship	VC	Vehicle Carriers: dedicated multi deck ships for the carriage of new unladen road vehicles.
61	Ship	YA	Yachts and pleasure craft.
62	Ship	OT	Other (specify in footnote).
63	Land station		Synoptic network
64	Land station		Local Network
65	Ship		Ocean Weather Ship (on station)
66	Ship		Ocean Weather Ship (off station)
67	Coastal / Island		Other
68	Coastal / Island		Coastal-Marine Automated Network (C-MAN) (NDBC operated)
69	Drifting buoy		Unspecified drifting buoy
70	Drifting buoy		Standard Lagrangian drifter (Global Drifter Programme)
71	Drifting buoy		Standard FGGE type drifting buoy (non-Lagrangian meteorological drifting buoy)
72	Drifting buoy		Wind measuring FGGE type drifting buoy (non-Lagrangian meteorological drifting buoy)
73	Ice buoy		Ice drifter
74	Drifting buoy		SVPG Standard Lagrangian drifter with GPS
75	Drifting buoy		SVP-HR drifter with high-resolution temperature or thermistor string
76	Subsurface float		Unspecified subsurface float
77	Profiling float		SOFAR
78	Profiling float		ALACE
79	Profiling float		MARVOR
80	Profiling float		RAFOS
81	Profiling float		PROVOR
82	Profiling float		SOLO
83	Profiling float		APEX
84	Moored buoy		Unspecified moored buoy
85	Moored buoy		Nomad
86	Moored buoy		3-metre discus
87	Moored buoy		10-12-metre discus
88	Moored buoy		ODAS 30 series
89	Moored buoy		ATLAS (e.g. TAO area)
90	Moored buoy		TRITON buoy
91	Moored buoy		FLEX mooring (e.g. TIP area)
92	Moored buoy		Omnidirectional waverider
93	Moored buoy		Directional waverider
94	Profiling float		Subsurface ARGO float
95	Profiling float		PALACE
96	Profiling float		NEMO
97	Profiling float		NINJA
98	Ice buoy		Ice buoy/float (POPS or ITP)

Continued on next page

Table 29 platform_sub_type (cont.)

value	platform_type	abbreviation	description
99	Moored buoy		Mooring oceanographic
100	Moored buoy		Mooring meteorological
101	Moored buoy		Mooring multidisciplinary (OceanSITES)
102	Moored buoy		Mooring tide gauge or tsunami buoy
103	Ice buoy		Ice beacon
104	Ice buoy		Ice mass balance buoy

End of table

Table 30: platform_type

value	description
0	Aircraft
1	Autonomous marine vehicle
2	Autonomous pinneped bathythermograph
3	Coastal / Island
4	Drifting buoy
5	Expendable bathythermograph (XBT)
6	Glider
7	High-resolution Conductivity-Temperature-Depth (CTD) / Expendable CTD(XCTD)
8	Ice buoy
9	Ice station
10	Land station
11	Land vehicle
12	Lightship
13	Mechanical / digital / micro bathythermograph (MBT)
14	Moored buoy
15	Oceanographic station data (bottle and low resolution CTD / XCTD data)
16	Profiling float
17	Rig / platform
18	Shallow water station (fixed to sea / lake floor)
19	Ship
20	Subsurface float (moving)
21	Tide gauge
22	Underwater platform
23	Undulating oceanographic recorder

End of table

Table 31: processing_level

value	processing_level	description
0	Unknown	NA
1	Raw	NA
2	Level 0	NA
3	Level I	NA
4	Level II	NA
5	Level III	NA
6	Level IV	NA

End of table

Table 32: profile_configuration_codes

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
0	1	balloon_manufacturer	0	0	Kaysam	NA	NA
1	1	balloon_manufacturer	1	1	Totex	NA	NA
2	1	balloon_manufacturer	2	2	KKS	NA	NA
3	1	balloon_manufacturer	3	3	Guangzhou Shuangyi (China)	NA	NA
4	1	balloon_manufacturer	4	4	ChemChina Zhuzhou (China)	NA	NA
5	2	balloon_type	0	NA	NA	NA	NA
8	5	humidity_correction_algorithm	0	0	No corrections	NA	NA
9	5	humidity_correction_algorithm	1	1	Time lag correction provided by manufacturer	NA	NA
10	5	humidity_correction_algorithm	2	2	Solar radiation correction provided by the manufacturer	NA	NA
11	5	humidity_correction_algorithm	3	3	Solar radiation and time lag correction provided by the manufacturer	NA	NA
12	5	humidity_correction_algorithm	4	7	GRUAN solar radiation and time lag	NA	NA
13	6	profile_direciton	0	0	Upwards profile	NA	NA

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
14	6	profile_direciton	1	1	Downwards profile	NA	NA
15	6	profile_direciton	2	2	Horizontal profile	NA	NA
17	8	geopotential_height_calculation	0	0	Geopotential height calculated from pressure	NA	NA
18	8	geopotential_height_calculation	1	1	Geopotential height calculated from GPS height	NA	NA
19	8	geopotential_height_calculation	2	2	Geopotential height calculated from radar height	NA	NA
21	10	include_descent	NA	NA	NA	NA	NA
22	11	instrument_type_for_water_temperature_salinity_profile	0	place holder	NA	NA	NA
23	12	method_of_depth_calculation	0	0	Depth calculated using fall rate equation	NA	NA
24	12	method_of_depth_calculation	1	1	Depth calculate from water pressure / equation of state (of sea water)	NA	NA
26	14	processing_code	0	cc	Calibration correction (of humidity sensors)	NA	NA
27	14	processing_code	1	HRC	Humidity radiation correction	NA	NA

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
28	14	processing_code	2	or	Outlier removal (remove temperature spikes)	NA	NA
29	14	processing_code	3	pGPS	Combination of pressure and GPS	NA	NA
30	14	processing_code	4	TL	Time-lag correction	NA	NA
31	14	processing_code	5	TRC	Temperature radiation correction	NA	NA
32	15	radiosonde_sounding_system	0	00	Reserved	NULL	30/06/2007
33	15	radiosonde_sounding_system	1	01	iMet-1-BB (United States)	01/01/1900	30/06/2007
34	15	radiosonde_sounding_system	2	01	Not vacant	30/06/2007	NULL
35	15	radiosonde_sounding_system	3	02	No radiosonde - passive target (e.g. reflector)	NULL	30/06/2007
36	15	radiosonde_sounding_system	4	03	No radiosonde - active target (e.g. transponder)	NULL	30/06/2007
37	15	radiosonde_sounding_system	5	04	No radiosonde - passive temperature-humidity profiler	NULL	30/06/2007
38	15	radiosonde_sounding_system	6	05	No radiosonde - active temperature-humidity profiler	NULL	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
39	15	radiosonde_sounding_system	7	06	No radiosonde - radio-acoustic sounder	NULL	30/06/2007
40	15	radiosonde_sounding_system	8	07	iMet-1-AB (United States)	01/01/1900	30/06/2007
41	15	radiosonde_sounding_system	9	07	Not vacant	30/06/2007	NULL
42	15	radiosonde_sounding_system	10	08	No radiosonde - ... (reserved)	NULL	30/06/2007
43	15	radiosonde_sounding_system	11	09	No radiosonde - system unknown or not specified	NULL	30/06/2007
44	15	radiosonde_sounding_system	12	10	Sippican LMS5 w/Chip Thermistor, duct mounted capacitance relative humidity sensor and derived pressure from GPS height	01/01/1900	30/06/2007
45	15	radiosonde_sounding_system	13	10	VIZ type A pressure-commutated (United States)	01/01/2008	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
46	15	radiosonde_sounding_system	14	11	Sippican LMS6 w/Chip Thermistor, external boom mounted capacitance relative humidity sensor, and derived pressure from GPS height	01/01/1900	30/06/2007
47	15	radiosonde_sounding_system	15	11	VIZ type B time-commutated (United States)	01/01/2008	NULL
48	15	radiosonde_sounding_system	16	12	Jin Yang RSG-20A with derived pressure from GPS height/GL-5000P (Republic of Korea)	01/01/1900	30/06/2007
49	15	radiosonde_sounding_system	17	12	RS SDC (Space Data Corporation - United States)	06/05/2015	NULL
50	15	radiosonde_sounding_system	18	13	Astor (no longer made - Australia)	01/01/1900	30/06/2007
51	15	radiosonde_sounding_system	19	13	Vaisala RS92/MARWIN MW32 (Finland)	15/09/2010	NULL
52	15	radiosonde_sounding_system	20	14	Vaisala RS92/DigiCORA MW41 (Finland)	01/01/1900	30/06/2007
53	15	radiosonde_sounding_system	21	14	VIZ MARK I MICROSONDE (United States)	03/11/2011	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
54	15	radiosonde_sounding_system	22	15	EEC Company type 23 (United States)	01/01/1900	30/06/2007
55	15	radiosonde_sounding_system	23	15	PAZA-12M/Radiotheodolite-UL (Ukraine)	01/12/2011	NULL
56	15	radiosonde_sounding_system	24	16	Elin (Austria)	01/01/1900	30/06/2007
57	15	radiosonde_sounding_system	25	16	PAZA-22/AVK-1 (Ukraine)	01/12/2011	NULL
58	15	radiosonde_sounding_system	26	17	Graw DFM-09 (Germany)	01/01/1900	30/06/2007
59	15	radiosonde_sounding_system	27	17	Graw G. (Germany)	02/05/2012	NULL
60	15	radiosonde_sounding_system	28	18	Graw DFM-06 (Germany)	01/01/1900	30/06/2007
61	15	radiosonde_sounding_system	29	18	Not vacant	30/06/2007	NULL
62	15	radiosonde_sounding_system	30	19	Graw M60 (Germany)	01/01/1900	30/06/2007
63	15	radiosonde_sounding_system	31	19	Vacant	30/06/2007	NULL
64	15	radiosonde_sounding_system	32	20	Indian Meteorological Service MK3 (India)	01/01/1900	30/06/2007
65	15	radiosonde_sounding_system	33	20	Not vacant	30/06/2007	NULL
66	15	radiosonde_sounding_system	34	21	Jin Yang 1524LA LORAN-C/GL5000 (Republic of Korea)	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
67	15	radiosonde_sounding_system	35	21	VIZ/Jin Yang MARK I MICROSONDE (Republic of Korea)	06/05/2015	NULL
68	15	radiosonde_sounding_system	36	22	Meisei RS-11G GPS radiosonde w/thermistor, capacitance relative humidity sensor, and derived pressure from GPS height (Japan)	01/01/1900	30/06/2007
69	15	radiosonde_sounding_system	37	22	Meisei RS2-80 (Japan)	02/05/2012	NULL
70	15	radiosonde_sounding_system	38	23	Mesural FMO 1950A (France)	01/01/1900	30/06/2007
71	15	radiosonde_sounding_system	39	23	Vaisala RS41/DigiCORA MW41 (Finland)	03/11/2011	NULL
72	15	radiosonde_sounding_system	40	24	Mesural FMO 1945A (France)	01/01/1900	30/06/2007
73	15	radiosonde_sounding_system	41	24	Vaisala RS41/AUTOSONDE (Finland)	03/11/2011	NULL
74	15	radiosonde_sounding_system	42	25	Mesural MH73A (France)	01/01/1900	30/06/2007
75	15	radiosonde_sounding_system	43	25	Vaisala RS41/MARWIN MW32 (Finland)	03/11/2011	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
76	15	radiosonde_sounding_system	44	26	Meteolabor Basora (Switzerland)	01/01/1900	30/06/2007
77	15	radiosonde_sounding_system	45	26	Meteolabor SRS-C34/Argus 37 (Switzerland)	07/05/2014	NULL
78	15	radiosonde_sounding_system	46	27	AVK-MRZ (Russian Federation)	01/01/1900	30/06/2007
79	15	radiosonde_sounding_system	47	27	Not vacant	30/06/2007	NULL
80	15	radiosonde_sounding_system	48	28	AVK - AK2-02 (Russian Federation)	01/01/1900	30/06/2007
81	15	radiosonde_sounding_system	49	28	Meteorit MARZ2-1 (Russian Federation)	15/09/2011	NULL
82	15	radiosonde_sounding_system	50	29	MARL-A or Vektor-M - AK2-02 (Russian Federation)	01/01/1900	30/06/2007
83	15	radiosonde_sounding_system	51	29	Meteorit MARZ2-2 (Russian Federation)	15/09/2011	NULL
84	15	radiosonde_sounding_system	52	30	Meisei RS-06G (Japan)	01/01/1900	30/06/2007
85	15	radiosonde_sounding_system	53	30	Oki RS2-80 (Japan)	01/01/2010	NULL
86	15	radiosonde_sounding_system	54	31	Taiyuan GTS1-1/GFE(L) (China)	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
87	15	radiosonde_sounding_system	55	31	VIZ/Valcom type A pressure-commutated (Canada)	03/11/2011	NULL
88	15	radiosonde_sounding_system	56	32	Shanghai GTS1/GFE(L) (China)	01/01/1900	30/06/2007
89	15	radiosonde_sounding_system	57	32	Shanghai Radio (China)	03/11/2011	NULL
90	15	radiosonde_sounding_system	58	33	Nanjing GTS1-2/GFE(L) (China)	01/01/1900	30/06/2007
91	15	radiosonde_sounding_system	59	33	UK Met Office MK3 (UK)	03/11/2011	NULL
92	15	radiosonde_sounding_system	60	34	Vacant	01/01/1900	30/06/2007
93	15	radiosonde_sounding_system	61	34	Vinohrady (Czechia)	30/06/2007	NULL
94	15	radiosonde_sounding_system	62	35	Meisei iMS-100 GPS radiosonde w/thermistor sensor, capacitance relative humidity sensor, and derived pressure from GPS height (Japan)	01/01/1900	30/06/2007
95	15	radiosonde_sounding_system	63	35	Vaisala RS18 (Finland)	07/05/2014	NULL
96	15	radiosonde_sounding_system	64	36	Vacant	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
97	15	radiosonde_sounding_system	65	36	Vaisala RS21 (Finland)	30/06/2007	NULL
98	15	radiosonde_sounding_system	66	37	Not vacant	01/01/1900	30/06/2007
99	15	radiosonde_sounding_system	67	37	Vaisala RS80 (Finland)	30/06/2007	NULL
100	15	radiosonde_sounding_system	68	38	Vacant	01/01/1900	30/06/2007
101	15	radiosonde_sounding_system	69	38	VIZ LOCATE Loran-C (United States)	30/06/2007	NULL
102	15	radiosonde_sounding_system	70	39	Sprenger E076 (Germany)	01/01/1900	30/06/2007
103	15	radiosonde_sounding_system	71	39	Vacant	30/06/2007	NULL
104	15	radiosonde_sounding_system	72	40	Sprenger E084 (Germany)	01/01/1900	30/06/2007
105	15	radiosonde_sounding_system	73	40	Vacant	30/06/2007	NULL
106	15	radiosonde_sounding_system	74	41	Sprenger E085 (Germany)	01/01/1900	30/06/2007
107	15	radiosonde_sounding_system	75	41	Vaisala RS41 with pressure derived from GPS height/ DigiCORA MW41 (Finland)	03/11/2011	NULL
108	15	radiosonde_sounding_system	76	42	Sprenger E086 (Germany)	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
109	15	radiosonde_sounding_system	77	42	Vaisala RS41 with pressure derived from GPS height/ AUTOSONDE (Finland)	03/11/2011	NULL
110	15	radiosonde_sounding_system	78	43	AIR IS - 4A - 1680 (United States)	01/01/1900	30/06/2007
111	15	radiosonde_sounding_system	79	43	NanJing Daqiao XGP-3G (China)*	07/05/2014	NULL
112	15	radiosonde_sounding_system	80	44	AIR IS - 4A - 1680 X (United States)	01/01/1900	30/06/2007
113	15	radiosonde_sounding_system	81	44	TianJin HuaYun-TianYi GTS(U)1 (China)*	07/05/2014	NULL
114	15	radiosonde_sounding_system	82	45	Beijing Changfeng CF-06 (China)*	01/01/1900	30/06/2007
115	15	radiosonde_sounding_system	83	45	RS MSS (United States)	07/05/2014	NULL
116	15	radiosonde_sounding_system	84	46	AIR IS - 4A - 403 (United States)	01/01/1900	30/06/2007
117	15	radiosonde_sounding_system	85	46	Shanghai Changwang GTS3 (China)*	07/05/2014	NULL
118	15	radiosonde_sounding_system	86	47	Meisei RS2-91 (Japan)	01/01/1900	30/06/2007
119	15	radiosonde_sounding_system	87	47	Not vacant	30/06/2007	NULL
120	15	radiosonde_sounding_system	88	48	PAZA-22M/MARL-A	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
121	15	radiosonde_sounding_system	89	48	VALCOM (Canada)	02/05/2012	NULL
122	15	radiosonde_sounding_system	90	49	Not vacant	01/01/1900	30/06/2007
123	15	radiosonde_sounding_system	91	49	VIZ MARK II (United States)	30/06/2007	NULL
124	15	radiosonde_sounding_system	92	50	Graw DFM-90 (Germany)	01/01/1900	30/06/2007
125	15	radiosonde_sounding_system	93	50	Meteolabor SRS-C50/Argus (Switzerland)	02/11/2016	NULL
126	15	radiosonde_sounding_system	94	51	Not vacant	01/01/1900	30/06/2007
127	15	radiosonde_sounding_system	95	51	VIZ-B2 (United States)	30/06/2007	NULL
128	15	radiosonde_sounding_system	96	52	Vaisala RS80-57H	01/01/1900	30/06/2007
129	15	radiosonde_sounding_system	97	52	Vaisala RS92-NGP/Intermet IMS-2000 (United States)	03/11/2011	NULL
130	15	radiosonde_sounding_system	98	53	AVK - I-2012 (Russian Federation)	01/01/1900	30/06/2007
131	15	radiosonde_sounding_system	99	53	AVK-RF95 (Russian Federation)	06/05/2015	NULL
132	15	radiosonde_sounding_system	100	54	Graw DFM-97 (Germany)	01/01/1900	30/06/2007
133	15	radiosonde_sounding_system	101	54	Not vacant	30/06/2007	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
134	15	radiosonde_sounding_system	102	55	Meisei RS-01G (Japan)	01/01/1900	30/06/2007
135	15	radiosonde_sounding_system	103	55	Not vacant	30/06/2007	NULL
136	15	radiosonde_sounding_system	104	56	M2K2 (France)	01/01/1900	30/06/2007
137	15	radiosonde_sounding_system	105	56	Not vacant	30/06/2007	NULL
138	15	radiosonde_sounding_system	106	57	Modem M2K2-DC (France)	01/01/1900	30/06/2007
139	15	radiosonde_sounding_system	107	57	Not vacant	30/06/2007	NULL
140	15	radiosonde_sounding_system	108	58	AVK-BAR (Russian Federation)	01/01/1900	30/06/2007
141	15	radiosonde_sounding_system	109	58	Not vacant	30/06/2007	NULL
142	15	radiosonde_sounding_system	110	59	Modem M2K2-R 1680 MHz RDF radiosonde with pressure sensor chip (France)	01/01/1900	30/06/2007
143	15	radiosonde_sounding_system	111	59	Not vacant	30/06/2007	NULL
144	15	radiosonde_sounding_system	112	60	MARL-A or Vektor-M - I-2012 (Russian Federation)	01/01/1900	30/06/2007
145	15	radiosonde_sounding_system	113	60	Vaisala RS80/MicroCora (Finland)	06/05/2015	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
146	15	radiosonde_sounding_system	114	61	Not vacant	01/01/1900	30/06/2007
147	15	radiosonde_sounding_system	115	61	Vaisala RS80/Loran/Digicora I, II or Marwin (Finland)	30/06/2007	NULL
148	15	radiosonde_sounding_system	116	62	MARL-A or Vektor-M - MRZ-3MK (Russian Federation)	01/01/1900	30/06/2007
149	15	radiosonde_sounding_system	117	62	Vaisala RS80/PCCora (Finland)	06/05/2015	NULL
150	15	radiosonde_sounding_system	118	63	Vacant	01/01/1900	30/06/2007
151	15	radiosonde_sounding_system	119	63	Vaisala RS80/Star (Finland)	30/06/2007	NULL
152	15	radiosonde_sounding_system	120	64	Orbital Sciences Corporation, Space Data Division, transponder radiosonde, type 909-11-XX, where XX corresponds to the model of the instrument (United States)	01/01/1900	30/06/2007
153	15	radiosonde_sounding_system	121	64	Vacant	30/06/2007	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
154	15	radiosonde_sounding_system	122	65	Vacant	01/01/1900	30/06/2007
155	15	radiosonde_sounding_system	123	65	VIZ transponder radiosonde, model number 1499-520 (United States)	30/06/2007	NULL
156	15	radiosonde_sounding_system	124	66	Vacant	01/01/1900	30/06/2007
157	15	radiosonde_sounding_system	125	66	Vaisala RS80 /Autosonde (Finland)	30/06/2007	NULL
158	15	radiosonde_sounding_system	126	67	Not vacant	01/01/1900	30/06/2007
159	15	radiosonde_sounding_system	127	67	Vaisala RS80/Digicora III (Finland)	30/06/2007	NULL
160	15	radiosonde_sounding_system	128	68	AVK-RZM-2 (Russian Federation)	01/01/1900	30/06/2007
161	15	radiosonde_sounding_system	129	68	Not vacant	30/06/2007	NULL
162	15	radiosonde_sounding_system	130	69	MARL-A or Vektor-M-RZM-2 (Russian Federation)	01/01/1900	30/06/2007
163	15	radiosonde_sounding_system	131	69	Not vacant	30/06/2007	NULL
164	15	radiosonde_sounding_system	132	70	Not vacant	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
165	15	radiosonde_sounding_system	133	70	Vaisala RS92/Star (Finland)	30/06/2007	NULL
166	15	radiosonde_sounding_system	134	71	Not vacant	01/01/1900	30/06/2007
167	15	radiosonde_sounding_system	135	71	Vaisala RS90/Loran/Digicora I, II or Marwin (Finland)	30/06/2007	NULL
168	15	radiosonde_sounding_system	136	72	Not vacant	01/01/1900	30/06/2007
169	15	radiosonde_sounding_system	137	72	Vaisala RS90/PC-Cora (Finland)	30/06/2007	NULL
170	15	radiosonde_sounding_system	138	73	MARL-A (Russian Federation) - ASPAN-15 (Kazakhstan)	01/01/1900	30/06/2007
171	15	radiosonde_sounding_system	139	73	Vaisala RS90/Autosonde (Finland)	02/11/2016	NULL
172	15	radiosonde_sounding_system	140	74	Not vacant	01/01/1900	30/06/2007
173	15	radiosonde_sounding_system	141	74	Vaisala RS90/Star (Finland)	30/06/2007	NULL
174	15	radiosonde_sounding_system	142	75	AVK-MRZ-ARMA (Russian Federation)	01/01/1900	30/06/2007
175	15	radiosonde_sounding_system	143	75	Not vacant	30/06/2007	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
176	15	radiosonde_sounding_system	144	76	AVK-RF95-ARMA (Russian Federation)	01/01/1900	30/06/2007
177	15	radiosonde_sounding_system	145	76	Not vacant	30/06/2007	NULL
178	15	radiosonde_sounding_system	146	77	GEOLINK GPSonde GL98 (France)	01/01/1900	30/06/2007
179	15	radiosonde_sounding_system	147	77	Modem GPSonde M10 (France)	15/03/2010	NULL
180	15	radiosonde_sounding_system	148	78	Not vacant	01/01/1900	30/06/2007
181	15	radiosonde_sounding_system	149	78	Vaisala RS90/Digicora III (Finland)	30/06/2007	NULL
182	15	radiosonde_sounding_system	150	79	Not vacant	01/01/1900	30/06/2007
183	15	radiosonde_sounding_system	151	79	Vaisala RS92/Digicora I, II or Marwin (Finland)	30/06/2007	NULL
184	15	radiosonde_sounding_system	152	80	Not vacant	01/01/1900	30/06/2007
185	15	radiosonde_sounding_system	153	80	Vaisala RS92/Digicora III (Finland)	30/06/2007	NULL
186	15	radiosonde_sounding_system	154	81	Not vacant	01/01/1900	30/06/2007
187	15	radiosonde_sounding_system	155	81	Vaisala RS92/Autosonde (Finland)	30/06/2007	NULL

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
188	15	radiosonde_sounding_system	156	82	Lockheed Martin LMS-6 w/chip thermistor; external boom mounted polymer capacitive relative humidity sensor; capacitive pressure sensor and GPS wind	01/01/1900	30/06/2007
189	15	radiosonde_sounding_system	157	82	Sippican MK2 GPS/STAR (United States) with rod thermistor, carbon element and derived pressure	07/11/2012	NULL
190	15	radiosonde_sounding_system	158	83	Sippican MK2 GPS/W9000 (United States) with rod thermistor, carbon element and derived pressure	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
191	15	radiosonde_sounding_system	159	83	Vaisala RS92-D/Intermet IMS 1500 w/silicon capacitive pressure sensor, capacitive wire temperature sensor, twin thin-film heated polymer capacitive relative humidity sensor and RDF wind	07/11/2012	NULL
192	15	radiosonde_sounding_system	160	84	Sippican MARK II with chip thermistor, carbon element and derived pressure from GPS height	01/01/1900	30/06/2007
193	15	radiosonde_sounding_system	161	84	Vacant	30/06/2007	NULL
194	15	radiosonde_sounding_system	162	85	Not vacant	01/01/1900	30/06/2007
195	15	radiosonde_sounding_system	163	85	Sippican MARK IIA with chip thermistor, carbon element and derived pressure from GPS height	30/06/2007	NULL
196	15	radiosonde_sounding_system	164	86	Not vacant	01/01/1900	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
197	15	radiosonde_sounding_system	165	86	Sippican MARK II with chip thermistor, pressure and carbon element	30/06/2007	NULL
198	15	radiosonde_sounding_system	166	87	Not vacant	01/01/1900	30/06/2007
199	15	radiosonde_sounding_system	167	87	Sippican MARK IIA with chip thermistor, pressure and carbon element	30/06/2007	NULL
200	15	radiosonde_sounding_system	168	88	MARL-A or Vektor-M-MRZ (Russian Federation)	01/01/1900	30/06/2007
201	15	radiosonde_sounding_system	169	88	Not vacant	30/06/2007	NULL
202	15	radiosonde_sounding_system	170	89	MARL-A or Vektor-M-BAR (Russian Federation)	01/01/1900	30/06/2007
203	15	radiosonde_sounding_system	171	89	Not vacant	30/06/2007	NULL
204	15	radiosonde_sounding_system	172	90	Radiosonde not specified or unknown	NULL	30/06/2007
205	15	radiosonde_sounding_system	173	91	Pressure only radiosonde	NULL	30/06/2007
206	15	radiosonde_sounding_system	174	92	Pressure only radiosonde plus transponder	NULL	30/06/2007

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
207	15	radiosonde_sounding_system	175	93	Pressure only radiosonde plus radar reflector	NULL	30/06/2007
208	15	radiosonde_sounding_system	176	94	No pressure radiosonde plus transponder	NULL	30/06/2007
209	15	radiosonde_sounding_system	177	95	No pressure radiosonde plus radar reflector	NULL	30/06/2007
210	15	radiosonde_sounding_system	178	96	Descending radiosonde	NULL	30/06/2007
211	15	radiosonde_sounding_system	179	97	BAT-16P (South Africa)	01/01/1900	30/06/2007
212	15	radiosonde_sounding_system	180	97	Not vacant	30/06/2007	NULL
213	15	radiosonde_sounding_system	181	98	BAT-16G (South Africa)	01/01/1900	30/06/2007
214	15	radiosonde_sounding_system	182	98	Not vacant	30/06/2007	NULL
215	15	radiosonde_sounding_system	183	99	BAT-4G (South Africa)	NA	NA
216	15	radiosonde_sounding_system	184	99	Not vacant	NA	NA
218	16	radiosonde_completeness	0	1	Pressure only radiosonde	NA	NA
219	16	radiosonde_completeness	1	2	Pressure only radiosonde plus trasnponder	NA	NA
220	16	radiosonde_completeness	2	3	Pressure only radiosonde plus radar reflector	NA	NA

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
221	16	radiosonde_completeness	3	4	No-pressure radiosonde plus transponder	NA	NA
222	16	radiosonde_completeness	4	5	No-pressure radiosonde plus radar reflector	NA	NA
223	17	radiosonde_computational_method	0	TBD	NA	NA	NA
225	19	radiosonde_ground_receiving_system	0	0	InterMet IMS 2000	NA	NA
226	19	radiosonde_ground_receiving_system	1	1	InterMet IMS 1500C	NA	NA
227	19	radiosonde_ground_receiving_system	2	2	Shanghai GTC1	NA	NA
228	19	radiosonde_ground_receiving_system	3	3	Nanjing GTC2	NA	NA
229	19	radiosonde_ground_receiving_system	4	4	Nanjing GFE(L)1	NA	NA
230	19	radiosonde_ground_receiving_system	5	5	MARL-A radar	NA	NA
231	19	radiosonde_ground_receiving_system	6	6	VEKTOR-M radar	NA	NA
232	20	radiosonde_type	NA	NA	Common code table C2	NA	NA

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
233	21	reason_for_termination	NA	NA	Place holder	NA	NA
234	22	solar_and_infrared_radiation_correction	0	0	No correction	NA	NA
235	22	solar_and_infrared_radiation_correction	1	1	CIMO solar corrected and CIMO infrared corrected	NA	NA
236	22	solar_and_infrared_radiation_correction	2	2	CIMO solar corrected and infrared corrected	NA	NA
237	22	solar_and_infrared_radiation_correction	3	3	CIMO solar corrected only	NA	NA
238	22	solar_and_infrared_radiation_correction	4	4	Solar and infrared corrected automatically by radiosonde system	NA	NA
239	22	solar_and_infrared_radiation_correction	5	5	Solar corrected automatically by radiosonde system	NA	NA
240	22	solar_and_infrared_radiation_correction	6	6	Solar and infrared corrected as specified by country	NA	NA
241	22	solar_and_infrared_radiation_correction	7	7	Solar corrected as specified by country	NA	NA

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
242	22	solar_and_infrared_radiation_correction	8	8	Solar and infrared correction as specified by GRUAN	NA	NA
243	22	solar_and_infrared_radiation_correction	9	9	Solar corrected as specified by GRUAN	NA	NA
244	23	tracking_technique	NA	NA	common code table C7	NA	NA
245	24	type_of_balloon	0	0	GP26	NA	NA
246	24	type_of_balloon	1	1	GP28	NA	NA
247	24	type_of_balloon	2	2	GP30	NA	NA
248	24	type_of_balloon	3	3	HM26	NA	NA
249	24	type_of_balloon	4	4	HM28	NA	NA
250	24	type_of_balloon	5	5	HM30	NA	NA
251	24	type_of_balloon	6	6	SV16	NA	NA
252	24	type_of_balloon	7	7	Totex TA type balloons	NA	NA
253	24	type_of_balloon	8	8	Totex TX type balloons	NA	NA
254	25	type_of_balloon_shelter	NA	NA	Place holder	NA	NA
255	26	type_of_gas_used_in_balloon	NA	NA	Place holder	NA	NA
256	27	type_of_measuring_equipment_used	0	0	Pressure instrument associated with wind measuring equipment	NA	NA
257	27	type_of_measuring_equipment_used	1	1	Optical theodolite	NA	NA

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
258	27	type_of_measuring_equipment_used	2	2	Radio theodolite	NA	NA
259	27	type_of_measuring_equipment_used	3	3	Radar	NA	NA
260	27	type_of_measuring_equipment_used	4	4	VLF-Omega	NA	NA
261	27	type_of_measuring_equipment_used	5	5	Loran-C	NA	NA
262	27	type_of_measuring_equipment_used	6	6	Wind profiler	NA	NA
263	27	type_of_measuring_equipment_used	7	7	Satellite navigation	NA	NA
264	27	type_of_measuring_equipment_used	8	8	Radio-acoustic Sounding System (RASS)	NA	NA
265	27	type_of_measuring_equipment_used	9	9	Sodar	NA	NA
266	27	type_of_measuring_equipment_used	10	14	Pressure instrument associated with wind measuring equipment but pressure element failed during ascent	NA	NA

Continued on next page

Table 32 profile_configuration_codes (cont.)

value	field_number	field_name	code_value	abbreviation	description	start_date	end_date
267	27	type_of_measuring_equipment_used	11	15	Missing value	NA	NA
268	27	type_of_measuring_equipment_used	12	10 - 13	Reserved	NA	NA
269	28	type_of_pressure_sensor	0	0	Capacitance aneroid	NA	NA
270	28	type_of_pressure_sensor	1	1	Derived from GPS	NA	NA
271	28	type_of_pressure_sensor	2	2	Resistive strain gauge	NA	NA
272	28	type_of_pressure_sensor	3	3	Silicon capacitor	NA	NA
273	28	type_of_pressure_sensor	4	4	Derived from radar height	NA	NA
274	29	unwinder_type		NA	STRING	NA	NA
275	30	water_temperature_profile_recorder_type	NA	NA	Place holder / TBD (check BUFR tables)	NA	NA
276	31	XBT_launcher_type	NA	NA	Place holder / TBD (check BUFR tables)	NA	NA

End of table

Table 33: profile_configuration_fields

value	field_name	type	description
1	balloon_manufacturer	int (fk)	NA
2	balloon_type	int (fk)	NA
3	burstpoint_altitude	numeric	NA
4	burstpoint_pressure	numeric	NA
5	humidity_correctio n_algorithm	int (fk)	NA
6	profile_direction	int (fk)	NA
7	filling_weight	numeric	NA
8	geopotential_heig ht_calculation	int(fk)	NA
9	gross_weight	numeric	NA
10	include_descent	numeric	NA
11	instrument_type_fo r_water_temperatur e_salinity_profile	int (fk)	NA
12	method_of_depth_ calculation	int (fk)	NA
13	payload	numeric	NA
14	processing_code	int (fk)	NA
15	radiosonde_soun ding_system	int (fk)	NA
16	radiosonde_com pleteness	int(fk)	NA
17	radiosonde_compu tational_method	int(fk)	NA
18	radiosonde_con figuration	int(fk)	NA
19	radiosonde_ground_ receiving_system	int(fk)	NA
20	radiosonde_type	int(fk)	See WMO3685
21	reason_for_termination	int(fk)	NA
22	solar_and_infrared_ra diation_correction	int(fk)	NA
23	tracking_technique	int(fk)	NA
24	type_of_balloon	int(fk)	NA
25	type_of_balloonshelter	int(fk)	NA
26	type_of_gasuse dinballoon	int(fk)	NA
27	type_of_measuring_ equipmentused	int(fk)	NA
28	type_of_pressu re_sensor	int(fk)	NA
29	unwinder_type	int(fk)	NA
30	water_temperature_p rofile_recorder_type	int(fk)	NA
31	XBT_launcher_type	int(fk)	XBT / XCTD launcher type

End of table

Table 34: quality_flag

value	description
0	Good
1	Inconsistent
2	Doubtful

Continued on next page

Table 34 quality_flag (cont.)

value	description
3	Wrong
4	Not checked
5	Has been changed
6	Estimated
7	Missing value

End of table

Table 35: region

value	WMO_region	description
0	NA	Reserved
1	1	Africa
2	2	Asia
3	3	South America
4	4	North America, Central America, Caribbean
5	5	South-West Pacific
6	6	Europe
7	7	Antarctica

End of table

Table 36: report_processing_codes

value	description
0	date / times quality controlled
1	location quality controlled
2	observation quality controlled
3	adjustment applied to observed value

End of table

Table 37: report_processing_level

value	description
0	Raw - data as originally reported in source data set
1	Partial - subset of reported values (location, date / time, observand etc) processed
2	Full - all elements of report processed

End of table

Table 38: report_type

value	abbreviation	description
0	SYNOP	NA
1	TEMP	NA
2	CLIMAT	NA

End of table

Table 39: sampling_strategy

value	description
0	Continuous
1	Discrete
2	Event

End of table

Table 40: sea_level_datum

value	description
0	Earth Gravitational Model 1996
1	Baltic height system 1977

End of table

Table 41: sensor_configuration_fields

value	field	parameter	field_name	type	code_value	description
0	0	humidity	icebulbstatus	int (fk)	0	Ice bulb
1	0	humidity	icebulbstatus	int (fk)	1	Wet bulb
8	3	all	sensorhousing-configuration	int (fk)	0	Double v section louvers
9	3	all	sensorhousing-configuration	int (fk)	1	non-overlapping louvers
10	3	all	sensorhousing-configuration	int (fk)	2	Not applicable
11	3	all	sensorhousing-configuration	int (fk)	3	Overlapping louvers
12	3	all	sensorhousing-configuration	int (fk)	4	single v-section louvers
13	3	all	sensorhousing-configuration	int (fk)	5	vented, non-louvered
14	4	all	sensorhousing-heating	int (fk)	0	Heated
15	4	all	sensorhousing-heating	int (fk)	1	Unheated
16	5	all	sensorhousing-material	int (fk)	0	Metal alloy
17	5	all	sensorhousing-material	int (fk)	1	Plastic / Glass reinforced plastic
18	5	all	sensorhousing-material	int (fk)	2	Reed / grass / leaf
19	5	all	sensorhousing-material	int (fk)	3	Wood
20	6	all	sensorhousing-radiationshielding	int (fk)	0	Concentric tube
21	6	all	sensorhousing-radiationshielding	int (fk)	1	Cylindrical section plate shield

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
22	6	all	sensorhousing-radiationshielding	int (fk)	2	Integrated (e.g. chilled mirror)
23	6	all	sensorhousing-radiationshielding	int (fk)	3	Marine Stevenson screen
24	6	all	sensorhousing-radiationshielding	int (fk)	4	Open covered inverted V roof
25	6	all	sensorhousing-radiationshielding	int (fk)	5	open covered lean-to
26	6	all	sensorhousing-radiationshielding	int (fk)	6	Rectangular section section
27	6	all	sensorhousing-radiationshielding	int (fk)	7	Square section shield
28	6	all	sensorhousing-radiationshielding	int (fk)	8	Stevenson screen
29	6	all	sensorhousing-radiationshielding	int (fk)	9	Triangular section shield
30	7	all	sensorhousing-type	int (fk)	0	Aspirated (e.g. Assmann)
31	7	all	sensorhousing-type	int (fk)	1	Hand-held digital temperature/humidity sensor
32	7	all	sensorhousing-type	int (fk)	2	Other shelter
33	7	all	sensorhousing-type	int (fk)	3	Radiation Shield (e.g. cylindrical / Gill multi-plate radiation shield)
34	7	all	sensorhousing-type	int (fk)	4	Screen
35	7	all	sensorhousing-type	int (fk)	5	Sling / whirling
36	7	all	sensorhousing-type	int (fk)	6	Unscreened.
37	8	all	sensorhousing-ventilation	int (fk)	0	Artificial aspiration in use, constant flow at time of reading
38	8	all	sensorhousing-ventilation	int (fk)	1	Artificial aspiration in use, variable flow at time of reading
39	8	all	sensorhousing-ventilation	int (fk)	2	Natural ventilation in use

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
40	9	all	sensorhousing-ventilationrate	numeric	NA	cubic m per second
41	10	all	sensorlocation-ship	int (fk)	0	Aft mast.
42	10	all	sensorlocation-ship	int (fk)	1	Bridge wing
43	10	all	sensorlocation-ship	int (fk)	2	Foremast yardarm
44	10	all	sensorlocation-ship	int (fk)	3	Foremast.
45	10	all	sensorlocation-ship	int (fk)	4	Handheld.
46	10	all	sensorlocation-ship	int (fk)	5	Main deck
47	10	all	sensorlocation-ship	int (fk)	6	Mainmast yardarm
48	10	all	sensorlocation-ship	int (fk)	7	Mainmast.
49	10	all	sensorlocation-ship	int (fk)	8	Mast on wheelhouse top yardarm
50	10	all	sensorlocation-ship	int (fk)	9	Mast on wheelhouse top.
51	10	all	sensorlocation-ship	int (fk)	10	Meteorological mast.
52	10	all	sensorlocation-ship	int (fk)	11	Not fitted.
53	10	all	sensorlocation-ship	int (fk)	12	Other
54	10	all	sensorlocation-ship	int (fk)	13	Pressurised wheelhouse (closed and not vented to the outside).
55	10	all	sensorlocation-ship	int (fk)	14	Wheelhouse
56	10	all	sensorlocation-ship	int (fk)	15	Wheelhouse, not pressurised (vented to the outside).
57	11	all	sensorside-ship	int (fk)	0	Center
58	11	all	sensorside-ship	int (fk)	1	Port
59	11	all	sensorside-ship	int (fk)	2	Starboard
60	11	all	sensorside-ship	int (fk)	3	Windward side
61	12	all	sensorowner	int (fk)	0	National hydrometeorological / weather service
62	12	all	sensorowner	int (fk)	1	Other
63	12	all	sensorowner	int (fk)	2	Standards institute
64	13	air temperature	sensortype-airtemperature	int (fk)	0	Alcohol / glycol

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
65	13	air temperature	sensortype-airte mperature	int (fk)	1	Bead thermistor
66	13	air temperature	sensortype-airte mperature	int (fk)	2	Capacitance bead
67	13	air temperature	sensortype-airte mperature	int (fk)	3	Capacitance wire
68	13	air temperature	sensortype-airte mperature	int (fk)	4	Chip thermistor
69	13	air temperature	sensortype-airte mperature	int (fk)	5	Mercury
70	13	air temperature	sensortype-airte mperature	int (fk)	6	Resistive sensor
71	13	air temperature	sensortype-airte mperature	int (fk)	7	Rod thermistor
72	14	pressure trend	sensortype-b arograph	int (fk)	0	Open Scale barograph with 1 day clock.
73	14	pressure trend	sensortype-b arograph	int (fk)	1	Open Scale barograph with 2 day clock.
74	14	pressure trend	sensortype-b arograph	int (fk)	2	Open Scale barograph with 3 day clock.
75	14	pressure trend	sensortype-b arograph	int (fk)	3	Open Scale barograph with 4 day clock.
76	14	pressure trend	sensortype-b arograph	int (fk)	4	Open Scale barograph with 5 day clock.
77	14	pressure trend	sensortype-b arograph	int (fk)	5	Open Scale barograph with 6 day clock.
78	14	pressure trend	sensortype-b arograph	int (fk)	6	Open Scale barograph with 7 day clock.
79	14	pressure trend	sensortype-b arograph	int (fk)	7	Open Scale barograph with 8 day clock.

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
80	14	pressure trend	sensortype-barograph	int (fk)	8	Open Scale barograph with 9 day clock.
81	14	pressure trend	sensortype-barograph	int (fk)	9	Open Scale barograph.
82	14	pressure trend	sensortype-barograph	int (fk)	10	Other (specify in footnote).
83	14	pressure trend	sensortype-barograph	int (fk)	11	Small Scale barograph.
84	14	pressure trend	sensortype-barograph	int (fk)	12	Tendency obtained from an electronic digital barometer.
85	15	pressure	sensortype-barometer	int (fk)	0	Aneroid barometer (issued by the PMO or a NMS).
86	15	pressure	sensortype-barometer	int (fk)	1	Digital aneroid barometer (aka Precision Aneroid Barometer).
87	15	pressure	sensortype-barometer	int (fk)	2	Electronic digital barometer (consisting of one or more pressure transducers).
88	15	pressure	sensortype-barometer	int (fk)	3	Mercury barometer.
89	15	pressure	sensortype-barometer	int (fk)	4	Other
90	15	pressure	sensortype-barometer	int (fk)	5	Ship's aneroid barometer.
91	16	evaporation	sensortype-evaporation	int (fk)	0	placeholder
92	17	air temperature	sensortype-extremes	int (fk)	0	Automated instruments
93	17	air temperature	sensortype-extremes	int (fk)	1	Maximum / minimum thermometers
94	17	air temperature	sensortype-extremes	int (fk)	2	Reserved

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
95	17	air temperature	sensortype-extremes	int (fk)	3	Thermograph
96	18	humidity	sensortype-humidity	int (fk)	0	Capacitive (ceramic, including metal oxide)
97	18	humidity	sensortype-humidity	int (fk)	1	Capacitive (generic)
98	18	humidity	sensortype-humidity	int (fk)	2	Capacitive (polymer)
99	18	humidity	sensortype-humidity	int (fk)	3	Carbon hygristor
100	18	humidity	sensortype-humidity	int (fk)	4	chilled mirror hygrometer
101	18	humidity	sensortype-humidity	int (fk)	5	dew cell
102	18	humidity	sensortype-humidity	int (fk)	6	Electric.
103	18	humidity	sensortype-humidity	int (fk)	7	Goldbeater's skin
104	18	humidity	sensortype-humidity	int (fk)	8	Gravimetric
105	18	humidity	sensortype-humidity	int (fk)	9	Hair hygrometer.
106	18	humidity	sensortype-humidity	int (fk)	10	Humicap capacitance sensor with active de-icing method
107	18	humidity	sensortype-humidity	int (fk)	11	Hygristor.
108	18	humidity	sensortype-humidity	int (fk)	12	optical absorption sensor
109	18	humidity	sensortype-humidity	int (fk)	13	Ordinary human hair
110	18	humidity	sensortype-humidity	int (fk)	14	Other
111	18	humidity	sensortype-humidity	int (fk)	15	Paper - metal coil
112	18	humidity	sensortype-humidity	int (fk)	16	Psychrometer.
113	18	humidity	sensortype-humidity	int (fk)	17	Resistive (conductive polymer)
114	18	humidity	sensortype-humidity	int (fk)	18	Resistive (generic)
115	18	humidity	sensortype-humidity	int (fk)	19	Resistive (salt polymer)
116	18	humidity	sensortype-humidity	int (fk)	20	Rolled hair (torsion)
117	18	humidity	sensortype-humidity	int (fk)	21	Sippican Mark IIA carbon hygristor
118	18	humidity	sensortype-humidity	int (fk)	22	Thermal conductivity
119	18	humidity	sensortype-humidity	int (fk)	23	Twin alternatively heated Humicap capacitance sensor
120	18	humidity	sensortype-humidity	int (fk)	24	Vaisala A-Humicap
121	18	humidity	sensortype-humidity	int (fk)	25	Vaisala H-Humicap

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
122	18	humidity	sensortype-humidity	int (fk)	26	Vaisala RS90
123	18	humidity	sensortype-humidity	int (fk)	27	VIZ B2 hygristor
124	18	humidity	sensortype-humidity	int (fk)	28	VIZ Mark II carbon hygristor
125	19	precipitation	sensortype-precipitation	int (fk)	t_b_d	TBD
126	20	present weather	sensortype-presentweather	int (fk)	0	Automatic, included (using WMO Codes 4677 and 4561)
127	20	present weather	sensortype-presentweather	int (fk)	1	Automatic, included (using WMO codes 4680 amd 4531)
128	20	present weather	sensortype-presentweather	int (fk)	2	Automatic, omitted (no observation, data not available)
129	20	present weather	sensortype-presentweather	int (fk)	3	Automatic, omitted (no significant phenomenon to report)
130	20	present weather	sensortype-presentweather	int (fk)	4	Manned, included
131	20	present weather	sensortype-presentweather	int (fk)	5	Manned, omitted (no observation, data not available)
132	20	present weather	sensortype-presentweather	int (fk)	6	Manned, omitted (no significant phenomenon to report)
133	21	salinity	sensortype-salinity	int (fk)	0	in situ, accuracy better han 0.02 ppt
134	21	salinity	sensortype-salinity	int (fk)	1	in situ, accuracy worse than 0.02 ppt
135	21	salinity	sensortype-salinity	int (fk)	2	No salinity
136	21	salinity	sensortype-salinity	int (fk)	3	sample analysis
137	22	water temperature	sensortype-watertemperature	int (fk)	0	Bait tanks thermometer.
138	22	water temperature	sensortype-watertemperature	int (fk)	1	Bucket
139	22	water temperature	sensortype-watertemperature	int (fk)	2	Condensor Intake on Steam Ships, or Engine Cooling System Inlet on Motor Ships.
140	22	water temperature	sensortype-watertemperature	int (fk)	3	Digital BT

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
141	22	water temperature	sensortype-water temperature	int (fk)	4	electronic sensor
142	22	water temperature	sensortype-water temperature	int (fk)	5	Expendable BT
143	22	water temperature	sensortype-water temperature	int (fk)	6	Hull contact sensor
144	22	water temperature	sensortype-water temperature	int (fk)	7	Iimplied bucket [note: applicable to early ICOADS data]
145	22	water temperature	sensortype-water temperature	int (fk)	8	In-line thermosalinograph
146	22	water temperature	sensortype-water temperature	int (fk)	9	Infrared radiometer
147	22	water temperature	sensortype-water temperature	int (fk)	10	Infrared scanner
148	22	water temperature	sensortype-water temperature	int (fk)	11	Mechanical BT
149	22	water temperature	sensortype-water temperature	int (fk)	12	Microwave scanner
150	22	water temperature	sensortype-water temperature	int (fk)	13	Other
151	22	water temperature	sensortype-water temperature	int (fk)	14	Radiation thermometer.
152	22	water temperature	sensortype-water temperature	int (fk)	15	Reversing thermometer
153	22	water temperature	sensortype-water temperature	int (fk)	16	reversing thermometer or mechanical sensor
154	22	water temperature	sensortype-water temperature	int (fk)	17	STD / CTD sensor
155	22	water temperature	sensortype-water temperature	int (fk)	18	Thermistor Chain

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
156	22	water temperature	sensortype-water temperature	int (fk)	19	Through Hull sensor.
157	22	water temperature	sensortype-water temperature	int (fk)	20	Towed body
158	22	water temperature	sensortype-water temperature	int (fk)	21	Trailing thermistor
159	22	water temperature	sensortype-water temperature	int (fk)	22	unknown or non-bucket
160	23	waves	sensortype-waves	int (fk)	0	buoy
161	23	waves	sensortype-waves	int (fk)	1	other
162	23	waves	sensortype-waves	int (fk)	2	shipborne wave recorder
163	24	wind speed	sensortype-windspeed	int (fk)	0	Anemograph.
164	24	wind speed	sensortype-windspeed	int (fk)	1	Anemometer - type unspecified
165	24	wind speed	sensortype-windspeed	int (fk)	2	Beaufort force
166	24	wind speed	sensortype-windspeed	int (fk)	3	Cup anemometer and wind vane (combined unit).
167	24	wind speed	sensortype-windspeed	int (fk)	4	Cup anemometer and wind vane (separate instruments).
168	24	wind speed	sensortype-windspeed	int (fk)	5	Cup rotor
169	24	wind speed	sensortype-windspeed	int (fk)	6	Handheld anemometer.
170	24	wind speed	sensortype-windspeed	int (fk)	7	Other (specify in footnote).
171	24	wind speed	sensortype-windspeed	int (fk)	8	Propeller rotor
172	24	wind speed	sensortype-windspeed	int (fk)	9	Propeller vane.

Continued on next page

Table 41 sensor_configuration_fields (cont.)

value	field	parameter	field_name	type	code_value	description
173	24	wind speed	sensortype-windspeed	int (fk)	10	Sonic anemometer.
174	24	wind speed	sensortype-windspeed	int (fk)	11	Wind observation through ambiant noise (WOTAN)
175	25	wind speed	sensorlocation-distancefrombow	numeric	NA	Distance of sensor from bow of ship (m)
176	26	wind speed	sensorlocation-distancefromcenterline	numeric	NA	Distance of sensor from center line of ship (m)
177	27	wind speed	sensorlocation-heightabovedeck	numeric	NA	Height of sensor above deck on which it is installed (m)
178	28	sonde	weight	numeric	NA	Weight of sensor (g)
179	29	sonde	telemetry_sonde	int (fk)		NA
180	30	all	software_version	varchar	NA	NA
190	31	all	manufacturer	int(fk)	0	Vaisala
191	32	all	sensor_type	int(fk)	0	Anemometer
193	33	all	sensor_model	int(fk)	0	WMT700
194	34	all	serial_number	varchar	NA	ABC-123-zyx-987

End of table

Table 42: source_configuration_fields

value	field	field_name	kind	code_value	description	extended_description
0	1	DelayedModeFormat	int (fk)	0	IMMT version just prior to version number being included	NA
1	1	DelayedModeFormat	int (fk)	1	IMMT-1 (in effect from 2 Nov. 1994)	NA
2	1	DelayedModeFormat	int (fk)	2	IMMT-2 (in effect from Jan. 2003)	NA
3	1	DelayedModeFormat	int (fk)	3	IMMT-3 (in effect from Jan. 2007)	NA
4	1	DelayedModeFormat	int (fk)	4	IMMT-4 (in effect from Jan. 2011)	NA
5	1	DelayedModeFormat	int (fk)	5	IMMT-5 (in effect from June 2012)	NA
6	2	MetadataSource	int (fk)	0	COAPS	NA
7	2	MetadataSource	int (fk)	1	WMO Publication 47	NA
8	3	MetadataSourceFormat	int (fk)	1	Output from digitisation project, semi-colon delimited format (1955)	NA
9	3	MetadataSourceFormat	int (fk)	2	Output from digitisation project, semi-colon delimited format (1956)	NA
10	3	MetadataSourceFormat	int (fk)	3	Output from digitisation project, semi-colon delimited format (1957 - 1967)	NA

Continued on next page

Table 42 source_configuration_fields (cont.)

value	field	field_name	kind	code_value	description	extended_description
11	3	MetadataSourceFormat	int (fk)	4	Output from digitisation project, semi-colon delimited format (1968 - 1969)	NA
12	3	MetadataSourceFormat	int (fk)	5	Fixed format (1970 - 1004)	NA
13	3	MetadataSourceFormat	int (fk)	6	Semi-colon delimited format (1995 - 2001)	NA
14	3	MetadataSourceFormat	int (fk)	7	Semi-colon delimited format (2002 - 2007 q1)	NA
15	3	MetadataSourceFormat	int (fk)	8	Semi-colon delimited format (2007 - 2008)	NA
16	3	MetadataSourceFormat	int (fk)	9	Semi-colon delimited format (2009 - 2014)	NA
17	4	ObservationSourceType	int (fk)	0	unknown	NA
18	4	ObservationSourceType	int (fk)	1	delayed mode - logbook (paper)	NA
19	4	ObservationSourceType	int (fk)	2	real time - national telecommunication channels	NA
20	4	ObservationSourceType	int (fk)	3	delayed mode - national publications	NA
21	4	ObservationSourceType	int (fk)	4	delayed mode - logbook (electronic)	NA
22	4	ObservationSourceType	int (fk)	5	real time - global telecommunication system (GTS)	NA
23	4	ObservationSourceType	int (fk)	6	delayed mode - International publications	NA

Continued on next page

Table 42 source_configuration_fields (cont.)

value	field	field_name	kind	code_value	description	extended_description
24	5	RealTimeFormat	int (fk)	0	previous to FM24-V	NA
25	5	RealTimeFormat	int (fk)	1	FM 24-V	NA
26	5	RealTimeFormat	int (fk)	2	FM 24-VI Ext.	NA
27	5	RealTimeFormat	int (fk)	3	FM 13-VII	NA
28	5	RealTimeFormat	int (fk)	4	FM 13-VIII	NA
29	5	RealTimeFormat	int (fk)	5	FM 13-VIII Ext.	NA
30	5	RealTimeFormat	int (fk)	6	FM 12-IX	NA
31	5	RealTimeFormat	int (fk)	7	FM 13-IX Ext.	NA
32	5	RealTimeFormat	int (fk)	8	FM 13-X	NA
33	5	RealTimeFormat	int (fk)	9	FM 13-XI	NA
34	5	RealTimeFormat	int (fk)	10	FM 13-XII Ext.	NA
35	5	RealTimeFormat	int (fk)	11	FM 13-XIII	NA
36	5	RealTimeFormat	int (fk)	12	FM 13-XIV Ext.	NA
37	6	SourceFormat	int (fk)	0	IMMA - Version 0	NA
38	6	SourceFormat	int (fk)	1	IMMA - Version 1	NA
39	7	SourceDeck	int (fk)	NA	ICOADS Source deck	NA
40	8	SourceID	int (fk)	NA	ICOADS Source ID	NA
41	9	ProductLevel	int (fk)	2	Data read from original data file	NA
42	10	ProductStatus	int (fk)	1	Data approved	Data exist, read from chache, PTU + altitude columns available, all GC25 tests ok, all uncertainties as expected
43	11	ProductOrgResolutiuon	numeric	NA	Original time resolution of data	NA
44	field	original_format	int (fk)	0	Paper logbook	NA

End of table

Table 43: source_format

value	description
0	IMMA
1	NetCDF (GRUAN)
2	NetCDF (Other)
3	CSV

End of table

Table 44: spatial_representativeness

value	description
0	Nil reason - None of the codes in the table is applicable in the context of the observed quantity or unknown, or not available information.
1	Microscale - An area or volume less than 100 m horizontal extent (for example, evaporation)
2	Toposcale, local scale - An area or volume of 100 m to 3 km horizontal extent (for example, air pollution, tornadoes)
3	Mesoscale - An area or volume of 3 km to 100 km horizontal extent (for example, thunderstorms, sea and mountain breezes)
4	Large scale- An area or volume of 100 km to 3000 km horizontal extent (for example, fronts, various cyclones, cloud clusters)
5	Planetary scale - An area or volume of more than 3000 km horizontal extent (for example, long upper tropospheric waves)
6	Drainage area - An area (also known as catchment) having a common outlet for its surface runoff, in km2

End of table

Table 45: station_configuration_fields

value	field	field_name	kind	code_value	abbreviation	description
0	1	AWSEntryandDisplaySoftware	int (fk)			TBD
1	2	AWSEntryandDisplaySoftwareVersion	int (fk)			TBD
2	3	AWSModel	int (fk)			TBD
3	4	AWSModelVersion	int (fk)			TBD
4	5	AWSSoftware	int (fk)			TBD
5	6	AWSSoftwareversion	int (fk)			TBD
6	7	Cargoheight	numeric	NA		Height of cargo above max summer load line (m)
7	8	Distanceofbridgefrombow	numeric	NA		Distance of bridge from bow of ship (m)
8	9	Draught	numeric	NA		Draught of ship (m)
9	10	Droguetype	int (fk)	0		Unspecified drogue
10	10	Droguetype	int (fk)	1		Holey sock
11	10	Droguetype	int (fk)	2		TRISTAR
12	10	Droguetype	int (fk)	3		Window shade
13	10	Droguetype	int (fk)	4		Parachute
14	10	Droguetype	int (fk)	5		Non-lagrangian sea anchor
15	11	Freeboard	numeric	NA		Freeboard of ship
16	12	Lagrangiandrifterdroguestatus	int (fk)	0		Drogue is detached
17	12	Lagrangiandrifterdroguestatus	int (fk)	1		Drogue is attached
18	12	Lagrangiandrifterdroguestatus	int (fk)	2		Drogue status unknown
19	13	Lengthoverallofthesship,ignoringbulbousbow	numeric	NA		Length of ship

Continued on next page

Table 45 station_configuration_fields (cont.)

value	field	field_name	kind	code_value	abbreviation	description
20	14	LogBooksoftwareandversion	int (fk)			TBD
21	15	Maximumoperatingspeedonnormalservice	numeric	NA		maximum operating speed of platform (m/s)
22	16	Mouldedbreadth	numeric	NA		breadth of ship
23	17	Otherinstruments	int (fk)	0	BAT	Bathythermometer.
24	17	Otherinstruments	int (fk)	1	BT	Bathythermograph (towed).
25	17	Otherinstruments	int (fk)	2	FLM	Fluorometer.
26	17	Otherinstruments	int (fk)	3	LWR	Long wave radiation.
27	17	Otherinstruments	int (fk)	4	MAX	Maximum thermometer.
28	17	Otherinstruments	int (fk)	5	MIN	Minimum thermometer.
29	17	Otherinstruments	int (fk)	6	NTE	Nitrate sensor.
30	17	Otherinstruments	int (fk)	7	NTT	Nutrient sensor.
31	17	Otherinstruments	int (fk)	8	P	Pilot balloon equipment.
32	17	Otherinstruments	int (fk)	9	CO2	pCO2 system.
33	17	Otherinstruments	int (fk)	10	PLK	Plankton recorder.
34	17	Otherinstruments	int (fk)	11	PRS	Photosynthetic radiation sensor.
35	17	Otherinstruments	int (fk)	12	PYG	Pyrogeometer.
36	17	Otherinstruments	int (fk)	13	R	Radiosonde equipment.
37	17	Otherinstruments	int (fk)	14	RG	Rain gauge.
38	17	Otherinstruments	int (fk)	15	RSD	Radar storm and meteorological phenomena detection.
39	17	Otherinstruments	int (fk)	16	RT	Reversing thermometer.
40	17	Otherinstruments	int (fk)	17	SKY	Sky camera.
41	17	Otherinstruments	int (fk)	18	SLM	Solarimeter.
42	17	Otherinstruments	int (fk)	19	ST	Sea thermograph.
43	17	Otherinstruments	int (fk)	20	SWR	Short wave radiation.
44	17	Otherinstruments	int (fk)	21	TSD	Temperature/salinity/depth probe.
45	17	Otherinstruments	int (fk)	22	TUR	Turbidity sensor.

Continued on next page

Table 45 station_configuration_fields (cont.)

value	field	field_name	kind	code_value	abbreviation	description
46	17	Otherinstruments	int (fk)	23	W	Radiowind or radarwind equipment.
47	17	Otherinstruments	int (fk)	24	WR	Wave Recorder
48	17	Otherinstruments	int (fk)	25	XBT	Expendable bathythermograph.
49	17	Otherinstruments	int (fk)	26	OT	Other (specify in footnote).
50	18	Stationstatus	int (fk)	1		Planned
51	18	Stationstatus	int (fk)	2		Pre-operational
52	18	Stationstatus	int (fk)	3		Operational / Reporting
53	18	Stationstatus	int (fk)	4		Partly reporting
54	18	Stationstatus	int (fk)	5		Temporarily suspended
55	18	Stationstatus	int (fk)	6		Closed
56	19	Typeofmeteorological reportingship	int (fk)	0	70	Auxiliary ship
57	19	Typeofmeteorological reportingship	int (fk)	1	75	Auxiliary ship (AWS)
58	19	Typeofmeteorological reportingship	int (fk)	2	10	Selected
59	19	Typeofmeteorological reportingship	int (fk)	3	15	Selected (AWS)
60	19	Typeofmeteorological reportingship	int (fk)	4	40	Supplementary
61	19	Typeofmeteorological reportingship	int (fk)	5	45	Supplementary (AWS)
62	19	Typeofmeteorological reportingship	int (fk)	6	80	Third party
63	19	Typeofmeteorological reportingship	int (fk)	7	85	Third party (AWS)
64	19	Typeofmeteorological reportingship	int (fk)	8	99	Unknown
65	19	Typeofmeteorological reportingship	int (fk)	9	30	VOSClim - VOS Climate

Continued on next page

Table 45 station_configuration_fields (cont.)

value	field	field_name	kind	code_value	abbreviation	description
66	19	Typeofmeteorological reportingship	int (fk)	10	35	VOSClim (AWS) - VOS Climate (AWS)

End of table

Table 46: station_type

value	description
1	Land station
2	Sea station
3	Aircraft
4	Satellite
5	Underwater platform

End of table

Table 47: sub_region

value	type	code	sub_region
0	country	AD	ANDORRA
1	country	AE	UNITED ARAB EMIRATES
2	country	AF	AFGHANISTAN
3	country	AG	ANTIGUA AND BARBUDA
4	country	AI	ANGUILLA
5	country	AL	ALBANIA
6	country	AM	ARMENIA
7	country	AN	NETHERLANDS ANTILLES
8	country	AO	ANGOLA
9	country	AQ	ANTARCTICA
10	country	AR	ARGENTINA
11	country	AS	AMERICAN SAMOA
12	country	AT	AUSTRIA
13	country	AU	AUSTRALIA
14	country	AW	ARUBA
15	country	AX	ALAND ISLANDS
16	country	AZ	AZERBAIJAN
17	country	BA	BOSNIA AND HERZEGOVINA
18	country	BB	BARBADOS
19	country	BD	BANGLADESH
20	country	BE	BELGIUM
21	country	BF	BURKINA FASO
22	country	BG	BULGARIA
23	country	BH	BAHRAIN
24	country	BI	BURUNDI
25	country	BJ	BENIN
26	country	BL	SAINT BARTHLEMY
27	country	BM	BERMUDA
28	country	BN	BRUNEI DARUSSALAM
29	country	BO	BOLIVIA
30	country	BR	BRAZIL
31	country	BS	BAHAMAS
32	country	BT	BHUTAN
33	country	BV	BOUVET ISLAND
34	country	BW	BOTSWANA
35	country	BY	BELARUS
36	country	BZ	BELIZE
37	country	CA	CANADA
38	country	CC	COCOS (KEELING) ISLANDS
39	country	CD	CONGO, THE DEMOCRATIC REPUBLIC OF THE
40	country	CF	CENTRAL AFRICAN REPUBLIC
41	country	CG	CONGO
42	country	CH	SWITZERLAND

Continued on next page

Table 47 sub_region (cont.)

value	type	code	sub_region
43	country	CI	COTE D'IVOIRE
44	country	CK	COOK ISLANDS
45	country	CL	CHILE
46	country	CM	CAMEROON
47	country	CN	CHINA
48	country	CO	COLOMBIA
49	country	CR	COSTA RICA
50	country	CU	CUBA
51	country	CV	CAPE VERDE
52	country	CX	CHRISTMAS ISLAND
53	country	CY	CYPRUS
54	country	CZ	CZECH REPUBLIC
55	country	DD	GERMAN DEMOCRATIC REPUBLIC
56	country	DE	GERMANY
57	country	DJ	DJIBOUTI
58	country	DK	DENMARK
59	country	DM	DOMINICA
60	country	DO	DOMINICAN REPUBLIC
61	country	DZ	ALGERIA
62	country	EC	ECUADOR
63	country	EE	ESTONIA
64	country	EG	EGYPT
65	country	EH	WESTERN SAHARA
66	country	ER	ERITREA
67	country	ES	SPAIN
68	country	ET	ETHIOPIA
69	country	FI	FINLAND
70	country	FJ	FIJI
71	country	FK	FALKLAND ISLANDS (MALVINAS)
72	country	FM	MICRONESIA, FEDERATED STATES OF
73	country	FO	FAROE ISLANDS
74	country	FR	FRANCE
75	country	GA	GABON
76	country	GB	UNITED KINGDOM
77	country	GD	GRENADA
78	country	GE	GEORGIA
79	country	GF	FRENCH GUIANA
80	country	GG	GUERNSEY
81	country	GH	GHANA
82	country	GI	GIBRALTAR
83	country	GL	GREENLAND
84	country	GM	GAMBIA
85	country	GN	GUINEA
86	country	GP	GUADELOUPE
87	country	GQ	EQUATORIAL GUINEA
88	country	GR	GREECE
89	country	GS	SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS
90	country	GT	GUATEMALA
91	country	GU	GUAM
92	country	GW	GUINEA-BISSAU
93	country	GY	GUYANA
94	country	HK	HONG KONG
95	country	HM	HEARD ISLAND AND MCDONALD ISLANDS
96	country	HN	HONDURAS

Continued on next page

Table 47 sub_region (cont.)

value	type	code	sub_region
97	country	HR	CROATIA
98	country	HT	HAITI
99	country	HU	HUNGARY
100	country	ID	INDONESIA
101	country	IE	IRELAND
102	country	IL	ISRAEL
103	country	IM	ISLE OF MAN
104	country	IN	INDIA
105	country	IO	BRITISH INDIAN OCEAN TERRITORY
106	country	IQ	IRAQ
107	country	IR	IRAN, ISLAMIC REPUBLIC OF
108	country	IS	ICELAND
109	country	IT	ITALY
110	country	JE	JERSEY
111	country	JM	JAMAICA
112	country	JO	JORDAN
113	country	JP	JAPAN
114	country	KE	KENYA
115	country	KG	KYRGYZSTAN
116	country	KH	CAMBODIA
117	country	KI	KIRIBATI
118	country	KM	COMOROS
119	country	KN	SAINT KITTS AND NEVIS
120	country	KP	KOREA, DEMOCRATIC PEOPLE'S REPUBLIC OF
121	country	KR	KOREA, REPUBLIC OF
122	country	KW	KUWAIT
123	country	KY	CAYMAN ISLANDS
124	country	KZ	KAZAKHSTAN
125	country	LA	LAO PEOPLE'S DEMOCRATIC REPUBLIC
126	country	LB	LEBANON
127	country	LC	SAINT LUCIA
128	country	LI	LIECHTENSTEIN
129	country	LK	SRI LANKA
130	country	LR	LIBERIA
131	country	LS	LESOTHO
132	country	LT	LITHUANIA
133	country	LU	LUXEMBOURG
134	country	LV	LATVIA
135	country	LY	LIBYAN ARAB JAMAHIRIYA
136	country	MA	MOROCCO
137	country	MC	MONACO
138	country	MD	MOLDOVA, REPUBLIC OF
139	country	ME	MONTENEGRO
140	country	MF	SAINT MARTIN
141	country	MG	MADAGASCAR
142	country	MH	MARSHALL ISLANDS
143	country	MK	MACEDONIA, THE FORMER YUGOSLAV REPUBLIC OF
144	country	ML	MALI
145	country	MM	MYANMAR
146	country	MN	MONGOLIA
147	country	MO	MACAO
148	country	MP	NORTHERN MARIANA ISLANDS
149	country	MQ	MARTINIQUE

Continued on next page

Table 47 sub_region (cont.)

value	type	code	sub_region
150	country	MR	MAURITANIA
151	country	MS	MONTSERRAT
152	country	MT	MALTA
153	country	MU	MAURITIUS
154	country	MV	MALDIVES
155	country	MW	MALAWI
156	country	MX	MEXICO
157	country	MY	MALAYSIA
158	country	MZ	MOZAMBIQUE
159	country	NA	NAMIBIA
160	country	NC	NEW CALEDONIA
161	country	NE	NIGER
162	country	NF	NORFOLK ISLAND
163	country	NG	NIGERIA
164	country	NI	NICARAGUA
165	country	NL	NETHERLANDS
166	country	NO	NORWAY
167	country	NP	NEPAL
168	country	NR	NAURU
169	country	NU	NIUE
170	country	NZ	NEW ZEALAND
171	country	OM	OMAN
172	country	PA	PANAMA
173	country	PE	PERU
174	country	PF	FRENCH POLYNESIA
175	country	PG	PAPUA NEW GUINEA
176	country	PH	PHILIPPINES
177	country	PK	PAKISTAN
178	country	PL	POLAND
179	country	PM	SAINT PIERRE AND MIQUELON
180	country	PN	PITCAIRN
181	country	PR	PUERTO RICO
182	country	PS	PALESTINIAN TERRITORY, OCCUPIED
183	country	PT	PORTUGAL
184	country	PW	PALAU
185	country	PY	PARAGUAY
186	country	QA	QATAR
187	country	RE	REUNION
188	country	RO	ROMANIA
189	country	RS	SERBIA
190	country	RU	RUSSIAN FEDERATION
191	country	RW	RWANDA
192	country	SA	SAUDI ARABIA
193	country	SB	SOLOMON ISLANDS
194	country	SC	SEYCHELLES
195	country	SD	SUDAN
196	country	SE	SWEDEN
197	country	SG	SINGAPORE
198	country	SH	SAINT HELENA
199	country	SI	SLOVENIA
200	country	SJ	SVALBARD AND JAN MAYEN
201	country	SK	SLOVAKIA
202	country	SL	SIERRA LEONE
203	country	SM	SAN MARINO
204	country	SN	SENEGAL

Continued on next page

Table 47 sub_region (cont.)

value	type	code	sub_region
205	country	SO	SOMALIA
206	country	SR	SURINAME
207	country	ST	SAO TOME AND PRINCIPE
208	country	SU	USSR
209	country	SV	EL SALVADOR
210	country	SY	SYRIAN ARAB REPUBLIC
211	country	SZ	SWAZILAND
212	country	TC	TURKS AND CAICOS ISLANDS
213	country	TD	CHAD
214	country	TF	FRENCH SOUTHERN TERRITORIES
215	country	TG	TOGO
216	country	TH	THAILAND
217	country	TJ	TAJIKISTAN
218	country	TK	TOKELAU
219	country	TL	TIMOR-LESTE
220	country	TM	TURKMENISTAN
221	country	TN	TUNISIA
222	country	TO	TONGA
223	country	TR	TURKEY
224	country	TT	TRINIDAD AND TOBAGO
225	country	TV	TUVALU
226	country	TW	TAIWAN, PROVINCE OF CHINA
227	country	TZ	TANZANIA, UNITED REPUBLIC OF
228	country	UA	UKRAINE
229	country	UG	UGANDA
230	country	UM	UNITED STATES MINOR OUTLYING ISLANDS
231	country	US	UNITED STATES
232	country	UY	URUGUAY
233	country	UZ	UZBEKISTAN
234	country	VA	HOLY SEE (VATICAN CITY STATE)
235	country	VC	SAINT VINCENT AND THE GRENADINES
236	country	VE	VENEZUELA
237	country	VG	VIRGIN ISLANDS, BRITISH
238	country	VI	VIRGIN ISLANDS, U.S.
239	country	VN	VIET NAM
240	country	VU	VANUATU
241	country	WF	WALLIS AND FUTUNA
242	country	WS	SAMOA
243	country	YE	YEMEN
244	country	YT	MAYOTTE
245	country	YU	YUGOSLAVIA
246	country	ZA	SOUTH AFRICA
247	country	ZM	ZAMBIA
248	country	ZW	ZIMBABWE
249	country	ZZ	THIRD PARTY SUPPORT SHIPS

End of table

Table 48: time_quality

value	description
0	Timestamp valid, time reported to nearest second
1	Timestamp valid, time reported to nearest minute
2	Timestamp valid, time reported to nearest hour
3	Time missing, date valid. Report set to local midday

Continued on next page

Table 48 time_quality (cont.)

value	description
4	Day missing
5	Invalid date / time

End of table

Table 49: time_reference

value	description
0	Unknown
1	Time server
2	Radio clock
3	Manual comparison

End of table

Table 50: traceability

value	description
0	Unknown
1	Traceable to international standards
2	Traceable to other standards

End of table

Table 51: units

value	units	conventional_abbreviation	abbreviation_in_ASCII	abbreviation_in_ITA2	definition_in_base_units
1	metre	m	m	M	NA
2	kilogram	kg	kg	KG	NA
3	second	s	s	S	NA
4	ampere	A	A	A	NA
5	kelvin	K	K	K	NA
6	mole	mol	mol	MOL	NA
7	candela	cd	cd	CD	NA
21	radian	rad	rad	RAD	NA
22	steradian	sr	sr	SR	NA
30	hertz	Hz	Hz	HZ	s1
31	newton	N	N	N	kg m s-2
32	pascal	Pa	Pa	PAL	kg m-1 s2
33	joule	J	J	J	kg m2 s-2
34	watt	W	W	W	kg m2 s-3
35	coulomb	C	C	C	A s
36	volt	V	V	V	kg m2 s-3 A1
37	farad	F	F	F	kg-1 m2 s4 A2
38	ohm		Ohm	OHM	kg m2 s-3 A2
39	siemens	S	S	SIE	kg-1 m2 s3 A2
40	weber	Wb	Wb	WB	kg m2 s-2 A1
41	tesla	T	T	T	kg s-2 A1
42	henry	H	H	H	kg m2 s-2 A2
60	degree Celsius	C	Cel	CEL	K+273.15
70	lumen	lm	lm	LM	cd sr
71	lux	lx	lx	LX	cd sr m-2
80	becquerel	Bq	Bq	BQ s-1	NA
81	grey	Gy	Gy	GY	m2 s-2
82	sievert	Sv	Sv	SV	m2 s-2
110	degree (angle)		deg	DEG	NA

Continued on next page

Table 51 units (cont.)

value	units	conventional_abbreviation	abbreviation_in_ASCII	abbreviation_in_ITA2	definition_in_base_units
111	minute (angle)	’	’	MNT	NA
112	second (angle)	”	”	SEC	NA
120	litre	l or L	l or L	L	NA
130	minute (time)	min	min	MIN	NA
131	hour	h	h	HR	NA
132	day	d	d	D	NA
150	tonne	t	t	TNE	NA
160	electron volt	eV	eV	EV	NA
161	atomic mass unit	u	u	U	NA
170	astronomic unit	AU	AU	ASU	NA
171	parsec	pc	pc	PRS	NA
200	nautical mile	NA	NA	NA	NA
201	knot	kt	kt	KT	NA
210	decibel (6)	dB	dB	DB	NA
220	hectare	ha	ha	HAR	NA
230	week	NA	NA	NA	NA
231	year	a	a	ANN	NA
300	per cent	%	%	PERCENT	NA
301	parts per thousand		0/00	PERTHOU	NA
310	eighths of cloud	okta	okta	OKTA	NA
320	degrees true		deg	DEG	NA
321	degrees per second	degree/s	deg/s	DEG/S	NA
350	degrees Celsius (8)	C	C	C	NA
351	degrees Celsius per metre	C/m	C/m	C/M	NA
352	degrees Celsius per 100 metres	C/100 m	C/100 m	C/100 M	NA
360	Dobson Unit (9)	DU	DU	DU	NA
430	month	mon	mon	MON	NA

Continued on next page

Table 51 units (cont.)

value	units	conventional_abbreviation	abbreviation_in_ASCII	abbreviation_in_ITA2	definition_in_base_units
441	per second (same as hertz)	s-1	/s	/S	NA
442	per second squared	s-2	s2	NA	NA
501	knots per 1000 metres	kt/1000 m	kt/km	KT/KM	NA
510	foot	ft	ft	FT	NA
511	inch	in	in	IN	NA
520	decipascals per second (microbar per second)	dPa s-1	dPa/s	DPAL/S	NA
521	centibars per second	cb s-1	cb/s	CB/S	NA
522	centibars per 12 hours	cb/12 h	cb/12 h	CB/12 HR	NA
523	dekapascal	daPa	daPa	DAPAL	NA
530	hectopascal	hPa	hPa	HPAL	NA
531	hectopascals per second	hPa s-1	hPa/s	HPAL/S	NA
532	hectopascals per hour	hPa h-1	hPa/h	HPAL/HR	NA
533	hectopascals per 3 hours	hPa/3 h	hPa/3 h	HPAL/3 HR	NA
535	nanobar = hPa 10-6	nbar	nbar	NBAR	NA
620	grams per kilogram	g kg-1	g/kg	G/KG	NA
621	grams per kilogram per second	g kg-1 s1	g kg1 s1	NA	NA
622	kilograms per kilogram kg kg-1	kg/kg	KG/KG	NA	NA
623	kilograms per kilogram per second	kg kg-1 s1	kg kg1 s1	NA	NA
624	kilograms per square metre	kg m-2	kg m2	NA	NA
630	acceleration due to gravity	g	g	NA	NA
631	geopotential metre	gpm	gpm	NA	NA
710	millimetre	mm	mm	MM	NA

Continued on next page

Table 51 units (cont.)

value	units	conventional_abbreviation	abbreviation_in_ASCII	abbreviation_in_ITA2	definition_in_base_units
711	millimetres per second	mm s-1	mm/s	MM/S	NA
712	millimetres per hour	mm h-1	mm/h	MM/HR	NA
713	millimetres to the sixth power per cubic metre	mm6 m-3	mm6 m3	NA	NA
715	centimetre	cm	cm	CM	NA
716	centimetres per second	cm s-1	cm/s	CM/S	NA
717	centimetres per hour	cm h-1	cm/h	CM/HR	NA
720	decimetre	dm	dm	DM	NA
731	metres per second	m s-1	m/s	M/S	NA
732	metres per second per metre	m s-1/m	m s1/m	NA	NA
733	metres per second per 1000 metres	m s-1/1000 m	m s1/km	NA	NA
734	square metres	m2	m2	M2	NA
735	square metres per second	m2 s-1	m2/s	M2/S	NA
740	kilometre	km	km	KM	NA
741	kilometres per hour	km h-1	km/h	KM/HR	NA
742	kilometres per day	km/d	km/d	KM/D	NA
743	per metre	m-1	m1	/M	NA
750	becquerels per litre	Bq l-1	Bq/l	BQ/L	NA
751	becquerels per square metre	Bq m-2	Bq m2	BQ/M2	NA
752	becquerels per cubic metre	Bq m-3	Bq m3	BQ/M3	NA
753	millisievert	mSv	mSv	MSV	NA
760	metres per second squared	m s-2	m s2	NA	NA
761	square metres second	m2 s	m2 s	NA	NA

Continued on next page

Table 51 units (cont.)

value	units	conventional_abbreviation	abbreviation_in_ASCII	abbreviation_in_ITA2	definition_in_base_units
762	square metres per second squared	m2 s-2	m2 s2	NA	NA
763	square metres per radian second	m2 rad-1 s	m2 rad1 s	NA	NA
764	square metres per hertz	m2 Hz-1	m2/Hz	NA	NA
765	cubic metres	m3	m3	NA	NA
766	cubic metres per second	m3 s-1	m3/s	NA	NA
767	cubic metres per cubic metre	m3 m-3	m3 m3	NA	NA
768	metres to the fourth power	m4	m4	NA	NA
769	metres to the two thirds power per second	m2/3 s-1	m2/3 s1	NA	NA
772	logarithm per metre	log (m-1)	log (m1)	NA	NA
773	logarithm per square metre	log (m-2)	log (m2)	NA	NA
775	kilograms per metre	kg m-1	kg/m	NA	NA
776	kilograms per square metre per second	kg m-2 s1	kg m2 s1	NA	NA
777	kilograms per cubic metre	kg m-3	kg m3	NA	NA
778	per square kilogram per second	kg-2 s1	kg2 s1	NA	NA
779	seconds per metre	s m-1	s/m	NA	NA
785	kelvin metres per second	K m s-1	K m s1	NA	NA
786	kelvins per metre	K m-1	K/m	NA	NA
787	kelvin square metres per kilogram per second	K m2 kg-1 s1	K m2 kg1 s1	NA	NA
788	moles per mole	mol mol-1	mol/mol	NA	NA
790	radians per metre	rad m-1	rad/m	NA	NA

Continued on next page

Table 51 units (cont.)

value	units	conventional_abbreviation	abbreviation_in_ASCII	abbreviation_in_ITA2	definition_in_base_units
795	newtons per square metre	N m-2	N m2	NA	NA
800	pascals per second	Pa s-1	Pa/s	NA	NA
801	kilopascal	kPa	kPa	NA	NA
805	joules per square metre	J m-2	J m2	NA	NA
806	joules per kilogram	J kg-1	J/kg	NA	NA
810	watts per metre per steradian	W m-1 sr1 W m1 sr1	NA	NA	NA
811	watts per square metre	W m-2	W m2	NA	NA
812	watts per square metre per steradian	W m-2 sr1	W m2 sr1	NA	NA
813	watts per square metre per steradian centimeter	W m-2 sr1 cm	W m2 sr1 cm	NA	NA
814	watts per square metre per steradian metre	W m-2 sr1 m	W m2 sr1 m	NA	NA
815	watts per cubic metre per steradian	W m-3 sr1	W m3 sr1	NA	NA
820	siemens per metre	S m-1	S/m	NA	NA
825	square degrees	degree2	deg2	NA	NA
830	becquerel seconds per cubic metre	Bq s m-3	Bq s m3	NA	NA
835	decibels per metre	dB m-1	dB/m	NA	NA
836	decibels per degree	dB degree-1	dB/deg	NA	NA
841	pH unit	pH unit	pH unit	NA	NA
842	N units	N units	N units	NA	NA
843	Nephelometric turbidity units	NTU	NTU	NA	NA
no	(yotta)	(Y)	(Y)	(Y)	NA
no	(zetta)	(Z)	(Z)	(Z)	NA

Continued on next page

Table 51 units (cont.)

value	units	conventional_abbreviation	abbreviation_in_ASCII	abbreviation_in_ITA2	definition_in_base_units
no	exa	E	E	E	NA
no	peta	P	P	PE	NA
no	tera	T	T	T	NA
no	giga	G	G	G	NA
no	mega	M	M	MA	NA
no	kilo	k	k	K	NA
no	hector	h	h	H	NA
no	deca	da	da	DA	NA
no	deci	d	d	D	NA
no	centi	c	c	C	NA
no	milli	m	m	M	NA
no	micro		u	U	NA
no	nano	n	n	N	NA
no	pico	p	p	P	NA
no	femto	f	f	F	NA
no	atto	a	a	A	NA
no	(zepto)	(z)	(z)	NA	NA
no	(yocto)	(y)	(y)	NA	NA

End of table

Table 52: update_frequency

value	description
1	Annual

End of table

Table 53: z_coordinate_method

value	description
0	Value from chart

End of table

Table 54: z_coordinate_type

value	description
0	height (m) above sea level

End of table