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

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Summary ...

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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 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:

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: Atmospheric profile data from GRUAN. Multiple observations of the same parameter(s) at different heights in a single report ?

Lot 4: Users of data extracted from CDS?

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 Observations table

Preamble text ...

Table 1: observations_table

element_number	element_name	kind	external_table	wigos	description
1	report_id	bigint (pk)		NA	Unique ID for report (unique ID given by combination of RecordID and ObservationID)
2	region	int (fk)	region	3-01 (c)	Region (WMO region / Ocean basin)
3	sub_region	int (fk)	sub_region	3-02 (c)	Country / regional sea
4	application_area	int[] (fk)	application_area	2-01 (m)	WMO application area(s)
5	observing_programme	int (fk)	observing_programme	2-02 (m)	Observing programme, e.g. VOS
6	report_type	int (fk)	report_type	NA	e.g. SYNOP, TEMP, CLIMAT, etc
7	station_name	varchar		3-03 (m)	e.g. GRUAN station name, ship name, site name etc
8	station_type	int (fk)	station_type	3-04 (m)	Type of station, e.g. land station, sea station etc
9	platform_type	int (fk)	platform_type	NA	Structure upon which sensor is mounted, e.g. ship, drifting buoy, tower etc
10	platform_sub_type	int (fk)	platform_sub_type	NA	Sub-type for platform, e.g. 3m discuss buoy
11	primary_station_id	varchar		3-06 (m)	Unique (WMO) station identifier, e.g. WIGOS ID
12	primary_station_id_scheme	int (fk)	id_scheme	NA	Scheme used for unique station ID
13	secondary_station_id	varchar			Alternate (local) ID for station, e.g. Network ID
14	secondary_station_id_scheme	int (fk)	id_scheme		Alternate ID Scheme, e.g. Network ID
15	station_location_longitude	numeric		3-07 (m)	Longitude of station, -180.0 to 180.0 (or other as defined by StationCRS)
16	station_location_latitude	numeric		3-07 (m)	Latitude of station, -90 to 90 (or other as defined by StationCRS)
17	station_location_accuracy	numeric		NA	Accuracy to which station location recorded (radius in km)
18	station_location_method	int(fk)	NA	location_method	Method by which location determined
19	station_location_quality	int (fk)	location_quality	NA	Quality flag for station location
20	station_crs	int (fk)	crs	11-02	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	4-01 (c)	e.g. rolling hills

Continued on next page

Table 1 observations_table (cont.)

element_number	element_name	kind	external_table	wigos	description
25	surface_type_scheme	int (fk)	surface_type_scheme	4-02 (c)	Scheme used to classify surface cover
26	site_topography	int (fk)	site_topography	4-03 (c)	Description of local topography and broader context
27	station_configuration	bigint (fk)	station_configuration	NA	Link to station metadata / configuration
28	height_of_station_above_local_ground	numeric		3-07 (m)	Height of station above local ground (m)
29	height_of_station_above_sea_level	numeric		3-07 (m)	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	11-03 (m)	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		NA	Precision to which time was recorded (s)
41	report_time_quality	int (fk)	time_quality	NA	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	bigint (fk)	profile_configuration	NA	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	4-04 (o)	e.g. ship hove to, crop burning etc.
45	report_quality	int (fk)	quality_flag	NA	Overall quality of report
46	duplicate_status	int (fk)	duplicate_status	NA	E.g. no duplicates, best duplicate, duplicate, not checked.

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Table 1 observations_table (cont.)

element_number	element_name	kind	external_table	wigos	description
47	duplicates	bigint [] (fk)	observations_table	NA	Array of reportIDs for duplicates
48	maintenance_and_update_frequency	int (fk)	update_frequency	NA	Frequency with which modifications and deletions are made to the data after it is first produced
49	history	bigint (fk)	report_history	NA	Sequence of processing steps link to table
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		NA	Seconds of revision of this record (UTC)
56	processing_level	int	report_processing_level		Level of processing applied to this report
57	processing_code	int[]	report_processing_code		Processing applied to this report
58	source_id	int (fk)	source_configuration	NA	Original source of data link to table
59	source_record_id	varchar		NA	Record ID in source data, e.g. ID of event from GRUAN meta database
60	data_policy_licence	int (fk)	data_policy_licence	9-02 (m)	WMOessential, WMOadditional, WMOother
61	observation_id	int (pk)			Together with RecordID forms unique ID for observation / record
62	observed_variable	int (fk)	observed_variable	1-01 (m)	The variable being observed / measured
63	units	int (fk)	units	1-02 (m)	Units for the observed variable
64	code_table	int (fk)	observation_code_table	NA	Encode / decode table for variable (if encoded)
65	observation_value	numeric		NA	The observed value
66	observation_value_significance	int (fk)	observation_value_significance	NA	e.g. min, max, mean, sum
67	observation_timestamp_meaning	int (fk)	meaning_of_time_stamp	11-03 (m)	beginning, middle, end
68	observation_year	int		1-03 (m)	Year ofobservation (UTC)
69	observation_month	int		1-03 (m)	Month of observation (UTC)
70	obvservation_day	int		1-03 (m)	Day of observation (UTC)
71	observation_hour	int		1-03 (m)	Hour of observation (UTC)
72	observation_minute	int		1-03 (m)	Minutes of observation (UTC)
73	observation_seconds	int		1-03 (m)	Seconds of observation (UTC)

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Table 1 observations_table (cont.)

element_number	element_name	kind	external_table	wigos	description
74	observation_duration	int		7-09 (m)	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		1-04 (m)	Latitude of the observed value, -90 to 90 (or other as defined by CRS)
77	observation_location_method	int (fk)	location_method	11-01	Method of determining location,
78	observation_location_precision	numeric			Precision to which location is reported (radius km)
79	observation_bounding_box_xmin	numeric	longitude	1-04 (m)	Bounding box for observation, valid range given by CRS
80	observation_bounding_box_xmax	numeric	longitude	1-04 (m)	Bounding box for observation, valid range given by CRS
81	observation_bounding_box_ymin	numeric	latitude	1-04 (m)	Bounding box for observation, valid range given by CRS
82	observation_bounding_box_ymax	numeric	latitude	1-04 (m)	Bounding box for observation, valid range given by CRS
83	observation_spatial_representativeness	int (fk)	spatial_representativeness	1-05 (o)	Spatial representativeness of observation
84	observation_height_above_station_surface	numeric		5-05 (c)	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		5-05 (c)	z coordinate of observation
86	observation_z_coordinate_type	int (fk)	z_coordinate_type	5-05 (c)	Type of z coordinate
87	observation_z_coordinate_method	int (fk)	z_coordinate_method		Method of determining z coordinate
88	quality_flag	int (fk)	quality_flag	8-03 (m)	Quality flag for observation
89	numerical_precision	int		7-12 (o)	Reporting precision of observation in units given by 'Units' variable. Equivalent to BUFR scale factor
90	standard_uncertainty	numeric		8-01 (c)	Standard uncertainty in reported value
91	method_of_estimating_standard_uncertainty	int (fk)	method_of_estimating_uncertainty	8-02 (c)	Method of estimating the standard uncertainty

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Table 1 observations_table (cont.)

element_number	element_name	kind	external_table	wigos	description
92	uncertainty_due_to_correlated_errors	numeric		8-01 (c)	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	8-02 (c)	NA
94	uncertainty_due_to_uncorrelated_errors	numeric		8-01 (c)	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	8-02 (c)	NA
96	uncertainty_due_to_systematic_errors	numeric		8-01 (c)	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	8-02 (c)	NA
98	total_uncertainty	numeric		8-01 (c)	NA
99	method_of_estimating_total_uncertainty	int (fk)	method_of_estimating_uncertainty	8-02 (c)	NA
100	sensor_configuration	int (fk)	sensor_configuration		NA
101	sensor_automation_status	int (fk)	automation_status	5-01 (m)	Automated, manual, mixed or visual observation
102	exposure_of_sensor	int (fk)	instrument_exposure_quality	5-15 (c)	Whether the exposure of the instrument will impact on the quality of the measurement
103	original_precision	int		NA	Original reporting precision in units given by 'OriginalUnits'
104	original_units	int (fk)	units	NA	Original units
105	original_value	numeric		NA	Original value as reported or recorded in log book.
106	conversion_factor	int (fk)	conversion_factor	7-01 (o)	Link to table describing conversion process
107	processing_code	int (fk)	processing_code	7-01 (o)	e.g. TRC (temperature radiation corrections) etc. Encoded in table.
108	processing_level	int (fk)	processing_level	7-06 (o)	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	8-05 (c)	Whether observation can be traced to international standards.

End of table

3 Station configuration table

Entity-attribute value based table for station configuration (and others).

4 Source configuration table

5 Profile configuration table

6 Sensor configuration table

7 Code tables

Table 2: Region

Value	WMORegion	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 3: Sub region

Value	Type	Code	Subregion
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

Continued on next page

Table 3 Sub region (cont.)

Value	Type	Code	Subregion
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
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

Continued on next page

Table 3 Sub region (cont.)

Value	Type	Code	Subregion
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
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

Continued on next page

Table 3 Sub region (cont.)

Value	Type	Code	Subregion
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 YU-GOSLAV 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
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

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Table 3 Sub region (cont.)

Value	Type	Code	Subregion
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
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

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Table 3 Sub region (cont.)

Value	Type	Code	Subregion
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 4: 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 5: 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

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Table 5 Observing programme (cont.)

Value	Abbreviation	Description	Sponsor
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
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

Continued on next page

Table 5 Observing programme (cont.)

Value	Abbreviation	Description	Sponsor
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

Continued on next page

Table 5 Observing programme (cont.)

Value	Abbreviation	Description	Sponsor
43	NDACC	Network for the Detection of Atmospheric Composition Change	GALION; WMO/GAW
44	OPERA	European Weather Radar Project	EUMETNET; (WMO/GOS)
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 6: Report type

Value	Description
0	SYNOP

Continued on next page

Table 6 Report type (cont.)

Value	Description
1	TEMP
2	CLIMAT

End of table

Table 7: Station type

Value	Description
1	Land station
2	Sea station
3	Aircraft
4	Satellite
5	Underwater platform

End of table

Table 8: 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 9: 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

Continued on next page

Table 9 Platform sub type (cont.)

Value	Platform Type	Abbreviation	Description
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
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.

Continued on next page

Table 9 Platform sub type (cont.)

Value	Platform Type	Abbreviation	Description
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.
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

Continued on next page

Table 9 Platform sub type (cont.)

Value	Platform Type	Abbreviation	Description
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)
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 10: 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)
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

End of table

Table 11: Location method

Value	Description
0	Argos
1	ARGOS DOPPLER
2	ARGOS Kalman
3	Argos-3
4	Argos-4
5	From map
6	GALILEO

Continued on next page

Table 11 Location method (cont.)

Value	Description
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 12: 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 13: Sea level datum

Value	Description
0	Earth Gravitational Model 1996
1	Baltic height system 1977

End of table

Table 14: Meaning of time stamp

Value	name	Description
1	beginning	Time stamps indicate the beginning of a period covering the range up to but excluding the following time stamp.
2	end	Time stamps indicate the end of a period covering the range up to but excluding the preceding time stamp.
3	middle	Time stamps indicate the middle of a period beginning at the middle of the range described by this and the preceding time stamp and ending right before the middle of the range described by this and the following time stamp.

End of table

Table 15: Time quality

Value	Description
0	Timestamp valid, time reported to nearest second

Continued on next page

Table 15 Time quality (cont.)

Value	Description
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
4	Day missing
5	Invalid date / time

End of table

Table 16: Time reference

Value	Description
0	Unknown
1	Time server
2	Radio clock
3	Manual comparison

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: Quality flag

Value	Description
0	Good
1	Inconsistent
2	Doubtful
3	Wrong
4	Not checked
5	Has been changed
6	Estimated
7	Missing value

End of table

Table 19: Duplicate status

Value	Description
0	Unique observation, no known duplicates
1	Best duplicate
2	Worst duplicate
3	Unchecked

End of table

Table 20: Update frequency

Value	Description
1	Annual

End of table

Table 21: Data policy licence

Value	name	Description
1	wmo essential	WMO Essential Data: free and unrestricted international exchange of basic data and products.
2	wmo additional	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.
3	wmo other	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 22: Observed variable

Value	Parameter group	Domain	Sub domain	Abbreviation	Name	Units	Description
0	cloud	atmospheric	upper-air	ch	highcloudtype	coded	type of high clouds (ch)
1	cloud	atmospheric	upper-air	cm	middlecloudtype	coded	type of middle clouds (cm)
2	cloud	atmospheric	upper-air	cl	lowcloudtype	coded	type of low clouds (cl)
3	cloud	atmospheric	upper-air	nh	cloudbaseheight	m	cloud base height (nh)
4	cloud	atmospheric	upper-air	nl	lowcloudamount	Okta	low cloud amount (n)
5	cloud	atmospheric	upper-air	tcc	totalcloudamount	Okta	total amount of clouds
6	cloud	atmospheric	upper-air	n	cloudcover	Okta	Total cloud cover
7	humidity	atmospheric	surface; upper-air	rh	relativehumidity	1	NA
8	humidity	atmospheric	surface; upper-air	q	specifichumidity	1	specific means per unit mass. Specific humidity is the mass fraction of water vapor in (moist) air.
9	humidity	atmospheric	surface; upper-air	depdew	dewpointdepression	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	tdew	dewpointtemperature	K	Dew point temperature is the temperature at which a parcel of air reaches saturation upon being cooled at constant pressure and specific humidity.
11	humidity	atmospheric	surface; upper-air	twet	wetbulbtemperature	K	NA
12	humidity	atmospheric	surface; upper-air	ticebulb	icebulbtemperature	K	NA
13	pressure	atmospheric	surface	a	pressuretendencycharacteristic	coded	characteristic of pressure tendency (used in synoptic maps)
14	pressure	atmospheric	surface	slp	airpressure	Pa	NA

Continued on next page

Table 22 Observed variable (cont.)

Value	Parameter group	Domain	Sub domain	Abbreviation	Name	Units	Description
15	pressure	atmospheric	surface	mslp	airpressureatsealevel	Pa	sealevel 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	pressuretendancy	Pa	pressure tendency
18	salinity	oceanic	surface; sub-surface	sal	salinity	psu	ocean salinity (PSU)
19	temperature	atmospheric	surface; upper-air	tair	airtemperature	K	Air temperature is the bulk temperature of the air, not the surface (skin) temperature.
20	temperature	oceanic	surface; sub-surface	twater	watertemperature	K	Water (sea, river, lake) temperature at depth indicated
21	visibility	atmospheric	surface	vv	horizontalvisibilityinair	m	The visibility is the distance at which something can be seen.
22	weather	atmospheric	surface	w1	pastweather1	coded	past weather (w)
23	weather	atmospheric	surface	ww	presentweather	coded	present weather (ww)
24	weather	atmospheric	surface	w2	pastweather2	coded	past weather 2 (used in synoptic maps)
26	wind	atmospheric	surface; upper-air	d	windfromdirection	degree	direction from which the wind is blowing
27	wind	atmospheric	surface; upper-air	u	eastwardwindspeed	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 upwardairvelocity.)
28	wind	atmospheric	surface; upper-air	v	northwardwindspeed	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 upwardairvelocity.)

Continued on next page

Table 22 Observed variable (cont.)

Value	Parameter group	Domain	Sub domain	Abbreviation	Name	Units	Description
29	wind	atmospheric	surface; upper-air	w	windspeed	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 upwardairvelocity.) The wind speed is the magnitude of the wind velocity.
30	wind	atmospheric	surface	wgust	windspeedofgust	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 upwardairvelocity.) 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 cellmethods 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 23: Units

Value	Units	Conventional abbreviation	Abbreviation in IA5/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 s2
32	pascal	Pa	Pa	PAL	kg m1 s2
33	joule	J	J	J	kg m2 s2
34	watt	W	W	W	kg m2 s3
35	coulomb	C	C	C	A s
36	volt	V	V	V	kg m2 s3 A1
37	farad	F	F	F	kg1 m2 s4 A2
38	ohm		Ohm	OHM	kg m2 s3 A2
39	siemens	S	S	SIE	kg1 m2 s3 A2
40	weber	Wb	Wb	WB	kg m2 s2 A1
41	tesla	T	T	T	kg s2 A1
42	henry	H	H	H	kg m2 s2 A2
60	degree Celsius	C	Cel	CEL	K+273.15
70	lumen	lm	lm	LM	cd sr
71	lux	lx	lx	LX	cd sr m2
80	becquerel	Bq	Bq	BQ s1	NA
81	grey	Gy	Gy	GY	m2 s2
82	sievert	Sv	Sv	SV	m2 s2
110	degree (angle)		deg	DEG	NA

Continued on next page

Table 23 Units (cont.)

Value	Units	Conventional abbreviation	Abbreviation in IA5/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 23 Units (cont.)

Value	Units	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
441	per second (same as hertz)	s1	/s	/S	NA
442	per second squared	s2	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 s1	dPa/s	DPAL/S	NA
521	centibars per second	cb s1	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 s1	hPa/s	HPAL/S	NA
532	hectopascals per hour	hPa h1	hPa/h	HPAL/HR	NA
533	hectopascals per 3 hours	hPa/3 h	hPa/3 h	HPAL/3 HR	NA
535	nanobar = hPa 106	nbar	nbar	NBAR	NA
620	grams per kilogram	g kg1	g/kg	G/KG	NA
621	grams per kilogram per second	g kg1 s1	g kg1 s1	NA	NA
622	kilograms per kilogram kg kg1	kg/kg	KG/KG	NA	NA
623	kilograms per kilogram per second	kg kg1 s1	kg kg1 s1	NA	NA
624	kilograms per square metre	kg m2	kg m2	NA	NA
630	acceleration due to gravity	g	g	NA	NA

Continued on next page

Table 23 Units (cont.)

Value	Units	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
631	geopotential metre	gpm	gpm	NA	NA
710	millimetre	mm	mm	MM	NA
711	millimetres per second	mm s1	mm/s	MM/S	NA
712	millimetres per hour	mm h1	mm/h	MM/HR	NA
713	millimetres to the sixth power per cubic metre	mm6 m3	mm6 m3	NA	NA
715	centimetre	cm	cm	CM	NA
716	centimetres per second	cm s1	cm/s	CM/S	NA
717	centimetres per hour	cm h1	cm/h	CM/HR	NA
720	decimetre	dm	dm	DM	NA
731	metres per second	m s1	m/s	M/S	NA
732	metres per second per metre	m s1/m	m s1/m	NA	NA
733	metres per second per 1000 metres	m s1/1000 m	m s1/km	NA	NA
734	square metres	m2	m2	M2	NA
735	square metres per second	m2 s1	m2/s	M2/S	NA
740	kilometre	km	km	KM	NA
741	kilometres per hour	km h1	km/h	KM/HR	NA
742	kilometres per day	km/d	km/d	KM/D	NA
743	per metre	m1	m1	/M	NA
750	becquerels per litre	Bq l1	Bq/l	BQ/L	NA
751	becquerels per square metre	Bq m2	Bq m2	BQ/M2	NA
752	becquerels per cubic metre	Bq m3	Bq m3	BQ/M3	NA

Continued on next page

Table 23 Units (cont.)

Value	Units	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
753	millisievert	mSv	mSv	MSV	NA
760	metres per second squared	m s2	m s2	NA	NA
761	square metres second	m2 s	m2 s	NA	NA
762	square metres per second squared	m2 s2	m2 s2	NA	NA
763	square metres per radian second	m2 rad1 s	m2 rad1 s	NA	NA
764	square metres per hertz	m2 Hz1	m2/Hz	NA	NA
765	cubic metres	m3	m3	NA	NA
766	cubic metres per second	m3 s1	m3/s	NA	NA
767	cubic metres per cubic metre	m3 m3	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 s1	m2/3 s1	NA	NA
772	logarithm per metre	log (m1)	log (m1)	NA	NA
773	logarithm per square metre	log (m2)	log (m2)	NA	NA
775	kilograms per metre	kg m1	kg/m	NA	NA
776	kilograms per square metre per second	kg m2 s1	kg m2 s1	NA	NA
777	kilograms per cubic metre	kg m3	kg m3	NA	NA
778	per square kilogram per second	kg2 s1	kg2 s1	NA	NA

Continued on next page

Table 23 Units (cont.)

Value	Units	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
779	seconds per metre	s m1	s/m	NA	NA
785	kelvin metres per second	K m s1	K m s1	NA	NA
786	kelvins per metre	K m1	K/m	NA	NA
787	kelvin square metres per kilogram per second	K m2 kg1 s1	K m2 kg1 s1	NA	NA
788	moles per mole	mol mol1	mol/mol	NA	NA
790	radians per metre	rad m1	rad/m	NA	NA
795	newtons per square metre	N m2	N m2	NA	NA
800	pascals per second	Pa s1	Pa/s	NA	NA
801	kilopascal	kPa	kPa	NA	NA
805	joules per square metre	J m2	J m2	NA	NA
806	joules per kilogram	J kg1	J/kg	NA	NA
810	watts per metre per steradian	W m1 sr1 W m1 sr1	NA	NA	NA
811	watts per square metre	W m2	W m2	NA	NA
812	watts per square metre per steradian	W m2 sr1	W m2 sr1	NA	NA
813	watts per square metre per steradian centimeter	W m2 sr1 cm	W m2 sr1 cm	NA	NA
814	watts per square metre per steradian metre	W m2 sr1 m	W m2 sr1 m	NA	NA
815	watts per cubic metre per steradian	W m3 sr1	W m3 sr1	NA	NA

Continued on next page

Table 23 Units (cont.)

Value	Units	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units
820	siemens per metre	S m1	S/m	NA	NA
825	square degrees	degree2	deg2	NA	NA
830	becquerel seconds per cubic metre	Bq s m3	Bq s m3	NA	NA
835	decibels per metre	dB m1	dB/m	NA	NA
836	decibels per degree	dB degree1	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
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

Continued on next page

Table 23 Units (cont.)

Value	Units	Conventional abbreviation	Abbreviation in IA5/ASCII	Abbreviation in ITA2	Definition in base units

End of table

Table 24: 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

End of table

Table 25: 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)

Continued on next page

Table 25 Spatial representativeness (cont.)

Value	Description
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 26: 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 27: 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 28: Conversion factor

Value	description	Implementation
0	farenheit to degrees celsius	Tcelsius = (TFarenheit - 32) / 1.8

End of table

Table 29: Processing level

Value	Description
0	Unknown
1	Raw
2	Level 0
3	Level I
4	Level II
5	Level III
6	Level IV

End of table

Table 30: 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 31: Traceability

Value	Description
0	Unknown
1	Traceable to international standards
2	Traceable to other standards

End of table

Table 32: Institute

Value	Name	Region	Sub region	Address	Contact	Contact email	URL
0	National Oceanography Centre	6	76	European Way, Southampton, UK, SO14 3ZH	Dr David I. Berry	dyb@noc.ac.uk	www.noc.ac.uk

End of table

Table 33: Observing frequency

Value	Code	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 34: 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)

Continued on next page

Table 34 Communication method (cont.)

Value	Description
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
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 35: Metadata source

Value	Description	Version	URL
0	WMO Publication 47	1957 edition	url / doi for document / data

End of table

Table 36: Source format

Value	Description
0	IMMA
1	NetCDF (GRUAN)
2	NetCDF (Other)
3	CSV

End of table

Table 37: Observing method

Value	Description
0	Measured
1	Estimated
2	Computed

End of table

Table 38: Sampling strategy

Value	Description
0	Continuous

Continued on next page

Table 38 Sampling strategy (cont.)

Value	Description
1	Discrete
2	Event

End of table

Table 39: 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