Copernicus Climate Change Service

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

## C3S̲311a̲Lot2̲NUIM - Access to Observations from Global Climate Data Archives

Draft

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# Defining a Common Data Model

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## Summary

This document describes background information on the definition of a common data model for the representation of in situ observations as part of the C3S 311a activity.

A draft data model is proposed.

**Call participants are requested to**:

- Review the proposed data model, specifically tables 3 - 7.

- Review the configuration field tables and suggest modifications, additions and deletions.

- Review the configuration code tables and suggest modifications, additions and deletions.

- Review the code tables and propose / identify where an existing table (e.g. BUFR code table) and be used in replacement.

Tab separated versions of the code tables can be found at:

https://github.com/glamod/common_data_model/tree/master/tables

# Contents

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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[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, developed based on two existing efforts: the WMO I-DARE portal and the EU FP 7 ERA-CLIM 2 data registry. New and enhanced data tools and techniques rescugin / digitising data will also be developed. Lot 1 includes a small data rescue component focused on three regions in the Southern Hemisphere in and around Argentina, South Africa and in the New Zealand to Drake Passage sector, and will link to other data rescue efforts including ACRE, IEDRO and ICA&D. Lot 1 will deal with the full range of historical terrestrial and marine surface weather observations plus upper air data and have 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 data sources include land stations,merchant ships, drifting buoys and other marine platforms. As part of Lot 2 as common data model (CDM) will be developed in collaboration with the other Lots. The aim is to make this compliant with the ISO19115 Satandard and WIGOS Metadata Standard and be compatible with the ODB database / data model developed by ECMWF.

**Lot 3** will create a harmonised 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 ECMWF Observations DataBase (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

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[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.

for statistical comparisons with Regional Climate Model output (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 have now become reference datasets for a larger user community, extending beyond 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

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

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 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 burst point.

In order to represent the wide variety of metadata required across (and within) Lots four 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).

- Similar to the EAV based approach, the minimum set of information required is included in the main observations table and the main observations table is linked to a series of metadata tables. These metadata tables then include the additional fields through the use of arrays indicating the field the metadata is for and storing the value of the metadata.

Within this document we are proposing to use solution (4), with the use of arrays to store metadata elements not common across all data types. Compared to the EAV approach, this requires fewer joins between tables and less duplication of entries, making the data model in principle more efficient. 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 / nested through a series of auxiliary / configuration tables. A schematic of this is shown in Figure 1 - a more complete schematic can be found at `https://github.com/glamod/common_data_model/blob/master/cdm_short.pdf`. The primary table, or data structure, containing the observations is defined by the "observations_table" (Table 3). This table contains the information on the geospatial location of the observations (and station), date / time of the report, the observed parameter, source information; data licensing and usage permissions etc and links to additional metadata. The "station_configuration" table (Table 4) contains detailed information on the station reporting the data including: institute operating the station; the type of station; station / AWS model type; location; operating territory; reporting frequency etc. The "source_configuration" table (Table 5) contains detailed information on the source dataset, including: information on the product; whether any processing has been applied; the original data centre the data were sourced from; citation information; the data licence for the product; how to cite the data source etc. The "profile_configuration" table (Table 6) contains detailed metadata for atmospheric and oceanic profiles, including: profile type; type of launcher; direction of profile; balloon / XBT type etc; The "sensor_configuration" table (Table 7) contains detailed information on the sensor used to make a particular observation, including: calibration status; sampling strategy; observing method; sensor housing and ventilation; instrument model and serial number etc;

Whilst Figure 1 and Tables 3 - 7 show the data model from a relational database perspective the same data model could be represented in XML. A simplified XML example of this is shown in Figure 2. For readability the majority of elements have been omitted, with a few example elements and nested data structures retained. In this example, the records from the configuration tables are nested within the entries for the respective records from the observations_table.

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.

Figure 1: Simplified schematic showing overview of common data model

- (fk)                  The indicated value is also a foreign key linking to another table.

```
<observations_table>
    <report>
        <report_id type="integer"/>
        <region type="integer"/>
        <sub_region type="integer"/>
        <application_area type="array"></application_area>
        <observing_programme type="array"></observing_programme>
        <report_type type="integer"/>
        <station_name type="string"/>
        ...
        ...
        <station_configuration>
            <station_primary_id type="string"/>
            <station_primary_id_scheme type="integer"/>
            ...
            ...
            <field_numeric type="array"></field_numeric>
            <value_numeric type="array"></value_numeric>
            ...
        </station_configuration>
        ...
        ...
    </report>
    <report>
    ...
    </report>
</observations_table>
```

Figure 2: Truncated / simplified XML example of data model defined in Tables 3 - 7.

## 3.1 Observations table

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 station ID |
| 13 | secondary_station_id | varchar | | Alternate (e.g. 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 |
| 25 | surface_type_scheme | int (fk) | surface_type_scheme | Scheme used to classify surface cover |

Table 3 observations_table (cont.)

| element_number | element_name | kind | external_table | description |
|---|---|---|---|---|
| 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 |
| 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 |

Table 3 observations_table (cont.)

| element_number | element_name | kind | external_table | description |
|---|---|---|---|---|
| 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_codes | int[] (fk) | report_processing_codes | 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_times tamp_meaning | int (fk) | meaning_of_time_stamp | beginning, middle, end |
| 68 | observation_year | int | | Year ofobservation (UTC) |
| 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 obser-vation was made (s) |
| 75 | observation_longitude | numeric | | Longitude of the observed value, -180 to 180 (or other as defined by CRS) |

Continued on next page

Table 3 observations_table (cont.)

| element_number | element_name | kind | external_table | description |
|---|---|---|---|---|
| 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 surface (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 |
| 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, e.g. due to sensor housing |

Continued on next page

Table 3 observations_table (cont.)

| element_number | element_name | kind | external_table | description |
|---|---|---|---|---|
| 93 | method_of_estimatin g_uncertainty_due_to _correlated_errors | int (fk) | method_of_estimat ing_uncertainty | NA |
| 94 | uncertainty_due_to_u ncorrelated_errors | numeric | | Uncertainty due to errors in the observation that are uncorrelated between observations, e.g. due to sensor noise / small scale variability |
| 95 | method_of_estimating _uncertainty_due_to_u ncorrelated_errors | int (fk) | method_of_estimat ing_uncertainty | NA |
| 96 | uncertainty_due_to_s ystematic_errors | numeric | | Uncertainty due to errors in the observations that are correlated under similar observing conditions |
| 97 | method_of_estimatin g_uncertainty_due_to _systematic_errors | int (fk) | method_of_estimat ing_uncertainty | NA |
| 98 | total_uncertainty | numeric | | Sum of uncertainty terms added in quadrature |
| 99 | method_of_estimatin g_total_uncertainty | int (fk) | method_of_estimat ing_uncertainty | NA |
| 100 | sensor_id | int (fk) | sensor_configuration | NA |
| 101 | sensor_automat ion_status | int (fk) | automation_status | Automated, manual, mixed or visual observation |
| 102 | exposure_of_sensor | int (fk) | instrument_expos ure_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 |
| 105 | original_value | numeric | | Original value as reported or recorded in log book. |
| 106 | conversion_method | int (fk) | conversion_method | Link to table describing conversion process |
| 107 | processing_code | int[] (fk) | processing_code | e.g. TRC (temperature radiation cor-rections) 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 re-ported in observation value (observa-tion_value = original + adjustment) |
| 110 | traceability | int (fk) | traceability | Whether observation can be traced to international standards. |

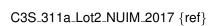End of table

## 3.2 Station configuration table

Table 4: station_configuration

| element_number | element_name | type | external_table | description |
|---|---|---|---|---|
| 0 | station_primary_id | varchar | | Primary (e.g. WMO) ID for station |
| 1 | station_primary_id_scheme | int (fk) | id_scheme | Scheme used for primary ID |
| 2 | station_record_number | int | | Record number for this station entry |
| 3 | station_secondary_id | varchar | | Secondary (e.g. 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 |

Table 4 station_configuration (cont.)

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

End of table

## 3.3 Profile configuration table

Table 5: profile_configuration

| element_number | element_name | kind | external_table | description |
| --- | --- | --- | --- | --- |
| 0 | profile_id | varchar | NA | Unique ID for this profile entry |
| 1 | report_id | int (fk) | observations_table | Report to which this profile entry belongs |
| 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 | | 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[] | | Values for the additional fields |
| 12 | field_timestamp | int[] (fk) | profile_configuration_fields | Fields to which the following values apply |
| 13 | value_timestamp | timestamp[] | | Values for the additional fields |
| 14 | comments | varchar | | Any additional comments / footnotes |
| | | | | End of table |

## 3.4 Source configuration table

Table 6: 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[] | | 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[] | | additional values |

Table 6 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[] | | additional values |
| 23 | history | varchar | | History of source |
| 24 | comments | varchar | | Additional comments / footnotes |
| 25 | timestamp | | | Date record created / created |

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 |
| 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 | | Date of last calibration |
| 6 | field_numeric | int[] (fk) | sensor_configuration_fields | fields for which this entry is applicable |
| 7 | value_numeric | numeric[] | | 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[] | | 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[] | | time stamp entry |
| 14 | comments | varchar | | additional comments for sensor not reportable elsewhere |
| 15 | date_start | timestamp | | start date for period of validity associated with this entry |
| 16 | date_end | timestamp | | end date for period of validity associated with this entry |
| | | | | End of table |

# 4 Mapping to WIGOS metadata standard

To do ...

# 5 Mapping to INSPIRE

To do ...

# 6 Common Data Model governance

- Tables defining data model and decode tables stored in Git repository (`https://github.com/glamod/common_data_model/`).

- Whilst service in development data model updated / revised annually (modified / new elements in Tables 3 - 7).

- New entries to decode tables every 3 / 6 months (TBD).

- Changes made by consensus across Lots and with ECMWF.

# 7 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.

# 8 Appendix

## 8.1 Code tables

Table 8: adjustment

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

Table 9: application_area (WIGOS Code Table 2-02)

| index | application_area | description |
|---|---|---|
| 0 | 1 | Global numerical weather prediction (GNWP) |
| 1 | 2 | High-resolution numerical weather prediction (HRNWP) |
| 2 | 3 | Nowcasting and very short range forecasting (NVSRF) |
| 3 | 4 | Seasonal and inter-annual forecasting (SIAF) |
| 4 | 5 | General weather forecasting |
| 5 | 6 | Aeronautical meteorology |
| 6 | 7 | Ocean applications |
| 7 | 8 | Agricultural meteorology |
| 8 | 9 | Hydrology |
| 9 | 10 | Climate monitoring (as undertaken through the Global Climate Observing System, GCOS) |
| 10 | 11 | Climate applications |
| 11 | 12 | Space weather |
| 12 | 13 | Cryosphere applications |
| 13 | 14 | Energy sector |
| 14 | 15 | Transportation sector |
| 15 | 16 | Health sector |
| 16 | 17 | Terrestrial ecology |
| 17 | 18 | Operational air quality forecasting |
| 18 | 19 | Atmospheric composition forecasting |
| 19 | 20 | Atmospheric composition monitoring and analysis |
| 20 | 21 | Large urban complexes |

End of table

Table 10: automation_status

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

End of table

Table 11: calibration_status (WIGOS Code Table 5-08)

| index | calibration_status | description |
|---|---|---|
| 0 | 0 | No changes - in calibration. |

Continued on next page

Table 11 calibration_status (cont.)

| index | calibration_status | description |
|---|---|---|
| 1 | 1 | No changes - out of calibration. |
| 2 | 2 | No changes - calibration unknown. |
| 3 | 3 | Recalibrated - in calibration. |

End of table

Table 12: communication_method

| index | communication_method | description |
|---|---|---|
| 0 | 0 | Cellular (unspecified) |
| 1 | 1 | Meteosat DCP |
| 2 | 2 | Iridium (unspecified) |
| 3 | 3 | GOES DCP |
| 4 | 4 | VSAT (unspecified) |
| 5 | 5 | Landline telephone |
| 6 | 6 | Radio modem |
| 7 | 7 | E-mail (unspecified) |
| 8 | 8 | Voice (ship). The observation is sent to a NMS through the telephone network. The communication may use Inmarsat, Iridium, Vsat, VHF |
| 9 | 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 | 10 | Web (ship). The observation is sent through the Web (example: TurboWeb). The satellite communication provider may be Inmarsat, Iridium, Vsat |
| 11 | 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 | 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 | 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 | 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 | 15 | Automated Identification System (direct or through satellite) |
| 16 | 16 | Argos system |

Table 12 communication_method (cont.)

| index | communication_method | description |
|-------|---------------------|-------------|
| 17 | 17 | Cellular (Dial-up). Dial-up communication using terrestrial wireless networks (GSM, GPRS) |
| 18 | 18 | Cellular (SMS). SMS sent through terrestrial wireless networks (GSM, GPRS) |
| 19 | 19 | Globalstar communication system |
| 20 | 20 | GMS (DCP). Data Collecting Platform of Geostationary Meteorological Satellites |
| 21 | 21 | Iridium (SBD). Short Burst Data service of Iridium communication system |
| 22 | 22 | Iridium (Email). Email sent through Iridium (e.g. Easymail) |
| 23 | 23 | Iridium (Dial-up). Dial-up communication using Iridium |
| 24 | 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 | 25 | Inmarsat-C (Email). Email sent through Inmarsat-C |
| 26 | 26 | Orbcomm communication system |
| 27 | 27 | Vsat (Email). Email sent through Vsat |
| 28 | 28 | Vsat (Dial-up). Dial-up communication using Vsat |
| 29 | 29 | Delayed Mode only |
| 30 | 30 | Other (specify in footnote). |

End of table

Table 13: conversion_method

| index | conversion | description | implementation | reference |
|---|---|---|---|---|
| 0 | 0 | Farenheit to degrees Celsius | T_Celsius = (T_Farenheit - 32) / 1.8 | NA |
| | | | End of table | |

Table 14: crs (BUFR Code Table 0 01 150)

| index | crs | description |
|---|---|---|
| 0 | 0 | WGS84 |
| 1 | 1 | ETRS89 |
| 2 | 2 | NAD83 |
| 3 | 3 | DHDN |
| 4 | 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 (WIGOS Code Table 9-02)

| index | data_policy_licence | name | description |
|---|---|---|---|
| 0 | 1 | WMOessential | WMO Essential Data: free and unrestricted international exchange of basic data and products. |
| 1 | 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. |
| 2 | 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

| index | duplicate_status | description |
|---|---|---|
| 0 | 0 | Unique observation, no known duplicates |
| 1 | 1 | Best duplicate |
| 2 | 2 | Worst duplicate |

Table 16 duplicate_status (cont.)

| index | duplicate_status | description |
|---|---|---|
| 3 | 3 | Unchecked |

End of table

Table 17: events_at_station (WIGOS Code Table 4-04 (Needs expanding for marine obs.))

| index | events_at_station | description |
|---|---|---|
| 0 | 1 | Grass-cutting |
| 1 | 2 | Snow clearing |
| 2 | 3 | Tree removal |
| 3 | 4 | Construction activity |
| 4 | 5 | Road work |
| 5 | 6 | Biomass burning |
| 6 | 7 | Dust storm |
| 7 | 8 | Storm damage |
| 8 | 9 | Wind storm |
| 9 | 10 | Flood |
| 10 | 11 | Fire |
| 11 | 12 | Earthquake |
| 12 | 13 | Land slide |
| 13 | 14 | Storm surge or tsunami |
| 14 | 15 | Lightning |
| 15 | 16 | Vandalism |

End of table

Table 18: id_scheme

| index | id_scheme | description |
|---|---|---|
| 0 | 0 | ICOADS: ID present, but unknown type |
| 1 | 1 | ICOADS: ship, Ocean Station Vessel (OSV), or ice station callsign |
| 2 | 2 | ICOADS: generic ID (e.g., SHIP, BUOY, RIGG, PLAT) |
| 3 | 3 | ICOADS: WMO 5-digit buoy number |
| 4 | 4 | ICOADS: other buoy number (e.g., Argos or national buoy number) |
| 5 | 5 | ICOADS: Coastal-Marine Automated Network (C-MAN) ID (assigned by US NDBC or other organizations) |
| 6 | 6 | ICOADS: station name or number |
| 7 | 7 | ICOADS: oceanographic platform/cruise number |
| 8 | 8 | ICOADS: fishing vessel psuedo-ID |
| 9 | 9 | ICOADS: national ship number |
| 10 | 10 | ICOADS: composite information from early ship data |
| 11 | 11 | ICOADS: 7-digit buoy ID (proposed) |
| 12 | 12 | WIGOS ID |

Table 18 id_scheme (cont.)

| index | id_scheme | description |
|-------|-----------|-------------|
| 13 | 13 | GRUAN ID |
| 14 | 14 | IMO Number |
| 15 | 15 | National ID |
| 16 | 16 | WMO buoy / station number |

End of table

Table 19: institute

| index | institute | name | region | sub_region | address | contact | contact_email | URL |
|---|---|---|---|---|---|---|---|---|
| 0 | 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 20: instrument_exposure_quality (WIGOS Code Table 5-15)

| index | instrument_exposure_quality | description |
|---|---|---|
| 0 | 1 | Class 1 - Exposure of instrument allows reference level measurements |
| 1 | 2 | Class 2 - Exposure of instrument has small or infrequent influence on measurement |
| 2 | 3 | Class 3 - Exposure of instrument leads to increased uncertainty or occasional invalid measurements |
| 3 | 4 | Class 4 - Exposure of instruemnt leads to high uncertainty or regular invalid measurements |
| 4 | 5 | Class 5 - Exposure of instrument leads to invalid measurements |

End of table

Table 21: location_method

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

End of table

Table 22: location_quality

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

End of table

Table 23: meaning_of_time_stamp

| index | meaning_of_time_stamp | name | description |
|---|---|---|---|
| 0 | 1 | beginning | Date / time specified indicates the start of the period over which the observation was made. |
| 1 | 2 | end | Date / time specified indicates the end of the period over which the observation was made. |
| 2 | 3 | middle | Date / time specified indicates the middle of the period over which the observation was made. |

End of table

Table 24: measuring_system_model

| index | measuring_system_model | description |
|---|---|---|
| 0 | 0 | BATOS 4.8 |

End of table

Table 25: method_of_estimating_uncertainty

| index | method_of_estimating_uncertainty | description |
|---|---|---|
| 0 | 0 | Laboratory based calibration. |
| 1 | 1 | Comparison to co-located instrument |

End of table

Table 26: observed_variable

| index | observed_variable | paramete r_group | domain | sub_do main | abbrevi ation | name | units | description |
|---|---|---|---|---|---|---|---|---|
| 0 | 0 | cloud | atmospheric | upper-air | ch | high_clou d_type | coded | type of high clouds (ch) |
| 1 | 1 | cloud | atmospheric | upper-air | cm | middle_clo ud_type | coded | type of middle clouds (cm) |
| 2 | 2 | cloud | atmospheric | upper-air | cl | low_clou d_type | coded | type of low clouds (cl) |
| 3 | 3 | cloud | atmospheric | upper-air | nh | cloud_bas e_height | m | cloud base height (nh) |
| 4 | 4 | cloud | atmospheric | upper-air | nl | low_cloud _amount | Okta | low cloud amount (n) |
| 5 | 5 | cloud | atmospheric | upper-air | tcc | total.cloud _amount | Okta | total amount of clouds |
| 6 | 6 | cloud | atmospheric | upper-air | n | cloud_cover | Okta | Total cloud cover |
| 7 | 7 | humidity | atmospheric | surface; upper-air | rh | relative_h umidity | 1 | NA |
| 8 | 8 | humidity | atmospheric | surface; upper-air | q | specific_h umidity | 1 | specific means per unit mass. Specific humidity is the mass fraction of water vapor in (moist) air. |
| 9 | 9 | humidity | atmospheric | surface; upper-air | dep_dew | dew_point_ depression | 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 | 10 | humidity | atmospheric | surface; upper-air | t_dew | dew_point_t emperature | K | Dew point temperature is the temperature at which a parcel of air reaches saturation upon being cooled at constant pressure and specific humidity. |

Continued on next page

Table 26 observed_variable (cont.)

| index | observed_variable | parameter_group | domain | sub_domain | abbreviation | name | units | description |
|---|---|---|---|---|---|---|---|---|
| 11 | 11 | humidity | atmospheric | surface; upper-air | t_wet | wet_bulb_temperature | K | NA |
| 12 | 12 | humidity | atmospheric | surface; upper-air | t_ice_bulb | ice_bulb_temperature | K | NA |
| 13 | 13 | pressure | atmospheric | surface | a | pressure_tendancy_characteristics | coded | characteristic of pressure tendency (used in synoptic maps) |
| 14 | 14 | pressure | atmospheric | surface | p | air_pressure | Pa | NA |
| 15 | 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 | 16 | pressure | atmospheric | surface | ppp | pressure_tendancy | Pa | pressure tendency |
| 17 | 18 | salinity | oceanic | surface; sub-surface | sal | salinity | psu | ocean salinity (PSU) |
| 18 | 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. |
| 19 | 20 | temperature | oceanic | surface; sub-surface | t_water | water_temperature | K | Water (sea, river, lake) temperature at depth indicated |
| 20 | 21 | visibility | atmospheric | surface | vv | horizontal_visibility_in_air | m | The visibility is the distance at which something can be seen. |
| 21 | 22 | weather | atmospheric | surface | w1 | past_weather_1 | coded | past weather (w) |
| 22 | 23 | weather | atmospheric | surface | ww | present_weather | coded | present weather (ww) |
| 23 | 24 | weather | atmospheric | surface | w2 | past_weather_2 | coded | past weather 2 (used in synoptic maps) |
| 24 | 26 | wind | atmospheric | surface; upper-air | d | wind_from_direction | degree | direction from which the wind is blowing |

Continued on next page

Table 26 observed_variable (cont.)

| index | observed_variable | parameter_group | domain | sub_domain | abbreviation | name | units | description |
|---|---|---|---|---|---|---|---|---|
| 25 | 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.) |
| 26 | 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.) |
| 27 | 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. |

Table 26 observed_variable (cont.)

| index | observed_variable | parameter_group | domain | sub_domain | abbreviation | name | units | description |
|---|---|---|---|---|---|---|---|---|
| 28 | 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 27: observation_code_tables

| index | code_table_scheme | code_table_id | code_table_name | value | description |
|---|---|---|---|---|---|
| 0 | BUFR | 0 20 003 | Present weather | NA | See BUFR 0 20 003 |
| 1 | BUFR | 0 20 004 | Past weather | NA | See BUFR 0 20 004 |
| 2 | BUFR | 0 10 063 | Characteristics of pressure tendancy | NA | See BUFR 0 10 063 |

End of table

Table 28: observation_value_significance

| index | observation_value_significance | description |
|---|---|---|
| 0 | 0 | Maximum value over indicated period |
| 1 | 1 | Minimum value over indicated period |
| 2 | 2 | Mean value over indicated period |
| 3 | 3 | Median value over indicated period |
| 4 | 4 | Modal value over indicated period |
| 5 | 5 | Mean absolute error over indicated period |
| 6 | 6 | Best estimate of standard deviation (N-1) of observed parameter over indicated period |
| 7 | 7 | Standard deviation (N) of observed parameter over indicated period |
| 8 | 8 | Harmonic mean of observed parameter over indicated period |
| 9 | 9 | Root mean square vector error of observed parameter over indicated period |
| 10 | 10 | root mean square of observed parameter over indicated period |
| 11 | 11 | Vector mean of observed parameter over indicated period |
| 12 | 12 | Instantaneous value of observed parameter |
| 13 | 13 | Accumulation over specified period |

End of table

Table 29: observing_frequency

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

End of table

Table 30: observing_method

| index | observing_method | description |
|---|---|---|
| 0 | 0 | Measured |
| 1 | 1 | Estimated |
| 2 | 2 | Computed |

End of table

Table 31: observing_programme (WIGOS Code Table 2-02)

| index | observing_programme | abbreviation | description | sponsor |
|---|---|---|---|---|
| 0 | 1 | AMDAR | Global Aircraft Meteorological DAta Relay | WMO/GOS |
| 1 | 2 | EPA | Environmental Protection Agency | NA |
| 2 | 3 | EUMETNET | Grouping of European National Meteorological Services | WMO/GOS |
| 3 | 4 | WMO/GAW | World Meteorological Organization/Global Atmospheric Watch | NA |
| 4 | 5 | GCOS | Global Climate Observing System | NA |
| 5 | 6 | GCW | Global Cryosphere Watch | NA |
| 6 | 7 | GOOS | Global Ocean Observing System | NA |
| 7 | 8 | IPA | International Permafrost Association | NA |
| 8 | 9 | JCOMM | Joint Technical Commission for Oceanography and Marine Meteorology | WMO/GOS |
| 9 | 10 | WMO/GOS | World Meteorological Organization/Global Observing System | NA |
| 10 | 11 | GTOS | Global Terrestrial Observing System | NA |
| 11 | 12 | IAGOS | In-service Aircraft for a Global Observing System | NA |
| 12 | 13 | WHYCOS | World Hydrological Cycle Observing System | NA |
| 13 | 14 | WMO/CLW | World Meteorological Office/Climate and Water Department | NA |

Continued on next page

Table 31 observing-programme (cont.)

| index | observing-programme | abbreviation | description | sponsor |
|---|---|---|---|---|
| 14 | 15 | ADNET | Asian dust and aerosol lidar observation network | GALION ; WMO/GAW |
| 15 | 16 | Aeronet | AErosol RObotic NETwork | NASA? |
| 16 | 17 | ANTON | Antarctic Observing Network | WMO/GOS |
| 17 | 18 | ASAP | Automated Shipboard Aerological Program | WMO/GOS |
| 18 | 19 | BSRN | Baseline Surface Radiation Network | WMO/GAW & GCOS |
| 19 | 20 | CASTNET | Clean Air Status and Trends Network | (National - USA) |
| 20 | 21 | CIS-LiNet | Lidar network for monitoring atmosphere over CIS regions | GALION ; WMO/GAW |
| 21 | 22 | CLN | CREST Lidar Network | GALION ; WMO/GAW |
| 22 | 23 | DART | Deep-ocean Assessment and Reporting of Tsunamis | NOAA Centre for Tsunamis Research |
| 23 | 24 | E-AMDAR | European - Aircraft Meteorological DAta Relay | EUMETNET ; WMO/GOS |
| 24 | 25 | E-ASAP | European - Automated Shipboard Aerological Program | EUMETNET ; WMO/GOS |
| 25 | 26 | E-GVAP | European - GNSS water vapour programme | EUMETNET ; WMO/GOS |
| 26 | 27 | E-PROFILE | European - wind profiles from radar | EUMETNET ; WMO/GOS |
| 27 | 28 | E-SURFMAR | European - Surface Marine Operational Service | EUMETNET ; WMO/GOS |
| 28 | 29 | EARLINET | European Aerosol Research Lidar Network | GALION ; WMO/GAW |
| 29 | 30 | GALION | GAW Aerosol Lidar Observation Network | WMO/GAW |
| 30 | 31 | GAW-PFR | GAW-Precision Filter Radiometers | WMO/GAW |

Table 31 observing-programme (cont.)

| index | observing-programme | abbreviation | description | sponsor |
|---|---|---|---|---|
| 31 | 32 | German AOD Network | German Aerosol Optical Depth Network | WMO/GAW |
| 32 | 33 | GLOSS | Global Sea Level Observing System | JCOMM ; WMO/GOS |
| 33 | 34 | GRUAN | GCOS Reference Upper Air Network | GCOS |
| 34 | 35 | GSN | GCOS Surface Network | GCOS |
| 35 | 36 | GTN-G | Global Terrestrial Network - Glaciers | GCOS |
| 36 | 37 | GTN-H | Global Terrestrial Network - Hydrology | WMO/CLW ; GCOS ; GTOS |
| 37 | 38 | GTN-P | Global Terrestrial Network - Permafrost | IPA ; GCOS ; GTOS |
| 38 | 39 | GUAN | GCOS Upper Air Network | GCOS |
| 39 | 40 | IAGOS-MOZAIC | Measurement of Ozone and Water Vapour on Airbus in-service Aircraft | IAGOS |
| 40 | 41 | LALINET | Latin America Lidar Network | GALION; WMO/GAW |
| 41 | 42 | MPLNET | Micro Pulse Lidar Network | GALION; WMO/GAW |
| 42 | 43 | NDACC | Network for the Detection of Atmospheric Composition Change | GALION; WMO/GAW |
| 43 | 44 | OPERA | European Weather Radar Project | EUMETNET; (WMO/GOS) |
| 44 | 45 | PIRATA | Prediction and Research Moored Array in the Atlantic | GOOS; WMO/GOS |
| 45 | 46 | PolarAOD | Polar Aerosol Optical Depth Measurement Network Project | WMO/GAW |

Table 31 observing-programme (cont.)

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

End of table

Table 32: platform_sub_type

| index | platform_sub_type | platform_type | abbreviation | description |
|---|---|---|---|---|
| 0 | 0 | Ship | BA | Barge |
| 1 | 1 | Ship | BC | Bulk Carrier |
| 2 | 2 | Ship | CA | Cable ship |
| 3 | 3 | Ship | CG | Coast Guard Ship |
| 4 | 4 | Ship | CS | Container Ship |
| 5 | 5 | Ship | DR | Dredger |
| 6 | 6 | Ship | FE | Passenger ferries |
| 7 | 7 | Ship | FP | Floating production and storage units |
| 8 | 8 | Ship | FV | Other Fishing Vessel |
| 9 | 9 | Ship | GC | General Cargo |
| 10 | 10 | Ship | GT | Gas Tanker |
| 11 | 11 | Ship | IC | Icebreaking vessel |
| 12 | 12 | Ship | IF | Inshore Fishing Vessel |
| 13 | 13 | Ship | LC | Livestock carrier |
| 14 | 14 | Ship | LT | Liquid Tanker |
| 15 | 15 | Ship | LV | Light Vessel |
| 16 | 16 | Ship | MI | Mobile installation including mobile offshore drill ships, jack-up rigs and semi-submersibles |
| 17 | 17 | Ship | MS | Military Ship |
| 18 | 18 | Ship | OT | Other |
| 19 | 19 | Ship | MW | Ocean Weather Ship |
| 20 | 20 | Ship | PI | Pipe layer |
| 21 | 21 | Ship | PS | Passenger ships and cruise liners |
| 22 | 22 | Ship | RF | Ro/Ro Ferry |
| 23 | 23 | Ship | RR | Ro/Ro Cargo |
| 24 | 24 | Ship | RS | Refrigerated cargo ships including banana ships |
| 25 | 25 | Ship | RV | Research Vessel |
| 26 | 26 | Ship | SA | Large sailing vessels |
| 27 | 27 | Ship | SV | Support Vessel |
| 28 | 28 | Ship | TR | Trawler |
| 29 | 29 | Ship | TU | Tug |
| 30 | 30 | Ship | VC | Vehicle carriers |
| 31 | 31 | Ship | YA | Yacht / Pleasure Craft |
| 32 | 32 | Ship | BA | Barges, including crane barges and tank barges. |

Table 32 platform_sub_type (cont.)

| index | platform_sub_type | platform_type | abbreviation | description |
|---|---|---|---|---|
| 33 | 33 | Ship | BC | Bulk Carriers, including Ore/Bulk/Oil (OBO) carriers and Ore/Oil carriers. |
| 34 | 34 | Ship | CA | Cable ships. |
| 35 | 35 | Ship | CG | Coastguard cutters, patrol ships and launches. |
| 36 | 36 | Ship | CS | Container ships, including open and closed container ships and refrigerated container ships. |
| 37 | 37 | Ship | DR | Dredgers including bucket, hopper, grab and suction dredgers. |
| 38 | 38 | Ship | FE | Passenger ferries (carrying passengers only). |
| 39 | 39 | Ship | FP | Floating Production and Storage Units. |
| 40 | 40 | Ship | FV | Fishing Vessels including purse seiners, long liners etc., but excluding trawlers. |
| 41 | 41 | Ship | GC | General Cargo ships with one or more holds. |
| 42 | 42 | Ship | GT | Liquefied gas carriers/tankers including LNG and LPG carriers. |
| 43 | 43 | Ship | IC | Icebreaking vessels (dedicated vessel). If the vessel fits in another category and is ice strengthened |
| 44 | 44 | Ship | LC | Livestock Carrier (dedicated ship for the carriage of livestock). |
| 45 | 45 | Ship | LT | Liquid tankers including oil product tankers, chemical tankers and crude oil tankers (including VLCC's and ULCC's). |
| 46 | 46 | Ship | LV | Light vessels. |
| 47 | 47 | Ship | MI | Mobile installations, including mobile offshore drill ships, jack-up rigs, semi-submersibles. |
| 48 | 48 | Ship | MS | Military ships. |
| 49 | 49 | Ship | OW | Ocean Weather Ships (dedicated weather ship). |
| 50 | 50 | Ship | PI | Pipe Layers. |
| 51 | 51 | Ship | PS | Passenger ships and Cruise liners. |
| 52 | 52 | Ship | RF | Ro Ro ferries (carrying passengers and laden vehicles). |
| 53 | 53 | Ship | RR | Ro Ro cargo ships for carriage of road and/or rail vehicles and cargo, including containerised cargo. |
| 54 | 54 | Ship | RS | Refrigerated cargo ships including banana ships. |

Table 32 platform_sub_type (cont.)

| index | platform_sub_type | platform_type | abbreviation | description |
|---|---|---|---|---|
| 55 | 55 | Ship | RV | Research Vessels, including oceanographic, meteorological and hydrographic research ships and seismographic research ships. |
| 56 | 56 | Ship | SA | Large sailing vessels, including sail training vessels. |
| 57 | 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 | 58 | Ship | TR | Trawler fishing vessels. |
| 59 | 59 | Ship | TU | Tugs, including fire-fighting tugs, salvage tugs, pusher tugs, pilot vessels, tenders etc. |
| 60 | 60 | Ship | VC | Vehicle Carriers: dedicated multi deck ships for the carriage of new unladen road vehicles. |
| 61 | 61 | Ship | YA | Yachts and pleasure craft. |
| 62 | 62 | Ship | OT | Other (specify in footnote). |
| 63 | 63 | Land station | | Synoptic network |
| 64 | 64 | Land station | | Local Network |
| 65 | 65 | Ship | | Ocean Weather Ship (on station) |
| 66 | 66 | Ship | | Ocean Weather Ship (off station) |
| 67 | 67 | Coastal / Island | | Other |
| 68 | 68 | Coastal / Island | | Coastal-Marine Automated Network (C-MAN) (NDBC operated) |
| 69 | 69 | Drifting buoy | | Unspecified drifting buoy |
| 70 | 70 | Drifting buoy | | Standard Lagrangian drifter (Global Drifter Programme) |
| 71 | 71 | Drifting buoy | | Standard FGGE type drifting buoy (non-Lagrangian meteorological drifting buoy) |
| 72 | 72 | Drifting buoy | | Wind measuring FGGE type drifting buoy (non-Lagrangian meteorological drifting buoy) |
| 73 | 73 | Ice buoy | | Ice drifter |
| 74 | 74 | Drifting buoy | | SVPG Standard Lagrangian drifter with GPS |
| 75 | 75 | Drifting buoy | | SVP-HR drifter with high-resolution temperature or thermistor string |
| 76 | 76 | Subsurface float | | Unspecified subsurface float |

Continued on next page

Table 32 platform_sub_type (cont.)

| index | platform_sub_type | platform_type | abbreviation | description |
|---|---|---|---|---|
| 77 | 77 | Profiling float | | SOFAR |
| 78 | 78 | Profiling float | | ALACE |
| 79 | 79 | Profiling float | | MARVOR |
| 80 | 80 | Profiling float | | RAFOS |
| 81 | 81 | Profiling float | | PROVOR |
| 82 | 82 | Profiling float | | SOLO |
| 83 | 83 | Profiling float | | APEX |
| 84 | 84 | Moored buoy | | Unspecified moored buoy |
| 85 | 85 | Moored buoy | | Nomad |
| 86 | 86 | Moored buoy | | 3-metre discus |
| 87 | 87 | Moored buoy | | 10-12-metre discus |
| 88 | 88 | Moored buoy | | ODAS 30 series |
| 89 | 89 | Moored buoy | | ATLAS (e.g. TAO area) |
| 90 | 90 | Moored buoy | | TRITON buoy |
| 91 | 91 | Moored buoy | | FLEX mooring (e.g. TIP area) |
| 92 | 92 | Moored buoy | | Omnidirectional waverider |
| 93 | 93 | Moored buoy | | Directional waverider |
| 94 | 94 | Profiling float | | Subsurface ARGO float |
| 95 | 95 | Profiling float | | PALACE |
| 96 | 96 | Profiling float | | NEMO |
| 97 | 97 | Profiling float | | NINJA |
| 98 | 98 | Ice buoy | | Ice buoy/float (POPS or ITP) |
| 99 | 99 | Moored buoy | | Mooring oceanographic |
| 100 | 100 | Moored buoy | | Mooring meteorological |
| 101 | 101 | Moored buoy | | Mooring multidisciplinary (OceanSITES) |
| 102 | 102 | Moored buoy | | Mooring tide gauge or tsunami buoy |
| 103 | 103 | Ice buoy | | Ice beacon |
| 104 | 104 | Ice buoy | | Ice mass balance buoy |

End of table

Table 33: platform_type

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

End of table

Table 34: processing_level (WIGOS Code Table 7-06)

| index | processing_level | name | description |
|---|---|---|---|
| 0 | 0 | Unknown | NA |
| 1 | 1 | Raw | NA |
| 2 | 2 | Level 0 | Analogue/digital electric signals |

Continued on next page

Table 34 processing_level (cont.)

| index | processing_level | name | description |
|---|---|---|---|
| 3 | 3 | Level I | Level I data (Primary Data): in general, are instrument readings expressed in appropriate physical units, and referred to Earth geographical coordinates. They require conversion to the normal meteorological variables (identified in Part I, Chapter 1). Level I data themselves are in many cases obtained from the processing of electrical signals such as voltages, referred to as raw data. Examples of these data are satellite radiances and water-vapour pressure, positions of constant-level balloons, etc. but not raw telemetry signals. Level I data still require conversion to the meteorological parameters specified in the data requirements. |
| 4 | 4 | Level II | Level II Data (Meteorological parameters). They may be obtained directly from many kinds of simple instruments, or derived from Level I data. For example, a sensor cannot measure visibility, which is a Level II quantity; instead, sensors measure the extinction coefficient, which is a Level I quantity. |
| 5 | 5 | Level III | Level III (Initial state parameters) are internally consistent data sets, generally in gridpoint form obtained from level II data by applying established initialization procedures. NOTE: Data exchanged internationally are level II or level III data. |
| 6 | 6 | Level IV | NA |

End of table

Table 35: product_level

| index | product_level | description |
|---|---|---|
| 0 | 2 | Data read from original data file |

End of table

Table 36: product_status

| index | product_status | description | extended_description |
|---|---|---|---|
| 0 | 1 | Data approved | Data exist, read from chache, PTU + altitude columns available, all GC25 tests ok, all uncertainties as expected |

End of table

Table 37: profile_configuration_codes

| index | 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_direction | 0 | 0 | Upwards profile | NA | NA |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 14 | 6 | profile_direction | 1 | 1 | Downwards profile | NA | NA |
| 15 | 6 | profile_direction | 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 27 | 14 | processing_code | 1 | HRC | Humidity radiation correction | NA | NA |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field number | field name | code value | abbreviation | description | start date | end date |
|---|---|---|---|---|---|---|---|
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 67 | 15 | radiosonde_sounding_system | 35 | 21 | VIZ/Jin Yang MARK I MI-CROSONDE (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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 LO-CATE Loran-C (United States) | 30/06/2007 | NULL |
| 102 | 15 | radiosonde _sounding _system | 70 | 39 | Sprenger E076 (Germany) | 01/01/1900 | 30/06/2007 |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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/ Digi-CORA MW41 (Finland) | 03/11/2011 | NULL |
| 108 | 15 | radiosonde_sounding_system | 76 | 42 | Sprenger E086 (Germany) | 01/01/1900 | 30/06/2007 |
| 109 | 15 | radiosonde_sounding_system | 77 | 42 | Vaisala RS41 with pressure derived from GPS height/ AU-TOSONDE (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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 Chang-wang 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 |
| 121 | 15 | radiosonde_sounding_system | 89 | 48 | VALCOM (Canada) | 02/05/2012 | NULL |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 133 | 15 | radiosonde_sounding_system | 101 | 54 | Not vacant | 30/06/2007 | NULL |
| 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 |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|-------|--------------|------------|------------|--------------|-------------|------------|----------|
| 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 |
| 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 |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 GP-Sonde M10 (France) | 15/03/2010 | NULL |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|-------|-------------|-----------|-----------|-------------|-------------|------------|----------|
| 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 37 profile_configuration_codes (cont.)

| index | 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/S-TAR (United States) with rod thermistor, carbon element and derived pressure | 07/11/2012 | NULL |
| 190 | 15 | radiosonde_sounding_system | 158 | 83 | Sippican MK2 GP-S/W9000 (United States) with rod thermistor, carbon element and derived pressure | 01/01/1900 | 30/06/2007 |

Table 37 profile_configuration_codes (cont.)

| index | 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 ca-pacitive pres-sure sensor, capacitive wire temper-ature sen-sor, twin thin-film heated polymer ca-pacitive rela-tive humidity sensor and RDF wind | 07/11/2012 | NULL |
| 192 | 15 | radiosonde _sounding _system | 160 | 84 | Sippican MARK II with chip thermis-tor, carbon element and derived pres-sure 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 |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 225 | 19 | radiosonde_g round_receiv ing_system | 0 | 0 | InterMet IMS 2000 | NA | NA |
| 226 | 19 | radiosonde_g round_receiv ing_system | 1 | 1 | InterMet IMS 1500C | NA | NA |
| 227 | 19 | radiosonde_g round_receiv ing_system | 2 | 2 | Shanghai GTC1 | NA | NA |
| 228 | 19 | radiosonde_g round_receiv ing_system | 3 | 3 | Nanjing GTC2 | NA | NA |
| 229 | 19 | radiosonde_g round_receiv ing_system | 4 | 4 | Nanjing GFE(L)1 | NA | NA |
| 230 | 19 | radiosonde_g round_receiv ing_system | 5 | 5 | MARL-A radar | NA | NA |
| 231 | 19 | radiosonde_g round_receiv ing_system | 6 | 6 | VEKTOR-M radar | NA | NA |
| 232 | 20 | radiosond e_type | NA | NA | Common code table C2 | NA | NA |
| 233 | 21 | reason_for_t ermination | NA | NA | Place holder | NA | NA |
| 234 | 22 | solar_and_infr ared_radiatio n_correction | 0 | 0 | No correction | NA | NA |
| 235 | 22 | solar_and_infr ared_radiatio n_correction | 1 | 1 | CIMO so- lar corrected and CIMO infrared cor- rected | NA | NA |
| 236 | 22 | solar_and_infr ared_radiatio n_correction | 2 | 2 | CIMO so- lar corrected and infrared corrected | NA | NA |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 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 |
| 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 |

Table 37 profile_configuration_codes (cont.)

| index | field number | field name | code value | abbreviation | description | start date | end date |
|---|---|---|---|---|---|---|---|
| 260 | 27 | type_of_mea suring_equip ment_used | 4 | 4 | VLF-Omega | NA | NA |
| 261 | 27 | type_of_mea suring_equip ment_used | 5 | 5 | Loran-C | NA | NA |
| 262 | 27 | type_of_mea suring_equip ment_used | 6 | 6 | Wind profiler | NA | NA |
| 263 | 27 | type_of_mea suring_equip ment_used | 7 | 7 | Satellite navigation | NA | NA |
| 264 | 27 | type_of_mea suring_equip ment_used | 8 | 8 | Radio-acoustic Sounding System (RASS) | NA | NA |
| 265 | 27 | type_of_mea suring_equip ment_used | 9 | 9 | Sodar | NA | NA |
| 266 | 27 | type_of_mea suring_equip ment_used | 10 | 14 | Pressure instrument associated with wind measuring equipment but pressure element failed during ascent | NA | NA |
| 267 | 27 | type_of_mea suring_equip ment_used | 11 | 15 | Missing value | NA | NA |
| 268 | 27 | type_of_mea suring_equip ment_used | 12 | 10 - 13 | Reserved | NA | NA |
| 269 | 28 | type_of_pres sure_sensor | 0 | 0 | Capacitance aneroid | NA | NA |

Continued on next page

Table 37 profile_configuration_codes (cont.)

| index | field_number | field_name | code_value | abbreviation | description | start_date | end_date |
|---|---|---|---|---|---|---|---|
| 270 | 28 | type_of_pres sure_sensor | 1 | 1 | Derived from GPS | NA | NA |
| 271 | 28 | type_of_pres sure_sensor | 2 | 2 | Resistive strain gauge | NA | NA |
| 272 | 28 | type_of_pres sure_sensor | 3 | 3 | Silicon ca- pacitor | NA | NA |
| 273 | 28 | type_of_pres sure_sensor | 4 | 4 | Derived from radar height | NA | NA |
| 274 | 29 | unwinde r_type | NA | NA | STRING | NA | NA |
| 275 | 30 | water_temper ature_profile_r ecorder_type | NA | NA | Place holder / TBD (check BUFR tables) | NA | NA |
| 276 | 31 | XBT_launc her_type | NA | NA | Place holder / TBD (check BUFR tables) | NA | NA |

End of table

Table 38: profile_configuration_fields

| index | field | field_name | type | description |
|---|---|---|---|---|
| 0 | 1 | balloon_manufacturer | int (fk) | NA |
| 1 | 2 | balloon_type | int (fk) | NA |
| 2 | 3 | burstpoint_altitude | numeric | NA |
| 3 | 4 | burstpoint_pressure | numeric | NA |
| 4 | 5 | humidity_correctio n_algorithm | int (fk) | NA |
| 5 | 6 | profile_direction | int (fk) | NA |
| 6 | 7 | filling_weight | numeric | NA |
| 7 | 8 | geopotential_heig ht_calculation | int(fk) | NA |
| 8 | 9 | gross_weight | numeric | NA |
| 9 | 10 | include_descent | numeric | NA |
| 10 | 11 | instrument_type_fo r_water_temperatur e_salinity_profile | int (fk) | NA |
| 11 | 12 | method_of_depth_ calculation | int (fk) | NA |
| 12 | 13 | payload | numeric | NA |
| 13 | 14 | processing_code | int (fk) | NA |
| 14 | 15 | radiosonde_soun ding_system | int (fk) | NA |
| 15 | 16 | radiosonde_com pleteness | int(fk) | NA |
| 16 | 17 | radiosonde_compu tational_method | int(fk) | NA |
| 17 | 18 | radiosonde_con figuration | int(fk) | NA |
| 18 | 19 | radiosonde_ground_ receiving_system | int(fk) | NA |
| 19 | 20 | radiosonde_type | int(fk) | See WMO3685 |
| 20 | 21 | reason_for_termination | int(fk) | NA |
| 21 | 22 | solar_and_infrared_ra diation_correction | int(fk) | NA |
| 22 | 23 | tracking_technique | int(fk) | NA |
| 23 | 24 | type_of_balloon | int(fk) | NA |
| 24 | 25 | type_of_balloonshelter | int(fk) | NA |

Continued on next page

Table 38 profile_configuration_fields (cont.)

| index | field | field_name | type | description |
|---|---|---|---|---|
| 25 | 26 | type_of_gasuse dinballoon | int(fk) | NA |
| 26 | 27 | type_of_measuring_ equipmentused | int(fk) | NA |
| 27 | 28 | type_of_pressur e_sensor | int(fk) | NA |
| 28 | 29 | unwinder_type | int(fk) | NA |
| 29 | 30 | water_temperature_p rofile_recorder_type | int(fk) | NA |
| 30 | 31 | XBT_launcher_type | int(fk) | XBT / XCTD launcher type |

End of table

Table 39: quality_flag (BUFR Code Table 0 33 020)

| index | quality_flag | description |
|---|---|---|
| 0 | 0 | Good |
| 1 | 1 | Inconsistent |
| 2 | 2 | Doubtful |
| 3 | 3 | Wrong |
| 4 | 4 | Not checked |
| 5 | 5 | Has been changed |
| 6 | 6 | Estimated |
| 7 | 7 | Missing value |

End of table

Table 40: region (WIGOS Code Table 3-01)

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

End of table

Table 41: report_processing_codes

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

End of table

Table 42: report_processing_level

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

End of table

Table 43: report_type

| index | report_type | abbreviation | description |
|---|---|---|---|
| 0 | 0 | SYNOP | NA |
| 1 | 1 | TEMP | NA |
| 2 | 2 | CLIMAT | NA |
| | | | End of table |

Table 44: sampling_strategy (WIGOS Code Table 6-03)

| index | sampling_strategy | description |
|---|---|---|
| 0 | 1 | Continuous |
| 1 | 2 | Discrete |
| 2 | 3 | Event |
| | | End of table |

Table 45: sea_level_datum (BUFR Code Table 0 01 151)

| index | sea_level_datum | description |
|---|---|---|
| 0 | 0 | Earth Gravitational Model 1996 |
| 1 | 1 | Baltic height system 1977 |
| | | End of table |

Table 46: sensor_configuration_codes

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 0 | 0 | ice bulb status | humidity | 0 | Ice bulb |
| 1 | 0 | ice bulb status | humidity | 1 | Wet bulb |
| 2 | 1 | sensor housing - configuration | all | 0 | Double v section louvers |
| 3 | 1 | sensor housing - configuration | all | 1 | non-overlapping louvers |
| 4 | 1 | sensor housing - configuration | all | 2 | Not applicable |
| 5 | 1 | sensor housing - configuration | all | 3 | Overlapping louvers |
| 6 | 1 | sensor housing - configuration | all | 4 | single v-section louvers |
| 7 | 1 | sensor housing - configuration | all | 5 | vented, non-louvered |
| 8 | 2 | sensor housing - heating | all | 0 | Heated |
| 9 | 2 | sensor housing - heating | all | 1 | Unheated |
| 10 | 3 | sensor housing - material | all | 0 | Metal alloy |
| 11 | 3 | sensor housing - material | all | 1 | Plastic / Glass reinforced plastic |
| 12 | 3 | sensor housing - material | all | 2 | Reed / grass / leaf |
| 13 | 3 | sensor housing - material | all | 3 | Wood |
| 14 | 4 | sensor housing - radiation shielding | all | 0 | Concentric tube |
| 15 | 4 | sensor housing - radiation shielding | all | 1 | Cylindrical section plate shield |
| 16 | 4 | sensor housing - radiation shielding | all | 2 | Integrated (e.g. chilled mirror) |
| 17 | 4 | sensor housing - radiation shielding | all | 3 | Marine Stevenson screen |
| 18 | 4 | sensor housing - radiation shielding | all | 4 | Open covered inverted V roof |

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 19 | 4 | sensor housing - radiation shielding | all | 5 | open covered lean-to |
| 20 | 4 | sensor housing - radiation shielding | all | 6 | Rectangular section section |
| 21 | 4 | sensor housing - radiation shielding | all | 7 | Square section shield |
| 22 | 4 | sensor housing - radiation shielding | all | 8 | Stevenson screen |
| 23 | 4 | sensor housing - radiation shielding | all | 9 | Triangular section shield |
| 24 | 5 | sensor housing - type | all | 0 | Aspirated (e.g. Assmann) |
| 25 | 5 | sensor housing - type | all | 1 | Hand-held digital temperature/humidity sensor |
| 26 | 5 | sensor housing - type | all | 2 | Other shelter |
| 27 | 5 | sensor housing - type | all | 3 | Radiation Shield (e.g. cylindrical / Gill multi-plate radiation shield) |
| 28 | 5 | sensor housing - type | all | 4 | Screen |
| 29 | 5 | sensor housing - type | all | 5 | Sling / whirling |
| 30 | 5 | sensor housing - type | all | 6 | Unscreened. |
| 31 | 6 | sensor housing - ventilation | all | 0 | Artificial aspiration in use, constant flow at time of reading |
| 32 | 6 | sensor housing - ventilation | all | 1 | Artificial aspiration in use, variable flow at time of reading |
| 33 | 6 | sensor housing - ventilation | all | 2 | Natural ventilation in use |
| 34 | 8 | sensor location - ship | all | 0 | Aft mast. |
| 35 | 8 | sensor location - ship | all | 1 | Bridge wing |
| 36 | 8 | sensor location - ship | all | 2 | Foremast yardarm |

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 37 | 8 | sensor location - ship | all | 3 | Foremast. |
| 38 | 8 | sensor location - ship | all | 4 | Handheld. |
| 39 | 8 | sensor location - ship | all | 5 | Main deck |
| 40 | 8 | sensor location - ship | all | 6 | Mainmast yardarm |
| 41 | 8 | sensor location - ship | all | 7 | Mainmast. |
| 42 | 8 | sensor location - ship | all | 8 | Mast on wheelhouse top yardarm |
| 43 | 8 | sensor location - ship | all | 9 | Mast on wheelhouse top. |
| 44 | 8 | sensor location - ship | all | 10 | Meteorological mast. |
| 45 | 8 | sensor location - ship | all | 11 | Not fitted. |
| 46 | 8 | sensor location - ship | all | 12 | Other |
| 47 | 8 | sensor location - ship | all | 13 | Pressurised wheelhouse (closed and not vented to the outside). |
| 48 | 8 | sensor location - ship | all | 14 | Wheelhouse |
| 49 | 8 | sensor location - ship | all | 15 | Wheelhouse, not pressurised (vented to the outside). |
| 50 | 9 | sensor side - ship | all | 0 | Center |
| 51 | 9 | sensor side - ship | all | 1 | Port |
| 52 | 9 | sensor side - ship | all | 2 | Starboard |
| 53 | 9 | sensor side - ship | all | 3 | Windward side |
| 54 | 10 | sensor owner | all | 0 | National hydrometeorological / weather service |
| 55 | 10 | sensor owner | all | 1 | Other |
| 56 | 10 | sensor owner | all | 2 | Standards institute |
| 57 | 11 | sensor type - air temperature | air temperature | 0 | Alcohol / glycol |
| 58 | 11 | sensor type - air temperature | air temperature | 1 | Bead thermistor |

Continued on next page

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 59 | 11 | sensor type - air temperature | air temperature | 2 | Capacitance bead |
| 60 | 11 | sensor type - air temperature | air temperature | 3 | Capacitance wire |
| 61 | 11 | sensor type - air temperature | air temperature | 4 | Chip thermistor |
| 62 | 11 | sensor type - air temperature | air temperature | 5 | Mercury |
| 63 | 11 | sensor type - air temperature | air temperature | 6 | Resistive sensor |
| 64 | 11 | sensor type - air temperature | air temperature | 7 | Rod thermistor |
| 65 | 12 | sensor type - barograph | pressure trend | 0 | Open Scale barograph with 1 day clock. |
| 66 | 12 | sensor type - barograph | pressure trend | 1 | Open Scale barograph with 2 day clock. |
| 67 | 12 | sensor type - barograph | pressure trend | 2 | Open Scale barograph with 3 day clock. |
| 68 | 12 | sensor type - barograph | pressure trend | 3 | Open Scale barograph with 4 day clock. |
| 69 | 12 | sensor type - barograph | pressure trend | 4 | Open Scale barograph with 5 day clock. |
| 70 | 12 | sensor type - barograph | pressure trend | 5 | Open Scale barograph with 6 day clock. |
| 71 | 12 | sensor type - barograph | pressure trend | 6 | Open Scale barograph with 7 day clock. |
| 72 | 12 | sensor type - barograph | pressure trend | 7 | Open Scale barograph with 8 day clock. |
| 73 | 12 | sensor type - barograph | pressure trend | 8 | Open Scale barograph with 9 day clock. |
| 74 | 12 | sensor type - barograph | pressure trend | 9 | Open Scale barograph. |
| 75 | 12 | sensor type - barograph | pressure trend | 10 | Other (specify in footnote). |
| 76 | 12 | sensor type - barograph | pressure trend | 11 | Small Scale barograph. |

Continued on next page

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 77 | 12 | sensor type - barograph | pressure trend | 12 | Tendency obtained from an electronic digital barometer. |
| 78 | 13 | sensor type - barometer | pressure | 0 | Aneroid barometer (issued by the PMO or a NMS). |
| 79 | 13 | sensor type - barometer | pressure | 1 | Digital aneroid barometer (aka Precision Aneroid Barometer). |
| 80 | 13 | sensor type - barometer | pressure | 2 | Electronic digital barometer (consisting of one or more pressure transducers). |
| 81 | 13 | sensor type - barometer | pressure | 3 | Mercury barometer. |
| 82 | 13 | sensor type - barometer | pressure | 4 | Other |
| 83 | 13 | sensor type - barometer | pressure | 5 | Ship's aneroid barometer. |
| 84 | 14 | sensor type - evaporation | evaporation | NA | placeholder |
| 85 | 15 | sensor type - extremes | air temperature | 0 | Automated instruments |
| 86 | 15 | sensor type - extremes | air temperature | 1 | Maximum / minimum thermometers |
| 87 | 15 | sensor type - extremes | air temperature | 2 | Reserved |
| 88 | 15 | sensor type - extremes | air temperature | 3 | Thermograph |
| 89 | 16 | sensor type - humidity | humidity | 0 | Capacitive (ceramic, including metal oxide) |
| 90 | 16 | sensor type - humidity | humidity | 1 | Capacitive (generic) |
| 91 | 16 | sensor type - humidity | humidity | 2 | Capacitive (polymer) |
| 92 | 16 | sensor type - humidity | humidity | 3 | Carbon hygristor |
| 93 | 16 | sensor type - humidity | humidity | 4 | chilled mirror hygrometer |
| 94 | 16 | sensor type - humidity | humidity | 5 | dew cell |

Continued on next page

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 95 | 16 | sensor type - humidity | humidity | 6 | Electric. |
| 96 | 16 | sensor type - humidity | humidity | 7 | Goldbeater's skin |
| 97 | 16 | sensor type - humidity | humidity | 8 | Gravimetric |
| 98 | 16 | sensor type - humidity | humidity | 9 | Hair hygrometer. |
| 99 | 16 | sensor type - humidity | humidity | 10 | Humicap capacitance sensor with active de-icing method |
| 100 | 16 | sensor type - humidity | humidity | 11 | Hygristor. |
| 101 | 16 | sensor type - humidity | humidity | 12 | optical absorption sensor |
| 102 | 16 | sensor type - humidity | humidity | 13 | Ordinary human hair |
| 103 | 16 | sensor type - humidity | humidity | 14 | Other |
| 104 | 16 | sensor type - humidity | humidity | 15 | Paper - metal coil |
| 105 | 16 | sensor type - humidity | humidity | 16 | Psychrometer. |
| 106 | 16 | sensor type - humidity | humidity | 17 | Resistive (conductive polymer) |
| 107 | 16 | sensor type - humidity | humidity | 18 | Resistive (generic) |
| 108 | 16 | sensor type - humidity | humidity | 19 | Resistive (salt polymer) |
| 109 | 16 | sensor type - humidity | humidity | 20 | Rolled hair (torsion) |
| 110 | 16 | sensor type - humidity | humidity | 21 | Sippican Mark IIA carbon hygristor |
| 111 | 16 | sensor type - humidity | humidity | 22 | Thermal conductivity |
| 112 | 16 | sensor type - humidity | humidity | 23 | Twin alternatively heated Humi-cap capacitance sensor |

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 113 | 16 | sensor type - humidity | humidity | 24 | Vaisala A-Humicap |
| 114 | 16 | sensor type - humidity | humidity | 25 | Vaisala H-Humicap |
| 115 | 16 | sensor type - humidity | humidity | 26 | Vaisala RS90 |
| 116 | 16 | sensor type - humidity | humidity | 27 | VIZ B2 hygristor |
| 117 | 16 | sensor type - humidity | humidity | 28 | VIZ Mark II carbon hygristor |
| 118 | 17 | sensor type - precipitation | precipitation | NA | Place holder |
| 119 | 18 | sensor type - present weather | present weather | 0 | Automatic, included (using WMO Codes 4677 and 4561) |
| 120 | 18 | sensor type - present weather | present weather | 1 | Automatic, included (using WMO codes 4680 amd 4531) |
| 121 | 18 | sensor type - present weather | present weather | 2 | Automatic, omitted (no observation, data not available) |
| 122 | 18 | sensor type - present weather | present weather | 3 | Automatic, omitted (no significant phenomenon to report) |
| 123 | 18 | sensor type - present weather | present weather | 4 | Manned, included |
| 124 | 18 | sensor type - present weather | present weather | 5 | Manned, omitted (no observation, data not available) |
| 125 | 18 | sensor type - present weather | present weather | 6 | Manned, omitted (no significant phenomenon to report) |
| 126 | 19 | sensor type - salinity | salinity | 0 | in situ, accuracy better han 0.02 ppt |
| 127 | 19 | sensor type - salinity | salinity | 1 | in situ, accuracy worse than 0.02 ppt |
| 128 | 19 | sensor type - salinity | salinity | 2 | No salinity |
| 129 | 19 | sensor type - salinity | salinity | 3 | sample analysis |
| 130 | 20 | sensor type - water temperature | water temperature | 0 | Bait tanks thermometer. |

Continued on next page

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 131 | 20 | sensor type - water temperature | water temperature | 1 | Bucket |
| 132 | 20 | sensor type - water temperature | water temperature | 2 | Condensor Intake on Steam Ships, or Engine Cooling System Inlet on Motor Ships. |
| 133 | 20 | sensor type - water temperature | water temperature | 3 | Digital BT |
| 134 | 20 | sensor type - water temperature | water temperature | 4 | electronic sensor |
| 135 | 20 | sensor type - water temperature | water temperature | 5 | Expendable BT |
| 136 | 20 | sensor type - water temperature | water temperature | 6 | Hull contact sensor |
| 137 | 20 | sensor type - water temperature | water temperature | 7 | [implied bucket [note: applicable to early ICOADS data] |
| 138 | 20 | sensor type - water temperature | water temperature | 8 | In-line thermosalinograph |
| 139 | 20 | sensor type - water temperature | water temperature | 9 | Infrared radiometer |
| 140 | 20 | sensor type - water temperature | water temperature | 10 | Infrared scanner |
| 141 | 20 | sensor type - water temperature | water temperature | 11 | Mechanical BT |
| 142 | 20 | sensor type - water temperature | water temperature | 12 | Microwave scanner |
| 143 | 20 | sensor type - water temperature | water temperature | 13 | Other |
| 144 | 20 | sensor type - water temperature | water temperature | 14 | Radiation thermometer. |
| 145 | 20 | sensor type - water temperature | water temperature | 15 | Reversing thermometer |
| 146 | 20 | sensor type - water temperature | water temperature | 16 | reversing thermometer or mechanical sensor |
| 147 | 20 | sensor type - water temperature | water temperature | 17 | STD / CTD sensor |
| 148 | 20 | sensor type - water temperature | water temperature | 18 | Thermistor Chain |

Continued on next page

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 149 | 20 | sensor type - water temperature | water temperature | 19 | Through Hull sensor. |
| 150 | 20 | sensor type - water temperature | water temperature | 20 | Towed body |
| 151 | 20 | sensor type - water temperature | water temperature | 21 | Trailing thermistor |
| 152 | 20 | sensor type - water temperature | water temperature | 22 | unknown or non-bucket |
| 153 | 21 | sensor type - waves | waves | 0 | buoy |
| 154 | 21 | sensor type - waves | waves | 1 | other |
| 155 | 21 | sensor type - waves | waves | 2 | shipborne wave recorder |
| 156 | 22 | sensor type - wind speed | wind speed | 0 | Anemograph. |
| 157 | 22 | sensor type - wind speed | wind speed | 1 | Anemometer - type unspecified |
| 158 | 22 | sensor type - wind speed | wind speed | 2 | Beaufort force |
| 159 | 22 | sensor type - wind speed | wind speed | 3 | Cup anemometer and wind vane (combined unit). |
| 160 | 22 | sensor type - wind speed | wind speed | 4 | Cup anemometer and wind vane (separate instruments). |
| 161 | 22 | sensor type - wind speed | wind speed | 5 | Cup rotor |
| 162 | 22 | sensor type - wind speed | wind speed | 6 | Handheld anemometer. |
| 163 | 22 | sensor type - wind speed | wind speed | 7 | Other (specify in footnote). |
| 164 | 22 | sensor type - wind speed | wind speed | 8 | Propeller rotor |
| 165 | 22 | sensor type - wind speed | wind speed | 9 | Propeller vane. |
| 166 | 22 | sensor type - wind speed | wind speed | 10 | Sonic anemometer. |

Table 46 sensor_configuration_codes (cont.)

| index | field | field_name | parameter | code_value | description |
|---|---|---|---|---|---|
| 167 | 22 | sensor type - wind speed | wind speed | 11 | Wind observation through ambiant noise (WOTAN) |
| 168 | 27 | telemetry_sonde | sonde | | NA |
| 169 | 29 | manufacturer | all | 0 | Vaisala |

End of table

Table 47: sensor_configuration_fields

| index | field | field_name | parameter | type | decription |
|-------|-------|------------|-----------|------|------------|
| 0 | 0 | ice bulb status | humidity | int (fk) | NA |
| 1 | 1 | sensor housing - configuration | all | int (fk) | NA |
| 2 | 2 | sensor housing - heating | all | int (fk) | NA |
| 3 | 3 | sensor housing - material | all | int (fk) | NA |
| 4 | 4 | sensor housing - radiation shielding | all | int (fk) | NA |
| 5 | 5 | sensor housing - type | all | int (fk) | NA |
| 6 | 6 | sensor housing - ventilation | all | int (fk) | NA |
| 7 | 7 | sensor housing - ventilation rate | all | numeric | NA |
| 8 | 8 | sensor location - ship | all | int (fk) | NA |
| 9 | 9 | sensor side - ship | all | int (fk) | NA |
| 10 | 10 | sensor owner | all | int (fk) | NA |
| 11 | 11 | sensor type - air temperature | air temperature | int (fk) | NA |
| 12 | 12 | sensor type - barograph | pressure trend | int (fk) | NA |
| 13 | 13 | sensor type - barometer | pressure | int (fk) | NA |
| 14 | 14 | sensor type - evaporation | evaporation | int (fk) | NA |
| 15 | 15 | sensor type - extremes | air temperature | int (fk) | NA |
| 16 | 16 | sensor type - humidity | humidity | int (fk) | NA |
| 17 | 17 | sensor type - precipitation | precipitation | int (fk) | NA |
| 18 | 18 | sensor type - present weather | present weather | int (fk) | NA |

Table 47 sensor_configuration_fields (cont.)

| index | field | field name | parameter | type | decription |
|---|---|---|---|---|---|
| 19 | 19 | sensor type - salinity | salinity | int (fk) | NA |
| 20 | 20 | sensor type - water temperature | water temperature | int (fk) | NA |
| 21 | 21 | sensor type - waves | waves | int (fk) | NA |
| 22 | 22 | sensor type - wind speed | wind speed | int (fk) | NA |
| 23 | 23 | sensor location - distance from bow | wind speed | numeric | NA |
| 24 | 24 | sensor location - distance from center line | wind speed | numeric | NA |
| 25 | 25 | sensor location - height above deck | wind speed | numeric | NA |
| 26 | 26 | weight | sonde | numeric | NA |
| 27 | 27 | telemetry_sonde | sonde | int (fk) | NA |
| 28 | 28 | software_version | all | varchar | NA |
| 29 | 29 | manufacturer | all | int(fk) | NA |
| 30 | 30 | sensor model | all | varchar | NA |
| 31 | 31 | serial number | all | varchar | NA |
| 32 | 32 | sensor accuracy | all | numeric | Reported accuracy of sensor in units of measurement. |
| 33 | 33 | sensor stability | all | numeric | Reported stability of sensor in reported units of measurement per year. |
| 34 | 34 | calibration interval | all | numeric | Maximum number of months recom- mended between calibrations. |
| 35 | 35 | calibration method | all | int(fk) TDB | Method used to calibrate instrument |
| 36 | 36 | calibration party | all | varchar | Who performed the calibration |
| 37 | 37 | calibration result | all | varchar TBD | Result of the calibration |
| 38 | 38 | sensor range - min | all | numeric | Minimum observable value with sensor in reported units of measurement |
| 39 | 39 | sensor range - max | all | numeric | Maximum observable value with sensor in reported units of measurement |
| 40 | 40 | sensor re- sponse time | all | numeric | Time (s) for sensor to chnage from previous state to current state |

Continued on next page

Table 47 sensor_configuration_fields (cont.)

| index | field | field name | parameter | type | decription |
|---|---|---|---|---|---|
| 41 | 41 | sensor resolution | all | numeric | NA |
| 42 | 42 | sampling frequency | all | numeric | time period (s) between successive measurements from sensor |
| 43 | 43 | sample treatment | all | TBD | treatment of the sample prior to analysis |
| 44 | 44 | sampling procedure | all | TBD | how the sample was obtained |
| 45 | 45 | quality control procedure | all | int (fk) | Procedure used to quality control the observation and set quality flag |

End of table

Table 48: source_configuration_codes

| index | field | field_name | code_value | description | extended_description |
|---|---|---|---|---|---|
| 0 | 0 | delayed mode format | 0 | IMMT version just prior to version number being included | NA |
| 1 | 0 | delayed mode format | 1 | IMMT-1 (in effect from 2 Nov. 1994) | NA |
| 2 | 0 | delayed mode format | 2 | IMMT-2 (in effect from Jan. 2003) | NA |
| 3 | 0 | delayed mode format | 3 | IMMT-3 (in effect from Jan. 2007) | NA |
| 4 | 0 | delayed mode format | 4 | IMMT-4 (in effect from Jan. 2011) | NA |
| 5 | 0 | delayed mode format | 5 | IMMT-5 (in effect from June 2012) | NA |
| 6 | 1 | metadata source | 0 | COAPS | NA |
| 7 | 1 | metadata source | 1 | WMO Publication 47 | NA |
| 8 | 2 | metadata source format | 1 | Output from digitisation project, semi-colon delimited format (1955) | NA |
| 9 | 2 | metadata source format | 2 | Output from digitisation project, semi-colon delimited format (1956) | NA |
| 10 | 2 | metadata source format | 3 | Output from digitisation project, semi-colon delimited format (1957 - 1967) | NA |
| 11 | 2 | metadata source format | 4 | Output from digitisation project, semi-colon delimited format (1968 - 1969) | NA |

Continued on next page

Table 48 source_configuration_codes (cont.)

| index | field | field_name | code_value | description | extended_description |
|---|---|---|---|---|---|
| 12 | 2 | metadata source format | 5 | Fixed format (1970 - 1004) | NA |
| 13 | 2 | metadata source format | 6 | Semi-colon de-limited format (1995 - 2001) | NA |
| 14 | 2 | metadata source format | 7 | Semi-colon delim-ited format (2002 - 2007 q1) | NA |
| 15 | 2 | metadata source format | 8 | Semi-colon de-limited format (2007 - 2008) | NA |
| 16 | 2 | metadata source format | 9 | Semi-colon de-limited format (2009 - 2014) | NA |
| 17 | 3 | observation source type | 0 | unknown | NA |
| 18 | 3 | observation source type | 1 | delayed mode - logbook (paper) | NA |
| 19 | 3 | observation source type | 2 | real time - national telecommunica-tion channels | NA |
| 20 | 3 | observation source type | 3 | delayed mode - na-tional publications | NA |
| 21 | 3 | observation source type | 4 | delayed mode - logbook (elec-tronic) | NA |
| 22 | 3 | observation source type | 5 | real time - global telecommunication system (GTS) | NA |
| 23 | 3 | observation source type | 6 | delayed mode - International publications | NA |
| 24 | 4 | real time format | 0 | previous to FM24-V | NA |
| 25 | 4 | real time format | 1 | FM 24-V | NA |
| 26 | 4 | real time format | 2 | FM 24-VI Ext. | NA |
| 27 | 4 | real time format | 3 | FM 13-VII | NA |

Continued on next page

Table 48 source_configuration_codes (cont.)

| index | field | field_name | code_value | description | extended_description |
|---|---|---|---|---|---|
| 28 | 4 | real time format | 4 | FM 13-VIII | NA |
| 29 | 4 | real time format | 5 | FM 13-VIII Ext. | NA |
| 30 | 4 | real time format | 6 | FM 12-IX | NA |
| 31 | 4 | real time format | 7 | FM 13-IX Ext. | NA |
| 32 | 4 | real time format | 8 | FM 13-X | NA |
| 33 | 4 | real time format | 9 | FM 13-XI | NA |
| 34 | 4 | real time format | 10 | FM 13-XII Ext. | NA |
| 35 | 4 | real time format | 11 | FM 13-XIII | NA |
| 36 | 4 | real time format | 12 | FM 13-XIV Ext. | NA |
| 37 | 5 | source format | 0 | IMMA - Version 0 | NA |
| 38 | 5 | source format | 1 | IMMA - Version 1 | NA |
| 39 | 6 | icoads source deck | NA | See ICOADS Source Deck | NA |
| 40 | 7 | icoads source id | NA | See ICOADS Source ID | NA |
| 41 | 8 | product level | 2 | Data read from original data file | NA |
| 42 | 9 | product status | 1 | Data approved | Data exist, read from chache, PTU + altitude columns available, all GC25 tests ok, all uncertainties as expected |

End of table

Table 49: source_configuration_fields

| index | field | field_name | kind | description |
|-------|-------|------------|------|-------------|
| 0 | 0 | delayed mode format | int (fk) | NA |
| 1 | 1 | metadata source | int (fk) | NA |
| 2 | 2 | metadata source format | int (fk) | NA |
| 3 | 3 | observation source type | int (fk) | NA |
| 4 | 4 | real time format | int (fk) | NA |
| 5 | 5 | source format | int (fk) | NA |
| 6 | 6 | source deck | int (fk) | NA |
| 7 | 7 | source id | int (fk) | NA |
| 10 | 10 | product original time resolution | numeric | NA |

End of table

Table 50: source_format

| index | source_format | description |
|---|---|---|
| 0 | 0 | IMMA |
| 1 | 1 | NetCDF (GRUAN) |
| 2 | 2 | NetCDF (Other) |
| 3 | 3 | CSV |

End of table

Table 51: spatial_representativeness

| index | spatial_representativeness | description |
|---|---|---|
| 0 | 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 | 1 | Microscale - An area or volume less than 100 m horizontal extent (for example, evaporation) |
| 2 | 2 | Toposcale, local scale - An area or volume of 100 m to 3 km horizontal extent (for example, air pollution, tornadoes) |
| 3 | 3 | Mesoscale - An area or volume of 3 km to 100 km horizontal extent (for example, thunderstorms, sea and mountain breezes) |
| 4 | 4 | Large scale- An area or volume of 100 km to 3000 km horizontal extent (for example, fronts, various cyclones, cloud clusters) |
| 5 | 5 | Planetary scale - An area or volume of more than 3000 km horizontal extent (for example, long upper tropospheric waves) |
| 6 | 6 | Drainage area - An area (also known as catchment) having a common outlet for its surface runoff, in km2 |

End of table

Table 52: station_configuration_codes

| index | field | field_name | code_value | abbreviation | description |
|---|---|---|---|---|---|
| 0 | 0 | AWS Entry and Display Software | | | TBD |
| 1 | 1 | AWS Entry and Display Software Version | | | TBD |
| 2 | 2 | AWS Model | | | TBD |
| 3 | 3 | AWS Model Version | | | TBD |
| 4 | 4 | AWS Software | | | TBD |
| 5 | 5 | AWS Software version | | | TBD |
| 6 | 9 | Drogue type | NA | | See BUFR code table 0 02 034 |
| 12 | 11 | Lagrangian drifter drogue status | NA | | See BUFR code table 0 22 060 |
| 15 | 11 | LogBook software and version | | | TBD |
| 16 | 16 | Other instruments | 0 | BAT | Bathythermometer. |
| 17 | 16 | Other instruments | 1 | BT | Bathythermograph (towed). |
| 18 | 16 | Other instruments | 2 | FLM | Fluorometer. |
| 19 | 16 | Other instruments | 3 | LWR | Long wave radiation. |
| 20 | 16 | Other instruments | 4 | MAX | Maximum thermometer. |
| 21 | 16 | Other instruments | 5 | MIN | Minimum thermometer. |
| 22 | 16 | Other instruments | 6 | NTE | Nitrate sensor. |
| 23 | 16 | Other instruments | 7 | NTT | Nutrient sensor. |
| 24 | 16 | Other instruments | 8 | P | Pilot balloon equipment. |
| 25 | 16 | Other instruments | 9 | CO2 | pCO2 system. |
| 26 | 16 | Other instruments | 10 | PLK | Plankton recorder. |
| 27 | 16 | Other instruments | 11 | PRS | Photosynthetic radiation sensor. |
| 28 | 16 | Other instruments | 12 | PYG | Pyrogeometer. |
| 29 | 16 | Other instruments | 13 | R | Radiosonde equipment. |
| 30 | 16 | Other instruments | 14 | RG | Rain gauge. |
| 31 | 16 | Other instruments | 15 | RSD | Radar storm and meteorological phenomena detection. |
| 32 | 16 | Other instruments | 16 | RT | Reversing thermometer. |
| 33 | 16 | Other instruments | 17 | SKY | Sky camera. |

Continued on next page

Table 52 station_configuration_codes (cont.)

| index | field | field_name | code_value | abbreviation | description |
|---|---|---|---|---|---|
| 34 | 16 | Other instruments | 18 | SLM | Solarimeter. |
| 35 | 16 | Other instruments | 19 | ST | Sea thermograph. |
| 36 | 16 | Other instruments | 20 | SWR | Short wave radiation. |
| 37 | 16 | Other instruments | 21 | TSD | Temperature/salinity/depth probe. |
| 38 | 16 | Other instruments | 22 | TUR | Turbidity sensor. |
| 39 | 16 | Other instruments | 23 | W | Radiowind or radarwind equipment. |
| 40 | 16 | Other instruments | 24 | WR | Wave Recorder |
| 41 | 16 | Other instruments | 25 | XBT | Expendable bathythermograph. |
| 42 | 16 | Other instruments | 26 | OT | Other (specify in footnote). |
| 43 | 17 | Station status | 1 | | Planned |
| 44 | 17 | Station status | 2 | | Pre-operational |
| 45 | 17 | Station status | 3 | | Operational / Reporting |
| 46 | 17 | Station status | 4 | | Partly reporting |
| 47 | 17 | Station status | 5 | | Temporarily suspended |
| 48 | 17 | Station status | 6 | | Closed |
| 49 | 18 | Type of meteorological reporting ship | 0 | 70 | Auxiliary ship |
| 50 | 18 | Type of meteorological reporting ship | 1 | 75 | Auxiliary ship (AWS) |
| 51 | 18 | Type of meteorological reporting ship | 2 | 10 | Selected |
| 52 | 18 | Type of meteorological reporting ship | 3 | 15 | Selected (AWS) |
| 53 | 18 | Type of meteorological reporting ship | 4 | 40 | Supplementary |
| 54 | 18 | Type of meteorological reporting ship | 5 | 45 | Supplementary (AWS) |
| 55 | 18 | Type of meteorological reporting ship | 6 | 80 | Third party |

Continued on next page

Table 52 station_configuration_codes (cont.)

| index | field | field_name | code_value | abbreviation | description |
|---|---|---|---|---|---|
| 56 | 18 | Type of meteorological reporting ship | 7 | 85 | Third party (AWS) |
| 57 | 18 | Type of meteorological reporting ship | 8 | 99 | Unknown |
| 58 | 18 | Type of meteorological reporting ship | 9 | 30 | VOSClim - VOS Climate |
| 59 | 18 | Type of meteorological reporting ship | 10 | 35 | VOSClim (AWS) - VOS Climate (AWS) |
| | | | | | End of table |

Table 53: station_configuration_fields

| index | field | field_name | kind | description |
|---|---|---|---|---|
| 0 | 0 | AWS Entry and Display Software | int (fk) | NA |
| 1 | 1 | AWS Entry and Display Software Version | int (fk) | NA |
| 2 | 2 | AWS Model | int (fk) | NA |
| 3 | 3 | AWS Model Version | int (fk) | NA |
| 4 | 4 | AWS Software | int (fk) | NA |
| 5 | 5 | AWS Software version | int (fk) | NA |
| 6 | 6 | Cargo height | numeric | NA |
| 7 | 7 | Distance of bridge from bow | numeric | NA |
| 8 | 8 | Draught | numeric | NA |
| 9 | 9 | Drogue type | int (fk) | NA |
| 10 | 10 | Freeboard | numeric | NA |
| 11 | 11 | Lagrangian drifter drogue status | int (fk) | NA |
| 12 | 12 | Length overall of the ship, ignoring bulbous bow | numeric | NA |
| 13 | 13 | LogBook software and version | int (fk) | NA |
| 14 | 14 | Maximum operating speed on normal service | numeric | NA |
| 15 | 15 | Moulded breadth | numeric | NA |
| 16 | 16 | Other instruments | int (fk) | NA |
| 17 | 17 | Station status | int (fk) | NA |
| 18 | 18 | Type of meteorological reporting ship | int (fk) | NA |

End of table

Table 54: station_type

| index | station_type | description |
|---|---|---|
| 0 | 1 | Land station |
| 1 | 2 | Sea station |
| 2 | 3 | Aircraft |
| 3 | 4 | Satellite |
| 4 | 5 | Underwater platform |

End of table

Table 55: sub_region

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 0 | 0 | country | AD | ANDORRA |
| 1 | 1 | country | AE | UNITED ARAB EMIRATES |
| 2 | 2 | country | AF | AFGHANISTAN |
| 3 | 3 | country | AG | ANTIGUA AND BARBUDA |
| 4 | 4 | country | AI | ANGUILLA |
| 5 | 5 | country | AL | ALBANIA |
| 6 | 6 | country | AM | ARMENIA |
| 7 | 7 | country | AN | NETHERLANDS ANTILLES |
| 8 | 8 | country | AO | ANGOLA |
| 9 | 9 | country | AQ | ANTARCTICA |
| 10 | 10 | country | AR | ARGENTINA |
| 11 | 11 | country | AS | AMERICAN SAMOA |
| 12 | 12 | country | AT | AUSTRIA |
| 13 | 13 | country | AU | AUSTRALIA |
| 14 | 14 | country | AW | ARUBA |
| 15 | 15 | country | AX | ALAND ISLANDS |
| 16 | 16 | country | AZ | AZERBAIJAN |
| 17 | 17 | country | BA | BOSNIA AND HERZEGOVINA |
| 18 | 18 | country | BB | BARBADOS |
| 19 | 19 | country | BD | BANGLADESH |
| 20 | 20 | country | BE | BELGIUM |
| 21 | 21 | country | BF | BURKINA FASO |
| 22 | 22 | country | BG | BULGARIA |
| 23 | 23 | country | BH | BAHRAIN |
| 24 | 24 | country | BI | BURUNDI |
| 25 | 25 | country | BJ | BENIN |
| 26 | 26 | country | BL | SAINT BARTHLEMY |
| 27 | 27 | country | BM | BERMUDA |
| 28 | 28 | country | BN | BRUNEI DARUSSALAM |
| 29 | 29 | country | BO | BOLIVIA |
| 30 | 30 | country | BR | BRAZIL |
| 31 | 31 | country | BS | BAHAMAS |
| 32 | 32 | country | BT | BHUTAN |
| 33 | 33 | country | BV | BOUVET ISLAND |
| 34 | 34 | country | BW | BOTSWANA |

Table 55 sub_region (cont.)

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 35 | 35 | country | BY | BELARUS |
| 36 | 36 | country | BZ | BELIZE |
| 37 | 37 | country | CA | CANADA |
| 38 | 38 | country | CC | COCOS (KEELING) ISLANDS |
| 39 | 39 | country | CD | CONGO, THE DEMOCRATIC RE-PUBLIC OF THE |
| 40 | 40 | country | CF | CENTRAL AFRICAN REPUBLIC |
| 41 | 41 | country | CG | CONGO |
| 42 | 42 | country | CH | SWITZERLAND |
| 43 | 43 | country | CI | COTE D'IVOIRE |
| 44 | 44 | country | CK | COOK ISLANDS |
| 45 | 45 | country | CL | CHILE |
| 46 | 46 | country | CM | CAMEROON |
| 47 | 47 | country | CN | CHINA |
| 48 | 48 | country | CO | COLOMBIA |
| 49 | 49 | country | CR | COSTA RICA |
| 50 | 50 | country | CU | CUBA |
| 51 | 51 | country | CV | CAPE VERDE |
| 52 | 52 | country | CX | CHRISTMAS ISLAND |
| 53 | 53 | country | CY | CYPRUS |
| 54 | 54 | country | CZ | CZECH REPUBLIC |
| 55 | 55 | country | DD | GERMAN DEMOCRATIC REPUBLIC |
| 56 | 56 | country | DE | GERMANY |
| 57 | 57 | country | DJ | DJIBOUTI |
| 58 | 58 | country | DK | DENMARK |
| 59 | 59 | country | DM | DOMINICA |
| 60 | 60 | country | DO | DOMINICAN REPUBLIC |
| 61 | 61 | country | DZ | ALGERIA |
| 62 | 62 | country | EC | ECUADOR |
| 63 | 63 | country | EE | ESTONIA |
| 64 | 64 | country | EG | EGYPT |
| 65 | 65 | country | EH | WESTERN SAHARA |
| 66 | 66 | country | ER | ERITREA |
| 67 | 67 | country | ES | SPAIN |
| 68 | 68 | country | ET | ETHIOPIA |
| 69 | 69 | country | FI | FINLAND |

Table 55 sub_region (cont.)

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 70 | 70 | country | FJ | FIJI |
| 71 | 71 | country | FK | FALKLAND ISLANDS (MALVINAS) |
| 72 | 72 | country | FM | MICRONESIA, FEDERATED STATES OF |
| 73 | 73 | country | FO | FAROE ISLANDS |
| 74 | 74 | country | FR | FRANCE |
| 75 | 75 | country | GA | GABON |
| 76 | 76 | country | GB | UNITED KINGDOM |
| 77 | 77 | country | GD | GRENADA |
| 78 | 78 | country | GE | GEORGIA |
| 79 | 79 | country | GF | FRENCH GUIANA |
| 80 | 80 | country | GG | GUERNSEY |
| 81 | 81 | country | GH | GHANA |
| 82 | 82 | country | GI | GIBRALTAR |
| 83 | 83 | country | GL | GREENLAND |
| 84 | 84 | country | GM | GAMBIA |
| 85 | 85 | country | GN | GUINEA |
| 86 | 86 | country | GP | GUADELOUPE |
| 87 | 87 | country | GQ | EQUATORIAL GUINEA |
| 88 | 88 | country | GR | GREECE |
| 89 | 89 | country | GS | SOUTH GEORGIA AND THE SOUTH SANDWICH ISLANDS |
| 90 | 90 | country | GT | GUATEMALA |
| 91 | 91 | country | GU | GUAM |
| 92 | 92 | country | GW | GUINEA-BISSAU |
| 93 | 93 | country | GY | GUYANA |
| 94 | 94 | country | HK | HONG KONG |
| 95 | 95 | country | HM | HEARD ISLAND AND MCDONALD ISLANDS |
| 96 | 96 | country | HN | HONDURAS |
| 97 | 97 | country | HR | CROATIA |
| 98 | 98 | country | HT | HAITI |
| 99 | 99 | country | HU | HUNGARY |
| 100 | 100 | country | ID | INDONESIA |
| 101 | 101 | country | IE | IRELAND |
| 102 | 102 | country | IL | ISRAEL |
| 103 | 103 | country | IM | ISLE OF MAN |
| 104 | 104 | country | IN | INDIA |

Table 55 sub_region (cont.)

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 105 | 105 | country | IO | BRITISH INDIAN OCEAN TERRITORY |
| 106 | 106 | country | IQ | IRAQ |
| 107 | 107 | country | IR | IRAN, ISLAMIC REPUBLIC OF |
| 108 | 108 | country | IS | ICELAND |
| 109 | 109 | country | IT | ITALY |
| 110 | 110 | country | JE | JERSEY |
| 111 | 111 | country | JM | JAMAICA |
| 112 | 112 | country | JO | JORDAN |
| 113 | 113 | country | JP | JAPAN |
| 114 | 114 | country | KE | KENYA |
| 115 | 115 | country | KG | KYRGYZSTAN |
| 116 | 116 | country | KH | CAMBODIA |
| 117 | 117 | country | KI | KIRIBATI |
| 118 | 118 | country | KM | COMOROS |
| 119 | 119 | country | KN | SAINT KITTS AND NEVIS |
| 120 | 120 | country | KP | KOREA, DEMOCRATIC PEO-PLE'S REPUBLIC OF |
| 121 | 121 | country | KR | KOREA, REPUBLIC OF |
| 122 | 122 | country | KW | KUWAIT |
| 123 | 123 | country | KY | CAYMAN ISLANDS |
| 124 | 124 | country | KZ | KAZAKHSTAN |
| 125 | 125 | country | LA | LAO PEOPLE'S DEMOCRATIC REPUBLIC |
| 126 | 126 | country | LB | LEBANON |
| 127 | 127 | country | LC | SAINT LUCIA |
| 128 | 128 | country | LI | LIECHTENSTEIN |
| 129 | 129 | country | LK | SRI LANKA |
| 130 | 130 | country | LR | LIBERIA |
| 131 | 131 | country | LS | LESOTHO |
| 132 | 132 | country | LT | LITHUANIA |
| 133 | 133 | country | LU | LUXEMBOURG |
| 134 | 134 | country | LV | LATVIA |
| 135 | 135 | country | LY | LIBYAN ARAB JAMAHIRIYA |
| 136 | 136 | country | MA | MOROCCO |
| 137 | 137 | country | MC | MONACO |
| 138 | 138 | country | MD | MOLDOVA, REPUBLIC OF |
| 139 | 139 | country | ME | MONTENEGRO |

Continued on next page

Table 55 sub_region (cont.)

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 140 | 140 | country | MF | SAINT MARTIN |
| 141 | 141 | country | MG | MADAGASCAR |
| 142 | 142 | country | MH | MARSHALL ISLANDS |
| 143 | 143 | country | MK | MACEDONIA, THE FORMER YU-GOSLAV REPUBLIC OF |
| 144 | 144 | country | ML | MALI |
| 145 | 145 | country | MM | MYANMAR |
| 146 | 146 | country | MN | MONGOLIA |
| 147 | 147 | country | MO | MACAO |
| 148 | 148 | country | MP | NORTHERN MARIANA ISLANDS |
| 149 | 149 | country | MQ | MARTINIQUE |
| 150 | 150 | country | MR | MAURITANIA |
| 151 | 151 | country | MS | MONTSERRAT |
| 152 | 152 | country | MT | MALTA |
| 153 | 153 | country | MU | MAURITIUS |
| 154 | 154 | country | MV | MALDIVES |
| 155 | 155 | country | MW | MALAWI |
| 156 | 156 | country | MX | MEXICO |
| 157 | 157 | country | MY | MALAYSIA |
| 158 | 158 | country | MZ | MOZAMBIQUE |
| 159 | 159 | country | NA | NAMIBIA |
| 160 | 160 | country | NC | NEW CALEDONIA |
| 161 | 161 | country | NE | NIGER |
| 162 | 162 | country | NF | NORFOLK ISLAND |
| 163 | 163 | country | NG | NIGERIA |
| 164 | 164 | country | NI | NICARAGUA |
| 165 | 165 | country | NL | NETHERLANDS |
| 166 | 166 | country | NO | NORWAY |
| 167 | 167 | country | NP | NEPAL |
| 168 | 168 | country | NR | NAURU |
| 169 | 169 | country | NU | NIUE |
| 170 | 170 | country | NZ | NEW ZEALAND |
| 171 | 171 | country | OM | OMAN |
| 172 | 172 | country | PA | PANAMA |
| 173 | 173 | country | PE | PERU |
| 174 | 174 | country | PF | FRENCH POLYNESIA |

Table 55 sub_region (cont.)

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 175 | 175 | country | PG | PAPUA NEW GUINEA |
| 176 | 176 | country | PH | PHILIPPINES |
| 177 | 177 | country | PK | PAKISTAN |
| 178 | 178 | country | PL | POLAND |
| 179 | 179 | country | PM | SAINT PIERRE AND MIQUELON |
| 180 | 180 | country | PN | PITCAIRN |
| 181 | 181 | country | PR | PUERTO RICO |
| 182 | 182 | country | PS | PALESTINIAN TERRITORY, OCCUPIED |
| 183 | 183 | country | PT | PORTUGAL |
| 184 | 184 | country | PW | PALAU |
| 185 | 185 | country | PY | PARAGUAY |
| 186 | 186 | country | QA | QATAR |
| 187 | 187 | country | RE | REUNION |
| 188 | 188 | country | RO | ROMANIA |
| 189 | 189 | country | RS | SERBIA |
| 190 | 190 | country | RU | RUSSIAN FEDERATION |
| 191 | 191 | country | RW | RWANDA |
| 192 | 192 | country | SA | SAUDI ARABIA |
| 193 | 193 | country | SB | SOLOMON ISLANDS |
| 194 | 194 | country | SC | SEYCHELLES |
| 195 | 195 | country | SD | SUDAN |
| 196 | 196 | country | SE | SWEDEN |
| 197 | 197 | country | SG | SINGAPORE |
| 198 | 198 | country | SH | SAINT HELENA |
| 199 | 199 | country | SI | SLOVENIA |
| 200 | 200 | country | SJ | SVALBARD AND JAN MAYEN |
| 201 | 201 | country | SK | SLOVAKIA |
| 202 | 202 | country | SL | SIERRA LEONE |
| 203 | 203 | country | SM | SAN MARINO |
| 204 | 204 | country | SN | SENEGAL |
| 205 | 205 | country | SO | SOMALIA |
| 206 | 206 | country | SR | SURINAME |
| 207 | 207 | country | ST | SAO TOME AND PRINCIPE |
| 208 | 208 | country | SU | USSR |
| 209 | 209 | country | SV | EL SALVADOR |
| 210 | 210 | country | SY | SYRIAN ARAB REPUBLIC |

Table 55 sub_region (cont.)

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 211 | 211 | country | SZ | SWAZILAND |
| 212 | 212 | country | TC | TURKS AND CAICOS ISLANDS |
| 213 | 213 | country | TD | CHAD |
| 214 | 214 | country | TF | FRENCH SOUTHERN TERRITORIES |
| 215 | 215 | country | TG | TOGO |
| 216 | 216 | country | TH | THAILAND |
| 217 | 217 | country | TJ | TAJIKISTAN |
| 218 | 218 | country | TK | TOKELAU |
| 219 | 219 | country | TL | TIMOR-LESTE |
| 220 | 220 | country | TM | TURKMENISTAN |
| 221 | 221 | country | TN | TUNISIA |
| 222 | 222 | country | TO | TONGA |
| 223 | 223 | country | TR | TURKEY |
| 224 | 224 | country | TT | TRINIDAD AND TOBAGO |
| 225 | 225 | country | TV | TUVALU |
| 226 | 226 | country | TW | TAIWAN, PROVINCE OF CHINA |
| 227 | 227 | country | TZ | TANZANIA, UNITED REPUBLIC OF |
| 228 | 228 | country | UA | UKRAINE |
| 229 | 229 | country | UG | UGANDA |
| 230 | 230 | country | UM | UNITED STATES MINOR OUTLYING ISLANDS |
| 231 | 231 | country | US | UNITED STATES |
| 232 | 232 | country | UY | URUGUAY |
| 233 | 233 | country | UZ | UZBEKISTAN |
| 234 | 234 | country | VA | HOLY SEE (VATICAN CITY STATE) |
| 235 | 235 | country | VC | SAINT VINCENT AND THE GRENADINES |
| 236 | 236 | country | VE | VENEZUELA |
| 237 | 237 | country | VG | VIRGIN ISLANDS, BRITISH |
| 238 | 238 | country | VI | VIRGIN ISLANDS, U.S. |
| 239 | 239 | country | VN | VIET NAM |
| 240 | 240 | country | VU | VANUATU |
| 241 | 241 | country | WF | WALLIS AND FUTUNA |
| 242 | 242 | country | WS | SAMOA |
| 243 | 243 | country | YE | YEMEN |
| 244 | 244 | country | YT | MAYOTTE |
| 245 | 245 | country | YU | YUGOSLAVIA |
| 246 | 246 | country | ZA | SOUTH AFRICA |

Continued on next page

Table 55 sub_region (cont.)

| index | sub_region | type | code | name |
|---|---|---|---|---|
| 247 | 247 | country | ZM | ZAMBIA |
| 248 | 248 | country | ZW | ZIMBABWE |
| 249 | 249 | country | ZZ | THIRD PARTY SUPPORT SHIPS |

End of table

Table 56: time_quality

| index | time_quality | description |
|---|---|---|
| 0 | 0 | Timestamp valid, time reported to nearest second |
| 1 | 1 | Timestamp valid, time reported to nearest minute |
| 2 | 2 | Timestamp valid, time reported to nearest hour |
| 3 | 3 | Time missing, date valid. Report set to local midday |
| 4 | 4 | Day missing |
| 5 | 5 | Invalid date / time |

End of table

Table 57: time_reference

| index | time_reference | description |
|---|---|---|
| 0 | 0 | Unknown |
| 1 | 1 | Time server |
| 2 | 2 | Radio clock |
| 3 | 3 | Manual comparison |

End of table

Table 58: traceability

| index | traceability | description |
|---|---|---|
| 0 | 0 | Unknown |
| 1 | 1 | Traceable to international standards |
| 2 | 2 | Traceable to other standards |

End of table

Table 59: units

| index | units | name | conventional abbreviation | abbreviation in ASCII | abbreviation in ITA2 | definition in base units |
|---|---|---|---|---|---|---|
| 0 | 1 | metre | m | m | M | NA |
| 1 | 2 | kilogram | kg | kg | KG | NA |
| 2 | 3 | second | s | s | S | NA |
| 3 | 4 | ampere | A | A | A | NA |
| 4 | 5 | kelvin | K | K | K | NA |
| 5 | 6 | mole | mol | mol | MOL | NA |
| 6 | 7 | candela | cd | cd | CD | NA |
| 7 | 21 | radian | rad | rad | RAD | NA |
| 8 | 22 | steradian | sr | sr | SR | NA |
| 9 | 30 | hertz | Hz | Hz | HZ | s1 |
| 10 | 31 | newton | N | N | N | kg m s-2 |
| 11 | 32 | pascal | Pa | Pa | PAL | kg m-1 s2 |
| 12 | 33 | joule | J | J | J | kg m2 s-2 |
| 13 | 34 | watt | W | W | W | kg m2 s-3 |
| 14 | 35 | coulomb | C | C | C | A s |
| 15 | 36 | volt | V | V | V | kg m2 s-3 A1 |
| 16 | 37 | farad | F | F | F | kg-1 m2 s4 A2 |
| 17 | 38 | ohm | | Ohm | OHM | kg m2 s-3 A2 |
| 18 | 39 | siemens | S | S | SIE | kg-1 m2 s3 A2 |
| 19 | 40 | weber | Wb | Wb | WB | kg m2 s-2 A1 |
| 20 | 41 | tesla | T | T | T | kg s-2 A1 |
| 21 | 42 | henry | H | H | H | kg m2 s-2 A2 |
| 22 | 60 | degree Celsius | C | Cel | CEL | K+273.15 |
| 23 | 70 | lumen | lm | lm | LM | cd sr |
| 24 | 71 | lux | lx | lx | LX | cd sr m-2 |
| 25 | 80 | becquerel | Bq | Bq | BQ s-1 | NA |
| 26 | 81 | grey | Gy | Gy | GY | m2 s-2 |
| 27 | 82 | sievert | Sv | Sv | SV | m2 s-2 |
| 28 | 110 | degree (angle) | deg | deg | DEG | NA |
| 29 | 111 | minute (angle) | ' | ' | MNT | NA |
| 30 | 112 | second (angle) | " | " | SEC | NA |
| 31 | 120 | litre | l or L | l or L | L | NA |
| 32 | 130 | minute (time) | min | min | MIN | NA |
| 33 | 131 | hour | h | h | HR | NA |

Table 59 units (cont.)

| index | units | name | conventional_ abbreviation | abbreviatio n_in_ASCII | abbreviatio n_in_ITA2 | definition_in_base_units |
|---|---|---|---|---|---|---|
| 34 | 132 | day | d | d | D | NA |
| 35 | 150 | tonne | t | t | TNE | NA |
| 36 | 160 | electron volt | eV | eV | EV | NA |
| 37 | 161 | atomic mass unit | u | u | U | NA |
| 38 | 170 | astronomic unit | AU | AU | ASU | NA |
| 39 | 171 | parsec | pc | pc | PRS | NA |
| 40 | 200 | nautical mile | NA | NA | NA | NA |
| 41 | 201 | knot | kt | kt | KT | NA |
| 42 | 210 | decibel (6) | dB | dB | DB | NA |
| 43 | 220 | hectare | ha | ha | HAR | NA |
| 44 | 230 | week | NA | NA | NA | NA |
| 45 | 231 | year | a | a | ANN | NA |
| 46 | 300 | per cent | % | % | PERCENT | NA |
| 47 | 301 | parts per thousand | 0/00 | 0/00 | PERTHOU | NA |
| 48 | 310 | eighths of cloud | okta | okta | OKTA | NA |
| 49 | 320 | degrees true | deg | deg | DEG | NA |
| 50 | 321 | degrees per second | degree/s | deg/s | DEG/S | NA |
| 51 | 350 | degrees Cel- sius (8) | C | C | C | NA |
| 52 | 351 | degrees Celsius per metre | C/m | C/m | C/M | NA |
| 53 | 352 | degrees Celsius per 100 metres | C/100 m | C/100 m | C/100 M | NA |
| 54 | 360 | Dobson Unit (9) | DU | DU | DU | NA |
| 55 | 430 | month | mon | mon | MON | NA |
| 56 | 441 | per second (same as hertz) | s-1 | /s | /S | NA |
| 57 | 442 | per second squared | s-2 | s2 | NA | NA |
| 58 | 501 | knots per 1000 metres | kt/1000 m | kt/km | KT/KM | NA |
| 59 | 510 | foot | ft | ft | FT | NA |

Continued on next page

Table 59 units (cont.)

| index | units | name | conventional abbreviation | abbreviation in ASCII | abbreviation in ITA2 | definition in base units |
|---|---|---|---|---|---|---|
| 60 | 511 | inch | in | in | IN | NA |
| 61 | 520 | decipascals per second (micro-bar per second) | dPa s-1 | dPa/s | DPAL/S | NA |
| 62 | 521 | centibars per second | cb s-1 | cb/s | CB/S | NA |
| 63 | 522 | centibars per 12 hours | cb/12 h | cb/12 h | CB/12 HR | NA |
| 64 | 523 | dekapascal | daPa | daPa | DAPAL | NA |
| 65 | 530 | hectopascal | hPa | hPa | HPAL | NA |
| 66 | 531 | hectopascals per second | hPa s-1 | hPa/s | HPAL/S | NA |
| 67 | 532 | hectopascals per hour | hPa h-1 | hPa/h | HPAL/HR | NA |
| 68 | 533 | hectopascals per 3 hours | hPa/3 h | hPa/3 h | HPAL/3 HR | NA |
| 69 | 535 | nanobar = hPa 10-6 | nbar | nbar | NBAR | NA |
| 70 | 620 | grams per kilogram | g kg-1 | g/kg | G/KG | NA |
| 71 | 621 | grams per kilogram per second | g kg-1 s1 | g kg1 s1 | NA | NA |
| 72 | 622 | kilograms per kilogram kg kg-1 | kg/kg | KG/KG | NA | NA |
| 73 | 623 | kilograms per kilogram per second | kg kg-1 s1 | kg kg1 s1 | NA | NA |
| 74 | 624 | kilograms per square metre | kg m-2 | kg m2 | NA | NA |
| 75 | 630 | acceleration due to gravity | g | g | NA | NA |
| 76 | 631 | geopotential metre | gpm | gpm | NA | NA |
| 77 | 710 | millimetre | mm | mm | MM | NA |

Continued on next page

Table 59 units (cont.)

| index | units | name | conventional_ abbreviation | abbreviatio n_in_ASCII | abbreviatio n_in_ITA2 | definition_in_base_units |
|---|---|---|---|---|---|---|
| 78 | 711 | millimetres per second | mm s-1 | mm/s | MM/S | NA |
| 79 | 712 | millimetres per hour | mm h-1 | mm/h | MM/HR | NA |
| 80 | 713 | millimetres to the sixth power per cubic metre | mm6 m-3 | mm6 m3 | NA | NA |
| 81 | 715 | centimetre | cm | cm | CM | NA |
| 82 | 716 | centimetres per second | cm s-1 | cm/s | CM/S | NA |
| 83 | 717 | centimetres per hour | cm h-1 | cm/h | CM/HR | NA |
| 84 | 720 | decimetre | dm | dm | DM | NA |
| 85 | 731 | metres per second | m s-1 | m/s | M/S | NA |
| 86 | 732 | metres per sec-ond per metre | m s-1/m | m s1/m | NA | NA |
| 87 | 733 | metres per second per 1000 metres | m s-1/1000 m | m s1/km | NA | NA |
| 88 | 734 | square metres | m2 | m2 | M2 | NA |
| 89 | 735 | square metres per second | m2 s-1 | m2/s | M2/S | NA |
| 90 | 740 | kilometre | km | km | KM | NA |
| 91 | 741 | kilometres per hour | km h-1 | km/h | KM/HR | NA |
| 92 | 742 | kilometres per day | km/d | km/d | KM/D | NA |
| 93 | 743 | per metre | m-1 | m1 | /M | NA |
| 94 | 750 | becquerels per litre | Bq l-1 | Bq/l | BQ/L | NA |
| 95 | 751 | becquerels per square metre | Bq m-2 | Bq m2 | BQ/M2 | NA |
| 96 | 752 | becquerels per cubic metre | Bq m-3 | Bq m3 | BQ/M3 | NA |
| 97 | 753 | millisievert | mSv | mSv | MSV | NA |

Table 59 units (cont.)

| index | units | name | conventional_abbreviation | abbreviation_in_ASCII | abbreviation_in_ITA2 | definition_in_base_units |
|-------|-------|------|---------------------------|-----------------------|----------------------|--------------------------|
| 98 | 760 | metres per second squared | m s-2 | m s2 | NA | NA |
| 99 | 761 | square metres second | m2 s | m2 s | NA | NA |
| 100 | 762 | square metres per second squared | m2 s-2 | m2 s2 | NA | NA |
| 101 | 763 | square metres per radian second | m2 rad-1 s | m2 rad1 s | NA | NA |
| 102 | 764 | square metres per hertz | m2 Hz-1 | m2/Hz | NA | NA |
| 103 | 765 | cubic metres | m3 | m3 | NA | NA |
| 104 | 766 | cubic metres per second | m3 s-1 | m3/s | NA | NA |
| 105 | 767 | cubic metres per cubic metre | m3 m-3 | m3 m3 | NA | NA |
| 106 | 768 | metres to the fourth power | m4 | m4 | NA | NA |
| 107 | 769 | metres to the two thirds power per second | m2/3 s-1 | m2/3 s1 | NA | NA |
| 108 | 772 | logarithm per metre | log (m-1) | log (m1) | NA | NA |
| 109 | 773 | logarithm per square metre | log (m-2) | log (m2) | NA | NA |
| 110 | 775 | kilograms per metre | kg m-1 | kg/m | NA | NA |
| 111 | 776 | kilograms per square metre per second | kg m-2 s1 | kg m2 s1 | NA | NA |
| 112 | 777 | kilograms per cubic metre | kg m-3 | kg m3 | NA | NA |

Table 59 units (cont.)

| index | units | name | conventional_ abbreviation | abbreviatio n_in_ASCII | abbreviatio n_in_ITA2 | definition_in_base_units |
|---|---|---|---|---|---|---|
| 113 | 778 | per square kilogram per second | kg-2 s1 | kg2 s1 | NA | NA |
| 114 | 779 | seconds per metre | s m-1 | s/m | NA | NA |
| 115 | 785 | kelvin metres per second | K m s-1 | K m s1 | NA | NA |
| 116 | 786 | kelvins per metre | K m-1 | K/m | NA | NA |
| 117 | 787 | kelvin square metres per kilogram per second | K m2 kg-1 s1 | K m2 kg1 s1 | NA | NA |
| 118 | 788 | moles per mole | mol mol-1 | mol/mol | NA | NA |
| 119 | 790 | radians per metre | rad m-1 | rad/m | NA | NA |
| 120 | 795 | newtons per square metre | N m-2 | N m2 | NA | NA |
| 121 | 800 | pascals per second | Pa s-1 | Pa/s | NA | NA |
| 122 | 801 | kilopascal | kPa | kPa | NA | NA |
| 123 | 805 | joules per square metre | J m-2 | J m2 | NA | NA |
| 124 | 806 | joules per kilogram | J kg-1 | J/kg | NA | NA |
| 125 | 810 | watts per metre per steradian | W m-1 sr1 W m1 sr1 | NA | NA | NA |
| 126 | 811 | watts per square metre | W m-2 | W m2 | NA | NA |
| 127 | 812 | watts per square metre per steradian | W m-2 sr1 | W m2 sr1 | NA | NA |
| 128 | 813 | watts per square metre per steradian centimeter | W m-2 sr1 cm | W m2 sr1 cm | NA | NA |

Continued on next page

Table 59 units (cont.)

| index | units | name | conventional_abbreviation | abbreviation_in_ASCII | abbreviation_in_ITA2 | definition_in_base_units |
|---|---|---|---|---|---|---|
| 129 | 814 | watts per square metre per steradian metre | W m-2 sr1 m | W m2 sr1 m | NA | NA |
| 130 | 815 | watts per cubic metre per steradian | W m-3 sr1 | W m3 sr1 | NA | NA |
| 131 | 820 | siemens per metre | S m-1 | S/m | NA | NA |
| 132 | 825 | square degrees | degree2 | deg2 | NA | NA |
| 133 | 830 | becquerel seconds per cubic metre | Bq s m-3 | Bq s m3 | NA | NA |
| 134 | 835 | decibels per metre | dB m-1 | dB/m | NA | NA |
| 135 | 836 | decibels per degree | dB degree-1 | dB/deg | NA | NA |
| 136 | 841 | pH unit | pH unit | pH unit | NA | NA |
| 137 | 842 | N units | N units | N units | NA | NA |
| 138 | 843 | Nephelometric turbidity units | NTU | NTU | NA | NA |
| 139 | no | (yotta) | (Y) | (Y) | (Y) | NA |
| 140 | no | (zetta) | (Z) | (Z) | (Z) | NA |
| 141 | no | exa | E | E | E | NA |
| 142 | no | peta | P | P | PE | NA |
| 143 | no | tera | T | T | T | NA |
| 144 | no | giga | G | G | G | NA |
| 145 | no | mega | M | M | MA | NA |
| 146 | no | kilo | k | k | K | NA |
| 147 | no | hector | h | h | H | NA |
| 148 | no | deca | da | da | DA | NA |
| 149 | no | deci | d | d | D | NA |
| 150 | no | centi | c | c | C | NA |
| 151 | no | milli | m | m | M | NA |
| 152 | no | micro | u | u | U | NA |

Continued on next page

Table 59 units (cont.)

| index | units | name | conventional_ abbreviation | abbreviatio n_in_ASCII | abbreviatio n_in_ITA2 | definition_in_base_units |
|---|---|---|---|---|---|---|
| 153 | no | nano | n | n | N | NA |
| 154 | no | pico | p | p | P | NA |
| 155 | no | femto | f | f | F | NA |
| 156 | no | atto | a | a | A | NA |
| 157 | no | (zepto) | (z) | (z) | NA | NA |
| 158 | no | (yocto) | (y) | (y) | NA | NA |

End of table

Table 60: update_frequency

| index | update_frequency | description |
|-------|------------------|-------------|
| 0 | 1 | Annual |
| | | End of table |

Table 61: z_coordinate_method

| index | z_coordinate_method | description |
|-------|---------------------|-------------|
| 0 | 0 | Value from chart |
| | | End of table |

Table 62: z_coordinate_type

| index | z_coordinate_type | description |
|-------|-------------------|-------------|
| 0 | 0 | height (m) above sea level |
| | | End of table |