**ANNEX**

**2. MANUAL ON CODES: TABLE-DRIVEN CODE FORMS**

**§ 2018-2.2.1(CM-II) /Additional elements for optimal cloud analysis and instantaneous rain rate products (FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_1)

*Add* the following elements to GRIB Table 4.2, discipline 3 – Space products, parameter category 1 – quantitative products:

|  |  |  |
| --- | --- | --- |
| ***Number*** | ***Parameter*** | ***Units*** |
| 98 | Correlation coefficient between MPE rain-rates for the co-located IR data and the microwave data rain-rates | Numeric |
| 99 | Standard deviation between MPE rain-rates for the co-located IR data and the microwave data rain-rates | kg m–2 s-1 |

*Add* the following elements to GRIB Table 4.2, discipline 3 – Space products, parameter category 2 – cloud properties:

|  |  |  |
| --- | --- | --- |
| ***Number*** | ***Parameter*** | ***Units*** |
| 30 | Measurement cost | Numeric |
| 31 | Upper layer cloud optical depth | Numeric |
| 32 | Upper layer cloud top pressure | Pa |
| 33 | Upper layer cloud effective radius | m |
| 34 | Error in upper layer cloud optical depth | Numeric |
| 35 | Error in upper layer cloud top pressure | Pa |
| 36 | Error in upper layer cloud effective radius | m |
| 37 | Lower layer cloud optical depth | Numeric |
| 38 | Lower layer cloud top pressure | Pa |
| 39 | Error in lower layer cloud optical depth | Numeric |
| 40 | Error in lower layer cloud top pressure | Pa |

Note: Numbers 31 to 40 are deprecated.

*Add* the following entries to Code table 4.218 – Pixel scene type:

|  |  |
| --- | --- |
| ***Code Figure*** | ***Meaning*** |
| 111 | Single Layer Water Cloud |
| 112 | Single Layer Ice Cloud |

**§ 2018-**[**2.2.2(CM-II)/New fixed surface type in Code table 4.5**](#S2018_2_2_2) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_2)

add a new entry in

**Code table 4.5 – *Fixed surface types and units***

Code figure Meaning Unit

25 Highest level where radar reflectivity exceeds dBZ

the specified value

(echo top for a given threshold of reflectivity)

26–99 Reserved

**§ 2018-**[**2.2.3(CM-II)/New entry in GRIB2 Code table 4.9 (FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_3)](#S2018_2_2_3)

The modifications to the table are highlighted in red

**Code table 4.9** – *Probability type*

Code figure Meaning

0 Probability of event below lower limit

1 Probability of event above upper limit

2 Probability of event between lower and upper limits (the range includes the lower limit   
 but not the upper limit)

3 Probability of event above lower limit

4 Probability of event below upper limit

5 Probability of event equal to lower limit

6–191 Reserved

192–254 Reserved for local use

255 Missing

**§ 2018-**[**2.2.4(CM-II) /New lightning GRIB parameters**](#S2018_2_2_4) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_4)

The modifications to the table are highlighted in red

**Product discipline 0 – Meteorological products, parameter category 17: electrodynamics**

|  |  |  |
| --- | --- | --- |
| Number | Parameter | Units |
| 0 | Lightning strike density | m–2 s–1 |
| 1 | Lightning potential index (LPI) (see Note 1) | J kg–1 |
| 2 | Cloud-to-ground Lightning flash density | km-2 day-1 |
| 3 | Cloud-to-cloud Lightning flash density | km-2 day-1 |
| 4 | Total Lightning flash density (see Note 2) | km-2 day-1 |

Notes:

(1) Definition of LPI after Lynn et al.: Lynn, B. and Y. Yair, 2010: Prediction of lightning flash density with the WRF model, Adv. Geosci., 23:11–16; Yair, Y., B. Lynn, C. Price, V. Kotroni, K. Lagouvardos, E. Morin, A. Mugnai and M. Llasat, 2010: Predicting the potential for lightning activity in Mediterranean storms based on the Weather Research and Forecasting (WRF) model dynamic and microphysical fields, Journal of Geophysical Research, 115, D04205, doi:10.1029/2008JD010868.

(2) The total lightning flash density is the sum of cloud-to-ground and cloud-to-cloud lightning flash densities (see Lopez, P., 2016: A lightning parameterization for the ECMWF Integrated Forecasting System, Monthly Weather Review, 144, 3057-3075).

Comments:

* The difference between Lightning stroke density and Lightning Flash density relies in the fact that a “flash” is composed by one or more “strokes” occurring within a defined space within one second.
* The units are chosen to be km-2 day-1 to reflect the very low occurrence of events (flashes) in time and space. If expressed in m-2 s-1, a typical value for these parameters would be in the order of 10^-16.

**§ 2018-**[**2.2.5(CM-II)/New GRIB2 Code table 4.2 entries**](#S2018_2_2_5) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_5)

Proposed new entries for Code Table 4.2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Product Discipline | Parameter Category | Parameter number | Units |
| Peak wave direction | 10 | 0 (Waves) | 46 | deg |
| Significant wave height of first swell partition | 10 | 0 (Waves) | 47 | m |
| Significant wave height of second swell partition | 10 | 0 (Waves) | 48 | m |
| Significant wave height of third swell partition | 10 | 0 (Waves) | 49 | m |
| Mean wave period of first swell partition | 10 | 0 (Waves) | 50 | s |
| Mean wave period of second swell partition | 10 | 0 (Waves) | 51 | s |
| Mean wave period of third swell partition | 10 | 0 (Waves) | 52 | s |
| Mean wave direction of first swell partition | 10 | 0 (Waves) | 53 | deg |
| Mean wave direction of second swell partition | 10 | 0 (Waves) | 54 | deg |
| Mean wave direction of third swell partition | 10 | 0 (Waves) | 55 | deg |

**§ 2018-**[**2.2.6(CM-II) /New “freezing drizzle” precipitation type**](#S2018_2_2_6) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_6)

The following new entry is proposed to be added to table 4.201. The modifications to the table are highlighted in red

**Code table 4.201** – *Precipitation type*

Code figure Meaning

0 Reserved

1 Rain

2 Thunderstorm

3 Freezing rain

4 Mixed/ice

5 Snow

6 Wet snow

7 Mixture of rain and snow

8 Ice pellets

9 Graupel

10 Hail

11 Drizzle

12 Freezing drizzle

13–191 Reserved

192–254 Reserved for local use

255 Missing

**§ 2018-**[**2.2.7(CM-II)/Representing gnomonic grids**](#S2018_2_2_7) **(Validation)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_7)

***Code table 3.1 – Grid definition template number***

Code figure Meaning

60 Gnomonic

***Grid definition template 3.60 – Gnomonic***

Octet No. Contents

15 Shape of the Earth (see Code table 3.2)

16 Scale factor of radius of spherical Earth

17–20 Scaled value of radius of spherical Earth

21 Scale factor of major axis of oblate spheroid Earth

22–25 Scaled value of major axis of oblate spheroid Earth

26 Scale factor of minor axis of oblate spheroid Earth

27–30 Scaled value of minor axis of oblate spheroid Earth

31–34 Nx – number of points along the x-axis

35–38 Ny – number of points along the y-axis

39–42 La1 – latitude of first grid point

43–46 Lo1 – longitude of first grid point

47 Resolution and component flags (see Flag table 3.3)

48–51 LatC – latitude of the projection center

52–55 LonC – longitude of the projection center

56–59 Dx – x-direction grid length (see Note 1)

60–63 Dy – y-direction grid length (see Note 1)

64 Projection centre flag (see Flag table 3.5)

65 Scanning mode (see Flag table 3.4)

Notes:

(1) Grid lengths are in units of 10-3 m.

**§ 2018-**[**2.2.8(CM-II)/New GRIB2 Code table 4.9 entries**](#S2018_2_2_8) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_2_8)

Proposed entries for Code Table 4.9 (new ones in red)

|  |  |
| --- | --- |
| **Code Figure** | **Meaning** |
| 0 | Probability of event below lower limit |
| 1 | Probability of event above upper limit |
| 2 | Probability of event between upper and lower limits (the range includes lower limit but no the upper limit) |
| 3 | Probability of event above lower limit |
| 4 | Probability of event below upper limit |
| 5 | Probability of event equal to lower limit |
| 6 | Probability of event in above normal category (See Notes 1 and 2) |
| 7 | Probability of event in near normal category (See Notes 1 and 2) |
| 8 | Probability of event in below normal category (See Notes 1 and 2) |
| 9-191 | Reserved |
|  |  |
| 192-254 | Reserved for Local Use |
| 255 | Missing |

Notes:

(1) Above normal, near normal and below normal are defined as three equiprobable categories based on climatology at each point over the geographical area covered by the grid. The type and methodology of the reference climatology are unspecified and should be documented concurrently by the data producer.

(2) Product Definition Templates that use Code Table 4.9 may contain octets to store the values of lower and upper limits. When categorical probability is used (such as below, near and above normal), these octets shall be set to “all ones” (missing).

**§ 2018-**[**2.4.1(CM-II)/BUFR descriptors for flagged ancillary data**](#S2018_2_4_1)[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_1)

(withdrawn)

**§ 2018-**[**2.4.2(CM-II)/New BUFR sequence for describing satellite observations compressed using principal component analysis (FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_2)](#S2018_2_4_2)

*Add* the following sequence “Observing satellite and instruments” to BUFR Table D/01:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
| 3 01 129 | 0 01 007 | Satellite identifier |  |
| 0 01 031 | Identification of originating/  generating centre |  |
| 0 02 019 | Satellite instruments |  |
| 0 02 020 | Satellite classification |  |

*Add* the following sequence “High precision timestamp” to BUFR Table D/01:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
| 3 01 131 | 3 01 011 | Year, month, day |  |
| 3 01 012 | Hour, minute |  |
| 2 02 131 | Change scale | Add 3 to scale |
| 2 01 138 | Change data width | Add 10 to width |
| 0 04 006 | Second |  |
| 2 01 000 | Change scale | Cancel |
| 2 02 000 | Change data width | Cancel |

*Add* the following sequence “Pixel geolocation” to BUFR Table D/01:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
| 3 01 132 | 3 01 021 | Latitude/longitude (high accuracy) |  |
| 0 07 024 | Satellite zenith angle |  |
| 0 05 021 | Bearing or azimuth |  |
| 0 07 025 | Solar zenith angle |  |
| 0 05 022 | Solar azimuth |  |

*Amend* the name of 0 14 046 “Scaled IASI radiance” to read “Scaled radiance” to allow use for non-IASI instruments.

*Add* the following sequence “Radiance in channel” to BUFR Table D/04:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
| 3 04 040 | 2 01 136 | Change data width | Add 8 to width |
| 0 05 042 | Channel number |  |
| 2 01 000 | Change data width | Cancel |
| 0 14 046 | Scaled radiance |  |

*Add* the following sequence “Principal component score in band” to BUFR Table D/04:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
| 3 04 041 | 0 25 140 | Start channel |  |
| 0 25 141 | End channel |  |
| 0 40 026 | Score quantization factor |  |
| 0 40 016 | Residual RMS in band |  |
| 0 25 062 | Database identification |  |
| 1 01 000 | Delayed replicator of 1 descriptor |  |
| 0 31 002 | Extended delayed descriptor replication factor |  |
| 0 40 017 | Non-normalized principal component  score |  |

*Amend* the name of 3 40 002 “IASI Level 1c band description” to read “Band description” to allow use for non-IASI instruments.

*Add* the following sequence “Principal component scores, channel selection and enhanced data collected on board a geostationary platform” to BUFR Table D/40:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
| 3 40 016 | 3 01 129 | Observing satellite and instruments |  |
|  | 3 01 130 | High precision timestamp |  |
|  | 3 01 131 | Pixel geolocation |  |
|  | 2 02 134 | Change scale | Add 6 to scale |
|  | 0 07 001 | Height of station |  |
|  | 2 02 000 | Change scale | Cancel |
|  | 1 01 000 | Delayed replicator of 1 descriptor |  |
|  | 0 31 002 | Extended delayed descriptor replication factor |  |
|  | 3 40 002 | Band description |  |
|  | 1 01 000 | Delayed replicator of 1 descriptor |  |
|  | 0 31 002 | Extended delayed descriptor replication factor |  |
|  | 3 04 039 | Radiance in channel |  |
|  | 0 01 000 | Delayed replicator of 1 descriptor |  |
|  | 0 31 002 | Extended delayed descriptor replication factor |  |
|  | 3 04 040 | Principal component score in band |  |

**§ 2018-**[**2.4.3(CM-II)/BUFR descriptors for IASI Level 2 Products**](#S2018_2_4_3) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_3)

*Associate field solution*

*Add* the following elements to BUFR Table B/40:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptor** | **Name** | **Units** | **Scale** | **Reference** | **Width** |
| 0-40-043 | Satellite manoeuvre indicator | Code table | 0 | 0 | 3 |
| 0-40-044 | Dust index | Numeric | 1 | 0 | 8 |
| 0-40-045 | Cloud formation and height assignment | Flag table | 0 | 0 | 5 |
| 0-40-046 | Cloudiness summary | Code table | 0 | 0 | 3 |
| 0-40-047 | Validation flag for IASI or IASI-NG level 1 product | Code table | 0 | 0 | 3 |
| 0-40-048 | Validation flag of AMSU-A level 1 data flow | Code table | 0 | 0 | 3 |
| 0-40-049 | Cloud tests executed and results | Flag table | 0 | 0 | 16 |
| 0-40-050 | Retrieval initialisation | Flag table | 0 | 0 | 8 |
| 0-40-051 | Convergence of the iterative retrieval | Code table | 0 | 0 | 3 |
| 0-40-052 | Indication of super-adiabatic and super-saturation in final retrieval | Flag table | 0 | 0 | 8 |
| 0-40-053 | Number of iterations used for retrieval | Numeric | 0 | 0 | 8 |
| 0-40-054 | Number of iterations | Numeric | 0 | 0 | 3 |
| 0-40-055 | Potential processing and inputs errors | Flag table | 0 | 0 | 13 |
| 0-40-056 | Diagnostics on the retrieval | Flag table | 0 | 0 | 21 |
| 0-40-057 | General retrieval quality flag | Code table | 0 | 0 | 3 |
| 0-40-058 | IASI level 2 retrieval flags | Flag table | 0 | 0 | 31 |
| 0-40-059 | Number of vectors describing the characterization matrices | Numeric | 0 | 0 | 8 |
| 0-40-060 | Number of layers actually retrieved | Numeric | 0 | 0 | 8 |
| 0-40-061 | Number of profiles retrieved in scanline | Numeric | 0 | 0 | 8 |
| 0-40-062 | Air partial columns on each retrieved layer | mol/cm² | 3 | 0 | 16 |
| 0-40-063 | A-priori partial columns on each retrieved layer | mol/cm² | 10 | 0 | 16 |
| 0-40-064 | Scaling vector multiplying the a priori CO vector in order to define the retrieved CO vector | Numeric | 5 | 0 | 26 |
| 0-40-065 | Main eigenvalues of the sensitivity matrix | Numeric | 6 | 0 | 31 |
| 0-40-066 | Main eigenvectors of the sensitivity matrix | Numeric | 6 | -1000000000 | 31 |
| 0-40-067 | Quality indicator for atmospheric water vapour | Numeric | 1 | 0 | 8 |
| 0-40-068 | Quality indicator for atmospheric temperature | Numeric | 1 | 0 | 8 |

*Add* the following associated code table:

0-40-043 Satellite manoeuvre indicator

|  |  |
| --- | --- |
| ***Code Figure*** | ***Description*** |
| 0 | The platform is not undergoing a manoeuvre |
| 1 | The platform is undergoing a manoeuvre, nominal processing |
| 2 | The platform is undergoing a manoeuvre, no processing |
| 3-6 | Reserved |
| 7 | Missing value |

*Add* the following associated flag table:

0-40-045 Cloud formation and height assignment

|  |  |
| --- | --- |
| ***Bit No*** | ***Description*** |
| 1 | Cloud products retrieved with the chi-squared method. |
| 2 | Cloud products retrieved with the CO2-slicing. |
| 3 | Height assignment performed with statistical first guess retrieval. |
| 4 | Height assignment performed with NWP forecasts. |
| All 5 | Missing value. |

*Add* the following associated code table:

0-40-046 Cloudiness summary

|  |  |
| --- | --- |
| ***Code Figure*** | ***Description*** |
| 0 | The IASI IFOV is clear |
| 1 | Small cloud contamination possible |
| 2 | The IASI IFOV is partially covered by clouds |
| 3 | High or full cloud coverage |
| 4-6 | Reserved |
| 7 | Missing value |

*Add* the following associated code table:

0-40-047 Validation flag for IASI or IASI-NG level 1 product

|  |  |
| --- | --- |
| ***Code Figure*** | ***Description*** |
| 0 | The IASI measurements and side information are available and of good quality for L2 processing |
| 1 | The IASI L1c products are of degraded quality according to IASI L1c flags, no L2 processing. |
| 2 | Quality control indicates that the IASI L1c data are of degraded quality (not indicated by the IASI L1c flags), no L2 processing. |
| 3-6 | Reserved |
| 7 | Missing value |

*Add* the following associated code table:

0-40-048 Validation flag of AMSU-A level 1 data flow

|  |  |
| --- | --- |
| ***Code Figure*** | ***Description*** |
| 0 | The expected AMSU measurements are available, of good quality and collocated with IASI for processing. |
| 1 | AMSU-A data are available but of degraded quality (according to AMSU L1 flags or QC tests) and not used for processing. |
| 2 | No coincident (time and space) AMSU measurements available for processing. |
| 3-6 | Reserved |
| 7 | Missing value |

*Add* the following associated flag table:

0-40-049 Cloud tests executed and results

|  |  |
| --- | --- |
| ***Bit No.*** | ***Description*** |
| 1-3 | Reserved |
| 4 | IASI cloud optical thickness indicates a cloud. |
| 5 | IASI cloud optical thickness computed. |
| 6 | AVHRR heterogeneity test indicates a cloud. |
| 7 | AVHRR heterogeneity test executed. |
| 8 | IASI-AVHRR ANN cloud test indicates a cloud. |
| 9 | IASI-AVHRR ANN cloud test executed. |
| 10 | AVHRR integrated cloud fraction indicates a cloud. |
| 11 | AVHRR integrated cloud fraction assessed. |
| 12 | AMSU cloud test indicates a cloud. |
| 13 | AMSU cloud test executed. |
| 14 | IASI Window cloud test indicates a cloud. |
| 15 | IASI Window cloud test executed. |
| All 16 | Missing value |

*Add* the following associated flag table:

0-40-050 Retrieval initialisation

|  |  |
| --- | --- |
| ***Bit No.*** | ***Description*** |
| 1-4 | Reserved |
| 5 | MHS included |
| 6 | AMSU included |
| 7 | IASI included |
| All 8 | Missing value |

*Add* the following associated code table:

0-40-051 Convergence of the iterative retrieval

|  |  |
| --- | --- |
| ***Code Figure*** | ***Description*** |
| 0 | OEM not attempted |
| 1 | OEM aborted because first guess residuals too high |
| 2 | The minimisation did not converge, sounding rejected |
| 3 | The minimisation did not converge, sounding accepted |
| 4 | The minimisation converged but sounding rejected |
| 5 | The minimisation converged, sounding accepted |
| 6 | Reserved |
| 7 | Missing value |

*Add* the following associated flag table:

0-40-052 Indication of super-adiabatic and super-saturation in final retrieval

|  |  |
| --- | --- |
| ***Bit No.*** | ***Description*** |
| 1-3 | Reserved |
| 4 | Supersaturation conditions in the OEM retrieval |
| 5 | Superadiabatic conditions in the OEM retrieval |
| 6 | Supersaturation conditions in the first guess |
| 7 | Superadiabatic conditions in the first guess |
| All 8 | Missing value |

*Add* the following associated flag table:

0-40-055 Potential processing and inputs errors

|  |  |
| --- | --- |
| ***Bit No.*** | ***Description*** |
| 1 | An error has been detected |
| 2 | Message from L1 |
| 3 | Message from L2 |
| 4 | Message from ancillary data |
| 5 | Message from fitting procedure |
| 6 | File opening |
| 7 | File reading |
| 8 | Quality flag |
| 9 | Level 2 "from linear regression"(F\_Qual), report a pixel where L2 are not fully trusted |
| 10 | Empty field or data |
| 11 | Missing surface pressure value |
| 12 | Radiance filtering |
| All 13 | Missing value |

*Add* the following associated flag table:

0-40-056 Diagnostics on the retrieval

|  |  |
| --- | --- |
| ***Bit No.*** | ***Description*** |
| 1 | Radiance filtering |
| 2 | Polar regions |
| 3 | Location in the night |
| 4 | Negative altitude Surface below m.s.l. |
| 5 | Cloud covered scene |
| 6 | Scene above the sea |
| 7 | Scene above desert |
| 8 | Skin temperature |
| 9 | Skin temperature differential |
| 10 | Spectral line contrast too weak |
| 11 | Maximum number of iterations exceeded |
| 12 | Negative partial columns |
| 13 | Matrix ill conditioned |
| 14 | Fit diverged |
| 15 | Error in gsl usage |
| 16 | Residuals “biased” |
| 17 | Residuals “sloped” |
| 18 | Residuals rms large |
| 19 | Weird averaging kernels |
| 20 | Ice presence detected |
| All 21 | Missing value |

*Add* the following associated code table:

0-40-057 General retrieval quality

|  |  |
| --- | --- |
| ***Code Figure*** | ***Description*** |
| 0 | Use not recommended |
| 1 | Use with caution |
| 2 | Best quality |
| 3-6 | Reserved |
| 7 | Missing value |

*Add* the following associated flag table:

0-40-058 IASI level 2 retrieval flags

|  |  |
| --- | --- |
| ***Bit No.*** | ***Description*** |
| 1 | An error has been detected |
| 2 | Message from L1 |
| 3 | Message from L2 |
| 4 | Message from ancillary data |
| 5 | Message from fitting procedure |
| 6 | Reserved |
| 7 | Bad L1 or L2 flag raised |
| 8 | Level 2 not fully trusted |
| 9 | Missing temperature or humidity levels in the vertical profile |
| 10 | Missing surface pressure value |
| 11 | Radiance filtering |
| 12 | Polar regions |
| 13 | Location in the night |
| 14 | Negative altitude |
| 15 | Cloud covered scene |
| 16 | Scene above the sea |
| 17 | Scene above desert |
| 18 | Missing skin temperature |
| 19 | Retrieved skin temperature too different from model |
| 20 | Spectral line contrast too weak |
| 21 | Maximum number of iterations exceeds |
| 22 | Negative partial columns |
| 23 | Matrix ill conditioned |
| 24 | Fit diverged |
| 25 | Error in GSL usage |
| 26 | Residuals biased |
| 27 | Residuals sloped |
| 28 | Residuals RMS large |
| 29 | Weird averaging kernels |
| 30 | Ice presence detected |
| 31 | All 31 bits |

**§ 2018-**[**2.4.4(CM-II)/New BUFR sequence for snow water equivalent (SWE) (FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_4)](#S2018_2_4_4)

The following new BUFR sequence 3 07 103 and corresponding BUFR table B entries and code table are proposed:

|  |  |  |
| --- | --- | --- |
| TABLE  REFERENCE | TABLE  REFERENCES | ELEMENT NAME |
| F X Y |
| **3 07 103** |  | (Snow observation, snow density, snow water equivalent) |
| 3 01 150 | WIGOS identifier |
| 3 07 101 | Snow observation |
| 0 13 117 | Snow density |
| 0 03 028 | Method of snow water equivalent measurement |
| 0 13 163 | Snow water equivalent |

**Class 03 – BUFR/CREX Instrumentation**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TABLE**  **REFERENCE** | **ELEMENT**  **NAME** | **BUFR** | | | | **CREX** | | |
| **F X Y** | **UNIT** | **SCALE** | **REFERENCE**  **VALUE** | **DATA**  **WIDTH**  **(Bits)** | **UNIT** | **SCALE** | **DATA**  **WIDTH**  **(Characters)** |
| 0 03 028 | Method Of Snow Water Equivalent Measurement | Code table | 0 | 0 | 6 | Code table | 0 | 2 |

**Class 13 – BUFR/CREX Hydrographic and hydrological elements**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TABLE**  **REFERENCE** | **ELEMENT**  **NAME** | **BUFR** | | | | **CREX** | | |
| **F X Y** | **UNIT** | **SCALE** | **REFERENCE**  **VALUE** | **DATA**  **WIDTH**  **(Bits)** | **UNIT** | **SCALE** | **DATA**  **WIDTH**  **(Characters)** |
| 0 13 163 | Snow Water Equivalent | Kg m-2 | 0 | 0 | 16 | Kg m-2 | 0 | 5 |

**Code table 0 03 028 – Method of Snow Water Equivalent Measurement**

|  |  |
| --- | --- |
| **Code figure** |  |
| 0 | MULTI POINT MANUAL SNOW SURVEY |
| 1 | SINGLE POINT MANUAL SNOW WATER EQUIVALENT MEASUREMENT |
| 2 | SNOW PILLOW OR SNOW SCALE |
| 3 | PASSIVE GAMMA |
| 4 | GNSS/GPS METHODS |
| 5 | COSMIC RAY ATTENUATION |
| 6 | TIME DOMAIN REFLECTOMETRY |
| 7-62 | Reserved |
| 63 | Missing |

**§ 2018-**[**2.4.5(CM-II)/Revision of BUFR sequence 3 09 056 – Sequence for representation of radiosonde descent data**](#S2018_2_4_5) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_5)

1. **Revised BUFR Table D sequence 3 09 056:**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **(Sequence for representation of radiosonde descent data)** |  |
| **3 09 056** | 3 01 150 | WIGOS identifier |  |
|  | 3 01 111 | Identification of launch site and instrumentation |  |
|  | 3 01 128 | Additional information on radiosonde ascent | Valid also for decent |
|  | 3 01 113 | Date/time of launch | (see Note 1) |
|  | 0 08 091 | Coordinates significance | = 2 Start of observation |
|  | 3 01 021 | Latitude/longitude (high accuracy) |  |
|  | 0 07 007 | Height | Begin of descending of radiosonde above mean sea level |
|  | 0 08 091 | Coordinates significance | Set to missing (cancel) |
|  | 1 01 000 | Delayed replication of 1 descriptor |  |
|  | 0 31 002 | Extended delayed descriptor replication factor |  |
|  | 3 03 056 | Temperature, dewpoint and wind data at a pressure level with radiosonde position and higher precision of pressure and geopotential height | (see Notes 2 and 3) |
|  | 1 01 000 | Delayed replication of 1 descriptor |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 3 03 051 | Wind shear data at a pressure level with radiosonde position |  |

Notes:

(1) Date/time of launch indicates date/time of start of descent measurement.

(2) In this sequence for representation of radiosonde descent data, indication of standard levels using the extended vertical sounding significance (0 08 042) is not mandatory.

(3) Data represented by this sequence should be sorted in descending order with respect to pressure.

**Add** new sequence 3 03 056 – “Temperature, dewpoint and wind data at a pressure level with radiosonde position and higher precision of pressure and geopotential height”

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | (Temperature, dewpoint and wind data at a pressure level with radiosonde position and higher precision of pressure and geopotential height) |  |
| **3 03 056** | 0 04 086 | Long time period or displacement (since launch time) | Since launch time |
|  | 0 08 042 | Extended vertical sounding significance |  |
|  | 2 07 001 | Increase scale, reference value and data width |  |
|  | 0 07 004 | Pressure | Scale: 0 |
|  | 0 10 009 | Geopotential height | Scale: 1 |
|  | 2 07 000 | Increase scale, reference value and data width | Cancel |
|  | 0 05 015 | Latitude displacement since launch site (high accuracy) |  |
|  | 0 06 015 | Longitude displacement since launch site (high accuracy) |  |
|  | 0 12 101 | Temperature/air temperature | Scale: 2 |
|  | 0 12 103 | Dewpoint temperature | Scale: 2 |
|  | 0 11 001 | Wind direction |  |
|  | 0 11 002 | Wind speed |  |

This sequence expands as follows:

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **Identification of drop site and instrumentation** |  |
|  |  | *WIGOS identifier* |  |
| **3 01 150** | 0 01 125 | WIGOS identifier series | Numeric, 0 |
|  | 0 01 126 | WIGOS issuer of identifier | Numeric, 0 |
|  | 0 01 127 | WIGOS issue number | Numeric, 0 |
|  | 0 01 128 | WIGOS local identifier (character) | CCITT IA5 |
|  |  | *Identification of launch site and instrumentation* |  |
| **3 01 111** | 3 01 001 | WMO block number | Numeric |
|  |  | WMO station number | Numeric |
|  | 0 01 011 | Ship or mobile land station identifier | CCITT IA5 |
|  | 0 02 011 | Radiosonde type | Code table |
|  | 0 02 013 | Solar and infrared radiation correction | Code table |
|  | 0 02 014 | Tracking technique/status of system used | Code table |
|  |  | *Additional information on radiosonde ascent* |  |
| **3 01 128** | 0 01 081 | Radiosonde serial number | CCITT IA5 |
|  | 0 01 082 | Radiosonde ascension number | Numeric, 0 |
|  | 0 01 083 | Radiosonde release number | Numeric, 0 |
|  | 0 01 095 | Observer identification | CCITT IA5 |
|  | 0 02 015 | Radiosonde completeness | Code table |
|  | 0 02 016 | Radiosonde configuration (3 = Parachute) | Flag table |
|  | 0 02 017 | Correction algorithms for humidity measurements | Code table |
|  | 0 02 066 | Radiosonde ground receiving system | Code table |
|  | 0 02 067 | Radiosonde operating frequency | Hz, scale -5 |
|  | 0 02 080 | Balloon manufacturer | Code table |
|  | 0 02 081 | Type of balloon | Code table |
|  | 0 02 082 | Weight of balloon | kg, scale 3 |
|  | 0 02 083 | Type of balloon shelter | Code table |
|  | 0 02 084 | Type of gas used in balloon | Code table |
|  | 0 02 085 | Amount of gas used in balloon | kg, scale 3 |
|  | 0 02 086 | Balloon flight train length | m, scale 1 |
|  | 0 02 095 | Type of pressure sensor | Code table |
|  | 0 02 096 | Type of temperature sensor | Code table |
|  | 0 02 097 | Type of humidity sensor | Code table |
|  | 0 02 103 | Radome | Flag table |
|  | 0 02 191 | Geopotential height calculation | Code table |
|  | 0 25 061 | Software identification and version number | CCITT IA5 |
|  | 0 35 035 | Reason for termination | Code table |
|  |  | **Date/time of drop** |  |
| **3 01 113** | 0 08 021 | Time significance (= 18 Launch time) | Code table |
|  | 3 01 011 | Year | Year |
|  |  | Month | Month |
|  |  | Day | Day |
|  | 3 01 013 | Hour | Hour |
|  |  | Minute | Minute |
|  |  | Second | Second |
|  |  | **Horizontal and vertical coordinates of drop site** |  |
| **0 08 091** |  | Coordinates significance (= 2 Start of observation) | Code table |
|  |  | *Latitude/longitude (high accuracy)* |  |
| **3 01 021** | 0 05 001 | Latitude (high accuracy) | Degree, scale 5 |
|  | 0 06 001 | Longitude (high accuracy) | Degree, scale 5 |
| **0 07 007** |  | Height |  |
| **0 08 091** |  | Coordinates significance (Set to missing (cancel)) |  |
|  |  | **Temperature, dewpoint and wind data at pressure levels** |  |
| **1 01 000** |  | Delayed replication of 1 descriptor |  |
| **0 31 002** |  | Extended delayed descriptor replication factor | Numeric |
|  |  | *Temperature, dewpoint and wind data at a pressure level with radiosonde position* |  |
| **3 03 056** | 0 04 086 | Long time period or displacement (since launch time) | Second |
|  | 0 08 042 | Extended vertical sounding significance | Flag table |
|  | 2 07 001 | Increase scale, reference value and data width |  |
|  | 0 07 004 | Pressure | Pa, scale 0 |
|  | 0 10 009 | Geopotential height | Gpm, scale 1 |
|  | 2 07 000 | Cancel increase scale, reference value and data width |  |
|  | 0 05 015 | Latitude displacement since launch site (high accuracy) | Degree, scale 5 |
|  | 0 06 015 | Longitude displacement since launch site (high accuracy) | Degree, scale 5 |
|  | 0 12 101 | Temperature/air temperature | K, scale 2 |
|  | 0 12 103 | Dewpoint temperature | K, scale 2 |
|  | 0 11 001 | Wind direction | Degree true |
|  | 0 11 002 | Wind speed | m s–1, scale 1 |
|  |  | **Wind shear data** |  |
| **1 01 000** |  | Delayed replication of 1 descriptor |  |
| **0 31 001** |  | Delayed descriptor replication factor | Numeric |
|  |  | *Wind shear data at a pressure level* |  |
| **3 03 051** | 0 04 086 | Long time period or displacement (since launch time) | Second |
|  | 0 08 042 | Extended vertical sounding significance | Flag table |
|  | 0 07 004 | Pressure | Pa, scale –1 |
|  | 0 05 015 | Latitude displacement since launch site (high accuracy) | Degree, scale 5 |
|  | 0 06 015 | Longitude displacement since launch site (high accuracy) | Degree, scale 5 |
|  | 0 11 061 | Absolute wind shear in 1 km layer below | m s–1, scale 1 |
|  | 0 11 062 | Absolute wind shear in 1 km layer above | m s–1, scale 1 |

**§ 2018-**[**2.4.6(CM-II)/New sequence for representation of radiosonde observation data with higher precision of pressure and geopotential height**](#S2018_2_4_6) **(FT2018-2/ABC2019)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_6)

**Add** new sequences 3 09 057 and 3 03 56 to Table D (FT2018-2):

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE  REFERENCE | TABLE  REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
|  |  | (Sequence for representation of TEMP, TEMP SHIP and TEMP MOBIL observation type data with higher precision of pressure and geopotential height) |  |
| **3 09 057** | 3 01 150 | WIGOS identifier |  |
|  | 3 01 111 | Identification of launch site and instrumentation for P, T, U and wind measurements |  |
|  | 3 01 128 | Additional information on radiosonde ascent |  |
|  | 3 01 113 | Date/time of launch |  |
|  | 3 01 114 | Horizontal and vertical coordinates of launch site |  |
|  | 3 02 049 | Cloud information reported with vertical soundings |  |
|  | 0 22 043 | Sea/water temperature |  |
|  | 1 01 000 | Delayed replication of 1 descriptor |  |
|  | 0 31 002 | Extended delayed descriptor replication factor |  |
|  | 3 03 056 | Temperature, dewpoint and wind data at a pressure level with radiosonde position and higher precision of pressure and geopotential height |  |
|  | 1 01 000 | Delayed replication of 1 descriptor |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 3 03 051 | Wind shear data at a pressure level with radiosonde position |  |

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE  REFERENCE | TABLE  REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
|  |  |  |  |
|  |  | (Temperature, dewpoint and wind data at a pressure level with radiosonde position and higher precision of pressure and geopotential height) |  |
| 3 03 056 | 0 04 086 | Long time period or displacement | Since launch time |
|  | 0 08 042 | Extended vertical sounding significance |  |
|  | 2 07 001 | Increase scale, reference value and data width |  |
|  | 0 07 004 | Pressure | Scale: 0 |
|  | 0 10 009 | Geopotential height | Scale: 1 |
|  | 2 07 000 | Increase scale, reference value and data width | Cancel |
|  | 0 05 015 | Latitude displacement (high accuracy) | Since launch site |
|  | 0 06 015 | Longitude displacement (high accuracy) | Since launch site |
|  | 0 12 101 | Temperature/air temperature | Scale: 2 |
|  | 0 12 103 | Dewpoint temperature | Scale: 2 |
|  | 0 11 001 | Wind direction |  |
|  | 0 11 002 | Wind speed |  |

**ADD (ABC2019):**

a note to B/C25,

Note: When a station has a capability to report pressure and geopotential height in a higher precision, the sequence 3 09 057 (Sequence for representation of TEMP, TEMP SHIP and TEMP MOBIL observation type data with higher precision of pressure and geopotential height) can be used instead of TM309052.

**§ 2018-**[**2.4.7(CM-II)/New BUFR sequence for describing the "First five" Fourier components of the directional wave spectrum**](#S2018_2_4_7) **(Validation)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_7)

**PROPOSAL**

Add new entries to BUFR Table B

**Class 42 (Oceanographic elements)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table Reference | Element name | BUFR | | | | CREX | | |
| Unit | Scale | Reference value | Data width (bits) | Unit | Scale | Data width (characters) |
| F XX YYY |
| 0 42 011 | a1 coefficient of the directional Fourier series | Numeric | 4 | -2 | 15 | Numeric | 4 | 6 |
| 0 42 012 | b1 coefficient of the directional Fourier series | Numeric | 4 | -2 | 15 | Numeric | 4 | 6 |
| 0 42 013 | a2 coefficient of the directional Fourier series | Numeric | 4 | -2 | 15 | Numeric | 4 | 6 |
| 0 42 014 | b2 coefficient of the directional Fourier series | Numeric | 4 | -2 | 15 | Numeric | 4 | 6 |
| 0 42 015 | Check factor K (inverse of wave ellipticity) | Numeric | 2 | 0 | 12 | Numeric | 2 | 4 |

Add new entry to BUFR Table D

**Category 15 (Oceanographic report sequences)**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **First five Fourier components of the wave spectrum** |  |
| 3 15 010 | 1 08 000 | Delayed replication of 8 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 22 080 | Waveband central frequency (Hz) |  |
|  | 0 22 096 | Spectral band width (Hz) |  |
|  | 0 22 069 | Spectral wave density (m2 Hz-1) |  |
|  | 0 42 011 | a1 coefficient of the directional Fourier series | First moment of the directional wave spectrum |
|  | 0 42 012 | b1 coefficient of the directional Fourier series | First moment of the directional wave spectrum |
|  | 0 42 013 | a2 coefficient of the directional Fourier series | Second moment of the directional wave spectrum |
|  | 0 42 014 | b2 coefficient of the directional Fourier series | Second moment of the directional wave spectrum |
|  | 0 42 015 | Check factor K (inverse of wave ellipticity) |  |

**§ 2018-[2.4.8(CM-II)/New BUFR sequence for reporting of basic ship AWS data](#S2018_2_4_8) (FT2019-1)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_8)

**ADD:**

in BUFR Table D,

**Category 08 – Surface report sequences (sea)**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Sequence for reporting of basic ship AWS observations |  |
| 3 08 018 | 3 01 150 | WIGOS Identifier |  |
|  | 3 01 093 | Ship identification, movement, date/time, horizontal and vertical coordinates |  |
|  | 3 02 001 | Pressure and 3-hour pressure change |  |
|  | 3 02 072 | Temperature and humidity data |  |
|  | 1 01 000 | Delayed replication of 1 descriptor |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 3 02 056 | Sea/water temperature |  |
|  | 1 01 000 | Delayed replication of 1 descriptor |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 3 02 064 | Ship or other marine platform wind data |  |

**§ 2018-**[**2.4.9(CM-II)/Review sequence 3-10-067**](#S2018_2_4_9) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_9)

**ADD:**

in Category 10 of BUFR Table D,

(see Note 2) to entry 3 10 067, and

Note: (2) In the context of 3-10-067, pressure values which immediately follow occurrences

of wind components should be understood to pertain to those components.

a new Table D entry

|  |  |  |  |
| --- | --- | --- | --- |
| 3 10 077 |  | (Satellite-derived winds) |  |
|  |  | *Processing information* |  |
|  | 0 01 033 | Identification of originating/generating centre |  |
|  | 0 01 034 | Identification of originating/generating sub-centre |  |
|  | 0 25 061 | Software identification and version number |  |
|  | 0 25 062 | Database identification |  |
|  |  | *Satellite/Instrument identification* |  |
|  | 0 01 007 | Satellite identifier |  |
|  | 0 02 153 | Satellite channel centre frequency |  |
|  | 0 01 012 | Direction of motion of moving observing platform |  |
|  | 2 01 138 | Change data width |  |
|  | 0 02 026 | Cross-track resolution |  |
|  | 0 02 027 | Along-track resolution |  |
|  | 2 01 000 | Cancel change data width |  |
|  |  | *Methods* |  |
|  | 0 02 028 | Segment size at nadir in x-direction (target box size) |  |
|  | 0 02 029 | Segment size at nadir in y-direction (target box size) |  |
|  | 0 02 161 | Wind processing method |  |
|  | 0 02 164 | Tracer correlation method |  |
|  | 0 02 023 | Satellite derived wind computation method |  |
|  | 0 08 012 | Land/sea qualifier |  |
|  | 0 08 013 | Day/night qualifier |  |
|  |  | *Final AMV data* |  |
|  | 0 01 124 | Grid point identifier | . |
|  | 0 05 001 | Latitude (high accuracy) |  |
|  | 0 06 001 | Longitude (high accuracy) |  |
|  | 0 04 001 | Year |  |
|  | 0 04 002 | Month |  |
|  | 0 04 003 | Day |  |
|  | 0 04 004 | Hour |  |
|  | 0 04 005 | Minute |  |
|  | 0 04 006 | Second |  |
|  | 0 04 086 | Long time period or displacement (seconds) |  |
|  | 0 02 162 | Extended height assignment method |  |
|  | 0 07 004 | Pressure |  |
|  | 0 11 001 | Wind direction |  |
|  | 0 11 002 | Wind speed |  |
|  | 0 11 003 | Wind u-component |  |
|  | 0 11 004 | Wind v-component |  |
|  | 0 12 001 | Temperature |  |
|  | 0 20 014 | Height of top of cloud |  |
|  | 0 07 024 | Satellite zenith angle |  |
|  | 0 01 023 | Observation sequence number |  |
|  | 1 04 000 | Delayed replication of 4 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 02 162 | Extended height assignment method |  |
|  | 0 07 004 | Pressure |  |
|  | 0 12 001 | Temperature |  |
|  | 0 20 014 | Height of top of cloud |  |
|  |  | *Image information (for each image used)* |  |
|  | 1 13 000 | Delayed replication of 13 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 04 086 | Long time period or displacement (seconds) |  |
|  | 0 02 020 | Satellite classification |  |
|  | 0 01 007 | Satellite identifier |  |
|  | 0 02 019 | Satellite instruments |  |
|  | 0 05 042 | Channel number |  |
|  | 0 02 153 | Satellite channel centre frequency |  |
|  | 0 05 040 | Orbit number |  |
|  | 0 07 024 | Satellite zenith angle |  |
|  | 0 05 021 | Bearing or azimuth |  |
|  | 0 02 162 | Extended height assignment method |  |
|  | 0 07 004 | Pressure |  |
|  | 0 12 001 | Temperature |  |
|  | 0 20 014 | Height of top of cloud |  |
|  |  | *Intermediate vectors (for each component vector)* |  |
|  | 1 19 000 | Delayed replication of 19 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 04 086 | Long time period or displacement (seconds) |  |
|  | 0 04 086 | Long time period or displacement (seconds) |  |
|  | 0 05 001 | Latitude (high accuracy) |  |
|  | 0 06 001 | Longitude (high accuracy) |  |
|  | 0 11 003 | u-component |  |
|  | 0 11 004 | v-component |  |
|  | 0 11 113 | Tracking correlation of vector |  |
|  | 0 25 148 | Coefficient of variation |  |
|  | 1 03 000 | Delayed replication of 3 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 08 023 | First order statistics |  |
|  | 0 11 003 | u-component |  |
|  | 0 11 004 | v-component |  |
|  | 0 08 023 | First order statistics | Set to missing (cancel) |
|  | 1 03 000 | Delayed replication of 3 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 20 111 | x-axis error ellipse major component |  |
|  | 0 20 112 | y-axis error ellipse minor component |  |
|  | 0 20 114 | Angle of x-axis in error ellipse |  |
|  |  | *Corresponding forecast data* |  |
|  | 0 01 033 | Identification of originating/generating centre |  |
|  | 0 08 021 | Time significance | = 27 First guess |
|  | 0 07 004 | Pressure |  |
|  | 0 11 095 | u-component of the model wind vector |  |
|  | 0 11 096 | v-component of the model wind vector |  |
|  | 0 08 021 | Time significance | = 4 Forecast |
|  | 0 07 004 | Pressure |  |
|  | 0 11 095 | u-component of the model wind vector |  |
|  | 0 11 096 | v-component of the model wind vector |  |
|  | 0 08 021 | Time significance | Set to missing (cancel) |
|  | 0 08 086 | Vertical significance for NWP | = 10 Level of best fit |
|  | 0 07 004 | Pressure |  |
|  | 0 11 095 | u-component of the model wind vector |  |
|  | 0 11 096 | v-component of the model wind vector |  |
|  | 0 08 086 | Vertical significance for NWP | Set to missing (cancel) |
|  |  | *Final AMV quality* |  |
|  | 1 02 004 | Replicate 2 descriptors 4 times |  |
|  | 0 01 044 | Standard generating application |  |
|  | 0 33 007 | Per cent confidence |  |
|  | 0 08 092 | Measurement uncertainty expression | = 0 Standard uncertainty |
|  | 0 07 004 | Pressure |  |
|  | 0 11 003 | u-component |  |
|  | 0 11 004 | v-component |  |
|  | 0 08 092 | Measurement uncertainty expression | Set to missing (cancel) |
|  | 0 33 066 | AMV Quality Flag |  |
|  |  | *Cloud data and microphysics (refers to the nominal image used for HA)* |  |
|  | 0 20 081 | Cloud amount |  |
|  | 0 20 012 | Cloud type |  |
|  | 0 20 056 | Cloud phase |  |
|  | 1 17 000 | Delayed replication of 17 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 08 023 | First order statistics |  |
|  | 0 20 016 | Pressure at the top of cloud |  |
|  | 0 08 092 | Measurement uncertainty expression | = 0 Standard uncertainty |
|  | 0 08 003 | Vertical significance (satellite observations) | = 2 Cloud top |
|  | 0 12 001 | Temperature |  |
|  | 0 08 003 | Vertical significance (satellite observations) | Set to missing (cancel) |
|  | 0 20 016 | Pressure at the top of cloud |  |
|  | 0 08 092 | Measurement uncertainty expression | Set to missing (cancel) |
|  | 0 25 149 | Optimal estimation cost |  |
|  | 0 20 016 | Pressure at top of cloud |  |
|  | 0 20 014 | Height of top of cloud |  |
|  | 0 13 093 | Cloud optical thickness |  |
|  | 0 13 109 | Ice/liquid water path |  |
|  | 0 40 038 | Cloud particle size |  |
|  | 0 08 011 | Meteorological feature | = 12 Cloud |
|  | 0 14 050 | Emissivity |  |
|  | 0 08 011 | Meteorological feature | Set to missing (cancel) |
|  | 0 08 023 | First order statistics | Set to missing (cancel) |

*Add* the following elements to BUFR Table B/01:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Descriptor** | **Name** | **Units** | **Scale** | **Reference** | **Width** |
| 0-01-044 | Standard generating application | Code table | 0 | 0 | 8 |

**Add:**

**the following associated code table:**

0-01-044 Standard generating application

|  |  |
| --- | --- |
| ***Code Figure*** | ***Description*** |
| 0 | Reserved |
| 1 | Full weighted mixture of individual quality tests |
| 2 | Weighted mixture of individual tests, but excluding forecast comparison |
| 3 | Recursive filter function |
| 4 | Common quality index (QI) without forecast |
| 5 | QI without forecast |
| 6 | QI with forecast |
| 7 | Estimated Error (EE) in m/s converted to a percent confidence |
| 8-254 | Reserved |
| 255 | Missing value |

**§ 2018-2.4.10(CM-II)/Revised BUFR template for surface observations from n-minute period (FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_10)

Revised Table D sequence 3 07 092:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE  REFERENCE | TABLE  REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
|  |  | (BUFR template for surface observations from n-minute period) |  |
| **3 07 092** | 3 01 150 | WIGOS identifier |  |
|  | 3 01 001 | WMO block and station numbers |  |
|  | 2 08 040 | Change width of CCITT IA5 |  |
|  | 0 01 019 | Long station or site name | 40 characters |
|  | 2 08 000 | Change width of CCITT IA5 |  |
|  | 3 01 011 | Year, month, day | The time identification refers to the end of the n-minute period. |
|  | 3 01 012 | Hour, minute |
|  | 3 01 021 | Latitude/longitude (high accuracy) |  |
|  | 0 07 030 | Height of station ground above mean sea level |  |
|  | 0 01 023 | Observation Sequence number |  |
|  | 1 08 000 | Delayed replication of 8 descriptors |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 0 07 031 | Height of barometer above mean sea level |  |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 10 004 | Pressure | Measured value of the air pressure at the sensor location and sensor height |
|  | 0 10 051 | Pressure reduced to mean sea level |  |
|  | 0 07 004 | Pressure (standard level) |  |
|  | 0 10 009 | Geopotential height of the standard level |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 15 000 | Delayed replication of 15 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 07 032 | Height of sensor above local ground |  |
|  | 0 08 010 | Surface qualifier |  |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 12 101 | Temperature/Air-temperature | Scale: 2 |
|  | 0 12 103 | Dew-point temperature | Scale: 2 |
|  | 2 02 129 | Change scale |  |
|  | 2 01 132 | Change data width |  |
|  | 0 13 003 | Relative humidity | Mandatory to report (presuming a humidity sensor is installed), data width 11 Bits |
|  | 2 01 000 | Cancel change data width |  |
|  | 2 02 000 | Cancel change scale |  |
|  | 0 13 009 | Relative humidity (original measured value) |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 0 07 032 | Height of sensor above local ground | Set to missing (cancel) |
|  | 0 08 010 | Surface qualifier | Set to missing (cancel) |
|  | 1 07 000 | Delayed replication of 7 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 07 061 | Depth below land surface |  |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 12 130 | Soil temperature |  |
|  | 0 13 111 | Soil moisture |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 0 07 061 | Depth below land surface | Set to missing (cancel) |
|  | 1 05 000 | Delayed replication of 5 descriptors |  |
|  | 0 31 000 | Delayed descriptor replication factor |  |
|  | 0 33 041 | Attribute of following value |  |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 20 001 | Horizontal visibility |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 13 000 | Delayed replication of 13 descriptors |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 20 010 | Cloud cover (total) |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 07 000 | Replicate 7 descriptors four times |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 08 002 | Vertical significance |  |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 20 011 | Cloud amount |  |
|  | 0 20 013 | Height of base of cloud |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 0 08 002 | Vertical significance | Set to missing (cancel) |
|  | 1 05 000 | Delayed replication of 5 descriptors |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 20 062 | State of ground (with or without snow) |  |
|  | 0 13 013 | Total snow depth |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 05 000 | Delayed replication of 5 descriptors |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 0 04 025 | Time period | = - n minutes |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 20 003 | Present weather |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 05 000 | Delayed replication of 5 descriptors |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 0 04 025 | Time period | = - n minutes |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 13 011 | Total precipitation / total water equivalent of snow |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 15 000 | Delayed replication of 15 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 07 032 | Height of sensor above local ground |  |
|  | 0 08 021 | Time significance | = 2 Time averaged |
|  | 0 04 025 | Time period | = –10 minutes, or number of minutes after a significant change of wind |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 11 001 | Wind direction |  |
|  | 0 11 002 | Wind speed |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 0 08 021 | Time significance | Set to missing (cancel) |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 11 043 | Maximum wind gust direction |  |
|  | 0 11 041 | Maximum wind gust speed |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 0 07 032 | Height of sensor above local ground | Set to missing (cancel) |
|  | 1 05 000 | Delayed replication of 5 descriptor |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 0 04 025 | Time period | = - n minutes (Default n=10) |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 14 031 | Total sunshine |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 10 000 | Delayed replication of 10 descriptors |  |
|  | 0 31 000 | Short delayed descriptor replication factor | Open or close (1/0) |
|  | 0 04 025 | Time period | = - n minutes (Default n=10) |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 14 002 | Long-wave radiation, integrated over period specified | Upward long-wave radiation  According to BUFR Table B, under Class 14, Note (2): negative values |
|  | 0 14 002 | Long-wave radiation, integrated over period specified | Downward long-wave radiation  According to BUFR Table B, under Class 14, Note (1): positive values |
|  | 0 14 004 | Short-wave radiation, integrated over period specified | Upward short-wave radiation  According to BUFR Table B, under Class 14, Note (2): negative values |
|  | 0 14 028 | Global solar radiation (high accuracy), integrated over period specified |  |
|  | 0 14 029 | Diffuse solar radiation (high accuracy), integrated over period specified |  |
|  | 0 14 030 | Direct solar radiation (high accuracy), integrated over period specified |  |
|  | 2 04 000 | Cancel associated field |  |
|  | 1 13 000 | Delayed replication of 13 descriptors |  |
|  | 0 31 000 | Short delayed descriptor replication factor |  |
|  | 0 04 025 | Time period | = - n minutes (Default n=10) |
|  | 0 02 071 | Spectrographic wavelength | UV-A: 315 nm |
|  | 0 02 072 | Spectrographic width | UV-A: 85 nm |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance |  |
|  | 0 14 072 | Global UV irradiation, integrated over period specified | UV-A irradiation  According to BUFR Table B under Class 14, Note (8)  *(ISO 21348: UV-A wave length range 315 ≤ λ ≤400 nm)* |
|  | 2 04 000 | Cancel associated field |  |
|  | 0 02 071 | Spectrographic wavelength | UV-B: 280 nm |
|  | 0 02 072 | Spectrographic width | UV-B: 35 nm |
|  | 2 04 018 | Add associated field |  |
|  | 0 31 021 | Associated field significance | Quality flag |
|  | 0 14 072 | Global UV irradiation, integrated over period specified | UV-B irradiation  According to BUFR Table B under Class 14, Note (8)  *(ISO 21348 UV-B wave length range 280 ≤ λ ≤ 315 nm)* |
|  | 2 04 000 | Cancel associated field |  |

The corresponding TM:

**TM 307092 - BUFR template for AWS surface observations from n-minute period**

This template is proposed to be used for representation of observation data from surface-based automatic weather stations obtained in n-minute intervals.

Main principles:

* All groups of data have replication factors: if your automatic system doesn’t code the group, the 0 31 001 factor is put to 0 and the group is « closed »
* Main data are able to be qualified with an Associated field significance

This BUFR template further expands as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table References** | | **Element Name** | **Unit, Scale** | **Element Description** |
|  |  | **(WIGOS identifier)** (1) |  |  |
| 3 01 150 | 0 01 125 | WIGOS identifier series | Numeric, 0 |  |
|  | 0 01 126 | WIGOS issuer of identifier | Numeric, 0 |  |
|  | 0 01 127 | WIGOS issue number | Numeric, 0 |  |
|  | 0 01 128 | WIGOS local identifier (character) | CCITT IA5 |  |
|  |  | **(Surface station identification)** |  |  |
| 3 01 001 | 0 01 001 | WMO block number (2) | Numeric, 0 |  |
|  | 0 01 002 | WMO station number (2) | Numeric, 0 |  |
| 2 08 040 |  | Change width of CCITT IA5 |  |  |
| 0 01 019 |  | Long station or site name | CCITT IA5, 0 | 40 characters |
| 2 08 000 |  | Change width of CCITT IA5 |  |  |
|  |  | **(Year, month, day)** |  |  |
| 3 01 011 | 0 04 001 | Year(3) | Year, 0 |  |
|  | 0 04 002 | Month(3) | Month, 0 |  |
|  | 0 04 003 | Day(3) | Day, 0 |  |
|  |  | **(Hour, minute)** |  |  |
| 3 01 012 | 0 04 004 | Hour(3) | Hour, 0 |  |
|  | 0 04 005 | Minute(3) | Minute, 0 |  |
|  |  | **(Latitude, longitude (high accuracy))** |  |  |
| 3 01 021 | 0 05 001 | Latitude (high accuracy) | Degree, 5 |  |
|  | 0 06 001 | Longitude (high accuracy) | Degree, 5 |  |
| 0 07 030 |  | Height of station ground above mean sea level | m, 1 |  |
| 0 01 023 |  | Observation Sequence number | Numeric, 0 |  |
|  |  |  |  |  |
|  |  | **(INSTANTANEOUS DATA)** |  |  |
|  |  | **(Air pressure)** |  |  |
| 1 08 000 |  | Delayed replication of 8 descriptors |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 | Open or close (1/0) |
| 0 07 031 |  | Height of barometer above mean sea level | m, 1 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 10 004 |  | Pressure | Pa, –1 | Measured value of the air pressure at the sensor location and sensor height |
| 0 10 051 |  | Pressure reduced to mean sea level | Pa, –1 |  |
| 0 07 004 |  | Pressure (standard level) | Pa, –1 |  |
| 0 10 009 |  | Geopotential height of the standard level | gpm, 0 |  |
| 2 04 000 |  | Cancel associated field |  |  |
|  |  | **(Temperature and humidity)** |  | Data measured in different heights (e.g. 2m and 0cm or 5cm for ground temperature) |
| 1 15 000 |  | Delayed replication of 15 descriptors |  |  |
| 0 31 001 |  | Delayed descriptor replication factor | Numeric, 0 |  |
| 0 07 032 |  | Height of sensor above local ground | m, 2 |  |
| 0 08 010 |  | Surface qualifier | Code table, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 12 101 |  | Temperature/Air-temperature (scale 2) | K, 2 |  |
| 0 12 103 |  | Dew-point temperature (scale 2) | K, 2 |  |
| 2 02 129 |  | Change scale |  |  |
| 2 01 132 |  | Change data width |  |  |
| 0 13 003 |  | Relative humidity | %, 1 | Mandatory to report (presuming a humidity sensor is installed), data width 11 Bits |
| 2 01 000 |  | Cancel change data width |  |  |
| 2 02 000 |  | Cancel change scale |  |  |
| 0 13 009 |  | Relative humidity (original measured value) | %, 1 |  |
| 2 04 000 |  | Cancel associated field |  |  |
| 0 07 032 |  | Height of sensor above local ground  (set to missing to cancel the previous value) | m, 2 |  |
| 0 08 010 |  | Surface qualifier  (set to missing to cancel the previous value) | Code table, 0 |  |
|  |  | **(Soil temperature and soil moisture)** |  |  |
| 1 07 000 |  | Delayed replication of 7 descriptors |  |  |
| 0 31 001 |  | Delayed descriptor replication factor | Numeric, 0 |  |
| 0 07 061 |  | Depth below land surface | m, 2 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 12 130 |  | Soil temperature | K, 2 |  |
| 0 13 111 |  | Soil moisture | g kg-1, 0 |  |
| 2 04 000 |  | Cancel associated field |  |  |
| 0 07 061 |  | Depth below land surface  (set to missing to cancel the previous value) | m, 2 |  |
|  |  | **(Visibility)** |  |  |
| 1 05 000 |  | Delayed replication of 6 descriptors |  |  |
| 0 31 000 |  | Delayed descriptor replication factor | Numeric, 0 |  |
| 0 33 041 |  | Attribute of following value | Code table, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 20 001 |  | Horizontal visibility | m, –1 |  |
| 2 04 000 |  | Cancel associated field |  |  |
|  |  | **(Cloud)** |  |  |
| 1 13 000 |  | Delayed replication of 13 descriptors |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 | Open or close (1/0) |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 20 010 |  | Cloud cover (total) | %, 0 |  |
| 2 04 000 |  | Cancel associated field |  |  |
| 1 07 000 |  | Replicate 7 descriptors four times |  | 4 cloud layers |
| 0 31 001 |  | Delayed descriptor replication factor | Numeric, 0 |  |
| 0 08 002 |  | Vertical significance | Code table, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 20 011 |  | Cloud amount | Code table, 0 |  |
| 0 20 013 |  | Height of base of cloud | m, –1 |  |
| 2 04 000 |  | Cancel associated field |  |  |
| 0 08 002 |  | Vertical significance (set to missing) | Code table, 0 |  |
|  |  |  |  |  |
|  |  | **(State of ground and snow depth measurement)** |  |  |
| 1 05 000 |  | Delayed replication of 5 descriptors |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 20 062 |  | State of ground (with or without snow) | Code table, 0 |  |
| 0 13 013 |  | Total snow depth | m, 2 |  |
| 2 04 000 |  | Cancel associated field |  |  |
|  |  |  |  |  |
|  |  | **(PERIOD DATA)** |  |  |
|  |  | **(Present weather)** |  |  |
| 1 05 000 |  | Delayed replication of 5 descriptors |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 | Open or close (1/0) |
| 0 04 025 |  | Time period (= - n minutes) | Minute, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 20 003 |  | Present weather |  |  |
| 2 04 000 |  | Cancel associated field |  |  |
|  |  | **(Precipitation)** |  |  |
| 1 05 000 |  | Delayed replication of 5 descriptors |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 | Open or close (1/0) |
| 0 04 025 |  | Time period (= - n minutes) | Minute, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 13 011 |  | Total precipitation / total water equivalent of snow | kg m-2, 1 |  |
| 2 04 000 |  | Cancel associated field |  |  |
|  |  | **(Wind)** |  | Data measured in different heights |
| 1 15 000 |  | Delayed replication of 15 descriptors |  |  |
| 0 31 001 |  | Delayed descriptor replication factor | Numeric, 0 |  |
| 0 07 032 |  | Height of sensor above local ground | m, 2 |  |
| 0 08 021 |  | Time significance = 2 Time averaged | Code table, 0 |  |
| 0 04 025 |  | Time period = –10 minutes, or number of minutes after a significant change of wind | Minute, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 11 001 |  | Wind direction | Degree true, 0 |  |
| 0 11 002 |  | Wind speed | m s-1, 1 |  |
| 2 04 000 |  | Cancel associated field |  |  |
| 0 08 021 |  | Time significance = missing value | Code table, 0 |  |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 11 043 |  | Maximum wind gust direction | Degree true, 0 |  |
| 0 11 041 |  | Maximum wind gust speed | m s-1, 1 |  |
| 2 04 000 |  | Cancel associated field |  |  |
| 0 07 032 |  | Height of sensor above local ground  (set to missing to cancel the previous value) | m, 2 |  |
|  |  | **(Sunshine)** |  |  |
| 1 05 000 |  | Delayed replication of 5 descriptor |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 | Open or close (1/0) |
|  |  |  |  |  |
| 0 04 025 |  | Time period (= - n minutes) | Minute, 0 | Default 10 minutes |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
|  |  |  |  |  |
| 0 14 031 |  | Total sunshine | Minute, 0 |  |
| 2 04 000 |  | Cancel associated field |  |  |
|  |  | **(Short- and long-wave radiation)** |  |  |
| 1 10 000 |  | Delayed replication of 10 descriptors |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 | Open or close (1/0) |
| 0 04 025 |  | Time period (= - n minutes) | Minute, 0 | Default 10 minutes |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 14 002 |  | Long-wave radiation, integrated over period specified | J m-2, -3 | Upward long-wave radiation  According to BUFR Table B, under Class 14, Note (2): negative values |
| 0 14 002 |  | Long-wave radiation, integrated over period specified | J m-2, -3 | Downward long-wave radiation  According to BUFR Table B, under Class 14, Note (1): positive values |
| 0 14 004 |  | Short-wave radiation, integrated over period specified | J m-2, -3 | Upward short-wave radiation  According to BUFR Table B, under Class 14, Note (2): negative values |
| 0 14 028 |  | Global solar radiation (high accuracy), integrated over period specified | J m-2, -2 |  |
| 0 14 029 |  | Diffuse solar radiation (high accuracy), integrated over period specified | J m-2, -2 |  |
| 0 14 030 |  | Direct solar radiation (high accuracy), integrated over period specified | J m-2, -2 |  |
| 2 04 000 |  | Cancel associated field |  |  |
|  |  | **(UV radiation)** |  |  |
| 1 13 000 |  | Delayed replication of 13 descriptors |  |  |
| 0 31 000 |  | Short delayed descriptor replication factor | Numeric, 0 | Open or close (1/0) |
| 0 04 025 |  | Time period (= - n minutes) | Minute, 0 | Default 10 minutes |
|  |  |  |  |  |
|  |  |  |  |  |
| 0 02 071 |  | Spectrographic wavelength | m, 13 | UV-A: 315 nm |
| 0 02 072 |  | Spectrographic width | m, 13 | UV-A: 85 nm |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 14 072 |  | Global UV irradiation, integrated over period specified | J m-2, 0 | UV-A irradiation  According to BUFR Table B under Class 14, Note (8)  *(ISO 21348: UV-A wave length range 315 ≤ λ ≤400 nm)* |
| 2 04 000 |  | Cancel associated field |  |  |
| 0 02 071 |  | Spectrographic wavelength | m, 13 | UV-B: 280 nm |
| 0 02 072 |  | Spectrographic width | m, 13 | UV-B: 35 nm |
| 2 04 018 |  | Add associated field |  |  |
| 0 31 021 |  | Associated field significance | Code table, 0 | Quality flag |
| 0 14 072 |  | Global UV irradiation, integrated over period specified | J m-2, 0 | UV-B irradiation  According to BUFR Table B under Class 14, Note (8)  *(ISO 21348 UV-B wave length range 280 ≤ λ ≤ 315 nm)* |
| 2 04 000 |  | Cancel associated field |  |  |

1. WIGOS Station Identifiers shall be used for n-minute period observations.
2. According to WMO letter 37992/2017/OBS/WIS/DRMM/DRC/WIGOS/ID issued 30 October 2017 Members are asked to follow the guidelines: When Members report data from observation sites that have traditional station identifiers, such as WMO block number (0 01 001)/WMO station number (0 01 002) and buoy platform identifier (0 01 005), they should also be reported in addition to corresponding WSI (3 01 150), to ensure the continuity of data use. On the other hand, the traditional station identifiers should be reported as "missing" when observation sites do not have the traditional identifiers.
3. The time identification refers **to the end of the n-minute period**.

**§ 2018-2.4.11(CM-II)/New BUFR sequence and code and flag tables for Sentinel-3 SRAL product (FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_4_11)

*Add* the following sequence “Sentinel-3 (S3) Level 2 Water Product” to BUFR Table D/40:

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| 3 40 017 | 001007 | Satellite identifier | 61 (Sentinel 3A) or 65 (Sentinel 3B) |
| 002019 | Satellite instruments | 178 (SRAL) |
| 005044 | Satellite cycle number |  |
| 001096 | Station acquisition |  |
| 005040 | Orbit number |  |
| 001040 | Processing centre id code |  |
| 025061 | Software identification and version number |  |
| 025182 | L1 processing flag |  |
| 025183 | L1 processing quality |  |
| 025181 | L2 processing flag |  |
| 025184 | L2 product status |  |
| 301011 | Year, month, day |  |
| 301013 | Hour, minute, second |  |
| 004007 | Seconds within a minute (microsecond accuracy) |  |
| 301021 | Latitude/longitude (high accuracy) |  |
| 005063 | Spacecraft roll |  |
| 005064 | Spacecraft pitch |  |
| 005066 | Spacecraft yaw |  |
| 010081 | Altitude of cog above reference ellipsoid |  |
| 010082 | Instantaneous altitude rate |  |
| 008075 | Ascending/descending orbit qualifier |  |
| 025090 | Orbit state flag |  |
| 008029 | Surface type |  |
| 201137 | Change data width | Increase data width by 9 bits |
| 202129 | Change scale | Add 1 to scale |
| 006021 | Distance |  |
| 202000 | Change scale | Cancel |
| 201000 | Change data width | Cancel |
| 010087 | Ocean depth/land elevation |  |
| 025096 | Radiometer state flag |  |
| 040012 | Radiometer data quality flag |  |
| 008077 | Radiometer sensed surface type |  |
| 104002 | Replicate 4 descriptors 2 times |  |
| 002153 | Satellite channel centre frequency |  |
| 012063 | Brightness temperature |  |
| 012065 | Standard deviation brightness temperature |  |
| 040013 | Radiometer brightness temperature interpretation flag |  |
| 007002 | Height or altitude |  |
| 011098 | Wind speed from radiometer |  |
| 013090 | Radiometer water vapour content |  |
| 013091 | Radiometer liquid content |  |
| 025164 | Radiometer wet tropospheric correction |  |
| 025095 | Altimeter state flag |  |
| 040023 | Auxiliary altimeter state flags |  |
| 025113 | Band specific altimeter correction quality flag |  |
| 008074 | Altimeter echo type |  |
| 025190 | Altimeter echo processing mode |  |
| 021144 | Altimeter rain flag |  |
| 025191 | Altimeter tracking mode |  |
| 021143 | Ku band rain attenuation |  |
| 013055 | Intensity of precipitation |  |
| 021169 | Ice presence indicator |  |
| 010101 | Squared off nadir angle of the satellite from waveform data |  |
| 015012 | Total electron count per square metre |  |
| 007002 | Height or altitude |  |
| 011097 | Wind speed from altimeter |  |
| 040024 | Meteorological map availability |  |
| 007002 | Height or altitude |  |
| 025126 | Model dry tropospheric correction |  |
| 025128 | Model wet tropospheric correction |  |
| 040011 | Interpolation flag |  |
| 007002 | Height or altitude |  |
| 011095 | U-component of the model wind vector |  |
| 011096 | V-component of the model wind vector |  |
| 010088 | Total geocentric ocean tide height (solution 1) |  |
| 010089 | Total geocentric ocean tide height (solution 2) |  |
| 010090 | Long period tide height |  |
| 010092 | Solid earth tide height |  |
| 010093 | Geocentric pole tide height |  |
| 010098 | Loading tide height geocentric ocean tide solution 1 |  |
| 010099 | Loading tide height geocentric ocean tide solution 2 |  |
| 010100 | Non-equilibrium long period tide height |  |
| 025127 | Inverted barometer correction |  |
| 040014 | High-frequency fluctuations of the sea-surface topography correction |  |
| 010085 | Mean sea surface height |  |
| 010086 | Geoid's height |  |
| 010096 | Mean dynamic topography |  |
| 010103 | Mean dynamic topography accuracy |  |
| 010102 | Sea surface height anomaly |  |
| 022080 | Waveband central frequency |  |
| 008076 | Type of band |  |
| 022189 | Specific band ocean range |  |
| 022191 | Rms of specific band ocean range |  |
| 022130 | Number of valid points for specific band |  |
| 025165 | Ionospheric correction from model on specific band |  |
| 025166 | Sea state bias correction on specific band |  |
| 025167 | Specific band net instrumental correction |  |
| 021183 | Specific band corrected ocean backscatter coefficient |  |
| 021184 | Std specific band corrected ocean backscatter coefficient |  |
| 022134 | Number of valid points for specific band backscatter |  |
| 021122 | Attenuation correction on sigma-0 (from tb) |  |
| 022190 | Specific band significant wave height |  |
| 022131 | Rms specific band significant wave height |  |
| 022132 | Number of valid points for specific band sign. Wave height |  |
| 022133 | Specific band net instr. Correction for significant wave height |  |
| 021186 | Specific band automatic gain control |  |
| 021187 | Rms specific band automatic gain control |  |
| 021188 | Number of valid points for specific band automatic gain control |  |
| 021185 | Specific band net instrumental correction for agc |  |
| 025112 | Band specific altimeter data quality flag |  |
| 025113 | Band specific altimeter correction quality flag |  |
| 033092 | Band specific ocean quality flag |  |
| 008076 | Type of band |  |
| 022189 | Specific band ocean range |  |
| 022191 | Rms of specific band ocean range |  |
| 022130 | Number of valid points for specific band |  |
| 025165 | Ionospheric correction from model on specific band |  |
| 025166 | Sea state bias correction on specific band |  |
| 025167 | Specific band net instrumental correction |  |
| 021183 | Specific band corrected ocean backscatter coefficient |  |
| 021184 | Std specific band corrected ocean backscatter coefficient |  |
| 022134 | Number of valid points for specific band backscatter |  |
| 021122 | Attenuation correction on sigma-0 (from tb) |  |
| 022190 | Specific band significant wave height |  |
| 022131 | Rms specific band significant wave height |  |
| 022132 | Number of valid points for specific band sign. Wave height |  |
| 022133 | Specific band net instr. Correction for significant wave height |  |
| 021186 | Specific band automatic gain control |  |
| 021187 | Rms specific band automatic gain control |  |
| 021188 | Number of valid points for specific band automatic gain control |  |
| 021185 | Specific band net instrumental correction for agc |  |
| 025112 | Band specific altimeter data quality flag |  |
| 025113 | Band specific altimeter correction quality flag |  |
| 033092 | Band specific ocean quality flag |  |
| 025190 | Altimeter echo processing mode |  |
| 011097 | Wind speed from altimeter |  |
| 013090 | Radiometer water vapour content |  |
| 013091 | Radiometer liquid content |  |
| 021143 | Ku band rain attenuation |  |
| 021184 | Std specific band corrected ocean backscatter coefficient |  |
| 025128 | Model wet tropospheric correction |  |
| 025163 | Altimeter ionospheric correction on ku band |  |
| 025164 | Radiometer wet tropospheric correction |  |
| 010102 | Sea surface height anomaly |  |
| 022189 | Specific band ocean range |  |
| 022191 | Rms of specific band ocean range |  |
| 022130 | Number of valid points for specific band |  |
| 025166 | Sea state bias correction on specific band |  |
| 021183 | Specific band corrected ocean backscatter coefficient |  |
| 021184 | Std specific band corrected ocean backscatter coefficient |  |
| 022134 | Number of valid points for specific band backscatter |  |
| 022190 | Specific band significant wave height |  |
| 022131 | Rms specific band significant wave height |  |
| 022132 | Number of valid points for specific band sign. Wave height |  |
| 025112 | Band specific altimeter data quality flag |  |
| 025113 | Band specific altimeter correction quality flag |  |
| 033092 | Band specific ocean quality flag |  |
| 008049 | Number of observations |  |
| 022080 | Waveband central frequency |  |
| 134021 | Replicate 34 descriptors 21 times |  |
| 301011 | Year, month, day |  |
| 301013 | Hour, minute, second |  |
| 004007 | Seconds within a minute (microsecond accuracy) |  |
| 301021 | Latitude/longitude (high accuracy) |  |
| 010081 | Altitude of cog above reference ellipsoid |  |
| 010082 | Altitude of cog above reference ellipsoid |  |
| 008029 | Surface type |  |
| 201137 | Change data width | Add 9 bits to data width |
| 202129 | Change scale | Add 1 to scale |
| 006021 | Distance |  |
| 202000 | Change scale | Cancel |
| 201000 | Change data width | Cancel |
| 025191 | Altimeter tracking mode |  |
| 021071 | Peakiness |  |
| 010085 | Mean sea surface height |  |
| 040011 | Interpolation flag |  |
| 010102 | Sea surface height anomaly |  |
| 022189 | Specific band ocean range |  |
| 022146 | Ocog range |  |
| 025165 | Ionospheric correction from model on specific band |  |
| 025167 | Specific band net instrumental correction |  |
| 021183 | Specific band corrected ocean backscatter coefficient |  |
| 022190 | Specific band significant wave height |  |
| 022133 | Specific band net instr. Correction for significant wave height |  |
| 021177 | Corrected ocog backscatter coefficient |  |
| 021185 | Specific band net instrumental correction for agc |  |
| 013163 | Sea ice freeboard |  |
| 202126 | Change scale | Subtract 2 bits from scale |
| 022046 | Sea ice fraction |  |
| 202000 | Change scale | Cancel |
| 013117 | Snow density (liquid water content) |  |
| 013013 | Total snow depth |  |
| 025112 | Band specific altimeter data quality flag |  |
| 033092 | Band specific ocean quality flag |  |

*Add* the following element to BUFR Table B/25:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Descriptor | Name | Units | Scale | Reference | Width |
| 0-25-190 | Altimeter echo processing mode | Code table | 0 | 0 | 8 |
|  |  | Code table | 0 |  | 3 |

*Add* the following associated code table:

0-25-190 Altimeter echo processing mode

|  |  |
| --- | --- |
| *Code figure* | *Description* |
| 0 | Low Resolution Mode (LRM) |
| 1 | Synthetic Aperture Radar (SAR) |
| 2 | LRM and SAR (interleaved) |
| 3 | Reserved |
| 4 | Pseudo-LRM (PLRM) |
| 5 | SAR Interferometric Mode (SARIN) |
| 6-254 | Reserved |
| 255 | Missing value |

*Add* the following element to BUFR Table B/25:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Descriptor | Name | Units | Scale | Reference | Width |
| 0-25-191 | Altimeter tracking mode | Code table | 0 | 0 | 8 |
|  |  | Code table | 0 |  | 3 |

*Add* the following associated code table:

0-25-191 Altimeter tracking mode

|  |  |
| --- | --- |
| *Code figure* | *Description* |
| 0 | Open loop |
| 1 | Closed loop |
| 2 | Open Loop Fixed Gain |
| 3-254 | Reserved |
| 255 | Missing value |

*Add* the following element to BUFR Table B/10:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Descriptor | Name | Units | Scale | Reference | Width |
| 0-10-103 | Mean dynamic topography accuracy | m | 3 | -131072 | 18 |
|  |  | m | 3 |  | 6 |

*Add* the following element to BUFR Table B/33:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Descriptor | Name | Units | Scale | Reference | Width |
| 0-33-092 | Band specific ocean quality flag | Flag table | 0 | 0 | 9 |
|  |  | Flag table | 0 |  | 3 |

*Add* the following associated flag table:

0-33-092 Band specific ocean quality flag

|  |  |
| --- | --- |
| *Bit* | *Description* |
| 1 | Altimeter operating |
| 2 | MicroWave Radiometer (MWR) operating |
| 3-8 | Reserved |
| All 9 bits | Missing value |

*Add* the following element to BUFR Table B/13:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Descriptor | Name | Units | Scale | Reference | Width |
| 0-13-164 | Sea ice freeboard | m | 3 | -131072 | 18 |
|  |  | m | 3 |  | 6 |

**§ 2018-**[**2.5.1(CM-II)/Proposal for new entries in Common Code table C-5 and C-8**](#S2018_2_5_1) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_5_1)

*Add* the following elements to Common Code Table C5 Satellite identifier:

|  |  |  |  |
| --- | --- | --- | --- |
| *Code figure for I6I6I6* | *Code figure for BUFR (Code table 0 01 007)* | *Code figure for GRIB Edition 2* |  |
| 423 | 423 | 423 | Oceansat-3 |
| 503 | 503 | 503 | Hai Yang 2B (HY-2B, SOA/NSOAS China) |
| 802 | 802 | 802 | CFOSAT |

*Add* the following elements to Common Code Table C8 Satellite instruments:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Code* | *Agency* | *Type* | *Instrument short name* | *Instrument long name* |
| 943 | CNSA | Scatterometer | SCAT (on CFOSAT) | Scatterometer |

**§ 2018-**[**2.5.2(CM-II)/New entry in Common Code table C-2 for new radiosondes (FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_5_2)](#S2018_2_5_2)

**Amend:**

in Common Code Table C-2 : “Radiosonde/sounding system used” ,

replace the row

|  |  |  |  |
| --- | --- | --- | --- |
| Date of assignment of number (necessary after 30/06/2007) | Code figure for rara  (Code table 3685) | Code figure for BUFR  (Code table  0 02 011) |  |
| Needed | 63-66 | 163-166 | Vacant |

with the following rows:

|  |  |  |  |
| --- | --- | --- | --- |
| Date of assignment of number (necessary after 30/06/2007) | Code figure for rara  (Code table 3685) | Code figure for BUFR  (Code table  0 02 011) |  |
| 07/11/2018 | 63 | 163 | Modem M20 radiosonde w/thermistor sensor, capacitance relative humidity sensor, and derived pressure from GPS height (France) |
| 07/11/2018 | 64 | 164 | Modem PilotSonde GPS radiosonde (France) |
| Needed | 65-66 | 165-166 | Vacant |

**§ 2018-**[**2.5.3(CM-II)/New entries in Common Code Table C-12**](#S2018_2_5_3) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_5_3)

Add

in Common Code Table C-12 : “Sub-centre of originating centres defined by entries in Common Code tables C–1 or C–11”, under Region VI,

|  |  |  |  |
| --- | --- | --- | --- |
| Code figure | Name | Code figure | Name |
| 85 | Toulouse (RSMC) | 203 | Aarhus University (Denmark) |
| 85 | Toulouse (RSMC) | 204 | the Institute of Environmental Protection – National Research Institute (Poland) |

**§ 2018-**[**2.5.4(CM-II)/New entries in Common Code tables C-5 and C-8**](#S2018_2_5_4) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_5_4)

**Add:**

in Common Code table C-5 Satellite identifier,

|  |  |  |  |
| --- | --- | --- | --- |
| *Code figure for I6I6I6* | *Code figure for BUFR (Code table 0 01 007)* | *Code figure for GRIB Edition 2* |  |
| 803 | 803 | 803 | GRACE C (GRACE-FO) |
| 804 | 804 | 804 | GRACE D (GRACE-FO) |

in Common Code Table C8 - Satellite instruments,

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Code* | *Agency* | *Type* | *Instrument short name* | *Instrument long name* |
| 104 | NASA | GNSS occultation sounder | Tri-G | Triple-G (GPS, Galileo, GLONASS) |

**§ 2018-2.5.5(CM-II)/New entries in Common Code Table C-3**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_5_5)

Add new entries to Common Code Table C-3: Instrument make and type for water temperature profile measurement with fall rate equation coefficients

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Code figure for IxIxIx | Code figure for BUFR  (Code table 0 22 067) | Meaning | | |
| Instrument make and type | Equation Coefficients | |
| a | b |
| 873 | 873 | ALTO | Not applicable | |
| 874 | 874 | SOLO\_D\_MRV | Not applicable | |

**§ 2018-**[**2.6.1(CM-II)/GRIB edition 3 samples**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_1)](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_1)

| GRIB3 sample | Sample output | GRIB3 templates used in the sample |
| --- | --- | --- |
| [time3.0horizonal4.0vertical5.0.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.0vertical5.0.grib3?version=2&modificationDate=1524131406893&api=v2) | [time3.0horizonal4.0vertical5.0.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.0vertical5.0.grib3.txt?version=1&modificationDate=1524132419283&api=v2) | [Template 3.0 - Forecast Point in Time](https://software.ecmwf.int/wiki/display/DGOV/Template+3.0+-+Forecast+Point+in+Time)  [Template 4.0 - Latitude/longitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892446)  [Template 5.0 - Vertical level](https://software.ecmwf.int/wiki/display/DGOV/Template+5.0+-+Vertical+level) |
| [time3.0horizonal4.0vertical5.1.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.0vertical5.1.grib3?version=1&modificationDate=1524131805702&api=v2) | [time3.0horizonal4.0vertical5.1.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.0vertical5.1.grib3.txt?version=1&modificationDate=1524132419281&api=v2) | [Template 3.0 - Forecast Point in Time](https://software.ecmwf.int/wiki/display/DGOV/Template+3.0+-+Forecast+Point+in+Time)  [Template 4.0 - Latitude/longitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892446)  [Template 5.1 - Vertical layer](https://software.ecmwf.int/wiki/display/DGOV/Template+5.1+-+Vertical+layer) |
| [time3.0horizonal4.1vertical5.0.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.1vertical5.0.grib3?version=1&modificationDate=1524131406889&api=v2) | [time3.0horizonal4.1vertical5.0.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.1vertical5.0.grib3.txt?version=1&modificationDate=1524132419280&api=v2) | [Template 3.0 - Forecast Point in Time](https://software.ecmwf.int/wiki/display/DGOV/Template+3.0+-+Forecast+Point+in+Time)  [Template 4.1 - Rotated latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892966)  [Template 5.0 - Vertical level](https://software.ecmwf.int/wiki/display/DGOV/Template+5.0+-+Vertical+level) |
| [time3.0horizonal4.1vertical5.1.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.1vertical5.1.grib3?version=1&modificationDate=1524131378287&api=v2) | [time3.0horizonal4.1vertical5.1.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.1vertical5.1.grib3.txt?version=1&modificationDate=1524132419277&api=v2) | [Template 3.0 - Forecast Point in Time](https://software.ecmwf.int/wiki/display/DGOV/Template+3.0+-+Forecast+Point+in+Time)  [Template 4.1 - Rotated latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892966)  [Template 5.1 - Vertical layer](https://software.ecmwf.int/wiki/display/DGOV/Template+5.1+-+Vertical+layer) |
| [time3.0horizonal4.2vertical5.0.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.2vertical5.0.grib3?version=1&modificationDate=1524131378286&api=v2) | [time3.0horizonal4.2vertical5.0.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.2vertical5.0.grib3.txt?version=1&modificationDate=1524133734635&api=v2) | [Template 3.0 - Forecast Point in Time](https://software.ecmwf.int/wiki/display/DGOV/Template+3.0+-+Forecast+Point+in+Time)  [Template 4.2 - Stretched latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892971)  [Template 5.0 - Vertical level](https://software.ecmwf.int/wiki/display/DGOV/Template+5.0+-+Vertical+level) |
| [time3.0horizonal4.2vertical5.1.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.2vertical5.1.grib3?version=1&modificationDate=1524131378284&api=v2) | [time3.0horizonal4.2vertical5.1.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.2vertical5.1.grib3.txt?version=1&modificationDate=1524132991784&api=v2) | [Template 3.0 - Forecast Point in Time](https://software.ecmwf.int/wiki/display/DGOV/Template+3.0+-+Forecast+Point+in+Time)  [Template 4.2 - Stretched latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892971)  [Template 5.1 - Vertical layer](https://software.ecmwf.int/wiki/display/DGOV/Template+5.1+-+Vertical+layer) |
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| [time3.0horizonal4.3vertical5.1.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.3vertical5.1.grib3?version=1&modificationDate=1524131378280&api=v2) | [time3.0horizonal4.3vertical5.1.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.0horizonal4.3vertical5.1.grib3.txt?version=1&modificationDate=1524134307373&api=v2) | [Template 3.0 - Forecast Point in Time](https://software.ecmwf.int/wiki/display/DGOV/Template+3.0+-+Forecast+Point+in+Time)  [Template 4.3 - Stretched and rotated latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892978)  [Template 5.1 - Vertical layer](https://software.ecmwf.int/wiki/display/DGOV/Template+5.1+-+Vertical+layer) |
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| [time3.1horizonal4.1vertical5.1.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.1vertical5.1.grib3?version=1&modificationDate=1524131335444&api=v2) | [time3.1horizonal4.1vertical5.1.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.1vertical5.1.grib3.txt?version=1&modificationDate=1524134391437&api=v2) | [Template 3.1 – Forecast time interval](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=83399688)  [Template 4.1 - Rotated latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892966)  [Template 5.1 - Vertical layer](https://software.ecmwf.int/wiki/display/DGOV/Template+5.1+-+Vertical+layer) |
| [time3.1horizonal4.2vertical5.0.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.2vertical5.0.grib3?version=1&modificationDate=1524131335442&api=v2) | [time3.1horizonal4.2vertical5.0.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.2vertical5.0.grib3.txt?version=1&modificationDate=1524132852132&api=v2) | [Template 3.1 – Forecast time interval](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=83399688)  [Template 4.2 - Stretched latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892971)  [Template 5.0 - Vertical level](https://software.ecmwf.int/wiki/display/DGOV/Template+5.0+-+Vertical+level) |
| [time3.1horizonal4.2vertical5.1.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.2vertical5.1.grib3?version=1&modificationDate=1524131296782&api=v2) | [time3.1horizonal4.2vertical5.1.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.2vertical5.1.grib3.txt?version=2&modificationDate=1524132991785&api=v2) | [Template 3.1 – Forecast time interval](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=83399688)  [Template 4.2 - Stretched latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892971)  [Template 5.1 - Vertical layer](https://software.ecmwf.int/wiki/display/DGOV/Template+5.1+-+Vertical+layer) |
| [time3.1horizonal4.3vertical5.0.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.3vertical5.0.grib3?version=1&modificationDate=1524131277461&api=v2) | [time3.1horizonal4.3vertical5.0.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.3vertical5.0.grib3.txt?version=1&modificationDate=1524132852128&api=v2) | [Template 3.1 – Forecast time interval](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=83399688)  [Template 4.3 - Stretched and rotated latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892978)  [Template 5.0 - Vertical level](https://software.ecmwf.int/wiki/display/DGOV/Template+5.0+-+Vertical+level) |
| [time3.1horizonal4.3vertical5.1.grib3](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.3vertical5.1.grib3?version=1&modificationDate=1524131266626&api=v2) | [time3.1horizonal4.3vertical5.1.grib3.txt](https://software.ecmwf.int/wiki/download/attachments/104235175/time3.1horizonal4.3vertical5.1.grib3.txt?version=1&modificationDate=1524132852125&api=v2) | [Template 3.1 – Forecast time interval](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=83399688)  [Template 4.3 - Stretched and rotated latitude/logitude regular grid on ellipsoidal planet](https://software.ecmwf.int/wiki/pages/viewpage.action?pageId=81892978)  [Template 5.1 - Vertical layer](https://software.ecmwf.int/wiki/display/DGOV/Template+5.1+-+Vertical+layer) |

**§ 2018-**[**2.6.2(CM-II)/Horizontal domain URL**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_2)[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_2)

***Horizontal Domain Template Component 4.14 – URL***

|  |  |
| --- | --- |
| Byte No. | Contents |
| 1-2 | NURL - number of bytes used by the URL |
| 3 - 3+NURL | URL (note 1) |
| 4+NURL | verification checksum algorithm (code table 4.x) |
| 5+NURL - 5+NURL+NN | checksum (note 2) |

Notes:

(1) A URL is a Uniform Resource Locator that is identifying a web resource and is used in this context to locate and retrieve a GRIB message providing the template to be used.

The syntax of the URL is:

**scheme://**[**host**[**:port**]]**/path**[?**query**]

where port and query are optional and can be missing.

(2) the number of bytes NN is dictated by the verification checksum algorithm. Note that NN=0 if the checksum algorithm is set to "missing".

**Code table 4.x** – *Verification checksum algorithm*

Code figure Meaning

0 CRC32

1 MD5

2 SHA1

3-191 reserved

192-254 reserved for local use

255 Missing

***Horizontal Domain Template 4.9 – URL***

|  |  |
| --- | --- |
| Component Code | Component Name |
| 4.1 | URL |

**§ 2018-**[**2.6.3(CM-II)/Overlay Template URL**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_3)[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_3)

***Overlay Template Component 9.1 – URL***

|  |  |
| --- | --- |
| Byte No. | Contents |
| 1-2 | NURL - number of bytes used by the URL |
| 3 - 3+NURL | URL (note 1) |
| 4+NURL | verification checksum algorithm (code table 9.x) |
| 5+NURL - 5+NURL+NN | checksum (note 2) |

Notes:

(1) A URL is a Uniform Resource Locator that is identifying a web resource and is used in this context to locate and retrieve a GRIB message providing the template to be used.

The syntax of the URL is:

**scheme://**[**host**[**:port**]]**/path**[?**query**]

where port and query are optional and can be missing.

(2) the number of bytes NN is dictated by the verification checksum algorithm. Note that NN=0 if the checksum algorithm is set to "missing".

**Code table 9.x** – *Verification checksum algorithm*

Code figure Meaning

0 CRC32

1 MD5

2 SHA1

3-191 reserved

192-254 reserved for local use

255 Missing

***Overlay Template 9.1 – URL***

|  |  |
| --- | --- |
| Component Code | Component Name |
| 4.1 | URL |

**§ 2018-**[**2.6.4(CM-II)/New template components and templates for model level in GRIB Edition 3**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_4)[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_4)

It was stated, that the proposals and especially code table 5.2 need to be exactly defined by experts.

The following proposals are regarded as contributions to a possible solution and to enhance the discussion.

First we propose to split the computing algorithm and the parameter list: extract “algorithm” from template component VDTC 5.2 and put it into another (new) template component.

Then VDTC 5.2 looks like (with correction in offset):

***NEW (modified): VDTC 5.2 – Model level parameters list***

|  |  |
| --- | --- |
| **Byte No**. | **Contents** |
| 1-4 | NP – number of parameters |
| 5 – 4+NP\*4 | List of parameters (IEEE 32-bit floating –point) |

With “algorithm” in new template component:

***NEW: VDTC 5.x – Meta data for vertical coordinates (vertical grid identifier for model level)***

|  |  |
| --- | --- |
| **Byte No**. | **Contents** |
| 1-3 | Number of vertical grid (defined by originating center, Note 1) |
| 4 | Number of vertical grid in reference (Vertical staggering, code table 5.x) |
| 5-6 | Total number of vertical levels (according to code table 5.x) |
| 7 | Algorithm to compute height, depth, pressure or any other model level (code table 5.2) |
| 8 | Direction of increasing coordinate numbering (code table 5.y) |
| 9-24 | Fingerprint (unique identifier) |
|  |  |
| Note (1) | Identification number of vertical grid (Can be missing, but necessary in case of missing model level parameters or if a URL is used) |
|  |  |
|  |  |
| ***Code table 5.x*** | ***Vertical staggering*** |
|  |  |
| **Code** | **Meaning** |
| 0 | half level |
| 1 | full level |
| 2 | half levels given, full levels coded as layers between half levels |
| 3 | full levels given, half levels coded as layers between full levels |
| 255 | missing |
|  |  |
| ***Code table 5.y*** | ***Direction of increasing coordinate numbering*** |
|  |  |
| **Code** | **Meaning** |
| 0 | up |
| 1 | down |
| 255 | missing |
|  |  |

NEW VDT 5.2, 5.3, 5.5 and 5.6 (remove old ones):

***VDT 5.2 – Model level with list of parameters and URL of auxiliary fields***

***TC Content***

5.4 Level

5.x Meta data for vertical coordinate

5.2 Model level parameter list

99.0 Auxiliary fields URL

***VDT 5.3 – Model level with URL of list of parameters and URL of auxiliary fields***

***TC Content***

5.4 Level

5.x Meta data for vertical coordinate

99.0 Model level parameter list URL

99.0 Auxiliary fields URL

***VDT 5.5 – Layer of model level with list of parameters and URL of auxiliary fields***

***TC Content***

5.4 Level

5.4 Level

5.x Meta data for vertical coordinate

5.2 Model level parameter list

99.0 Auxiliary fields URL

***VDT 5.6 – Layer of model level with URL of list of parameters and URL of auxiliary fields***

***TC Content***

5.4 Level

5.4 Level

5.x Meta data for vertical coordinate

99.0 Model level parameter list URL

99.0 Auxiliary fields URL

Templates without URL of auxiliary fields could be the above ones without “Auxiliary fields URL”.

To define the “general vertical coordinate”, we propose the following templates:

***VDT 5.x – General vertical coordinate: model level***

***TC Content***

5.4 Level

5.x Meta data for vertical coordinate

***VDT 5.6 – General vertical coordinate: layer of model level***

***TC Content***

5.4 Level

5.4 Level

5.x Meta data for vertical coordinate

with new entry in code table 5.2 :

“Algorithm to compute height, depth, pressure or any other model level”

|  |  |
| --- | --- |
| ***Code table 5.2*** | ***Algorithm to compute height, depth or pressure or any other model level*** |
|  |  |
| **Code** | **Meaning** |
| 0 | The atmosphere is divided into NLEV layers. These layers are defined by the pressures at the interfaces between them (the 'half-levels'), and these pressures are given by  pk+1/2 = Ak+1/2 + Bk+1/2 ps (1)  for 0 ≤ k ≤ NLEV. The Ak+1/2 and Bk+1/2 are constants whose values effectively define the vertical coordinate and ps is the surface pressure field.  The values of the A k+1/2 and Bk+1/2 for all 0 ≤ k ≤ NLEV are the list of parameters and ps is the auxiliary field needed to compute the pressure pk associated with each model level (middle of layer) from  pk = 1/2 (pk−1/2 + pk+1/2) with 1 ≤ k ≤ NLEV by using (1) and the surface pressure field. |
| … | … |
| 150 | The computing algorithm is not given. The model level heights related to mean see level are given explicitly, coded as height with discipline 0, parameter category 3 and parameter number 6. |
| … | … |
| 255 | missing |

May be these proposals do not serve as general ones for “all” possible applications, but we feel confident that they are a base for validation or at least a trigger for new discussions.

**§ 2018-**[**2.6.5(CM-II)/New template component and templates for time interval in GRIB Edition 3**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_5)[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_5)

***Template Component 3.2 - Processed (included and missing) data in statistical process***

**Byte Content**

1-4 Total number of data values included in statistical process

5-8 Number of data values missing in statistical process

***Template 3.4 – Forecast time interval with number of processed data values***

**TC Content**

3.1 Forecast time interval

3.2 Processed data in statistical process

***Template 3.5 – Forecast two nested time intervals with number of processed data values***

**TC Content**

3.1 Forecast time interval (Note 1)

3.2 Processed data in statistical process (Note 1)

3.1 Forecast time interval

3.2 Processed data in statistical process

Note (1): Outer time interval (including processed data in statistical process) first

**§ 2018-**[**2.6.6(CM-II)/Comments on functionality and structure of referencing externally defined resources (URL) – in general and in case of unstructured mesh for GRIB Edition 3**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_6)[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_2_6_6)

**I. General URL definition**

According to above numbering 1./3. and 5. we propose a simple definition of a URL string in form of a new general definition:

New template component for URL:

***TC 99.0 -******General Template Component 99.0 – URL***

|  |  |
| --- | --- |
| **Byte No.** | **Contents** |
| 1-2 | NURL – number of bytes used by URL string |
| 3 – 2+NURL | URL string |

Note:

(1) A URL is a Uniform Resource Locator that is identifying a web resource and is used to locate and retrieve a GRIB message providing the template or the whole GRIB field to be used. NetCDF files (including netCDF-4/HDF5) are possible as well.

The URL string is coded according to International Reference Alphabet (IRA, formerly International Alphabet No. 5 or IA5)

For details on syntax see the “Request For Comment” document [RFC3986](https://tools.ietf.org/html/rfc3986#appendix-B).

(2) This is a general definition to be used in different sections.

If there is still the wish to keep the old definition, the fragment has to be added (all the byte numbers have to be checked):

***Alternative TC 99.0 -******General Template Component 99.0 – URL***

|  |  |
| --- | --- |
| **Byte No.** | **Contents** |
| 1-2 | scheme (code table) |
| 3 | Nhost - number of bytes used by host |
| 4 - 4+Nhost | host |
| 5+Nhost - 6+Nhost | port (unsigned integer) |
| 7+Nhost - 9+Nhost | Npath -number of bytes used by path |
| 10+Nhost - 10+Nhost+Npath | path |
| 11+Nhost+Npath - 13+Nhost+Npath | Nquery -number of bytes used by query |
| 14+Nhost+Npath - 14+Nhost+Npath+Nquery | query |
| 15+Nhost+Npath+Nquery - 17+Nhost+Npath+Nquery | Nfragment - number of bytes used by fragment |
| 18+Nhost+Npath+Nquery - 18+Nhost+Npath+Nquery+ Nfragment | fragment |

The syntax of the URL is:

**Scheme://**[**host**[**:port**]]**/path**[?**query**][#**fragment**]

where port, query and fragment are optional and can be missing.

***Code table 99.0*** – *URL scheme*

***Code figure Meaning***

0 http

1 https

2 ftp

3 file

65535 Missing

If this new general approach with template component 99.0 (and maybe code table 99.0) is accepted, the following template components and code tables have to be deleted:

Template components: 4.14, 5.3, 5.5, 9.1.

Code tables: 4.x, 5.3, 5.x, 9.1.

Additionally in all the templates using the removed template components (4.14, 5.3, 5.5, 9.1) these have to be replaced by TC 99.0. They are not listed here, because they may be subject to other changes (see II. and III.)

**II. New template component for identifiers of horizontal grid**

To overcome the problems shown in discussion points 2./4., the missing meta data are collected in a new template component:

***TC 4.x –Meta data for horizontal domain (Grid identifier in case of explicitly given grid point positions, for use with URL)***

|  |  |
| --- | --- |
| **Byte No**. | **Contents** |
| 1-3 | Number of horizontal grid (defined by originating center, Note 1) |
| 4 | Number of grid in reference (Horizontal staggering, code table 4.x) |
| 5-20 | Fingerprint (unique identifier) |
|  |  |
| Note (1) | Identification of resolution and generating algorithm. |
|  |  |
|  |  |
| ***Code table 4.x*** | ***Number of grid in reference*** |
|  |  |
| **Code** | **Meaning** |
| 0 | reserved |
| 1 | center |
| 2 | vertex |
| 3 | edge midpoint |
| 255 | missing |

**III. Effects of new definitions in I./II.**

All templates using URL definition have to be changed; TC 99.0 replaces all URL template components.

Define new template 4.9:

***NEW: Template 4.9 – URL (including grid identifiers)***

***TC Content***

4.x Meta data for horizontal domain

99.0 Horizontal domain URL

Replace template 4.39 by new one:

***NEW: Template 4.39 – Latitude\_longitude unstructured mesh on ellipsoidal planet simple packing***

***TC Content***

4.0 Ellipsoid of revolution defined with axis length

4.x Meta data for horizontal domain

4.12 Latitude\_longitude unstructured mesh simple packing

**IV. Outlook**

The URL usage in section 5 (vertical domain) has to be handled separately. In this case a new template component with vertical grid identifiers seems to be necessary/helpful as well.

**3. MANUAL ON CODES: REGULATIONS FOR REPORTING TRADITIONAL OBSERVATION DATA IN TABLE-DRIVEN CODE FORMS**

**§ 2018-**[**3.1(CM-II)/Amendments to B/C Regulations for standard time (ABC2019)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_3_1)](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_3_1)

**AMEND:**

in B/C1.1.2,

– Year ~~(standard time)~~(see Note 3);

– Month ~~(standard time)~~~~(see Note 1)~~;

– Day (~~standard time =~~ YY in the abbreviated telecommunication header for SYNOP data)~~(see Note 1)~~;

– Hour (~~standard time =~~ GG in the abbreviated telecommunication header for SYNOP data)~~(see Note 1)~~;

– Minute ~~(standard time =~~ 00 for SYNOP data)~~(see Note 1)~~.

Notes:

~~(1) Inclusion of these entries is required starting with CREX edition 2.~~

(1~~2~~) If inclusion of international data sub-category is required, Note 2 under Regulation B/C1.1.1 applies.

(2~~3~~) If an NMHS performs conversion of SYNOP data produced by another NMHS, Note 3 under Regulation B/C1.1.1 applies.

(3) Date (year, month and day) and time (hour, minute and second) are the most typical time in the BUFR message contents and specified in UTC.

*Editorial note: The reference to the Note 3 is once. It is to make the regulations simple and would be sufficient to lead Members to the note applicable to the date and time.*

in B/C20.1.1,

– Year ~~(of standard time), (year of the century up to BUFR edition 3)~~ (see Note 3);

– Month ~~(of standard time)~~;

– Day (~~when standard time, =~~ YY in the abbreviated telecommunication header for all PILOT type data);

– Hour (~~when standard time, =~~ GG in the abbreviated telecommunication header, e.g. = 00, 06, 12 or 18 for all PILOT type data);

– Minute (~~when standard time, =~~ = 00 for all PILOT type data);

– Second (= 0) ~~(see Note 1)~~.

Notes:

~~(1) Inclusion of this entry is required starting with BUFR edition 4.~~

(1~~2~~) If required, the international data sub-category shall be included at all observation times as follows:

= 001 for PILOT data;

= 002 for PILOT SHIP data;

= 003 for PILOT MOBIL data.

(2~~3~~) If an NMHS performs conversion of PILOT, PILOT SHIP or PILOT MOBIL data produced by another NMHS, originating centre in Section 1 shall indicate the converting centre and originating sub-centre shall indicate the producer of PILOT, PILOT SHIP or PILOT MOBIL bulletins. Producer of PILOT, PILOT SHIP or PILOT MOBIL bulletins shall be specified in Common Code table C-12 as a sub-centre of the originating centre, i.e. of the NMHS executing the conversion.

(3) Date (year, month and day) and time (hour, minute and second) are the most typical time in the BUFR message contents and specified in UTC.

in B/C1.2.2.1,

The time in section 1 (B/C1.1.1) may be reported instead of the actual time of observation, if the actual time of observation differs by 10 minutes or less from the nearest hour. [12.2.8]

Similarly in B/C1.1.1, B/C5.1.1, B/C5.1.2, B/C5.2.2.1, B/C10.1.1, B/C10.1.2, B/C10.2.4.1, B/C20.1.2, B/C25.1.1, B/C25.1.2, B/C26.1.1, B/C26.1.2, B/C30.1.1, B/C30.1.2, B/C32.1.1 and B/C32.1.2.

**§ 2018-**[**3.2(CM-II)/SYNOP data from Israel using 203YYY operator**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_3_2)](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_3_2)

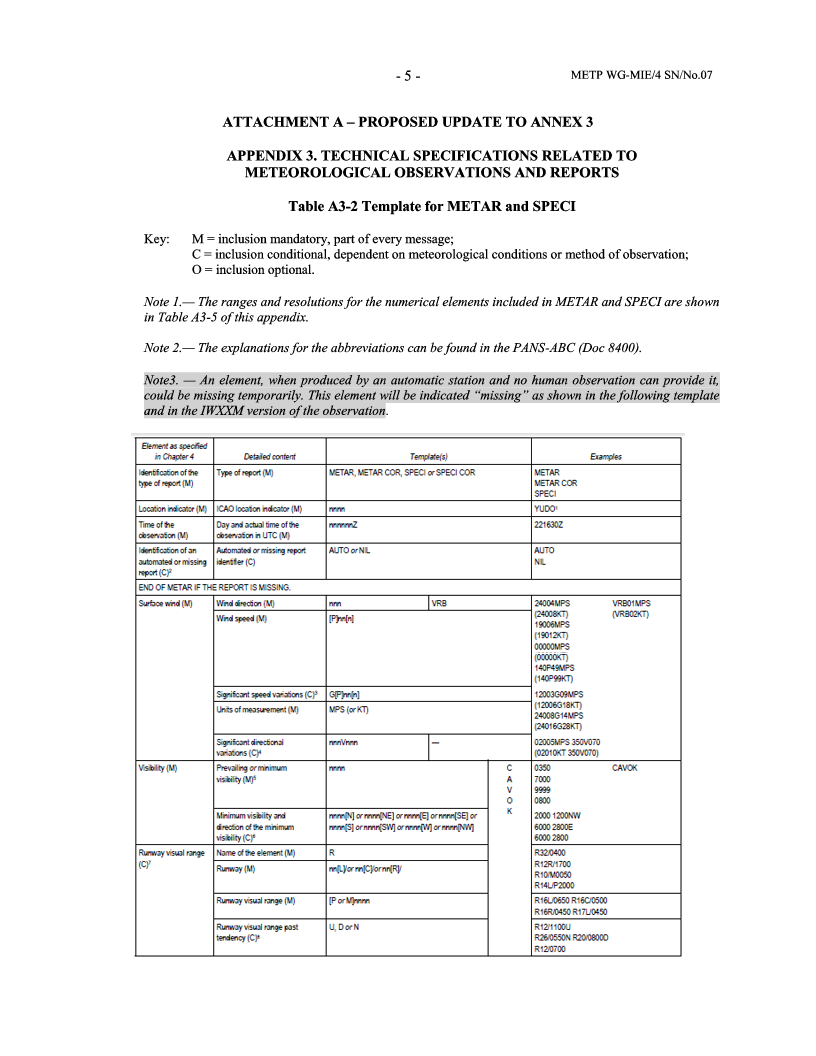
**Reference:**

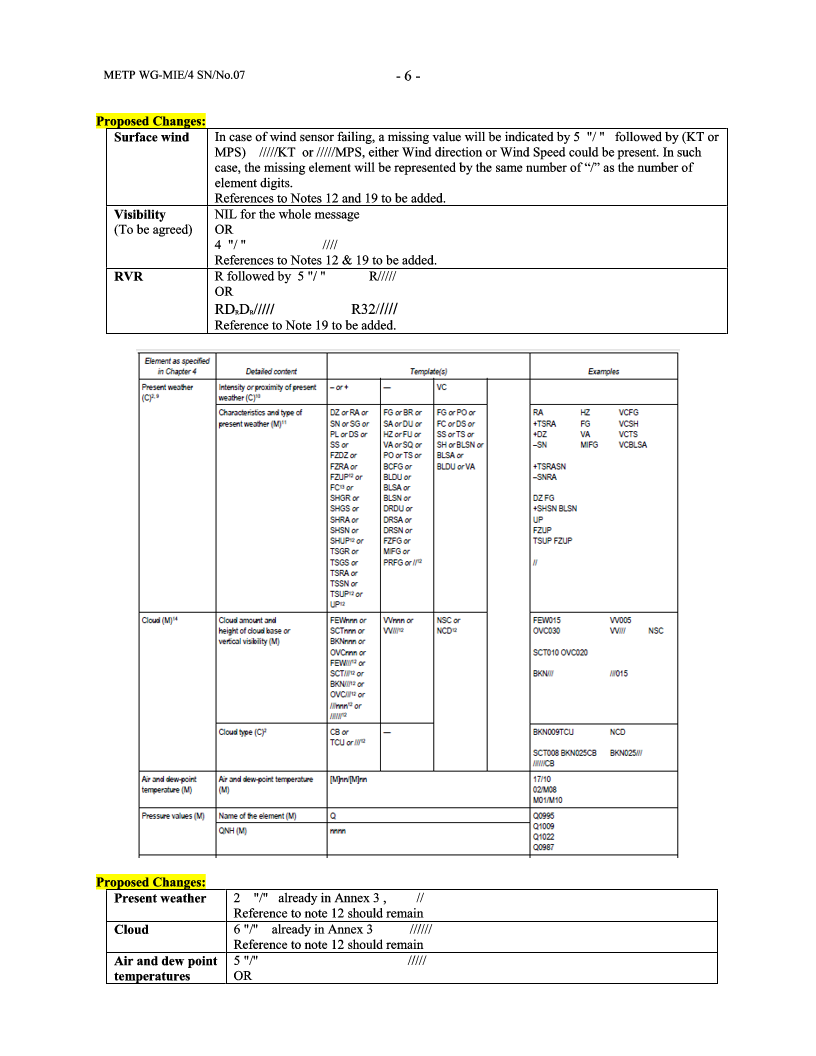
|  |  |  |  |
| --- | --- | --- | --- |
| TABLE  REFERENCE | TABLE  REFERENCES | ELEMENT NAME | DESCRIPTION |
| F X Y |
| **2 03 014** |  | Change of reference | Subsequent element descriptors define new reference values for corresponding Table B entries. Each new reference value is represented by 14 bits in the Data section. |
| **0 07 030** |  | Height of station ground above mean sea level | Element descriptor for which the reference is replaced by the corresponding value in the 14 bits element in data section |
| **0 07 031** |  | Height of barometer above mean sea level | Element descriptor for which the reference is replaced by the corresponding value in the 14 bits element in data section |
| **2 03 255** |  | End of change of reference | End of the list of descriptor elements for which the change of reference applies |
| **3 01 150** |  | (WIGOS identifier) |  |
|  | 0 01 125 | WIGOS identifier series |  |
|  | 0 01 126 | WIGOS issuer of identifier |  |
|  | 0 01 127 | WIGOS issue number |  |
|  | 0 01 128 | WIGOS local identifier (character) |  |
| **3 07 080** |  | (Sequence for representation of synoptic reports from a fixed land station suitable for SYNOP data |  |
|  | 3 01 090 | Surface station identification; time, horizontal and vertical coordinates |  |
|  | 3 02 031 | Pressure information |  |
|  | 3 02 035 | Basic synoptic “instantaneous” data |  |
|  | 3 02 036 | Clouds with bases below station level |  |
|  | 3 02 047 | Direction of cloud drift |  |
|  | 0 08 002 | Vertical significance (surface observations) |  |
|  | 3 02 048 | Direction and elevation of cloud |  |
|  | 3 02 037 | State of ground, snow depth, ground minimum temperature |  |
|  | 3 02 043 | Basic synoptic “period” data |  |
|  | 3 02 044 | Evaporation data |  |
|  | 1 01 002 | Replicate 1 descriptor 2 times |  |
|  | 3 02 045 | Radiation data (from 1 hour and 24-hour period) |  |
|  | 3 02 046 | Temperature change |  |

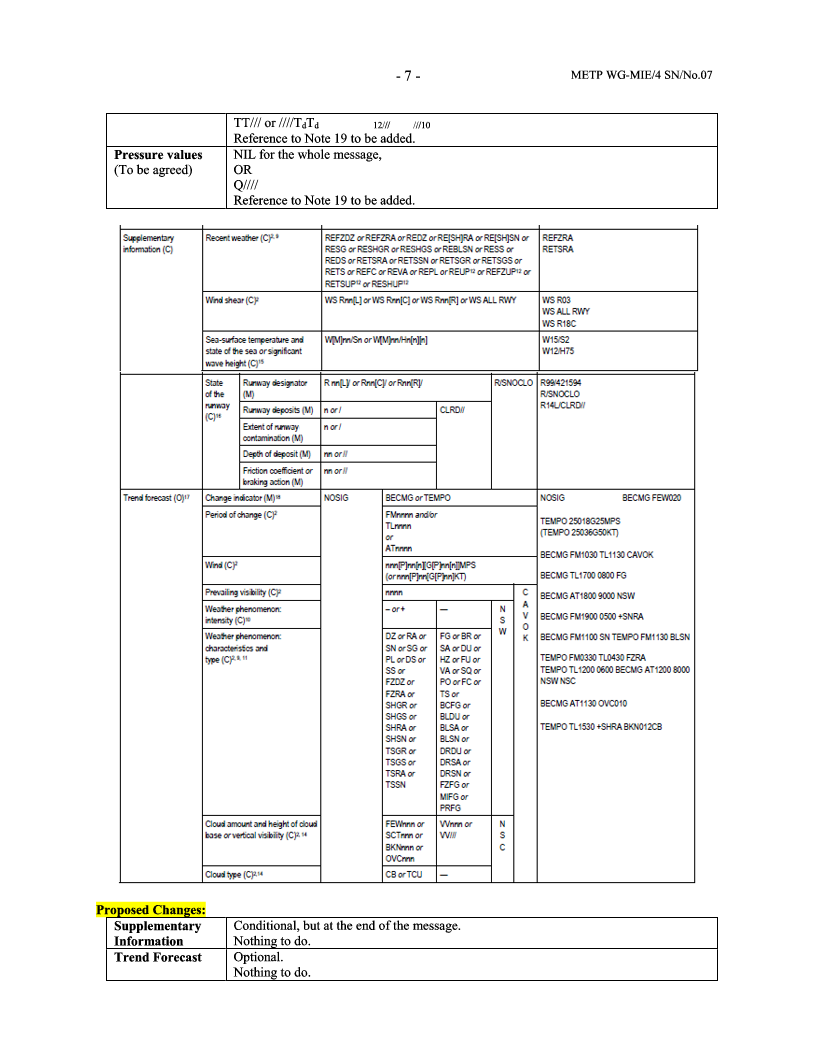
**4. MANUAL ON CODES: TRADITIONAL ALPHANUMERIC CODES**

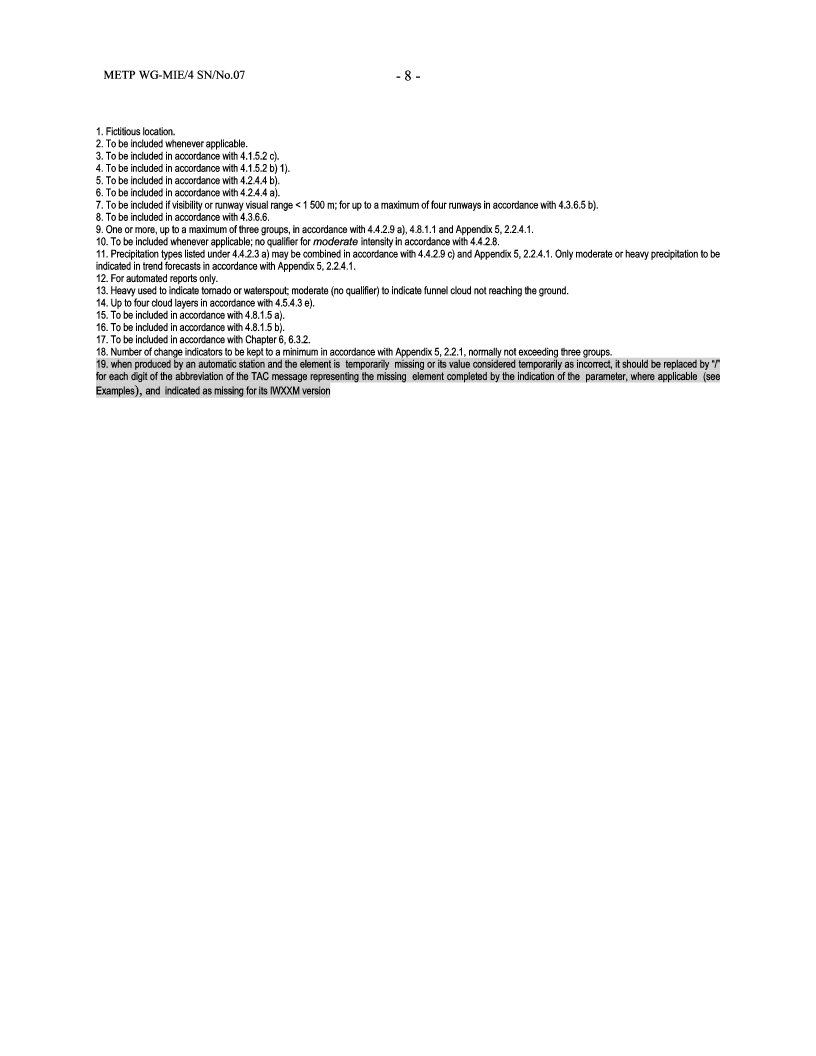
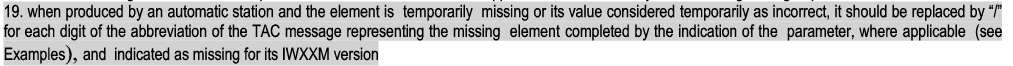
**§ 2018-**[**4.1(CM-II)/Possible Amendment 79 to ICAO Annex 3**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_4_1)[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_4_1)

PROPOSED UPDATE TO ANNEX 3 (ICAO METP WG-MIE/4)









**5. MANUAL ON THE GTS: DATA DESIGNATORS**

**§ 2018-**[**5.1(CM-II)/New data designator for space weather**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_5_1) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_5_1)

**ADD:**

in the Manual on the GTS (WMO-No. 386), Attachment II-5 (Data designators T1T2A1A2ii in abbreviated headings).

• T1 T2 = F N for space weather advisories in abbreviated plain language; and

• T1 T2 = L N for space weather advisories in IWXXM GML form.

**§ 2018-**[**5.2(CM-II)/Global exchange of daily climate data**](file:///M:\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-II_Offenbach2018\Report\ING_Report_IPET-CM-II_Offenbach_summary.docx#S2018_5_2) **(FT2018-2)**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_5_2)

**ADD:**

in the Manual on the GTS (WMO-No. 386), Attachment II-5 (Data designators T1T2A1A2ii in abbreviated headings),

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| T1 | T2 | A1 | ii | Data type | TAC correspondence | Data Category Sub Category (Common Table C13) |
| I | S | C | 60 | Climatic observations (monthly reports of daily climate data) | n/a | 000/021 |

in the Manual on Codes (WMO-No. 306), Volume I.2, Part C,

COMMON CODE TABLE C–13: Data sub-categories of categories defined by entries in BUFR

Table A

DATA CATEGORIES INTERNATIONAL DATA SUB-CATEGORIES

BUFR Edition 4, Octet 11 in Section 1 BUFR Edition 4, Octet 12 (if = 255, it means

other sub-category or undefined)

CREX Edition 2, nnn in Group CREX Edition 2, mmm in Group Annnmmm

Annnmmm of Section 1 of Section 1

Code figure Name Code figure Name (corresponding traditional alphanumeric

codes are in brackets)

0 Surface data – land 21 Climatological observations (monthly reports of daily   
 climate data)

**6. SUMMARY AND CONCLUSION OF PROPOSALS**

**§ 2018-6.1(CM-II)/Summary on amendments since IPET-CM-I**

Implementation of amendments during the intersessional period[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_6_1)

1. [Adoption between CBS sessions 2017](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2017/betweenCBS/02952-2017-OBS-WIS-DRMM-DRC_en.pdf) (8 November 2017)

2. [Fast-track 2017-2](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2017/fastTrack/FT2017-2_en.pdf) (8 November 2017)

3. [Fast-track 2018-1](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2018/fastTrack/FT2018-1_en.pdf) (2 May 2018)

4. [*Adoption between CBS sessions 2018*](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2018/betweenCBS/02952-2017-OBS-WIS-DRMM-DRC_en.pdf) *(7 November 2018: waiting for implementation)*

Note: English documents are available from the links. Some of them are also available in other languages, replacing "en" with "fr", "ru", "es" or "ar" (Item 4), or with "fr", "ru" and "es" (Items 2 and 3) in the links.

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The following tables are to highlight the proposals under validation for facilitating validation exercise and to record those implemented or adopted after the previous meeting of IPET-DRMM.  2. Proposals at validation stage have no status of Manual on Codes (WMO-No. 306) and MAY NOT be applied in operational data and products.  3. It should be noted proposals at validation stage may be modified during validation exercise.  It is recommended to update the proposals whenever modified.  **FM 92 GRIB**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | ID | Approval for Validation | Proposals | Status | Remarks | | 2017-2.2.1 | CM-I | [New GRIB2 Code table 4.2 entries, Reporting quality values in GRIB2](#A2017_2_2_1) | FT2017-2, **FT2018-1** |  | | 2017-2.2.2 | CM-I | [New GRIB2 Code table 4.2 entry](#A2017_2_2_2) | FT2017-2 |  | | 2017-2.2.3 | CM-I | [New GRIB2 Code table 4.2 entries](#A2017_2_2_3) | FT2017-2 |  | |  |  |  |  |  | | 2016-2.2.8 | DRMM-IV | [Encoding fields from Limited Area models combining conformal projections and bi-periodic spectral geometry](#A2016_2_2_8) | Val | Ongoing  (end of this year) | |  |  |  |  |  | | 2015-2.1.2 | DRMM-III | [New GRIB2 Regulations and notes to make it clear that forecast times may be negative](#A2015_2_1_2) | ABC2017 |  | | 2015-2.2.1~~/2.2.2~~ | DRMM-III | [New parameters in GRIB2 Code table 4.2/~~New GRIB2 parameters and product definition template for observational satellite data~~](#A2015_2_2_1) | Val | Withdrawn | |  |  |  |  |  | | 2014-2.2.2 | DRMM-II | [A product definition template for statistics over an ensemble](#A2014_2_2_2) | Val | Ongoing | |  |  |  |  |  | | 2012-2.2.9 | DRC-IV | [GRIB template for 4-D Trajectory grid definition](#A2012_2_2_9) | Val | Withdrawn |   **FM 94 BUFR/FM 95 CREX**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | ID | Approval for Validation | Proposals | Status | Confirmed at meeting | | 2017-2.4.1 | CM-I | [New BUFR entries for GPM precipitation data](#A2017_2_4_1) | FT2017-2 |  | | 2017-2.4.2 | CM-I | [New BUFR entries for radiosonde descent data](#A2017_2_4_2) | FT2017-2,  Val | Superseded  by 2018-2.4.5 (FT2018-2) | | 2017-2.4.3 | CM-I | [New BUFR entries for FY-3 VASS Products](#A2017_2_4_3) | FT2017-2, **FT2018-1** |  | | 2017-2.4.4 | CM-I | [BUFR template for surface observations from n-minute period](#A2017_2_4_4) | Val | Superseded  by 2018-2.4.10 (FT2018-2) | | 2017-2.4.5 | CM-I | [New BUFR sequence for describing satellites contributing to an observed geophysical quantity](#A2017_2_4_5) | Val | Ongoing | | 2017-3.1.1 | CM-I | [Regulations for radiosonde descent data](#A2017_3_1_1) | Val | Withdrawn | | 2017-3.1.2 | CM-I | [Regulations for reporting SHIP data in TDCF (B/C10)](#A2017_3_1_2) | **ABC2018** |  | | 2017-3.1.3 | CM-I | [Implementation of the Decision 15 of EC-69 regarding the International Exchange of Snow Data](#A2017_3_1_3) | **ABC2018** |  | |  |  |  |  |  | | 2016-3.2.7 | DRMM-IV | [Additional bio-geochemical sequences for data from Argo profiling floats](#A2016_3_2_7) | Val | Ongoing | | 2016-3.2.10 | DRMM-IV | [Revised note for encoding geographic coordinates in BUFR and new element descriptors for encoding coordinate reference systems and fixed reference mean sea level](#A2016_3_2_10) | ABC2017**,** FT2016-2 |  | |  |  |  |  |  | | 2014-3.2.7 | DRMM-II | [BUFR template for n-minute AWS data (3 07 092)](#A2014_3_2_7) | Val | Superseded  by 2018-2.4.10 (FT2018-2) | | 2014-3.2.9 | DRMM-II | [Proposed BUFR sequence for reporting observations from offshore platforms](#A2014_3_2_9) | FT2017-2 |  | |  |  |  |  |  | | 2013-3.2.4 | DRMM-I | [Satellite-derived winds in BUFR](#A2013_3_2_4) | FT2017-2 |  | | | |

**COMMON CODE TABLES**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Approval for Validation | Proposals | Status | Confirmed at meeting |
| 2017-2.5.1 | CM-I | [New Common Code table C-12 entries for CIMSS](#A2017_2_5_1) | FT2017-2 |  |
| 2017-2.5.2 | CM-I | [New Common Code table entries for Spire Global, Inc.](#A2017_2_5_2) | FT2017-2 |  |
| 2017-2.5.3 | CM-I | [New entries in Common Code tables C-5 and C-8 by India](#A2017_2_5_3) | FT2017-2 |  |
| 2017-2.5.4 | CM-I | [Common Code table for master table version numbers of GRIB, BUFR and CREX](#A2017_2_5_4) | **ABC2018** |  |
| 2017-2.5.5 | CM-I | [New entries to Common Code table C-3/BUFR Table 0 22 067 for Argo floats](#A2017_2_5_5) | FT2017-2 |  |
| 2017-2.5.6 | CM-I | [New Common Code table entries in C-5 and C-8 for FY-4A](#A2017_2_5_6) | FT2017-2 |  |
| 2017-2.5.7 | CM-I | [New entry in Common Code table C-5 to include satellite identifier for Sentinel 3B](#A2017_2_5_7) | FT2017-2 |  |

**7. MIGRATION TO TABLE-DRIVEN CODE FORMS**

**§ 2018-7.1(CM-II)/Comparison of number of reports received in TDCF and TAC during January 2018**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_7_1)

Table 1: Percentage of required surface observations received in Table Driven Code format (TDCF) and in Traditional Alphanumeric Code (TAC).

|  |  |  |
| --- | --- | --- |
| WMO Region | Average % of TDCF | Average % of TAC |
| 1 | 30 | 48 |
| 2 | 74 | 91 |
| 3 | 54 | 55 |
| 4 | 12 | 82 |
| 5 | 73 | 73 |
| 6 | 93 | 89 |
| Antarctica | 43 | 40 |

Table 2: Percentage of required upper air observations received in Table Driven Code format (TDCF) and in Traditional Alphanumeric Code (TAC).

|  |  |  |
| --- | --- | --- |
| WMO Region | Average % of TDCF | Average % of TAC |
| 1 | 10 | 14 |
| 2 | 47 | 79 |
| 3 | 41 | 44 |
| 4 | 38 | 90 |
| 5 | 48 | 64 |
| 6 | 53 | 80 |
| Antarctica | 4 | 7 |

Figure 1: Comparison of percentage of required surface reports received in TAC (left-pointing arrow) and TDCF (right pointing arrow) in the period 1-15 January 2018. The key is in Table 5.

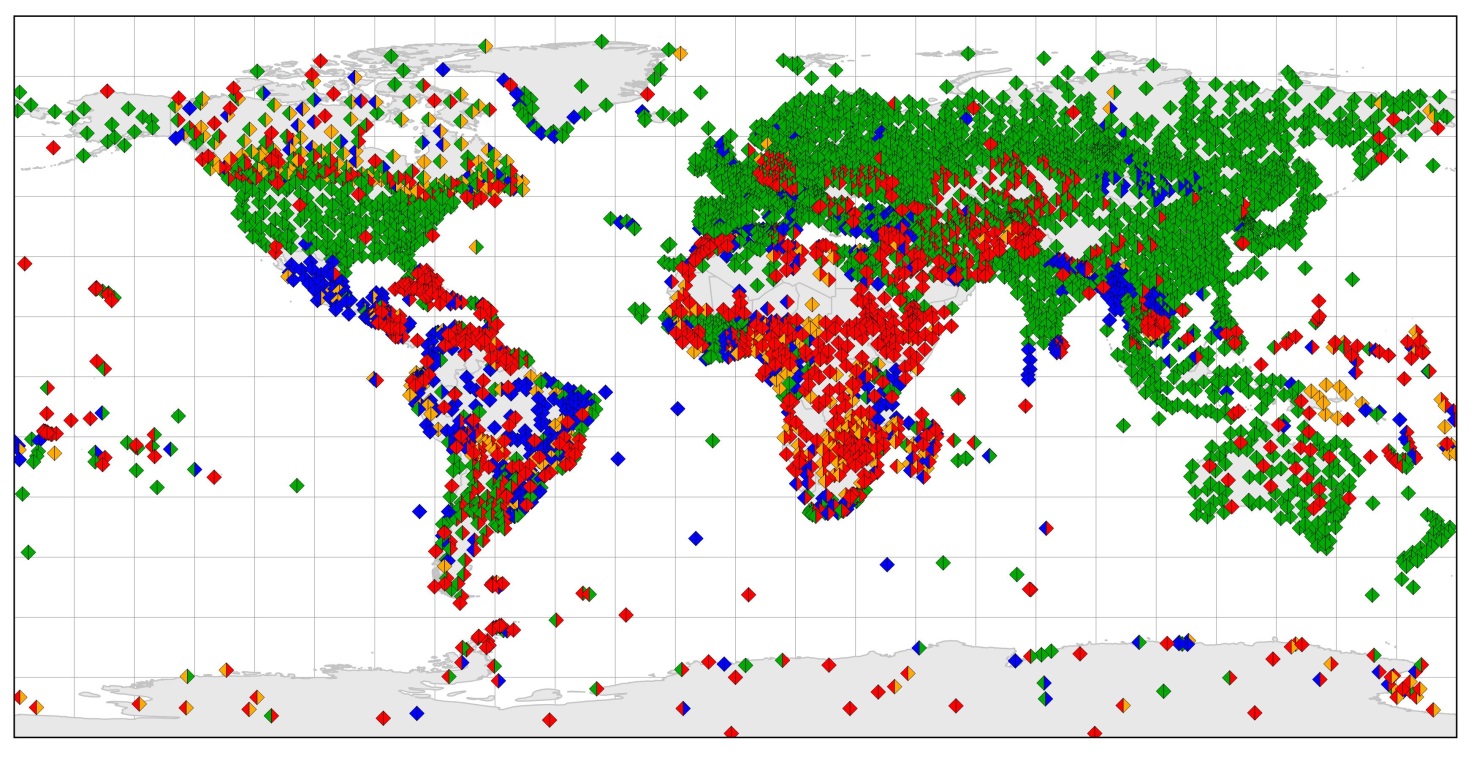
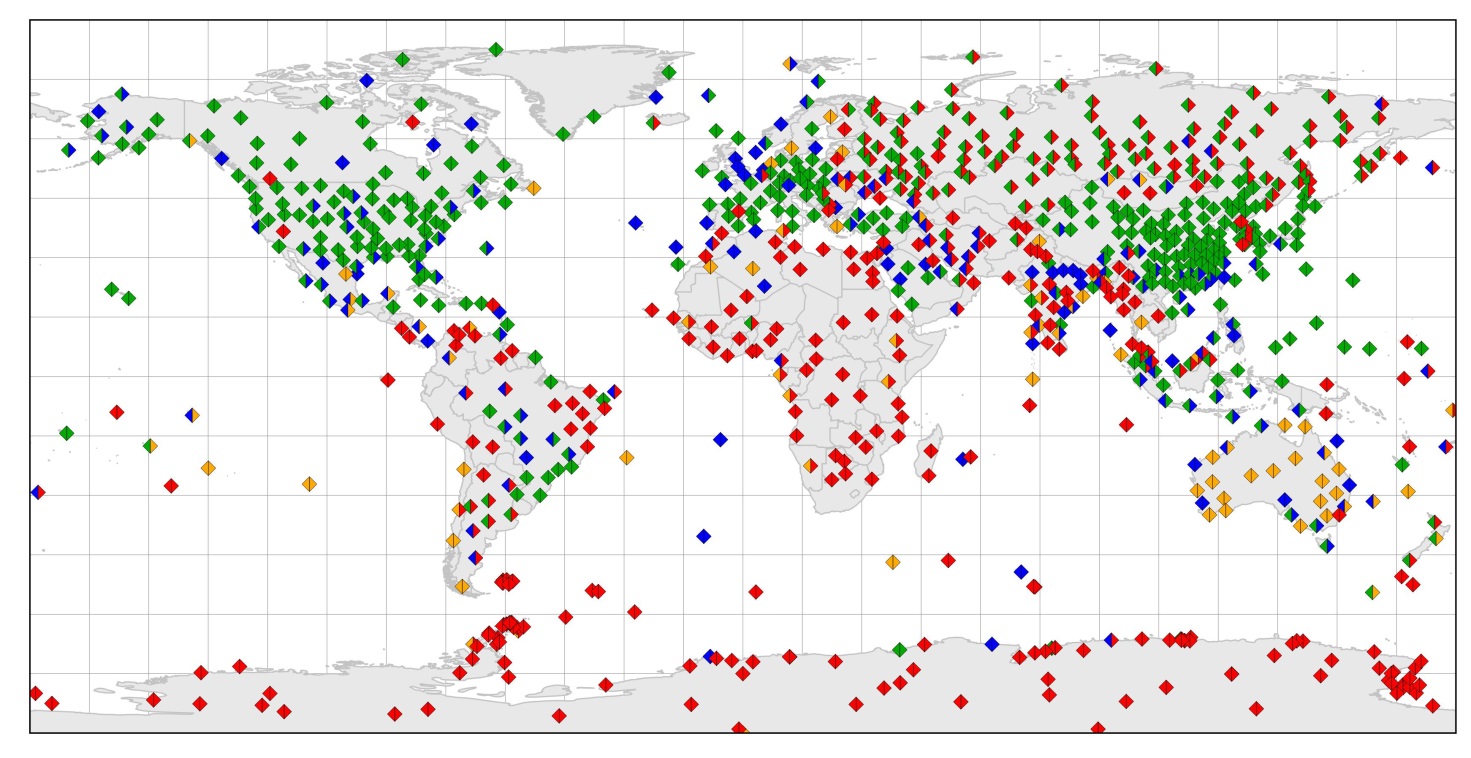


Figure 2: Comparison of percentage of required upper air reports received in TAC (left-pointing arrow) and TDCF (right pointing arrow) in the period 1-15 January 2018. The key is in Table 5.



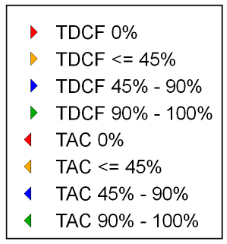


Table 5: Key for Table 3 and 4

**§ 2018-7.2.1(CM-II)/Status of migration to TDCF in RA I**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_7_2_1)

**TDCF migration status**

SYNOP messages:

a) Most African countries are in one of two situations: migration is 100% or migration has not started yet.

b) Some countries cannot even transmit their data on the GTS network. This is mainly due to the lack of adequate telecommunication links between the NMHSs and the concentration RTH.

c) Silent country stations: 5

Country with Migration 0%: 17+

Country with Migration 100%: 20+

* Morocco, Algeria, Mauritania, Senegal, Mali, Gambia, Guinea-Bissau
* Liberia, Cote d’Ivoire, Ghana, Burkina Faso
* Cameron, Gabon, Equatorial Guinea, Republic of Congo, Democratic Republic of Congo
* Egypt, Rwanda, Kenya, Tanzania.

TEMP messages:

a) The same status is observed for TEMP messages.

b) The BUFR message is generated by the upper air system and contains all parts of the TEMP.

c) In case of Morocco, the conversion from parts of TEMP to BUFR don’t work correctly but luckily Morocco has changed its system this year.

d) Country with Migration 100%:

* Morocco, Algeria, Niger, South of Africa.

**Analysis and recommendations**

* the problem is more related to the availability of data in the RTHs that can transmit them in the RTH network.
* No instance oversees the evolution of the migration to TDCF and it is not easy to have information about the migration.

**§ 2018-7.2.2(CM-II)/Status of migration to TDCF in RA II**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_7_2_2)

**RA-II Member activities related to TDCF**

[Hong Kong, China]

Hong Kong started dissemination of dropsonde observation data in BUFR format in October 2017 with GTS headings of IUDC[01-10] VHHH (when available). They also started to disseminate high-resolution radiosonde data in December 2017 with GTS heading IUSC02 VHHH (00 and 12 UTC).

[Republic of Korea]

Republic of Korea started dissemination of VOS (Voluntary Observing Ships) data in BUFR format in December 2017 with GTS headings of ISSX[01-02] RKSL (manual), ISSX[11-12] RKSL (automatic).

*[Vietnam]*

Vietnam started dissemination of TEMP and PILOT data in BUFR format in February 2018 with GTS headings of IUSC01 VNNN (00 and 12 UTC), IUJC01 VNNN (00 UTC).

[Kazakhstan]

Kazakhstan started SYNOP data in BUFR format in April 2018 with GTS headings of ISID[20, 30, 31] UAST (03, 09, 15, 21 UTC) and ISMD[01, 20, 21] UAST (00, 06, 12, 18 UTC).

[Japan]

Japan ceased drifting buoy data in the old format with GTS headings of IOB[A-D,I-L]0[1-3] RJTD in April 2018. Japan will start dissemination of high resolution native upper-air data in BUFR format in a few months, replacing BUFR reports converted from TEMP. GTS headings are as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| TTAAii | CCCC | WMO Station Index Number | |
| IU[K,S]C60 | RJTD | 47401 | (WAKKANAI) |
| IU[K,S]C61 | RJTD | 47412 | (SAPPORO) |
| IU[K,S]C62 | RJTD | 47418 | (KUSHIRO) |
| IU[K,S]C63 | RJTD | 47582 | (AKITA) |
| IU[K,S]C64 | RJTD | 47600 | (WAJIMA) |
| IU[K,S]C65 | RJTD | 47646 | (TATENO) |
| IU[K,S]C66 | RJTD | 47678 | (HACHIJOJIMA) |
| IU[K,S]C67 | RJTD | 47741 | (MATSUE) |
| IU[K,S]C68 | RJTD | 47778 | (SHIONOMISAKI) |
| IU[K,S]C69 | RJTD | 47807 | (FUKUOKA) |
| IU[K,S]C70 | RJTD | 47827 | (KAGOSHIMA) |
| IU[K,S]C71 | RJTD | 47909 | (NAZE/FUNCHATOGE) |
| IU[K,S]C72 | RJTD | 47918 | (ISHIGAKIJIMA) |
| IU[K,S]C73 | RJTD | 47945 | (MINAMIDAITOJIMA) |
| IU[K,S]C74 | RJTD | 47971 | (CHICHIJIMA) |
| IU[K,S]C75 | RJTD | 47991 | (MINAMITORISHIMA) |

[India]

India began to disseminate Radio Occultation Sounder of the Atmosphere (ROSA) data in BUFR format in October 2017, with the GTS headings of IUT[A-L]14 DEMS. Republic of Korea started dissemination of Clear Sky Radiance (CSR) data in BUFR format in March 2018 with GTS heading of IURX01 RKSL (hourly).

**Monitoring and Analysis of Migration Status**

Monitoring method:

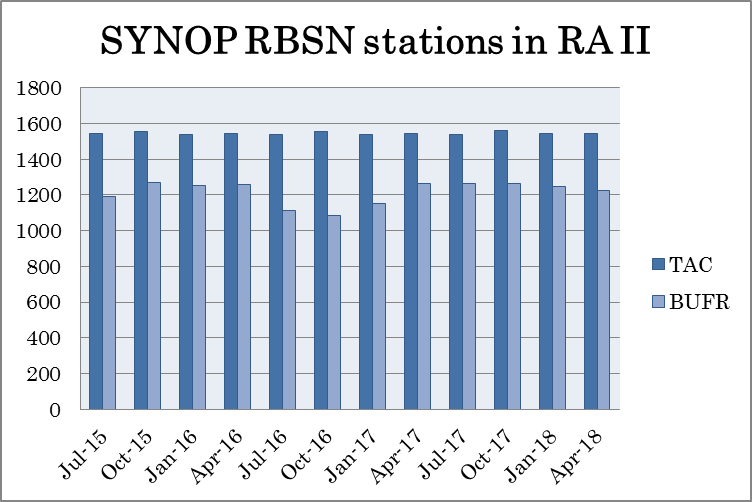
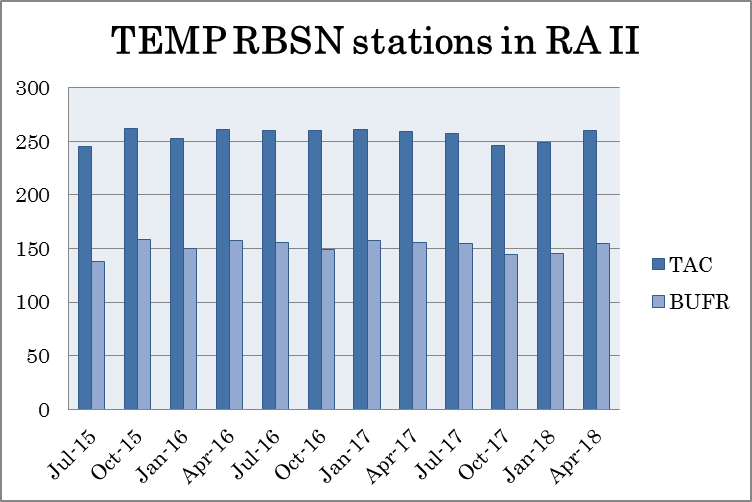
Statistics were collected for the monitoring period (January, April, July and October 1 through 15). Resources were derived from the results of Special MTN Monitoring (SMM) pre-analysis and Integrated WWW Monitoring (IWM) created by WMC Melbourne/RTH Tokyo and from the latest version of the surface and upper-air station list of Regional Basic Synoptic Networks (RBSN) at the time of analysis.

In addition to WWW monitoring, the status of TDCF data communication is also monitored based on a catalogue created by GISC Tokyo (available at http://www.wis-jma.go.jp/csv/catalog.csv).

Migration progress and status:

1) SYNOP, TEMP and PILOT reports

The figures below show numerical representations of the progress of stations issuing BUFR-format bulletins equivalent to SYNOP and TEMP reports over the past three years. In the latest monitoring period from April 1 to 15, 2018, RTH Tokyo received (i) at least one surface synoptic observation report (excluding NIL reports) in BUFR format from 75% of RA-II observation stations registered as part of RBSN (TAC format from 94%), and (ii) at least one upper-air sounding report in BUFR format from 54% of registered stations (TAC format from 91%). Twelve BUFR reports equivalent to PILOT reports were received by RTH Tokyo in the monitoring period, while TAC bulletins were received from eight stations.

Number of RA-II RBSN stations issuing surface synoptic observation (SYNOP) and upper-air sounding (TEMP) reports in TAC and BUFR format from July 2015 to April 2018

2) CLIMAT reports

As of May 2018, 13 Members out of 35 Members who have Regional Basic Climatological Network (RBCN) stations were reporting CLIMAT data in BUFR format: China; India; Mongolia; Saudi Arabia; Pakistan; Japan; Bangladesh; Hong Kong, China; Macao, China, Republic of Korea, Myanmar, Thailand and Lao PDR.

3) Marine reports

As of May 2018, India (TESAC), Hong Kong, China (SHIP), Japan (TESAC, TRACKOB, SHIP) and Republic of Korea (TESAC, VOS) were routinely disseminating marine observation data in BUFR format. Adoption of new templates for TESAC and BATHY is limited.

**§ 2018-7.2.3(CM-II)/Status of migration to TDCF in RA III**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_7_2_3)

GISC Brasilia is generating BUFR bulletins for upper-air sounding, CLIMAT, TEMP, PILOT, SYNOP from automatic and manned weather stations as well as provides the same information in TAC bulletins. There is a proposal to report upper-air sounding in BUFR directly from the Air Force upper air network. The Air Force agrees with this proposal, but a technical solution to implement it was not found yet.

DCPC Argentina generates BUFR bulletins for upper-air sounding (TEMP, PILOT), CLIMAT and SYNOP from automatic and manned weather stations as well as provides the same information in TAC bulletins. Aircraft data are also provided by Argentina in BUFR.

Chile do not report TAC bulletins any more. They are reporting BUFR bulletins from surface weather station with originating centre 45 (Santiago - Chile) and from aircraft data with generate centre 56 (ARINC Centre).

Colombia (Bogota) is already generate BUFR bulletin from surface weather station, using the originating centre code 54, and inserting them into the GTS through Brasilia. Peru, Ecuador and Venezuela are also start to generates BUFR bulletin.

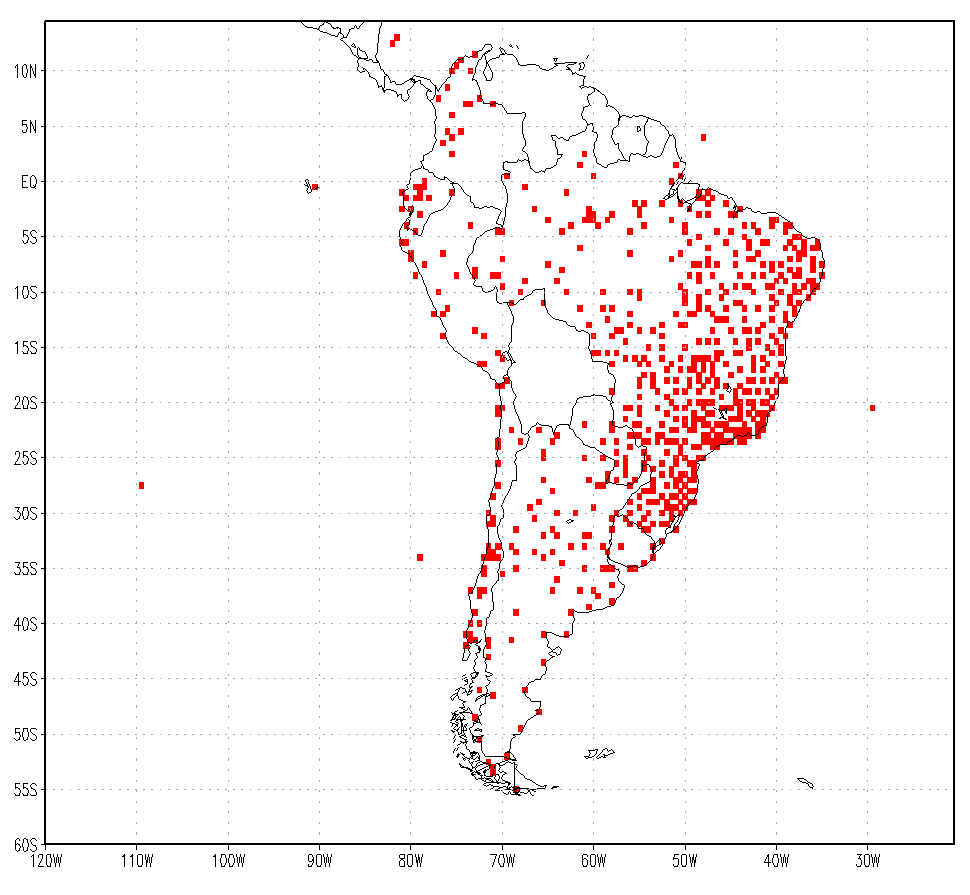
The National Centre in Venezuela last year informed some progress in the creation of BUFR bulletins but they are not producing at the operational level yet.

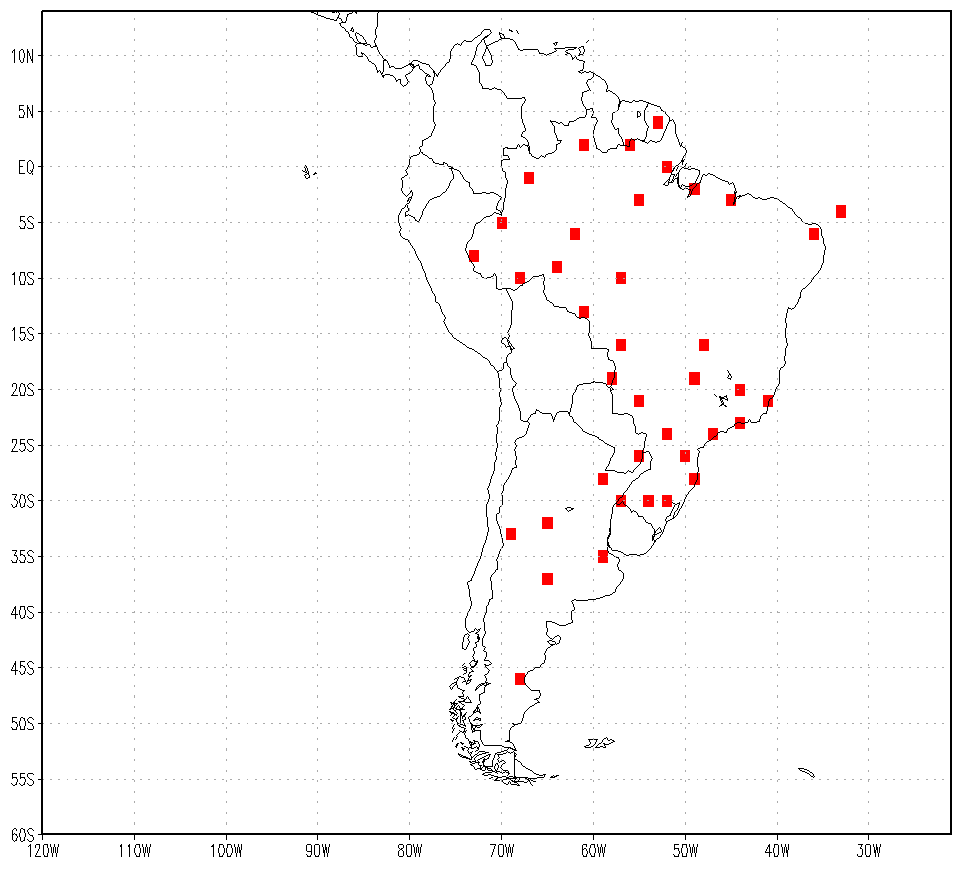
GISC Brasilia and DCPC Buenos Aires still converting TAC bulletins into TDCF for those centres which are not yet able to complete their migration work.

Training courses have been provided remotely by Jose Mauro from INMET/Brasilia, in support of other countries. The last one has been provided to Ecuador.

Other migration aspect is the use of BUFR bulletin in Region III. At the moment the information is that only INPE/CPTEC and the Navy besides INMET/Brasilia are capable to use BUFR data internally for generates products or assimilate in modelling.

The Figures 1 and 2 below represents the coverage of the surface data and upper air data in TDCF in April 2018 decoded at CPTEC. For this year the CPTEC is planning to implement an operational statistic of the data if TCDF, in order to compare with data received in TAC.

Figure 1: Coverage of Surface report in TDCF from region III in April 2018

Figure 2: Coverage of Upper air report (radiosonde) in TDCF from region III in April 2018

**§ 2018-7.2.7(CM-II)/Status of migration to TDCF in JCOMM**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_7_2_7)

Figure 1: During April 2018 the majority of VOS observations were distributed in parallel in both TAC and BUFR. Based on receipts at JCOMMOPS during March 2018 100 % of drifting buoys were reporting in BUFR with a small percentage (5%) reporting in both TAC and BUFR. During the same period 31 % of moored buoys reported in BUFR whilst 78 % reported in TACs. Similarly, 54 % of wave buoys reported using BUFR and 71 % using TAC.

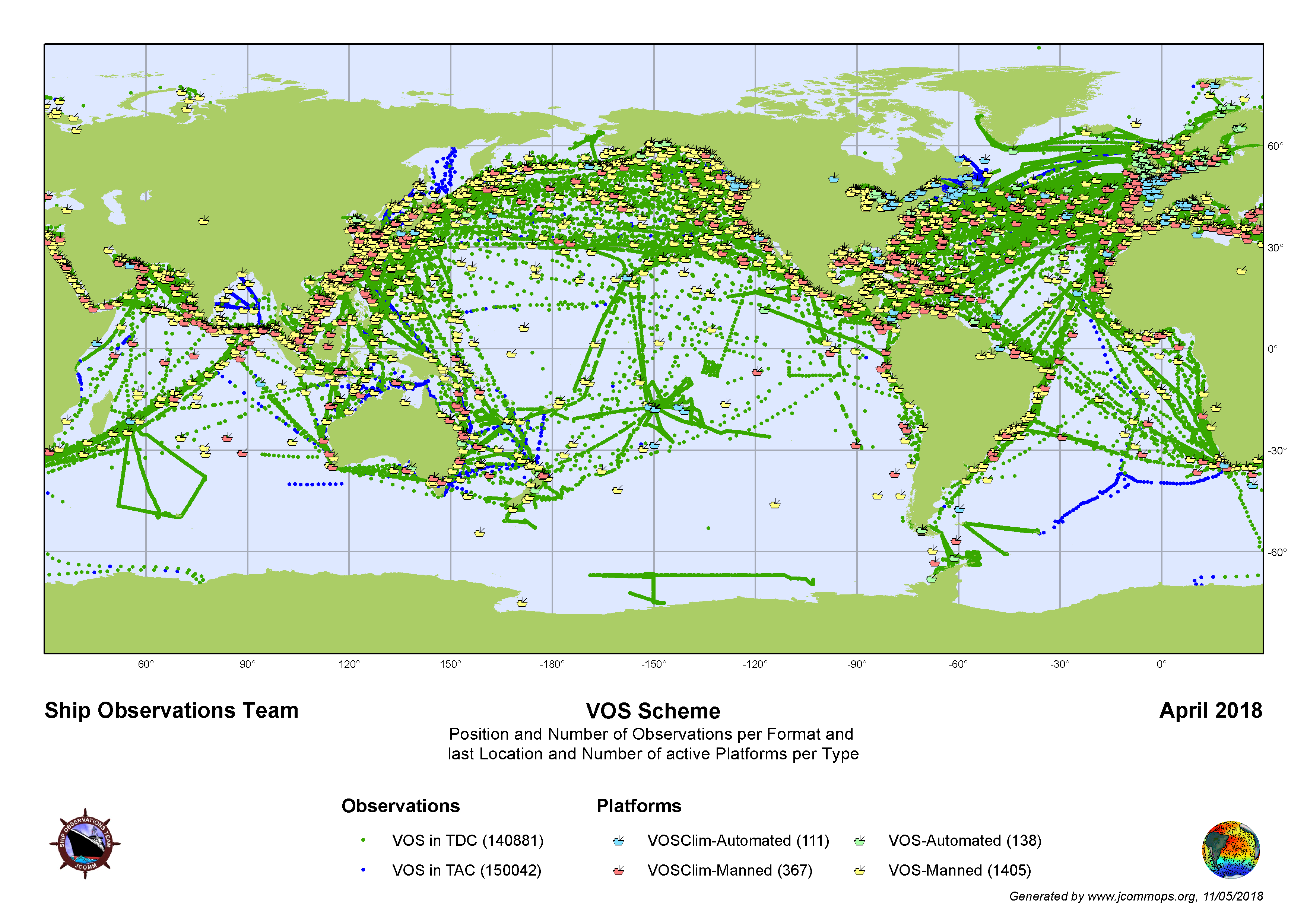
Figure 1: Format and spatial distribution of VOS observations on the GTS in April 2018

Table 1: BUFR templates/table D sequences in use for marine data. Migration to BUFR for E-ASAP observations was completed in 2016. The distribution of TAC messages for Argo profiling float observations will cease in July 2018.

Table 1: Summary of Table D sequences / BUFR templates in use for marine data

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***TAC*** | ***Description*** | ***Current template(s)*** | ***Status*** | ***Plans/comments*** |
| **FM13-XIV SHIP** | **VOS data** | B/C10 - Regulations for reporting SHIP data in TDCF | Operational (TM308009) | To be deprecated, use TM0308014 |
| **VOS data** | Synoptic reports from sea stations suitable for SHIP observation data from VOS stations | Operational (TM308014) | Replaces / supersedes TM308009.  Simplified version under development for UK VOS AWS systems. |
|  | **Offshore platforms** | Template for the representation of observations from offshore platforms | Operational (TM308017) |  |
| **FM18-XII BUOY** | **Drifting buoy data** | Template for the representation from drifting buoys | Operational (TM315009) | Simplified template specific to drifting buoys |
| **Moored buoy data** | Template for the representation of data from moored buoys | Operational (TM315008) | Simplified template specific to moored buoys, including directional and non-directional wave data |
| **Wave buoy data** | Template for the representation of data from moored buoys | Operational (TM315008) | Sequence to report ‘first 5’ spectral wave coefficients in development |
| **Argo data** | Sub-surface profiling floats | Operational (TM315003) | Additional sequences defined to extend template and may be present in reports |
| **FM36-XI Ext. TEMP SHIP** | **ASAP data** | B/C25 - Regulations for reporting TEMP, TEMP SHIP, TEMP MOBIL data in TDCF | Operational (TM309052) |  |
| **ASAP data** | UKMO template for representation of radiosonde data with geopotential height as the vertical coordinate | Operational (revisited in July 2010) |  |
| **FM62-VIII Ext. TRACKOB** | **TRACKOB data** | TRACKOB data – ThermoSalinoGraph (TSG) data and metadata | Operational (TM308010) | Plans to update template to include additional metadata. |
| **FM63-XI Ext. BATHY** | **XBT data** | New BUFR template for XBT Temperature Profile data | Operational (TM315004) |  |
| **FM64-XI Ext. TESAC** | **CTD / TESAC** | Template for the representation of data derived from a ship based lowered instrument measuring subsurface seawater temperature, salinity and current profiles. | Operational (TM 315007) |  |
| **FM65-XI Ext. WAVEOB** | **Wave buoy data** | Templates for the wave observations from different platforms suitable for WAVEOB data | Operational (TM308015)  and (TM308016) |  |
| **N/A** | **Sea-level data** | BUFR/CREX templates for tsunameter data and dart buoy system messages | Operational (TM306027) |  |
|  |  |  |  |

**8. ADMINISTRATIVE ISSUES**

**§ 2018-8.3(CM-II)/Category of amendments**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_8_3)

The agreed categories are composed of the factors:

*Involvement*: Global (1), Regional Association (2), Local (3) or National (4) level

This is to indicate the maximum range of Members involved in the activity, including international centres within the framework of WMO, which is managed by a Technical Commission, Regional Association, International centre, WMO Member or their collaboration.

Such Members should note the amendment and could make technical comments, if any, provided it is not compulsory to use the data produced from the activity (usually it is the case).

*Production*: Data production by Members as a WMO standard practice (a), data production tasked to specific Members (b) or as a recommended practice (c)

This is to indicate Members who are responsible for the data production.

In the case (a), Members, who meet the data production criteria of the standard practice, have to carefully review the amendments from the perspective of the impacts and the date of implementation as well as coding aspects (high impact). Other Members could review the amendments from users perspective or coding aspects.

In principle, an appropriate procedure other than fast-track should be pursued for adoption of this type.

In the case (b), Members, who are tasked the data production or will produce the data, have to carefully review the amendments from the perspective of the impacts and the date of implementation as well as coding aspects, however, since these Members would have been involved in the planning, serious issues may not be identified (mid to low impact).

In the case (c), no Members are requested compulsory data production (legally no impact).

*Expansion* factor: Future expansion of the data production, including generalization (+)

This is to indicate **expectation** on the future expansion of the data production and may imply future standard practice, which is currently a recommended practice.

This is just for awareness by Members and not critical. When the expansion is planned, it will result in a change to relevant regulations, framework or something that rule the practice.

These factors could be supplemented by some detailed information, such as the name of a technical commission and data production centre, which is optional.

Examples are shown below.

**Category 1a\_CBS/Standard:** Global and production as a WMO standard practice

This is applied to amendments for data production, such as a new observation, as a WMO standard practice (high impact).

**Category 1b\_CBS/Japan:** Global but production by tasked Members

Data production is tasked to specific Members, who would have been involved in the planning (mid to low impact to the tasked Members).

**Category 1b\_EUMETSAT:** Global but production by an international centre

Data will be produced by an international centre for global use.

**Category 2c\_RA II/regional practice:** Regional and production as a regional practice

This is applied to amendments for data production, such as a new observation, in the region, as a regional practice, i.e. no WMO standard practice (legally no impact).

**Category 3b\_Europe/ECMWF:** Local and production by an international centre

This is for a new data production, such as a new NWP product by an international NWP centre. If the proposal is submitted by the data production centre, no risk and no impact in adopting the amendment, provided use of the product is not compulsory for members of the centre (usually this is the case).

**Category 4b+\_Germany/DWD:** National and production by the Member but may expand to other Members locally, regionally or globally

This is a category for domestic data production by a Member but the data production centre may increase. No impact, since the expansion will result in a change to relevant regulations, framework or something that rule the practice, when the expansion is planned.

**Category CLR:** Clarification

Clarification is one of editorial corrections and is made mainly to wording to eliminate ambiguity. In worst case, this may have an impact to Members' systems and operations that have been established within a broad interpretation to the ambiguity (but, in most cases, no impact).

**Category EDT:** Editorial corrections

Editorial corrections are made mainly for technical terms and typographic errors together with wording. This should not have an impact to Members' systems and operations (no impact).

**9. IPET-CM AND TASK TEAMS**

**10. COLLABORATION WITH OTHER ORGANIZATIONS AND TECHNICAL BODIES**

**§ 2018-10.2(CM-II)/Exchange on GTS of monthly climate monitoring products**[**⮈**](Report_IPET-CM-II_Offenbach_summary.docx#S2018_10_2)

Proposed components in the NCMP:

– Year

– Month

– Country

– NCMP value with appropriate units

*NCMP1: mean temperature anomalies*

*NCMP2: percentage rainfall anomaly*

*NCMP 3: standardized precipitation index*

*NCMP 4: warm days*

*NCMP 5: cold nights*

*NCMP 6: extremes of temperatures and precipitation*

– For NCMP 6, the counts of stations exceeding daily records

– Number of stations reporting each element used that month to calculate the NCMP

– A flag [0,1] to indicate whether the station data used were homogenized

– A flag [0,1] to indicate whether the station data used had undergone QC

– Base period (at the time of writing, this was 1981–2010 in all cases)

– Version of the software or guidance used to calculate the NCMP

[END OF ANNEX TO THE REPORT]

**[NEW PROPOSALS THROUGH PFC]**

The following lists new amendments proposed through the practice between meetings of IPET-CM.

PFC2018-2.1 Amendment to Common Code table C-2 by Russian Federation

**ADD:**

in Common Code table C-2,

08/05/2019 19 119 ​  Polus-MRZ-N1 (Russian Federation)

PFC2018-2.2 New entry in Common Code table C-8 by EUMETSAT

**ADD:**

in Common Code table C-8

604 NOAA Radiometer HIRS/1 High-resolution infrared sounder/1

PFC2018-2.3 New entries in Common Code table C-12 by Brazil

**ADD:**

in Common Code Table C-12,

46 Brazilian Space Agency - INPE 18 SIPAM-Porto Velho-RO

46 Brazilian Space Agency - INPE 19 SIPAM-Belém-PA

**AMEND,**

in Common Code Table C-12,

46 Brazilian Space Agency - INPE 12 Brasilia (SEPIS – INMET)

PFC2018-2.4 New entries in Common Code tables C-1, C-11 and C-12 by Brazil

**ADD:**

in Common Code table C-1 and C-11,

148 Brazilian Department of Airspace Control - DECEA

in Common Code table C-12,

148 Brazilian Department of Airspace Control - DECEA

1 Integrated Center of Aeronautical Meteorology - CIMAER

PFC2018-2.5 Additional parameters for waves products

**ADD:**

in Code table 4.2, Product discipline 10 –Oceanographic products, parameter category 0: waves

|  |  |  |  |
| --- | --- | --- | --- |
| Code | Name | Units | Description |
| 56 | Wave directional width of first swell partition | - | Relative spread of the distribution in direction of the waves belonging to swell partition 1 |
| 57 | Wave directional width of second swell partition | - | Relative spread of the distribution in direction of the waves belonging to swell partition 2 |
| 58 | Wave directional width of third swell partition | - | Relative spread of the distribution in direction of the waves belonging to swell partition 3 |
| 59 | Wave frequency width of first swell partition | - | Relative spread of the distribution in frequency of the waves belonging to swell partition 1 |
| 60 | Wave frequency width of second swell partition | - | Relative spread of the distribution in frequency of the waves belonging to swell partition 2 |
| 61 | Wave frequency width of third swell partition | - | Relative spread of the distribution in frequency of the waves belonging to swell partition 3 |
| 62 | Wave frequency width | - | Relative spread of the distribution in frequency of all waves in the spectrum |
| 63 | Frequency width of wind waves | - | Relative spread of the distribution in frequency of all waves classified as wind waves |
| 64 | Frequency width of total swell | - | Relative spread of the distribution in frequency of all waves classified as swell |

PFC2018-2.6 New code for atmosphere composition modelling

**ADD:**

in the Code table 4.2, Product discipline 0 – Meteorological products, parameter category 20: atmospheric chemical constituents,

|  |  |  |
| --- | --- | --- |
| Number | Parameter | Units |
| 15 | Dry deposition velocity | m s–1 |
| 16 | Mass mixing ratio with respect to dry air | kg kg–1 |
| 17 | Mass mixing ratio with respect to wet air | kg kg–1 |
| 18–49 | Reserved | |
| ... | ... |  |
| 64 | Mole fraction with respect to dry air | mol mol–1 |
| 65 | Mole fraction with respect to wet air | mol mol–1 |
| 66 | Column-integrated in-cloud scavenging rate by precipitation | kg m–2 s–1 |
| 67 | Column-integrated below-cloud scavenging rate by precipitation | kg m–2 s–1 |
| 68 | Column-integrated release rate from evaporating precipitation | kg m–2 s–1 |
| 69 | Column-integrated in-cloud scavenging rate by large-scale precipitation | kg m–2 s–1 |
| 70 | Column-integrated below-cloud scavenging rate by large-scale precipitation | kg m–2 s–1 |
| 71 | Column-integrated release rate from evaporating large-scale precipitation | kg m–2 s–1 |
| 72 | Column-integrated in-cloud scavenging rate by convective precipitation | kg m–2 s–1 |
| 73 | Column-integrated below-cloud scavenging rate by convective precipitation | kg m–2 s–1 |
| 74 | Column-integrated release rate from evaporating convective precipitation | kg m–2 s–1 |
| 75 | Wildfire flux | kg m–2 s–1 |
| 76–99 | Reserved |  |

in Common Code table C-14,

|  |  |  |  |
| --- | --- | --- | --- |
| Code figure | Meaning | | Chemical fomula |
| 39 | Nitryl chloride | | NO2Cl |
| 40 | Sulphuric acid | | H2SO4 |
| 41 | Hydrogen sulphide | | H2S |
| 42 | Sulphur trioxide | | SO3 |
| 43 | Bromine | | Br2 |
| 44 | Hydrofluoric acid | | HF |
| 45 | Sulphur hexafluoride | | SF6 |
| 46 | Dichlorine | | Cl2 |
| 47–9999 | Reserved | | |
| ... | ... |  | |
| 10024 | Methanesulphonic acid | CH3SO3H | |
| 10025 | Methylglyoxal | CH3C(O)CHO | |
| 10026 | Peroxyacetyl radical | CH3C(O)OO• | |
| 10027 | Methacrylic acid | CH2C(CH3)COOH | |
| 10028 | Methacrolein | CH2C(CH3)CHO | |
| 10029 | Acetone | (CH3)2CO | |
| 10030 | Ethyl dioxidanyl radical | CH3CH2OO• | |
| 10031 | Butadiene | (CH2CH)2 | |
| 10032 | Acetaldehyde | CH3CHO | |
| 10033 | Glycolaldehyde | HOCH2CHO | |
| 10034 | Cresol (all isomers) | CH3PhOH | |
| 10035 | Peracetic acid | CH3C(O)OOH | |
| 10036 | 2-hydroxyethyl oxidanyl radical | HOCH2CH2O• | |
| 10037 | 2-hydroxyethyl dioxidanyl radical | HOCH2CH2OO• | |
| 10038 | Glyoxal | OCHCHO | |
| 10039 | Isopropyl dioxidanyl radical | (CH3)2CHOO• | |
| 10040 | Isopropyl hydroperoxide | (CH3)2CHOOH | |
| 10041 | Hydroxyacetone | CH3C(O)CH2OH | |
| 10042 | Peroxyacetic acid | CH3C(O)OOH | |
| 10043 | Methyl vinyl ketone | CH3C(O)CHCH2 | |
| 10044 | Phenoxy radical | PhO• | |
| 10045 | Methyl radical | CH3• | |
| 10046 | Carbonyl sulphide | OCS | |
| 10047 | Dibromomethane | CH2Br2 | |
| 10048 | Methoxy radical | CH3O | |
| 10049 | Tribromomethane | CHBr3 | |
| 10050 | Formyl radical | HOC• | |
| 10051 | Hydroxymethyl dioxidanyl radical | HOCH2OO• | |
| 10052 | Ethyl hydroperoxide | CH3CH2OOH | |
| 10053 | 3-hydroxypropyl dioxidanyl radical | HOCH2CH2CH2OO• | |
| 10054 | 3-hydroxypropyl hydroperoxide | HOCH2CH2CH2OOH | |
| 10055–10499 | Reserved | | |
| 10501 | DMSO | (CH3)2SO | |
| 10502–20000 |  | | |
| 20022 | HCFC141a | CH3CClF2 | |
| 20023–29999 | Reserved | | |
| 30295 | Carbon 13 | C-13 | |
| 30296 | Lead (natural abundance) | Pb | |
| 30297–39999 | Reserved | | |
| 40000 | Singlet sigma dioxygen | O2(1Σ+g) | |
| 40001 | Singlet delta dioxygen | O2(1Δg) | |
| 40002 | singlet excited oxygen atom | O(1D) | |
| 40003 | triplet ground state atom | O(3P) | |
| 40004–59999 | Reserved | | |
| 60018 | Aldehydes | RCHO | |
| 60019 | Peroxides | R-OOH | |
| 60020 | Organic nitrates | R-NO3 | |
| 60021 | Ethers | ROR’ | |
| 60022 | Amines | NRR’R’’ | |
| 60023 | Ketones | RC(O)R’ | |
| 60024 | Dicarbonyls unsaturated | RC(O)CH2C(O)R’ | |
| 60025 | Hydroxy dicarbonyls unsaturated | RC(O)CHOHC(O)R’ | |
| 60026 | Hydroxy ketone | RC(OH)C(O)R’ | |
| 60027 | Oxides | Ox | |
| 60028–61999 | Reserved | | |
| 62028 | Total aerosol hydrophilic | | |
| 62029 | Total aerosol hydrophobic | | |
| 62030–62099 | Reserved | | |

PFC2018-2.7 Additional parameters for ocean products

**ADD:**

in the Code table 4.2, Product discipline 10 – Oceanographic products, parameter category 4: subsurface properties,

|  |  |  |
| --- | --- | --- |
| Number | Parameter | Units |
| 16 | Water density (rho) | kg m-3 |
| 17 | Scaled water density (sigma) | kg m-3 |
| 18 | Water potential temperature (theta) | K |
| 19 | Water potential density (rho theta) | kg m-3 |
| 20 | Scaled Water potential density (sigma theta) | kg m-3 |
| 21 | Practical salinity | psu (numeric) |

PFC2018-2.8 Amendment to Common Code table C-2 by Germany [[PFC2018-2.](#P2018_2_8)8]

**ADD:**

in the Common Code table C-2,

08/05/2019 54 154 ​  Graw DFM-17 (Germany)

**[REVISIONS AND ADDITIONS IN RELATION TO IPET-CM-II]**

The following lists amendments revised or additionally proposed in relation to the IPET-CM-II for approval.

Some amendments editorially corrected may not be shown here, e.g. center to centre, sea surface to sea-surface, dew point to dewpoint.

1. New GRIB2 Code table 4.2 entries for astronomical seeing and transparency

**ADD:**

in Code table 4.2; Product Discipline 0 – Meteorological products, parameter category 19: physical atmospheric properties,

|  |  |  |
| --- | --- | --- |
| Number | Parameter | Units |
| 36 | Sky transparency index (see Note 4) | Code table 4.214 |
| 37 | Seeing index (see Note 5) | Code table 4.214 |
| 38-191 | Reserved |  |
| 192-254 | Reserved for local use |  |

Notes:

(4) In astronomy, *Sky transparency* means the effect on the viewing experience caused by the scattering of light through atmospheric water vapour, aerosols or other constituents. Ideal transparency conditions produce a black night sky conducive to viewing faint astronomical objects, almost like being in outer space. In poor transparency conditions, which may occur even in cloud-free conditions, the deep sky background is grayish (not black), faint details are washed out and contrast is reduced.

(5) *Seeing* means the steadiness or turbulence of the atmosphere in the context of astronomical observation. Turbulence causes rapid random fluctuations of the optical path through the atmosphere. The twinkling of stars, for example, occurs in poor seeing conditions.

|  |  |
| --- | --- |
| Code table 4.214 Qualitative perceptivility index | |
| Code Figure | Meaning |
| 0 | Not observable |
| 1 | Very poor |
| 2 | Poor |
| 3 | Average |
| 4 | Good |
| 5 | Excellent |
| 6-190 | Reserved |
| 191 | Unknown |
| 192-254 | Reserved for local use |
| 255 | Missing |

**[PROPOSALS UNDER VALIDATION]**

**FM 92 GRIB**

* **~~2017-2.2.1(CM-I)/New GRIB2 Code table 4.2 entries~~****~~[FT2017-2, FT2018-1]~~**~~<~~[~~para 6.1~~](#A2018_6_1_grib)~~>~~

**~~ADD:~~**

~~in GRIB2 Code table 4.2~~ **~~(FT2017-2)~~**~~,~~

~~Discipline 0 (Meteorological Products), Category 1 (Moisture)~~

|  |  |  |
| --- | --- | --- |
| ~~Number~~ | ~~Parameter~~ | ~~Unit~~ |
| ~~87~~ | ~~Stratiform precipitation rate~~ | ~~kg m~~~~-2~~ ~~s~~~~-1~~ |

~~Discipline 10 (Oceanographic Products), Category 1 (Currents)~~

|  |  |  |
| --- | --- | --- |
| ~~Number~~ | ~~Parameter~~ | ~~Unit~~ |
| ~~4~~ | ~~Rip current occurrence probability~~ | ~~%~~ |

~~Code tables 4.16/4.244 and PDT4.35~~ **~~(FT2018-1)~~**~~,~~

~~Code table 4.16 – Quality value associated with parameter~~

~~Code figure Meaning~~

~~0 Confidence index (see Note 2)~~

~~1 Quality indicator (see Note 3 and Code table 4.244)~~

~~2 Correlation of product with used calibration product (see Note 4)~~

~~3 Standard deviation (see Note 5)~~

~~4 Random error (see Note 5)~~

~~5-191 Reserved~~

~~192-254 Reserved for local use~~

~~255 Missing~~

~~Notes:~~

~~(1) When a non-missing value is used from this code table, the original data value is a quality value associated with the parameter defined by octets 10 and 11 of the product definition template.~~

~~(2) The original data value is a non-dimensional number from 0 to 1, where 0 indicates no confidence and 1 indicates maximal confidence.~~

~~(3) The original data value is defined by Code table 4.244.~~

~~(4) The original data value is a non-dimensional number without units.~~

~~(5) The original data value is in the same units as the parameter defined by octets 10 and 11 of the product definition template.~~

~~Code table 4.244 – Quality indicator~~

~~Code figure Meaning~~

~~0 No quality information available~~

~~1 Failed~~

~~2 Passed~~

~~3-191 Reserved~~

~~192-254 Reserved for local use~~

~~255 Missing~~

~~Product definition template 4.35 – satellite product with or without associated quality values~~

~~Octet No. Contents~~

~~10 Parameter category (see Code table 4.1)~~

~~11 Parameter number (see Code table 4.2)~~

~~12 Type of generating process (see Code table 4.3)~~

~~13 Observation generating process identifier (defined by originating centres)~~

~~14 Quality value associated with parameter (see Code Table 4.16)~~

~~15 Number of contributing spectral bands (NB)~~

~~16– Repeat the following 11 octets for each contributing band (nb = 1, NB)~~

~~(16+11(nb–1))–(17+11(nb–1)) Satellite series of band nb (code table defined by originating/generating centre)~~

~~(18+11(nb–1))–(19+11(nb–1)) Satellite numbers of band nb (code table defined by originating/ generating centre)~~

~~(20+11(nb–1))–(21+11(nb–1)) Instrument types of band nb (code table defined by originating/generating centre)~~

~~(22+11(nb–1)) Scale factor of central wave number of band nb~~

~~(23+11(nb–1))–(26+11(nb–1)) Scaled value of central wave number of band nb (units: m–1)~~

~~Note: For “satellite series of band nb”, “satellite numbers of band nb” and “instrument types of band nb”, it is recommended to encode the values as per BUFR Code tables 0 02 020, 0 01 007 (Common Code table C–5) and 0 02 019 (Common Code table C–8), respectively.~~

* **~~2017-2.2.2(CM-I)/New GRIB2 Code table 4.2 entry [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_grib)~~>~~

**~~ADD:~~**

~~in GRIB2 Code table 4.2,~~

~~Discipline 0 (Meteorological Products), Category 1 (Moisture)~~

|  |  |  |  |
| --- | --- | --- | --- |
| ~~Number~~ | ~~Parameter~~ | ~~Unit~~ | ~~Description~~ |
| ~~121~~ | ~~Fraction of snow cover~~ | ~~Proportion~~ | ~~Fraction (0-1) of the cell / grid-box occupied by snow.~~ |

* **~~2017-2.2.3(CM-I)/New GRIB2 Code table 4.2 entries [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_grib)~~>~~

**~~ADD:~~**

~~in GRIB2 Code table 4.2,~~

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ~~Parameter~~ | ~~Product Discipline~~ | ~~Parameter Category~~ | ~~Parameter number~~ | ~~Units~~ |
| ~~Highest freezing level~~ | ~~0~~ | ~~19 (Physical atmospheric properties)~~ | ~~32~~ | ~~m~~ |
| ~~Visibility through liquid fog~~ | ~~0~~ | ~~19 (Physical atmospheric properties)~~ | ~~33~~ | ~~m~~ |
| ~~Visibility through ice fog~~ | ~~0~~ | ~~19 (Physical atmospheric properties)~~ | ~~34~~ | ~~m~~ |
| ~~Visibility through blowing snow~~ | ~~0~~ | ~~19 (Physical atmospheric properties)~~ | ~~35~~ | ~~m~~ |
| ~~Categorical convective precipitation~~ | ~~0~~ | ~~1 (Moisture)~~ | ~~88~~ | ~~Code table 4.222~~ |

* **2016-2.2.8(DRMM-IV)/Encoding fields from Limited Area models combining conformal projections and bi-periodic spectral geometry [FT2019-1]**<[para 6.1](#A2018_6_1_grib)>

**Add templates:**

Grid definition template 3.13 – Mercator with modelling subdomains definition

|  |  |
| --- | --- |
| Octet No. | Contents |
| 15-nn | Same as grid definition template 3.10 |
| [nn+1]–[nn+4] | Nux – size of model forecast subdomain in x-direction (number of grid points) |
| [nn+5]–[nn+8] | Ncx – width of coupling area within forecast domain in x-direction (number of grid points) |
| [nn+9]–[nn+12] | Nuy – size of model forecast subdomain in y-direction (number of grid points) |
| [nn+13]–[nn+16] | Ncy – width of coupling area within forecast domain in y-direction (number of grid points) |

Grid definition template 3.23 – Polar stereographic with modelling subdomains definition

|  |  |
| --- | --- |
| Octet No. | Contents |
| 15–65 | Same as grid definition template 3.20 |
| 66–69 | Nux – size of model forecast subdomain in x-direction (number of grid points) |
| 70–73 | Ncx – width of coupling area within forecast domain in x-direction (number of grid points) |
| 74–77 | Nuy – size of model forecast subdomain in y-direction (number of grid points) |
| 78–81 | Ncy – width of coupling area within forecast domain in y-direction (number of grid points) |

Grid definition template 3.33 – Lambert conformal with modelling subdomains definition

|  |  |
| --- | --- |
| Octet No. | Contents |
| 15–81 | Same as grid definition template 3.30 |
| 82–85 | Nux – size of model forecast subdomain in x-direction (number of grid points) |
| 86–89 | Ncx – width of coupling area within forecast domain in x-direction (number of grid points) |
| 90–93 | Nuy – size of model forecast subdomain in y-direction (number of grid points) |
| 94–97 | Ncy – width of coupling area within forecast domain in y-direction (number of grid points) |

Grid definition template 3.61 – spectral Mercator with modelling subdomains definition

|  |  |
| --- | --- |
| Octet No. | Contents |
| 15 | Spectral representation type (see Code table 3.6) |
| 16–19 | N – bi-Fourier resolution parameter |
| 20–23 | M – bi-Fourier resolution parameter |
| 24 | Bi-Fourier truncation type (see Code table 3.25) |
| 25–32 | Lx – size in meters of the domain along x-axis |
| 33–40 | Lux – size in meters of model forecast subdomain along x-axis |
| 41–48 | Lcx – width in meters of coupling area within forecast domain along x-axis |
| 49–56 | Ly – size in meters of the domain along y-axis |
| 57–64 | Luy – size in meters of model forecast subdomain along y-axis |
| 65–72 | Lcy – width in meters of coupling area within forecast domain along y-axis |
| 73 | Shape of the Earth (see Code table 3.2) |
| 74 | Scale factor of radius of spherical Earth |
| 75–78 | Scaled value of radius of spherical Earth |
| 79 | Scale factor of major axis of oblate spheroid Earth |
| 80–83 | Scaled value of major axis of oblate spheroid Earth |
| 84 | Scale factor of minor axis of oblate spheroid Earth |
| 85–88 | Scaled value of minor axis of oblate spheroid Earth |
| 89–92 | La1 – latitude of first grid point |
| 93–96 | Lo1 – longitude of first grid point |
| 97–100 | LaD – latitude(s) at which the Mercator projection intersects the Earth (Latitude(s) where Di and Dj are specified) |
| 101–104 | La2 – latitude of last grid point |
| 105–108 | Lo2 – longitude of last grid point |
| 109–112 | Orientation of the grid, angle between i-direction on the map and the Equator (see Note 1) |

Note: Limited to the range of 0 to 90 degrees.

Grid definition template 3.62 – spectral polar stereographic with modelling subdomains definition

|  |  |
| --- | --- |
| Octet No. | Contents |
| 15 | Spectral representation type (see Code table 3.6) |
| 16–19 | N – bi-Fourier resolution parameter |
| 20–23 | M – bi-Fourier resolution parameter |
| 24 | Bi-Fourier truncation type (see Code table 3.25) |
| 25–32 | Lx – size in meters of the domain along x-axis |
| 33–40 | Lux – size in meters of model forecast subdomain along x-axis |
| 41–48 | Lcx – width in meters of coupling area within forecast domain along x-axis |
| 49–56 | Ly – size in meters of the domain along y-axis |
| 57–64 | Luy – size in meters of model forecast subdomain along y-axis |
| 65–72 | Lcy – width in meters of coupling area within forecast domain along y-axis |
| 73 | Shape of the Earth (see Code table 3.2) |
| 74 | Scale factor of radius of spherical Earth |
| 75–78 | Scaled value of radius of spherical Earth |
| 79 | Scale factor of major axis of oblate spheroid Earth |
| 80–83 | Scaled value of major axis of oblate spheroid Earth |
| 84 | Scale factor of minor axis of oblate spheroid Earth |
| 85–88 | Scaled value of minor axis of oblate spheroid Earth |
| 89–92 | La1 – latitude of first grid point |
| 93–96 | Lo1 – longitude of first grid point |
| 97 | Resolution and component flags (see Flag table 3.3) |
| 98–101 | LaD – latitude where Dx and Dy are specified |
| 102–105 | LoV – orientation of the grid |
| 106 | Projection centre flag (see Flag table 3.5) |

Grid definition template 3.63 – spectral Lambert conformal with modelling subdomains definition

|  |  |
| --- | --- |
| Octet No. | Contents |
| 15 | Spectral representation type (see Code table 3.6) |
| 16–19 | N – bi-Fourier resolution parameter |
| 20–23 | M – bi-Fourier resolution parameter |
| 24 | Bi-Fourier truncation type (see Code table 3.25) |
| 25–32 | Lx – size in meters of the domain along x-axis |
| 33–40 | Lux – size in meters of model forecast subdomain along x-axis |
| 41–48 | Lcx – width in meters of coupling area within forecast domain along x-axis |
| 49–56 | Ly – size in meters of the domain along y-axis |
| 57–64 | Luy – size in meters of model forecast subdomain along y-axis |
| 65–72 | Lcy – width in meters of coupling area within forecast domain along y-axis |
| 73 | Shape of the Earth (see Code table 3.2) |
| 74 | Scale factor of radius of spherical Earth |
| 75–78 | Scaled value of radius of spherical Earth |
| 79 | Scale factor of major axis of oblate spheroid Earth |
| 80–83 | Scaled value of major axis of oblate spheroid Earth |
| 84 | Scale factor of minor axis of oblate spheroid Earth |
| 85–88 | Scaled value of minor axis of oblate spheroid Earth |
| 89–92 | La1 – latitude of first grid point |
| 93–96 | Lo1 – longitude of first grid point |
| 97–100 | LaD – latitude where Dx and Dy are specified |
| 101–104 | LoV – longitude of meridian parallel to y-axis along which latitude increases as the y-coordinate increases |
| 105 | Projection centre flag (see Flag table 3.5) |
| 106–109 | Latin 1 – first latitude from the pole at which the secant cone cuts the sphere |
| 110–113 | Latin 2 – second latitude from the pole at which the secant cone cuts the sphere |
| 114–117 | Latitude of the southern pole of projection |
| 118–121 | Longitude of the southern pole of projection |

Data representation template 5.53 – spectral data for limited area models – complex packing

|  |  |
| --- | --- |
| Octet No. | Contents |
| 12–15 | Reference value (R) (IEEE 32-bit floating-point value) |
| 16–17 | Binary scale factor (E) |
| 18–19 | Decimal scale factor (D) |
| 20 | Number of bits used for each packed value (field width) |
| 21 | Bi-Fourier sub-truncation type (see Code table 5.25) |
| 22 | Packing mode for axes (see Code table 5.26) |
| 23–26 | P – Laplacian scaling factor (expressed in 10-6 units) |
| 27–28 | NS – bi-Fourier resolution parameter of the unpacked subset (see Note 1) |
| 29–30 | MS – bi-Fourier resolution parameter of the unpacked subset (see Note 1) |
| 31–34 | TS – total number of values in the unpacked subset (see Note 1) |
| 35 | Precision of the unpacked subset (see Code table 5.7) |

Notes:

(1) The unpacked subset is a set of values defined in the same way as the full set of values (on a spectrum limited to NS and MS), but on which scaling and packing are not applied. Associated values are stored in octets 6 onwards of Section 7.

(2) The remaining coefficients are multiplied by (n2+m2)P, scaled and packed. The operator associated with this multiplication is derived from the Laplacian operator.

(3) The retrieval formula for a coefficient of wave number n is then: Y = (R + X x 2E ) x 10–D x (m2+n2)-P where X is the packed scaled value associated with the coefficient.

Data template 7.53 – spectral data for limited area models – complex packing

|  |  |
| --- | --- |
| Octet No. | Contents |
| 6–(5+IxTS) | Data values from the unpacked subset (IEEE floating-point values on I octets) |
| (6+IxTS)–nn | Binary data values – binary string, with each (scaled) data value out of the unpacked subset |

**Add entries:**

in Code table 3.1 – Grid definition template number,

|  |  |
| --- | --- |
| Code figure | Meaning |
| 13 | Mercator with modelling subdomains definition |
| 23 | Polar stereographic with modelling subdomains definition |
| 33 | Lambert conformal with modelling subdomains definition |
| 61 | Spectral Mercator with modelling subdomains definition |
| 62 | Spectral polar stereographic with modelling subdomains definition |
| 63 | Spectral Lambert conformal with modelling subdomains definition |

in Code table 3.6 – spectral data representation type,

|  |  |
| --- | --- |
| Code figure | Meaning |
| 2 | Bi-Fourier representation |

in Code table 3.25 – type of bi-Fourier truncation,

|  |  |
| --- | --- |
| Code figure | Meaning |
| 77 | Rectangular |
| 88 | Elliptic |
| 99 | Diamond |

in Code table 5.0 – data representation template number,

|  |  |
| --- | --- |
| Code figure | Meaning |
| 53 | Spectral data for limited area models – complex packing |

in Code table 5.25 – type of bi-Fourier subtruncation,

|  |  |
| --- | --- |
| Code figure | Meaning |
| 77 | Rectangular |
| 88 | Elliptic |
| 99 | Diamond |

in Code table 5.26 – packing mode for axes

|  |  |
| --- | --- |
| Code figure | Meaning |
| 0 | Spectral coefficients for axes are packed |
| 1 | Spectral coefficients for axes included in the unpacked subset |

* **~~2015-2.1.2(DRMM-III) New GRIB2 Regulations and notes to make it clear that forecast times may be negative [ABC2017]~~**~~<~~[~~para 6.1~~](#A2018_6_1_grib)~~>~~

**~~Add a regulation:~~**

~~92.6.3 In product definition templates that refer to a forecast time or offset from reference time, this may be negative to refer to times or intervals that begin before the reference time, if this is applicable.~~

* **~~2015-2.2.1/2.2.2(DRMM-III)~~** [**~~New parameters in GRIB2 Code table 4.2/New GRIB2 parameters and product definition template for observational satellite data~~**](#A2015_2_2_1) **~~[Withdrawn]~~**~~<~~[~~para 6.1~~](#A2018_6_1_grib)~~>~~

**~~Add entries:~~**

~~In Code table 4.1,~~

~~Discipline 3 (Space products)~~

~~191 Miscellaneous~~

~~In Code Table 4.2:~~

~~Discipline 3 (Space products), category 1 (Quantitative products)~~

~~18 Water temperature K~~

~~Discipline 3 (Space products), Category 191 (Miscellaneous)~~

~~0 Seconds prior to initial reference time (defined in Section 1) s~~

**~~Add a code table:~~**

~~Code table 4.16 – Quality value associated with parameter~~

~~Code figure Meaning~~

~~0 Confidence index (see Note 2)~~

~~1 Quality indicator (see Note 3 and Code table 4.244)~~

~~2 Correlation of product with used calibration product (see Note 4)~~

~~3 Standard deviation of product from calibration product (see Note 5)~~

~~4-191 Reserved~~

~~192-254 Reserved for local use~~

~~255 Missing~~

~~Notes:~~

~~(1) When a non-missing value is used from this code table, the original data value is a quality value associated with the parameter defined by octets 10 and 11 of the product definition template.~~

~~(2) The original data value is a non-dimensional number from 0 to 1, where 0 indicates no confidence and 1 indicates maximal confidence.~~

~~(3) The original data value is defined by Code table 4.244.~~

~~(4) The original data value is a non-dimensional number without units.~~

~~(5) The original data value is in the same units as the parameter defined by octets 10 and 11 of the product definition template.~~

~~Code table 4.244 – Quality indicator~~

~~Code figure Meaning~~

~~0 No quality information available~~

~~1 Failed~~

~~2 Passed~~

~~3-191 Reserved~~

~~192-254 Reserved for local use~~

~~255 Missing~~

**~~Add a template:~~**

~~Product definition template 4.35 – satellite product with or without associated quality values~~

~~Octet No. Contents~~

~~10 Parameter category (see Code table 4.1)~~

~~11 Parameter number (see Code table 4.2)~~

~~12 Type of generating process (see Code table 4.3)~~

~~13 Observation generating process identifier (defined by originating centres)~~

~~14 Quality value associated with parameter (see Code Table 4.16)~~

~~15 Number of contributing spectral bands (NB)~~

*~~16– Repeat the following 11 octets for each contributing band (nb = 1, NB)~~*

~~(16+11(nb–1))–(17+11(nb–1)) Satellite series of band nb (code table defined by originating/generating centre)~~

~~(18+11(nb–1))–(19+11(nb–1)) Satellite numbers of band nb (code table defined by originating/generating centre)~~

~~(20+11(nb–1))–(21+11(nb–1)) Instrument types of band nb (code table defined by originating/generating centre)~~

~~(22+11(nb–1)) Scale factor of central wave number of band nb~~

~~(23+11(nb–1))–(26+11(nb–1)) Scaled value of central wave number of band nb (units: m~~~~–1~~~~)~~

~~Note: For “satellite series of band nb”, “satellite numbers of band nb” and “instrument types of band nb”, it is recommended to encode the values as per BUFR Code tables 0 02 020, 0 01 007 (Common Code table C–5) and 0 02 019 (Common Code table C–8), respectively.~~

* **2014-2.2.2(DRMM-II)/A product definition template for statistics over an ensemble**

**[Validation]**<[para 6.1](#A2018_6_1_grib)>

**Add a new template:**

Product definition template 4.62 – Statistics over an ensemble reforecast, at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12 Type of generating process (see Code table 4.3)

13 Background generating process identifier (defined by originating centre)

14 Forecast generating process identifier (defined by originating centre)

15 Indicator of unit of time range (see Code table 4.4)

16-19 Forecast time in units defined by octet 15 (see Note 1)

20 Type of first fixed surface (see Code table 4.5)

21 Scale factor of first fixed surface

22-25 Scaled value of first fixed surface

26 Type of second fixed surface (see Code table 4.5)

27 Scale factor of second fixed surface

28-31 Scaled value of second fixed surface

32 Type of ensemble forecast (see Code table 4.6)

33 Number of forecasts in ensemble

34 Number of years in the ensemble reforecast period (see Note 2)

35 First year of ensemble reforecast period

36 Last year of ensemble reforecast period

37 Total number of data values possible (or expected) in statistical process over the  
 ensemble reforecast

38-39 Total number of data values missing in statistical process over the ensemble  
 reforecast

40 Statistical process used to calculate the processed field over the ensemble reforecast  
 (see Code table 4.10)

41-42 Year of model version date (see Note 3)

43 Month of model version date

44 Day of model version date

45 Hour of model version date

46 Minute of model version date

47 Second of model version date

48 Month of end of overall time interval (see Note 5)

49 Day of end of overall time interval

50 Hour of end of overall time interval

51 Minute of end of overall time interval

52 Second of end of overall time interval

53 n - number of time range specifications describing the time intervals used

to calculate the statistically processed field

54-57 Total number of data values missing in statistical process

58-69 Specification of the outermost (or only) time range over which statistical

processing is done

58 Statistical process used to calculate the processed field from the field at

each time increment during the time range (see Code table 4.10)

59 Type of time increment between successive fields used in the statistical

processing (see Code table 4.11)

60 Indicator of unit of time for time range over which statistical processing is

done (see Code table 4.4)

61-64 Length of the time range over which statistical processing is done, in units

defined by the previous octet

65 Indicator of unit of time for the increment between the successive fields

used (see Code table 4.4)

66-69 Time increment between successive fields, in units defined by the previous

octet (see Note 3)

70-nn These octets are included only if n>1, where nn=69 + 12 x n

70-81 As octets 58 to 69, next innermost step of processing

82-nn Additional time range specifications, included in accordance with the value

of n. Contents as octets 58 to 69, repeated as necessary

Notes:

(1) The reference time in section 1 and the forecast time together define the beginning of the overall time interval.

(2) Octets 34-40 define a statistical process over both time and ensemble.

(3) This is the date to identify the model version that is used to generate the reforecast.

(4) An increment of zero means that the statistical processing is the result of a continuous (or near continuous) process, not the processing of a number of discrete samples. Examples of such continuous processes are the temperatures measured by analogue maximum and minimum thermometers or thermographs, and the rainfall measured by a rain gauge. The reference and forecast times are successively set to their initial values plus or minus the increment, as defined by the type of time increment (one of octets 59, 71. 83 ...). For all but the innermost (last) time range, the next inner range is then processed using these reference and forecast times as the initial reference and forecast time.

* **~~2012-2.2.9(DRC-IV)/~~**[**~~GRIB template for 4-D Trajectory grid definition~~**](https://www.wmo.int/pages/prog/www/ISS/Meetings/IPET-DRC_Exeter2012/Documents/IPETDRC-IV_Doc2-2_9_4Dtrajectory.doc) **~~[Withdrawn]~~**~~<~~[~~para 6.1~~](#A2018_6_1_grib)~~>~~

**~~Validate templates:~~**

~~Grid definition template 3.1010 – 4-D trajectory grid definition~~

~~Octet No. Contents~~

~~15 Shape of the Earth (see Code table 3.2)~~

~~16 Scale factor of radius of spherical Earth~~

~~17–20 Scaled value of radius of spherical Earth~~

~~21 Scale factor of major axis of oblate spheroid Earth~~

~~22–25 Scaled value of major axis of oblate spheroid Earth~~

~~26 Scale factor of minor axis of oblate spheroid Earth~~

~~27–30 Scaled value of minor axis of oblate spheroid Earth~~

~~31–32 Number of horizontal points in slice (see Note 1)~~

~~33–34 Number of vertical points in slice (see Note 1)~~

~~35–38 Di – slice horizontal grid length (see Note 2)~~

~~39–42 Dj – slice vertical grid length (see Note 2)~~

~~43–46 Pi – horizontal location of trajectory point within slice (see Note 3)~~

~~47–50 Pj – vertical location of trajectory point within slice (see Note 3)~~

~~51 Scanning mode (flags – see Flag table 3.4) (see Note 1)~~

~~52–53 NW – Number of way points (see Note 4)~~

~~54–(53+NW×24) Waypoint descriptions to define 4-D coordinates~~

~~Waypoint descriptions:~~

~~30+(N×24+0–N×24+3) LaN – latitude of Nth trajectory way point~~

~~30+(N×24+4–N×24+7) LoN – longitude of Nth trajectory way point~~

~~30+(N×24+8) Type of Nth’s trajectory way point surface (see Code table 4.5) (see  
 Note 5)~~

~~30+(N×24+9) Scale factor of Nth’s trajectory way point surface~~

~~30+(N×24+10–N×24+13) Scaled value of Nth’s trajectory way point surface~~

~~30+(N×24+14) Indicator of unit of time range (see Code table 4.4)~~

~~30+(N×24+15–N×24+18) Waypoint time in units defined by octet N×24+14 (see Note 6)~~

~~30+(N×24+19–N×24+22) Number of slices per trajectory segment (see Note 7)~~

~~30+(N×24+23) Number of additional leading and trailing slices (see Note 8)~~

~~Notes:~~

~~(1) Horizontal and vertical points in slice indicate orthogonal grid slice perpendicular to point along the trajectory segment. Therefore scanning mode describes scanning within single slice.~~

~~(2) Grid lengths are in units of 10~~~~–3~~ ~~m. Trajectory is always positioned in the centre of the slice.~~

~~(3) Location of trajectory point within slice is in units of 10~~~~–3~~ ~~m relative from first grid point of this slice.~~

~~(4) Type of line for way segments is assumed to be Great Circle.~~

~~(5) Each of waypoints can be in different types of surface coordinates. For the purpose of light transition level, point of transition can be repeated in both meters above surface and isobaric level equivalent to height reduction based on QNH valid for FIR at that moment. Waypoint can be also repeated for stopover on the trajectory with same 3-D coordinates but different waypoint time. First point of transition level or stopover description can have MISSING slices in this case.~~

~~(6) Waypoint time is relative to reference time of data defined in Section 1.~~

~~(7) Slices are defined as perpendicular planes which are equidistantly spaced along the trajectory segment. First slice is always located in first point of trajectory segment and last slice in last point of trajectory segment. Therefore minimum number of slices is 2, unless set to MISSING (for last point of trajectory or for transition level repeated point).~~

*~~Figure 3: Example of trajectory segment with 5 slices (circles represent trajectory waypoints)~~*

~~(8) Number of leading slices is same as number of trailing slices, and represents additional slices outside the trajectory segment but within its direction using same equidistant spacing as for corresponding trajectory segment itself.~~

*~~Figure 4: Example of trajectory segment with 5 slices and 1 leading and trailing slice (circles represent trajectory waypoints)~~*

~~(9) A scaled value of radius of spherical Earth, or major or minor axis of oblate spheroid Earth, is derived by applying the appropriate scale factor to the value expressed in metres.~~

~~Product definition template 4.1010 – 4-D trajectory~~

~~Octet No. Contents~~

~~10 Parameter category (see Code table 4.1)~~

~~11 Parameter number (see Code table 4.2)~~

~~12 Type of generating process (see Code table 4.3)~~

~~13 Background generating process identifier (defined by originating centre)~~

~~14 Analysis or forecast generating process identifier (defined by originating centre)~~

~~15–16 Hours of observational data cutoff after reference time (see Note)~~

~~17 Minutes of observational data cutoff after reference time~~

~~Note: Hours greater than 65534 will be coded as 65534.~~

~~Product definition template 4.1011 – 4-D trajectory ensemble forecast, control and perturbed~~

~~Octet No. Contents~~

~~10 Parameter category (see Code table 4.1)~~

~~11 Parameter number (see Code table 4.2)~~

~~12 Type of generating process (see Code table 4.3)~~

~~13 Background generating process identifier (defined by originating Centre)~~

~~14 Forecast generating process identifier (defined by originating Centre)~~

~~15–16 Hours after reference time of data cutoff (see Note)~~

~~17 Minutes after reference time of data cutoff~~

~~18 Type of ensemble forecast (see Code table 4.6)~~

~~19 Perturbation number~~

~~20 Number of forecasts in ensemble~~

~~Note: Hours greater than 65534 will be coded as 65534.~~

~~Product definition template 4.1015 – 4-D trajectory probability forecasts~~

~~Octet No. Contents~~

~~10 Parameter category (see Code table 4.1)~~

~~11 Parameter number (see Code table 4.2)~~

~~12 Type of generating process (see Code table 4.3)~~

~~13 Background generating process identifier (defined by originating centre)~~

~~14 Forecast generating process identifier (defined by originating centre)~~

~~15–16 Hours after reference time of data cutoff (see Note)~~

~~17 Minutes after reference time of data cutoff~~

~~18 Forecast probability number~~

~~19 Total number of forecast probabilities~~

~~20 Probability type (see Code table 4.9)~~

~~21 Scale factor of lower limit~~

~~22–25 Scaled value of lower limit~~

~~26 Scale factor of upper limit~~

~~27–30 Scaled value of upper limit~~

~~Note: Hours greater than 65534 will be coded as 65534.~~

**FM 94 BUFR/FM 95 CREX**

* **~~2017-2.4.1(CM-I)/New BUFR entries for GPM precipitation data [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~ADD:~~**

~~in BUFR Table D,~~

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | ~~(Global Precipitation Measurement (GPM) precipitation data)~~ |  |
| ~~3 40 015~~ | ~~0 01 007~~ | ~~Satellite identifier~~ |  |
|  | ~~0 02 019~~ | ~~Satellite instruments~~ |  |
|  | ~~3 01 011~~ | ~~Year, Month, Day~~ |  |
|  | ~~3 01 012~~ | ~~Hour, Minute~~ |  |
|  | ~~0 04 007~~ | ~~Seconds within a minute (microsecond accuracy)~~ |  |
|  | ~~2 01 133~~ | ~~Increase bit width~~ |  |
|  | ~~0 05 041~~ | ~~Scan line number~~ |  |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |  |
|  | ~~2 01 130~~ | ~~Increase bit width~~ |  |
|  | ~~0 05 043~~ | ~~Field of view number~~ |  |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |  |
|  | ~~2 07 001~~ | ~~Increase scale, reference value and data width~~ |  |
|  | ~~0 05 002~~ | ~~Latitude (coarse accuracy)~~ |  |
|  | ~~0 06 002~~ | ~~Longitude (coarse accuracy)~~ |  |
|  | ~~2 07 000~~ | ~~Cancel increase scale, reference value and data width~~ |  |
|  | ~~0 40 027~~ | ~~Sun glint angle~~ |  |
|  | ~~0 13 040~~ | ~~Surface flag~~ |  |
|  | ~~0 21 120~~ | ~~Probability of rain~~ |  |
|  | ~~2 07 003~~ | ~~Increase scale, reference value and data width~~ |  |
|  | ~~1 02 003~~ | ~~Repeat the following 2 descriptors 3 times~~ |  |
|  | ~~0 02 186~~ | ~~Capability to detect precipitation phenomena~~ | ~~1~~~~st~~ ~~replication set bit #1 = unknown/unspecified (total precipitation);~~  ~~2~~~~nd~~ ~~replication set bit #6 = solid precipitation;~~  ~~3~~~~rd~~ ~~replication set bit #24 = convective precipitation~~ |
|  | ~~0 13 155~~ | ~~Intensity of precipitation (high accuracy)~~ |  |
|  | ~~2 07 000~~ | ~~Cancel increase scale, reference value and data width~~ |  |
|  | ~~0 33 003~~ | ~~Quality information~~ |  |

~~in BUFR/CREX Code table 0 13 040 (Surface flag),~~

~~10 Standing water~~

~~11 Snow~~

**~~AMEND:~~**

~~in BUFR/CREX Flag table 0 02 186 (Capability to detect precipitation phenomena),~~

~~24 Convective precipitation~~

**~~ADD:~~**

~~in Common Code table C-13 under data category 12,~~

~~13 Precipitation~~

* **~~2017-2.4.2(CM-I)/New BUFR entries for radiosonde descent data [FT2017-2, Superseded]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~ADD:~~**

~~in BUFR Table D~~ **~~(Validation)~~**~~,~~

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **~~(Sequence for representation of radiosonde descent data)~~** |  |
| ~~3 09 056~~ | ~~3 01 150~~ | ~~WIGOS identifier~~ |  |
|  | ~~0 02 011~~ | ~~Radiosonde type~~ |  |
|  | ~~0 02 013~~ | ~~Solar and infrared radiation correction~~ |  |
|  | ~~0 02 014~~ | ~~Tracking technique/status of system used~~ |  |
|  | ~~0 02 003~~ | ~~Type of measuring equipment used~~ |  |
|  | ~~3 01 128~~ | ~~Additional information on radiosonde ascent~~ | ~~Valid also for decent~~ |
|  | ~~3 01 113~~ | ~~Date/time of launch~~ |  |
|  | ~~0 08 091~~ | ~~Coordinates significance~~ | ~~= 2 Start of observation~~ |
|  | ~~3 01 021~~ | ~~Latitude/longitude (high accuracy)~~ |  |
|  | ~~0 07 007~~ | ~~Height~~ | ~~Begin of descending of radiosonde above mean sea level~~ |
|  | ~~0 08 091~~ | ~~Coordinates significance~~ | ~~Set to missing (cancel)~~ |
|  | ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
|  | ~~0 31 002~~ | ~~Extended delayed descriptor replication factor~~ |  |
|  | ~~3 03 054~~ | ~~Temperature, dewpoint and wind data at a pressure level with radiosonde position~~ |  |
|  | ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~3 03 051~~ | ~~Wind shear data at a pressure level with radiosonde position~~ |  |

~~in Common Code table C-13~~ **~~(FT2017-2)~~**~~,~~

**~~COMMON CODE TABLE C–13:~~ *~~Data sub-categories of categories defined by entries in BUFR Table A~~***

~~DATA CATEGORIES INTERNATIONAL DATA SUB-CATEGORIES~~

~~BUFR Edition 4, Octet 11 in Section 1 BUFR Edition 4, Octet 12 (if = 255, it means~~

~~other sub-category or undefined)~~

~~CREX Edition 2, nnn in Group CREX Edition 2, mmm in Group Annnmmm  
Annnmmm of Section 1 of Section 1~~

~~Code figure Name Code figure Name (corresponding traditional alphanumeric  
 codes are in brackets)~~

~~2 Vertical soundings (other 14 Upper-level temperature/humidity/wind reports from~~

~~than satellite) descent radiosondes originally launched from~~

~~fixed-land stations~~

~~15 Upper-level temperature/humidity/wind reports from~~

~~descent radiosondes originally launched from ships~~

~~16 Upper-level temperature/humidity/wind reports from~~

~~descent radiosondes originally launched from~~

~~mobile land stations~~

* **~~2017-2.4.3(CM-I)/New BUFR entries for FY-3 VASS Products [FT2017-2, FT2018-1]~~** ~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~ADD:~~**

~~in Common Code table C-13~~ **~~(FT2017-2)~~**~~,~~

~~COMMON CODE TABLE C–13: Data sub-categories of categories defined by entries in BUFR Table A~~

~~DATA CATEGORIES INTERNATIONAL DATA SUB-CATEGORIES~~

~~BUFR Edition 4, Octet 11 in Section 1 BUFR Edition 4, Octet 12 (if = 255, it means~~

~~other sub-category or undefined)~~

~~CREX Edition 2, nnn in Group CREX Edition 2, mmm in Group Annnmmm  
Annnmmm of Section 1 of Section 1~~

~~Code figure Name Code figure Name (corresponding traditional alphanumeric  
 codes are in brackets)~~

~~3 Vertical soundings 8 VASS (Vertical atmospheric sounding system)~~

~~(satellite)~~

~~in BUFR Table D~~ **~~(FT2018-1)~~**~~,~~

|  |  |  |
| --- | --- | --- |
| ~~TABLE~~  ~~REFERENCE~~ | ~~TABLE~~  ~~REFERENCES~~ | ~~ELEMENT NAME~~ |
| ~~F X Y~~ |
|  | | **~~(VASS MWTS report of FY-3)~~** |
| **~~3 10 070~~** | ~~3 10 068~~ | ~~VASS field of view variables~~ |
| ~~1 01 013~~ | ~~Replicate 1 descriptor 13 times~~ |
| ~~3 10 069~~ | ~~VASS channel variables~~ |
|  | | **~~(VASS MWHS report of FY-3)~~** |
| **~~3 10 071~~** | ~~3 10 068~~ | ~~VASS field of view variables~~ |
| ~~1 01 015~~ | ~~Replicate 1 descriptor 15 times~~ |
| ~~3 10 069~~ | ~~VASS channel variables~~ |
|  | | **~~(VASS IRAS report of FY-3)~~** |
| **~~3 10 072~~** | ~~3 10 068~~ | ~~VASS field of view variables~~ |
| ~~1 01 026~~ | ~~Replicate 1 descriptor 26 times~~ |
| ~~3 10 069~~ | ~~VASS channel variables~~ |

|  |  |  |
| --- | --- | --- |
| ~~TABLE~~  ~~REFERENCE~~ | ~~TABLE~~  ~~REFERENCES~~ | ~~ELEMENT NAME~~ |
| ~~F X Y~~ |
|  | | **~~VASS field of view variables~~** |
| **~~3 10 068~~** | ~~0 08 070~~ | ~~Vertical sounding product qualifier~~ |
|  | ~~0 01 033~~ | ~~Identification of originating/generating centre~~ |
|  | ~~0 01 034~~ | ~~Identification of originating/generating sub-centre~~ |
|  | ~~0 01 007~~ | ~~Satellite identifier~~ |
|  | ~~0 02 019~~ | ~~Satellite instruments~~ |
|  | ~~0 12 064~~ | ~~Instrument temperature~~ |
|  | ~~0 05 040~~ | ~~Orbit number~~ |
|  | ~~2 01 136~~ | ~~Increase bit width~~ |
|  | ~~0 05 041~~ | ~~Scan line number~~ |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |
|  | ~~0 05 043~~ | ~~Field of view number~~ |
|  | ~~3 01 011~~ | ~~Year, Month, Day~~ |
|  | ~~3 01 012~~ | ~~Hour, Minute~~ |
|  | ~~2 01 138~~ | ~~Increase bit width~~ |
|  | ~~2 02 131~~ | ~~Change scale~~ |
|  | ~~0 04 006~~ | ~~Second~~ |
|  | ~~2 02 000~~ | ~~Cancel change scale~~ |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |
|  | ~~0 05 001~~ | ~~Latitude (high accuracy)~~ |
|  | ~~0 06 001~~ | ~~Longitude (high accuracy)~~ |
|  | ~~2 02 126~~ | ~~Change scale~~ |
|  | ~~0 07 001~~ | ~~Height of station~~ |
|  | ~~2 02 000~~ | ~~Cancel change scale~~ |
|  | ~~0 10 007~~ | ~~Height~~ |
|  | ~~0 07 024~~ | ~~Satellite zenith angle~~ |
|  | ~~0 05 021~~ | ~~Bearing or azimuth~~ |
|  | ~~0 07 025~~ | ~~Solar zenith angle~~ |
|  | ~~0 05 022~~ | ~~Solar azimuth~~ |
|  | ~~0 13 040~~ | ~~Surface flag~~ |
|  | ~~0 12 101~~ | ~~Temperature/air temperature(land or ocean surface temperature)~~ |
|  | ~~2 01 131~~ | ~~Increase bit width~~ |
|  | ~~2 02 129~~ | ~~Change scale~~ |
|  | ~~0 11 011~~ | ~~Wind direction at 10 m (ocean surface wind)~~ |
|  | ~~2 02 000~~ | ~~Cancel change scale~~ |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |
|  | ~~2 01 130~~ | ~~Increase bit width~~ |
|  | ~~2 02 129~~ | ~~Change scale~~ |
|  | ~~0 11 012~~ | ~~Wind speed at 10 m (ocean surface wind)~~ |
|  | ~~2 02 000~~ | ~~Cancel change scale~~ |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |
|  | ~~0 20 029~~ | ~~Rain flag~~ |
|  | ~~0 20 010~~ | ~~Cloud cover (total)~~ |
|  | ~~0 20 014~~ | ~~Height of top of cloud~~ |
|  | ~~0 13 162\*~~ | ~~Cloud liquid water~~ |
|  | ~~0 14 050~~ | ~~Emissivity~~ |

|  |  |  |
| --- | --- | --- |
| ~~TABLE~~  ~~REFERENCE~~ | ~~TABLE~~  ~~REFERENCES~~ | ~~ELEMENT NAME~~ |
| ~~F X Y~~ |
|  | | **~~VASS channel variables~~** |
| **~~3 10 069~~** | ~~0 05 042~~ | ~~Channel number~~ |
|  | ~~2 01 139~~ | ~~Increase bit width~~ |
|  | ~~0 02 155~~ | ~~Satellite channel wavelength~~ |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |
|  | ~~0 25 077~~ | ~~Bandwidth correction coefficient 1~~ |
|  | ~~0 25 078~~ | ~~Bandwidth correction coefficient 2~~ |
|  | ~~0 33 007~~ | ~~Per cent confidence~~ |
|  | ~~2 01 132~~ | ~~Increase bit width~~ |
|  | ~~2 02 129~~ | ~~Change scale~~ |
|  | ~~0 12 063~~ | ~~Brightness temperature~~ |
|  | ~~2 02 000~~ | ~~Cancel change scale~~ |
|  | ~~2 01 000~~ | ~~Cancel increase bit width~~ |

~~in BUFR/CREX Table B~~ **~~(FT2018-1)~~**~~,~~

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ~~TABLE~~  ~~REFERENCE~~  ~~F X Y~~ | ~~ELEMENT NAME~~ | ~~BUFR~~ | | | | ~~CREX~~ | | |
| ~~UNIT~~ | ~~SCALE~~ | ~~REFERENCE~~  ~~VALUE~~ | ~~DATA~~  ~~WIDTH~~  ~~(Bits)~~ | ~~UNIT~~ | ~~SCALE~~ | ~~DATA~~  ~~WIDTH~~  ~~(Characters)~~ |
| ~~0 13 162~~ | ~~Cloud liquid water~~ | ~~kg m–2~~ | ~~2~~ | ~~0~~ | ~~8~~ | ~~kg m–2~~ | ~~2~~ | ~~3~~ |

~~in Code table 0 13 040~~ **~~(FT2017-2)~~**~~,~~

~~0 13 040~~

~~Surface flag~~

|  |  |
| --- | --- |
| ~~Code Figure~~ |  |
| ~~7~~ | ~~Inland water\*~~ |
| ~~8~~ | ~~Snow cover~~ |
| ~~9~~ | ~~Sea ice~~ |

~~\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_~~

~~\*Inland water includes river, lake, wetland and swamp.~~

**~~AMEND:~~**

~~the element names in BUFR/CREX Table B~~ **~~(FT2017-2)~~**~~,~~

|  |  |
| --- | --- |
| ~~TABLE~~  ~~REFERENCE~~  ~~F X Y~~ | ~~ELEMENT NAME~~ |
|
| ~~0 08 070~~ | ~~Vertical sounding product qualifier~~ |
| ~~0 25 077~~ | ~~Bandwidth correction coefficient 1~~ |
| ~~0 25 078~~ | ~~Bandwidth correction coefficient 2~~ |

* **~~2017-2.4.4(CM-I)/BUFR template for surface observations from n-minute period [Superseded]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~ADD:~~**

~~TM307092 - BUFR template for surface observations from n-minute period~~

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **~~Station identification, time, horizontal and vertical coordinates~~** | **~~Unit, scale~~** |
|  |  | *~~WIGOS identifier~~* |  |
| **~~3 01 150~~** | ~~0 01 125~~ | ~~WIGOS identifier series~~ | ~~Numeric, 0~~ |
|  | ~~0 01 126~~ | ~~WIGOS issuer of identifier~~ | ~~Numeric, 0~~ |
|  | ~~0 01 127~~ | ~~WIGOS issue number~~ | ~~Numeric, 0~~ |
|  | ~~0 01 128~~ | ~~WIGOS local identifier (character)~~ | ~~CCITT IA5~~ |
| ~~0 01 015~~ |  | ~~Station or site name~~ | ~~CCITT IA5, 0~~ |
| ~~0 02 001~~ |  | ~~Type of station~~ | ~~Code table, 0~~ |
|  |  | *~~Year, month, day~~* |  |
| ~~3 01 011~~ | ~~0 04 001~~ | ~~Year~~~~(2)~~ | ~~Year, 0~~ |
|  | ~~0 04 002~~ | ~~Month~~~~(2)~~ | ~~Month, 0~~ |
|  | ~~0 04 003~~ | ~~Day~~~~(2)~~ | ~~Day, 0~~ |
|  |  | *~~Hour, minute~~* |  |
| ~~3 01 012~~ | ~~0 04 004~~ | ~~Hour~~~~(2)~~ | ~~Hour, 0~~ |
|  | ~~0 04 005~~ | ~~Minute~~~~(2)~~ | ~~Minute, 0~~ |
|  |  | *~~Latitude/ longitude (high accuracy)~~* |  |
| ~~3 01 021~~ | ~~0 05 001~~ | ~~Latitude (high accuracy)~~ | ~~Degree, 5~~ |
|  | ~~0 06 001~~ | ~~Longitude (high accuracy)~~ | ~~Degree, 5~~ |
| ~~0 07 030~~ |  | ~~Height of station ground above mean sea level~~ | ~~m, 1~~ |
| ~~0 07 031~~ |  | ~~Height of barometer above mean sea level~~ | ~~m, 1~~ |
| ~~0 01 023~~ |  | ~~Observation sequence number~~ | ~~Numeric, 0~~ |
|  |  | **~~Pressure~~** |  |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 10 004~~ |  | ~~Pressure~~ | ~~Pa, –1~~ |
| ~~0 10 051~~ |  | ~~Pressure reduced to mean sea level~~ | ~~Pa, –1~~ |
| ~~0 07 004~~ |  | ~~Pressure (standard level)~~ | ~~Pa, –1~~ |
| ~~0 10 009~~ |  | ~~Geopotential height of the standard level~~ | ~~gpm, 0~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
|  |  | **~~Wind~~** |  |
| ~~1 18 000~~ |  | ~~Delayed replication of 18 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (or deck of marine platform)~~ | ~~m, 2~~ |
| ~~0 02 002~~ |  | ~~Type of instrumentation for wind measurement~~ | ~~Flag table, 0~~ |
| ~~0 08 021~~ |  | ~~Time significance (= 2 Time averaged)~~ | ~~Code table, 0~~ |
| ~~0 04 025~~ |  | ~~Time period or displacement (= –10 minutes, or number of minutes after a significant change of wind)~~ | ~~Minute, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 11 001~~ |  | ~~Wind direction~~ | ~~Degree true, 0~~ |
| ~~0 11 002~~ |  | ~~Wind speed~~ | ~~m s~~~~-1~~~~, 1~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
| ~~0 08 021~~ |  | ~~Time significance (Set to missing)~~ | ~~Code table, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 11 043~~ |  | ~~Maximum wind gust direction~~ | ~~Degree true, 0~~ |
| ~~0 11 041~~ |  | ~~Maximum wind gust speed~~ | ~~m s~~~~-1~~~~, 1~~ |
| ~~0 11 016~~ |  | ~~Extreme counterclockwise wind direction of a variable wind~~ | ~~Degree true, 0~~ |
| ~~0 11 017~~ |  | ~~Extreme clockwise wind direction of a variable wind~~ | ~~Degree true, 0~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
| ~~0 04 025~~ |  | ~~Time period or displacement (= 0 minutes)~~ | ~~Minute, 0~~ |
|  |  | **~~Temperature and humidity data~~** |  |
| ~~1 11 000~~ |  | ~~Delayed replication of 11 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (or deck of marine platform)~~ | ~~m, 2~~ |
| ~~0 08 010~~ |  | ~~Surface qualifier (temperature data)~~ | ~~Code table, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 12 101~~ |  | ~~Temperature/air temperature (scale 2)~~ | ~~K, 2~~ |
| ~~0 12 103~~ |  | ~~Dewpoint temperature (scale 2)~~ | ~~K, 2~~ |
| ~~0 13 009~~ |  | ~~Relative humidity (original measured value)~~ | ~~%, 1~~ |
| ~~0 13 003~~ |  | ~~Relative humidity~~ | ~~%, 0~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (or deck of marine platform)~~  ~~(Set to missing (Cancel))~~ | ~~m, 2~~ |
| ~~0 08 010~~ |  | ~~Surface qualifier (temperature data)~~  ~~(Set to missing (Cancel))~~ | ~~Code table, 0~~ |
|  |  | **~~Soil temperature and soil moisture~~** |  |
| ~~1 07 000~~ |  | ~~Delayed replication of 7 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 07 061~~ |  | ~~Depth below land surface~~ | ~~m, 2~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 12 130~~ |  | ~~Soil temperature~~ | ~~K, 2~~ |
| ~~0 13 111~~ |  | ~~Soil moisture~~ | ~~g kg~~~~-1~~~~, 0~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
| ~~0 07 061~~ |  | ~~Depth below land surface~~  ~~(Set to missing (Cancel))~~ | ~~m, 2~~ |
|  |  | **~~Visibility~~** |  |
| ~~1 07 000~~ |  | ~~Delayed replication of 7 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
|  |  | ~~Visibility data~~ |  |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (or deck of marine platform)~~ | ~~m, 2~~ |
| ~~0 33 041~~ |  | ~~Attribute of following value~~ | ~~Code table, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 20 001~~ |  | ~~Horizontal visibility~~ | ~~m, –1~~ |
| ~~or~~ |  |  |  |
| ~~0 15 051~~ |  | ~~Meteorological optical range~~ | ~~m, 0~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (or deck of marine platform)~~  ~~(Set to missing (Cancel the previous value)~~ | ~~m, 2~~ |
|  |  | **~~Cloud~~** |  |
| ~~1 02 000~~ |  | ~~Delayed replication of 2 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 073~~ |  | *~~Cloud data~~* |  |
|  | ~~0 20 010~~ | ~~Cloud cover (total)~~ | ~~%, 0~~ |
|  | ~~1 05 004~~ | ~~Replicate 5 descriptors four times~~ |  |
|  | ~~0 08 002~~ | ~~Vertical significance~~ | ~~Code table, 0~~ |
|  | ~~0 20 011~~ | ~~Cloud amount~~ | ~~Code table, 0~~ |
|  | ~~0 20 012~~ | ~~Cloud type~~ | ~~Code table, 0~~ |
|  | ~~0 33 041~~ | ~~Attribute of following value~~ | ~~Code table, 0~~ |
|  | ~~0 20 013~~ | ~~Height of base of cloud~~ | ~~m, –1~~ |
| ~~0 08 002~~ |  | ~~Vertical significance (surface observations) (Set to missing)~~ | ~~Code table, 0~~ |
|  |  | **~~Ice and State of the ground~~** |  |
| ~~1 05 000~~ |  | ~~Delayed replication of 5 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 20 031~~ |  | ~~Ice deposit (thickness)~~ | ~~m, 2~~ |
| ~~0 20 032~~ |  | ~~Rate of ice accretion (estimated)~~ | ~~Code table, 0~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
| ~~1 04 000~~ |  | ~~Delayed replication of 4 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~3 02 078~~ |  | ~~State of ground and snow depth measurement~~ |  |
|  | ~~0 02 176~~ | ~~Method of state of ground measurement~~ | ~~Code table, 0~~ |
|  | ~~0 20 062~~ | ~~State of ground (with or without snow)~~ | ~~Code table, 0~~ |
|  | ~~0 02 177~~ | ~~Method of snow depth measurement~~ | ~~Code table, 0~~ |
|  | ~~0 13 013~~ | ~~Total snow depth~~ | ~~m, 2~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
|  |  | **~~Present weather~~** |  |
| ~~1 14 000~~ |  | ~~Delayed replication of 14 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 04 025~~ |  | ~~Time period or displacement (= -n minutes)~~ | ~~Minute, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 20 003~~ |  | ~~Present weather~~ |  |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
| ~~0 04 015~~ |  | ~~Time increment (= -n minutes)~~ |  |
| ~~0 04 025~~ |  | ~~Time period or displacement (= -1 minutes)~~ | ~~Minute, 0~~ |
| ~~0 04 065~~ |  | ~~Short time increment (= 1 minutes)~~ |  |
| ~~1 04 000~~ |  | ~~Delayed replication of 4 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor~~~~(n)~~ | ~~Numeric, 0~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 20 003~~ |  | ~~Present weather~~ |  |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |
|  |  | **~~Precipitation~~** |  |
| ~~1 02 000~~ |  | ~~Delayed replication of 2 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 079~~ |  | ~~Precipitation measurement~~ |  |
|  | ~~0 07 032~~ | ~~Height of sensor above local ground~~ | ~~m, 2~~ |
|  | ~~0 02 175~~ | ~~Method of precipitation measurement~~ | ~~Code table, 0~~ |
|  | ~~0 02 178~~ | ~~Method of liquid water content measurement of~~  ~~Precipitation~~ | ~~Code table, 0~~ |
|  | ~~0 04 025~~ | ~~Time period (= - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 13 011~~ | ~~Total precipitation / total water equivalent of snow~~ | ~~kg m~~~~-2~~~~, 1~~ |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (or deck of marine platform)~~  ~~(Set to missing (Cancel))~~ | ~~m, 2~~ |
|  |  | **~~Evaporation~~** |  |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 080~~ |  | ~~Evaporation measurement~~ |  |
|  | ~~0 02 185~~ | ~~Method of evaporation measurement~~ | ~~Code table, 0~~ |
|  | ~~0 04 025~~ | ~~Time period or displacement ( = - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 13 033~~ | ~~Evaporation /evapotranspiration~~ | ~~kg m~~~~-2~~~~, 1~~ |
|  |  | **~~Sunshine and radiation~~** |  |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 081~~ |  | *~~Total sunshine data~~* |  |
|  | ~~0 04 025~~ | ~~Time period (= - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 14 031~~ | ~~Total sunshine~~ | ~~Minute, 0~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 082~~ |  | *~~Radiation data~~* |  |
|  | ~~0 04 025~~ | ~~Time period (= - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 14 002~~ | ~~Long-wave radiation, integrated over period specified~~ | ~~J m~~~~-2~~~~, -3~~ |
|  | ~~0 14 004~~ | ~~Short-wave radiation, integrated over period specified~~ | ~~J m~~~~-2~~~~, -3~~ |
|  | ~~0 14 016~~ | ~~Net radiation, integrated over period specified~~ | ~~J m~~~~-2~~~~, -4~~ |
|  | ~~0 14 028~~ | ~~Global solar radiation (high accuracy),~~  ~~integrated over period specified~~ | ~~J m~~~~-2~~~~, -2~~ |
|  | ~~0 14 029~~ | ~~Diffuse solar radiation (high accuracy),~~  ~~integrated over period specified~~ | ~~J m~~~~-2~~~~, -2~~ |
|  | ~~0 14 030~~ | ~~Direct solar radiation (high accuracy),~~  ~~integrated over period specified~~ | ~~J m~~~~-2~~~~, -2~~ |
|  |  | **~~Lightning~~** |  |
| ~~1 05 000~~ |  | ~~Delayed replication of 5 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 04 025~~ |  | ~~Time period or displacement (= -n minutes)~~ | ~~Minute~~ |
| ~~2 04 006~~ |  | ~~Add associated field~~ |  |
| ~~0 31 021~~ |  | ~~Associated field significance (e.g. = 6)~~ | ~~Code table, 0~~ |
| ~~0 13 059~~ |  | ~~Number of flashes (thunderstorm)~~ | ~~Numeric~~ |
| ~~2 04 000~~ |  | ~~Add associated field (Cancel)~~ |  |

1. ~~WIGOS Station Identifiers shall be used for n-minute period observations.~~
2. ~~The time identification refers to the end of the n-minute period.~~
3. ~~The height above local ground 0 07 032 referring to ground temperature shall be considered as a variable. After a snowfall, the sensor is placed at the top of the snow layer and the changed value of 0 07 032 shall indicate this procedure (total snow depth is reported in 0 13 013).~~

* **2017-2.4.5(CM-I)/New BUFR sequence for describing satellites contributing to an observed geophysical quantity [Validation]**<[para 6.1](#A2018_6_1_bufr)>

**ADD:**

in BUFR Table D,

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F XY Y |
| 3 04 038 | 1 08 000 | Delayed replication of 8 descriptors |  |
|  | 0 31 001 | Delayed descriptor replication factor |  |
|  | 0 08 021 | Time significance | = 28 Start of scan |
|  | 3 01 011 | Year, month, day |  |
|  | 3 01 013 | Hour, minute, second |  |
|  | 0 08 021 | Time significance | = 29 End of scan |
|  | 3 01 011 | Year, month, day |  |
|  | 3 01 013 | Hour, minute, second |  |
|  | 0 01 007 | Satellite identifier |  |
|  | 0 02 019 | Satellite instruments |  |
|  | 0 08 021 | Time significance | Set to missing (cancel) |

* **~~2017-2.5.1(CM-I)/New Common Code table C-12 entries for CIMSS [FT2017-2]~~** ~~<~~[~~para 6.1~~](#A2018_6_1_comm)~~>~~

**~~ADD:~~**

~~in Common Code table C-12 under the originating centre #176 (=CIMSS),~~

~~20 Honolulu (United States)~~

~~21 Gilmore Creek (United States)~~

~~22 Madison (United States)~~

~~23 Miami (United States)~~

~~24 Mayaguez (Puerto Rico)~~

~~25 Monterey (United States)~~

~~26 Guam~~

~~27 Corvallis (United States)~~

~~28 Hampton (United States)~~

~~29 New York City (United States)~~

* **~~2017-2.5.2(CM-I)/New Common Code table entries for Spire Global, Inc. [FT2017-2]~~**   
  ~~<~~[~~para 6.1~~](#A2018_6_1_comm)~~>~~

**~~Add:~~**

~~in Common Code tables C-1 and C-11,~~

~~178 Spire Global, Inc.~~

~~in Common Code table C-5,~~

~~269 Spire Lemur 3U CubeSat~~

~~in Common Code table C-8,~~

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ~~Entry #~~ | ~~Agency~~ | ~~Type~~ | ~~Instrument short name~~ | ~~Instrument long name~~ |
| ~~530~~ | ~~Spire~~ | ~~GNSS occultation sounder~~ | ~~SGNOS-A~~ | ~~Spire global navigation satellite system occultation sounder A~~ |
| ~~531~~ | ~~Spire~~ | ~~GNSS occultation sounder~~ | ~~SGNOS-B~~ | ~~Spire global navigation satellite system occultation sounder B~~ |
| ~~532~~ | ~~Spire~~ | ~~GNSS occultation sounder~~ | ~~SGNOS-C~~ | ~~Spire global navigation satellite system occultation sounder C~~ |
| ~~533~~ | ~~Spire~~ | ~~GNSS occultation sounder~~ | ~~SGNOS-D~~ | ~~Spire global navigation satellite system occultation sounder D~~ |

* **~~2017-2.5.3(CM-I)/New entries in Common Code tables C-5 and C-8 by India [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_comm)~~>~~

**~~ADD:~~**

~~in Common Code table C-5,~~

~~Code figure for Code figure for~~

~~Code figure for BUFR GRIB~~

~~I~~~~6~~~~I~~~~6~~~~I~~~~6~~ ~~(Code table 0 01 007) Edition 2~~

~~473 473 473 INSAT 3DR~~

~~474 474 474 INSAT 3DS~~

~~855 855 855 Combination of INSAT 3D and INSAT 3DR~~

~~in Common Code table C-8,~~

~~Code Agency Type Instrument short name Instrument long name~~

~~289 ISRO Optical imager IMG Imager~~

* **2017-2.5.4(CM-I)/Common Code table for master table version numbers of GRIB, BUFR and CREX [ABC2018]**<[para 6.1](#A2018_6_1_comm)>

**AMEND:**

Octet 10 of Section 1 in Specifications of Octet Contents of FM 92 GRIB to

10 GRIB master table version number (see Common Code table C–0 and Note 1)

Octet 14 of Section 1 in Specifications of Octet Contents of FM 94 BUFR to

14 BUFR master table version number (see Common Code table C–0 and Note 2)

vv and bb in Group No. 1 of Section 1 in Specifications of Sections of FM 95 CREX to

vv: CREX master table version number (see Common Code table C–0)

bb: BUFR master table version number used (see Common Code table C–0)

Notes 2 and 3 to Class 00 of BUFR/CREX Table B to

(2) BUFR master table version numbers are described in Common Code table C–0 and Note 2 to Section 1 of BUFR regulations.

(3) CREX master table version numbers are described in Common Code table C–0.

**DELETE:**

Note 5 to Section 1 of Specifications of Octet Contents of FM 94 BUFR,

Note 3 to Specifications of Sections of FM 95 CREX.

**ADD:**

a note to GRIB Code table 1.0,

Note: This code table is deprecated. See Common Code table C–0 instead.

Common Code table C–0,

COMMON CODE TABLE C–0: *GRIB, BUFR and CREX master table version number*

Octet 10 in Section 1 of GRIB Edition 2

Octet 14 in Section 1 of BUFR Edition 4

vv and bb in Group No. 1 in Section 1 of CREX Edition 2

COMMON CODE TABLE C–0: GRIB, BUFR and CREX master table version number

Version number

GRIB BUFR CREX Effective date

0 0 0 Experimental

1 1 November 1988

2 1 November 1993

3 2 November 1994

4 8 November 1995

5 6 November 1996

6 5 November 1997

7 4 November 1998

8 1 3 May 2000

9 8 November 2000

1 10 2 7 November 2001

2 11 3 5 November 2003

3 12 4 2 November 2005

4 13 5 7 November 2007

5 14 6 4 November 2009

6 15 7 15 September 2010

7 16 16 4 May 2011

8 17 17 2 November 2011

9 18 18 2 May 2012

10 19 19 7 November 2012

11 20 20 8 May 2013

12 21 21 14 November 2013

13 22 22 7 May 2014

14 23 23 5 November 2014

15 24 24 6 May 2015

16 25 25 11 November 2015

17 26 26 4 May 2016

18 27 27 2 November 2016

19 28 28 3 May 2017

20 29 29 Pre-operational to be implemented by next

amendment

Notes:

(1) Introduction of Common Code table C–0 is a legal initiative. WMO Members and other TDCF users could practically deal with the version numbers the same as before until their software becomes capable of referring to the common code table.

(2) CREX master table version numbers 8–15 are not used.

(3) In the case of BUFR and CREX, these version numbers apply to the master table 0.

* **~~2017-2.5.5(CM-I)/New entries to Common Code table C-3/BUFR Table 0 22 067 for Argo floats [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_comm)~~>~~

**~~ADD:~~**

~~in Common Code table C-3 (Instrument make and type for water temperature profile measurement with fall rate equation coefficients),~~

~~Code figure for IxIxIx Code figure for BUFR (Code table 0 22 067) Meaning~~

~~Instrument make and type Equation coefficients~~

*~~a b~~*

~~835 835 PROVOR IV Not applicable~~

~~836 836 PROVOR III Not applicable~~

~~870 870 HM2000 Not applicable~~

~~871 871 COPEX Not applicable~~

~~872 872 S2X Not applicable~~

* **~~2017-2.5.6(CM-I)/New Common Code table entries in C-5 and C-8 for FY-4A [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_comm)~~>~~

**~~ADD:~~**

~~in Common Code table C-5,~~

~~530 FY-4A~~

~~in Common Code table C-8,~~

~~Code Agency Type Instrument short name Instrument long name~~

~~961 CMA Imaging multi-spectral AGRI Advanced Geosynchronous Radiation Imager  
 radiometer~~

~~962 CMA Atmospheric temperature GIIRS Geosynchronous Interferometric Infrared Sounder~~

~~and humidity sounder~~

~~963 CMA High-resolution optical LMI Lightning Mapping Imager~~

~~imager~~

~~964 CMA Space environment SEP Space Environment Package~~

~~in BUFR/CREX Code table 0 02 020,~~

~~383 FY-4~~

* **~~2017-2.5.7(CM-I)/New entry in Common Code table C-5 to include satellite identifier for Sentinel 3B [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_comm)~~>~~

**~~ADD:~~**

~~in Common Code table C-5,~~

~~Code figure~~

~~65 Sentinel 3B~~

* **~~2017-3.1.1(CM-I)/Regulations for radiosonde descent data [Withdrawn]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~ADD:~~**

~~new notes under B/C 25 Regulations,~~

~~(6) If the radiosonde and sounding system are capable to report data during the descent of the radiosonde, sequence <3 09 056> shall be used for reporting radiosonde descent data as outlined in Annex III.~~

~~new Annex III to B/C 25 Regulation,~~

**~~ANNEX III TO B/C25~~** ~~–~~ **~~Regulations~~**

**~~TM 309056 – BUFR template for P, T, U and wind vertical profiles suitable for radiosonde descent data~~**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **~~(Sequence for representation of radiosonde descent data)~~** |  |
| **~~3 09 056~~** | ~~3 01 150~~ | ~~WIGOS identifier~~ |  |
|  | ~~0 02 011~~ | ~~Radiosonde type~~ |  |
|  | ~~0 02 013~~ | ~~Solar and infrared radiation correction~~ |  |
|  | ~~0 02 014~~ | ~~Tracking technique/status of system used~~ |  |
|  | ~~0 02 003~~ | ~~Type of measuring equipment used~~ |  |
|  | ~~3 01 128~~ | ~~Additional information on radiosonde ascent~~ | ~~Valid also for radiosonde decent~~ |
|  | ~~3 01 113~~ | ~~Date/time of launch~~ | ~~Or drop respectively~~ |
|  | ~~0 08 091~~ | ~~Coordinates significance~~ | ~~= 2 Start of observation~~ |
|  | ~~3 01 021~~ | ~~Latitude/longitude (high accuracy)~~ |  |
|  | ~~0 07 007~~ | ~~Height~~ | ~~Begin of descending of radiosonde above mean sea level~~ |
|  | ~~0 08 091~~ | ~~Coordinates significance~~ | ~~Set to missing (cancel)~~ |
|  | ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
|  | ~~0 31 002~~ | ~~Extended delayed descriptor replication factor~~ |  |
|  | ~~3 03 054~~ | ~~Temperature, dewpoint and wind data at a pressure level with radiosonde position~~ |  |
|  | ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~3 03 051~~ | ~~Wind shear data at a pressure level with radiosonde position~~ |  |

~~This BUFR template for P, T, U and wind profiles further expands as follows:~~

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | **~~Identification of drop site and instrumentation~~** |  |
|  |  | *~~WIGOS identifier~~* |  |
| **~~3 01 150~~** | ~~0 01 125~~ | ~~WIGOS identifier series~~ | ~~Numeric, 0~~ |
|  | ~~0 01 126~~ | ~~WIGOS issuer of identifier~~ | ~~Numeric, 0~~ |
|  | ~~0 01 127~~ | ~~WIGOS issue number~~ | ~~Numeric, 0~~ |
|  | ~~0 01 128~~ | ~~WIGOS local identifier (character)~~ | ~~CCITT IA5~~ |
| **~~0 02 011~~** |  | ~~Radiosonde type~~ | ~~Code table~~ |
| **~~0 02 013~~** |  | ~~Solar and infrared radiation correction~~ | ~~Code table~~ |
| **~~0 02 014~~** |  | ~~Tracking technique/status of system used~~ | ~~Code table~~ |
| **~~0 02 003~~** |  | ~~Type of measuring equipment used~~ | ~~Code table~~ |
|  |  | *~~Additional information on radiosonde ascent~~* |  |
| **~~3 01 128~~** | ~~0 01 081~~ | ~~Radiosonde serial number~~ | ~~CCITT IA5~~ |
|  | ~~0 01 082~~ | ~~Radiosonde ascension number~~ | ~~Numeric, 0~~ |
|  | ~~0 01 083~~ | ~~Radiosonde release number~~ | ~~Numeric, 0~~ |
|  | ~~0 01 095~~ | ~~Observer identification~~ | ~~CCITT IA5~~ |
|  | ~~0 02 015~~ | ~~Radiosonde completeness~~ | ~~Code table~~ |
|  | ~~0 02 016~~ | ~~Radiosonde configuration (3 = Parachute)~~ | ~~Flag table~~ |
|  | ~~0 02 017~~ | ~~Correction algorithms for humidity measurements~~ | ~~Code table~~ |
|  | ~~0 02 066~~ | ~~Radiosonde ground receiving system~~ | ~~Code table~~ |
|  | ~~0 02 067~~ | ~~Radiosonde operating frequency~~ | ~~Hz, scale -5~~ |
|  | ~~0 02 080~~ | ~~Balloon manufacturer~~ | ~~Code table~~ |
|  | ~~0 02 081~~ | ~~Type of balloon~~ | ~~Code table~~ |
|  | ~~0 02 082~~ | ~~Weight of balloon~~ | ~~kg, scale 3~~ |
|  | ~~0 02 083~~ | ~~Type of balloon shelter~~ | ~~Code table~~ |
|  | ~~0 02 084~~ | ~~Type of gas used in balloon~~ | ~~Code table~~ |
|  | ~~0 02 085~~ | ~~Amount of gas used in balloon~~ | ~~kg, scale 3~~ |
|  | ~~0 02 086~~ | ~~Balloon flight train length~~ | ~~m, scale 1~~ |
|  | ~~0 02 095~~ | ~~Type of pressure sensor~~ | ~~Code table~~ |
|  | ~~0 02 096~~ | ~~Type of temperature sensor~~ | ~~Code table~~ |
|  | ~~0 02 097~~ | ~~Type of humidity sensor~~ | ~~Code table~~ |
|  | ~~0 02 103~~ | ~~Radome~~ | ~~Flag table~~ |
|  | ~~0 02 191~~ | ~~Geopotential height calculation~~ | ~~Code table~~ |
|  | ~~0 25 061~~ | ~~Software identification and version number~~ | ~~CCITT IA5~~ |
|  | ~~0 35 035~~ | ~~Reason for termination~~ | ~~Code table~~ |
|  |  | **~~Date/time of drop~~** |  |
| **~~3 01 113~~** | ~~0 08 021~~ | ~~Time significance (= 18 Launch time)~~ | ~~Code table~~ |
|  | ~~3 01 011~~ | ~~Year~~ | ~~Year~~ |
|  |  | ~~Month~~ | ~~Month~~ |
|  |  | ~~Day~~ | ~~Day~~ |
|  | ~~3 01 013~~ | ~~Hour~~ | ~~Hour~~ |
|  |  | ~~Minute~~ | ~~Minute~~ |
|  |  | ~~Second~~ | ~~Second~~ |
|  |  | **~~Horizontal and vertical coordinates of drop site~~** |  |
| **~~0 08 091~~** |  | ~~Coordinates significance (= 2 Start of observation)~~ | ~~Code table~~ |
|  |  | *~~Latitude/longitude (high accuracy)~~* |  |
| **~~3 01 021~~** | ~~0 05 001~~ | ~~Latitude (high accuracy)~~ | ~~Degree, scale 5~~ |
|  | ~~0 06 001~~ | ~~Longitude (high accuracy)~~ | ~~Degree, scale 5~~ |
| **~~0 07 007~~** |  | ~~Height~~ |  |
| **~~0 08 091~~** |  | ~~Coordinates significance (Set to missing (cancel))~~ |  |
|  |  | **~~Temperature, dewpoint and wind data at pressure levels~~** |  |
| **~~1 01 000~~** |  | ~~Delayed replication of 1 descriptor~~ |  |
| **~~0 31 002~~** |  | ~~Extended delayed descriptor replication factor~~ | ~~Numeric~~ |
|  |  | *~~Temperature, dewpoint and wind data at a pressure level with radiosonde position~~* |  |
| **~~3 03 054~~** | ~~0 04 086~~ | ~~Long time period or displacement (since launch time)~~ | ~~Second~~ |
|  | ~~0 08 042~~ | ~~Extended vertical sounding significance~~ | ~~Flag table~~ |
|  | ~~0 07 004~~ | ~~Pressure~~ | ~~Pa, scale –1~~ |
|  | ~~0 10 009~~ | ~~Geopotential height~~ | ~~gpm~~ |
|  | ~~0 05 015~~ | ~~Latitude displacement since launch site (high accuracy)~~ | ~~Degree, scale 5~~ |
|  | ~~0 06 015~~ | ~~Longitude displacement since launch site (high accuracy)~~ | ~~Degree, scale 5~~ |
|  | ~~0 12 101~~ | ~~Temperature/air temperature~~ | ~~K, scale 2~~ |
|  | ~~0 12 103~~ | ~~Dewpoint temperature~~ | ~~K, scale 2~~ |
|  | ~~0 11 001~~ | ~~Wind direction~~ | ~~Degree true~~ |
|  | ~~0 11 002~~ | ~~Wind speed~~ | ~~m s~~~~–1~~~~, scale 1~~ |
|  |  | **~~Wind shear data~~** |  |
| **~~1 01 000~~** |  | ~~Delayed replication of 1 descriptor~~ |  |
| **~~0 31 001~~** |  | ~~Delayed descriptor replication factor~~ | ~~Numeric~~ |
|  |  | *~~Wind shear data at a pressure level~~* |  |
| **~~3 03 051~~** | ~~0 04 086~~ | ~~Long time period or displacement (since launch time)~~ | ~~Second~~ |
|  | ~~0 08 042~~ | ~~Extended vertical sounding significance~~ | ~~Flag table~~ |
|  | ~~0 07 004~~ | ~~Pressure~~ | ~~Pa, scale –1~~ |
|  | ~~0 05 015~~ | ~~Latitude displacement since launch site (high accuracy)~~ | ~~Degree, scale 5~~ |
|  | ~~0 06 015~~ | ~~Longitude displacement since launch site (high accuracy)~~ | ~~Degree, scale 5~~ |
|  | ~~0 11 061~~ | ~~Absolute wind shear in 1 km layer below~~ | ~~m s~~~~–1~~~~, scale 1~~ |
|  | ~~0 11 062~~ | ~~Absolute wind shear in 1 km layer above~~ | ~~m s~~~~–1~~~~, scale 1~~ |

~~Regulations:~~

1. ~~Regulations B/C25.1 shall apply with following amendments:~~
   1. ~~Bufr edition 4 is required~~
   2. ~~The international data sub-category shall be included at all observation times as follows:~~~~= 014 for radiosonde descent data,  
       = 015 for radiosonde descent data from ships,  
       = 016 for radiosonde descent data from mobile stations.~~
2. ~~Regulations B/C25.3 shall apply~~
3. ~~Regulations B/C25.7 to B/C25.9, inclusive, shall apply.~~

~~Notes:~~

1. ~~If a parachute is used, the descriptor <0 02 016> ‘Radiosonde configuration’ in sequence <3 01 128> shall be encoded with bit no. 3 set to 1.~~

* **2017-3.1.2(CM-I)/Regulations for reporting SHIP data in TDCF (B/C10) [ABC2018]**   
  <[para 6.1](#A2018_6_1_bufr)>

**AMEND:**

B/C10.2.2.2,

B/C10.2.2.2 Direction and speed of motion of moving observing platform may be included as missing values in reports from ships that have not been directly recruited and instrumented by an NMHS, except when reporting from an area for which the ship report collecting centre, in order to meet a requirement of a search and rescue centre, has requested inclusion of direction and speed of ship motion as a routine procedure. [12.3.1.2(b)]

* **2017-3.1.3(CM-I)/Implementation of the Decision 15 of EC-69 regarding the International Exchange of Snow Data [ABC2018]**<[para 6.1](#A2018_6_1_bufr)>

**AMEND:**

in B/C Regulations,

**B/C1.8 State of ground, snow depth, ground minimum temperature   
<3 02 037>**

**B/C1.8.1 State of ground** (with or without snow) – Code table 0 20 062

State of ground without snow or with snow shall be reported using Code table 0 20 062. The synoptic hour at which this datum shall be reported is determined by regional decision. In addition to the synoptic hour, this datum should be reported at other synoptic hours, i.e. four times a day.

**B/C1.8.2 Total snow depth**

Total snow depth (0 13 013) shall be reported in metres (with precision in hundredths of a metre). The synoptic hour at which this datum is determined by regional decision. In addition to the synoptic hour, this datum should be reported at other synoptic hours, i.e. four times a day.

* **2016-3.2.7(DRMM-IV)/Additional bio-geochemical sequences for data from Argo profiling floats [Validation, ~~FT2017-2~~]**<[para 6.1](#A2018_6_1_bufr)>

**Add entries:**

in BUFR/CREX Table B,

Class 13 – Hydrographic and hydrological elements

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table reference | | | Element name | BUFR | | | | CREX | | |
| F | XX | YYY | Unit | Scale | Ref. value | Data width (bits) | Units | Scale | Data width (characters) |
| 0 | 13 | 161 | pH scale | Code table | 0 | 0 | 3 | Code table | 0 | 1 |

Class 41 – Marine bio-geochemical data

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Table reference | | | Element name | BUFR | | | | CREX | | |
| F | XX | YYY | Unit | Scale | Ref. value | Data width (bits) | Units | Scale | Data width (characters) |
| 0 | 41 | 006 | Backscattering | m-1 | 5 | 0 | 19 | m-1 | 5 | 6 |

in BUFR Table D,

**Sequence 3-06-044 for chlorophyll-A profile data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table Reference** | | | **Table References** | | | **Element Name** |  |
| F | X | Y |
| 3 | 06 | 044 |  |  |  | (Chlorophyll-A (fluorescence) profile data) |  |
|  | | | 1 | 09 | 000 | Delayed replication of 9 descriptors |  |
|  | | | 0 | 31 | 002 | Extended delayed descriptor replication factor | Gives number of depths |
|  | | | 0 | 07 | 062 | Depth below sea / water surface | Code as missing |
|  | | | 0 | 08 | 080 | Qualifier for quality class | Code as missing |
|  | | | 0 | 33 | 050 | GTSPP quality class | Code as missing |
|  | | | 0 | 07 | 065 | Water pressure |  |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 10, indicates pressure at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |
|  | | | 0 | 41 | 002 | Chlorophyll-A (fluorescence) | In kg l-1 (= 109 mg m-3) |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 21, chlorophyll-A at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |

Code depth related descriptors as missing as water pressure is used as the vertical axis

Chlorophyll-A specified in range 0 to 65.535 mg m-3 with a resolution of 0.001 mg m-3.

**Sequence 3-06-045 for dissolved nitrate profile data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table Reference** | | | **Table References** | | | **Element Name** |  |
| F | X | Y |
| 3 | 06 | 045 |  |  |  | (Dissolved nitrate profile data) |  |
|  | | | 1 | 09 | 000 | Delayed replication of 9 descriptors |  |
|  | | | 0 | 31 | 002 | Extended delayed descriptor replication factor | Gives number of depths |
|  | | | 0 | 07 | 062 | Depth below sea / water surface | Code as missing |
|  | | | 0 | 08 | 080 | Qualifier for quality class | Code as missing |
|  | | | 0 | 33 | 050 | GTSPP quality class | Code as missing |
|  | | | 0 | 07 | 065 | Water pressure |  |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 10, indicates pressure at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |
|  | | | 0 | 41 | 003 | Dissolved nitrate | In μmol kg-1 |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 22, nitrate at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |

Code depth related descriptors as missing as water pressure is used as the vertical axis.

**Sequence 3-06-046 for pH profile data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table Reference** | | | **Table References** | | | **Element Name** |  |
| F | X | Y |
| 3 | 06 | 046 |  |  |  | (pH profile data) |  |
|  | | | 1 | 09 | 000 | Delayed replication of 9 descriptors |  |
|  | | | 0 | 31 | 002 | Extended delayed descriptor replication factor | Gives number of depths |
|  | | | 0 | 07 | 062 | Depth below sea / water surface | Code as missing |
|  | | | 0 | 08 | 080 | Qualifier for quality class | Code as missing |
|  | | | 0 | 33 | 050 | GTSPP quality class | Code as missing |
|  | | | 0 | 07 | 065 | Water pressure |  |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 10, indicates pressure at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |
|  | | | 0 | 13 | 161 | pH scale |  |
|  | | | 0 | 13 | 080 | pH | dimensionless |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 23, pH at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |

Code depth related descriptors as missing as water pressure is used as the vertical axis.

**Sequence 3-06-047 for backscattering profile data**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Table Reference** | | | **Table References** | | | **Element Name** |  |
| F | X | Y |
| 3 | 06 | 047 |  |  |  | (Backscatter profile data) |  |
|  |  |  | 0 | 02 | 071 | (Spectrographic) wavelength | m |
|  | | | 1 | 09 | 000 | Delayed replication of 9 descriptors |  |
|  | | | 0 | 31 | 002 | Extended delayed descriptor replication factor | Gives number of depths |
|  | | | 0 | 07 | 062 | Depth below sea / water surface | Code as missing |
|  | | | 0 | 08 | 080 | Qualifier for quality class | Code as missing |
|  | | | 0 | 33 | 050 | GTSPP quality class | Code as missing |
|  | | | 0 | 07 | 065 | Water pressure |  |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 10, indicates pressure at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |
|  | | | 0 | 41 | 006 | Backscattering | m-1 |
|  | | | 0 | 08 | 080 | Qualifier for quality class (set to 24, backscatter at a level) |  |
|  | | | 0 | 33 | 050 | GTSPP quality class |  |

Code depth related descriptors as missing as water pressure is used as the vertical axis.

in BUFR/CREX code tables,

**0 02 149**

**Type of data buoy**

|  |  |
| --- | --- |
| Code figure | Meaning |
| 31 | Coastal sub-surface float |
| 32 | Deep sub-surface float |

**0 08 080**

**Qualifier for GTSPP Quality Flag**

|  |  |
| --- | --- |
| Code figure | Meaning |
| 21 | Chlorophyll-A at a level |
| 22 | Nitrate at a level |
| 23 | pH at a level |
| 24 | Backscattering at a level |

**~~0 22 067 (FT2017-2)~~**

**~~Instrument type for water temperature/salinity profile measurement~~**

|  |  |
| --- | --- |
| ~~Code figure~~ | ~~Meaning~~ |
| ~~835~~ | ~~PROVOR IV~~ |
| ~~836~~ | ~~PROVOR III~~ |
| ~~870~~ | ~~HM2000~~ |
| ~~871~~ | ~~COPEX~~ |
| ~~872~~ | ~~S2X~~ |
| ~~869~~ | ~~DOVA (no longer required)~~ |
| ~~870~~ | ~~NAMI (no longer required)~~ |
| ~~871~~ | ~~HM2000~~ |

**Add a code table:**

**0 13 161**

**pH scale**

|  |  |
| --- | --- |
| Code figure | Meaning |
| 0 | Seawater scale |
| 1 | Freescale |
| 2 | Total scale |
| 3-6 | Reserved |
| 7 | missing |

* **~~2016-3.2.10(DRMM-IV)/Revised note for encoding geographic coordinates in BUFR and new element descriptors for encoding coordinate reference systems and fixed reference mean sea level [ABC2017, FT2016-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~Add a note [ABC2017]:~~**

~~to Representation form of BUFR,~~

~~(10) Position can only be unambiguously interpreted if the coordinate reference system and, if required, fixed reference mean sea level, to which it is attributed, is known. If these are not specified it is assumed that the position shall be interpreted with respect to WGS84 geodetic system and Earth Geodetic Model EGM96.~~

* **~~2014-3.2.7(DRMM-II)/BUFR template for n-minute AWS data (3 07 092)~~** ~~<combined with 2013-3.2.1(DRMM-I)>~~ **~~[Superseded]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~Add new entries:~~**

**~~BUFR Table D --- Check availability of element descriptors~~**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | ~~(Temperature and humidity instrumentation)~~ |  |
| ~~3 01 130~~ | ~~0 03 002~~ | ~~Generic type of humidity instrument~~ |  |
|  | ~~0 03 003~~ | ~~Configuration of sensors~~ |  |
|  | ~~0 03 004~~ | ~~Type of shield or screen~~ |  |
|  | ~~0 03 005~~ | ~~Horizontal width of screen or shield (x)~~ |  |
|  | ~~0 03 006~~ | ~~Horizontal depth of screen or shield (y)~~ |  |
|  | ~~0 03 007~~ | ~~Vertical height of screen or shield (z)~~ |  |
|  | ~~0 03 008~~ | ~~Artificially ventilated screen or shield~~ |  |
|  | ~~0 03 009~~ | ~~Amount of forced ventilation at time of reading~~ |  |

**~~BUFR/CREX Table B --- Check availability of element descriptors~~**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ~~F X Y~~ | ~~Element Name~~ | ~~BUFR Units~~ | ~~BUFR Scale~~ | ~~BUFR Ref.~~ | ~~BUFR Width~~ | ~~CREX Units~~ | ~~CREX Scale~~ | ~~CREX Width~~ |
| ~~0 03 001~~ | ~~Surface station type~~ | ~~Code table~~ | ~~0~~ | ~~0~~ | ~~4~~ | ~~Code table~~ | ~~0~~ | ~~2~~ |
| ~~0 03 002~~ | ~~Generic type of humidity instrument~~ | ~~Code table~~ | ~~0~~ | ~~0~~ | ~~4~~ | ~~Code table~~ | ~~0~~ | ~~2~~ |
| ~~0 03 003~~ | ~~Configuration of sensors~~ | ~~Code table~~ | ~~0~~ | ~~0~~ | ~~3~~ | ~~Code table~~ | ~~0~~ | ~~1~~ |
| ~~0 03 004~~ | ~~Type of shield or screen~~ | ~~Code table~~ | ~~0~~ | ~~0~~ | ~~5~~ | ~~Code table~~ | ~~0~~ | ~~2~~ |
| ~~0 03 005~~ | ~~Horizontal width of screen or shield (x)~~ | ~~m~~ | ~~2~~ |  |  | ~~m~~ | ~~2~~ |  |
| ~~0 03 006~~ | ~~Horizontal depth of screen or shield (y)~~ | ~~m~~ | ~~2~~ |  |  | ~~m~~ | ~~2~~ |  |
| ~~0 03 007~~ | ~~Vertical height of screen or shield (z)~~ | ~~m~~ | ~~2~~ |  |  | ~~m~~ | ~~2~~ |  |
| ~~0 03 008~~ | ~~Artificially ventilated screen or shield~~ | ~~Code table~~ | ~~0~~ | ~~0~~ | ~~3~~ | ~~Code table~~ | ~~0~~ | ~~1~~ |
| ~~0 03 009~~ | ~~Amount of forced ventilation at time of reading~~ | ~~m~~~~-3~~ ~~s~~~~-1~~ | ~~1~~ |  |  | ~~m~~~~-3~~ ~~s~~~~-1~~ | ~~1~~ |  |

**~~Code tables --- Check availability of code tables~~**

**~~0 03 001 Surface station type~~**

~~Code figure~~

~~0 Land station (synoptic network)~~

~~1 Shallow water station (fixed to sea/lake floor)~~

~~2 Ship~~

~~3 Rig/platform~~

~~4 Moored buoy~~

~~5 Drifting buoy (or drifter)~~

~~6 Ice buoy~~

~~7 Land station (local network)~~

~~8 Land vehicle~~

~~9 Autonomous marine vehicle~~

~~10-14 Reserved~~

~~15 Missing value~~

~~Notes:~~

~~(1) The last three categories are for possible future use.~~

~~(2) "Land station (local network)" distinguishes "non-synoptic" stations these aren't currently distributed on the GTS but might be stored in BUFR in the future.~~

~~(3) There could be separate tables for marine and land stations but there are marginal cases (shallow water fixed stations in the southern North Sea and some rigs reporting in SYNOP code).~~

**~~0 03 002 Generic type of humidity instrument~~**

~~Code figure~~

~~0 Psychrometer [too generic]~~

~~1 Capacitive sensor (unheated)~~

~~2 Capacitive sensor (heated)~~

~~3 Resistive sensor [too generic]~~

~~4 Ordinary human hair~~

~~5 Rolled hair~~

~~6 Goldbeater’s skin~~

~~7 Chilled mirror hygrometer~~

~~8 Dew cell~~

~~9 Optical absorption sensor~~

~~10-14 Reserved~~

~~15 Missing value~~

**~~0 03 003 Configuration of Sensors [already full]~~**

~~Code figure~~

~~0 Solar radiation shield or screen (double v section louvers)~~

~~1 No solar radiation shield or screen~~

~~2 Solar radiation shield or screen (single v section louvers)~~

~~3 Solar radiation shield or screen (overlapping louvers)~~

~~4 Solar radiation shield or screen (non-overlapping louvers)~~

~~5 Solar radiation shield or screen (not louvered)~~

~~6 Integrated e.g. chilled mirror~~

~~7 Missing value~~

**~~0 03 004 Type of Shield or Screen [entries need to be checked]~~**

~~Code figure~~

~~0 Within Stevenson screen (wooden)~~

~~1 Within Stevenson screen (plastic)~~

~~2 Within marine Stevenson screen (wooden)~~

~~3 Within marine Stevenson screen (plastic)~~

~~4 Within cylindrical section plate shield (metal)~~

~~5 Within cylindrical section plate shield (wooden)~~

~~6 Within cylindrical section plate shield (plastic)~~

~~7 Within concentric tube (metal)~~

~~8 Within concentric tube (wooden)~~

~~9 Within concentric tube (plastic)~~

~~10 Within rectangular section shield (metal)~~

~~11 Within rectangular section shield (wooden)~~

~~12 Within rectangular section shield (plastic)~~

~~13 Within rectangular section shield (metal)~~

~~14 Within square section shield (wooden)~~

~~15 Within square section shield (plastic)~~

~~16 Within square section shield (metal)~~

~~17 Within triangular section shield (wooden)~~

~~18 Within triangular section shield (plastic)~~

~~19 Within triangular section shield (metal)~~

~~20 Within open covered lean-to (reed/grass/leaf)~~

~~21 Within open covered inverted v roof (reed/grass/leaf)~~

~~22-29 Reserved~~

~~30 Not Applicable, e.g. chilled mirror manufacturers enclosure~~

~~31 Missing value~~

**~~0 03 008 Artificially Ventilated Screen or Shield~~**

~~Code figure~~

~~0 Natural ventilation in use~~

~~1 Artificial aspiration in use: constant flow at time of reading~~

~~2 Artificial aspiration in use: variable flow at time of reading~~

~~3 -6 Reserved~~

~~7 Missing value~~

**~~Add a template~~**~~:~~

**~~BUFR template for surface observations from n-minute period~~**

**~~TM 307092~~**

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | ~~National station identification~~ |  |
| ~~3 01 089~~ | ~~0 01 101~~ | ~~State identifier~~ ~~(1)~~ | ~~Code table, 0~~ |
|  | ~~0 01 102~~ | ~~National station number~~ ~~(1)~~ | ~~Numeric, 0~~ |
|  |  | **~~Fixed surface station identification; time, horizontal and vertical co-ordinates~~** |  |
| **~~3 01 090~~** | ~~3 01 004~~ | ~~Surface station identification~~ |  |
|  |  | ~~WMO block number~~ | ~~Numeric, 0~~ |
|  |  | ~~WMO station number~~ | ~~Numeric, 0~~ |
|  |  | ~~Station or site name~~ | ~~CCITT IA5, 0~~ |
|  |  | ~~Type of station~~ | ~~Code table, 0~~ |
|  | ~~3 01 011~~ | ~~Year~~~~(2)~~ | ~~Year, 0~~ |
|  |  | ~~Month~~~~(2)~~ | ~~Month, 0~~ |
|  |  | ~~Day~~~~(2)~~ | ~~Day, 0~~ |
|  | ~~3 01 012~~ | ~~Hour~~~~(2)~~ | ~~Hour, 0~~ |
|  |  | ~~Minute~~~~(2)~~ | ~~Minute, 0~~ |
|  | ~~3 01 021~~ | ~~Latitude (high accuracy)~~ | ~~Degree, 5~~ |
|  |  | ~~Longitude (high accuracy)~~ | ~~Degree, 5~~ |
|  | ~~0 07 030~~ | ~~Height of station ground above mean sea level~~ | ~~m, 1~~ |
|  | ~~0 07 031~~ | ~~Height of barometer above mean sea level~~ | ~~m, 1~~ |
| ~~0 03 001~~ |  | ~~Surface station type~~ | ~~Code table, 0~~ |
| ~~0 08 010~~ |  | ~~Surface qualifier (for temperature data)~~ | ~~Code table, 0~~ |
| ~~3 01 091~~ |  | ~~Surface station instrumentation~~ |  |
|  | ~~0 02 180~~ | ~~Main present weather detecting system~~ | ~~Code table, 0~~ |
|  | ~~0 02 181~~ | ~~Supplementary present weather sensor~~ | ~~Flag table, 0~~ |
|  | ~~0 02 182~~ | ~~Visibility measurement system~~ | ~~Code table, 0~~ |
|  | ~~0 02 183~~ | ~~Cloud detection system~~ | ~~Code table, 0~~ |
|  | ~~0 02 184~~ | ~~Type of lightning detection sensor~~ | ~~Code table, 0~~ |
|  | ~~0 02 179~~ | ~~Type of sky condition algorithm~~ | ~~Code table, 0~~ |
|  | ~~0 02 186~~ | ~~Capability to detect precipitation phenomena~~ | ~~Flag table, 0~~ |
|  | ~~0 02 187~~ | ~~Capability to detect other weather phenomena~~ | ~~Flag table, 0~~ |
|  | ~~0 02 188~~ | ~~Capability to detect obscuration~~ | ~~Flag table, 0~~ |
|  | ~~0 02 189~~ | ~~Capability to discriminate lightning strikes~~ | ~~Flag table, 0~~ |
| ~~0 04 015~~ |  | ~~Time increment (= - n minutes)~~ | ~~Minute, 0~~ |
| ~~0 04 065~~ |  | ~~Short time increment ( = 1 minute)~~ | ~~Minute, 0~~ |
| ~~1 33 000~~ |  | ~~Delayed replication of 33 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor (= n)~~ | ~~Numeric, 0~~ |
| ~~0 10 004~~ |  | ~~Pressure~~ | ~~Pa, –1~~ |
| ~~1 03 000~~ |  | ~~Delayed replication of 3 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 070~~ |  | ~~Wind data~~ |  |
|  | ~~0 07 032~~ | ~~Height of sensor above local ground~~ | ~~m, 2~~ |
|  | ~~0 07 033~~ | ~~Height of sensor above water surface~~ | ~~m, 1~~ |
|  | ~~0 11 001~~ | ~~Wind direction~~ | ~~Degree true, 0~~ |
|  | ~~0 11 002~~ | ~~Wind speed~~ | ~~m s~~~~-1~~~~, 1~~ |
|  | ~~0 11 043~~ | ~~Maximum wind gust direction~~ | ~~Degree true, 0~~ |
|  | ~~0 11 041~~ | ~~Maximum wind gust speed~~ | ~~m s~~~~-1~~~~, 1~~ |
|  | ~~0 11 016~~ | ~~Extreme counterclockwise wind direction of a variable wind~~ | ~~Degree true, 0~~ |
|  | ~~0 11 017~~ | ~~Extreme clockwise wind direction of a variable wind~~ | ~~Degree true, 0~~ |
|  |  | ~~Temperature and humidity instrumentation~~ |  |
| ~~3 01 130~~ | ~~0 03 002~~ | ~~Generic type of humidity instrument~~ | ~~Code table, 0~~ |
|  | ~~0 03 003~~ | ~~Configuration of sensors~~ | ~~Code table, 0~~ |
|  | ~~0 03 004~~ | ~~Type of Shield or Screen~~ | ~~Code table, 0~~ |
|  | ~~0 03 005~~ | ~~Horizontal Width of Screen or Shield (x)~~ | ~~m, 2~~ |
|  | ~~0 03 006~~ | ~~Horizontal Depth of Screen or Shield (y)~~ | ~~m, 2~~ |
|  | ~~0 03 007~~ | ~~Vertical Height of Screen or Shield (z)~~ | ~~m, 2~~ |
|  | ~~0 03 008~~ | ~~Artificially Ventilated Screen or Shield~~ | ~~Code table, 0~~ |
|  | ~~0 03 009~~ | ~~Degree of Forced Ventilation at time of reading~~ | ~~m~~~~-3~~ ~~s~~~~-1~~~~, 1~~ |
|  | ~~0 33 003~~ | ~~Quality of humidity measurement~~ | ~~Code table, 0~~ |
|  |  | ~~Temperature and humidity data~~ |  |
| ~~3 02 072~~ | ~~0 07 032~~ | ~~Height of sensor above local ground~~ | ~~m, 2~~ |
|  | ~~0 07 033~~ | ~~Height of sensor above water surface~~ | ~~m, 1~~ |
|  | ~~0 12 101~~ | ~~Temperature/Air-temperature (scale 2)~~ | ~~K, 2~~ |
|  | ~~0 12 103~~ | ~~Dew-point temperature (scale 2)~~ | ~~K, 2~~ |
|  | ~~0 13 003~~ | ~~Relative humidity~~ | ~~%, 0~~ |
| ~~1 03 000~~ |  | ~~Delayed replication of 3 descriptors~~ |  |
| ~~0 31 001~~ |  | ~~Delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground~~~~(6)~~ | ~~m, 2~~ |
| ~~0 08 010~~ |  | ~~Surface qualifier~~ | ~~Code table, 0~~ |
| ~~0 12 120~~ |  | ~~Ground temperature~~ | ~~K, 2~~ |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (set to missing to cancel the previous value)~~ | ~~m, 2~~ |
| ~~0 08 010~~ |  | ~~Surface qualifier (set to missing to cancel the previous value)~~ | ~~Code table, 0~~ |
| ~~1 03 000~~ |  | ~~Delayed replication of 3 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~1 01 005~~ |  | ~~Replicate 1 descriptor five times~~ |  |
| ~~3 07 063~~ | ~~0 07 061~~ | ~~Depth below land surface~~ | ~~m, 2~~ |
|  | ~~0 12 130~~ | ~~Soil temperature (scale 2)~~ | ~~K, 2~~ |
| ~~0 07 061~~ |  | ~~Depth below land surface~~  ~~(set to missing to cancel the previous value)~~ | ~~m, 2~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 069~~ |  | ~~Visibility data~~ |  |
|  | ~~0 07 032~~ | ~~Height of sensor above local ground~~ | ~~m, 2~~ |
|  | ~~0 07 033~~ | ~~Height of sensor above water surface~~ | ~~m, 1~~ |
|  | ~~0 33 041~~ | ~~Attribute of following value~~ | ~~Code table, 0~~ |
|  | ~~0 20 001~~ | ~~Horizontal visibility~~ | ~~m, –1~~ |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (set to missing to cancel the previous value)~~ | ~~m, 2~~ |
| ~~0 07 033~~ |  | ~~Height of sensor above water surface~~  ~~(set to missing to cancel the previous value)~~ | ~~m, 1~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 073~~ |  | ~~Cloud data~~ |  |
|  | ~~0 20 010~~ | ~~Cloud cover (total)~~ | ~~%, 0~~ |
|  | ~~1 05 004~~ | ~~Replicate 5 descriptors four times~~ |  |
|  | ~~0 08 002~~ | ~~Vertical significance~~ | ~~Code table, 0~~ |
|  | ~~0 20 011~~ | ~~Cloud amount~~ | ~~Code table, 0~~ |
|  | ~~0 20 012~~ | ~~Cloud type~~ | ~~Code table, 0~~ |
|  | ~~0 33 041~~ | ~~Attribute of following value~~ | ~~Code table, 0~~ |
|  | ~~0 20 013~~ | ~~Height of base of cloud~~ | ~~m, –1~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 076~~ |  | ~~Precipitation, obscuration and other phenomena~~ |  |
|  | ~~0 20 021~~ | ~~Type of precipitation~~ | ~~Flag table, 0~~ |
|  | ~~0 20 022~~ | ~~Character of precipitation~~ | ~~Code table, 0~~ |
|  | ~~0 26 020~~ | ~~Duration of precipitation~~~~(3)~~ | ~~Minute, 0~~ |
|  | ~~0 20 023~~ | ~~Other weather phenomena~~ | ~~Flag table, 0~~ |
|  | ~~0 20 024~~ | ~~Intensity of phenomena~~ | ~~Code table, 0~~ |
|  | ~~0 20 025~~ | ~~Obscuration~~ | ~~Flag table, 0~~ |
|  | ~~0 20 026~~ | ~~Character of obscuration~~ | ~~Code table, 0~~ |
| ~~1 02 000~~ |  | ~~Delayed replication of 2 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 13 155~~ |  | ~~Intensity of precipitation~~ | ~~kgm~~~~-2~~~~s~~~~-1~~~~, 4~~ |
| ~~0 13 058~~ |  | ~~Size of precipitation element~~ | ~~m, 4~~ |
|  |  | *~~(end of the replicated sequence)~~* |  |
| ~~1 02 000~~ |  | ~~Delayed replication of 2 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 20 031~~ |  | ~~Ice deposit (thickness)~~ | ~~m, 2~~ |
| ~~0 20 032~~ |  | ~~Rate of ice accretion~~ | ~~Code table, 0~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 078~~ |  | ~~State of ground and snow depth measurement~~ |  |
|  | ~~0 02 176~~ | ~~Method of state of ground measurement~~ | ~~Code table, 0~~ |
|  | ~~0 20 062~~ | ~~State of ground (with or without snow)~~ | ~~Code table, 0~~ |
|  | ~~0 02 177~~ | ~~Method of snow depth measurement~~ | ~~Code table, 0~~ |
|  | ~~0 13 013~~ | ~~Total snow depth~~ | ~~m, 2~~ |
| ~~1 02 000~~ |  | ~~Delayed replication of 2 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 079~~ |  | ~~Precipitation measurement~~ |  |
|  | ~~0 07 032~~ | ~~Height of sensor above local ground~~ | ~~m, 2~~ |
|  | ~~0 02 175~~ | ~~Method of precipitation measurement~~ | ~~Code table, 0~~ |
|  | ~~0 02 178~~ | ~~Method of liquid water content measurement of~~  ~~Precipitation~~ | ~~Code table, 0~~ |
|  | ~~0 04 025~~ | ~~Time period (= - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 13 011~~ | ~~Total precipitation / total water equivalent of snow~~ | ~~kg m~~~~-2~~~~, 1~~ |
| ~~0 07 032~~ |  | ~~Height of sensor above local ground (set to missing to cancel the previous value)~~ | ~~m, 2~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 080~~ |  | ~~Evaporation measurement~~ |  |
|  | ~~0 02 185~~ | ~~Method of evaporation measurement~~ | ~~Code table, 0~~ |
|  | ~~0 04 025~~ | ~~Time period or displacement ( = - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 13 033~~ | ~~Evaporation /evapotranspiration~~ | ~~kg m~~~~-2~~~~, 1~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 081~~ |  | ~~Total sunshine data~~ |  |
|  | ~~0 04 025~~ | ~~Time period (= - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 14 031~~ | ~~Total sunshine~~ | ~~Minute, 0~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 082~~ |  | ~~Radiation data~~ |  |
|  | ~~0 04 025~~ | ~~Time period (= - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 14 002~~ | ~~Long-wave radiation, integrated over period specified~~ | ~~J m~~~~-2~~~~, -3~~ |
|  | ~~0 14 004~~ | ~~Short-wave radiation, integrated over period specified~~ | ~~J m~~~~-2~~~~, -3~~ |
|  | ~~0 14 016~~ | ~~Net radiation, integrated over period specified~~ | ~~J m~~~~-2~~~~, -4~~ |
|  | ~~0 14 028~~ | ~~Global solar radiation (high accuracy),~~  ~~integrated over period specified~~ | ~~J m~~~~-2~~~~, -2~~ |
|  | ~~0 14 029~~ | ~~Diffuse solar radiation (high accuracy),~~  ~~integrated over period specified~~ | ~~J m~~~~-2~~~~, -2~~ |
|  | ~~0 14 030~~ | ~~Direct solar radiation (high accuracy),~~  ~~integrated over period specified~~ | ~~J m~~~~-2~~~~, -2~~ |
| ~~1 02 000~~ |  | ~~Delayed replication of 2 descriptors~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~0 04 025~~ |  | ~~Time period (= - n minutes)~~ | ~~Minute~~ |
| ~~0 13 059~~ |  | ~~Number of flashes~~ | ~~Numeric~~ |
| ~~1 01 000~~ |  | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ |  | ~~Short delayed descriptor replication factor~~ | ~~Numeric, 0~~ |
| ~~3 02 083~~ |  | ~~First order statistics of P, W, T, U data~~ |  |
|  | ~~0 04 025~~ | ~~Time period (= - n minutes)~~ | ~~Minute, 0~~ |
|  | ~~0 08 023~~ | ~~First order statistics~~  ~~(= 9; best estimate of standard deviation)~~ ~~(4)~~ | ~~Code table, 0~~ |
|  | ~~0 10 004~~ | ~~Pressure~~ | ~~Pa, –1~~ |
|  | ~~0 11 001~~ | ~~Wind direction~~ | ~~Degree true, 0~~ |
|  | ~~0 11 002~~ | ~~Wind speed~~ | ~~m s~~~~-1~~~~, 1~~ |
|  | ~~0 12 101~~ | ~~Temperature/air temperature (scale 2)~~ | ~~K, 2~~ |
|  | ~~0 13 003~~ | ~~Relative humidity~~ | ~~%, 0~~ |
|  | ~~0 08 023~~ | ~~First order statistics (= missing value)~~ | ~~Code table, 0~~ |
| ~~0 33 005~~ |  | ~~Quality information (AWS data)~~ | ~~Flag table, 0~~ |
| ~~0 33 006~~ |  | ~~Internal measurement status information (AWS)~~ | ~~Code table, 0~~ |

**~~Notes:~~**

~~(1) 0 01 101 (WMO Member State identifier) and 0 01 102 (National AWS number) shall be used to identify a station within the national numbering system that is completely independent of the WMO international numbering system. The WMO international identification 0 01 001 (WMO block number) and 0 01 002 (WMO station number) shall be reported if available for the particular station.~~

~~(2) The time identification refers to the end of the n-minute period.~~

~~(3) Duration of precipitation (in minutes) represents number of minutes in which any precipitation was registered.~~

~~(4) Best estimate of standard deviation is counted out of a set of samples (signal measurements) recorded within the period specified; it should be reported as a missing value, if the measurements of the relevant element are not available from a part of the period specified by 0 04 025.~~

~~(5) If reporting nominal values is required, the template shall be supplemented with 3 07 093.~~

~~(6) The height above local ground 0 07 032 referring to ground temperature shall be considered as a variable. After a snowfall, the sensor is placed at the top of the snow layer and the changed value of 0 07 032 shall indicate this procedure (total snow depth is reported in 0 13 013).~~

* **~~2014-3.2.9(DRMM-II)/Proposed BUFR sequence for reporting observations from offshore platforms [FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~Add new entries:~~**

~~BUFR/CREX Table B~~

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ~~Table reference~~ | | | ~~Element name~~ | ~~BUFR~~ | | | | ~~CREX~~ | | |
| ~~F~~ | ~~XX~~ | ~~YYY~~ | ~~Unit~~ | ~~Scale~~ | ~~Ref. value~~ | ~~Data width (bits)~~ | ~~Units~~ | ~~Scale~~ | ~~Data width (characters)~~ |
| ~~0~~ | ~~02~~ | ~~008~~ | ~~Type of offshore platform~~ | ~~Code table~~ | ~~0~~ | ~~0~~ | ~~4~~ | ~~Code table~~ | ~~0~~ | ~~2~~ |

~~BUFR Table D~~

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | ~~(Sequence for platform identification, type, time and location of the observation report)~~ | |
| **~~3 01 056~~** | ~~0 01 087~~ | ~~WMO marine observing platform extended identifier~~ | ~~WMO number (extended 7 digit identifier)~~ |
|  | ~~0 01 011~~ | ~~Ship or mobile land station identifier~~ | ~~Call sign (where allocated)~~ |
|  | ~~0 01 015~~ | ~~Station or site name~~ | ~~Platform name~~ |
|  | ~~0 02 008~~ | ~~Type of offshore platform~~ |  |
|  | ~~0 02 001~~ | ~~Type of station~~ |  |
|  | ~~3 01 011~~ | ~~Year, month, day~~ |  |
|  | ~~3 01 012~~ | ~~Hour, minute~~ |  |
|  | ~~3 01 021~~ | ~~Latitude/longitude (high accuracy)~~ |  |
|  | ~~0 07 030~~ | ~~Height of station ground above mean sea level~~ | ~~Height of station platform above mean sea level~~ |
|  | ~~0 07 031~~ | ~~Height of barometer above mean sea level~~ |  |

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | ~~(Sequence for reporting observations from offshore platforms)~~ | |
| **~~3 08 017~~** | ~~3 01 056~~ | ~~Sequence for platform identification, type, time and location of the observation report~~ |  |
|  | ~~3 02 001~~ | ~~Pressure and 3-hour pressure change~~ |  |
| ~~3 02 052~~ | ~~Ship temperature and humidity data~~ |  |
| ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ | ~~Short delayed descriptor replication factor~~ |  |
| ~~3 02 056~~ | ~~Sea/water temperature~~ | ~~Optional~~ |
| ~~3 02 064~~ | ~~Ship wind data (see Note)~~ |  |
| ~~3 02 053~~ | ~~Ship visibility data~~ |  |
| ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ | ~~Short delayed descriptor replication factor~~ |  |
| ~~3 02 004~~ | ~~General cloud information~~ | ~~Optional~~ |
| ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ | ~~Short delayed descriptor replication factor~~ |  |
| ~~3 02 005~~ | ~~Cloud layer~~ | ~~Optional~~ |
| ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ | ~~Short delayed descriptor replication factor~~ |  |
| ~~3 02 038~~ | ~~Present and past weather~~ | ~~Optional~~ |
| ~~1 01 000~~ | ~~Delayed replication of 1 descriptor~~ |  |
| ~~0 31 000~~ | ~~Short delayed descriptor replication factor~~ |  |
| ~~3 06 039~~ | ~~Sequence for representation of basic wave measurements~~ | ~~Optional~~ |

**~~Add new code tables:~~**

**~~0 02 008~~**

**~~Type of offshore platform~~**

|  |  |
| --- | --- |
| **~~Code figure~~** | **~~Meaning~~** |
| ~~0~~ | ~~Fixed platform~~ |
| ~~1~~ | ~~Mobile offshore drill ship~~ |
| ~~2~~ | ~~Jack-up rig~~ |
| ~~3~~ | ~~Semi-submersible platform~~ |
| ~~4~~ | ~~FPSO (floating production storage and offloading unit)~~ |
| ~~5~~ | ~~Light vessel~~ |
| ~~6 – 14~~ | ~~Reserved~~ |
| ~~15~~ | ~~Missing value (or not known)~~ |

* **~~2013-3.2.4(DRMM-I)/~~**[**~~Satellite-derived winds in BUFR~~**](https://www.wmo.int/pages/prog/www/ISS/Meetings/IPET-DRMM_Tokyo2013/Documents/IPETDRMM-I_Doc3-2_4_SatelliteWind.docx)**~~[FT2017-2]~~**~~<~~[~~para 6.1~~](#A2018_6_1_bufr)~~>~~

**~~Add an entry:~~**

|  |  |  |  |
| --- | --- | --- | --- |
| **~~3 10 067~~** |  | **~~(Satellite-derived winds)~~** |  |
|  |  | *~~Processing information~~* |  |
|  | ~~0 01 033~~ | ~~Identification of originating/generating centre~~ |  |
|  | ~~0 01 034~~ | ~~Identification of originating/generating sub-centre~~ |  |
|  | ~~0 25 061~~ | ~~Software identification and version number~~ |  |
|  | ~~0 25 062~~ | ~~Database identification~~ |  |
|  |  | *~~Satellite/Instrument identification~~* |  |
|  | ~~0 01 007~~ | ~~Satellite identifier~~ |  |
|  | ~~0 02 153~~ | ~~Satellite channel centre frequency~~ |  |
|  | ~~0 01 012~~ | ~~Direction of motion of moving observing platform~~ |  |
|  | ~~2 01 138~~ | ~~Change data width~~ |  |
|  | ~~0 02 026~~ | ~~Cross-track resolution~~ |  |
|  | ~~0 02 027~~ | ~~Along-track resolution~~ |  |
|  | ~~2 01 000~~ | ~~Cancel change data width~~ |  |
|  |  | *~~Methods~~* |  |
|  | ~~0 02 028~~ | ~~Segment size at nadir in x-direction (target box size)~~ |  |
|  | ~~0 02 029~~ | ~~Segment size at nadir in y-direction (target box size)~~ |  |
|  | ~~0 02 161~~ | ~~Wind processing method~~ |  |
|  | ~~0 02 164~~ | ~~Tracer correlation method~~ |  |
|  | ~~0 02 023~~ | ~~Satellite derived wind computation method~~ |  |
|  | ~~0 08 012~~ | ~~Land/sea qualifier~~ |  |
|  | ~~0 08 013~~ | ~~Day/night qualifier~~ |  |
|  |  | *~~Final AMV data~~* |  |
|  | ~~0 01 124~~ | ~~Grid point identifier~~ | ~~.~~ |
|  | ~~0 05 001~~ | ~~Latitude (high accuracy)~~ |  |
|  | ~~0 06 001~~ | ~~Longitude (high accuracy)~~ |  |
|  | ~~0 04 001~~ | ~~Year~~ |  |
|  | ~~0 04 002~~ | ~~Month~~ |  |
|  | ~~0 04 003~~ | ~~Day~~ |  |
|  | ~~0 04 004~~ | ~~Hour~~ |  |
|  | ~~0 04 005~~ | ~~Minute~~ |  |
|  | ~~0 04 006~~ | ~~Second~~ |  |
|  | ~~0 04 086~~ | ~~Long time period or displacement (seconds)~~ |  |
|  | ~~0 11 001~~ | ~~Wind direction~~ |  |
|  | ~~0 11 002~~ | ~~Wind speed~~ |  |
|  | ~~0 11 003~~ | ~~Wind u-component~~ |  |
|  | ~~0 11 004~~ | ~~Wind v-component~~ |  |
|  | ~~0 02 162~~ | ~~Extended height assignment method~~ |  |
|  | ~~0 07 004~~ | ~~Pressure~~ |  |
|  | ~~0 12 001~~ | ~~Temperature~~ |  |
|  | ~~0 20 014~~ | ~~Height of top of cloud~~ |  |
|  | ~~0 07 024~~ | ~~Satellite zenith angle~~ |  |
|  | ~~0 01 023~~ | ~~Observation sequence number~~ |  |
|  | ~~1 04 000~~ | ~~Delayed replication of 4 descriptors~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~0 02 162~~ | ~~Extended height assignment method~~ |  |
|  | ~~0 07 004~~ | ~~Pressure~~ |  |
|  | ~~0 12 001~~ | ~~Temperature~~ |  |
|  | ~~0 20 014~~ | ~~Height of top of cloud~~ |  |
|  |  | *~~Image information (for each image used)~~* |  |
|  | ~~1 13 000~~ | ~~Delayed replication of 13 descriptors~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~0 04 086~~ | ~~Long time period or displacement (seconds)~~ |  |
|  | ~~0 02 020~~ | ~~Satellite classification~~ |  |
|  | ~~0 01 007~~ | ~~Satellite identifier~~ |  |
|  | ~~0 02 019~~ | ~~Satellite instruments~~ |  |
|  | ~~0 05 042~~ | ~~Channel number~~ |  |
|  | ~~0 02 153~~ | ~~Satellite channel centre frequency~~ |  |
|  | ~~0 05 040~~ | ~~Orbit number~~ |  |
|  | ~~0 07 024~~ | ~~Satellite zenith angle~~ |  |
|  | ~~0 05 021~~ | ~~Bearing or azimuth~~ |  |
|  | ~~0 02 162~~ | ~~Extended height assignment method~~ |  |
|  | ~~0 07 004~~ | ~~Pressure~~ |  |
|  | ~~0 12 001~~ | ~~Temperature~~ |  |
|  | ~~0 20 014~~ | ~~Height of top of cloud~~ |  |
|  |  | *~~Intermediate vectors (for each component vector)~~* |  |
|  | ~~1 19 000~~ | ~~Delayed replication of 19 descriptors~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~0 04 086~~ | ~~Long time period or displacement (seconds)~~ |  |
|  | ~~0 04 086~~ | ~~Long time period or displacement (seconds)~~ |  |
|  | ~~0 05 001~~ | ~~Latitude (high accuracy)~~ |  |
|  | ~~0 06 001~~ | ~~Longitude (high accuracy)~~ |  |
|  | ~~0 11 003~~ | ~~u-component~~ |  |
|  | ~~0 11 004~~ | ~~v-component~~ |  |
|  | ~~0 11 113~~ | ~~Tracking correlation of vector~~ |  |
|  | ~~0 25 148~~ | ~~Coefficient of variation~~ |  |
|  | ~~1 03 000~~ | ~~Delayed replication of 3 descriptors~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~0 08 023~~ | ~~First order statistics~~ |  |
|  | ~~0 11 003~~ | ~~u-component~~ |  |
|  | ~~0 11 004~~ | ~~v-component~~ |  |
|  | ~~0 08 023~~ | ~~First order statistics~~ | ~~Set to missing (cancel)~~ |
|  | ~~1 03 000~~ | ~~Delayed replication of 3 descriptors~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~0 20 111~~ | ~~x-axis error ellipse major component~~ |  |
|  | ~~0 20 112~~ | ~~y-axis error ellipse minor component~~ |  |
|  | ~~0 20 114~~ | ~~Angle of x-axis in error ellipse~~ |  |
|  |  | *~~Corresponding forecast data~~* |  |
|  | ~~0 01 033~~ | ~~Identification of originating/generating centre~~ |  |
|  | ~~0 08 021~~ | ~~Time significance~~ | ~~= 27 First guess~~ |
|  | ~~0 11 095~~ | ~~u-component of the model wind vector~~ |  |
|  | ~~0 11 096~~ | ~~v-component of the model wind vector~~ |  |
|  | ~~0 07 004~~ | ~~Pressure~~ |  |
|  | ~~0 08 021~~ | ~~Time significance~~ | ~~= 4 Forecast~~ |
|  | ~~0 11 095~~ | ~~u-component of the model wind vector~~ |  |
|  | ~~0 11 096~~ | ~~v-component of the model wind vector~~ |  |
|  | ~~0 07 004~~ | ~~Pressure~~ |  |
|  | ~~0 08 021~~ | ~~Time significance~~ | ~~Set to missing (cancel)~~ |
|  | ~~0 08 086~~ | ~~Vertical significance for NWP~~ | ~~= 10 Level of best fit~~ |
|  | ~~0 11 095~~ | ~~u-component of the model wind vector~~ |  |
|  | ~~0 11 096~~ | ~~v-component of the model wind vector~~ |  |
|  | ~~0 07 004~~ | ~~Pressure~~ |  |
|  | ~~0 08 086~~ | ~~Vertical significance for NWP~~ | ~~Set to missing (cancel)~~ |
|  |  | *~~Final AMV quality~~* |  |
|  | ~~1 02 004~~ | ~~Replicate 2 descriptors 4 times~~ |  |
|  | ~~0 01 032~~ | ~~Generating application~~ |  |
|  | ~~0 33 007~~ | ~~Per cent confidence~~ |  |
|  | ~~0 08 092~~ | ~~Measurement uncertainty expression~~ | ~~= 0 Standard uncertainty~~ |
|  | ~~0 11 003~~ | ~~u-component~~ |  |
|  | ~~0 11 004~~ | ~~v-component~~ |  |
|  | ~~0 07 004~~ | ~~Pressure~~ |  |
|  | ~~0 08 092~~ | ~~Measurement uncertainty expression~~ | ~~Set to missing (cancel)~~ |
|  | ~~0 33 066~~ | ~~AMV Quality Flag~~ |  |
|  |  | *~~Cloud data and microphysics (refers to the nominal image used for HA)~~* |  |
|  | ~~0 20 081~~ | ~~Cloud amount~~ |  |
|  | ~~0 20 012~~ | ~~Cloud type~~ |  |
|  | ~~0 20 056~~ | ~~Cloud phase~~ |  |
|  | ~~1 17 000~~ | ~~Delayed replication of 17 descriptors~~ |  |
|  | ~~0 31 001~~ | ~~Delayed descriptor replication factor~~ |  |
|  | ~~0 08 023~~ | ~~First order statistics~~ |  |
|  | ~~0 20 016~~ | ~~Pressure at the top of cloud~~ |  |
|  | ~~0 08 092~~ | ~~Measurement uncertainty expression~~ | ~~= 0 Standard uncertainty~~ |
|  | ~~0 08 003~~ | ~~Vertical significance (satellite observations)~~ | ~~= 2 Cloud top~~ |
|  | ~~0 12 001~~ | ~~Temperature~~ |  |
|  | ~~0 08 003~~ | ~~Vertical significance (satellite observations)~~ | ~~Set to missing (cancel)~~ |
|  | ~~0 20 016~~ | ~~Pressure at the top of cloud~~ |  |
|  | ~~0 08 092~~ | ~~Measurement uncertainty expression~~ | ~~Set to missing (cancel)~~ |
|  | ~~0 25 149~~ | ~~Optimal estimation cost~~ |  |
|  | ~~0 20 016~~ | ~~Pressure at top of cloud~~ |  |
|  | ~~0 20 014~~ | ~~Height of top of cloud~~ |  |
|  | ~~0 13 093~~ | ~~Cloud optical thickness~~ |  |
|  | ~~0 13 109~~ | ~~Ice/liquid water path~~ |  |
|  | ~~0 40 038~~ | ~~Cloud particle size~~ |  |
|  | ~~0 08 011~~ | ~~Meteorological feature~~ | ~~= 12 Cloud~~ |
|  | ~~0 14 050~~ | ~~Emissivity~~ |  |
|  | ~~0 08 011~~ | ~~Meteorological feature~~ | ~~Set to missing (cancel)~~ |
|  | ~~0 08 023~~ | ~~First order statistics~~ | ~~Set to missing (cancel)~~ |

**~~Add new entries to Table B:~~**

|  |  |  |  |
| --- | --- | --- | --- |
|  | ~~Element name~~ | ~~BUFR~~ | ~~CREX~~ |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ~~F X Y~~ |  | ~~Unit~~ | ~~Scale~~ | ~~Ref. value~~ | ~~Data width~~ | ~~Unit~~ | ~~Scale~~ | ~~Data width~~ |
| ~~0 02 161~~ | ~~Wind processing method~~ | ~~Flag table~~ | ~~0~~ | ~~0~~ | ~~16~~ | ~~Flag table~~ | ~~0~~ | ~~6~~ |
| ~~0 02 162~~ | ~~Extended height assignment method~~ | ~~Code table~~ | ~~0~~ | ~~0~~ | ~~6~~ | ~~Code table~~ | ~~0~~ | ~~2~~ |
| ~~0 11 113~~ | ~~Tracking correlation of vector~~ | ~~Numeric~~ | ~~3~~ | ~~-1000~~ | ~~12~~ | ~~Numeric~~ | ~~3~~ | ~~4~~ |
| ~~0 13 109~~ | ~~Ice/liquid water path~~ | ~~kg m-2~~ | ~~3~~ | ~~0~~ | ~~10~~ | ~~kg m-2~~ | ~~3~~ | ~~4~~ |
| ~~0 25 147~~ | ~~Size of largest cluster (in pixels)~~ | ~~Numeric~~ | ~~0~~ | ~~0~~ | ~~10~~ | ~~Numeric~~ | ~~0~~ | ~~4~~ |
| ~~0 25 148~~ | ~~Coefficient of variation~~ | ~~Numeric~~ | ~~2~~ | ~~-10000~~ | ~~15~~ | ~~Numeric~~ | ~~2~~ | ~~5~~ |
| ~~0 25 149~~ | ~~Optimal estimation cost~~ | ~~Numeric~~ | ~~0~~ | ~~0~~ | ~~8~~ | ~~Numeric~~ | ~~0~~ | ~~3~~ |
| ~~0 33 066~~ | ~~AMV quality flag~~ | ~~Flag table~~ | ~~0~~ | ~~0~~ | ~~24~~ | ~~Flag table~~ | ~~0~~ | ~~8~~ |
| ~~0 40 038~~ | ~~Cloud particle size~~ | ~~m~~ | ~~7~~ | ~~0~~ | ~~28~~ | ~~m~~ | ~~7~~ | ~~6~~ |

**~~Add new entries to 0-02-164~~**

~~3 Stereo matching~~

**~~Add new entries to 0-08-086~~**

~~10 Level of best fit~~

**~~Add new entries to 0-20-056~~**

~~5 Supercooled Liquid Water~~

**~~Add new entries to 0-20-012~~**

~~43 Clear~~

~~44 Liquid water~~

~~45 Supercooled liquid water~~

~~46 Mixed phase~~

~~47 Optically thick ice~~

~~48 Optically thin ice~~

~~49 Multilayered ice~~

**~~0-02-161 Wind processing method~~**

|  |  |
| --- | --- |
| ~~Bit~~ | ~~DESCRIPTION~~ |
| ~~1-10~~ | ~~Reserved~~ |
| ~~11~~ | ~~Wind height calculated from median cloud-top pressure of target~~ |
| ~~12~~ | ~~Target is cloudy~~ |
| ~~13~~ | ~~Low-level inversion~~ |
| ~~14~~ | ~~CCC method~~ |
| ~~15~~ | ~~Nested tracking~~ |
| ~~All 16~~ | ~~Missing value~~ |

**~~0-02-162 Extended height assignment method~~**

|  |  |
| --- | --- |
| ~~Code figure~~ | ~~DESCRIPTION~~ |
| ~~0~~ | ~~Auto editor~~ |
| ~~1~~ | ~~IRW height assignment~~ |
| ~~2~~ | ~~WV height assignment~~ |
| ~~3~~ | ~~H~~~~2~~~~O intercept height assignment~~ |
| ~~4~~ | ~~CO~~~~2~~ ~~slicing height assignment~~ |
| ~~5~~ | ~~Low pixel max gradient~~ |
| ~~6~~ | ~~Higher pixel max gradient~~ |
| ~~7~~ | ~~Primary height assignment~~ |
| ~~8~~ | ~~Layer thickness assignment~~ |
| ~~9~~ | ~~Cumulative contribution function - 10 percent height~~ |
| ~~10~~ | ~~Cumulative contribution function - 50 percent height~~ |
| ~~11~~ | ~~Cumulative contribution function - 90 percent height~~ |
| ~~12~~ | ~~Cumulative contribution function - height of maximum gradient~~ |
| ~~13~~ | ~~IR/two WV channel rationing method~~ |
| ~~14~~ | ~~Composite height assignment~~ |
| ~~15~~ | ~~Optimal estimation~~ |
| ~~16~~ | ~~Inversion correction~~ |
| ~~17~~ | ~~Geometric height assignment~~ |
| ~~18-62~~ | ~~Reserved~~ |
| ~~63~~ | ~~Missing value~~ |

**~~0-33-066 AMV quality flag~~**

|  |  |
| --- | --- |
| ~~Bit~~ | ~~DESCRIPTION~~ |
| ~~1-21~~ | ~~Reserved~~ |
| ~~22~~ | ~~Correlation surface constraint fails~~ |
| ~~23~~ | ~~Reserved~~ |
| ~~All 24~~ | ~~Missing value~~ |