**ANNEX**

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

2.1 Amendments to GRIB regulations

(none)

2.2 Additions to GRIB templates and tables

**2019-2.2.1(CM-III) New GRIB2 parameter for evapotranspiration rate**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_1)

1. Add the following note to existing parameter 6 (“Evapotranspiration”) within discipline 2, category 0 of Code Table 4.2:

The listed units for this parameter appear not to be appropriate for evapotranspiration . Instead, it is recommended to use parameter 39 with statistical process 1 (“Accumulation”), in order to report evapotranspiration in units of kg m–2

1. Add the following new parameter to discipline 2, category 0 of Code Table 4.2:

Discipline 2 (Land Surface Products), Category 0 (Vegetation/Biomass)

Parameter

    39                 Evapotranspiration rate            kg m–2 s–1

**2019-2.2.2(CM-III) New GRIB2 Code table 4.2 entries for snow squalls**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_2)

Product Discipline 0 – Meteorological products, parameter category 19: physical atmospheric properties

|  |  |  |
| --- | --- | --- |
| Number | Parameter | Units |
| 36 | Presence of snow squalls | [Code table 4.222](http://www.nco.ncep.noaa.gov/pmb/docs/grib2/grib2_doc/grib2_table4-222.shtml) |
| 37-191 | Reserved |  |
| 192-254 | Reserved for Local Use |  |

**2019-2.2.3(CM-III) New GRIB2 Code table 4.2 entries for various parameters [Urgent validation]**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_3)

Proposed new entry for Code table 4.2

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Product Discipline | Parameter Category | Parameter number | Units |
| Thunderstorm intensity index | 0 | 7 (Thermodynamic stability) | 20 | Code table 4.246 proposed new table |
| Precipitation intensity index | 0 | 1 (Moisture) | 122 | Code table 4.247 proposed new table |
| Probability of freezing rain | 1 | 1 (Hydrology probabilities) | 3 | % |
| Probability of freezing drizzle | 1 | 1 (Hydrology probabilities) | 4 | % |
| Probability of hail (Pas dans la requête Weather Elements) | 1 | 1 (Hydrology probabilities) | 198 | % |
| Probability of ice pellets | 1 | 1 (Hydrology probabilities) | 5 | % |
| Probability of snow squall | 1 | 1 (Hydrology probabilities) | 6 | % |
| Probability of snow | 1 | 1 (Hydrology probabilities) | 7 | % |
| Probability of rain | 1 | 1 (Hydrology probabilities) | 8 | % |
| Probability of blizzard (Pas dans la requête Weather Elements) | 1 | 1 (Hydrology probabilities) | 201 | % |
| Snow level | 0 | 19 (Physical atmospheric) | 36 | m |
| Dominant precipitation type | 0 | 1 (Moisture) | 123 | Code table 4.201 proposed modified table |
| Presence of showers | 0 | 1 (Moisture) | 124 | Numeric\*\*\*\* |
| Presence of blowing snow | 0 | 1 (Moisture) | 125 | Numeric\*\*\*\* |
| Presence of blizzard | 0 | 1 (Moisture) | 126 | Numeric\*\*\*\* |
| Ice pellets (non water equivalent) precipitation rate | 0 | 1 (Moisture) | 127 | m/s |

\*\*\*\* This parameter indicates whether the precipitation is convective (value=1) or not (value=0). The method used to determine the character of the precipitation is left open to the producer.

One table modification proposed:

GRIB2 - CODE TABLE 4.201, PRECIPITATION TYPE

|  |  |
| --- | --- |
| Code Figure | Meaning |
| 0 | Reserved |
| 1 | Rain |
| 2 | Thunderstorm |

**2019-2.2.4(CM-III) New templates for spatio-temporal changing tiles [Urgent validation]**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_4)

**Code table 4.0** – *Product definition template number*

Code figure Meaning

62 Average, accumulation and/or extreme values or other statistically processed values at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for spatio-temporal changing tiles at a horizontal level or horizontal layer at a point in time

63 Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for spatio-temporal changing tiles

Add 2 new templates:

*Product definition template 4.62 – average, accumulation and/or extreme values or other statistically processed values at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for spatio-temporal changing tiles at a horizontal level or horizontal layer at a point in time*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12 Tile classification (see Code table 4.242)

13 Total number (NT) of tile/attribute pairs (see Notes 1 and 2)

14 Number of used spatial tiles (NUT) (see Notes 1 and 2)

15 Tile index (ITN = {1,…, NUT}) (see Note 1)

16 Number of used tile attributes (NAT) for tile ITN (see Note 1)

17 Attribute of tile (see Code table 4.241)) (A = {A(1),…, A(NAT(ITN))}) (see Note 1)

18 Type of generating process (see Code table 4.3)

19 Background generating process identifier (defined by originating centre)

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

21–22 Hours of observational data cut-off after reference time (see Note 3)

23 Minutes of observational data cut-off after reference time

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

25–28 Forecast time in units defined by octet 24 (see Note 4)

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

30 Scale factor of first fixed surface

31–34 Scaled value of first fixed surface

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

36 Scale factor of second fixed surface

37–40 Scaled value of second fixed surface

41-42 Year

43 Month

44 Day Time of end of overall time interval

45 Hour

46 Minute

47 Second

48 n – number of time range specifications describing the time intervals used to calculate the statistically processed field

49–52 Total number of data values missing in statistical process

*53-64 Specification of the outermost (or only) time range over which statistical processing is done*

53 Statistical process used to calculate the processed field from the field at each time increment during the time range (see Code table 4.10)

54 Type of time increment between successive fields used in the statistical processing (see Code table 4.11)

55 Indicator of unit of time for time range over which statistical processing is done (see Code table 4.4)

56–59 Length of the time range over which statistical processing is done, in units defined by the previous octet

60 Indicator of unit of time for the increment between the successive fields used (see Code table 4.4)

61-64 Time increment between successive fields, in units defined by the previous octet (see Notes 5 and 6)

*65-nn These octets are included only if n > 1, where nn = 52 + 12 x n*

65-76 As octets 53 to 64, next innermost step of processing

77–nn Additional time range specifications, included in accordance with the value of n. Contents as octets 53 to 64, repeated as necessary

Notes:

(1) See Note 1 under product definition template 4.55.

(2) For more information, see Part B, GRIB Attachment IV.

(3) Hours greater than 65534 will be coded as 65534

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

(5) 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.

(6) 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 54, 66, 78, ...). 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 times.

*Product definition template 4.63 – Individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for spatio-temporal changing tiles*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12 Tile classification (see Code table 4.242)

13 Total number (NT) of tile/attribute pairs (see Notes 1 and 2)

14 Number of used spatial tiles (NUT) (see Notes 1 and 2)

15 Tile index (ITN = {1,…, NUT}) (see Note 1)

16 Number of used tile attributes (NAT) for tile ITN (see Note 1)

17 Attribute of tile (see Code table 4.241)) (A = {A(1),…, A(NAT(ITN))}) (see Note 1)

18 Type of generating process (see Code table 4.3)

19 Background generating process identifier (defined by originating centre)

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

21–22 Hours of observational data cut-off after reference time (see Note 3)

23 Minutes of observational data cut-off after reference time

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

25–28 Forecast time in units defined by octet 24 (see Note 4)

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

30 Scale factor of first fixed surface

31–34 Scaled value of first fixed surface

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

36 Scale factor of second fixed surface

37–40 Scaled value of second fixed surface

41 Type of ensemble forecast (see Code table 4.6)

42 Perturbation number

43 Number of forecasts in ensemble

44-45 Year

46 Month

47 Day Time of end of overall time interval

48 Hour

49 Minute

50 Second

51 n – number of time range specifications describing the time intervals used to calculate the statistically processed field

52-55 Total number of data values missing in statistical process

*56-67 Specification of the outermost (or only) time range over which statistical processing is done*

56 Statistical process used to calculate the processed field from the field at each time increment during the time range (see Code table 4.10)

57 Type of time increment between successive fields used in the statistical processing (see Code table 4.11)

58 Indicator of unit of time for time range over which statistical processing is done (see Code table 4.4)

59–62 Length of the time range over which statistical processing is done, in units defined by the previous octet

63 Indicator of unit of time for the increment between the successive fields used (see Code table 4.4)

64-67 Time increment between successive fields, in units defined by the previous octet (see Notes 5 and 6)

*68-nn These octets are included only if n > 1, where nn = 55 + 12 x n*

68-79 As octets 56 to 67, next innermost step of processing

80–nn Additional time range specifications, included in accordance with the value of n. Contents as octets 56 to 67, repeated as necessary

Notes:

(1) See Note 1 under product definition template 4.55.

(2) For more information, see Part B, GRIB Attachment IV.

(3) Hours greater than 65534 will be coded as 65534

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

(5) 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.

(6) 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 57, 69, 81, ...). 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 times.

**2019-2.2.5(CM-III) Space Weather in GRIB2 [Urgent validation]**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_5)

Rename Code table 3.2 as “Shape of the reference system” and add the following new entries:

**Code table 3.2** – *Shape of the reference system*

|  |  |
| --- | --- |
| Code figure | Meaning |
| 10 | Earth model assumed WGS84 with corrected geomagnetic coordinates (latitude and longitude) defined by Gustafsson et al., 1992 |
| 11 | Sun assumed spherical with radius = 695,990,000 m (Allen, C.W., 1976 Astrophysical Quantities (3rd Ed.; London: Athlone) and Stonyhurst latitude and longitude system with origin at the intersection of the solar central meridian (as seen from Earth) and the solar equator (Thompson, W, Coordinate systems for solar image data, A&A 449, 791–803 (2006)) |

Add the following new entries to Code table 4.5:

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

|  |  |  |
| --- | --- | --- |
| Code figure | Meaning | Unit |
| 30~~168~~ | Specified radius from the center of the Sun | m |
| 31~~169~~ | Solar photosphere |  |
| 32~~170~~ | Ionospheric D-region level |  |
| 33~~171~~ | Ionospheric E-region level |  |
| 34~~172~~ | Ionospheric F1-region level |  |
| 35~~173~~ | Ionospheric F2-region level |  |

**[Confirmed for FT2019-2]**

In Code table 0.0, rename existing entry #3 as “Satellite remote sensing products” and add new entry #4:

**Code table 0.0** - *Discipline of processed data in the GRIB message, number of GRIB Master table*

|  |  |
| --- | --- |
| **Code figure** | **Meaning** |
| 3 | Satellite remote sensing products  (formerly "Space products") |
| 4 | Space weather products |

**[Urgent validation]**

Add the following new entries to Code table 4.1:

**Code table 4.1** - *Parameter category by product discipline*

|  |  |
| --- | --- |
| Product Discipline 4 – Space Weather Products | |
| Category | Description |
| 0 | Temperature |
| 1 | Momentum |
| 2 | Charged particle mass and number |
| 3 | Electric and magnetic fields |
| 4 | Energetic particles |
| 5 | Waves |
| 6 | Solar electromagnetic emissions |
| 7 | Terrestrial electromagnetic emissions |
| 8 | Imagery |
| 9 | Ion-neutral coupling |
| 10 | Space Weather Indices |
| 11-191 | Reserved |
| 192-254 | Reserved for Local Use |
| 255 | Missing |

Add the following new entries to Code table 4.2:

**Code table 4.2** - *Parameter number by product discipline and parameter category*

**Product discipline 4 – Space weather products, parameter category 0: Temperature**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Temperature | K |  |
| 1 | Electron temperature | K |  |
| 2 | Proton temperature | K |  |
| 3 | Ion temperature | K |  |
| 4 | Parallel temperature | K |  |
| 5 | Perpendicular temperature | K |  |
| 6-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 1: Momentum**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Velocity magnitude (Speed) | m s-1 |  |
| 1 | 1st vector component of velocity (coordinate system dependent) | m s-1 |  |
| 2 | 2nd vector component of velocity (coordinate system dependent) | m s-1 |  |
| 3 | 3rd vector component of velocity (coordinate system dependent) | m s-1 |  |
| 4-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 2: Charged particle mass and number**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Particle number density | m-3 |  |
| 1 | Electron density | m-3 |  |
| 2 | Proton density | m-3 |  |
| 3 | Ion density | m-3 |  |
| 4 | Vertical total electron content | TECU |  |
| 5 | HF absorption frequency | Hz |  |
| 6 | HF absorption | dB |  |
| 9 | Spread F | m |  |
| 10 | h’ | m |  |
| 11 | Critical frequency | Hz |  |
| 12 | Maximal usable frequency (MUF) | Hz | The maximal usable Frequency (MUF) can be derived from the critical frequency and is commonly used in the space weather community. |
| 13 | Peak height (hm) | m |  |
| 14 | Peak density (Nm) | m-3 |  |
| 15 | Equivalent slab thickness (τ) | km |  |
| 16-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 3: Electric and magnetic fields**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Magnetic field magnitude | T |  |
| 1 | 1st vector component of magnetic field | T |  |
| 2 | 2nd vector component of magnetic field | T |  |
| 3 | 3rd vector component of magnetic field | T |  |
| 4 | Electric field magnitude | V m-1 |  |
| 5 | 1st vector component of electric field | V m-1 |  |
| 6 | 2nd vector component of electric field | V m-1 |  |
| 7 | 3rd vector component of electric field | V m-1 |  |
| 8-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 4: Energetic particles**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Proton flux (differential) | (m2 s sr eV)-1 |  |
| 1 | Proton flux (integral) | (m2 s sr )-1 |  |
| 2 | Electron flux (differential) | (m2 s sr eV)-1 |  |
| 3 | Electron flux (integral) | (m2 s sr)-1 |  |
| 4 | Heavy ion flux (differential) | (m2 s sr eV/nuc)-1 |  |
| 5 | Heavy ion flux (integral) | (m2 s sr)-1 |  |
| 6 | Cosmic ray neutron flux | h-1 |  |
| 7-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 5: Waves**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units |  |
| 0 | Amplitude | dB |  |
| 1 | Phase | rad |  |
| 2 | Frequency | Hz | Needed to couple observables with used frequency. (For example scintillation index S4 for L1 GNSS frequency). |
| 3 | Wave length | m |  |
| 4-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 6: Solar electromagnetic emissions**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Integrated Solar Irradiance | W m-2 |  |
| 1 | Solar X-ray Flux (XRS Long) | W m-2 |  |
| 2 | Solar X-ray Flux (XRS Short) | W m-2 |  |
| 3 | Solar EUV Irradiance | W m-2 |  |
| 5 | Solar Spectral Irradiance | W m-2 nm-1 |  |
| 6 | F10.7 | W m-2 Hz-1 |  |
| 7 | Solar radio emissions | W m-2 Hz-1 |  |
| 8-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 7: Terrestrial electromagnetic emissions**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Limb intensity | J m-2 s-1 |  |
| 1 | Disk intensity | J m-2 s-1 |  |
| 2 | Disk intensity day | J m-2 s-1 |  |
| 3 | Disk intensity night | J m-2 s-1 |  |
| 4-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 8: Imagery**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units |  |
| 0 | X-ray radiance | W sr-1 m-2 |  |
| 1 | EUV radiance | W sr-1 m-2 |  |
| 2 | H-alpha radiance | W sr-1 m-2 |  |
| 3 | White light radiance | W sr-1 m-2 |  |
| 4 | CaII-K radiance | W sr-1 m-2 |  |
| 5 | White light coronagraph radiance | W sr-1 m-2 |  |
| 6 | Heliospheric radiance | W sr-1 m-2 |  |
| 7 | Thematic mask | Numeric |  |
| 8-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 9: Ion-neutral coupling**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units |  |
| 0 | Pedersen conductivity | S m-1 |  |
| 1 | Hall conductivity | S m-1 |  |
| 2 | Parallel conductivity | S m-1 |  |
| 3-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**Product discipline 4 – Space weather products, parameter category 10: Space Weather Indices**

|  |  |  |  |
| --- | --- | --- | --- |
| Number | Parameter | Units | Description |
| 0 | Scintillation index σϕ | rad |  |
| 1 | Scintillation index S4 | Numeric |  |
| 2 | Rate of change of TEC Index (ROTI) | TECU/min |  |
| 3 | Disturbance Ionosphere Index Spatial Gradient (DIXSG) | Numeric |  |
| 4 | Along Arc TEC Rate (AATR) | TECU/min |  |
| 5 | Kp | Numeric |  |
| 6 | Equatorial disturbance stormtime index (Dst) | nT |  |
| 7 | Auroral Electrojet (AE) | nT |  |
| 8-191 | Reserved |  |  |
| 192-254 | Reserved for Local Use |  |  |
| 255 | Missing |  |  |

**[Confirmed for FT2019-2]**

TEC units (TECU) are used in the Space Weather community (and also in the ICAO context).

**Add in Common Code Table C-6: List of units for TDCFs**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Code  figure |  | Conventional  abbreviation | Abbreviation in  IA5/ASCII | Abbreviation  in ITA2 | Definition in  base units |
| 844 | Total Electron Content Unit | TECU | TECU | TECU | 1016 Electrons m-² |

**2019-2.2.6(CM-III)** New parameters and types of level for Ocean modelling[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_6)

Code table 4.2, Product discipline 10 – Oceanographic products, parameter category 3: surface properties

**ADD** the following entry

|  |  |  |
| --- | --- | --- |
| Code | Name | Units |
| 3 | Practical salinity | Numeric |

**AMEND:**

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

|  |  |  |
| --- | --- | --- |
| Number | Parameter | Units |
| 21 | Practical salinity | Numeric |

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

**ADD** the following entry

|  |  |  |
| --- | --- | --- |
| Code | Name | Units |
| 168 | Ocean model level | numeric |
| 169 | Ocean level defined by water density (sigma-theta) difference from near-surface to level (see Note 7) | kg m-3 |
| 170 | Ocean level defined by water potential temperature difference from near-surface to level (see Note 7) | K |

Notes:

(7) The level is defined by a water property difference from the near-surface to the level. The near-surface is typically chosen at 10 m depth. The physical quantity used to compute the difference can be water density (σθ) when using level type 169 or water potential temperature (θ) when using level type 170.

**2019-2.2.7(CM-III) New GRIB2 code table 4.2 entries [FOR REFERENCE]**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_7)

Proposed new entry for Code Table 4.2:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Parameter | Product Discipline | Parameter Category | Parameter number | Units |
| Total solid precipitation rate 1) | 0 | 1 | To be decided | kg m-2 s-1 |
| Direct normal short-wave radiation flux 2) | 0 | 4 | “ | W m-2 |
| Latent heat net flux due to evaporation 3) | 0 | 0 | “ | W m-2 |
| Latent heat net flux due to sublimation 4) | 0 | 0 | “ | W m-2 |
| Fog 5) | 0 | 6 | “ | % |

*Comments:*

1. Total solid precipitation includes the sum of all types of solid water, e.g. graupel, snow and hail
2. Normal flux is on a surface lifted to be normal to sun rays
3. Evaporation is the conversion of liquid into vapor
4. Sublimation is the conversion of solid state into vapor
5. Fog is defined as cloud cover in the lowest model level

**2019-2.2.8(CM-III) New GRIB2 parameters and templates for atmospheric composition modelling**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_2_8)

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

**ADD** the following entries

|  |  |  |
| --- | --- | --- |
| Code | Name | Units |
| 76 | Emission rate | kg kg-1 s-1 |
| 77 | Surface emission flux | kg m-2 s-1 |

**ADD** the following table and templates

#### Code table 4.238 - Source or sink

|  |  |
| --- | --- |
| Code | Name |
| 0 | Reserved |
| 1 | aviation |
| 2 | lightning |
| 3 | biogenic sources |
| 4 | anthropogenic sources |
| 5 | wild fires |
| 6 | natural sources |
| 7 | volcanoes |
| 8 | bio-fuel |
| 9 | fossil-fuel |
| 10 | wetlands |
| 11 | oceans |
| 12-191 | Reserved |
| 192-254 | Reserved for local use |
| 255 | Missing |

The templates below are derived from the existing templates for chemical constituents and aerosols templates. They all have an extra octet (octet 14) to specify the source/sink defined in the Code Table 4.238.

*Product definition template 4.76 – analysis or forecast at a horizontal level or in a horizontal  
 layer at a point in time for atmospheric chemical constituents*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Atmospheric chemical constituent type (see Code table 4.230)

14 Source or sink (see Code table 4.238)

15 Type of generating process (see Code table 4.3)

16 Background generating process identifier (defined by originating centre)

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

18–19 Hours of observational data cut-off after reference time (see Note)

20 Minutes of observational data cut-off after reference time

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

22–25 Forecast time in units defined by octet 20

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

27 Scale factor of first fixed surface

28–31 Scaled value of first fixed surface

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

33 Scale factor of second fixed surface

34–37 Scaled value of second fixed surface

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

*Product definition template 4.77 – individual ensemble forecast, control and perturbed, at a**horizontal level or in a horizontal layer at a point in time for**atmospheric chemical constituents*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Atmospheric chemical constituent type (see Code table 4.230)

14 Source or sink (see Code table 4.238)

15 Type of generating process (see Code table 4.3)

16 Background generating process identifier (defined by originating centre)

17 Forecast generating process identifier (defined by originating centre)

18–19 Hours after reference time of data cut-off (see Note)

20 Minutes after reference time of data cut-off

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

22–25 Forecast time in units defined by octet 20

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

27 Scale factor of first fixed surface

28–31 Scaled value of first fixed surface

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

33 Scale factor of second fixed surface

34–37 Scaled value of second fixed surface

38 Type of ensemble forecast (see Code table 4.6)

39 Perturbation number

40 Number of forecasts in ensemble

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

*Product definition template 4.78 – average, accumulation, and/or extreme values or other statistically processed values at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for atmospheric chemical constituents*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Atmospheric chemical constituent type (see Code table 4.230)

14 Source or sink (see Code table 4.238)

15 Type of generating process (see Code table 4.3)

16 Background generating process identifier (defined by originating centre)

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

18–19 Hours after reference time of data cut-off (see Note 1)

20 Minutes after reference time of data cut-off

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

22–25 Forecast time in units defined by octet 20 (see Note 2)

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

27 Scale factor of first fixed surface

28–31 Scaled value of first fixed surface

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

33 Scale factor of second fixed surface

34–37 Scaled value of second fixed surface

38–39 Year

40 Month

41 Day

42 Hour

43 Minute

44 Second

45 n – number of time range specifications describing the time intervals used to calculate the   
 statistically processed field

46–49 Total number of data values missing in statistical process

*50–61 Specification of the outermost (or only) time range over which statistical*   
 *processing is done*

50 Statistical process used to calculate the processed field from the field at each time increment during the time range (see Code table 4.10)

51 Type of time increment between successive fields used in the statistical processing (see   
 Code table 4.11)

52 Indicator of unit of time for time range over which statistical processing is done (see Code table 4.4)

53–56 Length of the time range over which statistical processing is done, in units defined by the   
 previous octet

57 Indicator of unit of time for the increment between the successive fields used (see Code table 4.4)

58–61 Time increment between successive fields, in units defined by the previous octet (see   
 Notes 3 and 4)

*62–nn These octets are included only if n > 1, where nn = 49 + 12 x n*

62–73 As octets 50 to 61, next innermost step of processing

74–nn Additional time range specifications, included in accordance with the value of n. Contents   
 as octets 50 to 61, repeated as necessary

Notes:

(1) Hours greater than 65534 will be coded as 65534.

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

(3) 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 raingauge.

(4) 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 51, 63, 75, …). 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 times.

*Product definition template 4.79 – individual ensemble forecast, control and perturbed, at a  
horizontal level or in a horizontal layer in a continuous or non-continuous time interval for atmospheric chemical constituents*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Atmospheric chemical constituent type (see Code table 4.230)

14 Source or sink (see Code table 4.238)

15 Type of generating process (see Code table 4.3)

16 Background generating process identifier (defined by originating centre)

17 Forecast generating process identifier (defined by originating centre)

18–19 Hours after reference time of data cut-off (see Note 1)

20 Minutes after reference time of data cut-off

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

22–25 Forecast time in units defined by octet 20 (see Note 2)

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

27 Scale factor of first fixed surface

28–31 Scaled value of first fixed surface

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

33 Scale factor of second fixed surface

34–37 Scaled value of second fixed surface

38 Type of ensemble forecast (see Code table 4.6)

39 Perturbation number

40 Number of forecasts in ensemble

41–42 Year of end of overall time interval

43 Month of end of overall time interval

44 Day of end of overall time interval

45 Hour of end of overall time interval

46 Minute of end of overall time interval

47 Second of end of overall time interval

48 n – number of time range specifications describing the time intervals used to calculate the   
 statistically processed field

49–52 Total number of data values missing in statistical process

*53–64 Specification of the outermost (or only) time range over which statistical*   
 *processing is done*

53 Statistical process used to calculate the processed field from the field at each time incre-  
 ment during the time range (see Code table 4.10)

54 Type of time increment between successive fields used in the statistical processing (see   
 Code table 4.11)

55 Indicator of unit of time for time range over which statistical processing is done (see Code   
 table 4.4)

56–59 Length of the time range over which statistical processing is done, in units defined by the   
 previous octet

60 Indicator of unit of time for the increment between the successive fields used (see Code   
 table 4.4)

61–64 Time increment between successive fields, in units defined by the previous octet (see   
 Notes 3 and 4)

*65–nn These octets are included only if n > 1, where nn = 52 + 12 x n*

65–76 As octets 53 to 64, next innermost step of processing

77–nn Additional time range specifications, included in accordance with the value of n. Contents   
 as octets 53 to 64, repeated as necessary

Notes:

(1) Hours greater than 65534 will be coded as 65534.

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

(3) 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 raingauge.

(4) 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 54, 66, 78, …). 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 times.

*Product definition template 4.80 – analysis or forecast at a horizontal level or in a horizontal layer at a point in time for optical properties of aerosol*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Aerosol type (see Common Code table C–14)

14 Source or sink (see Code table 4.238)

15 Type of interval for first and second size (see Code table 4.91)

16 Scale factor of first size

17–20 Scaled value of first size in metres

21 Scale factor of second size

22–25 Scaled value of second size in metres

26 Type of interval for first and second wavelength (see Code table 4.91)

27 Scale factor of first wavelength

28–31 Scaled value of first wavelength in metres

32 Scale factor of second wavelength

33–36 Scaled value of second wavelength in metres

37 Type of generating process (see Code table 4.3)

38 Background generating process identifier (defined by originating centre)

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

40–41 Hours of observational data cut-off after reference time (see Note)

42 Minutes of observational data cut-off after reference time

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

44–47 Forecast time in units defined by octet 42

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

49 Scale factor of first fixed surface

50–53 Scaled value of first fixed surface

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

55 Scale factor of second fixed surface

56–59 Scaled value of second fixed surface

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

*Product definition template 4.81 – individual ensemble forecast, control and perturbed, at* *a horizontal level or in a horizontal layer at a point in time* *for optical properties of aerosol*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Aerosol type (see Common Code table C–14)

14 Source or sink (see Code table 4.238)

15 Type of interval for first and second size (see Code table 4.91)

16 Scale factor of first size

17–20 Scaled value of first size in metres

21 Scale factor of second size

22–25 Scaled value of second size in metres

26 Type of interval for first and second wavelength (see Code table 4.91)

27 Scale factor of first wavelength

28–31 Scaled value of first wavelength in metres

32 Scale factor of second wavelength

33–36 Scaled value of second wavelength in metres

37 Type of generating process (see Code table 4.3)

38 Background generating process identifier (defined by originating centre)

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

40–41 Hours of observational data cut-off after reference time (see Note)

42 Minutes of observational data cut-off after reference time

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

44–47 Forecast time in units defined by octet 42

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

49 Scale factor of first fixed surface

50–53 Scaled value of first fixed surface

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

55 Scale factor of second fixed surface

56–59 Scaled value of second fixed surface

60 Type of ensemble forecast (see Code table 4.6)

61 Perturbation number

62 Number of forecasts in ensemble

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

*Product definition template 4.82 – average, accumulation, and/or extreme values or other*  
*statistically processed values at a horizontal level or in a*  
*horizontal layer in a continuous or non-continuous time*  
*interval for aerosol*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Aerosol type (see Code table 4.233)

14 Source or sink (see Code table 2.238)

15 Type of interval for first and second sizes (see Code table 4.91)

16 Scale factor of first size

17–20 Scaled value of first size in metres

21 cale factor of second size

22–25 Scaled value of second size in metres

26 Type of generating process (see Code table 4.3)

27 Background generating process identifier (defined by originating centre)

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

29–30 Hours after reference time of data cut-off (see Note 1)

31 Minutes after reference time of data cut-off

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

33–36 Forecast time in units defined by octet 31 (see Note 2)

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

38 Scale factor of first fixed surface

39–42 Scaled value of first fixed surface

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

44 Scale factor of second fixed surface

45–48 Scaled value of second fixed surface

49–50 Year

51 Month

52 Day

53 Hour

54 Minute

55 Second

56n – number of time range specifications describing the time intervals used to calculate   
the statistically processed field

57–60 Total number of data values missing in statistical process

*61–72 Specification of the outermost (or only) time range over which statistical* *processing is done*

*61 Statistical* process used to calculate the processed field from the field at each time increment during the time range (see Code table 4.10)

62 Type of time increment between successive fields used in the statistical processing (see Code table 4.11)

63 Indicator of unit of time for time range over which statistical processing is done (see Code table 4.4)

64–67 Length of the time range over which statistical processing is done, in units defined by the previous octet

68 Indicator of unit of time for the increment between the successive fields used (see Code table 4.4)

69–72 Time increment between successive fields, in units defined by the previous octet (see Notes 3 and 4)

*73–nn These octets are included only if n > 1, where nn = 60 + 12 x n*

73–*84* *As* octets 61 to 72, next innermost step of processing

85–nn Additional time range specifications, included in accordance with the value of n. Contents as octets 61 to 72, repeated as necessary

Notes:

(1) Hours greater than 65534 will be coded as 65534.

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

(3) 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 raingauge.

(4) 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 62, 74, ...). 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 times.

*Product definition template 4.83 – individual ensemble forecast, control and perturbed, at a horizontal level or in a horizontal layer in a continuous or non-continuous time interval for aerosol*

Octet No. Contents

10 Parameter category (see Code table 4.1)

11 Parameter number (see Code table 4.2)

12–13 Aerosol type (see Code table 4.233)

14 Source or sink (see Code table 4.238)

15 Type of interval for first and second sizes (see Code table 4.91)

16 Scale factor of first size

17–20 Scaled value of first size in metres

21 Scale factor of second size

22–25 Scaled value of second size in metres

26 Background generating process identifier (defined by originating centre)

27 Forecast generating process identifier (defined by originating centre)

28–29 Hours after reference time of data cut-off (see Note 1)

30 Minutes after reference time of data cut-off

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

32–35 Forecast time in units defined by octet 31 (see Note 2)

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

37 Scale factor of first fixed surface

38–41 Scaled value of first fixed surface

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

43 Scale factor of second fixed surface

44–47 Scaled value of second fixed surface

48 Type of ensemble forecast (see Code table 4.6)

49 Perturbation number

50 Number of forecasts in ensemble

51–52 Year of end of overall time interval

53 Month of end of overall time interval

54 Day of end of overall time interval

55 Hour of end of overall time interval

56 Minute of end of overall time interval

57 Second of end of overall time interval

58 n – number of time range specifications describing the time intervals used to   
calculate the statistically processed field

59–62 Total number of data values missing in statistical process

*63–74 Specification of the outermost (or only) time range over which statistical*   
*processing is done*

63 Statistical process used to calculate the processed field from the field at each   
time increment during the time range (see Code table 4.10)

64 Type of time increment between successive fields used in the statistical processing (see Code table 4.11)

65 Indicator of unit of time for time range over which statistical processing is done   
(see Code table 4.4)

66–69 Length of the time range over which statistical processing is done, in units defined   
by the previous octet

70 Indicator of unit of time for the increment between the successive fields used (see  
Code table 4.4)

71–74 Time increment between successive fields, in units defined by the previous octet   
(see Notes 3 and 4)

*75–nn These octets are included only if n > 1, where nn = 62 + 12 x n*

75–86 As octets 63 to 74, next innermost step of processing

87–nn Additional time range specifications, included in accordance with the value of n.   
Contents as octets 63 to 74, repeated as necessary

Notes:

(1) Hours greater than 65534 will be coded as 65534.

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

(3) 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 raingauge.

(4) 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 63, 75, ...). 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 times.

2.3 Amendments to BUFR/CREX regulations

(none)

2.4 Additions to BUFR/CREX tables

**2019-2.4.1(CM-III) New BUFR descriptors for limb profiler ozone data**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_4_1)

Add new entries to BUFR Table B

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| DESCRIPTOR | ELEMENT NAME | UNIT | SCALE | REFERENCE VALUE | DATA WIDTH |
| 0-02-092 | Ozone profile computation method | Code table | 0 | 0 | 3 |
| 0-15-006 | Log10 of number density of atmosphere | log(m-3) | 5 | 1800000 | 20 |
| 0-15-009 | Log10 of number density of ozone | log(m-3) | 5 | 1200000 | 20 |

0-02-092

Ozone profile computation method

|  |  |
| --- | --- |
| Code figure | Meaning |
| 0 | UV channel based retrieval |
| 1 | Visible channel based retrieval |
| 2 | Combined UV based retrieval and visible based retrieval |
| 3-6 | Reserved |
| 7 | Missing value |

**2019-2.4.2(CM-III) Development and Validation of a BUFR sequence for AMDAR Profile products**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_4_2)

|  |  |  |  |
| --- | --- | --- | --- |
| BUFR template for aircraft ascent/descent profile with latitude and long given for each level  (3 11 012) | | | |
| Table References | | Element Name | Element Description |
| 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 01 008 |  | Aircraft registration number or other identification |  |
| 0 01 111 |  | Origination airport | To be reported in case of an ascent profile |
| 0 01 112 |  | Destination airport | To be reported in case of an descent profile |
| 3 01 011 |  | Year, month, day | Date/Time and position of first level in profile (for ascent profile first report/take off, for descent profile last report/touch down) |
| 3 01 013 |  | Hour, Min, second |
| 3 01 021 |  | Latitude/Longitude |
| 0 08 004 |  | Phase of flight | Ascent or descent profile |
| 1 10 000 |  | Delayed replication of 6 descriptors |  |
| 0 31 002 |  | Extended delayed descriptor replication factor | Number of levels following |
|  |  | ***(Aircraft ascent/descent profile data for one level with lat. long. Indicated)*** | |
| 3 01 011 |  | Year, month, day | Date of single level report |
| 3 01 013 |  | Hour, Min, second | Time of single level report |
| 3 11 007 | 0 07 010 | Flight level | Pressure altitude |
|  | 3 01 021 | Latitude/Longitude |  |
|  | 0 11 001 | Wind direction |  |
|  | 0 11 002 | Wind speed |  |
|  | 0 02 064 | Roll angle quality |  |
|  | 0 12 101 | Temperature/dry-bulb temperature |  |
|  | 0 12 103 | Dew-point temperature | Value derived from Mixing ratio, limited to Td ≤ T |
| 2 01 144 |  | Change data width |  |
| 2 02 133 |  | Change scale |  |
| 0 13 002 |  | Mixing ratio | Originally measured value |
| 2 02 000 |  | Cancel change scale |  |
| 2 01 000 |  | Cancel change data width |  |
| 0 13 003 |  | Relative humidity | Value derived from Mixing ratio, limited to ≤ 100% |
| 0 33 026 |  | Moisture quality | Code table  (report code figure 10 if Td > T, see code table below) |

**2019-2.4.3(CM-III) Reporting CryoSat-2 NOP observations using element 0-25-190 following BUFR sequence 3-12-071**

(none)

**2019-2.4.4(CM-III) Table D sequence for reporting marine observations from unmanned surface vehicles**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_4_4)

Add new entry to BUFR Table D

Category 15 – Oceanographic report sequences

|  |  |  |  |
| --- | --- | --- | --- |
| Table Reference | Table References | Element Name | Element Description |
| FXXYYY |
| 315010 |  | Met-ocean observations from unmanned surface vehicles |  |
|  | 301150 | (WIGOS identifier) |  |
|  | 001036 | Agency in charge of operating the observing platform |  |
|  | 001085 | Observing platform manufacturer’s model |  |
|  | 001086 | Observing platform manufacturer’s serial number |  |
|  | 003001 | Surface station type |  |
|  | 208032 | Change width of CCITT IA5 field |  |
|  | 001079 | Unique ID for profile | UUID for report, 32 character hex string |
|  | 208000 | Change width of CCITT IA5 field |  |
|  | 301011 | Year, month, day |  |
|  | 301012 | Hour, minute |  |
|  | 301021 | (Latitude/longitude (high accuracy)) |  |
|  | 001012 | Direction of motion of moving observing platform |  |
|  | 001013 | Speed of motion of moving platform |  |
|  | 103000 | Delayed replication of 3 descriptor |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 007031 | Height of barometer above mean sea level |  |
|  | 306038 | Sequence for representation of standard surface marine meteorological observations from moored buoys |  |
|  | 012161 | Skin temperature |  |
|  | 101000 | Delayed replication of 1 descriptors |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 306034 | (Surface current) |  |
|  | 101000 | Delayed replication of 1 descriptor |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 306039 | (Sequence for representation of basic wave measurements) |  |
|  | 101000 | Delayed replication of 1 descriptors |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 306033 | (Surface salinity) |  |
|  | 101000 | Delayed replication of 1 descriptor |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 306041 | (Depth and temperature profile (high accuracy/precision)) |  |
|  | 101000 | Delayed replication of 1 descriptors |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 306004 | (Depth, temperature, salinity) |  |
|  | 101000 | Delayed replication of 1 descriptor |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 306005 | Sub-surface current measurements |  |
|  | 105000 | Delayed replication of 5 descriptors |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 041001 | pCO2 |  |
|  | 008043 | Atmospheric chemical or physical constituent type |  |
|  | 015028 | Mole fraction of atmospheric constituent / pollutant in dry air |  |
|  | 008043 | Atmospheric chemical or physical constituent type |  |
|  | 013080 | Water pH |  |
|  | 104000 | Delayed replication of 4 descriptors |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 041005 | Turbidity |  |
|  | 041003 | Dissolved nitrates |  |
|  | 022188 | Dissolved oxygen |  |
|  | 041002 | Fluorescence |  |
|  | 101000 | Delayed replication of 1 descriptor |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 306040 | (Sequence for representation of detailed spectral wave measurements) |  |
|  | 104000 | Delayed replication of 4 descriptors |  |
|  | 031000 | Short delayed descriptor replication factor |  |
|  | 008021 | Time significance |  |
|  | 004025 | Time period or displacement |  |
|  | 014017 | Instantaneous long-wave radiation |  |
|  | 014018 | Instantaneous short-wave radiation |  |

2.5 Additions to Common Code tables

**2019-2.5.1(CM-III) New entry to Common Code Table C-11**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_5_1)

Reassignment of Common Code Table C-11 entry 00290 as below.

00290 290 EUMETNET E-Profile

**2019-2.5.2(CM-III) New entry to Common Code Table C-5 (FY-2H)**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_5_2)

Add new entry to Common Code Table C-5:

1. FY-2H

**2019-2.5.3(CM-III) Proposal for new entries in Common Code Tables C5 and C8**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_5_3)

*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 |  |
| 66 | 66 | 66 | Sentinel-6A |
| 67 | 67 | 67 | Sentinel-6B |

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Code | Agency | Type | Instrument short name | Instrument long name |
| 57 | ESA / EUMETSAT | Radar altimeter | POSEIDON-4 | High precision altimetry, dual frequency (C- and Ku-band) pulse-width limited radar altimeter, synthetic-aperture processing, interleaved Low Rate and High Rate |

**2019-2.5.4(CM-III) Update to XBT Fall Rate Equations (Common Code Table C-3)**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_5_4)

Amend entries in Common Code Table C-3 (Instrument make and type for water temperature profile measurement with fall rate equation coefficients) with the values below (changes in red).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Code figure for IxIxIx | Code figure for BUFR  (Code table 0 22 067) | Meaning | | |
| Instrument make and type | Equation Coefficients | |
| a | b |
| 071 | 71 | Sippican T-11 | 1.7779 | -0.255 |
| 900 | 900 | Sippican LMP-5 XBT | 9.727 | –0.0473 |

**2019-2.5.5(CM-III) Amendment to Common Table C-14 (for experimental use)**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_5_5)

Common Code Table C-14 – Atmospheric chemical or physical constituent types

ADD

|  |  |  |
| --- | --- | --- |
| Code | Name | Formula |
| 63000-65534 | For experimental use at local level |  |

**COMMON CODE TABLE C–14: *Atmospheric chemical or physical constituent type***

Code Table 4.230 in GRIB 2

Code table 0 08 046 in BUFR

**2019-2.5.6(CM-III) Editorial changes to Common Code Table C-14 – Atmospheric chemical or physical constituent types**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_5_6)

Common Code Table C-14 – Atmospheric chemical or physical constituent types

EDIT the entries (in blue)

|  |  |  |
| --- | --- | --- |
| Code | Name | Formula |
| 10 | Ammonium cation | NH4+ |
| 13 | Nitrate radical | NO3• |
| 14 | Hydroperoxyl radical | HOO• |
| 20 | Dihydrogen | H2 |
| 22 | Sulphate anion | SO42- |
| 23 | Atomic Radon | Rn |
| 24 | Mercury vapor | Hg(0) |
| 25 | Mercury(II) cation | Hg2+ |
| 38 | Dioxygen | O2 |
|  |  |  |
| 10000 | Hydroxyl radical | HO• |
| 10001 | Methyl peroxy radical | CH3OO• |
| 10016 | Butane (all isomers) | C4H10 |
|  |  |  |
| 20001 | Hydrogen Chloride | HCl |
| 20002 | CFC-11 (trichlorofluoromethane) | CCl3F |
| 20003 | CFC-12 (dichlorodifluoromethane) | CCl2F2 |
| 20004 | CFC-113 (1,1,2-trichloro-1,2,2-trifluoroethane) | Cl2FC-CClF2 |
| 20005 | CFC-113a (1,1,1-trichloro-2,2,2-trifluoroethane) | Cl3C-CF3 |
| 20006 | CFC-114 (1,2-dichloro-1,1,2,2-tetrafluoroethane) | ClF2C-CClF2 |
| 20007 | CFC-115 (1-chloro-1,1,2,2,2-pentafluoroethane) | ClF2C-CF3 |
| 20008 | HCFC-22 (chlorodifluoromethane) | CHClF2 |
| 20009 | HCFC-141b (1,1-dichloro-1-fluoroethane) | Cl2FC-CH3 |
| 20010 | HCFC-142b (1-chloro-1,1-difluoroethane) | ClF2C-CH3 |
| 20011 | Halon-1202 (dibromo(difluoro)methane) | CBr2F2 |
| 20012 | Halon-1211 (bromochlorodifluoromethane) | CBrClF2 |
| 20013 | Halon-1301 (bromo(trifluoro)methane) | CBrF3 |
| 20014 | Halon-2402 (1,2-dibromo-1,1,2,2-tetrafluoroethane) | BrF2C-CBrF2 |
| 20015 | HCC-40 (methyl chloride) | CH3Cl |
| 20016 | HCC-10 (carbon tetrachloride) | CCl4 |
| 20017 | HCC-140a (1,1,1-trichloroethane) | Cl3C-CH3 |
| 20018 | HBC-40B1 (methyl bromide) | CH3Br |
| 20019 | HCH (hexachlorocyclohexane) all isomers | C6H6Cl6 |
| 20020 | α-HCH (α-hexachlorocyclohexane) both enantiomers | α-C6H6Cl6 |
| 20021 | PCB-153 (2,2',4,4',5,5'-hexachlorobiphenyl) | (C6H2Cl3)2 |
| 20022 | HCFC-141a (1,1-dichloro-2-fluoroethane) | Cl2HC-CH2F |
| 30010 | Tritium (Hydrogen 3) | H-3 |
| 30011 | Tritium organic bounded | H-3o |
| 30012 | Tritium inorganic | H-3a |
|  |  |  |
| 60000 | HOx radical (OH+HO2) | HOx• |
| 60001 | Total inorganic and organic peroxy radicals (HOO• + ROO•) | ROO• |

Note that entry 20022 which is not yet operational has the wrong chemical formula. It is now corrected in this document.

2.6 GRIB edition 3

(none)

2.7 BUFR and CREX new editions

**2019-2.7.1(CM-III) Exploring GRIB3 as a Universal Data Representation Binary Code Form**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_2_7_1)

BUFR profile of GRIB 3 Implementation

**Canonical Example**

Let’s use the common example of a moving instrument package (various measurements) on a 3D trajectory (say, a weather balloon).  Here, the data describes:

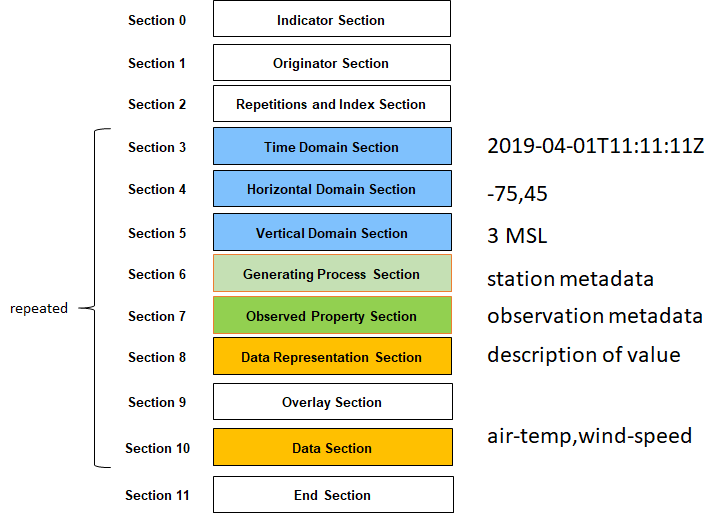
* Exact location and time of ongoing measurements, at possibly irregular time intervals
* Instrument metadata
* Time and location of launch

Given the GRIB 3 section layout and ISO 19156, possible approaches are articulated below.  Note that the example below does not constitute an official approach

**Option 1: Repetition of Sections 3 - 10**

Here, for each measurement:

* Section 3 would define temporal instant
* Section 4 would define spatial property
* Section 5 would define overall vertical property
* Section 6 would provide the procedure (station/platform)
* Section 7 would define what is measured (i.e. weather elements)
* Section 8 would define the format of Section 10
* Section 10 would provide the measurement
  + i.e. value

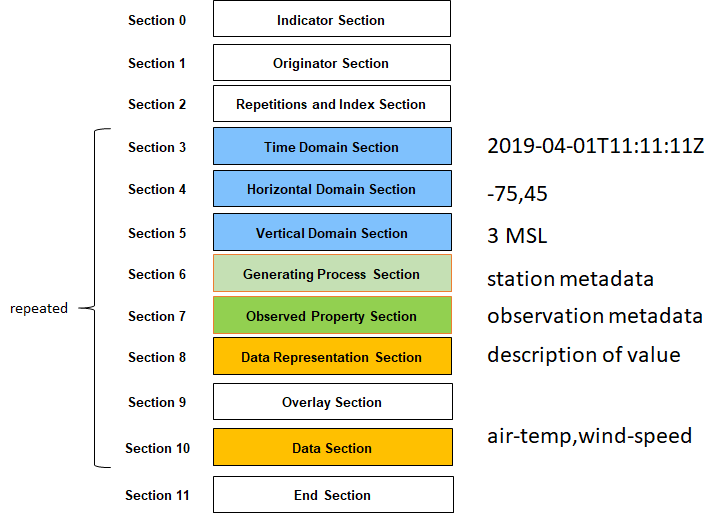


**Option 2: Deep Repetition of Sections 3 - 10**

In this approach, we expand repetition to the variable level and implement repeated data by reference/offset to a given section that is already defined:

Here, for each measurement element:

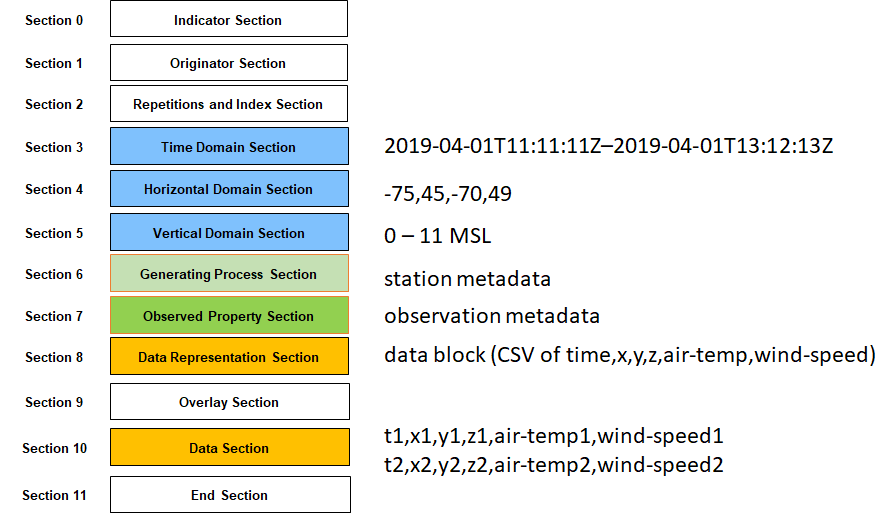
* Section 3 would define temporal instant
* Section 4 would define spatial property
* Section 5 would define vertical property
* Section 6 would provide the procedure (station/platform) once in the first repetition, then refer to it by offset in subsequent repetitions
* Section 7 would define what is measured (i.e. weather elements) once in the first repetition, then refer to it by offset in subsequent repetitions
* Section 8 would define the format of Section 10 once in the first repetition, then refer to it by offset in subsequent repetitions
* Section 10 would provide the measurement
  + i.e. value



**Option 3: No Repetition of Sections 3 - 10**

In this approach, we refactor sections 3 - 8 as aggregated values and expand Section 10 to provide data using increased density:

* Section 3 would define overall temporal extent (min/max)
* Section 4 would define overall spatial extent (min/max)
* Section 5 would define overall vertical extent (min/max)
* Section 6 would provide the procedure (station/platform)
* Section 7 would define what is measured (i.e. weather elements)
* Section 8 would define the format of Section 10
  + i.e. t,x,y,z,value
* Section 10 would provide a data block/dump of the data per Section 8



A similar XML implementation can be found at <http://schemas.opengis.net/om/2.0/examples/weatherObservation.xml>.  Here we see the associated data representation as an external reference to <http://schemas.opengis.net/om/2.0/examples/swe_weatherRecord1_t.xml>.  This approach is similar to the BUFR design pattern of external tables referenced by codes, using modernized data description approaches (XML).  The same can be accomplished with JSON Schema.

Though the example and options above are not exhaustive (others may exist), options 2 and 3 provide the opportunity for less redundancy.

**Value Proposition**

Profiling BUFR within the framework of GRIB 3 with the WMO Codes Registry provides the following advantages:

* A unified WMO core format/container on which to build/profile/extend/restrict
* Reduced maintenance of software to read and / or write GRIB 3 primitives
* Reduced maintenance and simplification of codes which are now managed as web accessible resources, allowing for distributed processing (or downloading a version of same for performance)
* Alignment and reuse of GRIB Edition 3 as the container mechanism, providing the ability for streamlined

**Future Work**

Concrete examples (data file samples, parsers, serializers) are required to further assess ease of use, integration with industry tools, size as well as comparing various aspects (operational, transport).  The Meteorological Service of Canada is working on proof of concept tooling that should be made available on GitHub in the coming weeks at <https://github.com/wmo-cop/bufr5>

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

(none)

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

**2019-4.1(CM-III) Alignment of the WMO Manual on Codes regarding the representation of midnight in OPMET information, including TAF, plus other relevant considerations**

(none)

**5 MANUAL ON GTS: DATA DESIGNATOR**

(none)

**6 SUMMARY AND CONCLUSION OF PROPOSALS**

**2019-6.1(CM-III) Summary on amendments since IPET-CM-II and update of status of validation**

Implementation of amendments during the intersessional period[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_6_1)

1. [Pre-operational](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2018/preOperational/PreO_2018-1.pdf) (23 August 2018)

2. [Fast-track 2018-2](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2018/fastTrack/FT2018-2_en.pdf) (7 November 2018) and [supporting documents](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2018/fastTrack/PFC2018-2_REPORTS.zip) at PFC2018-2

3. [Adoption between CBS sessions 2018](https://www.wmo.int/edistrib_exped/grp_prs/_en/01356-2018-OBS-WIS-DRMM-DRC_en.pdf) (7 November 2018)

4. [*Fast-track 2019-1*](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2019/fastTrack/FT2019-1_en.pdf) *(15 May 2019: waiting for implementation)*

5. [*Adoption between CBS sessions 2019*](http://www.wmo.int/pages/prog/www/WMOCodes/Amendments/2019/betweenCBS/19171-2019-OBS-WIS-DRMM-DRC_en.pdf) *(6 November 2019: 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 | | 2018-P5 | PFC-2 | [Additional parameters for waves products](#A2018_P5) | FT2019-1 |  | | 2018-P6 | PFC-2 | [New code for atmosphere composition modelling](#A2018_P6) | FT2019-1 |  | | 2018-P7 | PFC-2 | [Additional parameters for ocean products](#A2018_P7) | FT2019-1 |  | |  |  |  |  |  | | 2018-2.2.1 | CM-II | [Additional elements for optimal cloud analysis and instantaneous rain rate products](#A2018_2_2_1) | FT2018-2 |  | | 2018-2.2.2 | CM-II | [New fixed surface type in Code table 4.5](#A2018_2_2_2) | FT2018-2 |  | | 2018-2.2.3 | CM-II | [New entry in GRIB2 Code table 4.9](#A2018_2_2_3) | FT2018-2 |  | | 2018-2.2.4 | CM-II | [New lightning GRIB parameters](#A2018_2_2_4) | FT2018-2 |  | | 2018-2.2.5 | CM-II | [New GRIB2 Code table 4.2 entries](#A2018_2_2_5) | FT2018-2 |  | | 2018-2.2.6 | CM-II | [New “freezing drizzle” precipitation type](#A2018_2_2_6) | FT2018-2 |  | | 2018-2.2.7 | CM-II | [Representing gnomonic grids](#A2018_2_2_7) | Validation | Ongoing | | 2018-2.2.8 | CM-II | [New GRIB2 Code table 4.9 entries](#A2018_2_2_8) | FT2018-2 |  | |  |  |  |  |  | | 2016-2.2.8 | DRMM-IV | [GRIB templates and tables entries to support specific issues of limited area models](#A2016_2_2_8) | FT2019-1 |  | |  |  |  |  |  | | 2014-2.2.2 | DRMM-II | [A product definition template for statistics over an ensemble](#A2014_2_2_2) | Val | Ongoing |   **FM 94 BUFR/FM 95 CREX**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | ID | Approval for Validation | Proposals | Status | Confirmed at meeting | | 2018-2.4.2 | CM-II | [New BUFR sequence for describing satellite observations compressed using principal component analysis](#A2018_2_4_2) | FT2018-2 |  | | 2018-2.4.3 | CM-II | [BUFR descriptors for IASI Level 2 Products](#A2018_2_4_3) | FT2018-2 |  | | 2018-2.4.4 | CM-II | [New BUFR sequence for snow water equivalent (SWE)](#A2018_2_4_4) | FT2018-2 |  | | 2018-2.4.5 | CM-II | [Revision of BUFR sequence 3 09 056 – Sequence for representation of radiosonde descent data](#A2018_2_4_5) | FT2018-2 |  | | 2018-2.4.6 | CM-II | [New sequence for representation of radiosonde observation data with higher precision of pressure and geopotential height](#A2018_2_4_6) | FT2018-2  ABC2019 |  | | 2018-2.4.7 | CM-II | [New BUFR sequence for describing the "First five" Fourier components of the directional wave spectrum](#A2018_2_4_7) | Validation | FT2019-2 | | 2018-2.4.8 | CM-II | [New BUFR sequence for reporting of basic ship AWS data](#A2018_2_4_8) | FT2019-1 |  | | 2018-2.4.9 | CM-II | [Review sequence 3-10-067](#A2018_2_4_9) | FT2018-2 |  | | 2018-2.4.10 | CM-II | [Revised BUFR template for surface observations from n-minute period](#A2018_2_4_10) | FT2018-2 |  | | 2018-2.4.11 | CM-II | [New BUFR sequence and code and flag tables for Sentinel-3 SRAL product](#A2018_2_4_11) | FT2018-2 |  | | 2018-3.1 | CM-II | [Amendments to B/C Regulations for standard time](#A2018_3_1) | ABC2019 |  | |  |  |  |  |  | | 2017-2.4.5 | CM-I | [New BUFR sequence for describing satellites contributing to an observed geophysical quantity](#A2017_2_4_5) | 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 | | | |

**COMMON CODE TABLES/DATA DESIGNATORS**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ID | Approval for Validation | Proposals | Status | Confirmed at meeting |
| 2018-P1 | PFC-2 | [Amendment to Common Code table C-2 by Russian Federation](#A2018_P1) | FT2019-1 |  |
| 2018-P2 | PFC-2 | [New entry in Common Code table C-8 by EUMETSAT](#A2018_P2) | FT2019-1 |  |
| 2018-P3 | PFC-2 | [New entries in Common Code table C-12 by Brazil](#A2018_P3) | FT2019-1 |  |
| 2018-P4 | PFC-2 | [New entries in Common Code tables C-1, C-11 and C-12 by Brazil](#A2018_P4) | FT2019-1 |  |
| 2018-P8 | PFC-2 | [Amendment to Common Code table C-2 by Germany](#A2018_P8) | FT2019-1 |  |
|  |  |  |  |  |
| 2018-2.5.1 | CM-II | [Proposal for new entries in Common Code table C-5 and C-8](#A2018_2_5_1) | FT2018-2 |  |
| 2018-2.5.2 | CM-II | [New entry in Common Code table C-2 for new radiosondes](#A2018_2_5_2) | FT2018-2 |  |
| 2018-2.5.3 | CM-II | [New entries in Common Code Table C-12](#A2018_2_5_3) | FT2018-2 |  |
| 2018-2.5.4 | CM-II | [New entries in Common Code tables C-5 and C-8](#A2018_2_5_4) | FT2018-2 |  |
| 2018-2.5.5 | CM-II | [New entries in Common Code Table C-3](#A2018_2_5_5) | FT2018-2 |  |
| 2018-5.1 | CM-II | [New data designator for space weather](#A2018_5_1) | FT2018-2 |  |
| 2018-5.2 | CM-II | [Global exchange of daily climate data](#A2018_5_2) | FT2018-2 |  |
|  |  |  |  |  |
| 2017-2.5.4 | CM-I | [Common Code table for master table version numbers of GRIB, BUFR and CREX](#A2017_2_5_4) | ABC2018 |  |

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

**2019-7.1(CM-III) Comparison of number of reports received in TDCF and TAC during January 2019**[⮈](Report_IPET-CM-III_Marrakech_summary.docx#S2019_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 | 31 | 48 |
| 2 | 80 | 91 |
| 3 | 56 | 57 |
| 4 | 11 | 81 |
| 5 | 75 | 71 |
| 6 | 91 | 90 |
| Antarctica | 53 | 55 |

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 | 51 | 81 |
| 3 | 14 | 52 |
| 4 | 32 | 91 |
| 5 | 53 | 70 |
| 6 | 53 | 68 |
| Antarctica | 59 | 64 |

Table 3 - Comparison of percentage of required surface reports received in TAC (left-pointing arrow) and TDCF (right pointing arrow) in the period 1-15 January 2019. The key is in Table 5

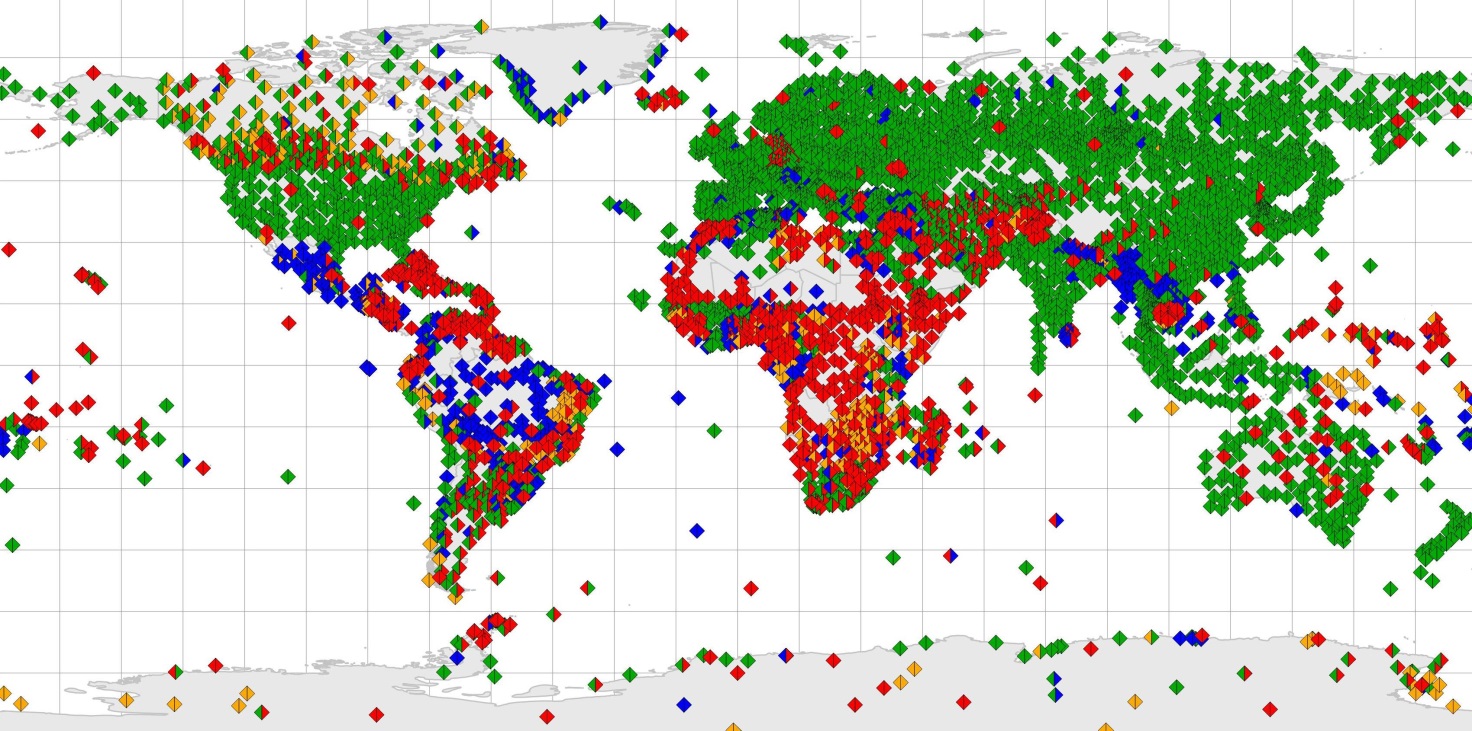


Table 4 - Comparison of percentage of required upper air reports received in TAC (left-pointing arrow) and TDCF (right pointing arrow) in the period 1-15 January 2019. The key is in Table 5

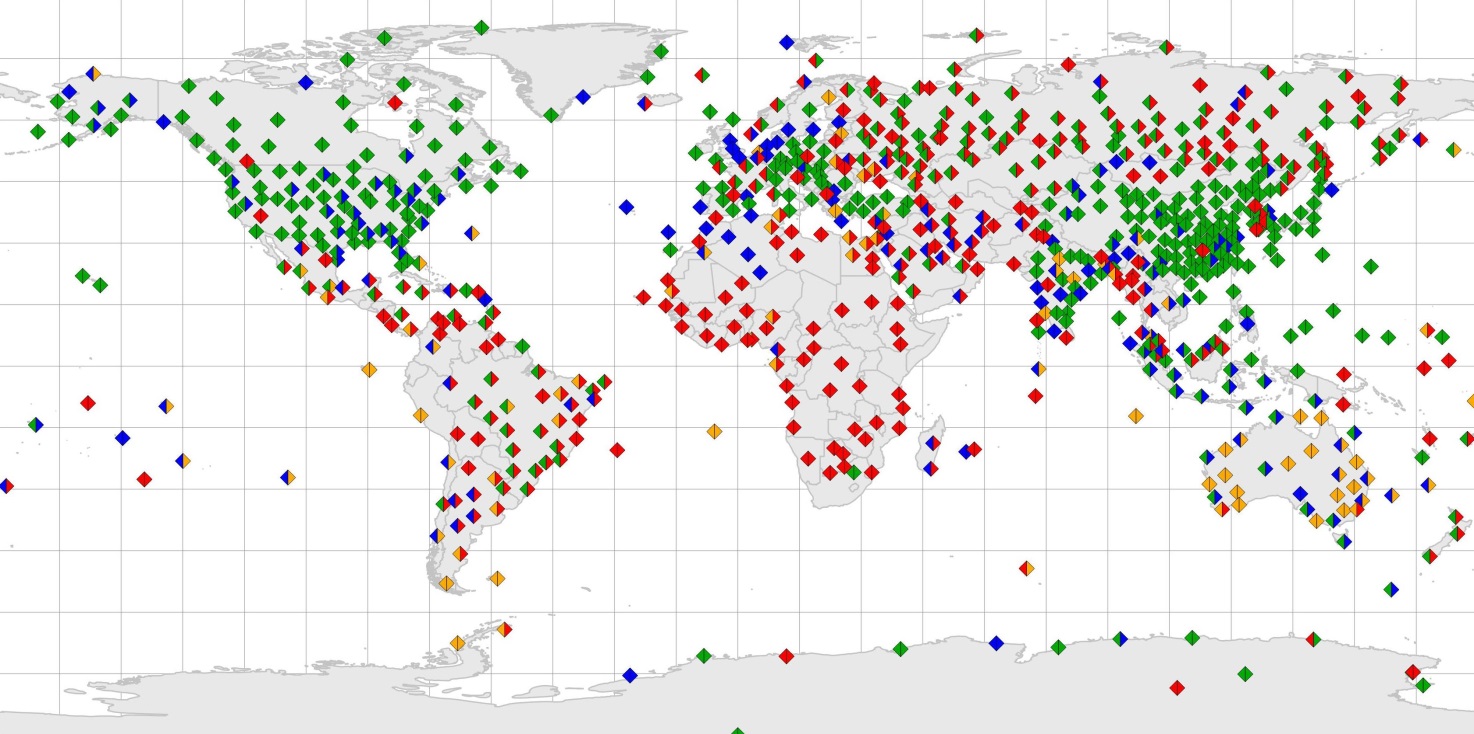
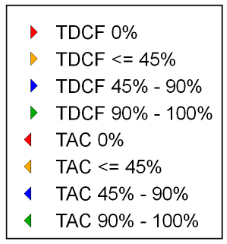


Table 5. Key for Table 3 and 4



**2019-7.2.1(CM-III) Status of migration to TDCF in RA I**[⮈](Report_IPET-CM-III_Marrakech_summary.docx#S2019_7_2_1)

SURVEY RESULTS

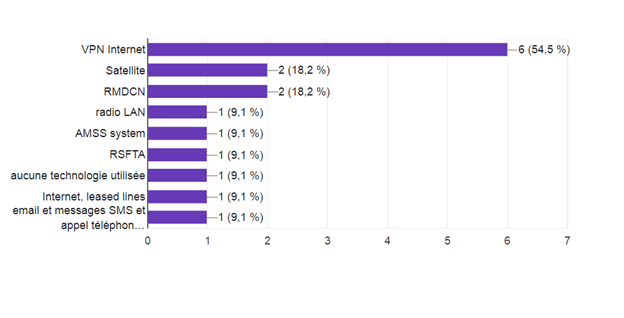
|  |  |  |  |
| --- | --- | --- | --- |
| Country | Migration Status | Encoding Software | Remarks |
| **Tanzania** | Exchanging TDCF reports | Customized ECMWF decoder | BUFR SYNOP being received in Nairobi |
| **Algeria** | Exchanging TDCF reports | COROBOR SYSTEMS | BUFR SYNOP being received in RTH/GISC Toulouse |
| **SENEGAL** | Exchanging TDCF reports | MESSIR COROBOR SYSTEM | DAKAR RTH encodes all TAC SYNOP, CLIMAT, TEMP and PILOT bulletins of Senegal and Countries under his responsibility in BUFR codes |
| **NIGER** | Exchanging TDCF reports | MESSIR COROBOR SYSTEM | NIAMEY RTH encodes all TAC SYNOP, CLIMAT, TEMP and PILOT bulletins of Niger and Countries under his responsibility in BUFR codes |
| **CONGO BRAZZA** | Exchanging TDCF reports | MESSIR COROBOR SYSTEM | BRAZZAVILLE RTH encodes all TAC SYNOP, CLIMAT, TEMP and PILOT bulletins of Congo and Countries under his responsibility in BUFR codes |
| **Egypt** | Exchanging TDCF reports | MESSIR COROBOR SYSTEM |  |
| **MALI** | Exchanging TDCF reports | MESSIR COROBOR SYSTEM | Bamako NC encodes all TAC SYNOP, CLIMAT, TEMP and PILOT bulletins of Mali in BUFR codes |
| **MAURITANIA** | Exchanging TDCF reports | MESSIR COROBOR SYSTEM | Nouakchott NC encodes all TAC SYNOP, CLIMAT, TEMP and PILOT bulletins of Mauritania in BUFR codes |
| **Zimbabwe** | Not exchanging TDCF reports | MESSIR COROBOR SYSTEM | SYNOPs are being sent to Pretoria in TAC via email since the encoding system (Messir-Comm) stopped working |
| **Madagascar** | Exchanging TDCF reports (AWS data) | CLIMSOFT |  |
| **Morocco** | Exchanging TDCF reports | TRANSMET |  |
| **Tunisia** | Exchanging TDCF reports | MESSIR COROBOR SYSTEM |  |
| **Kenya** | Exchanging TDCF reports | CLIMSOFT | TDCF reports received RTH/Gisc Toulouse |
| **Rwanda** | Exchanging TDCF reports | CLIMSOFT | SYNOP being received in Nairobi |
| **Uganda** | Not Exchanging TDCF reports | NO |  |
| **Burundi** | Not Exchanging TDCF reports | NO |  |
| **Malawi** | Not Exchanging TDCF reports | NO |  |
| **Botswana** | Not Exchanging TDCF reports | NO |  |
| **Mauritius** | Not exchanging reports in TDCF format | NO |  |
| **Zambia** | Not Exchanging TDCF reports | NO |  |
| **RDC** | Not exchanging TDCF report | NO | COROBOR System down |
| **Gabon (SMHN)** | No | NO | No |

Twenty (22) countries replied to the survey, with only fourteen (14) countries indicating that they disseminate TCDF reports to the Global Telecommunication System (GTS) i.e. SYNOP, TEMP and CLIMAT where applicable. The main obstacles identified in the transmission of the observations were:

* communication problems
* software for the encoding and decoding of observations.

The encoding software used are: ECMWF decoder, COROBOR systems, and CLIMSOFT software.

**Technology used to exchange data with GTS**

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**2019-7.2.2(CM-III) Status of migration to TDCF in RA II**[**⮈**](Report_IPET-CM-III_Marrakech_summary.docx#S2019_7_2_2)

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

1.1 *Republic of Korea*

Republic of Korea started dissemination of hourly buoy observation in BUFR format in June 2018 with GTS headings of IOBC[18, 40] RKSL.

1.2 *Russian Federation (Asia region)*

Russian Federation started to disseminate upper-air observation data in BUFR format in November 2018 and January 2019. GTS headings are as follows:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TTTAAii | CCCC | WMO station index number | Remarks | Date |
| IUKC01 | RUHB | 24266 | TEMP PART A, B | Nov 2018 |
| IUKC03 | RUHB | 30372, 30557, 30635, 30673, 30758, 30935, 30965 | TEMP PART A, B | Jan 2019 |
| IUKC04 | RUHB | 31088 | TEMP PART A, B | Nov 2018 |
| IUKC04 | RUNW | 29572, 29862, 30230 | TEMP PART A, B | Nov 2018 |
| IUKC05 | RUHB | 32540 | TEMP PART A, B | Nov 2018 |
| IUKD01 | RUNW | 20674, 23472 | TEMP PART A, B | Nov 2018 |
| IUKD02 | RUNW | 23921 | TEMP PART A, B | Nov 2018 |
| IUKD03 | RUNW | 28695, 28722 | TEMP PART A, B | Jan 2019 |
| IUSC01 | RUHB | 24266 | TEMP PART A, B, C, D | Nov 2018 |
| IUSC03 | RUHB | 30372, 30557, 30635, 30673, 30758, 30935, 30965 | TEMP PART A, B, C, D | Jan 2019 |
| IUSC04 | RUHB | 31088 | TEMP PART A, B, C, D | Nov 2018 |
| IUSC04 | RUNW | 29572, 29862, 30230 | TEMP PART A, B, C, D | Nov 2018 |
| IUSC05 | RUHB | 32540 | TEMP PART A, B, C, D | Nov 2018 |
| IUSD01 | RUNW | 20674, 23472 | TEMP PART A, B, C, D | Nov 2018 |
| IUSD02 | RUNW | 23921 | TEMP PART A, B, C, D | Nov 2018 |
| IUSD03 | RUNW | 28695, 28722 | TEMP PART A, B, C, D | Jan 2019 |

1.3 *Japan*

Japan started to disseminate daily CLIMAT in BUFR format in February 2019 with GTS heading of ISCC60 RJTD and ISCL60 RJTD (monthly). Japan stopped disseminating drifting buoy reports in TAC format (FM18 BUOY) in March 2019 with GTS headings of SSVB[01-19] RJTD.

1.4 *Hong Kong*

Hong Kong began dissemination of daily CLIMAT in BUFR format in February 2019 with GTS heading of ISCC60 VHHH (monthly).

1.5 *Pakistan*

Pakistan has been ready to disseminate daily CLIMAT in BUFR format since February 2019 with GTS heading of ISCD60 OPKC (monthly) and is coordinating with its principal GISC about routing of this bulletin.

**2 Monitoring and Analysis of Migration Status**

2.1 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).

2.2 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 January 1 to 15, 2019, RTH Tokyo received (i) at least one surface synoptic observation report (excluding NIL reports) in BUFR format from 82% 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 53% of registered stations (TAC format from 88%). Fourteen BUFR reports equivalent to PILOT reports were received by RTH Tokyo in the monitoring period, while TAC bulletins were received from fourteen stations.

Number of RA-II RBSN stations issuing surface synoptic observation (SYNOP) and upper-air sounding (TEMP) reports in TAC and BUFR format from April 2016 to January 2019

(2) CLIMAT reports

As of March 2019, 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. Hong Kong and Japan were also reporting daily CLIMAT reports in BUFR format.

(3) Marine reports

As of March 2019, 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.

**2019-7.2.3(CM-III) Status of migration to TDCF in RA III**

# 1 Mr Lazcano Guerrero[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_7_2_3)

# Countries of the Regional Association III

The following table shows the name of the RA III focal points. The names in gray correspond to unconfirmed data.

|  | **PAIS** | **Confirmación de Puntos Focales** | |
| --- | --- | --- | --- |
| **Nombre** | **correo** |
| 1 | Argentina | Lucas BERENGUA | lucasjb@smn.gov.ar |
| 2 | Bolivia | Antonio Terán | webmaster@seramhi.fob.bo |
| 3 | Brasil | José Mauro | Jmauro.rezende@inmet.gov.br |
| 4 | Chile | Luis Lazcano | llazcano@dgac.gob.cl |
| 5 | Colombia | Julio César FRANCO | jfranco@ideam.gov.co |
| 6 | Ecuador | Edison Cruz | ecruz@inamhi.gob.ec |
| 7 | Guyana | Ms. Haymawattie Danny | haymadanny@gmail.com |
| 8 | Paraguay | Wilson Caballero | wilson.caballero@meteorologia.gov.py |
| 9 | Perú | Jorge Dante Chira La Rosa | jchira@senamhi.gob.pe |
| 10 | Suriname | WARSODIKROMO Truusje Soetinie | wtruus@yahoo.com |
| 11 | Uruguay | Marcelo Chico Espinoza | mceuy@yahoo.com |
| 12 | Venezuela | Antonio Espinoza | antonio.espinoza07@gmail.com |

Editorial note: Only one overlap with and three experts missing in the list of Focal Point for Codes and Data Representation Matters (FP CDRM) available from:

http://www.wmo.int/pages/prog/www/CBS/Lists\_WorkGroups/CBS/cross-cutting/fp%20cdrm/members

# Bulletins in BUFR code published on the WIS portal

The following table shows the bulletins retrieved from the WIS portals of Argentina and Brazil.

|  | País | Boletines | Total |
| --- | --- | --- | --- |
| 1 | Argentina | IUAG01SABM,ISNI01SABM,IUKI05SAWB,ISCI03SABM,ISMI01SAWB,IUJI05SAWB,ISII03SABM,IUKI01SABM,IUKI02SABM,ISMI01SABM,IUJI02SABM,ISII01SABM,IUJI01SABM,ISCI01SABM,ISMI02SABM,ISNI02SABM,ISII02SABM,ISMI03SABM,ISNI03SABM | 19 |
| 2 | Bolivia | *Sin Boletines* | 0 |
| 3 | Brasil | Ver Tabla en Anexos… | 249 |
| 4 | Chile | ISMI03SCSC,ISII01SCSC,IUSJ01SCSC,ISAI01SCSC,ISCI60SCSC,IUSI02SCSC,ISCJ60SCSC,ISMI02SCSC,ISMI01SCSC,ISII02SCSC,ISCI01SCSC,ISCJ01SCSC,IUSI01SCSC | 13 |
| 5 | Colombia | ISAI01SKBO,ISME01SKBO | 2 |
| 6 | Ecuador | *Sin Boletines* | 0 |
| 7 | Guyana | *Sin Boletines* | 0 |
| 8 | Paraguay | [ISII01SGAS](http://gisc.inmet.gov.br/dw/index.xhtml) | 1 |
| 9 | Perú | ISMI01SPIM | 1 |
| 10 | Suriname | *Sin Boletines* | 0 |
| 11 | Uruguay | ISMI01SUMU | 1 |
| 12 | Venezuela | ISME01SVMR,ISIE01SVMR,ISIE20SVMR | 3 |

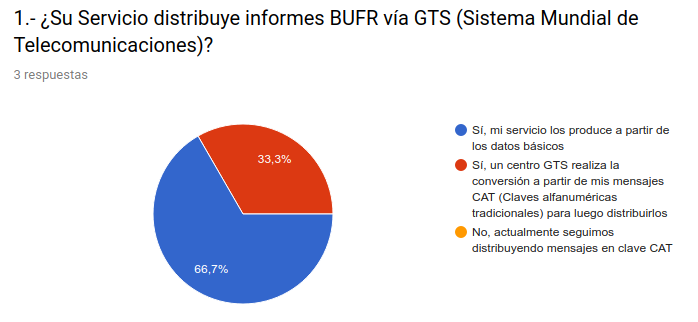
# 

# Online Survey

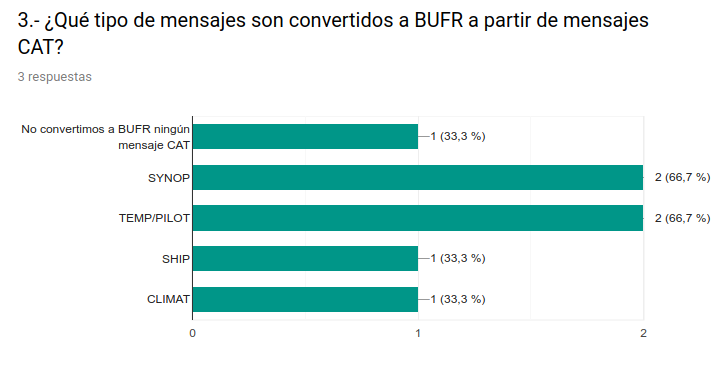
Lintk:

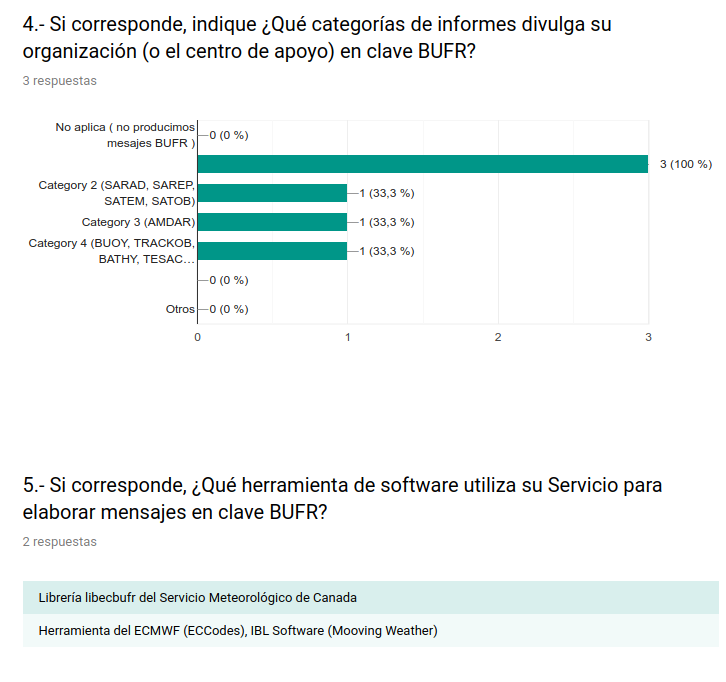
<https://docs.google.com/forms/d/e/1FAIpQLSdVSrOZRkk9aCvrmVRD-k8ah42xXtIwjmfDTFLKgPQ09pxR9A/viewform?vc=0&c=0&w=1>

Results of the survey:

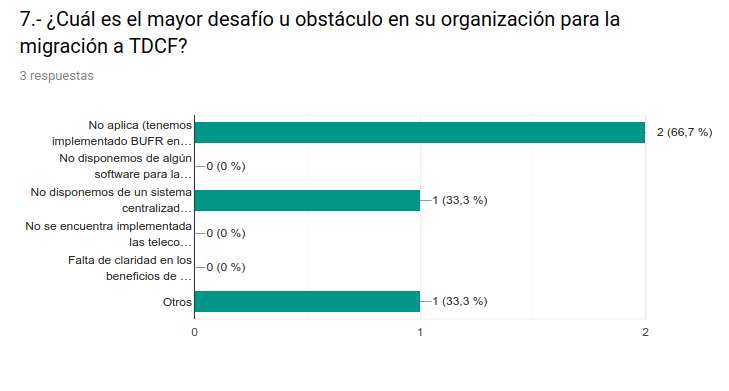


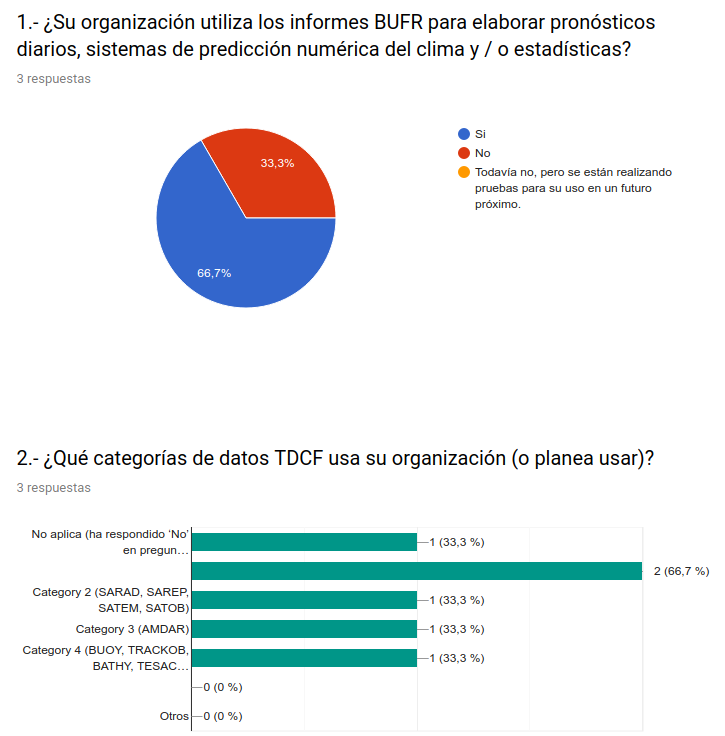
## 

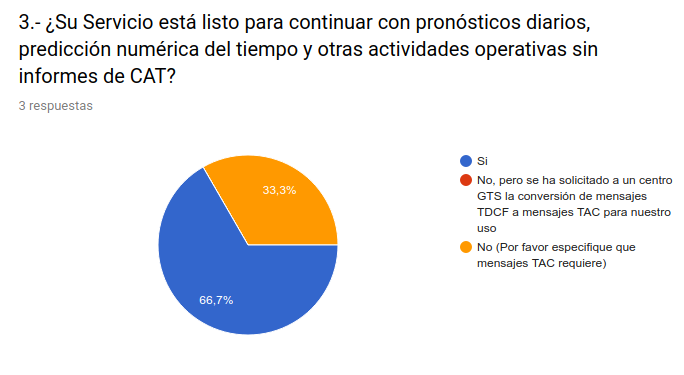


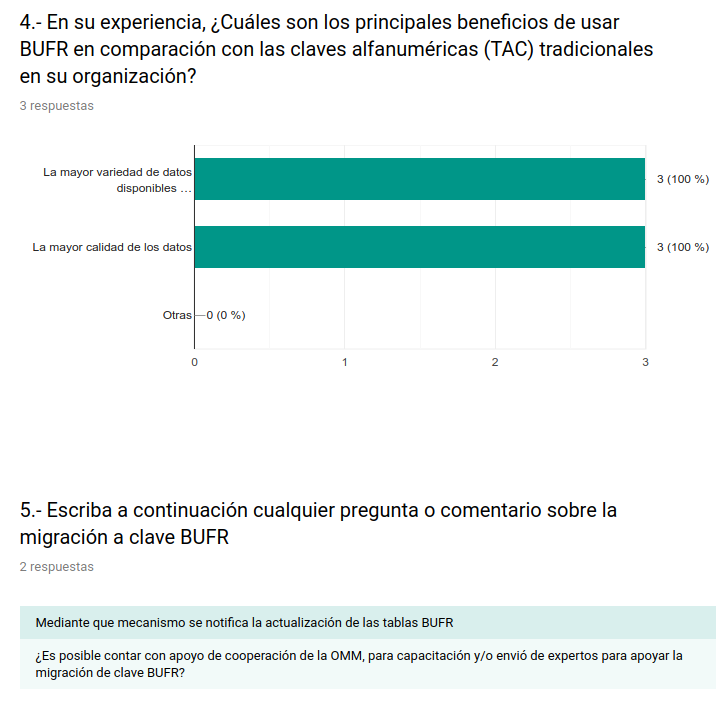












# Bulletins in BUFR defined in WIS

### Argentina

|  |  |
| --- | --- |
| Headings | Descripción |
| int.wmo.wis::IUAG01SABM | IUAG01 collection of AMDAR reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) |
| [int.wmo.wis::ISNI01SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISNI01 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at hourly UTC |
| [int.wmo.wis::IUKI05SAWB](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUKI05 collection of TEMP reports available from SAWB (BASE MARAMBIO) as BUFR at 12 UTC |
| [int.wmo.wis::ISCI03SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISCI03 collection of CLIMAT reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at MONTHLY |
| [int.wmo.wis::ISMI01SAWB](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISMI01 collection of SYNOP reports available from SAWB (BASE MARAMBIO) as BUFR at 00, 06, 12, 18 UTC |
| [int.wmo.wis::IUJI05SAWB](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUJI05 collection of PILOT reports available from SAWB (BASE MARAMBIO) as BUFR at 12 UTC |
| [int.wmo.wis::ISII03SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISII03 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 03, 09, 15, 21 UTC |
| [int.wmo.wis::IUKI01SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUKI01 collection of TEMP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 12 UTC |
| [int.wmo.wis::IUKI02SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUKI02 collection of TEMP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 12 UTC |
| [int.wmo.wis::ISMI01SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISMI01 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 00, 06, 12, 18 UTC |
| [int.wmo.wis::IUJI02SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUJI02 collection of PILOT reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 12 UTC |
| [int.wmo.wis::ISII01SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISII01 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 03, 09, 15 and 21 UTC |
| [int.wmo.wis::IUJI01SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUJI01 collection of PILOT reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 12 UTC |
| [int.wmo.wis::ISCI01SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISCI01 collection of CLIMAT reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at MONTHLY |
| [int.wmo.wis::ISMI02SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISMI02 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 00, 06, 12, 18 UTC |
| [int.wmo.wis::ISNI02SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISNI02 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at hourly UTC |
| [int.wmo.wis::ISII02SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISII02 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 03, 09, 15 and 21 UTC |
| [int.wmo.wis::ISMI03SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISMI03 collection of SYNOP reports available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at 00, 06, 12, 18 UTC |
| [int.wmo.wis::ISNI03SABM](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISNI03 collection of SYNOP report available from SABM (BUENOS AIRES (CENTRO REGIONAL MET.)) as BUFR at hourly UTC |

### Chile

|  |  |
| --- | --- |
| Headings | Descripción |
| [ISMI03SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISMI03 collection of SYNOP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) as BUFR at 12 and 18 UTC |
| [ISII01SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISII01 collection of SYNOP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) as BUFR at 03 and 09 UTC |
| [IUSJ01SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUSJ01 collection of TEMP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER) as BUFR at 00 UTC |
| [ISAI01SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISAI01 BUFR bulletin available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER)) at 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23 UTC |
| [ISCI60SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISCI60 collection of DAILY CLIMAT reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) in MONTHLY BUFR |
| [IUSI02SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUSI02 collection of TEMP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER) as BUFR at 12 and 00 UTC |
| [ISCJ60SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISCJ60 collection of DAILY CLIMAT reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) as BUFR at MONTHLY |
| [ISMI02SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISMI02 collection of SYNOP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) as BUFR at 06 UTC |
| [ISMI01SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISMI01 collection of SYNOP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) as BUFR at 00 UTC |
| [ISII02SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISII02 collection of SYNOP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) as BUFR at 15 UTC |
| [ISCI01SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISCI01 collection of CLIMAT reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) as BUFR at MONTHLY |
| [ISCJ01SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | ISCJ01 collection of CLIMAT reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER )) in MONTHLY BUFR |
| [IUSI01SCSC](http://dcpc.smn.gov.ar/dw/index.xhtml;jsessionid=403e3f419aafb7bc5ad4a9ef1057) | IUSI01 collection of TEMP reports available from SCSC (SANTIAGO DE CHILE (NATIONAL WEATHER CENTER) as BUFR at 12 UTC |

### Brazil

|  |  |
| --- | --- |
| Headings | Descripción |
| int.wmo.wis::INAX01SBBR | INAX01 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX02SBBR | INAX02 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX03SBBR | INAX03 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX04SBBR | INAX04 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX05SBBR | INAX05 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX06SBBR | INAX06 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX07SBBR | INAX07 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX08SBBR | INAX08 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX09SBBR | INAX09 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX10SBBR | INAX10 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX11SBBR | INAX11 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX12SBBR | INAX12 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX13SBBR | INAX13 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX14SBBR | INAX14 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX15SBBR | INAX15 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX16SBBR | INAX16 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX17SBBR | INAX17 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX18SBBR | INAX18 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INAX19SBBR | INAX19 SBBR BUFR bulletin ATOVS AMSU-A report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INCS01SBBR | INCS01 SBBR BUFR bulletin CrIS data report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INCX01SBBR | INCX01 SBBR BUFR bulletin CrIS data report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX01SBBR | INHX01 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX02SBBR | INHX02 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX03SBBR | INHX03 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX04SBBR | INHX04 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX05SBBR | INHX05 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX06SBBR | INHX06 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX07SBBR | INHX07 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX08SBBR | INHX08 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX09SBBR | INHX09SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX10SBBR | INHX10 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX11SBBR | INHX11 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX12SBBR | INHX12 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX13SBBR | INHX13 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX14SBBR | INHX14 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX15SBBR | INHX15 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX16SBBR | INHX16 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX17SBBR | INHX17 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX18SBBR | INHX18 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX19SBBR | INHX19 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX20SBBR | INHX20 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX21SBBR | INHX21 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX22SBBR | INHX22 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX23SBBR | INHX23 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INHX24SBBR | INHX24 SBBR BUFR bulletin ATOVS HIRS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX01SBBR | INMX01 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX02SBBR | INMX02 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX03SBBR | INMX03 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX04SBBR | INMX04 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX05SBBR | INMX05 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX06SBBR | INMX01 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX07SBBR | INMX07 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX08SBBR | INMX08 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX09SBBR | INMX09 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX10SBBR | INMX10 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX11SBBR | INMX11 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX12SBBR | INMX12 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX13SBBR | INMX13 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX14SBBR | INMX14 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX15SBBR | INMX15 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX16SBBR | INMX16 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX17SBBR | INMX17 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX18SBBR | INMX18 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX19SBBR | INMX19 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX20SBBR | INMX20 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX21SBBR | INMX21 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX22SBBR | INMX22 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX23SBBR | INMX23 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX24SBBR | INMX24 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX25SBBR | INMX25 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX26SBBR | INMX26 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX27SBBR | INMX27 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX28SBBR | INMX28 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX29SBBR | INMX29 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX30SBBR | INMX30 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX31SBBR | INMX31 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX32SBBR | INMX32 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX33SBBR | INMX33 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX34SBBR | INMX34 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX35SBBR | INMX35 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX36SBBR | INMX36 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX37SBBR | INMX37 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX38SBBR | INMX38 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX39SBBR | INMX39 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX40SBBR | INMX40 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX41SBBR | INMX41 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX42SBBR | INMX42 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX43SBBR | INMX43 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX44SBBR | INMX44 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX45SBBR | INMX45 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX46SBBR | INMX46 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX47SBBR | INMX47 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX48SBBR | INMX48 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX49SBBR | INMX49 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX50SBBR | INMX50 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX51SBBR | INMX51 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX52SBBR | INMX52 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX53SBBR | INMX53 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX54SBBR | INMX54 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX55SBBR | INMX55 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INMX56SBBR | INMX56 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INQS01SBBR | INQS01 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INQX01SBBR | INQX01 SBBR BUFR bulletin ATOVS AMSU-B/MHS report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INSS01SBBR | INSS01 SBBR BUFR bulletin ATMS data report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::INSX01SBBR | INSX01 SBBR BUFR bulletin ATMS data report available from SBBR (BRASILIA-BRAZIL) |
| int.wmo.wis::ISAI01SBBR | Brazilian AWS reports (INMET NATIONAL WEATHER CENTER) at 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23 UTC |
| int.wmo.wis::ISAI01SKBO | Colombia AWS reports (IDEAM - NATIONAL WEATHER CENTER) at 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23 UTC |
| int.wmo.wis::ISAI02SBBR | ISAI02 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21 and 22 UTC |
| int.wmo.wis::ISCE01SBBR | WIS/GTS bulletin ISCE01 SBBR in FM94 BUFR/Edition 4 (CLIMAT) |
| int.wmo.wis::ISCE02SBBR | WIS/GTS bulletin ISCE02 SBBR in FM94 BUFR/Edition 4 (CLIMAT) |
| int.wmo.wis::ISCE03SBBR | WIS/GTS bulletin ISCE03 SBBR in FM94 BUFR/Edition 4 (CLIMAT) |
| int.wmo.wis::ISCE04SBBR | WIS/GTS bulletin ISCE04 SBBR in FM94 BUFR/Edition 4 (CLIMAT) |
| int.wmo.wis::ISCE31SBBR | WIS/GTS bulletin ISCE31 SBBR in FM94 BUFR/Edition 4 (CLIMAT) |
| int.wmo.wis::ISCE32SBBR | WIS/GTS bulletin ISCE32 SBBR in FM94 BUFR/Edition 4 (CLIMAT) |
| int.wmo.wis::ISII06SBBR | ISII06 SBBR main synoptic hour surface observations |
| int.wmo.wis::ISME02SBBR | ISME02 BUFR bulletin available from BRASILIA (SBBR) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME03SBBR | ISME03 BUFR bulletin available from BRASILIA (SBBR) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME04SBBR | ISME04 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME05SBBR | ISME05 BUFR bulletin available from BRASILIA (SBBR) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME06SBBR | ISME06 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME31SBBR | ISME31 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME32SBBR | ISME32 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME33SBBR | ISME33 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME34SBBR | ISME34 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME35SBBR | ISME35 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISME36SBBR | ISME36 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI01SBBR | ISMI01 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI02SBBR | ISMI02 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI03SBBR | ISMI03 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI04SBBR | ISMI04 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI05SBBR | ISMI05 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI06SBBR | ISMI06 SBBR buletin available from BRASILIA (SBBR) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI31SBBR | ISMI31 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI32SBBR | ISMI32 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI33SBBR | ISMI33 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI34SBBR | ISMI34 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI35SBBR | ISMI35 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISMI36SBBR | ISMI36 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISNE06SBBR | ISNE06 BUFR bulletin available from BRASILIA (SBBR) at 00, 06, 12 and 18 UTC |
| int.wmo.wis::ISNE36SBBR | ISNE36 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 03, 09, 15 and 21 UTC |
| int.wmo.wis::ISNI06SBBR | ISNI06 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 03, 09, 15 and 21 UTC |
| int.wmo.wis::ISNI36SBBR | ISNI36 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 03, 09, 15 and 21 UTC |
| int.wmo.wis::IUCI01SBBR | IUCI01 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI02SBBR | IUCI02 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI03SBBR | IUCI03 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI04SBBR | IUCI04 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI05SBBR | IUCI05 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI06SBBR | IUCI06 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI07SBBR | IUCI07 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI08SBBR | IUCI08 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI09SBBR | IUCI09 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI10SBBR | IUCI10 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI11SBBR | IUCI11 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI12SBBR | IUCI12 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI13SBBR | IUCI13 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI14SBBR | IUCI14 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI15SBBR | IUCI15 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI16SBBR | IUCI16 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI17SBBR | IUCI17 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI18SBBR | IUCI18 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI19SBBR | IUCI19 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI20SBBR | IUCI20 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI21SBBR | IUCI21 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI22SBBR | IUCI22 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI23SBBR | IUCI23 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI24SBBR | IUCI24 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI25SBBR | IUCI25 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI26SBBR | IUCI26 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI27SBBR | IUCI27 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI28SBBR | IUCI28 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI29SBBR | IUCI29 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI30SBBR | IUCI30 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI31SBBR | IUCI31 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI32SBBR | IUCI32 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI33SBBR | IUCI33 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI34SBBR | IUCI34 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI35SBBR | IUCI35 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI36SBBR | IUCI36 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI37SBBR | IUCI37 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI38SBBR | IUCI38 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI39SBBR | IUCI39 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI40SBBR | IUCI40 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI41SBBR | IUCI41 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI42SBBR | IUCI42 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI43SBBR | IUCI43 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI44SBBR | IUCI44 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI45SBBR | IUCI45 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI46SBBR | IUCI46 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI47SBBR | IUCI47 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI48SBBR | IUCI48 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI49SBBR | IUCI49 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI50SBBR | IUCI50 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI51SBBR | IUCI51 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI52SBBR | IUCI52 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI54SBBR | IUCI54 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI55SBBR | IUCI55 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI56SBBR | IUCI56 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI57SBBR | IUCI57 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI58SBBR | IUCI58 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI59SBBR | IUCI59 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI60SBBR | IUCI60 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI61SBBR | IUCI61 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI63SBBR | IUCI63 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI64SBBR | IUCI64 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI66SBBR | IUCI66 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI68SBBR | IUCI68 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI73SBBR | IUCI73 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI74SBBR | IUCI74 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI75SBBR | IUCI75 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI76SBBR | IUCI76 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI77SBBR | IUCI77 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI78SBBR | IUCI78 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI79SBBR | IUCI79 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI80SBBR | IUCI80 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI81SBBR | IUCI81 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI82SBBR | IUCI82 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI83SBBR | IUCI83 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI84SBBR | IUCI84 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI85SBBR | IUCI85 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI86SBBR | IUCI86 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI87SBBR | IUCI87 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI88SBBR | IUCI88 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI89SBBR | IUCI89 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI90SBBR | IUCI90 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI91SBBR | IUCI91 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI92SBBR | IUCI92 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI93SBBR | IUCI93 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI94SBBR | IUCI94 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI95SBBR | IUCI95 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI96SBBR | IUCI96 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI97SBBR | IUCI97 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI98SBBR | IUCI98 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUCI99SBBR | IUCI99 BUFR bulletin available from SBBR (BRASILIA (AERO)) |
| int.wmo.wis::IUPE01SBBR | IUPE01 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPE02SBBR | IUPE02 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPE03SBBR | IUPE03 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPE04SBBR | IUPE04 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPE05SBBR | IUPE05 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPI01SBBR | IUPI01 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPI02SBBR | IUPI02 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPI03SBBR | IUPI03 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPI04SBBR | IUPI04 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPI05SBBR | IUPI05 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPZ01SBBR | IUPZ01 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPZ02SBBR | IUPZ02 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPZ03SBBR | IUPZ03 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPZ04SBBR | IUPZ04 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPZ05SBBR | IUPZ05 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |
| int.wmo.wis::IUPZ06SBBR | IUPZ06 BUFR bulletin available from SBBR (BRASILIA (AERO)) at 00 and 12 UTC |

### 

### Colombia

|  |  |
| --- | --- |
| Headings | Descripción |
| [int.wmo.wis::ISAI01SKBO](http://gisc.inmet.gov.br/dw/index.xhtml;jsessionid=41e3d6b24fe5a7db5c21bb15559e) | Colombia AWS reports (IDEAM - NATIONAL WEATHER CENTER) at 00, 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and 23 UTC |
| [int.wmo.wis::ISME01SKBO](http://gisc.inmet.gov.br/dw/index.xhtml;jsessionid=41e3d6b24fe5a7db5c21bb15559e) | ISME01 SKBO - BUFR bulletin available from Colombia - Bogota (00 -23 UTC) |

### Paraguay

|  |  |
| --- | --- |
| Headings | Descripción |
| [int.wmo.wis::ISII01SGAS](http://gisc.inmet.gov.br/dw/index.xhtml) | ISII01 SGAS- BUFR bulletin available from Assuncion - Paraguay |

### Venezuela

|  |  |
| --- | --- |
| Headings | Descripción |
| [int.wmo.wis::ISME01SVMR](http://gisc.inmet.gov.br/dw/index.xhtml) | ISME01 BUFR bulletin available from Venezuela - SVMR (00 -23 UTC) |
| [int.wmo.wis::ISIE01SVMR](http://gisc.inmet.gov.br/dw/index.xhtml) | ISIE01 BUFR bulletin available from Venezuela - SVMR (00 -23 UTC) |
| [int.wmo.wis::ISIE20SVMR](http://gisc.inmet.gov.br/dw/index.xhtml) | ISIE20 SVMR - BUFR bulletin available from Venezuela - SVMR (00 -23 UTC) |

### Uruguay

|  |  |
| --- | --- |
| Headings | Descripción |
| int.wmo.wis::ISMI01SUMU | ISMI01 SUMU - BUFR bulletin available from Montevideo - Uruguay |

### Perú

|  |  |
| --- | --- |
| Headings | Descripción |
| int.wmo.wis::ISMI01SPIM | ISMI01 BUFR bulletin available from PERU - SPIM (00 -23 UTC) |

**2 Dr Ferreira**[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_7_2_3)

**Summary**

Major part of surface data in Region III comes from Automatic Weather Stations (AWS), which are originally encoded in BUFR. These data are usually distributed at the main synoptic times (MST) as well as at non-standard times (NST). The countries that distribute AWS data are: Argentina, Brazil, Chile and Colombia.

Colombia generates BUFR bulletins from AWS, using the originating centre code 54 (Montreal RSMC).

Chile does not report TAC bulletins anymore and report BUFR bulletins from surface weather stations (SWS).

Argentina, Brazil, Chile and Peru are also reporting BUFR bulletins from surface weather stations, but they are reporting the same information in TAC (SYNOP).

GISC Brasilia and DCPC Buenos Aires are still converting TAC bulletins into BUFR for those centres not capable of completing their migration. GISC Brasilia is converting data for Equator, Uruguay and Colombia, while DCPC Buenos Aires is for Paraguay and Peru.

It is important to note that Peru is already generating BUFR bulletins from their surface stations. So, part of data in GTS under telecommunication header “ISMIii SPIM” have been generated by centre 49 – Peru NMC and other part by centre 41 Buenos Aires (RSMC/RAFC), according to the information observed in the Section 1 of respective BUFR bulletins.

**Evaluation of the surface data**

Table 1 shows the GTS headings used to distribute surface data in BUFR in Region III.

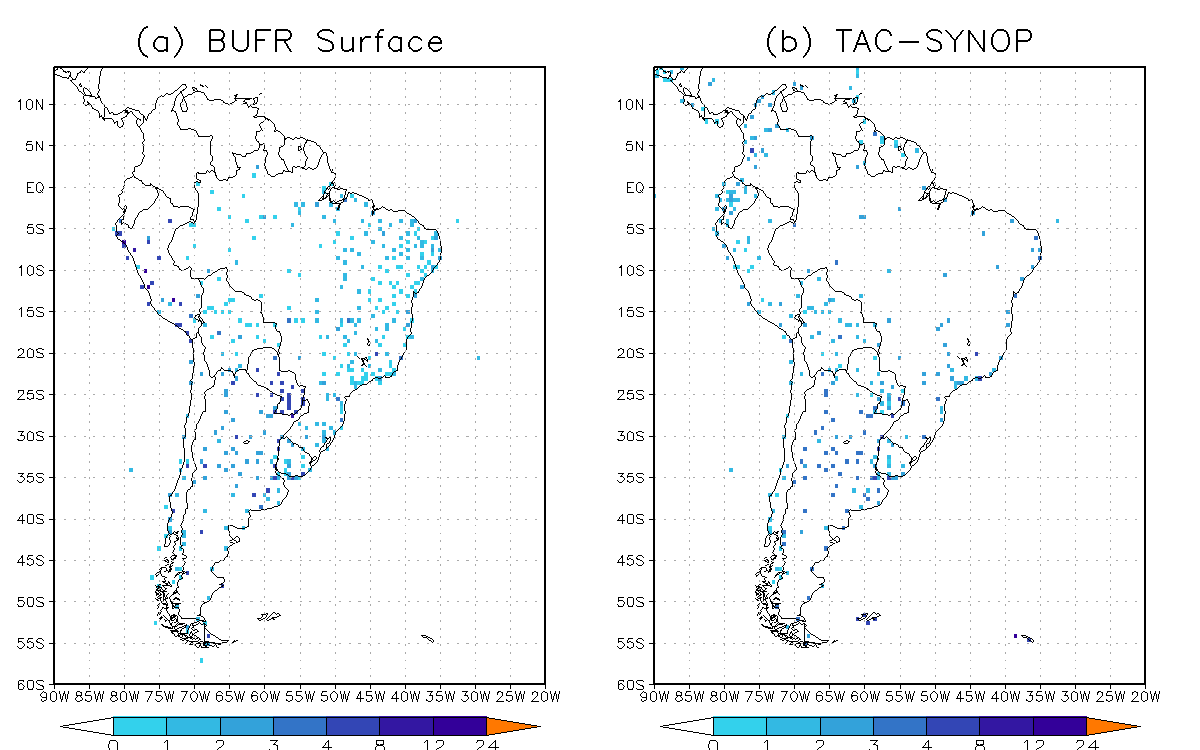
Table 1 - Monitoring resume of BUFR bulletins of surface data available in region III by Abbreviation Heading, Generator Centre and Time

|  |  |  |  |
| --- | --- | --- | --- |
|  | T1T2A1A2 | BUFR Generate Centre | Time |
| SABM – Buenos Aires - Argentina | ISII | 41 – Buenos Aires (RSMC) | NST |
| ISM | MST |
| SLLP - Bolivia | ISMM | 41 – Buenos Aires (RSMC) | MST |
| SBBR Brasilia – Brazil | ISAI, ISII | 43 – Brasilia(RSMC/RAFC) | NST |
| ISME | MST |
| SCSC - Santiago - Chile | ISAI | 45 - Santiago - Chile | NST |
| SKBO – Bogota (Colombia) | ISME | 43 - Brasilia (RSMC/RAFC) \* | MST |
| ISII, ISNI  ISMI,ISMX | 54 - Montreal (RSMC) \* | NST |
| SEQU – Quito - Ecuador | ISME | 43- Brasilia (RSMC/RAFC)  **\*** | MST |
| SGAS – Asuncion – Paraguay | ISII | 41 – Buenos Aires (RSMC) \* | Other |
| ISMI | MST |
| SPIM – Lima – Peru | ISMI | 49 – Peru NMC  41 – Buenos Aires (RSMC) \* | MST |
| SUMU – Montevideo - Uruguay | ISMI | 43- Brasilia (RSMC/RAFC) \* | MST |
| ISII,ISNI |  |

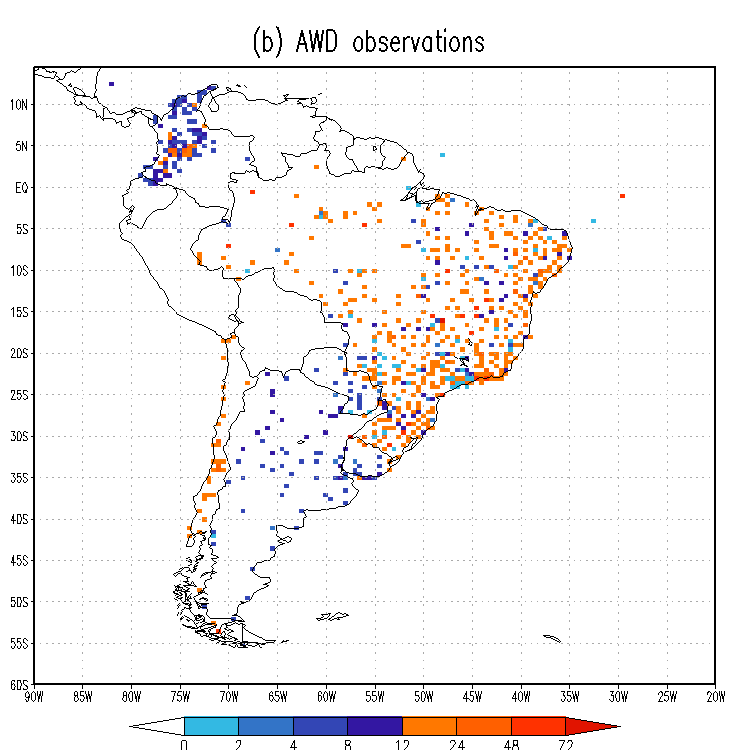
\* TAC data converted in BUFR by Brazil or Argentina

The results for MST in BUFR and TAC during January 2019 are presented in figure 1. The Figure 2 presents the coverage of surface data in the region at main synoptic times. The Figure 2a, the data in BUFR and the Figure 2.b the data in TAC. It can be observed that despite the number of data in BUFR already exceeding the number of data in TAC there are still regions covered only by TAC data.

Figure 1 - Number of surface observation (BUFR and TAC) at main synoptic time in January 2019

Figure 2: Coverage of surface observation in Region3 at main synoptic time in BUFR and TAC, during January 2019

The Figure 3 presents the distribution of surface data at NST. The most part of this data are from AWS. Many of this AWS generate more the 24 observation per day resulting in 10107 observations per day in the region.

  
Figure 3: Coverage of surface observation at non-synoptic time in BUFR , during January 2019

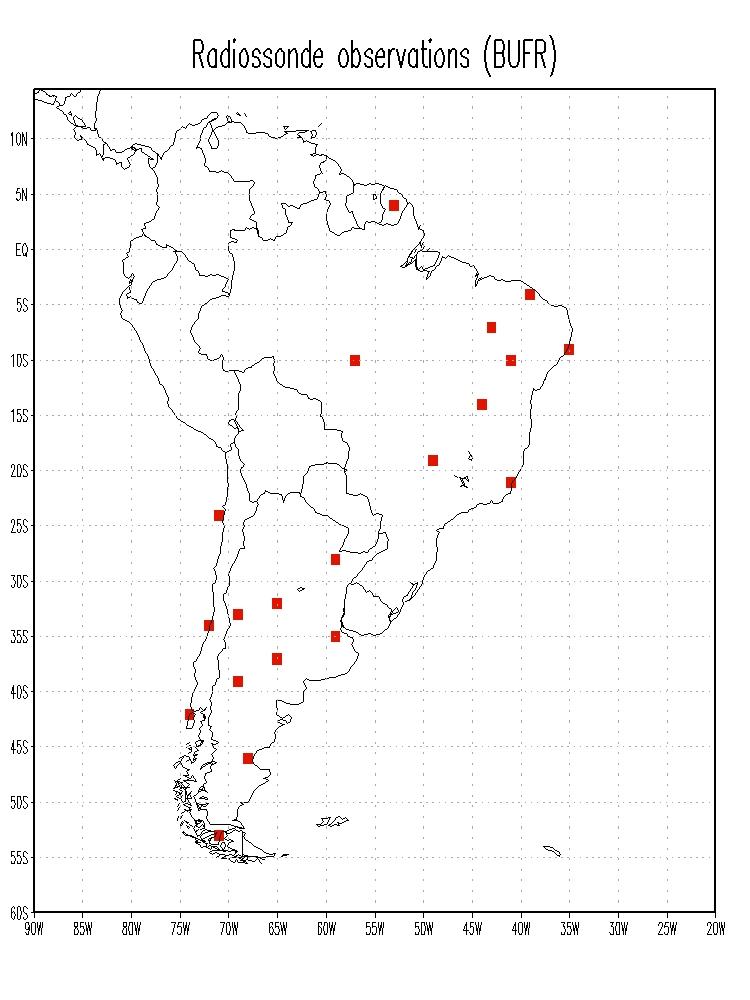
  
Figure 5 - Coverage of Radiosonde data in BUFR format during January 2019

  
Figure 4 - Number of surface observation per day (BUFR) at nom-standard time in January 2019

The Figure 4 present the distribution of this data during January 2019

**Evaluation of the Radiosonde data**

The figure 5 presents the coverage of radiosonde data in BUFR format during January 2019.

**Other related information**

INPE/CPTEC will start distributing RARS-BDMET Satellite data from antennas located in two new Amazon Protection System units (SIPAM) bases. One in Porto Velho (SBPV) and another in Belem (SBBE). The processing of the Belem station is already in operational test, for transmission to METOFFICE, and must also be transmitted by the GTS through GISC Brasilia. Porto Velho data is in initial test phase.

The Brazilian Air Force, through the Department of Airspace Control (DECEA) / Integrated Center of Aeronautical Meteorology (CIMAER) intends to start to provide Aircraft data in BUFR.

Chile and Argentina are already transmitting aircraft data in BUFR in the GTS.

**2019-7.2.4(CM-III) Status of migration to TDCF in RA IV**[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_7_2_4)

**SURVEY RESULTS**

Eleven (11) countries replied to the survey, with only four (4) countries indicating that they disseminate TCDF reports to the Global Telecommunication System (GTS) i.e. SYNOP, TEMP and CLIMAT where applicable. The main obstacle identified in the transmission of the observations was software for the encoding and decoding of observations. Of the eleven (11) countries, eight (8) indicated that they were not ready for the cessation of TAC reports from meteorological centres.

**TRAINING AND SOFTWARE OPPORTUNITIES IN RA IV**

There was only one training session specifically on the encoding and decoding of observations BUFR in RA IV. This was in 2005 in Costa Rica with assistance from Environment Canada and the software which the participants were exposed to was *libecbufr*. This is software which was created in-house in Environment Canada. The participants had to create an input template as a placeholder for the meteorological elements observed which would ingested by the software in the creation of the BUFR message.

The Caribbean Meteorological Organization (CMO) in 2014, created graphical user interface (GUI) sitting for the freely the available BUFR encoding/decoding software from the European Centre for Medium-Range Weather Forecasts (ECMWF) *bufrdc\_xxxxxx*. The GUI and the bufr software were provided to the Anglophone along with the software *VirtualBox*. The CMO also worked with two countries to write the technical specifications for new meteorological workstations which included the encoding/decoding of observations into bufr.

**PROBLEMS IDENTIFIED FOR NON-TRANSITION**

• All of the freely available encoding software uses a non-Windows operating system, which has been identified as a problem for some users;

• The ECMWF bufr software is now discontinued and although the table can be updated, the encoding/decoding of new synoptic stations cannot be completed, since some of the files are missing from the synop2bufr package.

**2019-7.2.5(CM-III) Status of migration to TDCF in RA V**[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_7_2_5)

**SYNOP, Upper Air, and CLIMAT data.**

The table below shows the current status of SYNOP, Upper Air and CLIMAT observations in BUFR format issued on the GTS from countries in RA-V.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Country | Synop. IS[M,I,N] | Upper Air IU[J,K,S,W] (Date last received) | | CLIMAT, ISC (Date Last received | |
| Australia | 10 | 159 | Current | 11 | Current |
| Brunei | 0 | 0 |  | 0 |  |
| Cook Islands | 2 | 8 | All 25/12/2016 | 0 |  |
| FS Micronesia | 0 | 0 |  | 0 |  |
| Fiji | 2 | 8 | Current | 0 |  |
| French Polynesia | 3 | 16 | Current | 1 | Current |
| Indonesia | 8 | 10 | Current | 2 | 15/08/2018 |
| Kiribati | 0 | 0 |  | 0 |  |
| Malaysia | 2 | 0 |  | 0 |  |
| Nauru | 0 | 0 |  | 0 |  |
| New Caledonia | 9 | 4 | Current | 1 | Current |
| New Zealand | 7 | 5 | Current | 0 |  |
| Philippines | 3 | 4 | Current | 1 | Current |
| Samoa | 3 | 0 |  | 0 |  |
| Singapore | 2 | 3 | Current | 1 | Current |
| Solomon Islands | 0 | 0 |  | 0 |  |
| Tonga | 2 | 0 |  | 0 |  |
| Tuvalu | 0 | 1 | 30/12/2018 | 0 |  |
| Vanuatu | 2 | 0 | All 15/08/2015 | 0 |  |

The numbers in the column 2, 3 and 5 are the number of BUFR bulletins issued daily with the TTAAii given in the heading of the column. All of these SYNOP and upper air bulletins are, in fact, advertised in Vol C1. As seen from the table:

SYNOP

• There are 6 countries yet to issue SYNOP in BUFR (number of bulletins [ISxxxx] is 0). All of them are presumably converted from TAC.

Upper-air

• There are 9 countries yet to issue upper-air observation data in BUFR. BUFR upper air data converted from TEMP/PILOT or directly from the instrument are not distinguished in this table. Some countries seem to have stopped producing upper-air BUFR bulletins. For example, the last bulletin received from Tuvalu was on 30/12/1018, and from the Cook Islands was on 25/12/2016. Vanuatu seems to have issued a set of bulletins once, possibly be as a trial, on 15/8/2015, and has never issued since then (therefore 0 in the table).

• The information from RTH Wellington indicates that the UKMO previously funded the consumables for the Cook Islands Upper Air programme, but this was withdrawn some time ago, which explains the cessation of bulletins from the Cook Islands.

• Australia upper air data are issued in high temporal resolution and from the source.

CLIMAT

• There are only 4 countries issuing CLIMAT bulletins in BUFR. Indonesia seems to have stopped since 15/08/2018.

**Marine data**

Table below shows the status of the bulletins for marine data issued in BUFR from RA-V. As seen, most countries are yet to issue BUFR bulletins for marine data. Australia issues BATHY, TESAC and WAVEOB bulletins in BUFR. Philippines and Singapore are issue SHIP report in BUFR.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Country | TRACKOB, IOR | BATHY, TESAC, IOS | WAVEOB, IOW | SHIP, ISS |
| Australia | 0 | 2 | 1 | 0 |
| Brunei | 0 | 0 | 0 | 0 |
| Cook Islands | 0 | 0 | 0 | 0 |
| FS Micronesia | 0 | 0 | 0 | 0 |
| Fiji | 0 | 0 | 0 | 0 |
| French Polynesia | 0 | 0 | 0 | 0 |
| Indonesia | 0 | 0 | 0 | 0 |
| Kiribati | 0 | 0 | 0 | 0 |
| Malaysia | 0 | 0 | 0 | 0 |
| Nauru | 0 | 0 | 0 | 0 |
| New Caledonia | 0 | 0 | 0 | 0 |
| New Zealand | 0 | 0 | 0 | 0 |
| Philippines | 0 | 0 | 0 | 4 |
| Samoa | 0 | 0 | 0 | 0 |
| Singapore | 0 | 0 | 0 | 1 |
| Solomon Islands | 0 | 0 | 0 | 0 |
| Tonga | 0 | 0 | 0 | 0 |
| Tuvalu | 0 | 0 | 0 | 0 |
| Vanuatu | 0 | 0 | 0 | 0 |

**2019-7.2.6(CM-III) Status of migration to TDCF in RA VI**[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_7_2_6)

Number of stations in the Area of Responsibility of Russian Federation that transmit observation data to international exchange is presented in the table:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Country | Synoptic data, number of stations | | Radiosonde data, number of stations | | Climate data, number of stations | |
| FM-12 | FM-94 BUFR | FM-35 | FM-94 BUFR | FM-71 | FM-94 BUFR/CREX |
| 1 | Russian Federation | 882 | 882\* | 111 | 43 + 66 | 229 | 0 |
| 2 | Azerbaijan | 7 | 0 | 1 | 0 | 6 | 0 |
| 3 | Armenia | 3 | 3\* | 1 | 1 | 4 | 4 (CREX) |
| 4 | Belarus | 27 | 27\* | 3 | 3 | 12 | 12 |
| 5 | Georgia | 9 | 9 | 0 | 0 | 7 | 0 |
| 6 | Kazakhstan | 82 | 82\* | 9 | 0 | 42 | 0 |
| 7 | Kyrgyzstan | 7 | 0 | 0 | 0 | 5 | 0 |
| 8 | Moldova | 16 | 0 | 0 | 0 | 4 | 0 |
| 9 | Tajikistan | 26 | 0 | 0 | 0 | 12 | 0 |
| 10 | Turkmenistan | 20 | 0 | 0 | 0 | 13 | 0 |
| 11 | Uzbekistan | 19 | 19\* | 0 | 0 | 12 | 0 |
| 12 | Ukraine | 32 | 32\* | 6 | 0 | 32 | 0 |
| 13 | Mongolia | 41 | 41 | 7 | 7\* | 32 | 0 |

\* Transcoded from data in traditional codes

Status of the migration to TDCF:

• Armenia and Belarus handled the migration to TDCF in full.

• Russian Federation has not yet made the transition to the TDCF on climate data. From April 25, 2019, the radio sounding data in FM-94 BUFR will be added to the international exchange from 66 stations of Roshydromet.

• Mongolian radiosonde data in FM-94 BUFR are transcoded from FM-35. WMO Secretariat pointed out the inadmissibility of such data.

• Russian Federation transcodes Armenian and Moldovan observations from FM-12 to FM-94 BUFR. Data from Moldova are not transferred to the international exchange, since not represented by the NMHS of Chisinau in WMO Volume C1.

• Russian Federation joined the international experiment announced by WMO in 2019 - every month to transmit daily climate data in the FM-94 BUFR code. Station 27612 (Moscow, VDNH) participates in the experiment. Data file in FM-94 BUFR code is created the NMHS and transmitted to dissemination system. Futher FGBU “Aviamettelecom” converts file into a WMO-format bulletin and push to the GTS.

• In accordance with the status report from the Working Group on Technology Development and Infrastructure (WG-TDI) TDCF Project-2 following from 2013, the following countries producing and distributing SYNOP, TEMP and CLIMAT data:

Austria, Croatia, Cyprus, Czech Republic, Denmark and Faroe Islands, Finland, France, Germany, Greece, Hungary, Ireland, Israel, Italy, Jordan, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom of Great Britain and Northern Ireland

**2019-7.2.7(CM-III) Status of migration to TDCF in JCOMM**[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_7_2_7)

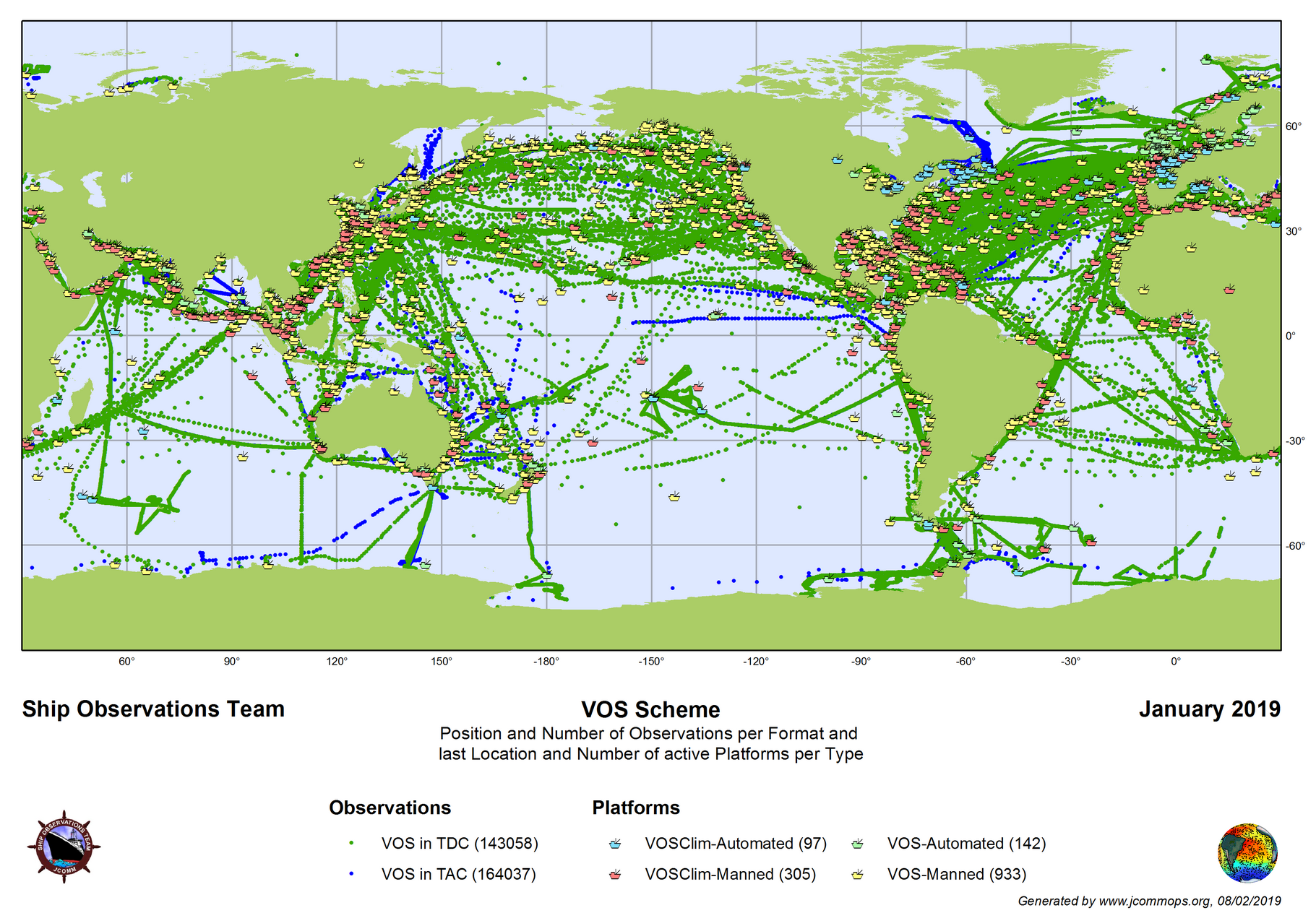


Figure 1: Format and spatial distribution of VOS observations on the GTS in 2019.

Table 1: Summary of Table D sequences / BUFR templates in use for marine data[⮈](file:///\\internal.wmo.int\userdata\redirected\AShimazaki\WORKPLACE\MEETING\CBS-IPET-CM\IPET-CM-III_Marrakech2019\REPORT\Report_IPET-CM-III_Marrakech_summary.docx#S2019_7_2_7)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| TAC | Description | Current template(s) | Status | Plans/comments |
| **FM13-XIV SHIP** | **VOS data** | B/C10 - Regulations for reporting SHIP data in TDCF | Operational (TM308009) | Deprecated, use TM0308014 |
| **VOS data** | Synoptic reports from sea stations suitable for SHIP observation data from VOS stations | Operational (TM308014) | Replaces / supersedes TM308009. |
| **VOS data** |  | TM308018 | Simplified template for automatic weather stations |
|  | **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) | Plans to update template to include additional metadata. |
| **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) |  |

### 7.3 Issues management process for upper air BUFR reports

**(none)**

**8 ADMINISTRATIVE ISSUES**

**2019-8.1(CM-III) Update of Category of Amendments**[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_8_1)

**CATEGORY OF AMENDMENTS ver. 1.0**

**AVAILABILITY**: Global (1), WMO Region (2), Local (3) or National (4) level

This factor is to indicate the maximum area where the data will be made available.

i) The data will be available globally (1), in a WMO region (2), in a responsible area by a centre operated by a Member or an international organization (3) or in a country or territory (4). If it is available across the areas, the broader area should apply.

ii) This does not directly mean impact to Members' systems and operations.

iii) Such Members who are in the corresponding area should note the amendment (availability) and could make comments on coding aspect.

**PRODUCTION**: WMO general standard practice (a), WMO special standard practice (b), WMO recommended practice (c) or voluntary production (d)

This factor is to indicate Members who play the role of data production.

i) WMO general standard practice (a), which is high impact to Members.

i-1) [PRODUCER] Members, who meet the data production criteria, review the amendments from the perspective of financial and operational impacts and the date of implementation as well as coding aspects.

Typical example is a new mandatory surface observation at sea.

i-2) [USER] Other Members, who do not meet the data production criteria, such as inland states, review the amendments from users perspective.

i-3) [PROCEDURE] An appropriate procedure other than "fast-track" be pursued for adoption of this type, such as "adoption between CBS sessions".

ii) WMO special standard practice (b), which is high impact to tasked Members.

Same as i) in the production factor but in most cases the impact to such Members tasked the data production would have been evaluated during the planning.

Typical example is a new data production by RSMCs with activity specialization.

iii) WMO recommended practice (c), which is no or less impact to Members.

iii-1) These Members, who are willing to participate in the data production, review the amendments from the perspective of financial and operational impacts and the date of implementation as well as coding aspects.

iii-2) i-2) applies.

iii-3) "Fast-track" could apply.

iv) Voluntary production (d), which is no impact to Members in general.

iv-1) This data production fully depends on decision by Members and organizations.

iv-2) i-2) applies.

iv-3) "Fast-track" could apply.

***EXPANSION***: Future expansion or generalization of the data production or availability (+)

This factor is just to indicate **expectation** on the future expansion of data production and availability, such as from recommended practice to standard practice.

i) This is just for awareness by Members and should not be critical information.

ii) When the availability or responsibility is expanded, relevant regulations, framework or else, which rules the practice, will be revised.

***Supplementary information***: Optionally, the above factors could be supplemented by some additional information, such as a managing body and data production centres.

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**Examples** are below.

**Category 1a\_CBS**

Globally available/WMO general standard practice/managed by CBS; e.g. new land surface observation

**Category 1a\_JCOMM**

Globally available/WMO general standard practice/managed by JCOMM; e.g. new marine observation

**Category 1b\_CBS/RSMCs**

Globally available/WMO special standard practice/managed by CBS/produced by RSMCs

**Category 1d\_EUMETSAT**

Globally available/voluntary production/managed and produced by EUMETSAT

**Category 2c\_RA-II**

Available to Region II/WMO recommended practice/managed by RA-II and produced by RA-II Members.

**Category 2d\_ECMWF**

Available to Region VI/voluntary production/managed and produced by ECMWF; e.g. ECMWF product for all RA-VI Members

**Category 4d+\_DWD**

Available in Germany/voluntary production/managed and produced by DWD/expansion to availability or production expected

**Category CLR:** Clarification

Clarification is one of editorial corrections and is made mainly to wording to eliminate ambiguity, which is no impact in most cases to Members' systems and operations. It should be carefully reviewed if a clarification changes meanings.

**Category EDT:** Editorial corrections

Editorial corrections are made mainly for technical terms and typographic errors together with wording other than clarification. This should not have an impact to Members' systems and operations.

**2019-8.3(CM-III) Common Code tables C-1 and C-11[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_8_3)**

Amend "Code table 0 01 033 in BUFR Edition 3" to "Code table 0 01 033 in BUFR" editorially in the first page of section c. COMMON CODE TABLES TO BINARY AND ALPHANUMERIC CODES.

**9 IPET-CM AND TASK TEAMS**

None

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

**2019-10.2(CM-III) WMO Programmes needs for CF conventions[⮈](Report_IPET-CM-III_Marrakech_summary.docx" \l "S2019_10_2)**

**D20** IPET-DD agrees that :

* there is a need for netCDF in the WMO communities and Programmes because the format is widely used in the research community and to reduce the research to operation time it is a good strategy to use in operation and in research formats that are as close as possible.
* netCDF is not a good standard for interoperability purposes and that CF conventions are partially covering the lack of specific structure of netCDF.
* CF conventions are too wide to enforce full interoperability and to facilitate the operational activities, therefore in many Programmes there is the need for specific profiles that could be maintained by WMO
* defining WMO netCDF profiles can produce data representations that are in conflict with CF conventions and this is not in the interest of the communities and WMO, therefore it is important to coordinate WMO activities of development of specific netCDF profiles based on CF conventions that WMO works in close collaboration with CF community to avoid conflicting data representaions.

(Cited from <http://wiswiki.wmo.int/tiki-download_file.php?fileId=5445>).

[END OF ANNEX TO THE REPORT]

**[NEW PROPOSALS THROUGH PFC]**

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

**2018-P1(PFC-2) Amendment to Common Code table C-2 by Russian Federation [FT2019-1]** <[status](#STATUS_comm)>

**ADD:**

in Common Code table C-2,

15~~08~~/05/2019 19 119 ​  Polus-MRZ-N1 (Russian Federation)

**2018-P2(PFC-2) New entry in Common Code table C-8 by EUMETSAT   
[FT2019-1]** <[status](#STATUS_comm)>

**ADD:**

in Common Code table C-8

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

**2018-P3(PFC-2) New entries in Common Code table C-12 by Brazil   
[FT2019-1]** <[status](#STATUS_comm)>

**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)

**2018-P4(PFC-2) New entries in Common Code tables C-1, C-11 and C-12 by Brazil [FT2019-1]** <[status](#STATUS_comm)>

**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

**2018-P5(PFC-2) Additional parameters for waves products   
[FT2019-1]** <[status](#STATUS_grib)>

**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 |

**2018-P6(PFC-2) New code for atmosphere composition modelling [FT2019-1]** <[status](#STATUS_grib)>

**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 | Chlorine | | Cl2 |
| 47–9999 | Reserved | | |
| ... | ... |  | |
| 10024 | Methanesulphonic acid | CH3SO3H | |
| 10025 | Methylglyoxal (2-oxopropanal) | CH3C(O)CHO | |
| 10026 | Peroxyacetyl radical | CH3C(O)OO• | |
| 10027 | Methacrylic acid (2-methylprop-2-enoic acid) | CH2C(CH3)COOH | |
| 10028 | Methacrolein (2-methylprop-2-enal) | CH2C(CH3)CHO | |
| 10029 | Acetone (propan-2-one) | CH3C(O)CH3 | |
| 10030 | Ethyl dioxidanyl radical | CH3CH2OO• | |
| 10031 | Butadiene (buta-1,3-diene) | (CH2CH)2 | |
| 10032 | Acetaldehyde (ethanal) | CH3CHO | |
| 10033 | Glycolaldehyde (hydroxyethanal) | HOCH2CHO | |
| 10034 | Cresol (methylphenol), all isomers | CH3C6H4OH | |
| 10035 | Peracetic acid (ethaneperoxoic acid) | CH3C(O)OOH | |
| 10036 | 2-hydroxyethyl oxidanyl radical | HOCH2CH2O• | |
| 10037 | 2-hydroxyethyl dioxidanyl radical | HOCH2CH2OO• | |
| 10038 | Glyoxal (oxaldehyde) | OCHCHO | |
| 10039 | Isopropyl dioxidanyl radical | (CH3)2CHOO• | |
| 10040 | Isopropyl hydroperoxide (2-hydroperoxypropane) | (CH3)2CHOOH | |
| 10041 | Hydroxyacetone (1-hydroxypropan-2-one) | CH3C(O)CH2OH | |
| 10042 | Peroxyacetic acid (ethaneperoxoic acid) | CH3C(O)OOH | |
| 10043 | Methyl vinyl ketone (but-3-en-2-one) | CH3C(O)CHCH2 | |
| 10044 | Phenoxy radical | C6H5O• | |
| 10045 | Methyl radical | CH3• | |
| 10046 | Carbonyl sulphide (carbon oxide sulphide) | OCS | |
| 10047 | Dibromomethane | CH2Br2 | |
| 10048 | Methoxy radical | CH3O• | |
| 10049 | Tribromomethane | CHBr3 | |
| 10050 | Formyl radical (oxomethyl 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 (dimethyl sulfoxide) | (CH3)2SO | |
| 10502–20000 |  | | |
| 20022 | HCFC 141a (1,1-dichloro-2-fluoro-ethane) | CH3CClF2 | |
| 20023–29999 | Reserved | | |
| 30295 | Carbon-13 | C-13 | |
| 30296 | Lead | Pb | |
| 30297–39999 | Reserved | | |
| 40000 | Singlet sigma oxygen (dioxygen (sigma singlet)) | O2(1Σ+g) | |
| 40001 | Singlet delta oxygen (dioxygen (delta singlet)) | O2(1Δg) | |
| 40002 | Singlet excited oxygen atom | O(1D) | |
| 40003 | Triplet ground state oxygen atom | O(3P) | |
| 40004–59999 | Reserved | | |
| 60018 | Organic aldehydes | RCHO | |
| 60019 | Organic peroxides | ROOH | |
| 60020 | Organic nitrates | RNO3 | |
| 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 ketones | RC(OH)C(O)R’ | |
| 60027 | Oxides | Ox | |
| 60028–61999 | Reserved | | |
| 62028 | Total aerosol hydrophilic | | |
| 62029 | Total aerosol hydrophobic | | |
| 62030–62099 | Reserved | | |

**2018-P7(PFC-2) Additional parameters for ocean products [FT2019-1]** <[status](#STATUS_grib)>

**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 | Water density anomaly (sigma) (see Note) | kg m-3 |
| 18 | Water potential temperature (theta) | K |
| 19 | Water potential density (rho theta) | kg m-3 |
| 20 | Water potential density anomaly (sigma theta) (see Note) | kg m-3 |
| 21 | Practical salinity | psu (numeric) |

Note: Numbers 17 and 20 are deviations from the reference value of 1 000 kg m-3

**2018-P8(PFC-2) Amendment to Common Code table C-2 by Germany [FT2019-1]** <[status](#STATUS_comm)>

**ADD:**

in the Common Code table C-2,

15~~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 <[status](#STATUS_grib)>

**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**

**2018-2.2.1(CM-II)/Additional elements for optimal cloud analysis and instantaneous rain rate products [FT2018-2]** <[status](#STATUS_grib)>

*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]** <[status](#STATUS_grib)>

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]** <[status](#STATUS_grib)>](#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]** <[status](#STATUS_grib)>

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]** <[status](#STATUS_grib)>

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]** <[status](#STATUS_grib)>

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]** <[status](#STATUS_grib)>

***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]** <[status](#STATUS_grib)>

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).

**2016-2.2.8(DRMM-IV)/GRIB templates and tables entries to support specific issues of limited area models [FT2019-1]** <[status](#STATUS_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 |

**2014-2.2.2(DRMM-II)/A product definition template for statistics over an ensemble [Validation]** <[status](#STATUS_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.

**FM 94 BUFR/FM 95 CREX**

**2018-**[**2.4.2(CM-II)/New BUFR sequence for describing satellite observations compressed using principal component analysis [FT2018-2]** <[status](#STATUS_bufr)>](#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 01 130 | 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 01 131 | 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~~  3 04 039 | 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~~  3 04 040 | 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]** <[status](#STATUS_bufr)>

*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 | Potential processing and inputs errors | Flag table | 0 | 0 | 13 |
| 0-40-055 | Diagnostics on the retrieval | Flag table | 0 | 0 | 21 |
| 0-40-056 | General retrieval quality flag | Code table | 0 | 0 | 3 |
| 0-40-057 | IASI level 2 retrieval flags | Flag table | 0 | 0 | 31 |
| 0-40-058 | Number of vectors describing the characterization matrices | Numeric | 0 | 0 | 8 |
| 0-40-059 | Number of layers actually retrieved | Numeric | 0 | 0 | 8 |
| 0-40-060 | Number of profiles retrieved in scanline | Numeric | 0 | 0 | 8 |
| 0-40-061 | Air partial columns on each retrieved layer | mol/cm² | 3 | 0 | 16 |
| 0-40-062 | A-priori partial columns on each retrieved layer | mol/cm² | 10 | 0 | 16 |
| 0-40-063 | Scaling vector multiplying the a priori CO vector in order to define the retrieved CO vector | Numeric | 5 | 0 | 26 |
| 0-40-064 | Main eigenvalues of the sensitivity matrix | Numeric | 6 | 0 | 31 |
| 0-40-065 | Main eigenvectors of the sensitivity matrix | Numeric | 6 | -1000000000 | 31 |
| 0-40-066 | Quality indicator for atmospheric water vapour | Numeric | 1 | 0 | 8 |
| 0-40-067 | Quality indicator for atmospheric temperature | Numeric | 1 | 0 | 8 |
| 0 40 068 | General retrieval quality flag for SO2 | Code table | 0 | 0 | 4 |
| 0 40 069 | PWLR\* estimated retrieval error for surface air temperature | K | 4 | -1000000 | 21 |
| 0 40 070 | PWLR estimated retrieval error of surface dew point | K | 4 | -1000000 | 21 |
| 0 40 071 | Retrieval error covariance matrix for ozone in principal component domain | Numeric | 4 | -1000000 | 21 |
| 0 40 072 | PWLR estimated retrieval quality indicator of atmospheric ozone | Numeric | 1 | 0 | 8 |
| 0 40 073 | PWLR estimated retrieval error of surface skin temperature | K | 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:

0-40-054 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:

0-40-055 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:

0-40-056 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:

0-40-057 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 |

0 40 068 General retrieval quality flag for SO2

|  |  |
| --- | --- |
| ***Bit No.*** | ***Description*** |
| 0 | Values calculated with IASI L2 |
| 1 | Pressure and temperature profiles missing in IASI L2 data; model / forecast data used instead |
| 2 | Best quality |
| 3-14 | Reserved |
| 15 | Missing value |

**2018-**[**2.4.4(CM-II)/New BUFR sequence for snow water equivalent (SWE) [FT2018-2]** <[status](#STATUS_bufr)>](#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]** <[status](#STATUS_bufr)>

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]** <[status](#STATUS_bufr)>

**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]** <[status](#STATUS_bufr)>

**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]** <[status](#STATUS_bufr)>

**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]** <[status](#STATUS_bufr)>

**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]** <[status](#STATUS_bufr)>

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]** <[status](#STATUS_bufr)>

*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]** <[status](#STATUS_comm)>

*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]** <[status](#STATUS_comm)>](#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]** <[status](#STATUS_comm)>

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]** <[status](#STATUS_comm)>

**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 [FT2018-2]** <[status](#STATUS_comm)>

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-**[**3.1(CM-II)/Amendments to B/C Regulations for standard time [ABC2019]** <[status](#STATUS_bufr)>](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-**[**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]** <[status](#STATUS_comm)>

**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]** <[status](#STATUS_comm)>

**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)

**2017-2.4.5(CM-I)/New BUFR sequence for describing satellites contributing to an observed geophysical quantity [Validation]** <[status](#STATUS_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) |

**2017-2.5.4(CM-I)/Common Code table for master table version numbers of GRIB, BUFR and CREX [ABC2018]** <[status](#STATUS_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.

**2017-3.1.2(CM-I)/Regulations for reporting SHIP data in TDCF (B/C10) [ABC2018]** <[status](#STATUS_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]** <[status](#STATUS_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~~]** <[status](#STATUS_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 |