* **2017-2.2.1(CM-I)/New GRIB2 Code table 4.2 entries**

**Appendix**

**ADD:**

in GRIB2 Code table 4.2,

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

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

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

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

* **2017-2.2.2(CM-I)/New GRIB2 Code table 4.2 entry**

**ADD:**

in GRIB2 Code table 4.2,

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

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

* **2017-2.2.3(CM-I)/New GRIB2 Code table 4.2 entries**

**ADD:**

in GRIB2 Code table 4.2,

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

* **2017-2.4.1(CM-I)/New BUFR entries for GPM precipitation data**

**ADD:**

in BUFR Table D,

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

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

10 Standing water

11 Snow

**AMEND:**

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

 24 Convective precipitation

**ADD:**

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

 13 Precipitation

* **2017-2.4.2(CM-I)/New BUFR entries for radiosonde descent data**

**ADD:**

in Common Code table C-13,

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

 DATA CATEGORIES INTERNATIONAL DATA SUB-CATEGORIES

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

 other sub-category or undefined)

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

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

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

 than satellite) descent radiosondes originally launched from

 fixed-land stations

 15 Upper-level temperature/humidity/wind reports from

 descent radiosondes originally launched from ships

 16 Upper-level temperature/humidity/wind reports from

 descent radiosondes originally launched from

 mobile land stations

* **2017-2.4.3(CM-I)/New BUFR entries for FY-3 VASS Products**

**ADD:**

in Common Code table C-13,

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

DATA CATEGORIES INTERNATIONAL DATA SUB-CATEGORIES

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

 other sub-category or undefined)

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

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

 3 Vertical soundings 8 VASS (Vertical atmospheric sounding system)

 (satellite)

in Code table 0 13 040,

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

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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

**AMEND:**

the element names in BUFR/CREX Table B,

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

* **2014-3.2.9(DRMM-II)/Proposed BUFR sequence for reporting observations from offshore platforms**

**ADD:**

in BUFR/CREX Table B,

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

in BUFR Table D,

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

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

Code table 0 02 008,

0 02 008

Type of offshore platform

|  |  |
| --- | --- |
| Code figure | Meaning |
| 0 | Fixed platform |
| 1 | Mobile offshore drill ship |
| 2 | Jack-up rig |
| 3 | Semi-submersible platform |
| 4 | FPSO (floating production storage and offloading unit) |
| 5 | Light vessel |
| 6–14 | Reserved |
| 15 | Missing value  |

* **2013-3.2.4(DRMM-I)/**[**Satellite-derived winds in BUFR**](#A2013_3_2_4)

**ADD:**

in BUFR Table D,

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

in BUFR/CREX Table B,

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

in Code table 0 02 164,

 3 Stereo matching

in Code table 0 08 086,

 10 Level of best fit

in Code table 0 20 056,

 5 Supercooled liquid water

in Code table 0 20 012,

43 Clear

44 Liquid water

45 Supercooled liquid water

46 Mixed phase

47 Optically thick ice

48 Optically thin ice

49 Multilayered ice

Flag table 0 02 161,

0 02 161 - Wind processing method

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

Code table 0 02 162,

0 02 162 Extended height assignment method

|  |  |
| --- | --- |
| Code figure | DESCRIPTION |
| 0 | Auto editor |
| 1 | IRW height assignment |
| 2 | WV height assignment |
| 3 | H2O intercept height assignment |
| 4 | CO2 slicing height assignment |
| 5 | Low pixel max gradient |
| 6 | Higher pixel max gradient |
| 7 | Primary height assignment |
| 8 | Layer thickness assignment |
| 9 | Cumulative contribution function - 10 percent height |
| 10 | Cumulative contribution function - 50 percent height |
| 11 | Cumulative contribution function - 90 percent height |
| 12 | Cumulative contribution function - height of maximum gradient |
| 13 | IR/two WV channel rationing method |
| 14 | Composite height assignment |
| 15 | Optimal estimation |
| 16 | Inversion correction |
| 17 | Geometric height assignment |
| 18-62  | Reserved |
| 63 | Missing value |

Flag table 0 33 066,

0 33 066 - AMV quality flag

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

* **2017-2.5.1(CM-I)/New Common Code table C-12 entries for CIMSS**

**ADD:**

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

 20 Honolulu (United States)

 21 Gilmore Creek (United States)

 22 Madison (United States)

 23 Miami (United States)

 24 Mayaguez (Puerto Rico)

 25 Monterey (United States)

 26 Guam

 27 Corvallis (United States)

 28 Hampton (United States)

 29 New York City (United States)

* **2017-2.5.2(CM-I)/New Common Code table entries for Spire Global, Inc.**

**ADD:**

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

 178 Spire Global, Inc.

in Common Code table C-5,

 269 Spire Lemur 3U CubeSat

in Common Code table C-8,

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

* **2017-2.5.3(CM-I)/New entries in Common Code tables C-5 and C-8 by India**

**ADD:**

in Common Code table C-5,

 Code figure for Code figure for

 Code figure for BUFR GRIB

 I6I6I6 (Code table 0 01 007) Edition 2

 473 473 473 INSAT 3DR

 474 474 474 INSAT 3DS

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

in Common Code table C-8,

 Code Agency Type Instrument short name Instrument long name

 289 ISRO Optical imager IMG Imager

* **2017-2.5.5(CM-I)/New entries to Common Code table C-3/BUFR Table 0 22 067 for Argo floats**

**ADD:**

in Common Code table C-3,

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

 Instrument make and type Equation coefficients

 *a b*

 835 835 PROVOR IV Not applicable

 836 836 PROVOR III Not applicable

 870 870 HM2000 Not applicable

 871 871 COPEX Not applicable

 872 872 S2X Not applicable

* **2017-2.5.6(CM-I)/New Common Code table entries in C-5 and C-8 for FY-4A**

**ADD:**

in Common Code table C-5,

 530 FY-4A

in Common Code table C-8,

 Code Agency Type Instrument short name Instrument long name

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

 962 CMA Atmospheric temperature GIIRS Geosynchronous Interferometric Infrared Sounder

 and humidity sounder

 963 CMA High-resolution optical LMI Lightning Mapping Imager

 imager

 964 CMA Space environment SEP Space Environment Package

in BUFR/CREX Code table 0 02 020,

 383 FY-4

* **2017-2.5.7(CM-I)/New entry in Common Code table C-5 to include satellite identifier for Sentinel 3B**

**ADD:**

in Common Code table C-5,

Code figure

 65 Sentinel 3B