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| WORLD METEOROLOGICAL ORGANIZATION  COMMISSION FOR BASIC SYSTEMS  -----------------------------  THIRD MEETING OF  INTER-PROGRAMME EXPERT TEAM ON DATA REPRESENTATION MAINTENANCE AND MONITORING  BEIJING, CHINA, 20 - 24 JULY 2015 |  | IPET-DRMM-III / Doc.2.2(7)  (22.06.2015)  -------------------------    ITEM 2.2    ENGLISH ONLY |

**New parameters in GRIB2 Code Table 4.1 4.2 and 4.3 for satellite data and products**

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**Summary and Purpose of Document**

This document proposes some new table entries in GRIB2 Code Table 4.1, 4.2, and 4.3 for some satellite data and products.

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**ACTION PROPOSED**

The meeting is requested to review the proposed new entries and approve them for pre-operation.

# 1. Background

The Australian Bureau of Meteorology operationally generates many quantitative satellite products that are used in forecasting operations. Many of these products do not have corresponding grib table entries. While we could use local tables, some of the fields are intended to be exchanged internationally. Standardising them would promote international exchange. Until now, Product Discipline 3 has not been heavily used, although there are increasing needs for exchange and use of satellite data in GRIB-2. The proposed entries will provide some examples and guidance for data producers to follow.

# 2. Proposed table entries.

2.1 Code Table 4.1

|  |  |  |  |
| --- | --- | --- | --- |
| Product Discipline | Parameter Category | | Description |
| 3 | 2 |  | Cloud Properties |
| 3 | 3 |  | Flight Rules Conditions |
| 3 | 4 |  | Volcanic Ash |
| 3 | 5 |  | Sea Surface Temperature |
| 3 | 6 |  | Solar Radiation |

2.2 GRIB Code Table 4.2, Product Discipline 3

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  |  |  | | --- | --- | --- | --- | --- | | Product Discipline | Parameter Category | Parameter Number | Parameter | Units | |  |  |  |  |  | | 3 | 1 | 24 | bidirectional reflectance factor (Note 1) | numeric | | 3 | 1 | 25 | brightness temperature | K | | 3 | 1 | 26 | scaled radiance (Note 2) | numeric | |  |  |  |  |  | | 3 | 2 | 0 | clear sky probability | % | | 3 | 2 | 1 | cloud top temperature | K | | 3 | 2 | 2 | cloud top pressure | Pa | | 3 | 2 | 3 | cloud type | table | | 3 | 2 | 4 | cloud phase | table | | 3 | 2 | 5 | cloud optical depth | Numeric | | 3 | 2 | 6 | cloud particle effective radius | m | | 3 | 2 | 7 | cloud liquid water path | kg/m2 | | 3 | 2 | 8 | cloud ice water path | kg/m2 | | 3 | 2 | 9 | cloud albedo | Numeric | | 3 | 2 | 10 | cloud emissivity | Numeric | | 3 | 2 | 11 | effective absorption optical depth ratio | Numeric | |  |  |  |  |  | | 3 | 3 | 0 | Probability of encountering Marginal Visual Flight Rules conditions | % | | 3 | 3 | 1 | Probability of encountering Low Instrument Flight Rules conditions | % | | 3 | 3 | 2 | Probability of encountering Instrument Flight Rules conditions | % | |  |  |  |  |  | | 3 | 4 | 0 | volcanic ash probability | % | | 3 | 4 | 1 | volcanic ash cloud top temperature | K | | 3 | 4 | 2 | volcanic ash cloud top pressure | Pa | | 3 | 4 | 3 | volcanic ash cloud top height | m | | 3 | 4 | 4 | volcanic ash cloud emissivity | Numeric | | 3 | 4 | 5 | volcanic ash effective absorption optical depth ratio | Numeric | | 3 | 4 | 6 | volcanic ash cloud optical depth | Numeric | | 3 | 4 | 7 | volcanic ash column density | kg/m2 | | 3 | 4 | 8 | volcanic ash particle effective radius | m | |  |  |  |  |  | | 3 | 5 | 0 | interface sea surface temperature (Note 3) | K | | 3 | 5 | 1 | skin sea surface temperature (Note 4) | K | | 3 | 5 | 2 | sub-skin sea surface temperature (Note 5) | K | | 3 | 5 | 3 | foundation sea surface temperature (Note 6) | K | | 3 | 5 | 4 | estimated bias between sea surface temperature and standard | K | | 3 | 5 | 5 | estimated standard deviation between sea surface temperature and standard | K | |  |  |  |  |  | | 3 | 6 | 0 | global solar irradiance (Note 7) | W/m2 | | 3 | 6 | 1 | global solar exposure (Note 8) | J/m2 | | 3 | 6 | 2 | direct solar irradiance (Note 9) | W/m2 | | 3 | 6 | 3 | direct solar exposure (Note 10) | J/m2 | | 3 | 6 | 4 | diffuse solar irradiance (Note 11) | W/m2 | | 3 | 6 | 5 | diffuse solar exposure (Note 12) | J/m2 | |  |  |  | Units |
| Notes:   |  | | --- | | 1. The ratio of the radiant flux reflected by a surface to that reflected into the same reflected-beam geometry and wavelength range by an ideal (lossless) and diffuse (Lambertian) standard surface, irradiated under the same conditions. | |  | | 2. Top of atmosphere radiance observed by a sensor, multiplied by pi and divided by the in-band solar irradiance. | |  | | 3. Theoretical temperature at the precise air-sea interface | | 4. Temperature of the water across a very small depth (approximately the upper 20 micrometers) | | 5. Temperature at the base of the thermal skin layer | | 6. Temperature of the water column free of diurnal temperature variability or equal to the SSTsubskin in the absence of any diurnal signal | | 7. The solar flux per unit area received from a solid angle of 2π sr on a horizontal surface | | 8. Time integral of global solar irradiance | | 9. The solar flux per unit area received from the solid angle of the sun’s disc on a surface normal to the sun direction | | 10. Time integral of direct solar irradiance | | 11. The solar flux per unit area received from a solid angle of 2π sr, except for the solid angle of the sun's disc, on a horizontal surface | | 12. Time integral of diffuse solar irradiance |   2.3 GRIB Code Table 4.218 (Pixel Scene Type) |  |  |  |  |
|  |  |  |  | numeric |
| |  |  | | --- | --- | | Code Figure | Meaning | | 19 | Warm liquid water cloud | | 20 | Supercooled liquid water cloud | | 21 | Mixed phase cloud | | 22 | Optically thin ice cloud | | 23 | Optically thick ice cloud | | 24 | Multi-layered cloud |   2.4 GRIB Code Table 4.3   |  |  | | --- | --- | | Code Figure | Meaning | | 16 | Physical retrieval | | 17 | Regression analysis | |  |  |  | K |
|  |  |  |  | numeric |
|  |  |  |  |  |
|  |  |  |  | % |
|  |  |  |  | K |
|  |  |  |  | Pa |
|  |  |  |  | table |
|  |  |  |  | table |
|  |  |  |  | Numeric |
|  |  |  |  | m |
|  |  |  |  | kg/m2 |
|  |  |  |  | kg/m2 |
|  |  |  |  | Numeric |
|  |  |  |  | Numeric |
|  |  |  |  | Numeric |
|  |  |  |  |  |
|  |  |  |  | % |
|  |  |  |  | % |
|  |  |  |  | % |
|  |  |  |  |  |
|  |  |  |  | % |
|  |  |  |  | K |
|  |  |  |  | Pa |
|  |  |  |  | m |
|  |  |  |  | Numeric |
|  |  |  |  | Numeric |
|  |  |  |  | Numeric |
|  |  |  |  | kg/m2 |
|  |  |  |  | m |
|  |  |  |  |  |
|  |  |  |  | K |
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|  |  |  |  | J/m2 |
|  |  |  |  | W/m2 |
|  |  |  |  | J/m2 |
|  |  |  |  | W/m2 |
|  |  |  |  | J/m2 |