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| WORLD METEOROLOGICAL ORGANIZATION  COMMISSION FOR BASIC SYSTEMS  -----------------------------  SECOND MEETING OF  INTER-PROGRAMME EXPERT TEAM ON CODES MAINTENANCE  OFFENBACH, GERMANY, 28 MAY - 1 JUNE 2018 |  | IPET-CM-II / Doc. 2.4 (2)  06.04.2018  -------------------------  ITEM 2.4  ENGLISH ONLY |

BUFR

**New BUFR sequences for describing satellite observations compressed using principal component analysis**

*Submitted by* *Simon Elliott (EUMETSAT), Daniel Lee (EUMETSAT)*

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**Summary and Purpose of Document**

This document proposes new BUFR sequences and quality flags in order to precisely encode principal component scores computed from geostationary hyperspectral satellite observations.

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**ACTION PROPOSED**

The meeting is requested to approve the contents for inclusion within the next update to the WMO Manual on Codes.

**DISCUSSIONS**

Principal component scores (PCS) have been in use for many years in order to reduce the volume of data required to transmit satellite observations. This data reduction technique will become more important with the launch of next-generation satellites, including e.g. EUMETSAT’s planned hyperspectral sounders, the Infrared Sounder (IRS) and the Ultraviolet, Visible and Near-Infrared Sounding instrument (UVN) on board the geostationary Meteosat Third Generation Sounder (MTG-S), as well as various other instruments planned or already in orbit from other agencies. To this end, it is proposed to introduce a new sequence for encoding PCS observed with hyperspectral sounders which can be used for multiple geostationary hyperspectral sounding instruments.

It is proposed to add multiple sequences to the Manual on Codes which summarize various sections of the product in order to make it more straightforward to create similar products as needed, e.g. for PCS products produced using data from next-generation polar orbiting satellites. This template is intended for use in conjunction with additional, mission-specific data, e.g. mission-specific quality flags to be included for EUMETSAT’s IRS.

**PROPOSAL**

***“Amend”, “add”, “delete” are the keywords***

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

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

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

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

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

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

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

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

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE REFERENCE | TABLE REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
| 3 04 039 | 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 04 040 | 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 40 013 | 3 01 129 | Observing satellite and instruments |  |
|  | 3 01 130 | High precision timestamp |  |
|  | 3 01 131 | Pixel geolocation |  |
|  | 2 02 132 | 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 |  |