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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 (4)  16.05.2018  -------------------------  ITEM 2.4  ENGLISH ONLY |

MANUAL ON CODES: TABLE-DRIVEN CODE FORMS

FM 94 BUFR/FM 95 CREX

New BUFR sequence for Snow Water Equivalent (SWE)

*Submitted by Marijana Crepulja, Enrico Fucile and Patricia de Rosnay, all from (ECMWF)*

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**Summary and Purpose of Document**

New BUFR sequence and elements are proposed to support encoding of SWE measurement.

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**ACTION PROPOSED**

The team is asked to review and validate the proposal and accept it for FT2018-2.

**DISCUSSIONS**

The WMO GCW, Snow Watch Team has requested the development of a BUFR sequence for the exchange of snow observations including the snow water equivalent alongside the snow density and snow depth. The need is originated by the increasing number of stations in, e.g. in North America and in Germany, providing snow water equivalent, many of them together with snow density and/or snow depth. Snow water equivalent and snow density correspond to the model snow mass prognostic variables, so they are very relevant for assimilation in NWP systems. ECMWF has supported the Snow Watch Team in the development of the new sequence.

**PROPOSAL**

A new 3-07-103 sequence is proposed based on the existing 3-07-101 by adding the WIGOS Station Identifier and the required elements to report the Snow Water Equivalent.

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 Location (horizontal – 1)**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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 |

We report below the expanded 3-07-103 sequence for convenience and for validation purposes.

|  |  |  |  |
| --- | --- | --- | --- |
| TABLE  REFERENCE | | TABLE  REFERENCES | ELEMENT NAME |
| F X Y | |
| **3 07 103** | **3 01 150** |  | (WIGOS identifier) |
|  | 0 01 125 | WIGOS identifier series |
|  | 0 01 126 | WIGOS issuer of identifier |
|  | 0 01 127 | WIGOS issue number |
|  | 0 01 128 | WIGOS local identifier (character) |
| **3 07 101** |  | (Snow observation) |
|  | 3 01 089 | National station identification |
|  | 0 01 019 | Long station or site name |
|  | 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 |
|  | 0 07 032 | Height of sensor above local ground (or deck of marine  platform) |
|  | 0 12 101 | Temperature/air temperature |
|  | 0 07 032 | Height of sensor above local ground (or deck of marine  platform) |
|  | 0 02 177 | Method of snow depth measurement |
|  | 0 20 062 | State of the ground (with or without snow) |
|  | 0 13 013 | Total snow depth |
| 0 13 117 |  | Snow density (LIQUID WATER CONTENT) |
| 0 03 028 |  | Method of snow water equivalent measurement |
| 0 13 163 |  | Snow water equivalent |