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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 (5)  17.05.2018  -------------------------  ITEM 2.4  ENGLISH ONLY |

MANUAL ON CODES: TABLE-DRIVEN CODE FORMS

FM 94 BUFR/FM 95 CREX

Revision of BUFR sequence 3 09 056 – Sequence for representation of radiosonde descent data

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**Summary and Purpose of Document**

This document proposes a revised BUFR sequence for radiosonde descent data.

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**ACTION PROPOSED**

The meeting is requested to review and approve the contents for inclusion within the November 2018 fast-track (FT2018-2) update to the WMO Manual on Codes.

**ANNEXES:**

**DISCUSSIONS**

DWD and FMI exchange radiosonde descent data from Vaisala RS41 radiosondes via GTS since several months now. NWP users from European NMHSs (EUMETNET) compared the radiosonde descent data with radiosonde ascent data. First results are very promising with almost similar quality of descent data compared to corresponding ascent data (especially for wind measurements).

European NMHSs as well as NMHSs from other Regional Associations were involved in the discussion regarding the drafting of a new sequence for radiosonde descent data reporting and approved that the proposed sequence contains all relevant information. The questions raised during IPET-CM-I in July 2017 were discussed in the various groups and consensus was found regarding the following (see IPET-CM-I meeting summary for details regarding the particular questions):

1. Data Subcategory in section 1 is sufficient to distinguish descent data from ascent data.
2. The definition of 3 01 113 (date/time of launch) and 3 01 021 0 07 007 (lat/lon, height) should be clarified to make it clear that they are time and location of balloon burst.
3. It is not favoured to use a template containing a general format for simple drift data both for ascent and descent data. It is preferred to have two separated formats.
4. NWP users do not prefer one single pack of all the drift data both for ascent and descent from a radiosonde due to the high impact of delaying the radiosonde data significantly.
5. Quality information at each level might be beneficial for users but at present the variuos manufacturers do not report such quality information.
6. Traditional location identifier should be included in the template in addition to WIGOS identifier sequence as recommended by IPET-CM in their guidelines for the implementation of the new WIGOS Station Identification system issued in November 2017.

In addition, to meet the GRUAN requirements of an increase of the precision of pressure and geopotential hight in high-resolution radiosonde data, the new proposed sequence 3 03 056 is also used for the descent data. (See Doc. 2.4(x) “New sequence for representation of radiosonde observation data with higher precision of pressure and geopotential height”.)

**PROPOSAL**

1. **Revised BUFR Table D sequence 3 09 056:**

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|  |  | **(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 |  |
|  | 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 |  |
|  | 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 |  |

**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 |