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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(6)  17.05.2018  -------------------------  ITEM 2.4  ENGLISH ONLY |

MANUAL ON CODES: TABLE-DRIVEN CODE FORMS

FM 94 BUFR/FM 95 CREX

New sequence for representation of radiosonde observation data with higher precision of pressure and geopotential height

*Submitted by Dr Ruud Dirksen (Head of GRUAN lead centre), Sibylle Krebber (DWD)*

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**Summary and Purpose of Document**

This document proposes new BUFR sequences for higher precision of geopotential height and pressure in radiosonde 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**

Motivation for the proposed changes in the precision of the data fields pressure and GPH in the BUFR format:

The GCOS reference upper air network (GRUAN) was established to perform high-quality reference upper air observations of essential climate variables for the purpose of climate monitoring. Other applications of GRUAN data include numerical weather prediction and validation of satellite observations. GRUAN currently consists of 26 sites, distributed over various climate zones around the globe, where radiosonde observations form the backbone of GRUAN. GRUAN radiosonde data provide vertical profiles of in-situ measurements at the highest sampling rate that the sounding system supports.

As part of the service to the NWP community, several GRUAN sites are submitting high-resolution BUFR data to the GTS. With Vaisala's latest radiosounding system, MW41, it is possible to report measurement values at 1-second intervals. Among others, the radiosounding system at the DWD GRUAN site in Lindenberg is configured to produce BUFR data at this 1-second resolution.

With the radiosonde's typical ascent speed of 5 m/s, it is possible that under specific circumstances consecutive readings of the geopotential height (GPH) differ by less than 1 meter. With the current definition of BUFR, where GPH is represented by an integer, this means that some consecutive GPH values can be identical.

This is a potentially confusing situation, which can be remedied by representing GPH as a floating point number, with one significant digit after the decimal point, representing a resolution of 0.1 meter. For the same reason of preventing repeating pressure values for consecutive data points, it is proposed to report radiosonde pressure measurements in Pascal (Pa).

Therefore new sequences are proposed with higher precision of the geopotential height and pressure. In addition, the WIGOS identifier and “additional information on radiosonde data” are included in the new sequence.

**PROPOSAL**

**Add** new sequences 3 09 057 and 3 03 56 to Table D:

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| --- | --- | --- | --- |
| TABLE  REFERENCE | TABLE  REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
|  |  | (Sequence for representation of TEMP, TEMP SHIP and TEMP MOBIL observation type data with higher precision of pressure and geopotential height) |  |
| **3 09 057** | 3 01 150 | WIGOS identifier |  |
|  | 3 01 111 | Identification of launch site and instrumentation for P, T, U and wind measurements |  |
|  | 3 01 128 | Additional information on radiosonde ascent |  |
|  | 3 01 113 | Date/time of launch |  |
|  | 3 01 114 | Horizontal and vertical coordinates of launch site |  |
|  | 3 02 049 | Cloud information reported with vertical soundings |  |
|  | 0 22 043 | Sea/water temperature |  |
|  | 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 |  |

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| TABLE  REFERENCE | TABLE  REFERENCES | ELEMENT NAME | ELEMENT DESCRIPTION |
| F X Y |
|  |  |  |  |
|  |  | (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 |
|  | 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 (high accuracy) | Since launch site |
|  | 0 06 015 | Longitude displacement (high accuracy) | Since launch site |
|  | 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 |  |