VALIDATION REPORT

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

**and**

**BUFR sequence 3 09 057 – Sequence for representation of radiosonde observation data with higher precision of pressure and geopotential height**

IPET-CM-II / Doc. 2.4 (5)

IPET-CM-II / Doc. 2.4 (6)

**1. Responsible Organizations**

 Leading organization (if any): EUMETNET and DWD

 Participating organization(s): JMA, CPTEC/INPE

**2. Requirements and Purposes**

 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.

In addition a GRUAN requirements of an increase of the precision of pressure and geopotential hight in high-resolution radiosonde data was received.

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 were proposed with higher precision of the geopotential height and pressure.

This requirement was also implemented in the sequence of radiosonde descent data.

For the validation of both sequences (3 09 056 and 3 09 057) example messages were encoded with DWD software.

Both BUFR message could be decoded successfully by the decoder software from JMA and INPE.

**3. Description of Proposal**

 See Document 2.4 (5) and 2.4 (6) of IPET-CM II

**4. Declaration of Validation Complete**

 Proposal has been Validated.

 Participating organizations: JMA, INPE, DWD

 Proof documents: [x]  BUFR messages and outputs

**5. Proposed Implementation Date and Procedure**

 Implementation date: November 2018

 Applicable procedure: Fast-track

**6. Deviation from initial proposal**

Minor changes

**7. Remarks**

 One comment from Sergio Ferreira (INPE) was received regarding the precision of pressure: “However, I would like to comment about pressure values in the data example for higher precision of pressure and geopotential height. The variation of pressure is usually too small in comparison with geopotential height in the stratosphere region. So we can see many repeats of pressure of 820 Pa and 810 Pa for many different vertical levels in the data. I don't have many experiences with this kind of data, but it seems to me that the accuracy of pressure should be even higher to represent the variation of pressure in this case.”