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**EXPERT TEAM ON REQUIREMENTS FOR DATA FROM
AUTOMATIC WEATHER STATIONS**
Third Session

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Reporting both nominal and instrument values in BUFR Templates for Surface Observation Data, especially Data from Automatic Weather Stations

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Summary and Purpose of Document

The document contains a proposal for BUFR descriptors to support reporting of nominal values in BUFR templates for surface observation data, especially data from automatic weather stations.

ACTION PROPOSED

The meeting is invited to examine the proposal and to submit recommendations for consideration by CBS-XIII.

References:

1. Manual on GOS, WMO-No. 544
2. Manual on GDPS, WMO-No. 485
3. Manual on Codes, WMO-No. 306, Volumes I.2
4. CBS-Ext.(02), Abridged Final Report with Resolutions and Recommendations, WMO-No. 955
5. Final Report, ET AWS, Geneva, 2 - 6 September 2002.

I. Background

The CBS-Ext.(02) appreciated that the Expert Team on Data Representation and Codes had finalized BUFR templates for AWS data and noted with appreciation the work carried out by the Expert Team on Requirements for Data from Automatic Weather Stations in developing accompanying BUFR/CREX descriptors. It was also agreed that BUFR templates were suitable for the exchange of AWS data.

The Commission considered the recommendation of ET on AWS that BUFR/CREX template should support reporting of both instrument and nominal values.

Various WMO manuals and guides define Level I data (primary data or instrument readings) as well as Level II data (meteorological parameters, i.e. nominal values) and provide the appropriate recommendations concerning requirements for data reporting:

Level I data: Primary data. In general these are instrument readings expressed in appropriate physical units and referred to Earth coordinates. Level I data still require conversion to the meteorological parameters specified in the data requirements.

Level II data: Meteorological parameters. These are obtained directly from many kinds of simple instruments, or derived from the Level I data.

Data exchanged internationally are supposed to be Level II data. BUFR templates for AWS data should be capable of reporting both Level I and Level II data. Therefore the specific task was identified by the Commission to investigate the possibility of reporting both nominal and instrument values in BUFR/CREX.

If Level I data meet requirements for data reporting defined in WMO manuals and guides, no adjustment is needed and both Level I data and Level II data have identical values.

II. Proposal

1 Nominal value indicator

A new descriptor in the Class 8 is proposed as a nominal value indicator (Level II data indicator):

0 08 083 Nominal value indicator, Flag table, 0, 0, 15

Bit No.	
1	Adjusted with respect to representative height of sensor above local ground (or deck of marine platform)
2	Adjusted with respect to representative height of sensor above water surface
3	Adjusted with respect to standard surface roughness
4	Adjusted with respect to wind speed
5	Adjusted with respect to temperature
6	Adjusted with respect to pressure
7	Adjusted with respect to humidity
8	Adjusted with respect to evaporation
9	Adjusted with respect to wetting losses
10 -14	Reserved
All 15	Missing value

Note: The term correction is not suitable to use as all measured values are corrected first (e.g. calibration correction, etc.).

The above proposed descriptor will allow reporting of Level II data (meteorological parameters, i.e. nominal values) in addition to Level I data (instrument values) in BUFR templates for surface observation data, especially for data from automatic weather stations.

In some cases, the WMO recommendations require adjustment of Level I data with respect to more than one aspect. The descriptor 0 08 083 will allow to indicate whether the instrument value has been adjusted with respect to all required aspects or only with respect to some of them or not at all.

Exhaustive validation of this descriptor, as well as a way of unambiguous reporting of Level II data, would be desirable. It is also to be considered that insertion of nominal values will increase volume of the data substantially.

Representation of nominal values using the nominal value indicator 0 08 083 in BUFR templates can be realized in several ways. One of the possibilities requires introducing two new descriptors: one for a representative height of a sensor above local ground (or deck of marine platform) and one for a representative height of a sensor above water surface, as described below.

2 Representative height of a sensor above local ground (or deck of marine platform)

In BUFR templates, some meteorological elements are preceded by the descriptor 0 07 032 to indicate the actual height above local ground (or deck of marine platform) at which the element is measured. Nominal values of these elements are proposed to be preceded by a descriptor from Class 7 which would indicate the standard (representative) height of the sensor above local ground (or deck of marine platform) required by WMO documentation. If bit No.1 of 0 08 083 (nominal value indicator) is set to 1, the following value of the meteorological element is adjusted (recalculated) to this standard (representative) height of the sensor above local ground (or deck of marine platform).

The standard (representative) height of a sensor above local ground is (or will be) defined in the WMO documentation, e.g. the standard height for wind sensor is 10 m.

Therefore, a new descriptor in Class 7 is proposed:

F X Y	Element name	BUFR				CREX		
0 07 065	Representative height of a sensor above local ground (or deck of marine platform)	m	2	0	16	m	2	5

with a note:

The representative height of a sensor above local ground (or deck of marine platform) is the standard height of the sensor required by WMO documentation. A value of the following meteorological element should be adjusted using a formula (or a recommended procedure for obtaining nominal values). For example, a standard height recommended in WMO documentation for a surface wind sensor is 10 m. If the sensor is placed at the different height, the wind speed should be adjusted using a formula (or a recommended procedure for obtaining nominal values).

3 Representative height of a sensor above water surface

In BUFR templates, some meteorological elements are preceded by the descriptor 0 07 033 to indicate the actual height above water surface at which the element is measured. Nominal values of these elements are proposed to be preceded by a descriptor from Class 7 which would indicate the standard height of the sensor above water surface required by WMO documentation. If bit No. 2 of 0 08 083 (nominal value indicator) is set to 1, the following value of the meteorological element shall be recalculated (adjusted) to this standard height of the sensor above water surface.

Therefore, a new descriptor in Class 7 is proposed:

F X Y	Element name	BUFR				CREX		
0 07 066	Representative height of a sensor above water surface	m	1	0	12	m	1	4

with a note:

The representative height of a sensor above water surface is the standard height of the sensor required by WMO documentation. A value of the following meteorological element should be adjusted using a formula (or a recommended procedure for obtaining nominal values).

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