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| WORLD METEOROLOGICAL ORGANIZATION  COMMISSION FOR BASIC SYSTEMS  -----------------------------  SECOND MEETING OF  INTER-PROGRAMME EXPERT TEAM ON DATA REPRESENTATION MAINTENANCE AND MONITORING  COLLEGE PARK, USA, 28 APRIL - 2 MAY 2014 |  | IPET-DRMM-II / Doc. 3.1 (4)  (21. 4. 2014)  -------------------------  ITEM 3.1  ENGLISH ONLY |

BUFR & CREX

**Reporting of Zero Snow Depth**

*Submitted by Richard Weedon & Dr Samantha Pullen (UK Metoffice)*

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**Summary and Purpose of Document**

Propose Changes to regulations for reporting of Snow Depth

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**ACTION PROPOSED**

The meeting is requested to consider the changes and if in agreement

to amend the regulations accordingly.

**References:**

1. Manual on Codes Volume II - Regional Codes and National Coding Practices
2. B/C1 – Regulations for reporting SYNOP data in TDCF

**Annexe:**

1. B/C 1.8 State of Ground, Snow Depth, Ground minimum temperature <3 02 037>
2. Manual on Codes - International Codes - Volume I.1 ,FM 12 SYNOP, FM 13 SHIP, FM 14 SYNOP MOBIL, 12.4.6 *Group* (4E´sss)
3. Regional Reporting Practices – Manual on Codes Volume II

**DISCUSSIONS**

Ground based observations of snow are very important for monitoring, model validation, validation of satellite-derived data, and increasingly for assimilation into Numerical Weather Prediction (NWP) models. Snow depth reports from SYNOP stations are currently assimilated by several NWP centres, and preparations are underway to develop similar snow depth assimilation capabilities at the Met Office. However, the current reporting practice, for which regional guidelines exist, results in an inconsistent approach to the reporting of zero snow depths. Snow depth is generally only reported when snow is present (i.e. positive reports of zero snow are not made), with missing data recorded for snow depth in snow-free conditions. This leads to an ambiguity for data users as it cannot be known whether this missing data indicates “no snow” or a technical problem at the station, for instance an instrument failure or system outage. This “missing data” must therefore be discarded, though the majority of it could potentially contain valid positive reports of zero snow.

In NWP, a good representation of the snow extent (i.e. positioning of snow-covered and snow-free areas) is of great importance because of the huge effect that snow cover has on the surface albedo. Therefore, for assimilation purposes, reports of zero snow are as important as non-zero snow depth reports as they enable better analysis of snowy and snow-free area. If snow depth reports are not made when no snow is present, no observational information can be presented to the assimilation system, leading to asymmetry in the assimilation and loss of a huge amount of information.

There is the option at many stations of recording “state of ground” which includes codes that indicate whether the ground is snow-covered or not, and reports are sometimes submitted indicating snow-free conditions. However, these reports are not made systematically, but are very variable in space and time when snow is not present. They are also only available for manned stations and, like those for snow depth, regional guidelines again indicate the need to report only in the presence of snow.

The issue of non-reporting of zero snow depths is gaining recognition in the international community, and is specifically included in the Global Cryosphere Watch (GCW) Snow Watch initiative. We would like to propose the adoption of systematic reporting of snow depth in all situations (snowy and snow-free), along with reports of state of ground wherever station setup allows. This would provide the data user community with a huge amount of valuable additional data, providing positive observations of snow-free conditions, and remove the existing asymmetry resulting from the use of station snow depths for validation and assimilation purposes.

**PROPOSAL**

The status of the manual on codes (WMO-306) after the completion of the transition to Table Driven Codes, is currently unknown, it is hoped however that producers of SYNOP data will adhere to the B/C Regulations which in the case of SYNOP requires compliance with B/C 1.

The B/C regulations have been constructed to provide a link between the reporting practices for TAC data given in WMO Vol I.1 and Vol II and those for FM 94 BUFR given in Volume I.2.

Regulations for the reporting of the State of Ground and Snow depth within TAC, are given in *Volume II Regional Codes and National Reporting Practices* and such vary from region to region.

The equivalent B/C regulations (B/C 1.8.xx see annexe) reflect this variance by deferring the reporting of Snow to regional practices.

As a result of this approach , the reporting of snow depth is not mandated in all circumstances.

Changes are needed within the current regulations to ensure that all practices require the reporting of Snow Depth on a regular basis regardless of the state of ground. This will entail the reporting of Zero snow depth when the state of ground indicates that there is no snow present.

Changes to code table 3889 (Total Depth of Snow) will be also be needed as outlined below to allow for the reporting of Zero Cover.

**Code Table 3889**

|  |  |  |  |
| --- | --- | --- | --- |
| **Code**  **figure** |  | **sss *Total depth of snow*** | **Changes proposed** |
| 000 |  | Not used | 0 cm |
| 001 |  | 1 cm | 1 cm |
| .  .  .  . |  | .  .  .  . | .  .  .  . |
| 996 |  | 996 cm | 996 cm |
| 997 |  | Less than 0.5 cm | Less than 0.5 cm |
| 998 |  | Snow cover, not continuous | Snow cover, not continuous |
| 999 |  | Measurement impossible or inaccurate | Measurement impossible or inaccurate |
| Note: See Regulations 12.4.6.1 and 12.4.6.2. | | | |

**Annexe**

**B/C 1.8 State of Ground, Snow Depth, Ground minimum temperature <3 02 037>**

**B/C 1.8.1 State of ground** (with or without snow) - Code table 0 20 062.

State of ground without snow or with snow shall be reported using Code table 0 20 062. The synoptic hour at which this datum is reported shall be determined by ***regional decision.***

**B/C 1.8.2 Total snow depth**

Total snow depth (0 13 013) shall be reported in meters (with precision in hundredths of a meter). The synoptic hour at which this datum is reported shall be determined by ***regional decision.***

**B/C 1.8.2.1**

When total snow depth has to be reported, it is reported as 0.00 m if no snow, ice and other forms of solid precipitation on the ground are observed at the time of observation. A snow depth value of “– 0.01 m” shall indicate a little (less than 0.005 m) snow. A snow depth value of “– 0.02 m” shall indicate “snow cover not continuous”.

**B/C 1.8.2.2**

The measurement shall include snow, ice and all other forms of solid precipitation on theground at the time of observation. [12.4.6.1]

**B/C 1.8.2.3**

When the depth is not uniform, the average depth over a representative area shall be reported. [12.4.6.2]

**Manual on Codes - International Codes - Volume I.1**

**FM 12 SYNOP, FM 13 SHIP, FM 14 SYNOP MOBIL**

**12.4.6 *Group* (4E´sss)**

**12.4.6.1** The measurement shall include snow, ice and all other forms of solid precipitation on

the ground at the time of observation.

**12.4.6.2** When the depth is not uniform, the average depth over a representative area shall be

reported

**Regional Reporting Practices – Manual on Codes Volume II**

**Region I**

1/12.9.2 Group (4E´sss) — Snow-depth data shall be reported by all stations capable of doing so, and

included at least once daily at either 0600 or 1200 UTC

**Region II**

2/12.10 *Group* (4E´sss)

**2/12.10.1 This group shall be included in the synoptic report only if there is ground snow or ice cover.**

2/12.10.2 The group 4E´sss shall be included at least once daily, preferably at 0000 UTC (the morning

observation time over most of Region II).

2/12.10.3 Code table 0975 shall be used for coding the indicator (E´) of the presence and state of snow

or ice cover. E´ shall be transmitted by all stations where such observations are carried out.

2/12.10.4 The snow depth or the thickness of ice cover shall be reported in sss, in accordance with Code

table 3889.

**Region III**

3/12.8 *Group* (4E´sss)

3/12.8.1 This group shall be made available for regional exchange. Where appropriate, the selection of

stations for the inclusion of sss shall be decided nationally.

**N o t e : This group is included only if ice and/or snow data are available.**

3/12.8.2 This group shall be included at least once daily, preferably at 1200 UTC, if possible.

3/12.8.3 If the ground is covered by hail, this group shall be included in the next report.

**Region IV**

4/12.8 *Group* (4E´sss)

This group shall be reported by all stations capable of doing so, and included at least once

daily at either 0600 or 1200 UTC.

**Region V**

5/12.8 *Group* (4E´sss)

This group shall be included by all stations capable of doing so at least once daily at either 0000

or 1800 UTC, whenever data are available.

**Region VI**

6/12.7 *Group* (4E´sss)

**6/12.7.1 This group shall be included only if snow or ice cover is observed on the ground.**

6/12.7.2 G roup 4E´sss shall be transmitted at least once daily, preferably at 0600 UTC (the morning observation

time over most of Region VI). Members of the Region are also recommended to include this group at

1800 UTC.

6/12.7.3 Code table 0975 shall be used to code the indicator (E´) of the presence and state of snow or ice cover. E´ shall be transmitted by all stations making these observations.

6/12.7.4 The snow depth or the thickness of ice cover shall be reported for sss. Where appropriate, a selection of stations for the inclusion of sss shall be decided nationally.

**Antartic**

7/12.7.1 Snow-depth data shall be reported by all stations capable of doing so, and included at least

once daily at either 0600 or 1800 UTC.

N o t e : When appropriate, the relevant special phenomena groups for time at which precipitation

given by RRR began or ended and depth of the snow freshly fallen since the last

0000 UTC observation shall be reported in lieu of the group 4E´sss.