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Organisation météorologique mondiale
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Всемирная метеорологическая организация
المنظمة العالمية للأرصاد الجوية
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Annex: 1

Subject: Trial phase for the monthly reporting of daily climate data

Dear Sir/Madam,

I am pleased to inform you that the necessary arrangements have been made for a one-year trial phase, on a voluntary basis, for the monthly reporting of daily climate data as per BUFR template 3 07 074 in addition to the traditional CLIMAT report (FM-71 CLIMAT and FM-94 BUFR with template 3 07 071) which contains monthly climate data. The international exchange of BUFR template 3 07 074 – Supplemental daily temperature and precipitation values, via the WMO Information System (WIS)/Global Telecommunication System (GTS), is scheduled to start on 1 February 2019 for data observed in January 2019, following the same schedule as for the traditional CLIMAT report.

Relevant background information, including justification, constituent body decisions and technical details, is summarized in the Annex.

Given the strong need for the international exchange of daily climate data, I kindly encourage you to participate in the above-mentioned trial phase as per Recommendation 5 (CCI-17) – Trial phase for the international exchange of daily climate observations, of the seventeenth session of the WMO Commission for Climatology, endorsed by the seventieth session of the Executive Council (Resolution 5 (EC-70)), in order to allow for a thorough testing with a view to implementing the operational reporting of daily climate data in the future.

I take this opportunity to thank you for your continued support to WMO Programmes and activities.

Yours faithfully,

(P. Taalas)
Secretary-General

To: Permanent Representatives (or Directors of Meteorological or Hydrometeorological Services) of Members of WMO

Ref.: 20824/2018-19 CLW/DMA

Reporting of daily climate data

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Background, history and reasoning for the reporting of daily climate observations

The development of the principal measure of the state of the climate – the global temperature record – has extensively depended on monthly CLIMAT data provided by National Meteorological and Hydrological Services (NMHSs). Over the last 20 years, there has been a growing demand for indices and measures of the climate that also consider extremes (Jones et al., 2012). For many extreme measures, monthly data are insufficient and there is a need for operationally exchanged daily climate data. This need is not just for timeliness, but principally for data that is compatible with long historical daily series developed and made available by NMHSs.

Attempts have been made to use SYNOP data for this purpose (e.g. by the European Climate Assessment and Dataset (ECA&D)) but there are serious issues of incompatibility of SYNOP data with traditional methods of climate measurement within NMHSs (see van den Besselaar et al., 2012). Daily summaries in SYNOP messages are based on measurements that occur between synoptic reporting times and often over a period of less than 24 hours. For instance, in Europe, minimum temperatures are recorded usually over the 18 to 06 UTC 12-hour period and maximum temperatures during the 06 to 18 UTC 12-hour period. Measured in this way, the true daily minimum and maximum temperatures may not be reported because they may have occurred outside those particular 12-hour periods. As a result, SYNOP reports have been shown to significantly underestimate extremes: minimum temperatures measured in this way may be higher than the true daily minimum temperature, and maximum temperatures reported may be lower than the true daily maximum temperature reported as 24-hour climate observation. Similar problems occur for precipitation. In other regions of the world, SYNOP reporting practices can differ but problems remain.

The Commission for Basic Systems (CBS) Open Programme Area Group on Integrated Observing Systems (OPAG-IOS), Implementation/Coordination Team on Integrated Observing Systems (ICT-IOS), recommended in 2012 that daily climate observations be included in monthly CLIMAT reports as a means of addressing the gap in the quality of daily climate observations. The U.S. National Oceanic and Atmospheric Administration (NOAA) National Centers for Environmental Information (NCEI), in cooperation with WMO Inter-programme Expert Team on Data Representation Maintenance and Monitoring (IPET-DRMM) and NOAA National Centers for Environmental Prediction (NCEP), developed a BUFR template for transmission of daily climate observations in BUFR format. This template was approved by CBS for implementation in May 2015. It was subsequently tested in the United States, with the cooperation of the UK Met Office. A one-year trial phase for the monthly reporting of daily climate observations was accepted by delegates to the seventeenth session of the Commission for Climatology in April 2018 (see Recommendation 5 (CCI-17)).

Reporting daily climate observations: Technical solution

NOAA/NCEI, in cooperation with IPET-DRMM (taken over by the Inter-programme Expert Team on Codes Maintenance (IPET-CM) in 2016) and NOAA/NCEP, developed a BUFR template, 3 07 074 – Supplemental daily temperature and precipitation values, for daily climate observations in BUFR format, for monthly reporting. **Please note that this does not replace the existing CLIMAT BUFR templates but offers complementary reporting of daily observations once per month.**

BUFR template 3 07 074 enables NMHSs to provide 31 daily observations consistent with national climate databases for the following elements:

- Time of observation for temperature
- Daily maximum temperature
- Daily minimum temperature
- Daily mean temperature (if it differs from $(T_{max}+T_{min})/2$)
- Time of observation for precipitation
- Total daily precipitation
- Depth of new snowfall
- Depth of total snow on the ground

Each of these observations should be recorded at the observing time consistent with the climate reporting practices of the NMHS and should reflect conditions over the previous 24-hour period. The climate convention varies from country to country; each country should retain its traditional observing practice in reporting daily climate summaries. For example, while in the U.S. the reporting time is local midnight, in Australia it is 9 a.m. local, and in Canada it is 06 UTC. These observations can be efficiently provided via daily CLIMAT reports or other methods specifically designed for climate purposes.

It is suggested, for the trial phase, to report daily climate data from those observing stations that prepare the traditional CLIMAT report.

The following sub-sections summarize relevant procedures.

I. Encoding in FM 94 BUFR

(a) The BUFR template 3 07 074 (section 3) for daily climate data is defined in the BUFR Table D as follows.

3 07 074 – Supplemental daily temperature and precipitation values for monthly climate report

3 01 001	WMO block and station numbers	
0 04 001	Year	
0 04 002	Month	
3 01 021	Latitude/longitude (high accuracy)	
0 07 030	Height of station ground above mean sea level	
0 07 032	Height of sensor above local ground (or deck of marine platform)	
1 12 000	Delayed replication of 12 descriptors	
0 31 001	Delayed descriptor replication factor	Set to the number of days in the particular month for which data are being reported
0 04 003	Day	
0 04 004	Hour	
0 04 024	Time period or displacement	Typically set to -24 to denote the time to period beginning 24 hours prior to and ending at the specified time
1 02 003	Replicate 2 descriptors 3 times	

0 08 023	First-order statistics	= 2 Daily maximum temperature, = 3 Daily minimum temperature, = 4 Daily average temperature
0 12 101	Temperature/air temperature	
0 08 023	First-order statistics	Set to missing (cancel)
0 04 004	Hour	
0 04 024	Time period or displacement	
0 13 060	Total accumulated precipitation	
0 13 012	Depth of fresh snow	
0 13 013	Total snow depth	

(b) Data category and sub-category (section 1) shall be specified.

Octet No. 11: Data category **000** = surface data – land

Octet No. 12: An international data sub-category for daily climate data will be adopted and Members will be notified through the World Weather Watch Operational Newsletter well in advance of the trial phase.

II. Global Telecommunication System abbreviated heading

A Global Telecommunication System (GTS) heading (T₁T₂A₁A₂ii) for daily climate data will be adopted and Members will be notified through the World Weather Watch Operational Newsletter well in advance of the trial phase.

A₂ will be a geographic designator indicating the area where the observing station is located.

Instructions for the proper application of the geographical area designator

- (a) The designators specified in the following table should be used to the greatest extent possible to indicate the geographical area of the data contained within (the text of) the bulletin.
- (b) Where the geographical area of the data does not correspond exactly to the designator, the designator for the area closest to that of the data may be used.
- (c) If the table does not contain a suitable designator for the geographical area, an alphabetic designator which is not assigned in the table should be introduced and the WMO Secretariat should be notified.

<i>Designator</i>	<i>Geographical area</i>		<i>Designator</i>	<i>Geographical area</i>	
A	0° – 90°W	northern hemisphere	I	0° – 90°W	southern hemisphere
B	90°W – 180°	northern hemisphere	J	90°W – 180°	southern hemisphere
C	180° – 90°E	northern hemisphere	K	180° – 90°E	southern hemisphere
D	90°E – 0°	northern hemisphere	L	90°E – 0°	southern hemisphere
E	0° – 90°W	tropical belt	N	Northern hemisphere	
F	90°W – 180°	tropical belt	S	Southern hemisphere	
G	180° – 90°E	tropical belt	T	45°W – 180°	northern hemisphere
H	90°E – 0°	tropical belt	X	Global area (area not definable)	

III. The international exchange of daily climate data in practice

(a) Notification to the WMO Secretariat

In accordance with the regulations on the responsibility of World Meteorological Centres (WMCs) and Regional Telecommunication Hubs (RTHs) (see the *Manual on the Global Telecommunication System* (WMO-No. 386), Part I, 2.1 (h), and Part II, 5.1) NMHSs make arrangements within their organization and consult with their responsible RTH, which shall notify the WMO Secretariat of the change to *Weather Reporting* (WMO-No. 9), Volume C1, at least two months in advance of the effective date of the change.

NMHSs update and make their WMO Information System (WIS) discovery metadata available to their responsible WIS centre (see the *Technical Regulations* (WMO-No. 49), Volume I, Part II, 1.2.8).

(b) METNO message

The WMO Secretariat will issue a METNO message (see the *Manual on the Global Telecommunication System* (WMO-No. 386), Part II, 5.2) to notify other NMHSs of the change.

References

Jones, P.D., Lister, D.H., Osborn, T.J., Harpham, C., Salmon, M., Morice, C.P., 2012: Hemispheric and large-scale land-surface air temperature variations: An extensive revision and an update to 2010. *Journal of Geophysical Research*, 117, D05127, doi:10.1029/2011JD017139.

Van den Besselaar, E.J.M., Klein Tank, A.M.G, van der Schrier, G. and Jones, P.D., 2012: Synoptic messages to extend climate data records. *Journal of Geophysical Research*, 117, D07101, doi:10.1029/2011JD1688.
