Activities of CBS Lead Centre for GCOS for the WMO RA VI in the year 2022

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1. Evaluation of availability, completeness and correctness of CLIMAT reports

On a routine basis, DWD applies a near real-time quality control regarding availability and correctness of CLIMAT reports. This refers to all CLIMAT stations worldwide included in the GCOS Surface Network (GSN), the former Regional Basic Climatological Network (RBCN) and the former Antarctic Observing Network (AntON). A transition of these deprecated networks to RBON has not yet been performed for the GCOS monitoring, because decisions regarding the registering of CLIMAT reporting stations are still pending.

The automatic quality control includes checks regarding the formal compliance of the messages. TAC format is checked as well as BUFR format, if TAC is not available. The results of the quality control are the basis for various monitoring products. Furthermore DWD checks the associated metadata and the quality of the observed geophysical parameters.

The Lead Centre continued to increase the availability of CLIMAT data:

- by ingesting CLIMAT reports into the GTS received via e-mail from NMHS that are not or not well connected,
- by pointing NMHS to missing CLIMAT reports in the course of a month,
- by informing in case of receiving an incorrect month,
- by informing about severe errors in the reports,
- by distributing the monthly monitoring results to the CBS Lead Centres and the GCOS Network Manager. They contain information about missing GSN stations and format problems of CLIMAT reports received by the 20th of a month. DWD informed the concerned NMHS directly by addressing the respective National Focal Points (NFP). Alternatively, the relevant CBS Lead Centre is approached with the request to contact the NMHS in charge.

Most errors belonged to the following categories:

- no or incorrect month-year indicator (TAC and BUFR),
- other errors in section 0 (incorrect spelling of code name CLIMAT, other invalid characters) (TAC),
- invalid text/characters within the other sections (TAC),
- format errors (e.g. too short/too long groups, usage of “-“ for negative temperature values), blanks within groups (TAC),
- content errors (e.g. extreme temperature values instead of mean values, incorrect numeric scales) (TAC and BUFR),
- binary code errors (BUFR),

- correct month-year indicator, but data from a different month (mostly TAC).

The NMHS of approx. 60 countries were contacted in 2022 with the request to send or rectify their CLIMAT reports. For RA VI the respective NHMS was contacted directly. For a NHMS associated with a different RA, contact was established via the responsible CBS LC. If this attempt was not successful, the NHMS was contacted directly by DWD.

1.1. Availability and correctness of GSN Stations in the RA VI

The GSN stations list of 2022 included 139 stations in RA VI. The annual average of received stations was 89 %.

Silent GSN stations in RA VI are:

Iceland:	04048 Vestmannaeyjar reported up to April 2013. Its current status in OSCAR/Surface is closed.
Macedonia:	13577 Lazaropole since January 2014
Albania:	13615 Tirana since September 2010
Croatia:	14236 Zagreb since March 2020. Observations continued quickly after an earthquake, but there are issues with the homogeneity of the time series. DHMZ is working on this.
Cyprus:	17600 Paphos
Russian Fed.:	26359 Puskinskiy Gory since August 2018
	34927 Krasnodar-Kruglik since July 2017
Azerbaijan:	37989 Astara since October 2020
Syria:	40001 Kamishli since October 2012
	40022 Latakia since November 2013
	40061 Palmyra since November 2013
Jordan:	40250 H-4 Rwashed since March 2020. Traditional weather station was closed in June 2018, since then AWS, also closed now. Efforts to reopen the AWS. In the GSNMC monitoring product “CLIMAT Availability” the station was shown as received, but the contents of the messages were “NIL”.

After establishing contact with IPMA the Portuguese station 08506 (Horta/Acores) restarted disseminating CLIMAT messages in July 2022 after 14 years of silence. Also station 08181 (Barcelona/Spain), which had been silent since Oct 2015, reported CLIMAT in 2022.

1.2. Availability of CLIMAT stations in BUFR

In 2022 there were still some countries which didn’t provide CLIMAT reports in BUFR format. Most of the RA VI countries provide BUFR as well as TAC. By the end of 2022 nine NMHS disseminate CLIMAT reports solely in BUFR format.

1.3. Comparison of the receipt of GSN stations at JMA/DWD and NCEI

JMA, NCEI and DWD continued evaluating the receipt status of GSN stations. This fulfilment of an action item from the 2016 GCOS Lead Centres Meeting bases on JMA's monthly GSN differ lists. They include GSN stations, which were only received by either DWD or JMA and those, which were missing by both.

The category of not received stations comprises also GSN stations reporting with an incorrect or missing month-year indicator. Other format errors prohibiting a correct automatic storage of the CLIMAT report are included as well as CLIMAT messages consisting of only "NIL".

1.4. Comparison of CLIMAT in TAC and BUFR

The LC was not able to perform the TAC/BUFR comparisons in 2022 due to temporarily limited staff resources. Knowing that there are still differences between messages, we hope to continue the comparison in 2023.

2. Availability of GUAN Stations

The number of GUAN stations in RA VI remained at 24. The basis for the following information are the GUAN summaries from NCEP (https://www1.ncdc.noaa.gov/pub/data/gcos/). With an update of the Integrated Global Radiosonde Archive (IGRA) in February 2023 the radiosonde reports back to 2014 have been augmented with BUFR data. This also applies to the GUAN summaries now. The WMO WDQMS monitoring (https://wdqms.wmo.int/gcos/land_upper-air) shows only the availability of observations in BUFR format.

The yearly totals mostly reached from approx. 700 to 1000 observations per station. More soundings (ca. 1400) were reported by station 10393 Lindenberg (Germany). Most stations provide upper air observations in TAC and BUFR format. Station 08001 Coruna (Spain) started to disseminate BUFR data in September 2022. From station 17130 Ankara (Turkey) very few BUFR reports were available. This is also true for station 37789 Yerevan (Armenia) which terminated data dissemination in June. Upper air observations from station 33345 Kiev (Ukraine) ceased in February 2022.

The NCEP GUAN summaries showed that most stations performed soundings at 00 and 12 UTC. Nearly all soundings reached 10 hPa and above.

3. GSN Monitoring Products

The redesigned GSNMC website www.gsnmc.dwd.de (published in March 2020) shows – besides the GSN – also the CLIMAT stations of the RBCN and AntON. Both networks were migrated to the WIGOS Regional Basic Observing Network (RBON) in June 2022 and are therefore deprecated now. The GSN monitoring has not yet been adapted in this regard. Within RBON an identification mechanism for stations which are expected to report CLIMAT is still missing.

Due to web browser configuration changes the filenames of the GSN datasets had to be modified. The file extension for all datasets is now '.txt' instead of as previously '.dat'. The data sets ('.dat' and '.txt') are also available at opendata.dwd.de.

4. WMO Incident Management System (IMS)

An approach regarding incorrect metadata of CLIMAT stations in OSCAR/Surface was agreed between the WMO secretariat and the LC with the support of the DWD division International Affairs. In January 2022 the Lead Centre was connected to the WMO Incident Management System (IMS) in order to raise tickets about general issues, e.g. missing registration of stations, incorrect coordinates, reporting status or network affiliation. The subsequent ticket processing by the Regional WIGOS Centres (RWC) revealed that the reason for issues being not resolved is mostly at the national level (missing or non-reacting NFP).

In July 2022 the LC participated virtually in the Global Workshop on Regional WIGOS Centres. A talk was given to inform about ToR and role of CBS Lead Centres and cooperation with the RWCs. In the following discussion the unclear future governance of the Lead Centres was addressed since CBS has been replaced by INFCOM.

5. Climate Observation Conference

The LC participated in the 2nd GCOS Climate Observation Conference, held on 17-19 October 2022 in Darmstadt, Germany. A poster about the global monthly climate data archive at DWD was presented.

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