WMO/IOC/UNEP/ICSU
GLOBAL CLIMATE OBSERVING SYSTEM (GCOS)

Doc. 1.01
(06.III.2024)

15th GRUAN Implementation-Coordination Meeting (ICM-15)
Bern
11 March - 15 March 2024

Session 1

Lead Centre Progress Report for March 2024

(Submitted by Lead Centre)

Summary and Purpose of this Document

Progress report from the Lead Centre.

Deutscher Wetterdienst
Lindenberg Meteorological Observatory
Richard Aßmann Observatory

GRUAN Lead Centre progress report 2024

Covering the period 12/2022 to 02/2024

Author

Ruud Dirksen
GRUAN Lead Centre
Lindenberg Meteorological Observatory – Richard Aßmann Observatory
Deutscher Wetterdienst

Summary

Various sites recertified.

New candidate site Helwan (Egypt), Faa'a (Tahiti)

Datastream established for Paramaribo (PMO)

Co-organization of ICM-15

Certification RS41-GDP completed.

Developing/testing alternatives to R23 for frostpoint hygrometers.

Writing report on WMO radiosonde intercomparison campaign (UAII2022)

Publication of various GRUAN TNs and TD.

Health of network

The network consists of 33 sites.

New sites: Helwan (Egypt), Faa'a (Tahiti). Data stream established for PMO, little progress with Dakar/Senegal. No data streams for BoM sites, Dolgoprudny, Xilinhot

New certifications: -

Certification process ongoing for La Reunion, Neumayer, and Tenerife; initiated for Hongkong

Recertification of various sites (Boulder, Lauder, Ny-Ålesund, Sodankylä, Payerne, Potenza).

Lead Centre operations

- Operationally running GRUAN data management server – GDMS (24/7).
- Operationally running GRUAN meta-data data base – GMDB (24/7).
- Operationally working GRUAN file archive – GFA (24/7).
- Ongoing development and optimization of all GRUAN server software

components, GDMS, GMDB, GFA. • Ongoing development on several software tools for use at sites, e.g. RsLaunchClient, gt92, gtRsl, gm41. • Regularly update of data flow statistic plots (available at website). • Lists of comparison soundings available at website, e.g. RS92-RS41 • Data streams for RS41-GDP.1 and iMS-100-GDP.2
Visitors to LC • GCOS secretariat WG co-chairs Dec 2023 • Holger Vömel (NCAR) Sept 2023 • Takuji Sugidachi (Meisei) May 2023
Instrument research The following activities were undertaken in testing and/or characterizing research instruments and radiosondes: • Meisei Skydew, N_2-CFH. • RS41, RS92, DFM-09, iMS-100, M10 (laboratory & intercomparison). • Research contract to investigate added value GRUAN processing
Site visits • –

Conferences

- NDACC SC meeting, Murnau, Sept 2023.
- Metexpo, Geneva October 2023

Achievements

- Certification of GRUAN data processor for RS41 (version 1)
- Execution of WMO radiosonde intercomparison campaign (UAII2022) in cooperation with Payerne.

Technical documentation published:

- GRUAN-TN-12 – Brief Description of Vaisala DigiCORA® 3 DataBase File Format (DC3DB)
- GRUAN-TN-13 – User Guide for the RS41 GRUAN Data Product Version 1 (RS41-GDP.1)
- GRUAN-TN-14 – GRUAN policy on silent sites
- GRUAN-TD-8 – GRUAN characterization and data processing of the Vaisala RS41 radiosonde

Training by Lead Centre

- AWI Ny Alesund staff

Issues

- Silent sites

Work plan **for next 12 months**

- Support development of GRUAN data product for M10 and Graw radiosondes
- Continue testing and assessment of non-R23 frostpoint hygrometers.
- (Re)certify sites.
- Further development of the GRUAN website.
- Start development of GRUAN data product for RS92 (RS92-GDP.3).
- Operationalize processing of CFH data.

Overview of GRUAN-related publications

2023

Borger, C., S. Beirle, and T. Wagner, A 16-year global climate data record of total column water vapour generated from omi observations in the visible blue spectral range, Earth System Science Data, 15(7), 3023–3049, doi:10.5194/essd-15-3023-2023, 2023, URL https://essd.copernicus.org/articles/15/3023/2023/essd-15-3023-2023.pdf.

Faber, J., M. Gerding, and T. Köpnick, Acquiring high-resolution wind measurements by modifying radiosonde sounding procedures, Atmospheric Measurement Techniques, 16(18), 4183–4193, doi:10.5194/amt-16-4183-2023, 2023, URL https://amt.copernicus.org/articles/16/4183/2023/.

Fassò, A., H. Keernik, and K. Rannat, On the Kalman Smoother Interpolation Error Distribution in Collocation Comparison of Atmospheric Profiles, Axioms, 12, 902, 2023.

Guo, X., D. Wu, Z. Wang, B. Wang, C. Li, Q. Deng, and D. Liu, A review of atmospheric water vapor lidar calibration methods, WIREs Water, p. e1712, doi:https://doi.org/10.1002/wat2.1712, 2023, URL https://wires.onlinelibrary.wiley.com/doi/abs/10.1002/wat2.1712.

Prange, M., S. A. Buehler, and M. Brath, How adequately are elevated moist layers represented in reanalysis and satellite observations?, Atmospheric Chemistry and Physics, 23(1), 725–741, doi:10.5194/acp-23-725-2023, 2023, URL https://acp.copernicus.org/articles/23/725/2023/.

Rannat, K., H. Keernik, and F. Madonna, The novel copernicus global dataset of atmospheric total water vapour content with related uncertainties from gnss observations, Remote Sensing, 15(21), doi:10.3390/rs15215150, 2023, URL https://www.mdpi.com/2072-4292/15/21/5150.

Trent, T., R. Siddans, B. Kerridge, M. Schröder, N. A. Scott, and J. Remedios, Evaluation of tropospheric water vapour and temperature profiles retrieved from metop-a by the infrared and microwave sounding scheme, Atmospheric Measurement Techniques, 16(6), 1503–1526, doi:10.5194/amt-16-1503-2023, 2023, URL https: //amt.copernicus.org/articles/16/1503/2023/.

Zhang, L., M. Ding, X. Zheng, J. Chen, J. Guo, and L. Bian, Assessment of airs version 7 temperature profiles and low-level inversions with gruan radiosonde observations in the arctic, Remote Sensing, 15(5), doi:10.3390/rs15051270, 2023, ISSN 2072-4292, URL https://www.mdpi.com/2072-4292/15/5/1270.

Agarwal, A., V. R. Meijer, S. D. Eastham, R. L. Speth, and S. R. H. Barrett, Reanalysis-driven simulations may overestimate persistent contrail formation by 100014,045, doi:10.1088/1748-9326/ac38d9, 2022, URL https: //iopscience.iop.org/article/10.1088/1748-9326/ac38d9/pdf.

2022

Beirle, S., C. Borger, S. Dörner, V. Kumar, and T. Wagner, Calculating the vertical column density of O4 during daytime from surface values of pressure, temperature, and relative humidity, Atmospheric Measurement Techniques, 15(4), 987–1006, doi:10.5194/amt-15-987-2022, 2022, URL https://amt.copernicus.org/ articles/15/987/2022/amt-15-987-2022.pdf.

Calbet, X., C. Carbajal Henken, S. DeSouza-Machado, B. Sun, and T. Reale, Horizontal small-scale variability of water vapor in the atmosphere: implications for intercomparison of data from different measuring systems, Atmospheric Measurement Techniques, 15(23), 7105–7118, doi:10.5194/amt-15-7105-2022, 2022, URL https://amt.copernicus.org/articles/15/7105/2022/.

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Madonna, F., E. Tramutola, S. SY, F. Serva, M. Proto, M. Rosoldi, S. Gagliardi, F. Amato, F. Marra, A.

Fassò, T. Gardiner, and P. W. Thorne, The New Radiosounding HARMonization (RHARM) Data Set of Homogenized Radiosounding Temperature, Humidity, and Wind Profiles With Uncertainties, Journal of Geophysical Research: Atmospheres, 127(2), e2021JD035,220, doi:https://doi.org/10.1029/2021JD035220, 2022, URL https://agupubs.onlinelibrary.wiley.com/doi/abs/10.1029/2021JD035220.

Nielsen, J. K., H. Gleisner, S. Syndergaard, and K. B. Lauritsen, Estimation of refractivity uncertainties and vertical error correlations in collocated radio occultations, radiosondes, and model forecasts, Atmospheric Measurement Techniques, 15(20), 6243–6256, doi:10.5194/amt-15-6243-2022, 2022, URL https://amt.copernicus. org/articles/15/6243/2022/amt-15-6243-2022.pdf.

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