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Session 2

Lead Centre Progress Report for April 2024 to October 2025

(Submitted by Lead Centre)

Summary and Purpose of this Document

Progress report from the Lead Centre.

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Summary

Certification of two sites (TEN, XIL), two sites recertified.

Datastream established for Xilinhot (XIL)

Co-organization of ICM-16

Publication of report on WMO radiosonde intercomparison campaign (UAII2022)

Providing web-based tools: Site report generator, Data viewer and Satellite collocation viewer

Ongoing development of GRUAN Data Products

Various visits to and from sites, meetings, collaborating partners

Issues with setting up data streams for several sites

Health of network

- The network consists of 32 sites, with operational radiosonde datastreams for 24 sites.
- A data stream has been established for Xilinhot, followed by certification of the site.
- Little progress with initiating data stream for Dakar/Senegal.
- There still is no data operational stream for BoM sites, due to unresolved IT-issues.
- There is no data stream for Dolgoprudny, mainly because of lack of a suitable radiosonde for GRUAN; the silent site policy has been initiated for this site.
- Initiating a data stream for the new site Helwan progresses slowly.
- New certifications: Tenerife (Nov 2025), Xilinhot (May 2025).
- The certification process was initiated for La Reunion and Neumayer, unfortunately with little progress to date. A certification application was submitted by Hong Kong and is under review.

- Recertifications: Beltsville, Ross Island.

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
- Regular 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 RS92-GDP.2
- Ongoing development of web-based tools, such as Site report generator, Data viewer and Satellite collocation viewer

Visitors to LC

- Thierry Leblanc, June 2024. Setting up data submission stream for one site. Installation of GLASS Lidar Data Processor on a centralized server at LC.
- GCOS secretariat & WG co-chairs, February 2025
- J. Frielingsdorf (Graw), May 2025. Coordination of GDP development
- Weathex, October 2025. Discussion of measurement errors of WtX radiosonde
- Li Huirong (CMA), October 2025. Cooperation for laboratory characterisation of Huayuntianyi GTH3 radiosonde

Instrument research

- Ongoing activities are undertaken in testing, characterization and comparison of research instruments and radiosondes.
- Laboratory characterisation of RS92, DFM-17, RS41, M10 radiosondes.
- Regular intercomparison flights with GDP radiosondes (RS41 / iMS-100 / RS92) and GDP candidate radiosondes M10 and DFM-17.
- Evaluation of the Skydew instrument for a long-term measurement program of stratospheric water vapor.

Site visits and other visits

- Xilinhot (October 2024) in connection to GSRN meeting in Xi'An. During the site visit local staff presented the on-site measurement systems, and there was a presentation and discussion on further steps for the GDP development for GTH3 radiosonde.
- GSRN Task Team meeting, Xi'An, October 2024.
- Work visit to KRISS (Korea), October 2024. Exchange about CFH operation and laboratory characterisation of humidity sensors at low temperatures.

GRUAN presentation at meetings and conferences

- Presentation on GRUAN and GRUAN data as part of the short course "Reference measurements for climate studies and applications" at the EGU general assembly, Vienna, April 2025
- NDACC symposium, Oct 2025 (online participation)
- NIMH National Environmental Conference, Sofia, April 2025

Involvement in other bodies and councils

- Participation in ISO TC146 SC5. Test methods for radiosonde temperature and humidity measurements.
- Participation in COST action CA24155, Climate Reference Instruments and Measurements

- Participation ET-UAM (Expert Team Upper Air Observations), update of Chapter 12 of WMO doc 8
- Participation in GSRN

Achievements

- Development of Beta-version of web-based tools for: generating Site reports, Data viewer and Satellite collocation viewer
- Publication of report on WMO radiosonde intercomparison campaign – UAII2022 (IOM No 143)
- Inclusion of historic RS92 measurements from other sites in GRUAN database
- Certification of two sites
- Extensive support of GDP development for M10 radiosonde (laboratory, soundings, TD review & editing)
- Extensive laboratory characterisation of RS92 & DFM-17 radiosondes
- Co-organization of ICM-16

Training by Lead Centre

AWI-staff

Issues

Silent sites: Dolgoprudny, BoM, Helwan

Documents

- Update of TN-8 “GRUAN Monitor MW41 and the Vaisala RS41 Additional Sensor Interface”
- Support and cooperation with review and editing of Technical Document on M10 data processing.

- Publication of report on WMO radiosonde intercomparison campaign – UAII2022 (IOM No 143)
- Information letter on switching the GRUAN data flow to the data portal `dp.gruan.info`
- Information letter for guidance on the continuation of stratospheric water vapor measurements

Work plan

Work plan for the next 18 months:

- Establish new sites in relevant regions
- Initiate data streams for currently inactive sites
- Extensive laboratory characterisation in support of development of GRUAN data products for M10, Graw, and Huayuntianyi radiosondes
- Continue testing and assessment of non-R23 frostpoint hygrometers
- (Re)certify sites
- Further development of the GRUAN website.
- Continue development of GRUAN data product for RS92 (RS92-GDP.3)
- Continue development of Beta-version of web-based tools (Site reports, Data viewer and Satellite collocation viewer)
- Operationalize processing of frost point hygrometer data
- Continue operationalisation of Lidar data-processing
- Co-organization of ICM-17
- Establish data dissemination via data publisher that supports DOI, data usage statistics etc

Overview of GRUAN-related publications

- Dunya Alraddawi, Philippe Keckhut, Florian Mandija, Alain Sarkissian, Christophe Pietras, Jean-Charles Dupont, Antoine Farah, Alain Hauchecorne, and Jacques Porteneuve. Calibration of Upper Air Water Vapour Profiles Using the IPRAL Raman Lidar and ERA5 Model Results and Comparison to GRUAN Radiosonde Observations. *Atmosphere*, 16(3), 2025

- Rachel Atlas, Aurlien Podglajen, Richard Wilson, Albert Hertzog, and Riwal Plougonven. Turbulence in the tropical stratosphere, equatorial Kelvin waves, and the quasi-biennial oscillation. *Proceedings of the National Academy of Sciences*, 122(2):e2409791122, 2025

- Audran Borella, tienne Vignon, Olivier Boucher, Yann Meurdesoif, and Laurent Fairhead. A New Prognostic Parameterization of Subgrid Ice Supersaturation and Cirrus Clouds in the ICOLMDZ AGCM. *Journal of Advances in Modeling Earth Systems*, 17(8), 2025

- D. Cimini, R. Gandoin, S. Fiedler, C. Acquistapace, A. Balotti, S. Gentile, E. Geraldi, C. Knist, P. Martinet, S. T. Nilo, G. Pace, B. Pospichal, and F. Romano. Atmospheric stability from numerical weather prediction models and microwave radiometer observations for onshore and offshore wind energy applications. *Atmospheric Measurement Techniques*, 18(9):2041–2067, 2025

- M. Fujiwara, B. Sun, A. Reale, D. Cimini, S. Larosa, L. Borg, C. von Rohden, M. Sommer, R. Dirksen, M. Maturilli, H. Vömel, R. Kivi, B. Ingleby, R. J. Kramer, B. Demoz, F. Madonna, F. Carminati, O. Lewis, B. Candy, C. Thomas, D. Edwards, Noersomadi, K. Shimizu, and P. Thorne. Justification for high ascent attainment for balloon radiosonde soundings at GRUAN and other sites. *Atmospheric Measurement Techniques*, 18(13):2919–2955, 2025

- V. Jayaweera, R. J. Sica, G. Martucci, and A. Haefele. Solar background radiation temperature calibration of a pure rotational Raman lidar. *Atmospheric Measurement Techniques*, 18(6):1461–1469, 2025

- Sung Min Kim, Young-Suk Lee, Byung-Il Choi, Sunghun Kim, Yong-Gyoo Kim, Yoonseuk Choi, and Sang-Wook Lee. Evaluating calibration uncertainty and response time of rs41 humidity sensors under a ventilation speed of 5 m s1. *Meteorological Applications*, 32(5), 2025

- Hung-Chi Kuo, Ting-Shuo Yo, Hungjui Yu, Shih-Hao Su, Ching-Hwang Liu, and Po-Hsiung Lin. Data quality control and calibration for mini-radiosonde system storm tracker in taiwan. *Journal of the Meteorological Society of Japan*, 103(5):573 593, 2025

- Y. Poltera, B. Luo, F. G. Wienhold, and T. Peter. The "golden points" and nonequilibrium correction of high-accuracy frost point hygrometers. *EGUsphere*, 2025:1–64, 2025

- T. Sugidachi, M. Fujiwara, K. Shimizu, S.-Y. Ogino, J. Suzuki, and R. J. Dirksen. Development of a Peltier-based chilled-mirror hygrometer, SKYDEW, for tropospheric and lower-stratospheric water vapor measurements. *Atmospheric Measurement Techniques*, 18(2):509–531, 2025

- Ling Wang and Marvin A. Geller. Temperature fluctuations of different vertical scales in raw and processed U.S. high vertical-resolution radiosonde data. *Journal of Atmospheric and Oceanic Technology*, 42(3):309 – 317, 2025

- D. Cimini, R. Gandoin, S. Fiedler, C. Acquistapace, A. Balotti, S. Gentile, E. Geraldi, C. Knist, P. Martinet, S. T. Nilo, G. Pace, B. Pospichal, and F. Romano. Atmospheric stability from microwave radiometer observations for on/offshore wind energy applications. *Atmospheric Measurement Techniques Discussions*, 2024:1–42, 2024
- Günther Heinemann, Lukas Schefczyk, and Rolf Zentek. A model-based study of the dynamics of arctic low-level jet events for the mosaic drift. *Elementa: Science of the Anthropocene*, 12(1):00064, 05 2024
- Frederick M. Mashao, Belay Demoz, Yehenew Kifle, Danitza Klopper, Hector Chikoore, Ricardo K. Sakai, and Kingsley K. Ayisi. An appraisal of the progress in utilizing radiosondes and satellites for monitoring upper air temperature profiles. *Atmosphere*, 15(3), 2024
- V. R. Meijer, S. D. Eastham, I. A. Waitz, and S. R. H. Barrett. Contrail altitude estimation using GOES-16 ABI data and deep learning. *Atmospheric Measurement Techniques*, 17(20):6145–6162, 2024
- World Meteorological Organization (WMO). Report of WMO's 2022 Upper-Air Instrument Intercomparison. Technical report, WMO, 2024. Instruments And Observing Methods Report No. 143