GRUAN Data Management

Current status and outlook

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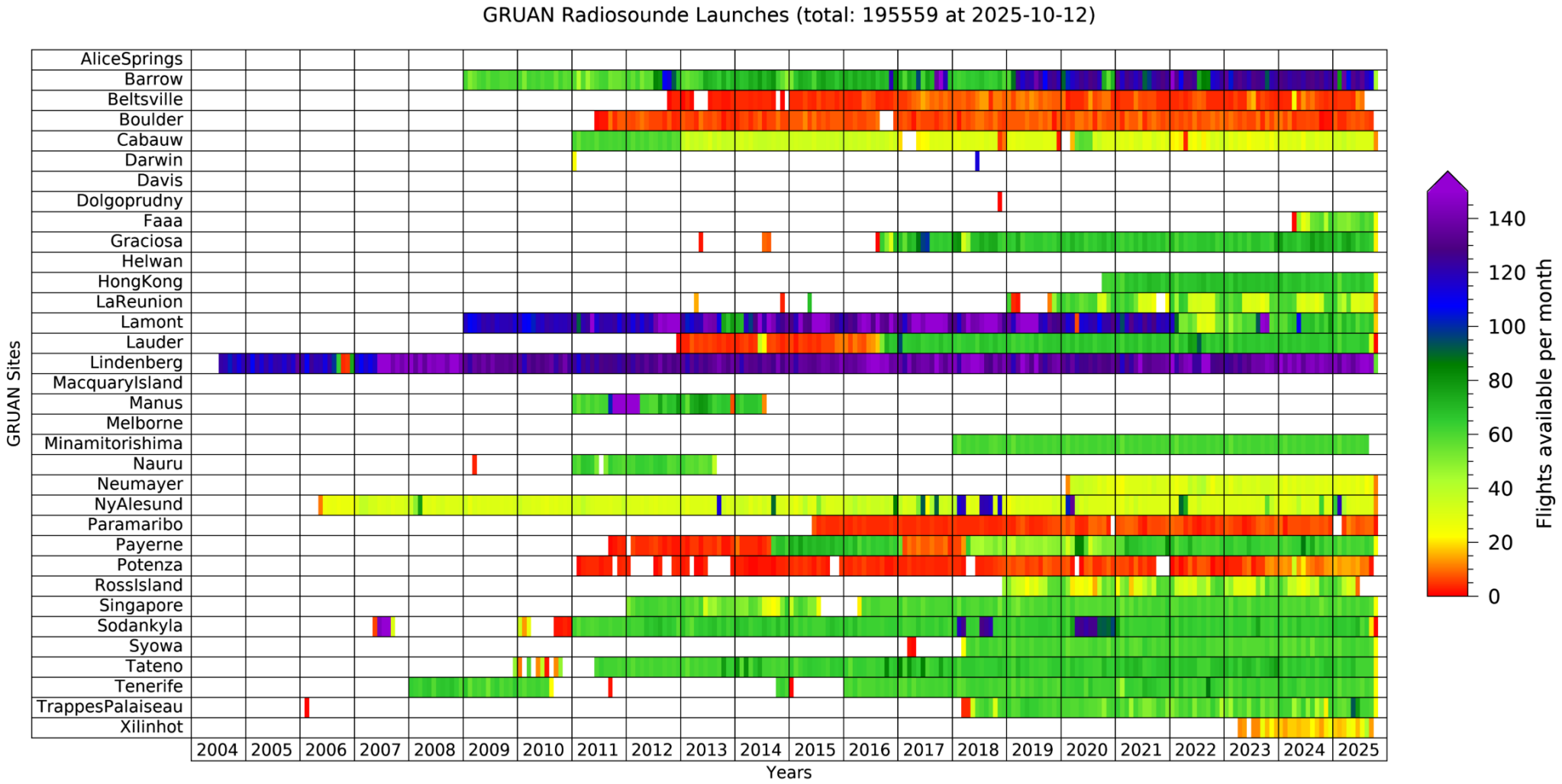
Session 3, 17 November 2025

Insight into the GRUAN data archive

Deutscher Wetterdienst
Wetter und Klima aus einer Hand



Structure of data management

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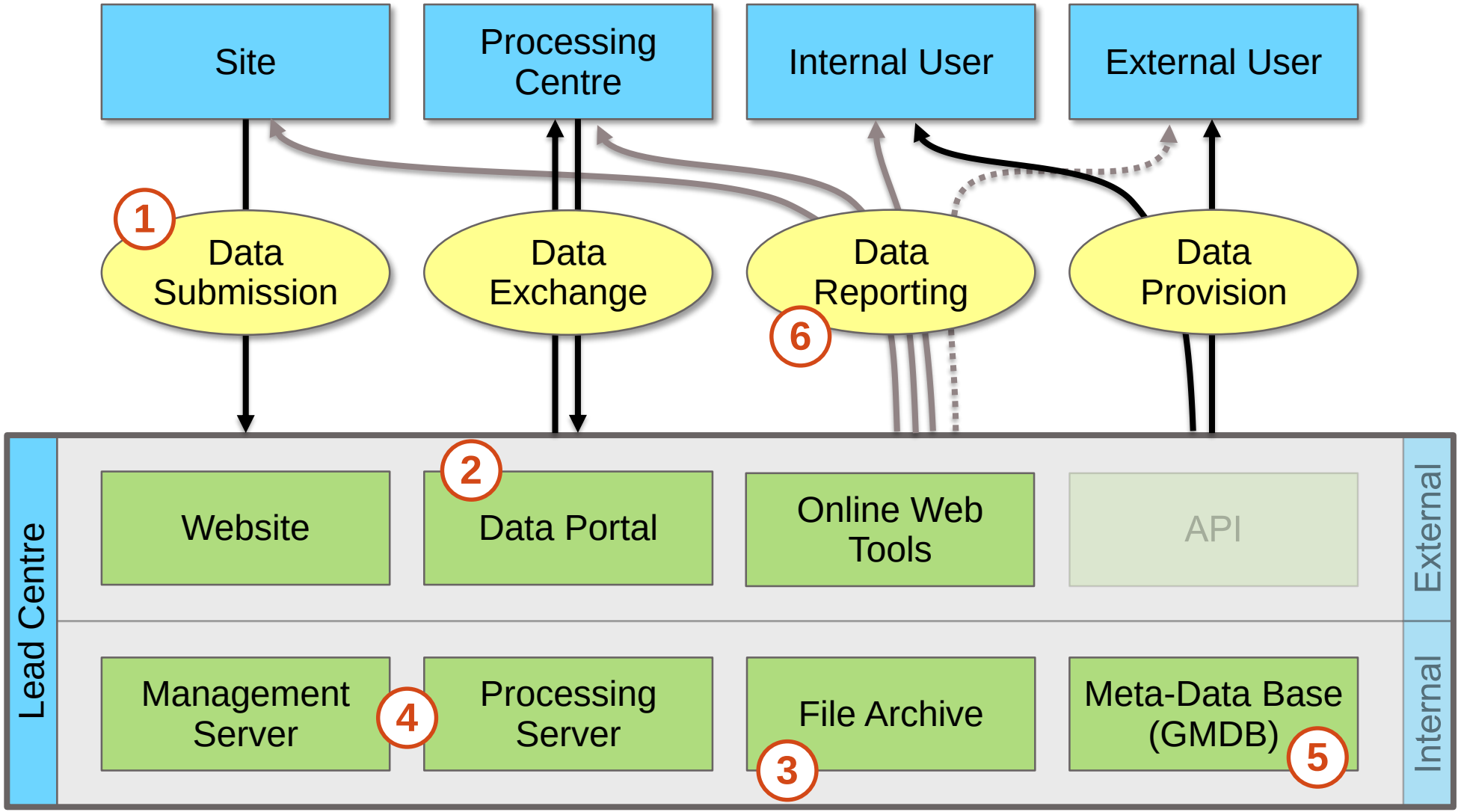
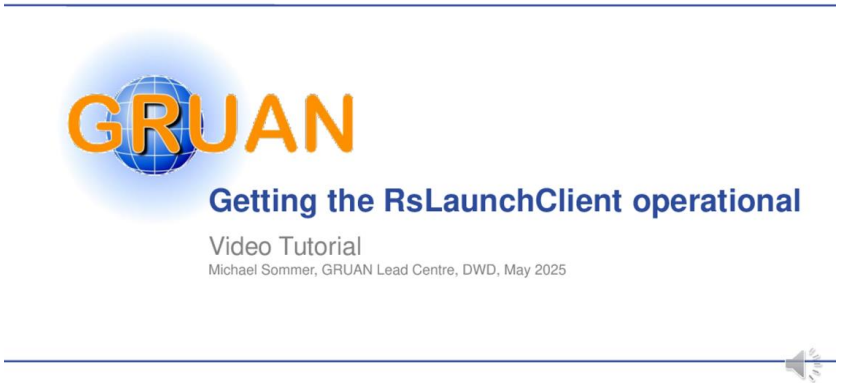


1) Data submission

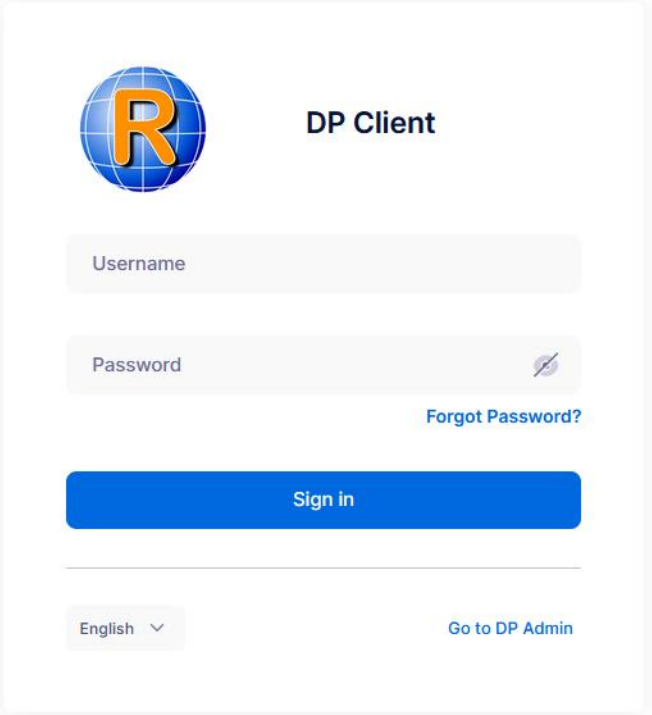
- Data submission from sites to GRUAN
  - In-situ sounding → specific upload of meta-data and raw measurement data to LC
    → from simple operational to complex research setups
    → special software available: RsLaunchClient, gtRsl
  - Lidar → day by day upload of raw data to LC
  - GNSS-PW → direct upload to GFZ (processing centre)

- New video tutorial is available
  - „Getting the RsLaunchClient operational“
  - https://www.gruan.org/documentation/tutorials



2) GRUAN Data Portal

- Data Portal → **https://dp.gruan.info**
  - Central instance of any GRUAN data flow
  - Upload data from sites to LC
  - Sharing data between LC and processing centres
  - Provide data to selected users → GRUAN-internal



- Access
  - User-based approach
    → each site and processing centre
  - Access options
    → browser (https), sftp, ftps, webdav
    → password and/or SSH key possible

- **IMPORTANT:** Old FTP server will be switched off end of 2025!

3) File Archive – Statistics (mid Oct.)

- Raw data files (any format)
  - **3.3 TB** – **total**, including RS and LI
  - 1.2 TB – LIDAR raw data
- Product data files (NetCDF)
  - **3.6 TB** – **total**
  - 2.6 TB – converted raw data
  - 50 GB – manufacturer data products
  - 0.95 TB – GRUAN data products
    → any versions incl. GDP, BETA and ALPHA
- Further data files
  - 400 GB – GNSS data
  - 100 GB – old data waiting for import

- Release versions (current)
  - RS41-GDP.1 – 369.66 GB (n = 90,862)
  - RS92-GDP.2 – 46.09 GB (n = 61,591)
  - IMS-100-GDP.2 – 78.74 GB (n = 14,034)
  - RS-11G-GDP.1 – 3.82 GB (n = 6,692)
- Beta versions (current)
  - M10-GDP-BETA.1 – 9.01 GB (n = 8,452)
  - RS-11G-BETA.2 – 10.88 GB (n = 1,907)

GDP	2021	2022	2023	2024	2025
RS41-GDP.1	12,424	11,017	11,021	11,150	8,266
IMS-100-GDP.2	1,084	1,946	2,584	2,625	1,587
M10-BETA.1	1,129	1,240	1,237	1,163	872
RS-11G-GDP.1	690	687	294	53	2
RS-11G-BETA.2	567	631	257	45	–
RS92-GDP.2	38	14	28	34	11

4) Management Server & Processing Server

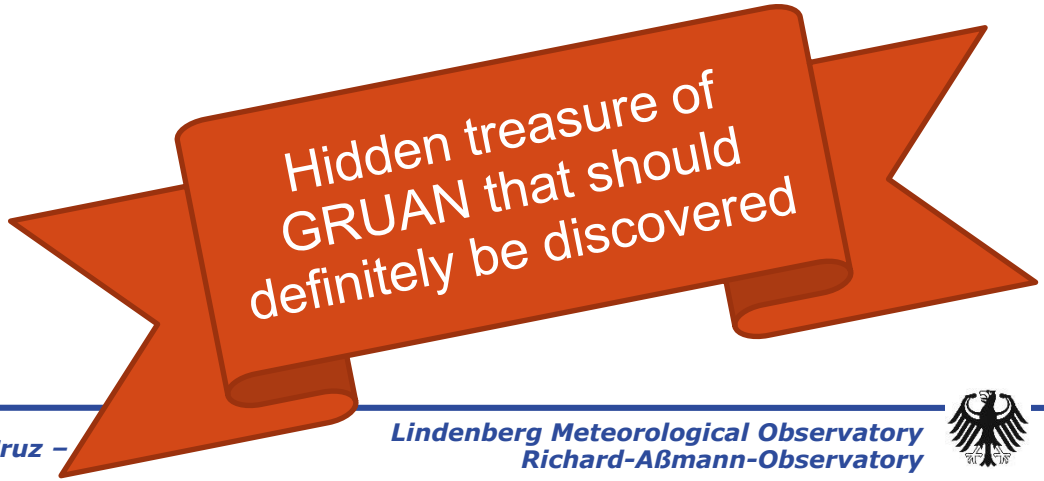
- GRUAN Data Management Server
  - 24/7 operational system
  - Located at DWD head quarter
  - Purposes:
    - Managing of any data flow tasks from/to sites, processing centres, …
    - Import of any data & meta-data to file archive and meta-data base

- GRUAN Processing Server
  - Converting of raw data files
  - Processing of data products (e.g. for RS41, RS92)
  - Detection of satellite collocations
  - … (and some more)

Each GRUAN Processing Centre (PC) has own processing servers

5) GMDB

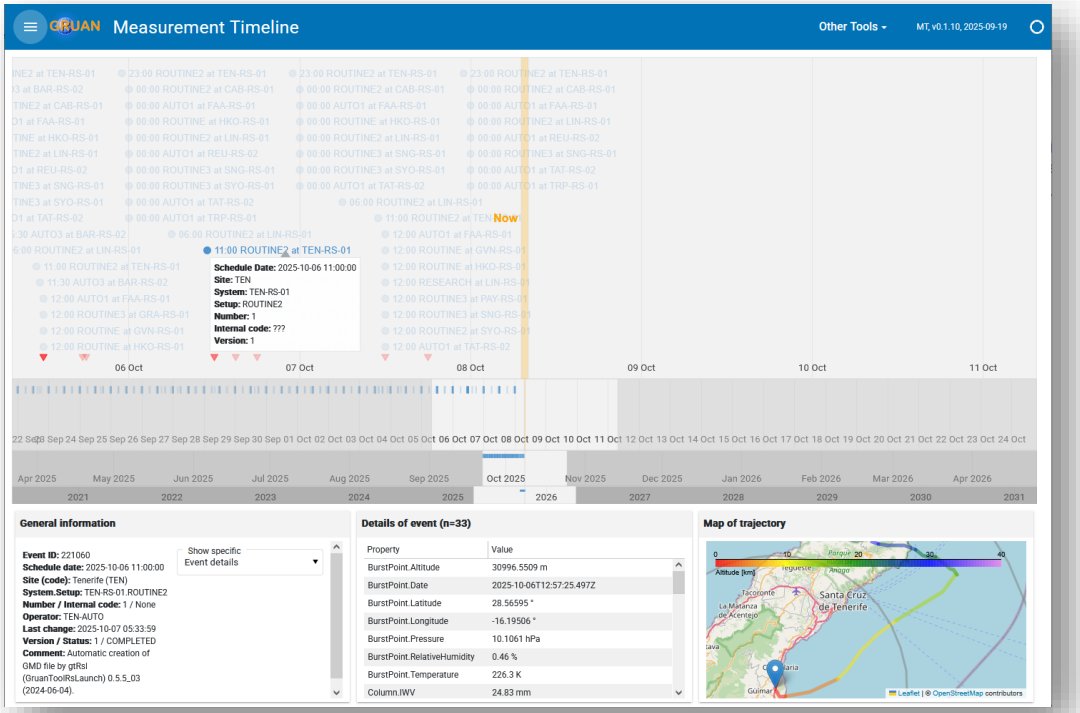
- GMDB – the GRUAN Meta-Data Base
- Measurement events
  - Radiosounding (RS) → ~200,000
  - Lidar (LI) → ~5,000
  - GNSS-PW (GN) → not yet part of GMDB → inclusion is planned
- Content includes:
  - Information about sites, measurement systems, equipment, instruments, …
  - Measurement events including all related equipment, instrument checks, files, weather conditions, …
  - Information about file archive
  - Information about processing tasks
  - …



6) Reporting – new possibilities

- Known annual GRUAN Site Reports
  - Very static and low response

- Development of new online web tools
  - Different tools for different aspects
    - Site Reports
    - Measurement Timeline
    - Satellite Collocation
    - Data Viewer
    - Balloon Trajectories
    - Data Stream Checker
  - Start of BETA phase
  - **My next presentation**



Example impressions of online tools

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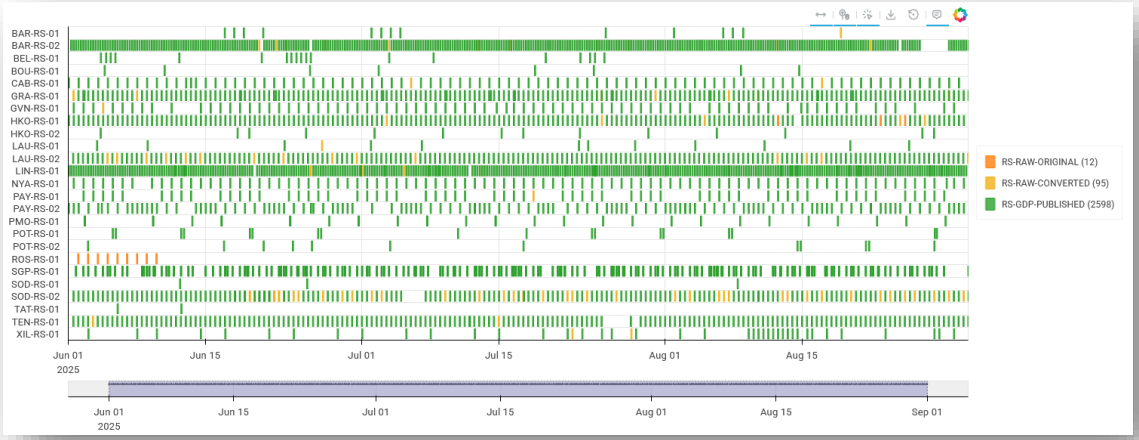

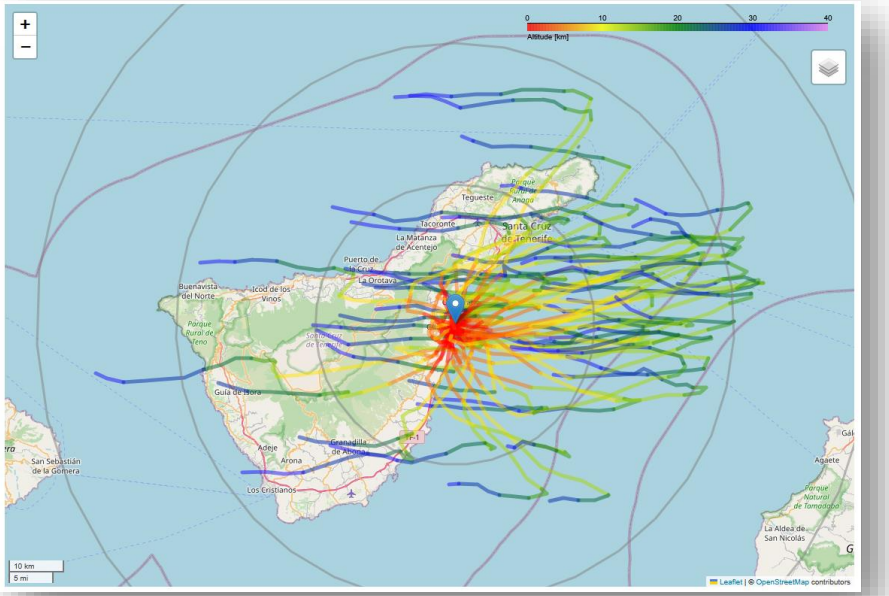

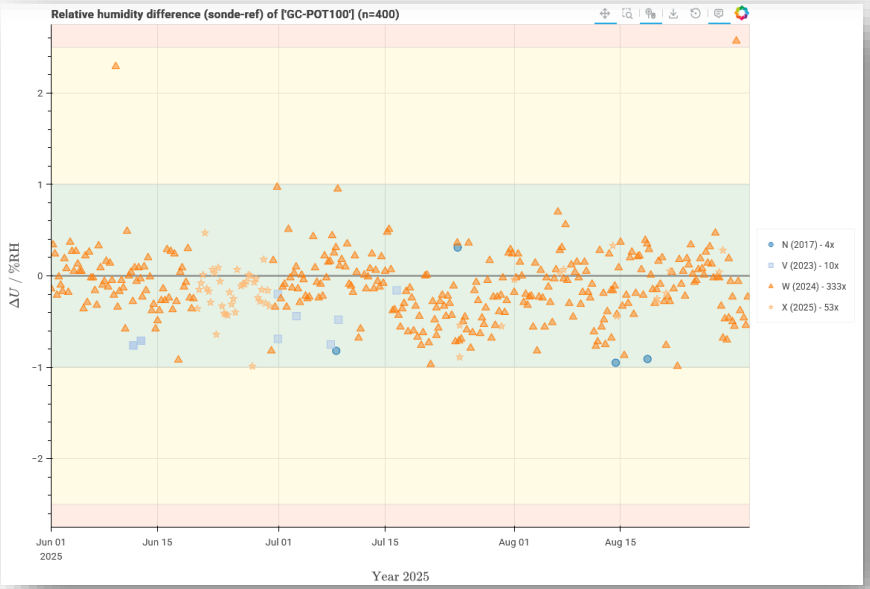

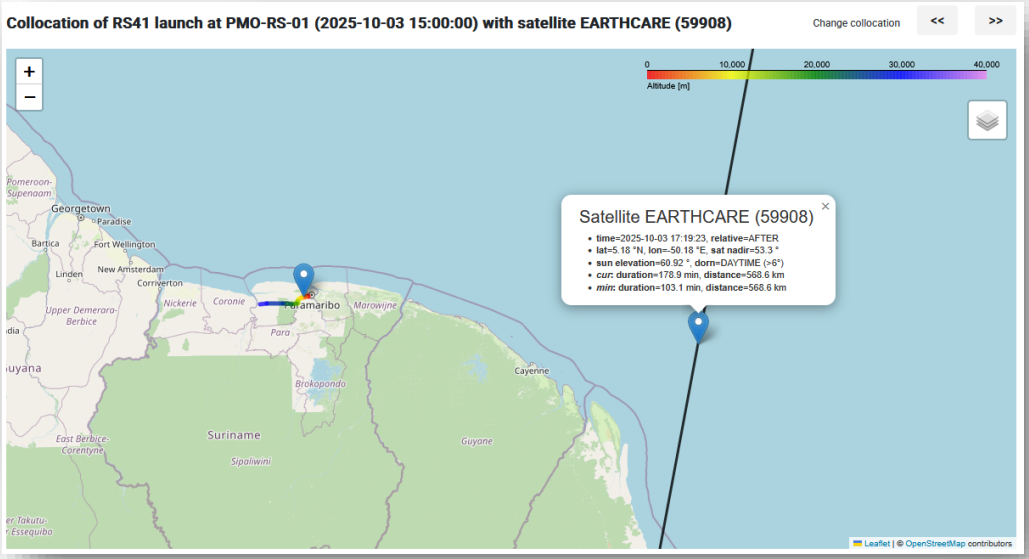

Further ideas

- User feedback to data & meta-data of GRUAN
  - Online tool that allows every user to provide feedback
  - **My presentation on Friday (Session 9)**
- Application Programming Interface (API)
  - All new web tools are based on content of GMDB
  - Make content of GMDB available for any further/user tools, programs, scripts, …
- Single-Sign On
  - Several GRUAN services with login
  - e.g. website, data portal, new online tools, …
  - One central GRUAN user management is (maybe?) a good option

Summary

- Data management in GRUAN is a continuously challenge
- GRUAN community should have better access to stored information
- New online tools are available now to solve this
- And there will be even more possibilities in the future

Thank you for your attention.