GCOS Reference Upper-Air Network

GRUAN Technical Note 3

Essential Meta-data of New GRUAN Stations

MICHAEL SOMMER AND RUUD DIRKSEN (GRUAN LEAD CENTRE)

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Abstract

This document provides general guidance that new GRUAN stations can collect essential meta-data for GRUAN.

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1 Introduction to GRUAN meta-data

One main basis of GRUAN is an exact documentation of all relevant details which can influence a measurement. Because that, collection of meta-data is very important in GRUAN. A station which want to be a GRUAN station should describe and document all specifics of site in a first step.

These meta-data will be used

- to build a starting point for this station in our GRUAN meta-data base (GMDB),
- to set GRUAN-specific tools up, like the RsLaunchClient for collection meta-data and raw data of all radiosonde launches,
- to present on our GRUAN website,
- to estimate valuable contribution of station to GRUAN.

Please create a document for your station and fill-in all essential meta-data which are specific for your station.

2 Station

In a first part all general information about the station should be collected.

2.1 Name

Full name (original) Full original name of station.
Example: Meteorologisches Observatorium Lindenberg

Full name (international) Full international name of station.
Example: Lindenberg Meteorological Observatory

Short name Common or official used short name of your station.
Example: Lindenberg, Ny-Ålesund

Acronym Common or official used acronym of the station.
Example: MOL-RAO

GRUAN name Unique name which should be used in GRUAN. This name should refer to a geographical fact (like a village, city, island) and should only use ASCII letter [A-Za-z] (no white-space, no other character).
Example: Lindenberg, NyAlesund

GRUAN code Unique code with 3 character [A-Z0-9]. This code will be used in all file naming, reporting, and so on. This code should usually be based on the GRUAN name.
Example: LIN, NYA

2.2 Organisation

Operating company Name of organisation/company which operates the station.

– (short or acronym) Short version of name (or acronym)
Example: DWD

– (long original) Long version of name (original version)
Example: Deutscher Wetterdienst

– (long international)	Long version of name (international version) *Example: German Meteorological Service*
Type of company	Type of operating company, like weather service, research institute, university, government agency, … *Example: weather service*
Website	Link to the official website *Example: http://www.dwd.de*
Additional description	Sometimes there are more complex conditions. Please give additional information of organisation structure of this station.

2.3 GRUAN main contact

One person should be main contact person who can be contacted for all GRUAN-related requests. This person

Name	Full name
Address	Full postal address
Email address	Email address
Telephone	Telephone number
Organisation	Organisation/company [*if different from station operator*]

2.4 Geographical location

Country	Name of country, where the station is located. *Example: Germany*
First order district	Name of first order district – or how it is named in your country, like state, federal state, province, district, … *Example: Brandenburg (federal state)*
Latitude	Longitude of station [degree north] *Example: 52.21 °N*
Longitude	Latitude of station [degree east] *Example: 14.12 °E*
Altitude	Altitude of station [m] *Example: 98 m (MSL)*
Time zone	Time zone of station *Example: UTC+1 (CET)*

2.5 Description of environments

Description	A longer description about the station with a couple of main facts. *Example: The MOL-RAO is resided in Lindenberg, a small village in a rural landscape in the East of Germany about 65 km South-East of Berlin, the capital of Germany. Embedded in this countryside are small and medium-sized lakes and the river Spree. The land use in this area is dominated by forest and agricultural fields, lakes, villages and traffic. Around Lindenberg are occurred sandy soils.*

Environment type General environment type of area around station.
Example: rural

Topography General topography type of area around station.
Example: small hills

Land use Land use around the station within 10 km.
Example: grassland/cropland 60 %, pine forest 30 %, open water 5 %, settlements 5 %

Climate Short description text of climate at station (climate region).
Example: moderate mid-latitude climate at the transition between marine and continental influences

Website Link to the official website of station.
Example: http://www.dwd.de/mol

2.6 History

Foundation Exact date (or year) of foundation of station
Example: 1905

History Main points of station history, each with date and short description

2.7 WMO

WMO number Official WMO number of station
Example: 10393

WMO name Official WMO name of station
Example: LINDENBERG

WMO region WMO region
Example: Region VI

2.8 Other networks

If the station is part of one or several other measurement networks (or programs, long-time projects, …), a list with following details should be documented here:

Name Name of network
Example: BSRN, Baseline Surface Radiation Network

Start date Date since the station is part of this network
Example: 1994-09-01

Type Related measurement systems of station
Example: Radiation measurements

Role [*only if relevant*] Role of station in this network

3 Measurement systems (general)

Such a section should be provided for each measurement system, which is relevant for GRUAN.

3.1 General

Name Name of measurement system
Example: Lindenberg radiosonde launch site

Type	Type of measurement system, e.g. Radiosonde (RS), Lidar (LI), GNSS-PW (GN), … *Example: Radiosonde*
GRUAN code	Automatic generated code with following parts: – GRUAN code of station (e.g. LIN) – GRUAN code of type of measurement (e.g. RS) – number of the system with two character (e.g. 01) *Example: LIN-RS-01 → that means first radiosonde launch site at Lindenberg*
Begin	Start date of measurements with this measurement system
Description	Free description of measurement system

3.2 Organisation

Operator	Operator organisation [*if different from station operator*] → see section 2.2
Main contact	Specific contact person [*if different from main contact*] → see section 2.3

3.3 Geographical position

All geographical details should be exact as possible.

Latitude	Longitude of station [degree north] *Example: 52.20933 °N*
Longitude	Latitude of station [degree east] *Example: 14.12020 °E*
Altitude	Altitude of station [m] *Example: 112 m (MSL)*

4 Balloon-born in-situ sounding (RS)

In GRUAN-context of radiosounding a special definition of measurement system is used. Such a system is a specific launch site and in addition there is always a separation between automatic and manual launches. That means, each automatic system (auto launcher) is a separate measurement system. And all manual sounding activities (which are located at one launch site) can be combined to one measurement system.

Please fill-in all details (of chapter 4) for each radiosonde measurement system.

4.1 Sounding site

→ see chapter 3

Please consider following points in addition:

- Different altitude values (plus an uncertainty) should be given for
  - Place of ground preparation / ground check
    Example: 103.65 m (MSL)
  - Launch site
    Example: 112 m (MSL)

- Used barometer for pressure at launch / ground check
  Example: 103.821 m (MSL)

- Latitude and longitude for launch site
  Example: 14.12020 °E, 52.20933 °N

4.2 Active sounding equipment

Active sounding components are very important to document. Please describe all used ground equipment and sondes. A couple of facts are of interest: name, model, version, manufacturer.

Ground system	Hardware and software of ground system (telemetry) *Example: Vaisala MW31, DigiCora3 v3.66.1*
Radiosonde	Manufacturer and model of used sondes *Example: Graw DFM-09*
Ground check tool	Tool which is used for a ground check (or other preparation step) of sonde *Example: Vaisala GC25*

4.3 Passive sounding equipment

In addition to active components also all passive equipment should be documented correctly in GRUAN.

Balloon	List of used balloons (manufacturer, model, weight, gas) *Example: Totex TA600, TA1000, TA1200, TA1500, TA2000, TX1000, TX1500, TX2000; Helium*
Parachute	List of used parachutes (manufacturer, model, diameter) *Example: Aeromet Parachute PC118, PC110*
Unwinder	List of used unwinders (manufacturer, model, string length) *Example: Graw, UW1, 60 m*
Other equipment	List of other additional equipment which is used (e.g. separators, rigs)

4.4 Reference equipment

GRUAN is a reference network. This ‘reference’ includes a traceability of all measurements to SI. Because that a documentation about all used ‘reference’ sensors are necessary to bridge ground based measurements and radiosoundings. A couple of facts are of interest:

Elevation/altitude	Elevation / altitude of sensor AGL / MSL (plus an uncertainty) *Example: 103.8 m* ± 0.08 m (MSL)
Manufacturer	Manufacturer of sensor/instrument
Model	Concrete model number and name
Type	Type of sensor *Example: Temperature sensor, thermistor*
Calibration	Information about calibration schema (schedule) and last calibration (date) *Example: yearly, last cal. at 2015-07-25*

Reference sensors of following variables are (maybe) relevant: pressure, temperature, humidity, wind. Required is an external pressure sensor which is used to bridge ground pressure and pressure from GPS altitude. Often 'reference' sensors are embedded in ground check tools like a temperature sensor. Please give a short description about all relevant references.

4.5 Ground checks

Please document which ground checks are used regularly at station before radiosonde launches.

Recommended ground checks are:

- Manufacturer-dependent ground check of radiosonde
- Manufacturer-dependent recalibration of radiosonde
- Sonde preparation procedures (e.g. for ECC sondes)
- Additional manufacturer-independent ground check (e.g. SHC – standard humidity chamber)

4.6 Current launch set-ups

Describe all current main set-ups which are used at station. Each set-up description should be include all relevant parts (passive and active components), like ground system, ground check (+tool), (add. preparation steps), radiosonde, balloon, parachute, unwinder/string, rig, radiosonde. It would be very helpful, if a sketch is provided for each concrete set-up.

At most stations are defined one to four (or sometimes more) set-ups, like:

- *ROUTINE* – a default set-up for all-day routine launches (with exactly one radiosonde)
- *OZONE* – a set-up for one weekly ozone sonde launch (coupled with a radiosonde)
- *DUAL* – a set-up for comparison launches with two different radiosondes
- *RESEARCH* – a set-up which holds all possibilities which are imaginable at the station. Such a set-up is more a place-holder for a lot of different concrete set-ups which are used very seldom.
- ... – Please feel free to define your own set-up which is used at your station.

4.7 Launch schedule

Please provide typical schedule of sonde launches for defined set-ups, e.g.

Routine – PTU
Example: twice daily, 00 and 12 UTC

Ozone – O3
Example: weekly, Wednesday 12 UTC

Dual – Redundant PTU
Example: biweekly

Research – Redundant humidity using different measurement techniques
– Stratospheric humidity
– Aerosol backscatter
– Cloud detection
– … or use of other special sensors
Example: monthly, dependent on weather

4.8 Specific history and change management

Please give an overview of history of radiosounding at the station. Most important are the last 10 to 25 years. Following facts are of interest:

Period	Period from *start* to *end*
Sonde model	Used sonde model
Sonde manufacturer	Manufacturer of sonde
Sonde sensor types	[*only if known*] List of sensor types for variables (temperature, humidity, pressure, position/altitude)
Additional comments	Special comments to clarify specifics at station
Data availability	Level of data availability, e.g. raw data, own product data, manufacturer product data, no data. This information is very helpful to find past periods, which can be reprocessed in a GRUAN way.

5 Additional material

If available, please provide additional material:

Photos	Photos of station, measurement systems, actions (e.g. balloon launch), and so on. Such photos are very helpful to build a nice web page inside our GRUAN website.
Documents / references	Papers, articles, 'grey documents' which helps to get a good overview about the station itself and good work of their staff.