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Session 3

GRUAN Site Report for Cabauw

(Submitted by Arnoud Apituley)

Summary and Purpose of this Document

Report from the GRUAN site Cabauw for the period January 2024 to December 2024.

Overview

The distributed site Cabauw/De Bilt executes Vaisala RS41 radiosonde launches (00 UTC) and ECC ozone sonde launches (weekly), including SHC calibration. The observations are operational and the data are contributed to the GRUAN Lead Centre for GDP generation.

At the Cabauw site, a GNSS station is operational, as well as a suite of ancillary observations, including water vapor Raman lidar, microwave radiometer and cloud observations. Where possible, data are contributing to the GRUAN data streams, and/or the development of data streams. A recent development is that the water vapour Raman lidar data are ready for ingestion in the GRUAN data processor (GLASS).

Change and change management

Over the reporting period, no changes to the observation program have taken place. However, in order to support the RS92 to RS41 transition, a programme for monthly dual soundings is executed.

The site description on the GRUAN website needs minor adjustments. These will be updated.

Resourcing

At this time. Resources are secured to sustain the observations at the current level. Additional radiosondes, more than the midnight launch, are not feasible at the moment.

Operations

The burst level is monitored by the operational staff responsible for the launches. Occasional reports of an early burst are received. These are usually related to specific weather conditions like precipitation or frost.

Site assessment and certification

N/A

GRUAN-related research

The Cabauw/De Bilt team is involved in the COST action Climate Reference Instruments and Measurements (Upper-air, Column and Near Surface) (CRIM).

WG-GRUAN interface

The Cabauw/De Bilt team is involved in the GRUAN Science Coordination Group, as well as the Task Team Sites.

Other archiving centers

Data acquired in the framework of GRUAN sonde GDP is also transmitted on the GTS (meteorological observations). GNSS data is also used for other geographical applications. Lidar data are part of ACTRIS. Ozone sondes are part of NDACC.

Participation in campaigns

In May–June 2024, the CINDI-3 campaign (3rd Cabauw Intercomparison of UV-Vis DOAS Instruments). The stationary remote sensing UV-vis observations in Cabauw were complemented with a range of additional measurements from ozone and aerosol lidars, NO_2 and ozone sondes, long-path DOAS and in-situ instruments. Airborne and mobile UV-visible measurements around Cabauw, De Bilt and Rotterdam were also made during selected days with favourable weather conditions using cars and bikes as well as a small research aircraft, to provide a more complete picture of the distribution of pollutants from the industrial and urbanised area around Rotterdam. The GRUAN radiosonde GDP, as well as the ozone sondes and lidar observations provide important ancillary data for the CINDI-3 main goals.

Future plans

- Water Vapour Raman Lidar data will be submitted starting end 2025 to the GRUAN Ground-Based data central processing hub in the GRUAN Lead Centre.

- The Water Vapour Raman Lidar will be upgraded with a new laser and new detection electronics to replace the ageing instrumentation as well as upgrading the performance.

GRUAN Site Report for Cabauw (CAB), 2024

Reported time range is Jan 2024 to Dec 2024
Created by the Lead Centre
Version from 2025-11-06

1 General GRUAN site information

Object	Value
Station name	Cabauw
Unique GRUAN ID	CAB
Geographical position	51.9700 °N, 4.9200 °E, 1.0 m
Operated by	KNMI | Koninklijk Nederlands Meteorologisch Instituut
Main contact	Apituley, Arnoud
WMO no./name	06260 DE BILT AWS
Operators	currently 0, changes +0 / -0
Sounding Site	1
Lidar	1
GNSS	1

1.1 General information about GRUAN measurement systems

System	Name	Type	Setups	Measurements
CAB-GN-01	GNSS Site CBW1	GNSS	1	operational
CAB-LI-01	Cabauw Raman Water Vapor Lidar (CAELI)	Lidar	1	0
CAB-RS-01	Radiosonde Launch Site (De Bilt)	Sounding Site	5	366

1.2 General comments from Lead Centre

No comments from Lead Centre.

2 System: GNSS Site CBW1 (CAB-GN-01)

Object	Value
System name	GNSS Site CBW1
Unique GRUAN ID	CAB-GN-01
System type	GNSS (GN - GNSS)
Geographical position	51.5810 °N, 4.5534 °E, 46.0 m
Operated by	KNMI | Koninklijk Nederlands Meteorologisch Instituut
Instrument contact	Apituley, Arnoud
Started at	2019-05-16
Defined setups	1 (HOURLY)
Possible streams	-

2.1 Lead Centre comments

2.1.1 Dataflow

No GNSS dataflow to LC has been established yet.

3 System: Cabauw Raman Water Vapor Lidar (CAELI) (CAB-LI-01)

Object	Value
System name	Cabauw Raman Water Vapor Lidar (CAELI)
Unique GRUAN ID	CAB-LI-01
System type	Lidar (LI - Lidar)
Geographical position	51.9700 °N, 4.9100 °E, 0.0 m
Operated by	KNMI | Koninklijk Nederlands Meteorologisch Instituut
Instrument contact	Apituley, Arnoud
Started at	2014-07-01
Defined setups	1 (DEFAULT)
Possible streams	LIDAR

3.1 Lead Centre comments

3.1.1 Dataflow

No lidar dataflow to LC has been established yet.

4 System: Radiosonde Launch Site (De Bilt) (CAB-RS-01)

Object	Value
System name	Radiosonde Launch Site (De Bilt)
Unique GRUAN ID	CAB-RS-01
System type	Sounding Site (RS - Radiosonde)
Geographical position	52.1000 °N, 5.1800 °E, 1.0 m
Operated by	KNMI | Koninklijk Nederlands Meteorologisch Instituut
Instrument contact	Apituley, Arnoud
Started at	-
Defined setups	5 (ROUTINE, OZONE, ROUTINE2, OZONE2, DUAL)
Possible streams	RS41, RS92

4.1 Lead Centre comments

4.1.1 Dataflow

The current operational radiosonde is the Vaisala RS41.

4.1.2 Data quality

Two sondes exhibit RH differences larger than 5%RH in SHC groundcheck. If this is real: it is not recommended to launch radiosondes that exhibit such a large difference during the ground check.

4.1.3 General

There is very good performance in terms of burst altitude which is 10 hPa and higher.

4.2 GRUAN data products

Product	Version	Soundings received	Available at LC	Distributed by NCEI

4.2.1 Stream: RS41

RS41		366	366	
RS41-RAW	001		366	
RS41-EDT	001		363	
RS41-GDP	001		361	

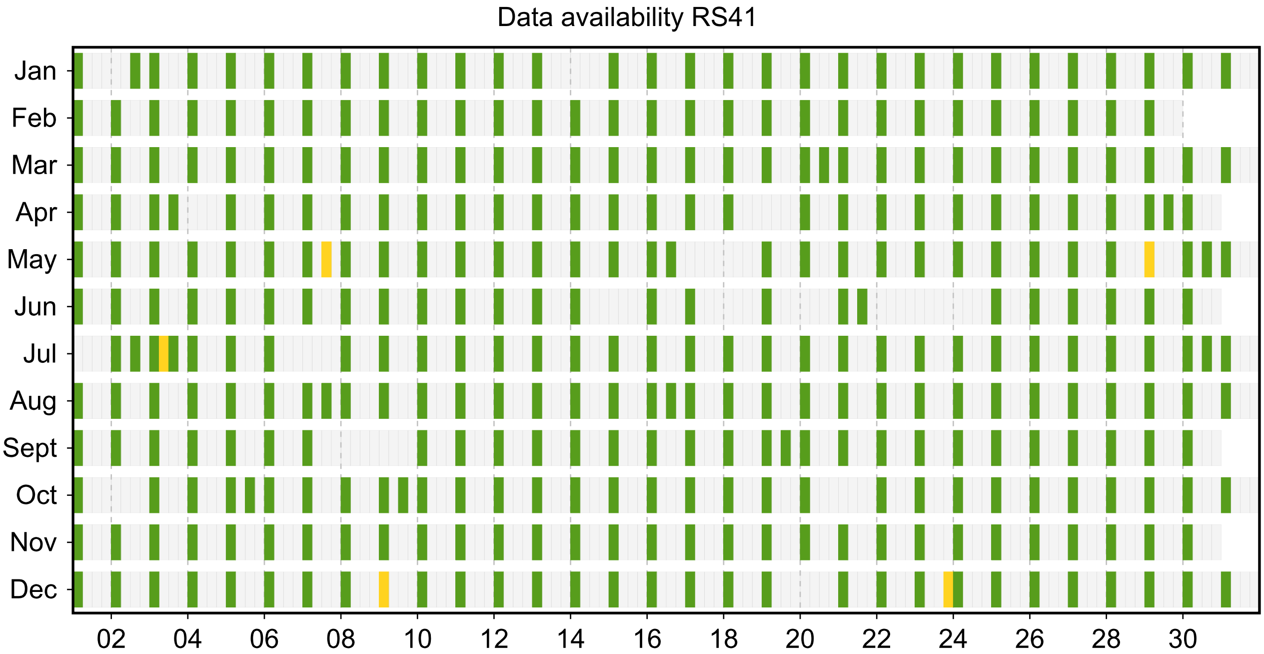
4.3 Availability of data products

Available (green): All steps of data processing have been successfully completed. The data product file is available at LC (e.g. files that didn't pass QA/QC or uncertified GRUAN data products) and/or at NCEI (a certified GRUAN data product file that did pass QA/QC).

Unprocessed (yellow): The manufacturer-produced file with raw measurement data has been successfully converted into a GRUAN-standardized raw data format (NetCDF). The GRUAN data processing has not been performed or was aborted. Reasons for this may be a still missing GRUAN data processor or a processing-software error.

Original (red): The original, manufacturer-produced, raw data file is available (e.g. MWX data file) but was not converted into a GRUAN-standardized raw data format (NetCDF). Reasons for this may be missing data conversion software, a software error, or a corrupt data file.

4.3.1 Stream: RS41



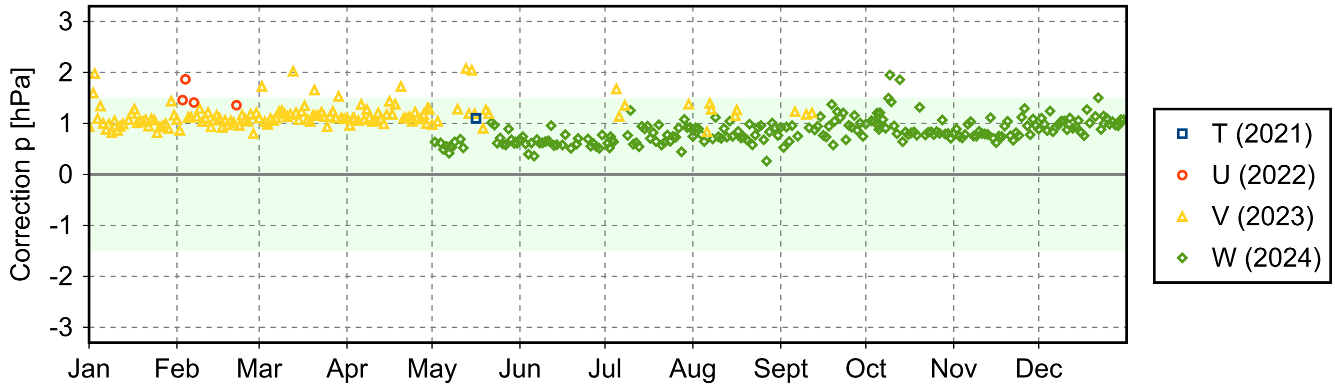
4.4 Instrument combinations of CAB-RS-01

Count	Instrument combination
366	RS41

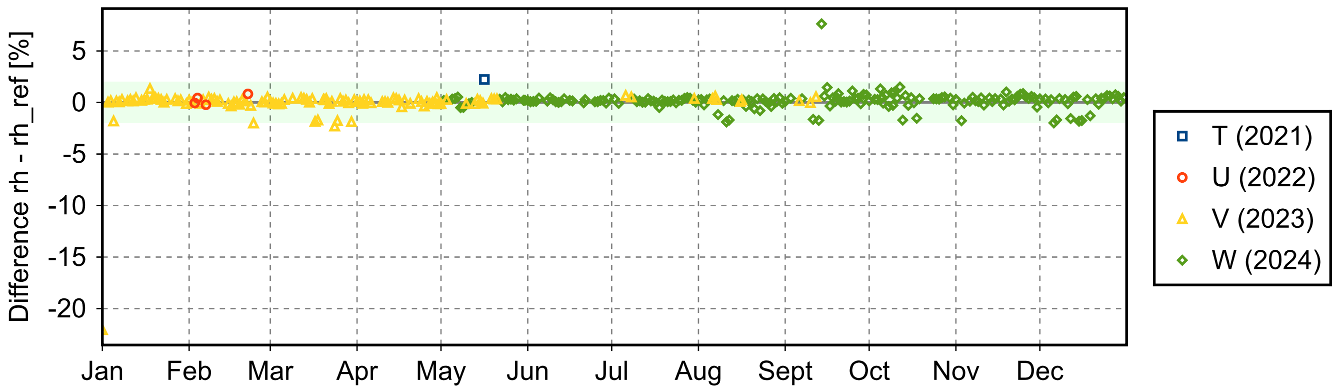
4.5 Instrument ground check

4.5.1 Stream: RS41

(1) GroundCheck: GC-RI41



(2) GroundCheck: GC-SHC



4.6 Measurement events