



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

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**12th GRUAN Implementation-  
Coordination Meeting (ICM-12)**

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Session 1

Virtual

16 - 20 November 2020

## GRUAN Site Report for Graciosa

*(Submitted by Evan Keeler)*

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### **Summary and Purpose of this Document**

Report from the GRUAN site Graciosa for the period January to December 2019.

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## **Overview**

The ARM Eastern North Atlantic (ENA) site in Graciosa, Portugal operated two Vaisala MW41 manual launch systems during 2019. The systems are designated C1 and S01. Both manual launch systems share a single UHF-GPS antenna set. ENA conducts 2 flights per day, launching at 00Z and 12Z. These flights are primarily conducted with the C1 system, however the site has the capability to do dual launches. All flight data is sent to the ARM Data Archive for processing and distribution.

## **Change and change management**

The site continues its normal operational launches described above as well as supporting the JPSS program. Phase 8 of the JPSS program continued through the end of 2019 with plans for phase 8 to end in 2020. Phase 9 will be started in 2020.

## **Resourcing**

Currently at ENA intends to continue launching standard ARM radiosondes without changes to the schedule while continuing support of research projects. Resourcing needs have been identified for the burstpoint at or above 10 hPa and the 100 % humidity chamber. ARM needs a request with sufficient scientific justification to make these changes to the sites.

## **Operations**

The operations concerns at ENA are the need to modify the operations to include the 600g balloons to consistently reach 10mb and the incorporation of the 100 % humidity chamber. However, this is more of a resourcing issue to provide the justification needed for ARM to make this change. The purchase of the 100 % humidity chamber needs to be revisited, the last investigation reported that individual units could not be sold.

## **Site assessment and certification**

Graciosa certification status will require an internal review of ENAs capability to maintain certification. ARMs focus is bringing SGP up to requirements and certifying NSA once Autosonde requirements are outlined.

## **GRUAN-related research**

In 2019 the ENA site continued its support of the following field campaigns with Lori Borg as the Principal Investigator:

- ARM Radiosondes for Joint Polar Satellite System (JPSS) Validation Field Campaign
  - <https://www.osti.gov/servlets/purl/1526023>

Support for the JPSS campaign continued through 2019 at ENA. In 2020 funding will run out for phase 8 and phase 9 will begin.

## **WG-GRUAN interface**

ARM will need to provide sufficient scientific justification for the incorporation and purchasing of 600mb balloons and the 100 % humidity chamber into ENA operations. ARM will continue to work with the GURAN working group to monitor the literature and put forward the justification for this change.

## **Other archiving centers**

ARM data is placed only in the ARM Data Archive.

<https://www.archive.arm.gov/discovery/>

## **Participation in campaigns**

All ARM field campaign information is available on the ARM website at:

<https://www.arm.gov/research/campaigns>

Most supported field campaigns request radiosonde launches to support the targeted research.

## **Future plans**

In 2020 Evan Keeler will be replacing Donna Holdridge as the radiosonde mentor. The ENA site will continue to support the JPSS radiosonde launches. The ENA will also continue the 2 operational launches per day.

ARM will continue to operate radiosonde launches in arctic locations in the MOSAIC campaign. The ARM Mobile Facility 2 (AMF2) will be aboard the Polarstern. AMF1 will be in Andøya Island, Norway, NSA in Utqiagvik, AK.

All Sonde computer systems will be upgraded to windows 10 in 2020. This will require all MW41 software to be updated to 2.16.

SGP, ENA, and NSA plan to continue radiosonde operations at the current schedule. ARM will operate radiosonde launches in arctic locations during and in the MOSAIC campaign. The ARM Mobile Facility 2 (AMF2) will be aboard the Polarstern, AMF1 will be in Andøya Island, Norway, NSA in Utqiagvik, AK, and AMF3 in Oliktok, AK will be in their current locations.



# GRUAN Site Report for Graciosa (GRA), 2019

Reported time range is Jan 2019 to Dec 2019

Created by the Lead Centre

Version from 2020-11-05

## 1 General GRUAN site information

| Object                | Value  |
|-----------------------|--|
| Station name          | Graciosa   |
| Unique GRUAN ID       | GRA  |
| Geographical position | 39.0911 °N, -28.0266 °W, 30.5 m                              |
| Operated by           | ARM   US DOE Atmospheric Radiation Measurement (ARM) Program |
| Main contact          | Keeler, Evan   |
| WMO no./name          | -  |
| Operators             | currently 0, changes +0 / -0                                 |
| Sounding Site         | 1  |
| GNSS                  | 1  |

### 1.1 General information about GRUAN measurement systems

| System    | Name  | Type          | Setups | Measurements |
|-----------|---|---------------|--------|--------------|
| GRA-GN-01 | GNSS site ENAO                                    | GNSS          | 1      | operational  |
| GRA-RS-01 | Balloon-Borne Sounding System (SONDE) at Graciosa | Sounding Site | 4      | 777          |

### 1.2 General comments from Lead Centre

#### 1.2.1 General

ARM employs an automated procedure to transmit raw and processed measurement data.

ARM is kindly requested to inform the Lead Centre of any (upcoming) changes in equipment, launch schedule, or procedures so that the metadata database can be kept up-to-date.

## 2 System: GNSS site ENAO (GRA-GN-01)

| Object                | Value  |
|-----------------------|--|
| System name           | GNSS site ENAO   |
| Unique GRUAN ID       | GRA-GN-01  |
| System type           | GNSS (GN - GNSS)   |
| Geographical position | 39.0528 °N, -28.0134 °W, 91.9 m                              |
| Operated by           | ARM   US DOE Atmospheric Radiation Measurement (ARM) Program |
| Instrument contact    | Keeler, Evan   |
| Started at            | 2019-07-15   |
| Defined setups        | 1 (HOURLY)   |
| Possible streams      | -  |

### 2.1 Lead Centre comments

#### 2.1.1 Dataflow

Dataflow of GNSS data to GRUAN LC and to the GRUAN GNSS processing centre at GFZ has started in July 2019. The current dataflow includes manufacturer raw data, converted raw data (RINEX), instrument logs, and processed data.

The operational processing as GNSS-PW-GDP is performed.

### 3 System: Balloon-Borne Sounding System (SONDE) at Graciosa (GRA-RS-

| Object                | Value  |
|-----------------------|--|
| System name           | Balloon-Borne Sounding System (SONDE) at Graciosa            |
| Unique GRUAN ID       | GRA-RS-01  |
| System type           | Sounding Site (RS - Radiosonde)                              |
| Geographical position | 39.0911 °N, -28.0266 °W, 30.5 m                              |
| Operated by           | ARM   US DOE Atmospheric Radiation Measurement (ARM) Program |
| Instrument contact    | Keeler, Evan   |
| Started at            | 2009-04-16   |
| Defined setups        | 4 (ROUTINE, ROUTINE2, ROUTINE3, DUAL)                        |
| Possible streams      | RS41, RS92   |

#### 3.1 Lead Centre comments

##### 3.1.1 Dataflow

Dataflow is running fully automated from the ARM Archive to the GRUAN LC. Launch metadata are not checked manually. Equipment changes (e.g. balloon, unwinder, ...) are not recorded.

As a consequence it is essential that the Lead Centre is notified of all upcoming changes to be able to maintain a correct metadata record. (This comment applies to all ARM sites in GRUAN.)

Change of operational sonde from Vaisala RS92-SGP to Vaisala RS41-SG was on 12 January 2019.

Additional launches from the 'RIVAL' field campaign are included in the dataflow until March 2019.

#### 3.2 GRUAN data products

| Product | Version | Soundings received | Available at LC | Distributed by NCEI |
|---------|---------|--------------------|-----------------|---------------------|
|---------|---------|--------------------|-----------------|---------------------|

##### 3.2.1 Stream: RS41

|                |     |     |     |  |
|----------------|-----|-----|-----|--|
| RS41           |     | 755 | 755 |  |
| RS41-RAW       | 001 |     | 755 |  |
| RS41-EDT       | 001 |     | 753 |  |
| RS41-GDP-ALPHA | 001 |     | 98  |  |
| RS41-GDP-ALPHA | 002 |     | 597 |  |
| RS41-GDP-ALPHA | 003 |     | 263 |  |
| RS41-GDP-ALPHA | 004 |     | 8   |  |
| RS41-GDP-BETA  | 001 |     | 264 |  |

##### 3.2.2 Stream: RS92

|          |     |    |    |  |
|----------|-----|----|----|--|
| RS92     |     | 30 | 30 |  |
| RS92-INT | 001 |    | 30 |  |
| RS92-RAW | 002 |    | 30 |  |
| RS92-EDT | 001 |    | 30 |  |
| RS92-GDP | 002 |    | 29 |  |



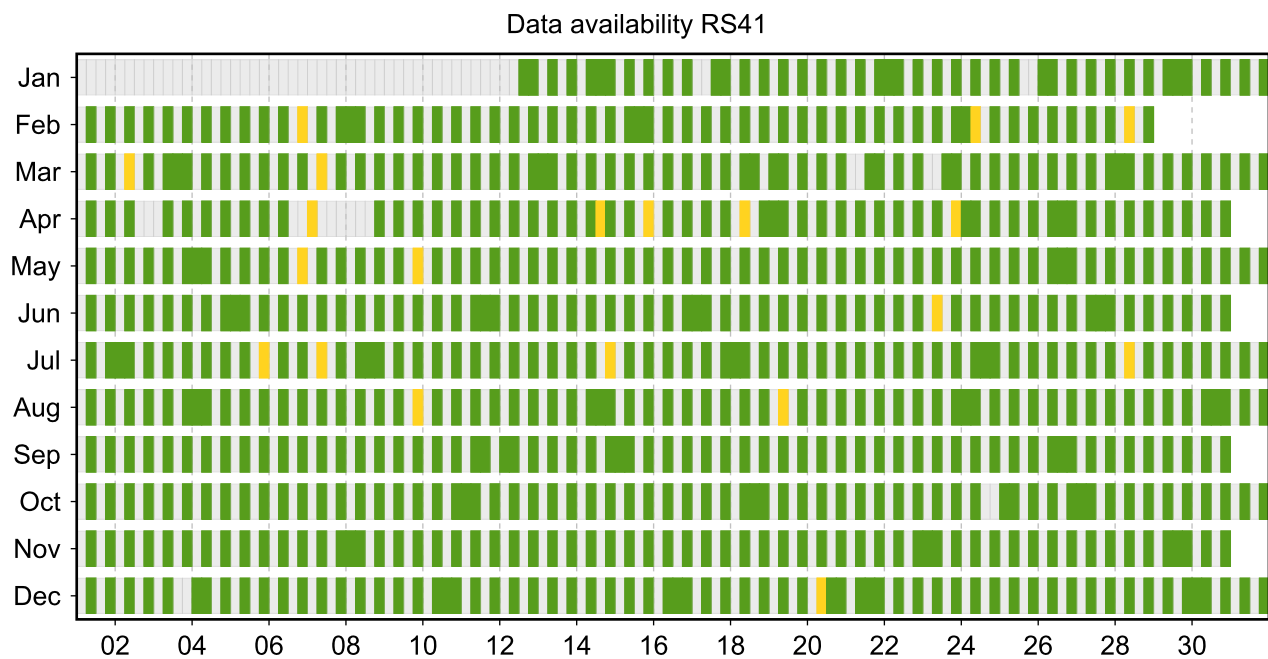
### 3.3 Availability of data products

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).

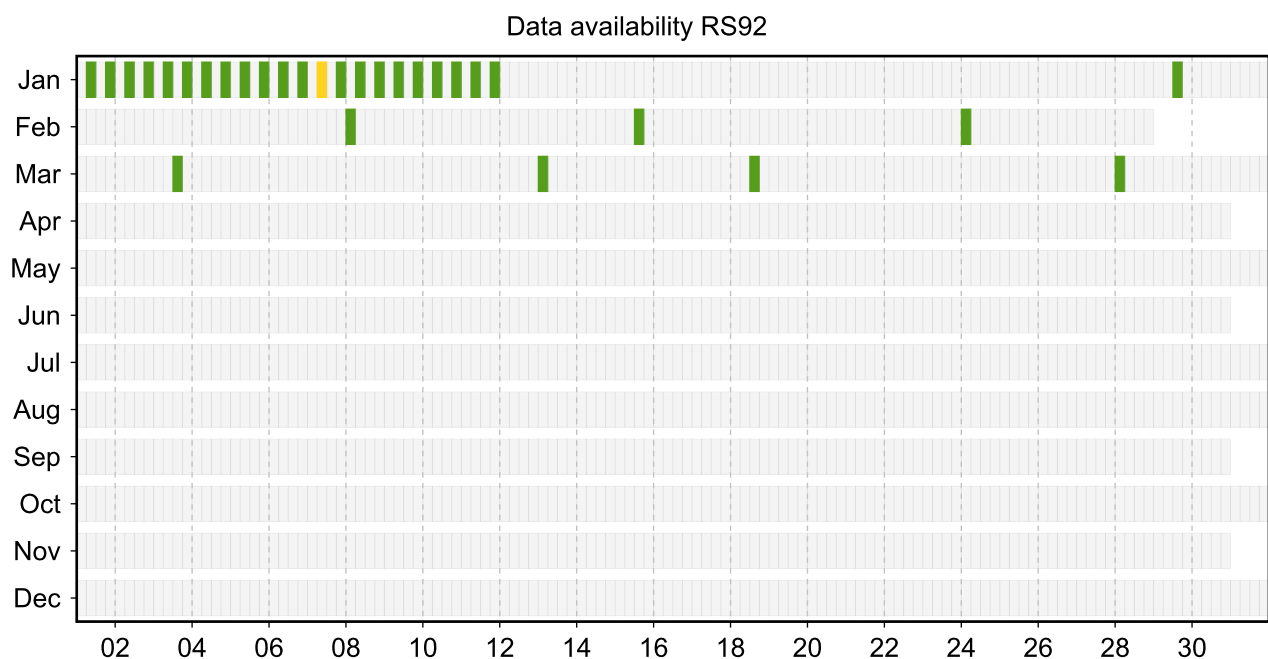
Unprocessed (yellow): The manufacturer-produced file with raw measurement data has been successfully converted into a GRUAN-standardized raw data format (NetCDF). The GRUAN data processing has not been performed or was aborted. Reasons for this may be a still missing GRUAN data processor or a processing-software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

#### 3.3.1 Stream: RS41



#### 3.3.2 Stream: RS92



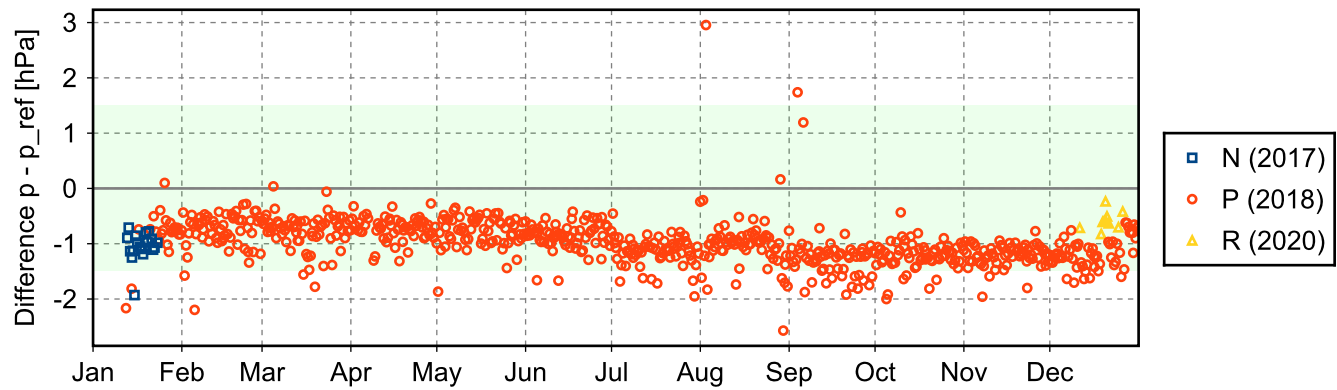
### 3.4 Instrument combinations of GRA-RS-01

| Count | Instrument combination |
|-------|------------------------|
| 747   | RS41                   |
| 8     | RS41, RS92             |
| 22    | RS92                   |

3.5 Instrument ground check

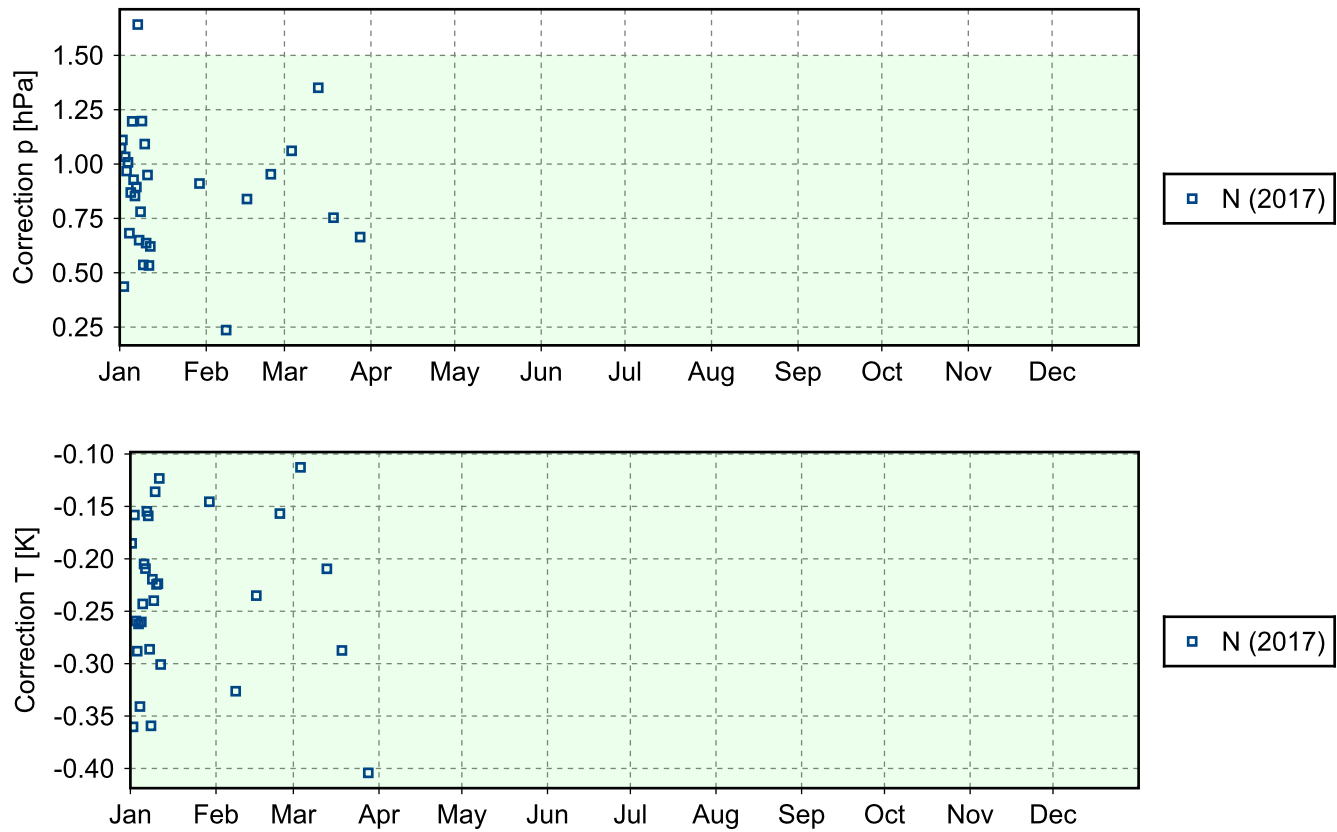
3.5.1 Stream: RS41

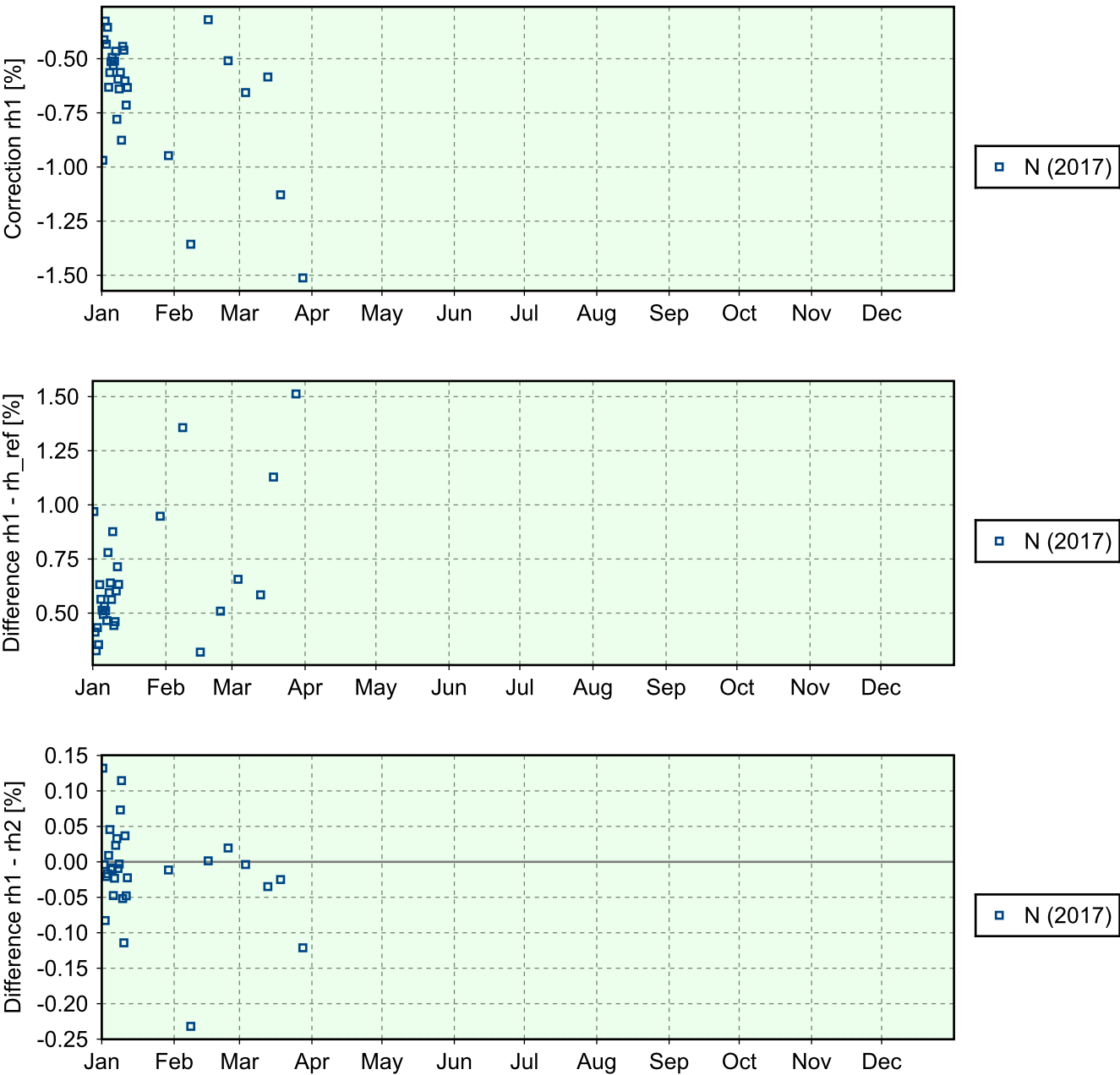
(1) GroundCheck: GC-RI41



3.5.2 Stream: RS92

(1) GroundCheck: GC-GC25





3.6 Measurement events

