



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

Doc. 7.09
(19.IV.2019)

**11th GRUAN Implementation-
Coordination Meeting (ICM-11)**

Session 7

Singapore

20 - 24 May 2019

GRUAN Site Report for Graciosa

(Submitted by Nicki Hickmon)

Summary and Purpose of this Document

Report from the GRUAN site Graciosa for the period January to December 2018.

Overview

The ARM Southern Great Plains (SGP) site near Lamont, Oklahoma operated four Vaisala MW41 manual launch systems during 2018. Each RS92-RS41 pair of MW41 systems shared a UHF-GPS antenna set and were grouped [C1+S02] and [S01+S03] for the purpose of the RIVAL field campaign. The ARM North Slope of Alaska (NSA) site in Barrow, Alaska operated two Vaisala MW41 manual launch systems and one Autosonde during 2018. The manual systems shared a UHF-GPS antenna set [S01+S02] for the purpose of the RIVAL field campaign.

The ARM Eastern North Atlantic (ENA) site on Graciosa, Azores, Portugal operated two Vaisala MW41 manual launch systems during 2018. The manual systems shared a UHF-GPS antenna set [C1+S01] for the purpose of the RIVAL field campaign.

System Status:

Site/Facility	MW41 Software Upgrade Date	RS41 Start Date	Radiosondes Used
SGP C1	12 April 2017	13 November 2017	RS41
SGP S01	12 April 2017	14 January 2018	RS41
SGP S02	12 April 2017	–	RS92
SGP S03	On Loan from Vaisala	–	RS92
NSA C1(Autosonde)	15 September 2017	18 October 2017	RS41
NSA S01	12 April 2017	27 February 2018	RS41
NSA S02	12 April 2017	–	RS92
ENA C1	11 April 2018	12 January 2019	RS41
ENA S01	12 April 2017	–	RS92
ENA S01	12 April 2017	3 Apr. 2018 to 11 Jan. 2019	RS41 (for RIVAL)

CFH and associated RS92/41 radiosondes are launched monthly at the SGP site.

Change and change management

As part of the RIVAL field campaign, SGP S01 began launching RS41 radiosondes on 14 January 2018. The addition of a fourth ground station (on loan from Vaisala) launching RS92 radiosondes for RIVAL was completed in January 2018. The first launch took place 13 February 2018.

Resourcing

Currently ARM intends to continue launching standard ARM radiosondes without changes to the schedule. Resourcing needs have been identified for the burstpoint at or above 10 hPa and the humid-

ity chamber. A request needs to be submitted defining the scientific community goals and needs for these upgrades. This can be submitted by non-ARM infrastructure through our ARM field campaign submission. This will trigger the review and subsequent decision regarding the upgrades.

Operations

ARM has identified the impacts of assuring that all ARM radiosondes reach 10 hPa. The budget impacts for purchasing 600-gram balloons, modification to the balloon launchers, and increase the amount of Helium have been provided to ARM management. In addition, ARM would like to investigate the benefit increasing the burst height of its radiosondes with regard to the difference in the amount of integrated water vapour in the atmospheric column at the current and proposed heights of balloon bursts.

The ARM Facility has transitioned fully to RS41 radiosondes at SGP, NSA and ENA, except for RS92 used for the RIVAL Field Campaign.

ARM SGP, NSA and ENA sites have all added an Alicat Scientific MC Series mass flow controller to control our helium use and to provide for consistent balloon fills and ascent rates.

To provide for a the RS41 and RS92 radiosonde humidity check at 100 % RH prior to launch. We have been informed that SHC1 units from Dr. Schultz and Partner in Germany are only available in lots of 10 units, so this purchase is on hold.

Site assessment and certification

SGP has been certified. NSA will be submitted when a path forward for autosonde style launching is determined.

GRUAN-related research

Lori Borg is the Principle Investigator of a Field Campaign via ARM: Radiosonde Intercomparison & VALidation (RIVAL). The proposal was approved and site preparations were started/completed at SGP, NSA, and ENA. The first official RIVAL launch took place at the SGP on 13 February 2018. (<https://www.arm.gov/publications/programdocs/doe-sc-arm-17-019.pdf>)

ARM intends to provide radiosondes for the MOSAIC field campaign as part of our mobile facility activities. AWI will process this data through GRUAN and make it available in the PANGEA database.

WG-GRUAN interface

Provide scientific justification for desired upgrades for burstpoint and humidity check.

Items for ICM-11 plenary discussions

- Autosonde site certification, scientific need for 10 hPa burstpoint.
- Arctic measurements during MOSAIC. It may be possible to provide GRUAN processed data from many sites during these activities.

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.

GRUAN-related Campaigns:

1. RIVAL campaign is beginning at three ARM sites; SGP, NSA, and ENA in early 2018 to coincide with the launch of NOAA-20.

<https://www.arm.gov/research/campaigns/sgp2017rival>

2. JPSS satellite validation launches are continuing into the 6th year at SGP, NSA, and ENA.

<https://www.arm.gov/research/campaigns/sgp2017rdosnppjpss>

Future plans

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), 2018

Reported time range is Jan 2018 to Dec 2018

Created by the Lead Centre

Version from 2019-05-09

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	Hickmon, Nicki
WMO no./name	-
Operators	currently 0, changes +0 / -0
Sounding Site	1

1.1 General information about GRUAN measurement systems

System	Name	Type	Setups	Measurements
GRA-RS-01	Balloon-Borne Sounding System (SONDE) at Graciosa	Sounding Site	3	748

1.2 General comments from Lead Centre

1.2.1 General

ARM site.

ARM is using an automated routine to transmit data and raw data. ARM is requested to inform the Lead Centre of all upcoming changes in equipment, launch schedule or procedures to be able to update the metadata database.

It is strongly recommended that the site uses a manufacturer independent ground check, e.g. SHC, for the RS41 radiosonde.

2 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	Hickmon, Nicki
Started at	2009-04-16
Defined setups	3 (ROUTINE, ROUTINE2, ROUTINE3)
Possible streams	RS41, RS92

2.1 Lead Centre comments

2.1.1 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.)

In 2018, the operational radiosonde was the Vaisala RS92.

2.2 GRUAN data products

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

2.2.1 Stream: RS41

RS41		17	17	
RS41-RAW	001		17	
RS41-EDT	001		17	
RS41-GDP-ALPHA	002		16	

2.2.2 Stream: RS92

RS92		731	731	
RS92-GCA	001		2	
RS92-INT	001		539	
RS92-RAW	001		190	
RS92-RAW	002		731	
RS92-EDT	001		728	
RS92-GDP	002		637	371

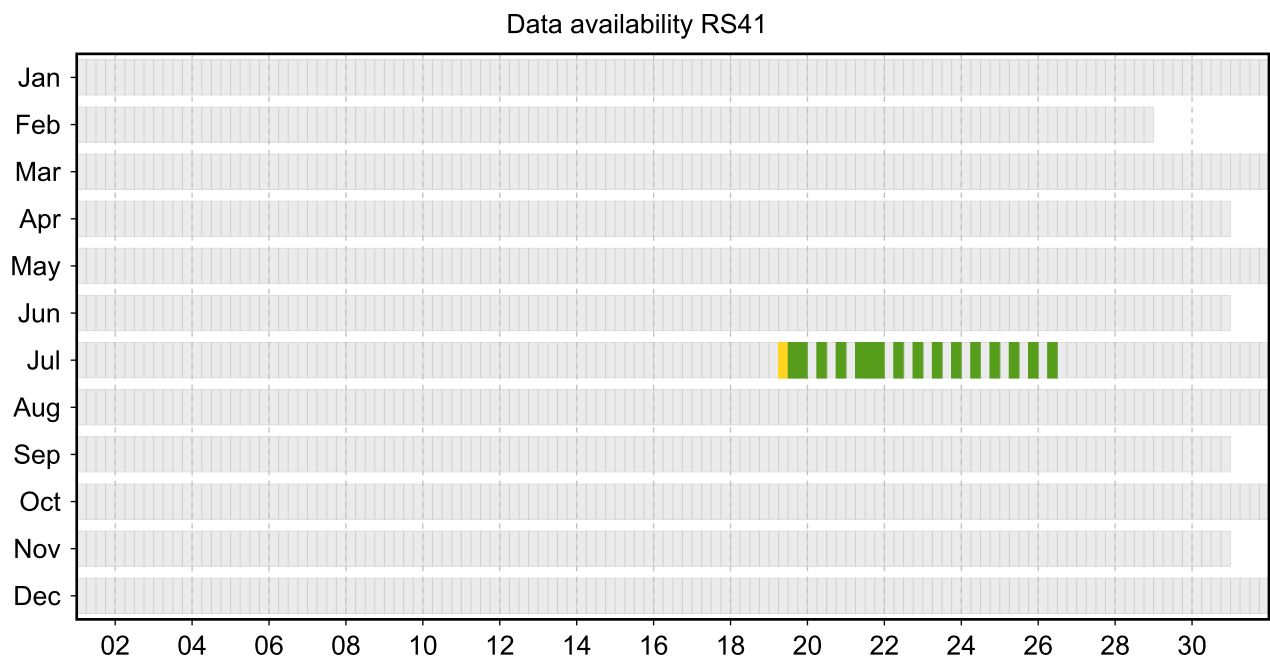
2.3 Data availability of data products

Available (green): All steps of processing have been successfully completed. The data file is available at LC (e.g. unapproved or uncertified GRUAN data products) and at NCEI (approved and certified GRUAN data products).

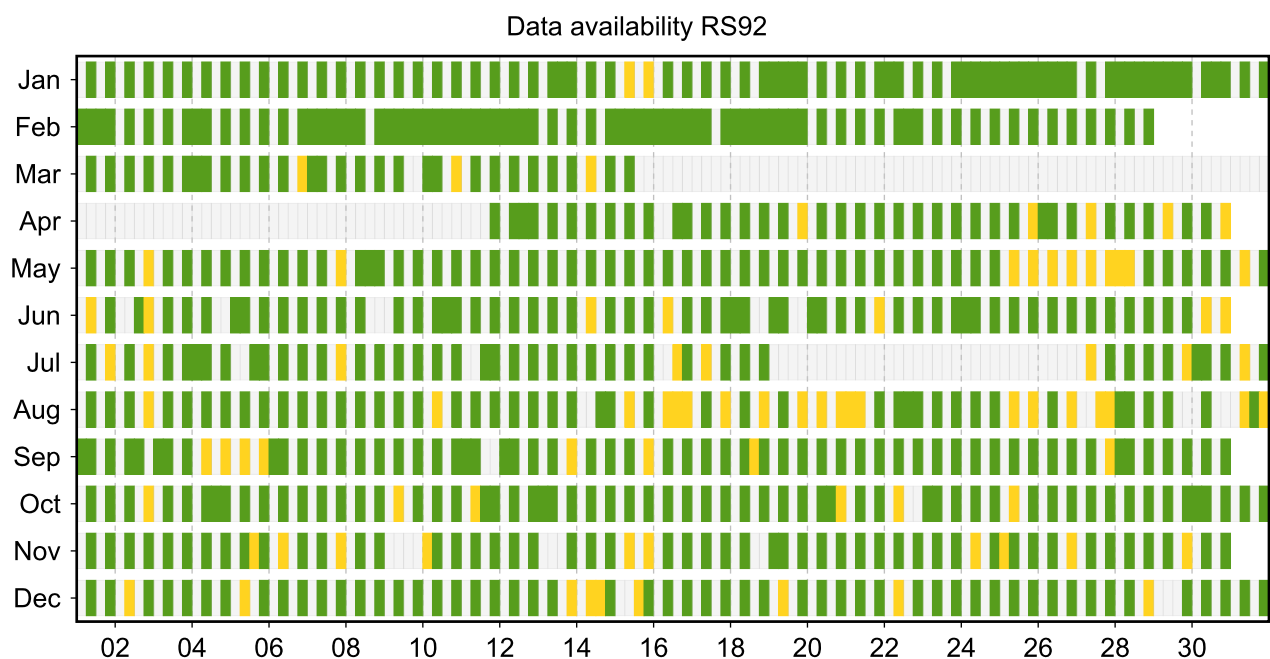
Unprocessed (yellow): The raw data file has been successfully converted to a GRUAN standardized raw data file format (NetCDF). The processing (e.g. GRUAN data processing) has not yet been done, or has not been completed. Reason may be a processing routine which does not yet exist, or software errors.

Original (red): The original raw data file is available (e.g. MWX). The raw data file was not converted to a GRUAN standardized raw data file format (NetCDF). Reason may be a converting routine which does not yet exist, or a corrupt original raw data file, or software errors.

2.3.1 Stream: RS41



2.3.2 Stream: RS92



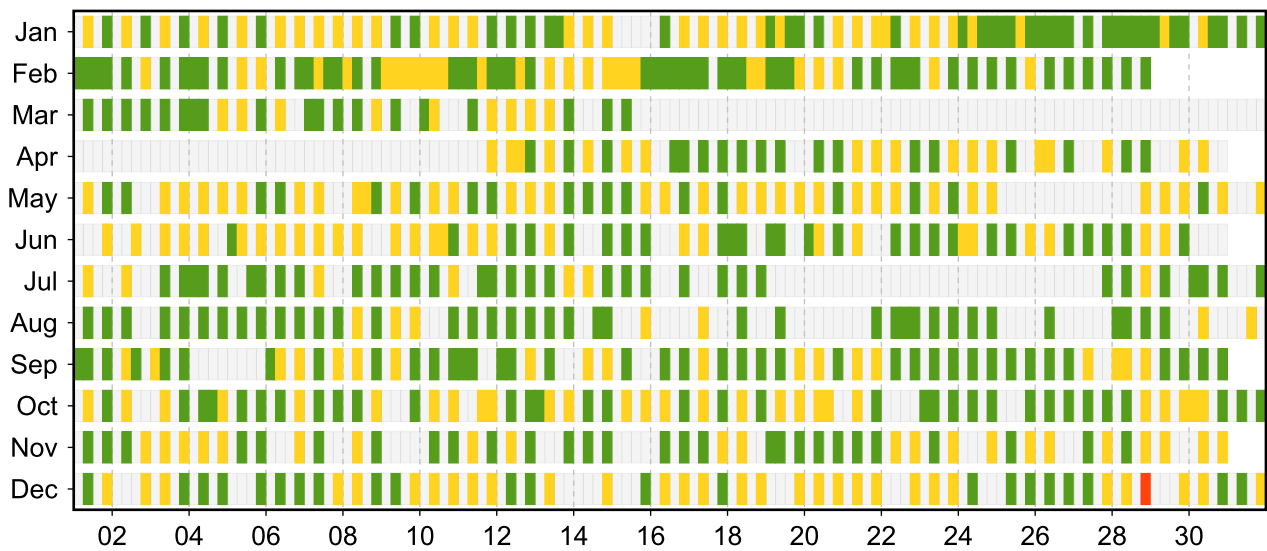
2.4 Data quality of current GRUAN data products

Month	Total	GRUAN Data Quality			Issues				
		Approved	Checked	Rejected	Meta-data	Process.	Press	Temp	RH

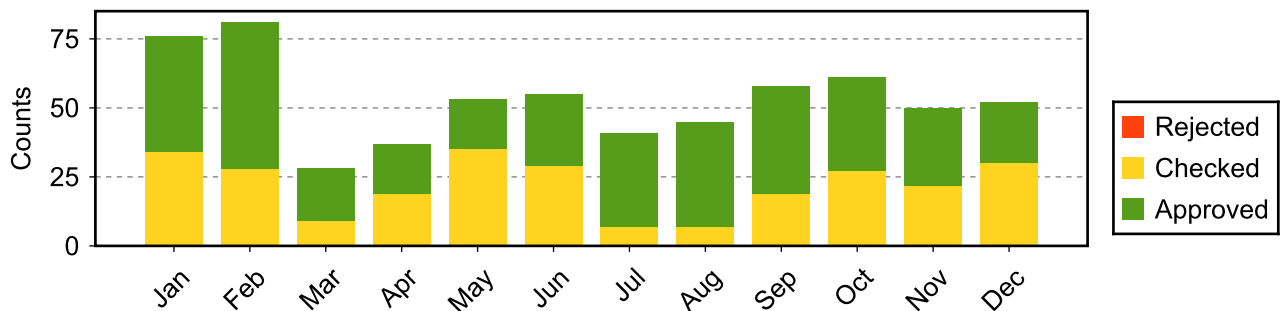
2.4.1 Stream: RS92 (Product: RS92-GDP-002)

Month	Total	Approved	Checked	Rejected	Meta-data	Process.	Press	Temp	RH
Jan	76	42	34				1		34
Feb	81	53	28						28
Mar	28	19	9						9
Apr	37	18	19						19
May	53	18	35						35
Jun	55	26	29				4		28
Jul	41	34	7				1		6
Aug	45	38	7				1		7
Sep	58	39	19				1		18
Oct	61	34	27				2		26
Nov	50	28	22				2		22
Dec	52	22	30				2		30
Sum	637	371	266				14		262

Data quality of stream RS92



Data quality statistic of stream RS92



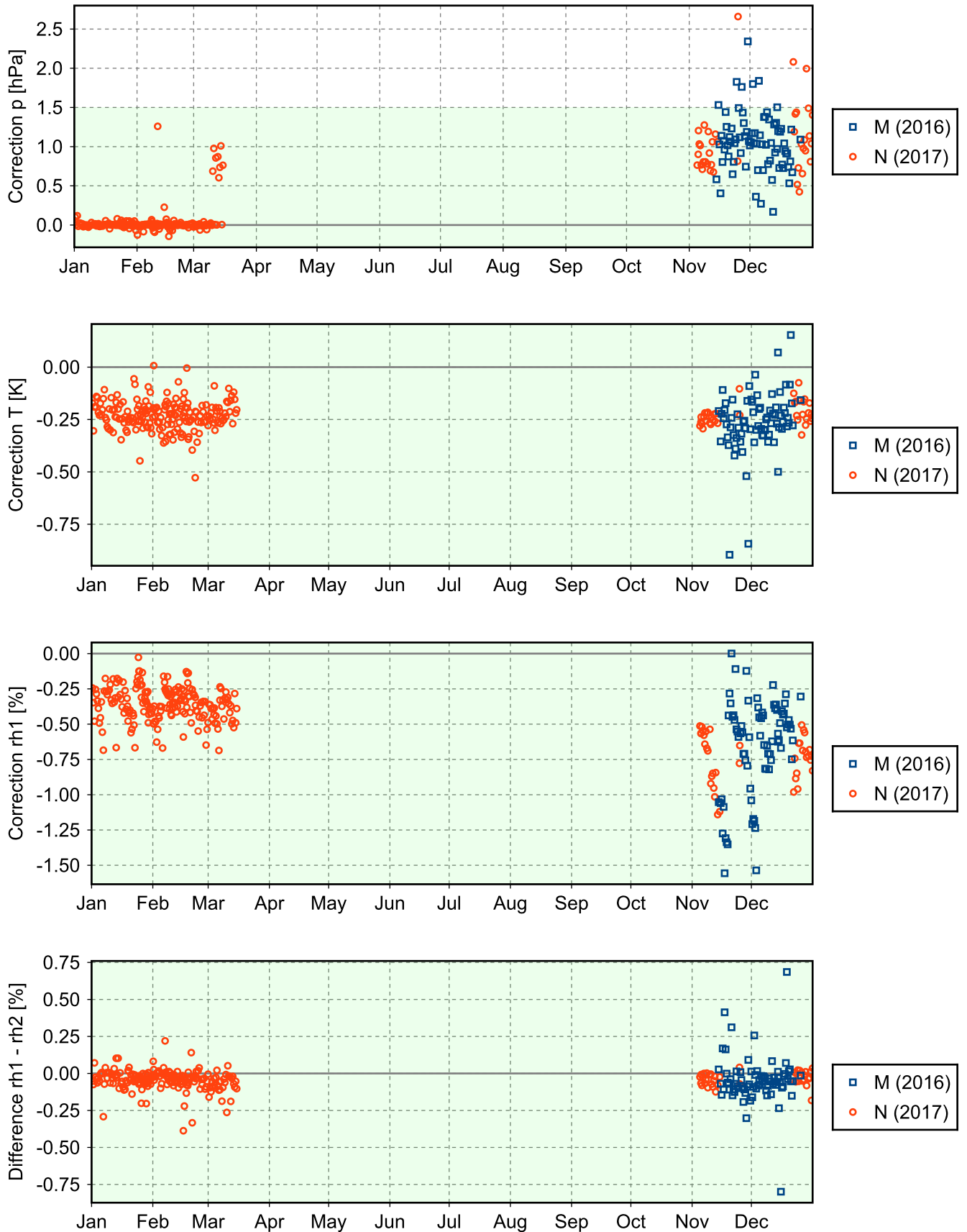
2.5 Instrument combinations of GRA-RS-01

Count	Instrument combination
17	RS41
731	RS92

2.6 Instrument ground check

2.6.1 Stream: RS92

(1) GroundCheck: GC-GC25



2.7 Measurement events

