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GLOBAL CLIMATE OBSERVING
SYSTEM (GCOS)

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

Session 7

Singapore
20 - 24 May 2019

GRUAN Site Report for Lauder

(Submitted by Richard Querel)

Summary and Purpose of this Document

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

Overview

The upper-air balloon programme at Lauder consisting of radiosondes, ozonesondes, and NOAA frost-point hygrometers, are all being submitted to GRUAN. The GNSS receiver data are also being submitted to GRUAN. Lauder hosts several NDACC and WOUDC submitting instruments that could be brought into GRUAN once formal products are defined. We are working with the Invercargill GUAN site and McMurdo station and are submitting their radiosonde data to the LC for GRUAN processing.

Change and change management

We have exhausted our supply of RS92 radiosonde (but still have several OIF92 boards we could donate to another group). We fly RS41 and Internet radiosondes. NIWA's ozonesonde processing software has been fully re-coded in Python. This new processor is identical in output result, but now allows for easier implementation of discrete modules to deal with homogenisation corrections and transfer functions. The system has been used to reprocess the entire Lauder ozonesonde timeseries as part of the ongoing homogenisation effort being done by the ozonesonde community. Since late 2018 we have provided the U.S. McMurdo radiosounding facility with an SHC and are receiving their MW41 .mwx files for uploading to the Lead Centre for GRUAN processing.

Resourcing

Lauder has 9 staff (4 full-time scientists, 4 full-time technicians, and 1 part-time maintenance person). Our current funding is stable, albeit shrinking in real terms. We have been successful in funding new instrumentation and hardware upgrades (i.e. two new HR125 Bruker FTS, three new MAXDOAS spectrometers, etc.), but are not making any progress in trying to fund more personnel. There is enough work for an additional scientist and technician but no funding yet to support them. Our balloon technician has given notice that they will resign as of September 2019. We are preparing to advertise this position.

Operations

No operational challenges. We are still considering building a tall shed for filling our balloons out of the wind, but to-date it is a low priority.

Site assessment and certification

Lauder has recently been re-certified. We are in the process of proposing our instruments at the Arrival Heights facility in NZ-Antarctica as a new GRUAN site. It would be managed through Lauder.

GRUAN-related research

- Radiosondes, ozonesondes, FPH, GNSS.
- Working on the GRUAN Ozonesonde Technical Document. Development of a trial GRUAN ozonesonde product based on community best practice.

WG-GRUAN interface

Support letter encouraging on-going measurements

Items for ICM-11 plenary discussions

- Status of the RS92-MW41, RS41 processing
- GEOMS format data for easier interchange with other networks
- SHC usage and SOP for sites
- Ozonesondes in GRUAN

Other archiving centers

GAW, NDACC, WOUDC, BSRN, TCCON

Participation in campaigns

- NDACC Dobson intercomparison in Melbourne (Lauder and Arrival Heights Dobson instruments)
- TIMTAM (MAXDOAS intercomparison in Melbourne (February 2017))
- SAGE3/ISS balloon launches during overpasses (ECC + FPH + POPS)
- NDACC stratospheric LIDAR intercomparison planned for 2019 with NASA Mobile LIDAR

Future plans

- RIVM have installed their hardware and software upgrade to the stratospheric ozone LIDAR in October 2018. NIWA has taken over the responsibilities of operating and processing data and submitting to NDACC and CAMS27 (rapid-delivery). We are working with JPL/Thierry LeBlanc to process the LIDAR data with GLASS. A full hardware upgrade of the LIDAR is being proposed.
- Dobson and Ozonesonde data are having their data converted into GEOMS format for participation in CAMS27 / real-time satellite validation.
- UV/vis data are being submitted to FRM4DOAS for central processing
- Automated sun-tracker hatch being prepared for FTIR at Arrival Heights (based on the Lauder units)
- EM27 campaign at Arrival Heights
- Increased FTIR automation in operations and processing



GRUAN Site Report for Lauder (LAU), 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	Lauder
Unique GRUAN ID	LAU
Geographical position	-45.0500 °S, 169.6800 °E, 370.0 m
Operated by	NIWA National Institute of Water & Atmospheric Research
Main contact	Querel, Richard
WMO no./name	93817 LAUDER UPPER AIR
Operators	currently 5, changes +0 / -0
Sounding Site	2
GNSS	1

1.1 General information about GRUAN measurement systems

System	Name	Type	Setups	Measurements
LAU-GN-01	GNSS Site LDRZ	GNSS	1	operational
LAU-RS-01	Radiosonde Launch Site (Lauder)	Sounding Site	6	55
LAU-RS-02	Radiosonde Launch Site (Invercargill)	Sounding Site	1	718

1.2 General comments from Lead Centre

1.2.1 General

In March 2014, the dataflow from Lauder has started.

In September 2016, an additional dataflow of daily operational sounding from Invercargill has started.

In October 2018, large improvement of burstpoint altitude after change of balloon type in Invercargill.

2 System: GNSS Site LDRZ (LAU-GN-01)

Object	Value
System name	GNSS Site LDRZ
Unique GRUAN ID	LAU-GN-01
System type	GNSS (GN - GNSS)
Geographical position	-45.0380 °S, 169.6840 °E, n m
Operated by	NIWA National Institute of Water & Atmospheric Research
Instrument contact	Querel, Richard
Started at	2012-05-01
Defined setups	1 (HOURLY)
Possible streams	-

2.1 Lead Centre comments

2.1.1 Dataflow

Measurements are recorded at station since May 2012.

Dataflow of GNSS data to GRUAN LC and the GRUAN GNSS processing centre at GFZ has started in February 2015. The current dataflow includes manufacturer raw data, converted raw data (RINEX) and instrument logs, containing all equipment changes.

3 System: Radiosonde Launch Site (Lauder) (LAU-RS-01)

Object	Value
System name	Radiosonde Launch Site (Lauder)
Unique GRUAN ID	LAU-RS-01
System type	Sounding Site (RS - Radiosonde)
Geographical position	-45.0500 °S, 169.6800 °E, 370.0 m
Operated by	NIWA National Institute of Water & Atmospheric Research
Instrument contact	Querel, Richard
Started at	-
Defined setups	6 (OZONE, FPH-OZONE, RS-ONLY, RS41-ONLY, RESEARCH, OZONE-2)
Possible streams	ECC, FPH, IMET-1, RS41, RS92

3.1 Lead Centre comments

3.1.1 General

Ozone soundings are launched weekly. Research soundings using FPH, ECC, iMet-1, and Vaisala RS92 or RS41 are launched approximately once per month.

3.2 GRUAN data products

Product	Version	Soundings received	Available at LC	Distributed by NCEI
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3.2.1 Stream: ECC

ECC		55	55	
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3.2.2 Stream: FPH

FPH		11	11	
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3.2.3 Stream: RS41

RS41		35	35	
RS41-GCA	001		35	
RS41-RAW	001		35	
RS41-EDT	001		35	
RS41-GDP-ALPHA	002		29	

3.2.4 Stream: RS92

RS92		20	20	
RS92-INT	001		19	
RS92-RAW	002		20	
RS92-EDT	001		19	
RS92-GDP	002		17	17

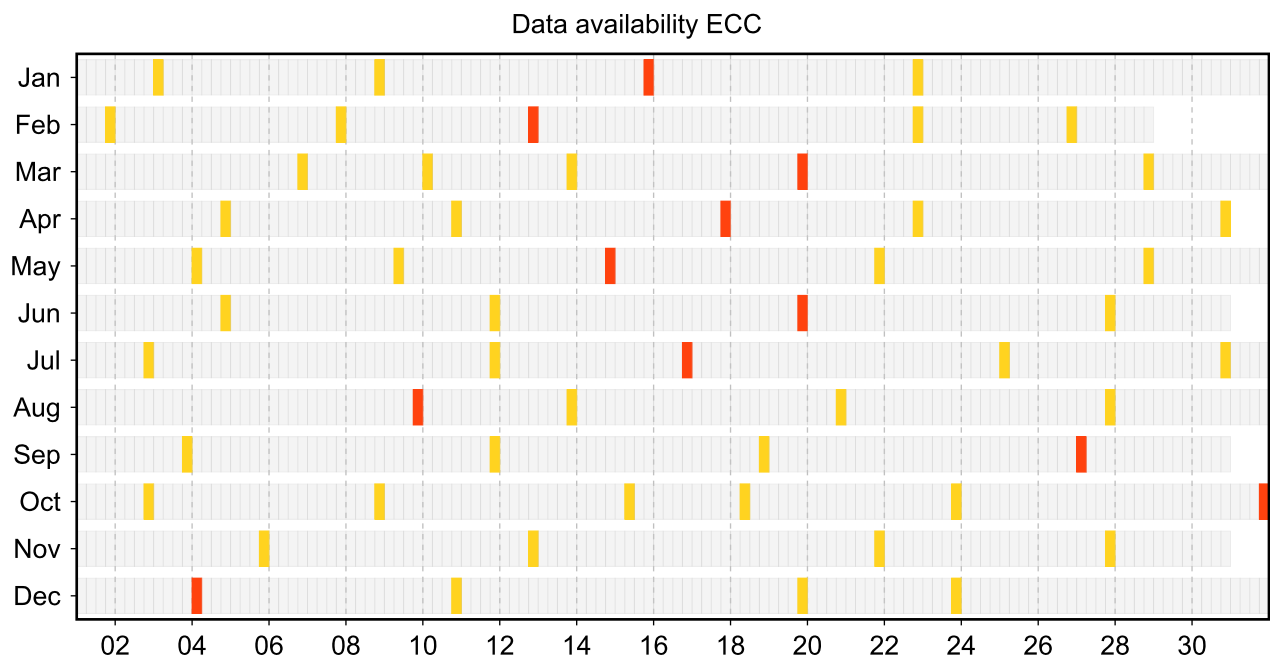
3.3 Data availability of data products

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).

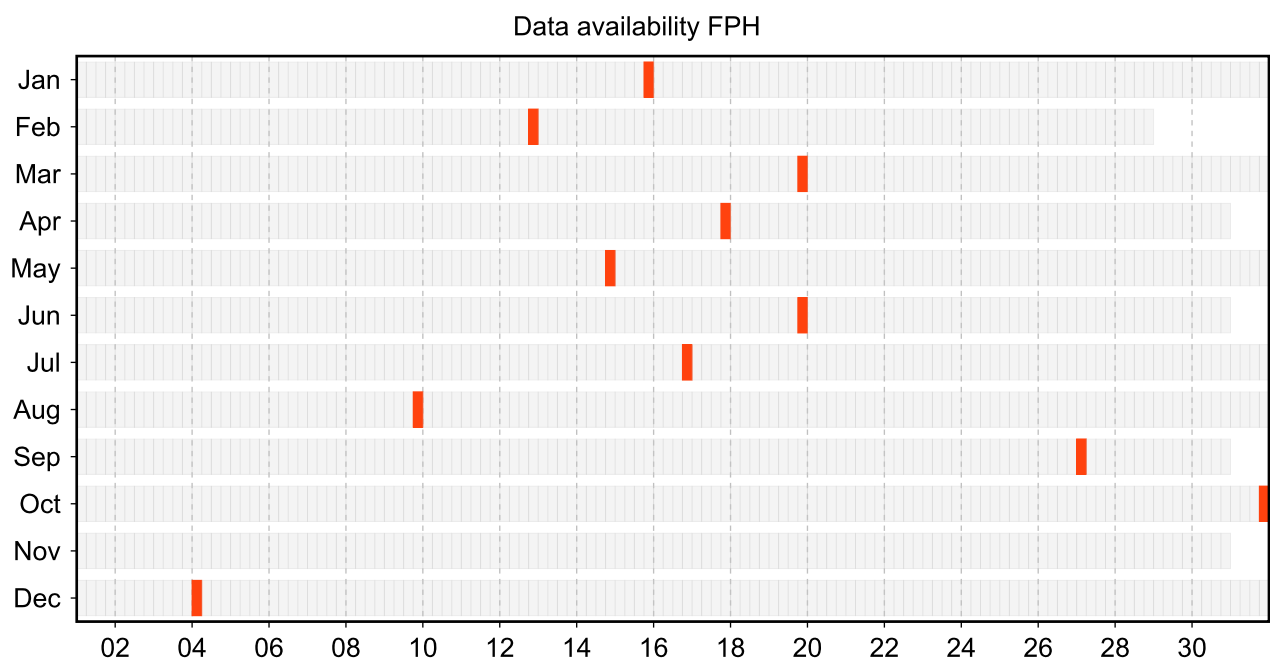
Unprocessed (yellow): The raw data file has been successfully converted to a GRUAN standardized raw data file format (NetCDF). The processing (e.g. GRUAN data processing) has not yet been done, or has not been completed. Reason may be a processing routine which does not yet exist, or software errors.

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.

3.3.1 Stream: ECC

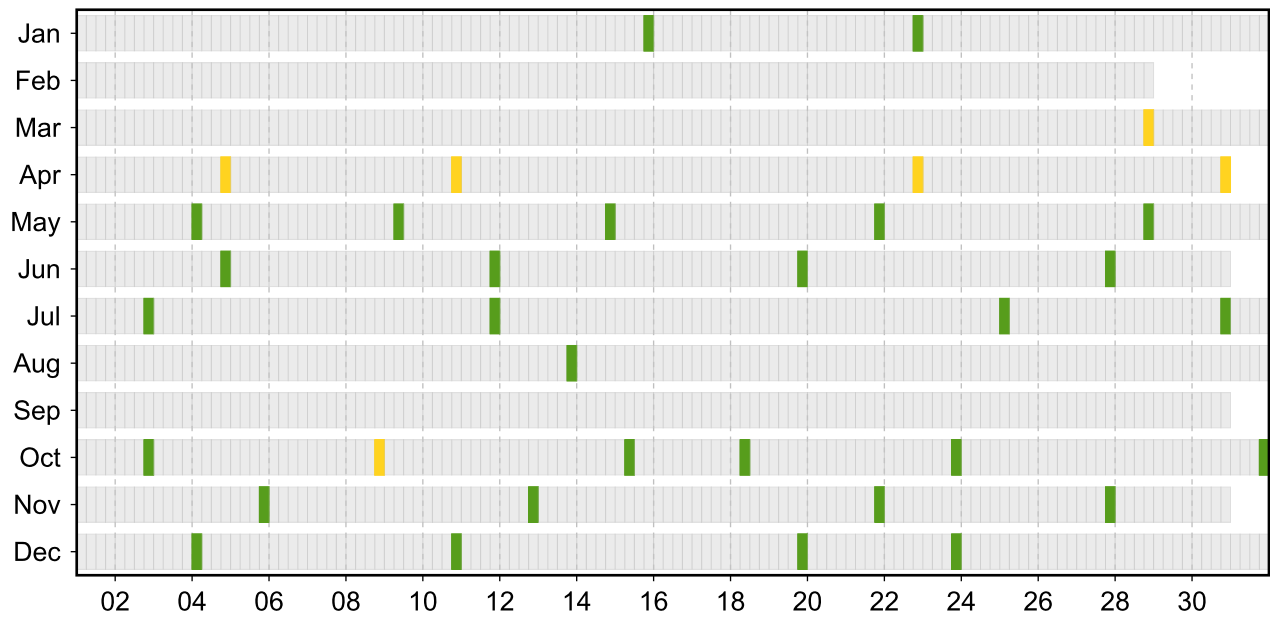


3.3.2 Stream: FPH



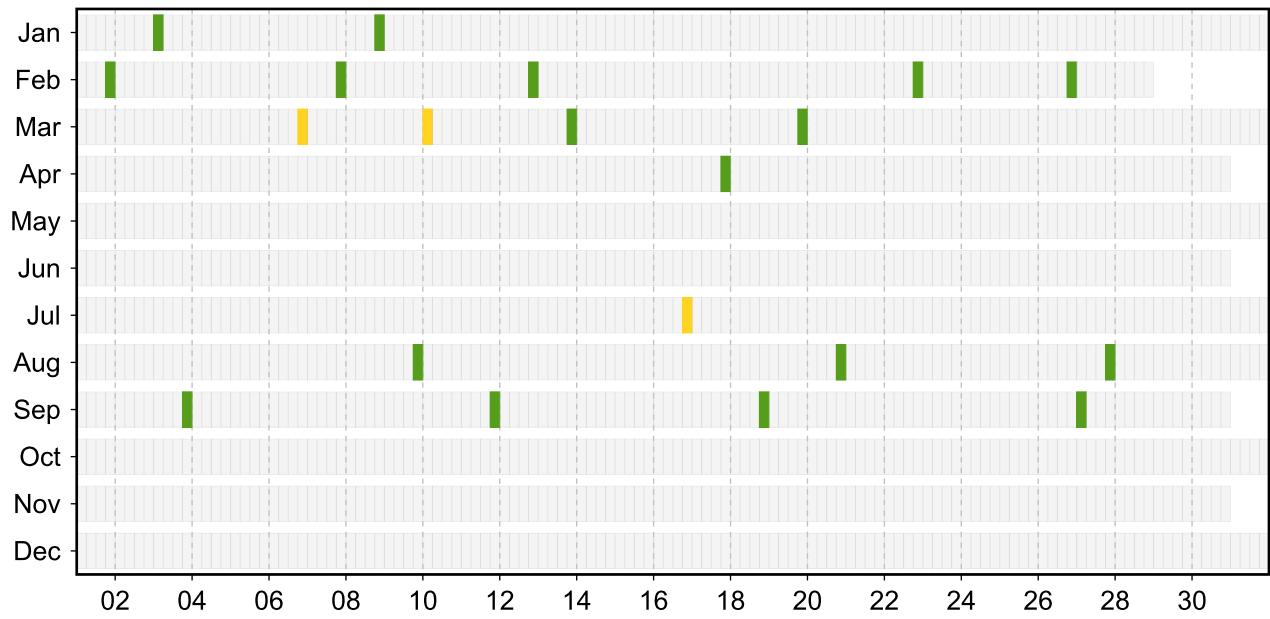
3.3.3 Stream: RS41

Data availability RS41



3.3.4 Stream: RS92

Data availability RS92



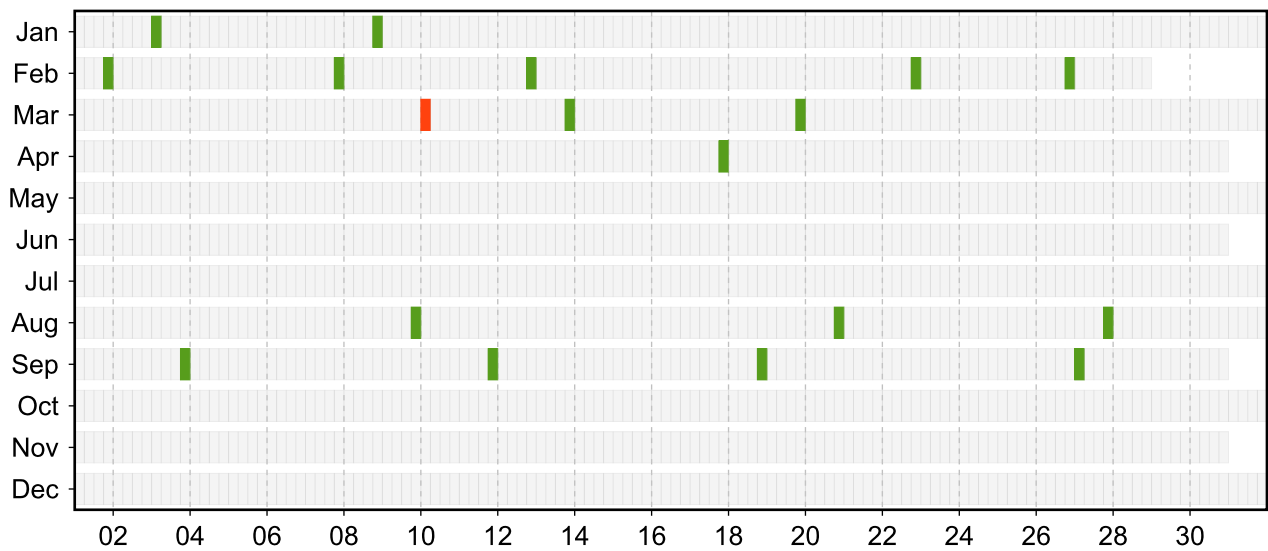
3.4 Data quality of current GRUAN data products

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

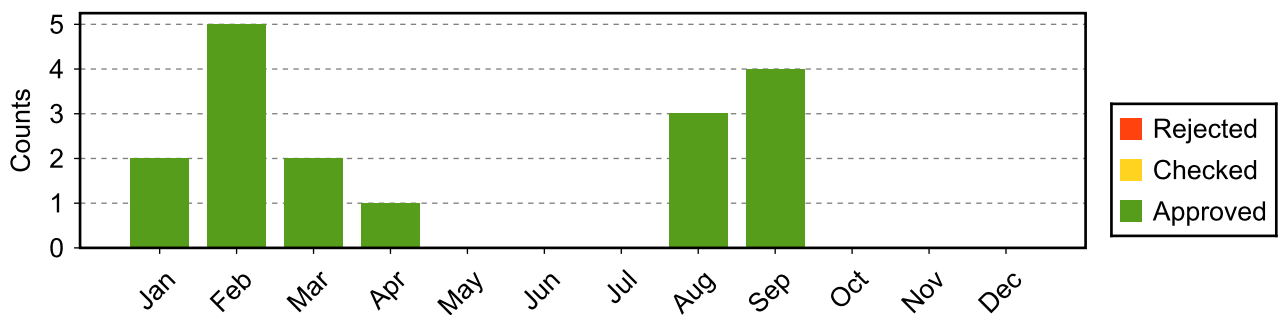
3.4.1 Stream: RS92 (Product: RS92-GDP-002)

Jan	2	2							
Feb	5	5							
Mar	2	2							
Apr	1	1							
May									
Jun									
Jul									
Aug	3	3							
Sep	4	4							1
Oct									
Nov									
Dec									
Sum	17	17							1

Data quality of stream RS92



Data quality statistic of stream RS92



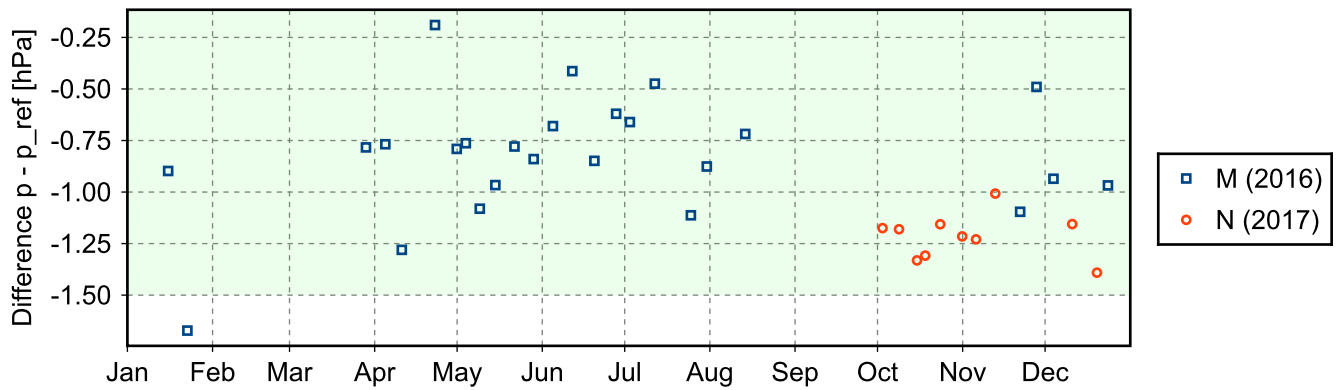
3.5 Instrument combinations of LAU-RS-01

Count	Instrument combination
5	ECC, FPH, RS41
6	ECC, FPH, RS92
30	ECC, RS41
14	ECC, RS92

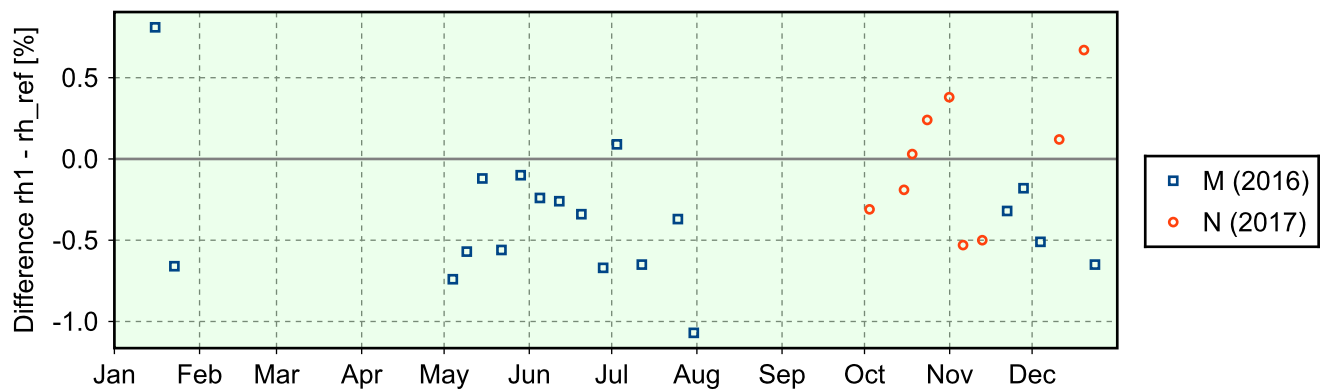
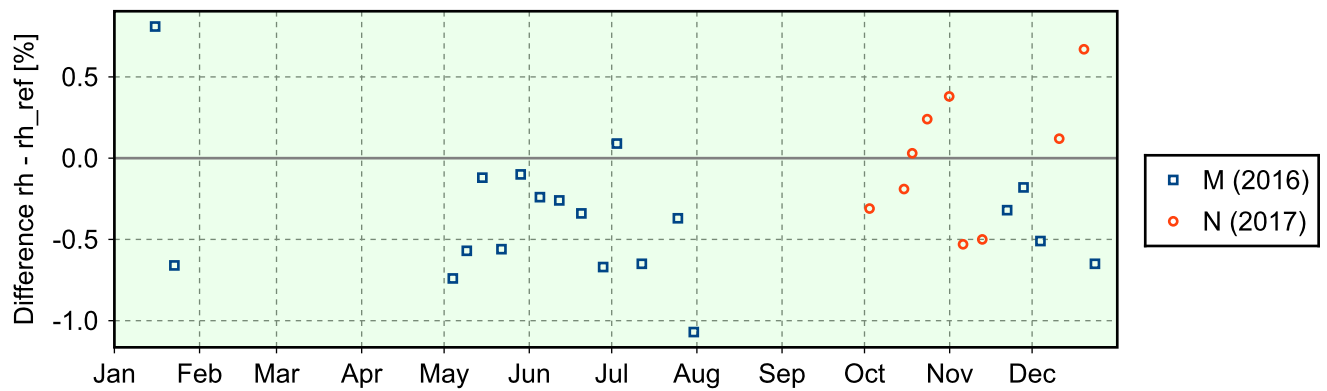
3.6 Instrument ground check

3.6.1 Stream: RS41

(1) GroundCheck: GC-RI41

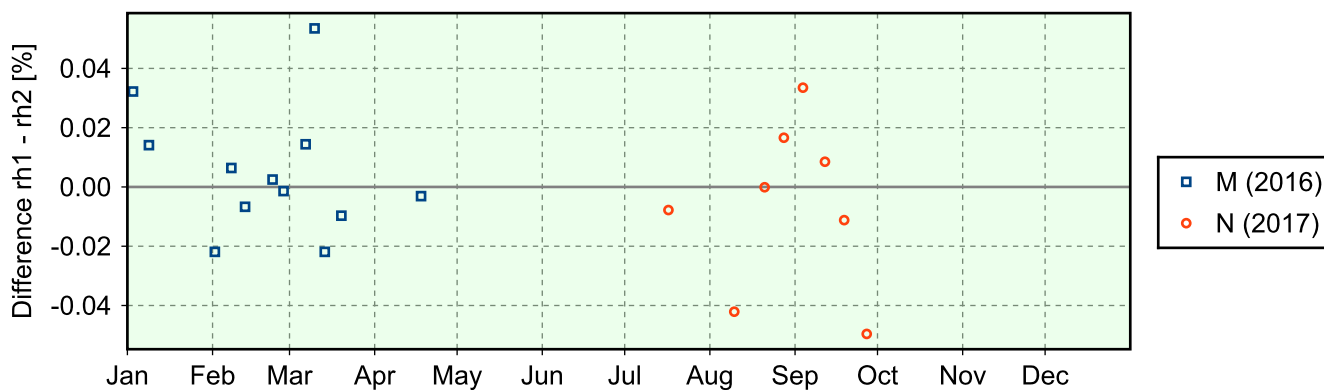
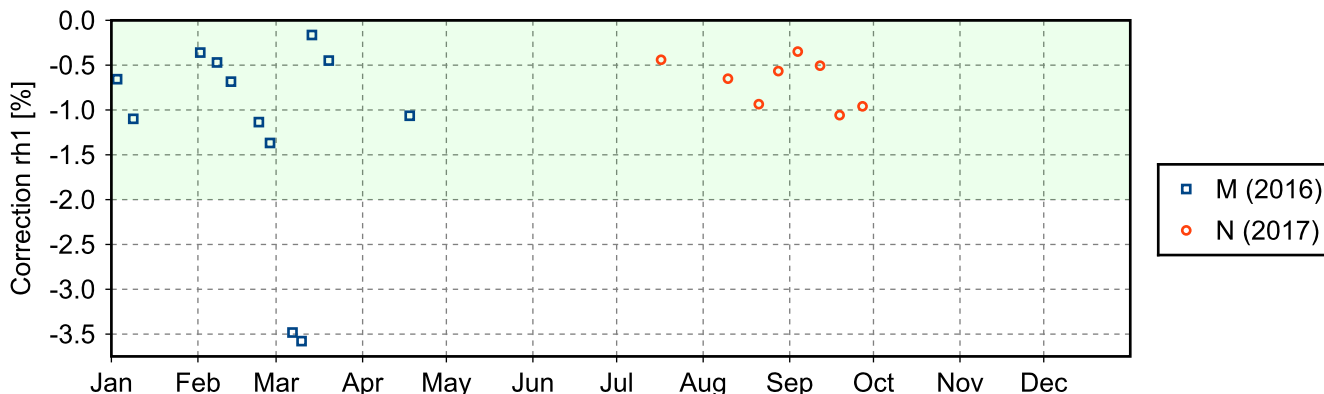
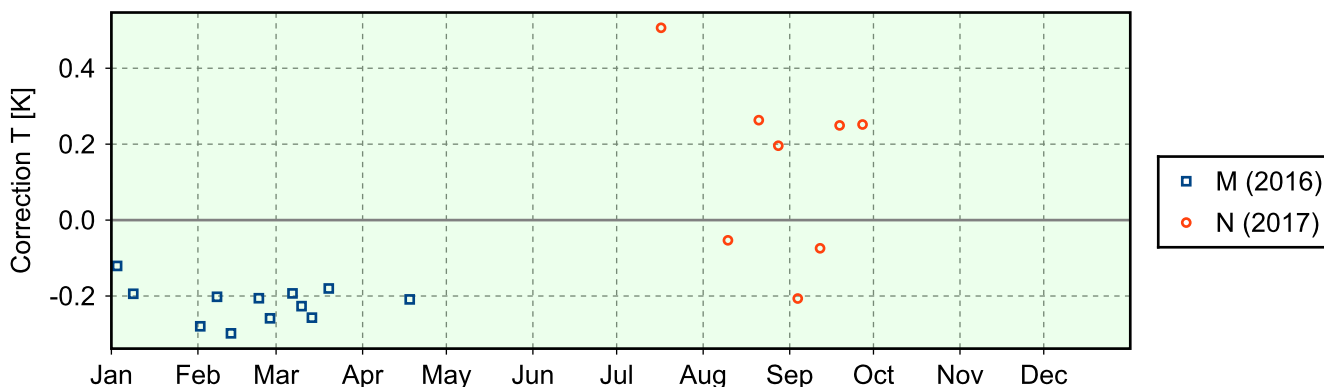
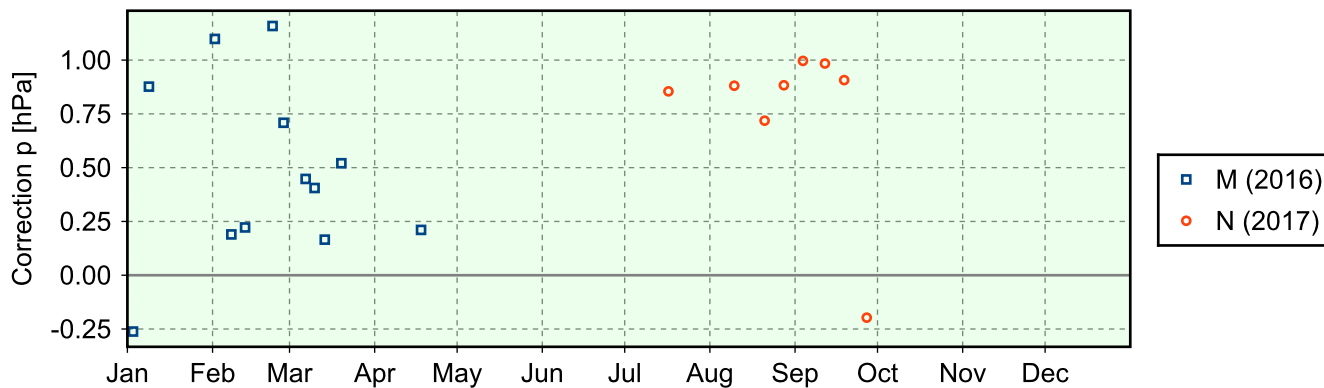


(2) GroundCheck: GC-SHC

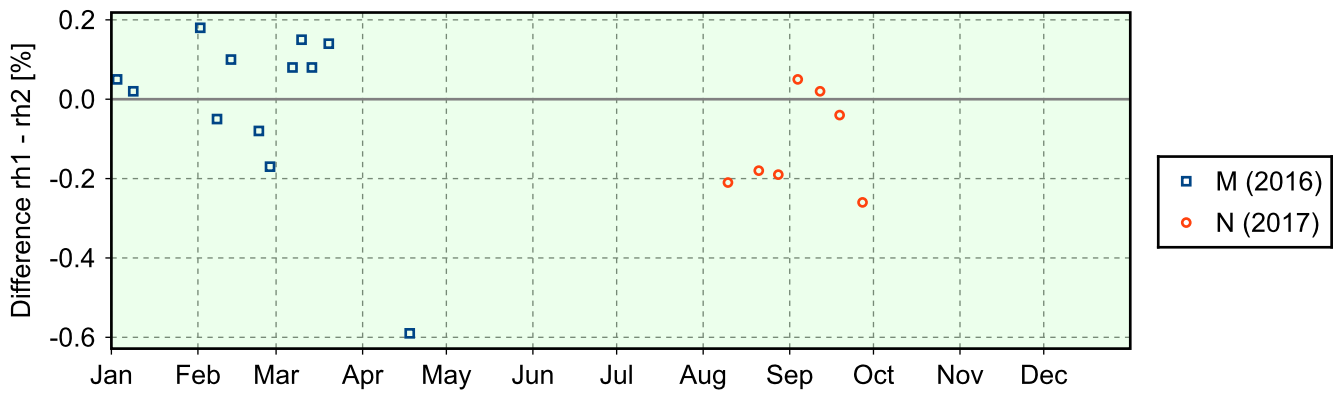
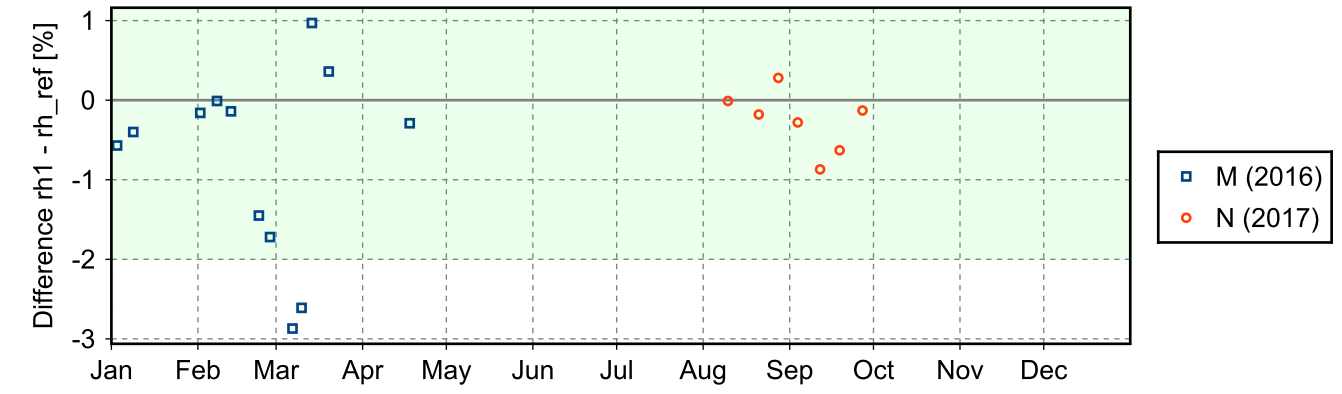


3.6.2 Stream: RS92

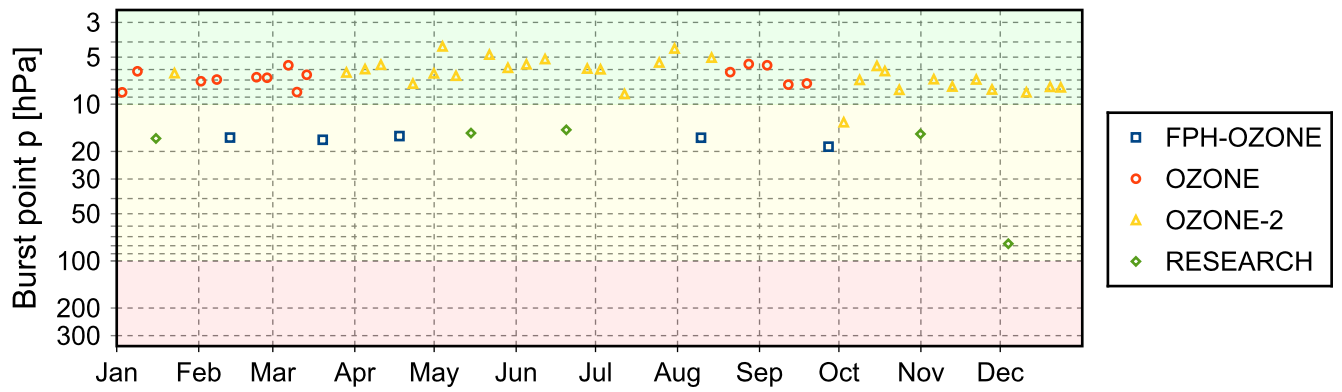
(1) GroundCheck: GC-GC25



(2) GroundCheck: GC-SHC



3.7 Measurement events



4 System: Radiosonde Launch Site (Invercargill) (LAU-RS-02)

Object	Value
System name	Radiosonde Launch Site (Invercargill)
Unique GRUAN ID	LAU-RS-02
System type	Sounding Site (RS - Radiosonde)
Geographical position	-46.4180 °S, 168.3305 °E, 2.0 m
Operated by	MET-SERVICE-NZ Meteorological Service of New Zealand Limited
Instrument contact	Querel, Richard
Started at	2016-07-01
Defined setups	1 (ROUTINE)
Possible streams	RS41

4.1 Lead Centre comments

4.1.1 Dataflow

Sonde dataflow of co-located site Invercargill to the GRUAN LC is operational since September 2016. This dataflow includes all twice daily operational soundings using the Vaisala RS41-SG.

4.1.2 General

Operational soundings using Vaisala RS41-SG are launched approximately twice daily since September 2016.

The change of balloon type from TA350 to TA700 in October 2018 resulted in a significant improvement in the burstpoint altitude. Now most of launches reaches 10 hPa and higher.

4.2 GRUAN data products

Product	Version	Soundings received	Available at LC	Distributed by NCEI
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4.2.1 Stream: RS41

RS41		718	718	
RS41-GCA	001		712	
RS41-RAW	001		718	
RS41-EDT	001		718	
RS41-GDP-ALPHA	002		583	

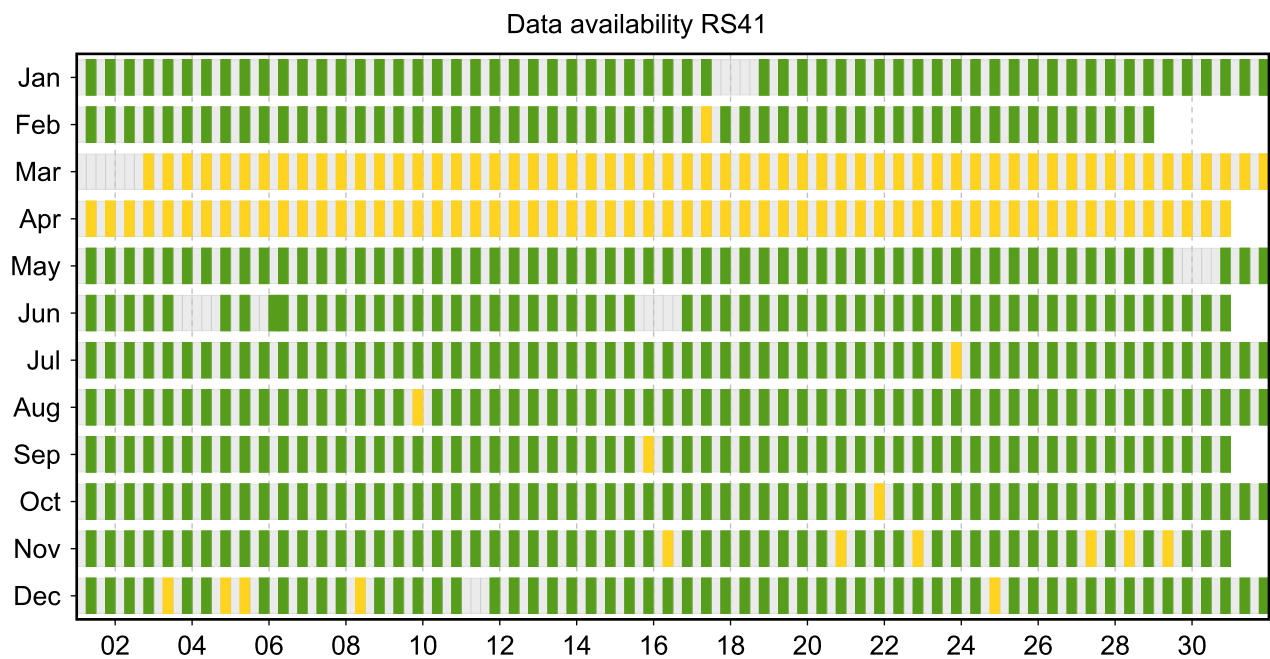
4.3 Data availability of data products

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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.

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4.3.1 Stream: RS41



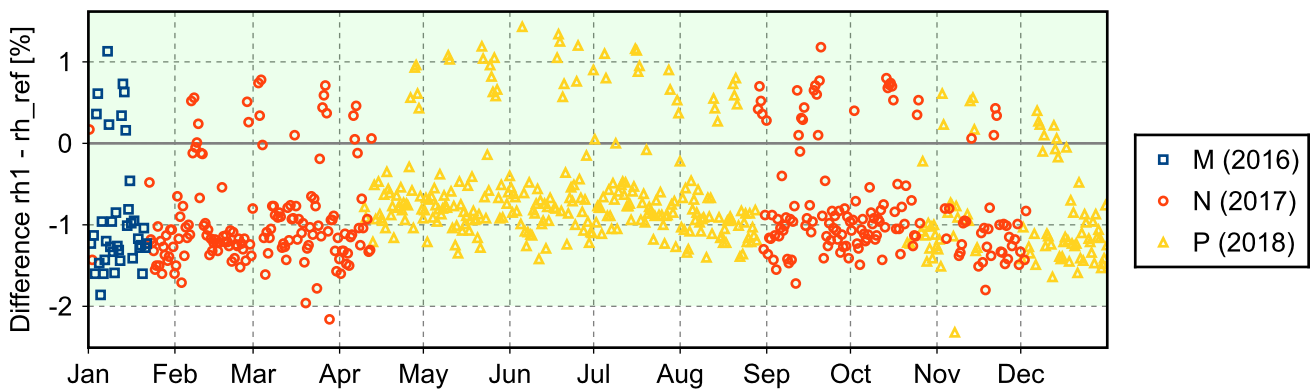
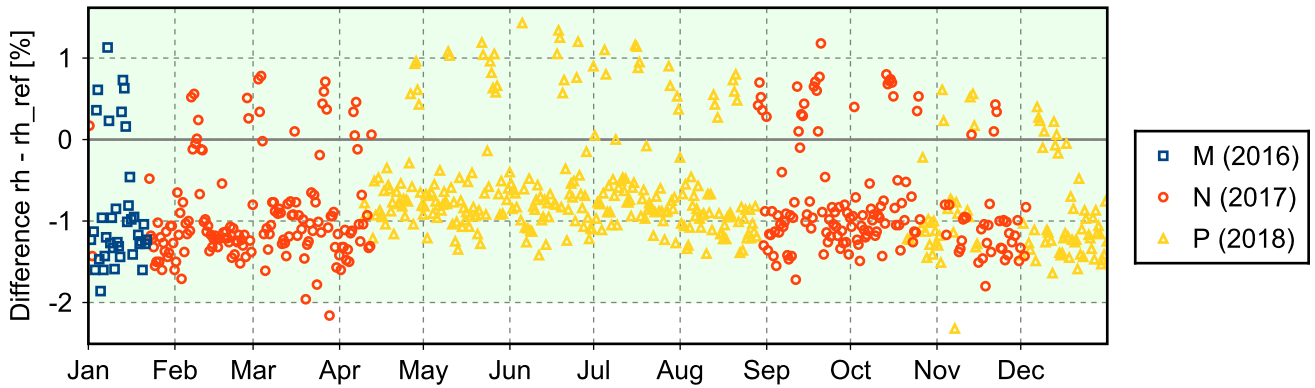
4.5 Instrument combinations of LAU-RS-02

Count	Instrument combination
718	RS41

4.6 Instrument ground check

4.6.1 Stream: RS41

(1) GroundCheck: GC-SHC



4.7 Measurement events

