



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

Doc. 1.12
(16.III.2021)

**13th GRUAN Implementation-
Coordination Meeting (ICM-13)**

Session 1

Virtual

15 November - 19 November 2021

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 2020.

Overview

The upper-air balloon programme at Lauder consisting of radiosondes, ozonesondes, and NOAA frost-point hygrometers (FPH), 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 GUAN site (now part of the Ross Island candidate GRUAN site) and we are submitting their radiosonde data to the LC for GRUAN processing.

Change and change management

No changes during 2020.

Resourcing

It is anticipated that our funding levels will remain stable over the next several years but are unlikely to increase.

Operations

- We have a stockpile of R23 cryogen for use at Lauder and to support a FPH viability campaign at Ross Island in 2021-2022.
- The fan assembly in the Invercargill SHC began to fall apart, the print density of the original 3d-printed component was not fit-for-purpose. We redesigned a strengthened version and 3d-printed a new fan blade unit. This was reinstalled in the Invercargill SHC.
- SHC ground-checks are not performed on Internet radiosondes.

Covid-19

We had minimal impact from Covid-19. During the NZ lockdown in early 2020, we had technicians living on-site that were granted essential worker status and allowed to continue our measurements, so nothing was adversely affected. The radiosonde launches at Invercargill also continued unaffected.

Site assessment and certification

Nothing to report.

GRUAN-related research

Richard Querel is participating in the ASOPOS expert panel that is reviewing ozonesonde standard operating procedures. RQ is working on the GRUAN ozonesonde data product, based on the best practice prescribed in the ASOPOS 2.0 report.

WG-GRUAN interface

Support letters from the Lead Centre are always helpful to demonstrate value to our management.

Other archiving centers

GAW, NDACC, WOUDC, BRNSN, TCCON, CAMS

Participation in campaigns

- TROLIX19 MAXDOAS UV/Vis intercomparison in The Netherlands.
- SAGE3/ISS balloon launches during overpasses (ECC + FPH + POPS)

Future plans

I am proposing an extensive hardware refurbishment of the Lauder stratospheric ozone LIDAR (LauSOL). Thierry Leblancs GLASS (GRUAN/NDACC central processing LIDAR software) has been used on LauSOL data.

The NDACC stratospheric LIDAR intercomparison planned for 2019 with NASAs Mobile LIDAR has been postponed indefinitely due to closed international borders in NZ. It is unknown when this will proceed, potentially late 2021 or even into 2022.

For the 2021/2022 Antarctic field season, I have an approved proposal to stage a set of trial launches of FPH+ECC packages from Scott Base. The intent is to use the campaign to sort out any logistical issues and problems in advance of establishing a routine (monthly) FPH sounding programme at the Ross Island site. This is of course under a Covid-free scenario. If the mandatory 2-week quarantine is still in place for all travel from NZ to Antarctica (the current requirement), then we will need to revisit this plan.

We have a new portable Bruker EM27 FTIR spectrometer that will be used for campaign-based satellite intercomparison measurements of GHGs as well as farm-scale agricultural emissions studies.

We have purchased a Vaisala CL61 depolarising ceilometer that will be used to improve boundary layer determination, cloud studies, and be compared with the Lauder aerosol LIDAR profiles. We are part way through building several AirCore packages in collaboration with NOAA.



GRUAN Site Report for Lauder (LAU), 2020

Reported time range is Jan 2020 to Dec 2020

Created by the Lead Centre

Version from 2021-04-27

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	727

1.2 General comments from Lead Centre

1.2.1 General

The GRUAN site Lauder is a distributed site with two places Lauder and Invercargill.

Operational data flow established in March 2014.

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.

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

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

A regular measurement program for the observation of stratospheric water vapor was performed using FPH.

3.2 GRUAN data products

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

3.2.1 Stream: ECC

ECC		55	55	
-----	--	----	----	--

3.2.2 Stream: FPH

FPH		9	9	
-----	--	---	---	--

3.2.3 Stream: IMET-1

IMET-1		10	10	
IMET-1-RAW	001		9	

3.2.4 Stream: RS41

RS41		53	53	
RS41-GCA	001		51	
RS41-RAW	001		53	
RS41-EDT	001		52	
RS41-GDP-ALPHA	003		19	
RS41-GDP-ALPHA	004		11	
RS41-GDP-BETA	001		52	
RS41-GDP-BETA	002		15	

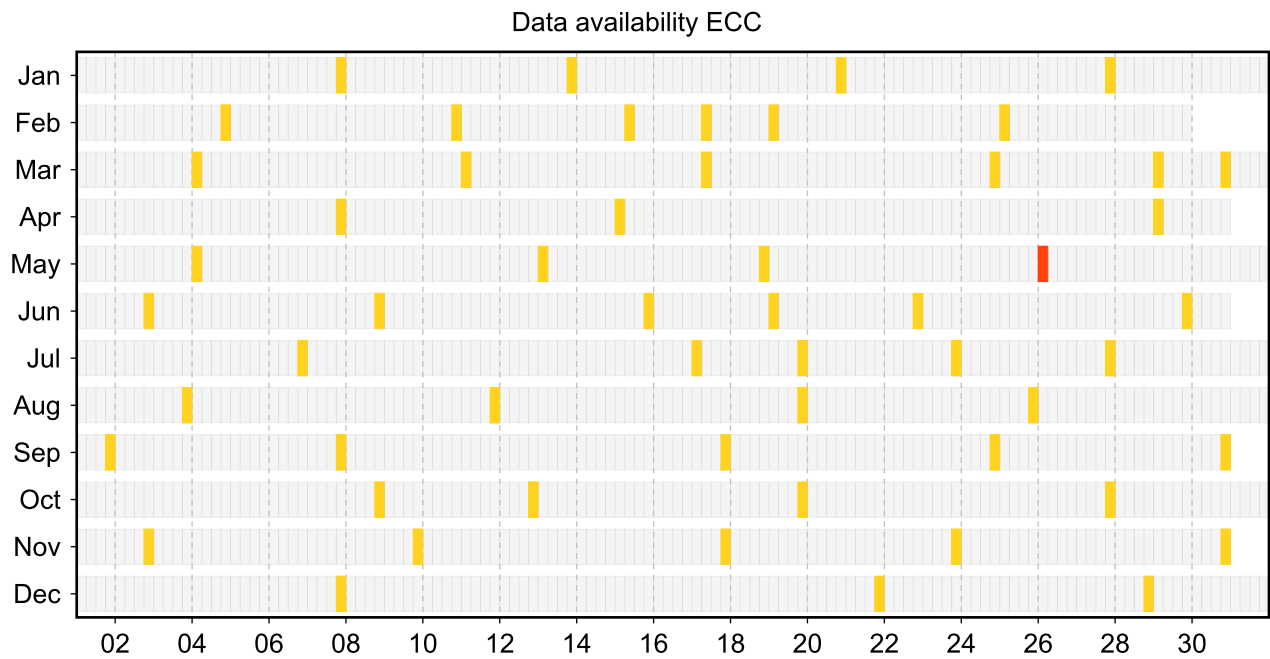
3.3 Availability of data products

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).

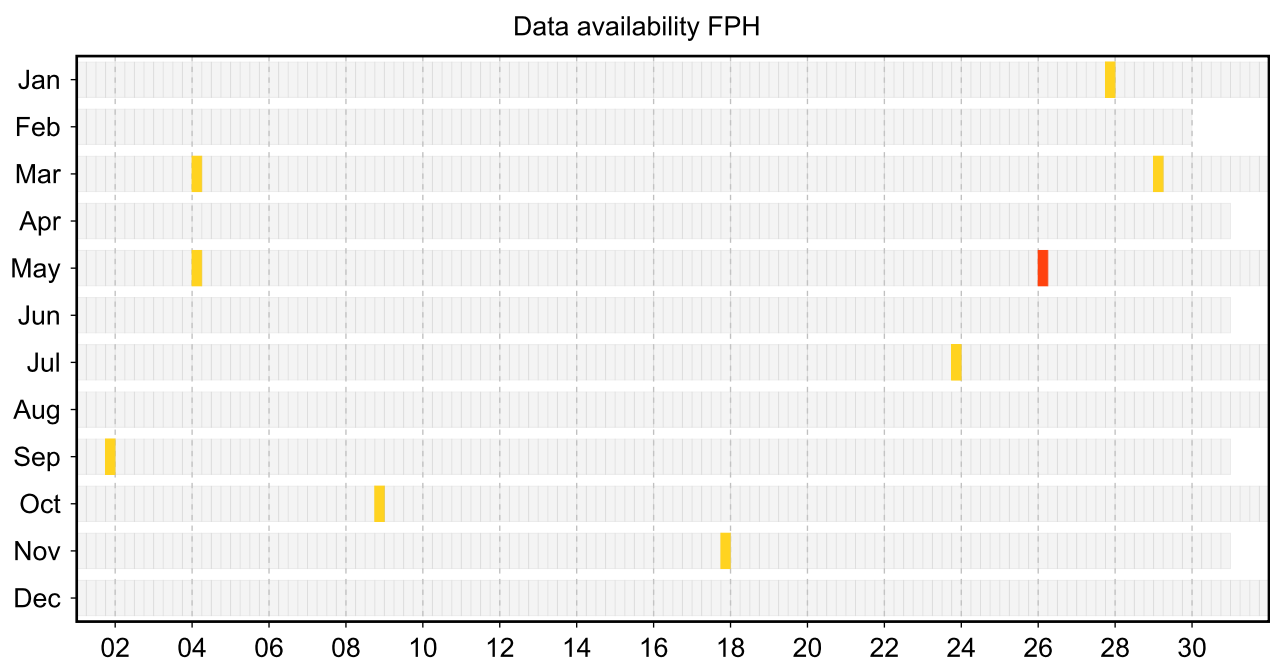
Unprocessed (yellow): The manufacturer-produced file with raw measurement data has been successfully converted into a GRUAN-standardized raw data format (NetCDF). The GRUAN data processing has not been performed or was aborted. Reasons for this may be a still missing GRUAN data processor or a processing-software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

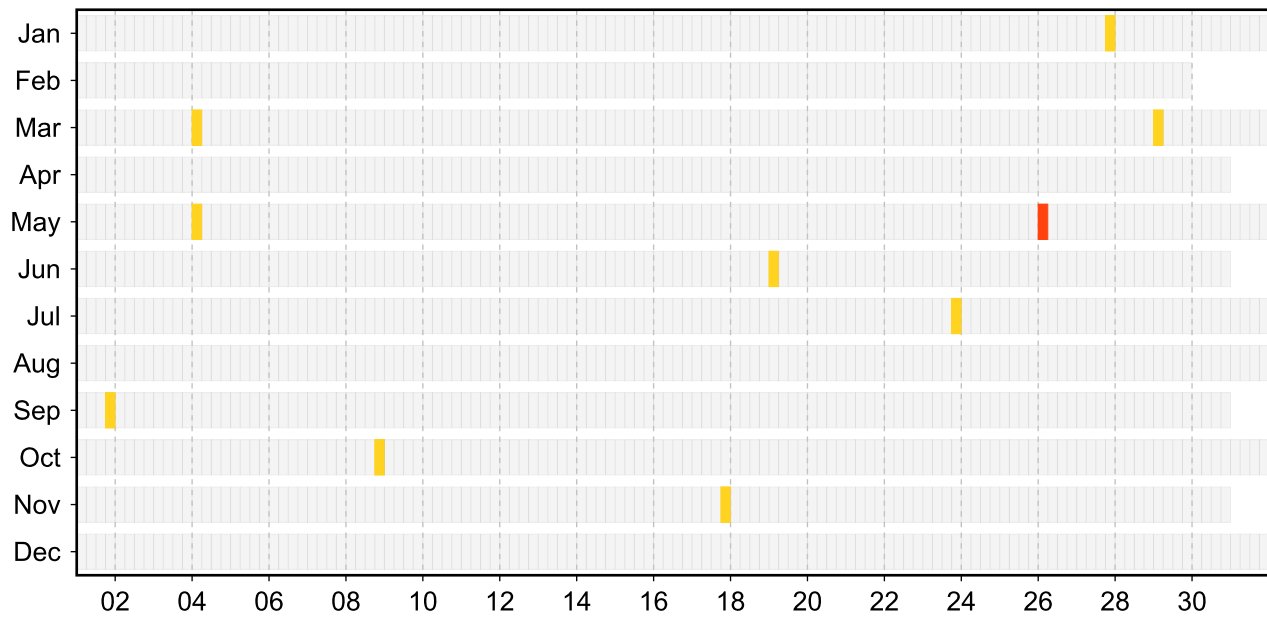


3.3.2 Stream: FPH



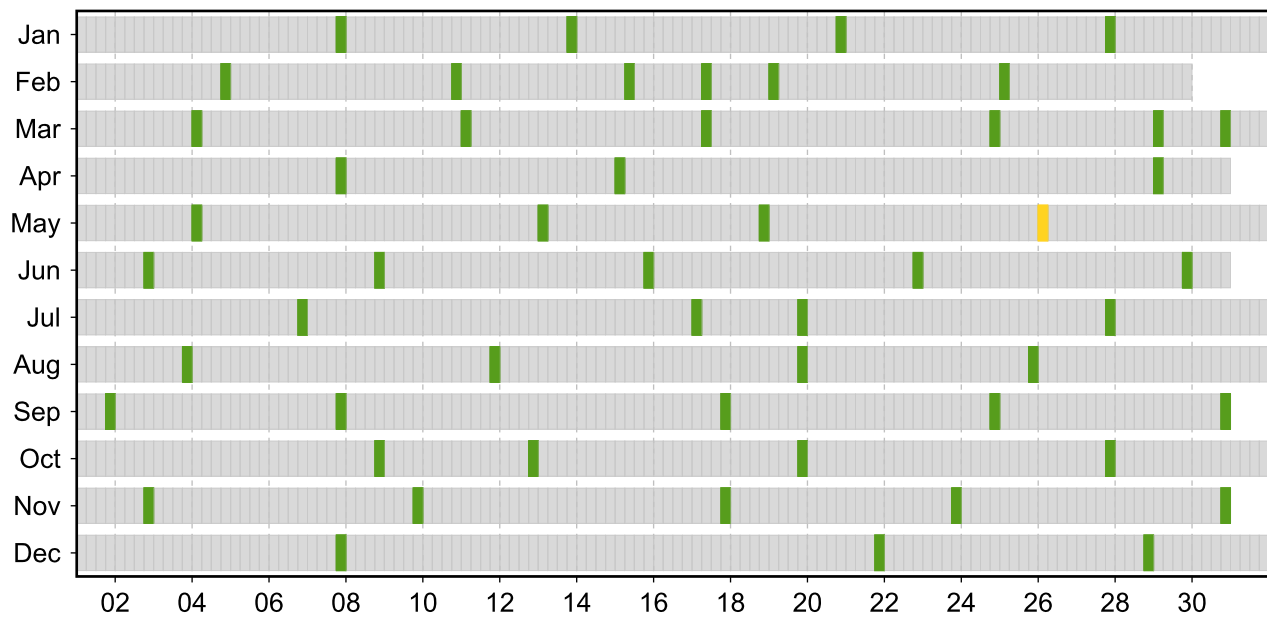
3.3.3 Stream: IMET-1

Data availability IMET-1



3.3.4 Stream: RS41

Data availability RS41



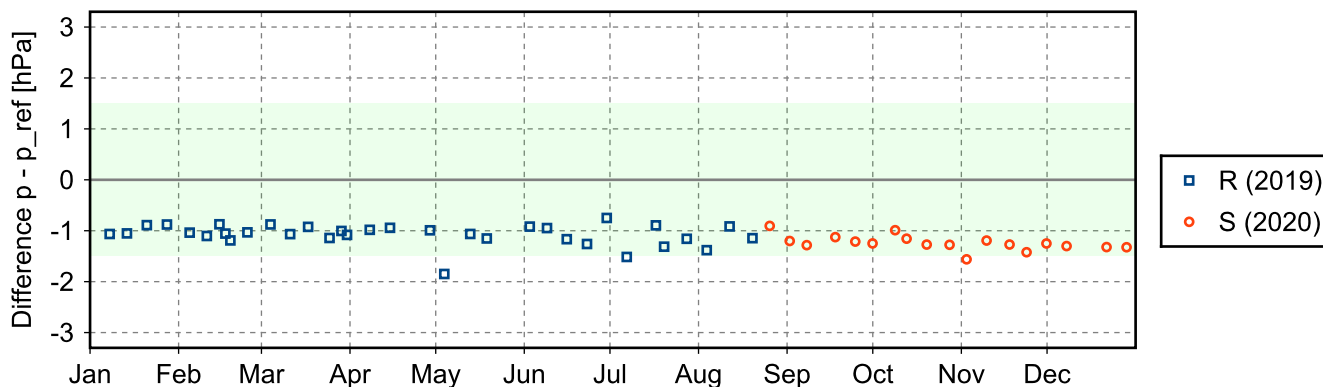
3.4 Instrument combinations of LAU-RS-01

Count	Instrument combination
1	ECC, FPH, IMET-1
8	ECC, FPH, IMET-1, RS41
1	ECC, IMET-1
45	ECC, RS41

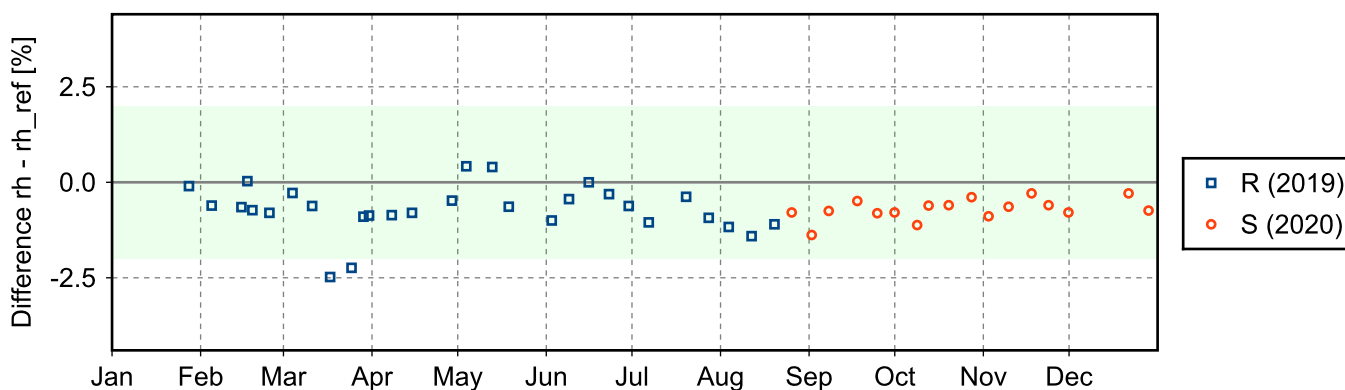
3.5 Instrument ground check

3.5.1 Stream: RS41

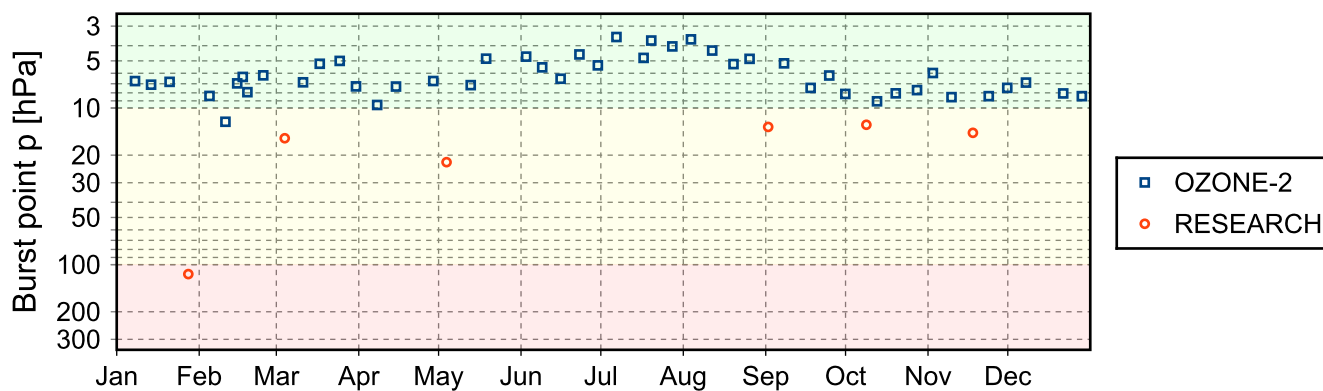
(1) GroundCheck: GC-RI41



(2) GroundCheck: GC-SHC



3.6 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.

4.2 GRUAN data products

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

4.2.1 Stream: RS41

RS41		727	727	
RS41-GCA	001		720	
RS41-RAW	001		727	
RS41-EDT	001		721	
RS41-GDP-ALPHA	003		216	
RS41-GDP-ALPHA	004		169	
RS41-GDP-BETA	001		723	
RS41-GDP-BETA	002		120	

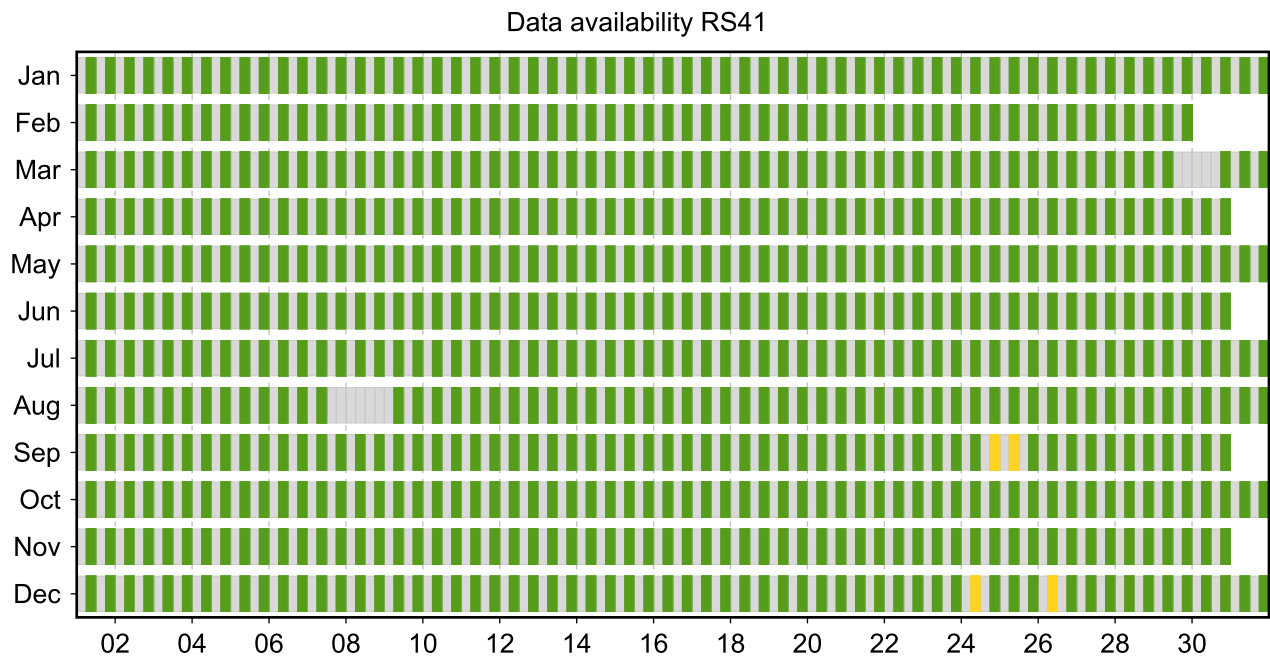
4.3 Availability of data products

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



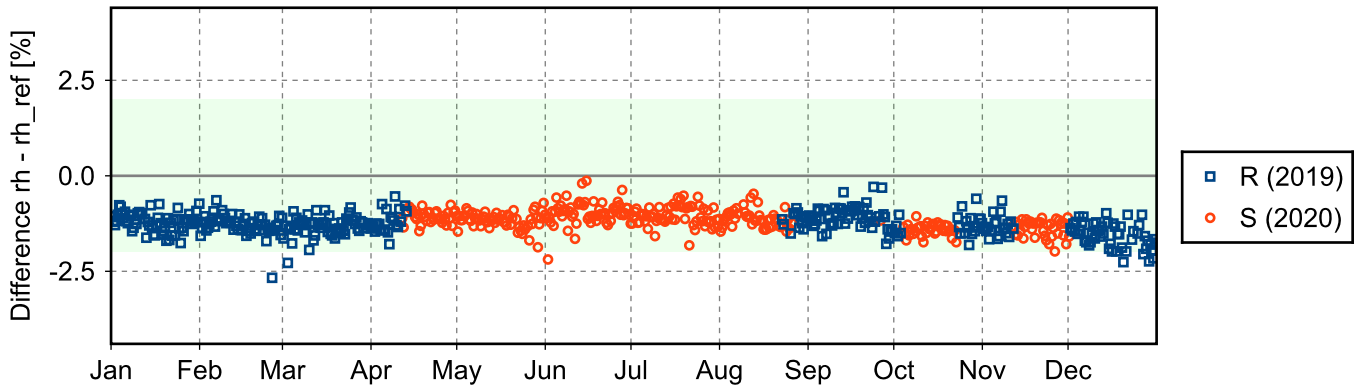
4.4 Instrument combinations of LAU-RS-02

Count	Instrument combination
727	RS41

4.5 Instrument ground check

4.5.1 Stream: RS41

(1) GroundCheck: GC-SHC



4.6 Measurement events

