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GLOBAL CLIMATE OBSERVING
SYSTEM (GCOS)

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**15th GRUAN Implementation-
Coordination Meeting (ICM-15)**

Session 5

Bern

11 March - 15 March 2024

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 2022 to December 2023.

Overview

The upper-air balloon programme at Lauder, consisting of radiosondes, ozonesondes, and NOAA frost-point hygrometers (FPH), are all submitted to GRUAN. The GNSS receiver data are also 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 submitting their radiosonde data to the LC for GRUAN processing.

Change and change management

No changes during 2022 or 2023.

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.
- SHC ground-checks are not performed on I-met radiosondes.
- Mid-2022, we received a shipment of Totex TA1500 balloons that were bursting early. Totex quickly provided replacement balloons and the new balloons are behaving well.
- The lack of Lauder FPH launches during the latter half of 2023 was due to a combination of poor weather during overpasses and our focus on providing hardware for the Ross Island launches.

Covid-19

We had minimal impact from Covid-19.

Site assessment and certification

Lauder was recertified in 2023 and the next recertification date is October 2027.

GRUAN-related research

Lauder personnel were involved with the successful feasibility launches of NOAA B²SAP packages at Ross Island in 2022 and 2023. Work continues on ozonesonde ground-checks and ASOPOS-related SOPs and homogenisation.

WG-GRUAN interface

Richard Querel is co-chair of TT-Sites since December 2022.

Other archiving centers

GAW, NDACC, WOUDC, BRNS, TCCON, CAMS, LINZ

Participation in campaigns

SAGE3/ISS balloon launches during overpasses (ECC + FPH + POPS)

Future plans

- Hope to begin post-R23 FPH/CFH launches soon.
- Ground-validation campaigns for MethaneSAT and a related controlled release of methane & ethane experiment are being planned.
- The newly redeveloped Lauder stratospheric ozone lidar made first measurements in November 2023. Work to semi-automate the system and resume routine operation is underway.
- A joint NIWA-NASA lidar deployment at Lauder and Ross Island is being planned.

- An NDACC lidar intercomparison at Lauder with the NASA STROZ mobile lidar is being planned.



GRUAN Site Report for Lauder (LAU), 2022

Reported time range is Jan 2022 to Dec 2022

Created by the Lead Centre

Version from 2024-03-01

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	51
LAU-RS-02	Radiosonde Launch Site (Invercargill)	Sounding Site	1	778

1.2 General comments from Lead Centre

1.2.1 General

The GRUAN site Lauder is a distributed site with two locations Lauder and 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, 380.2 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

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 Dataflow

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

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

3.1.2 General

Good performance of stratospheric water vapor measurement programm (FPH) and ECC ozone soundings can be confirmed.

Until September there is good performance in terms of burst altitude which is regularly 10 hPa and higher.

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		51	51	
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3.2.2 Stream: FPH

FPH		8	8	
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3.2.3 Stream: IMET-1

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

3.2.4 Stream: RS41

RS41		50	50	
RS41-RAW	001		50	
RS41-EDT	001		50	
RS41-GDP	001		50	

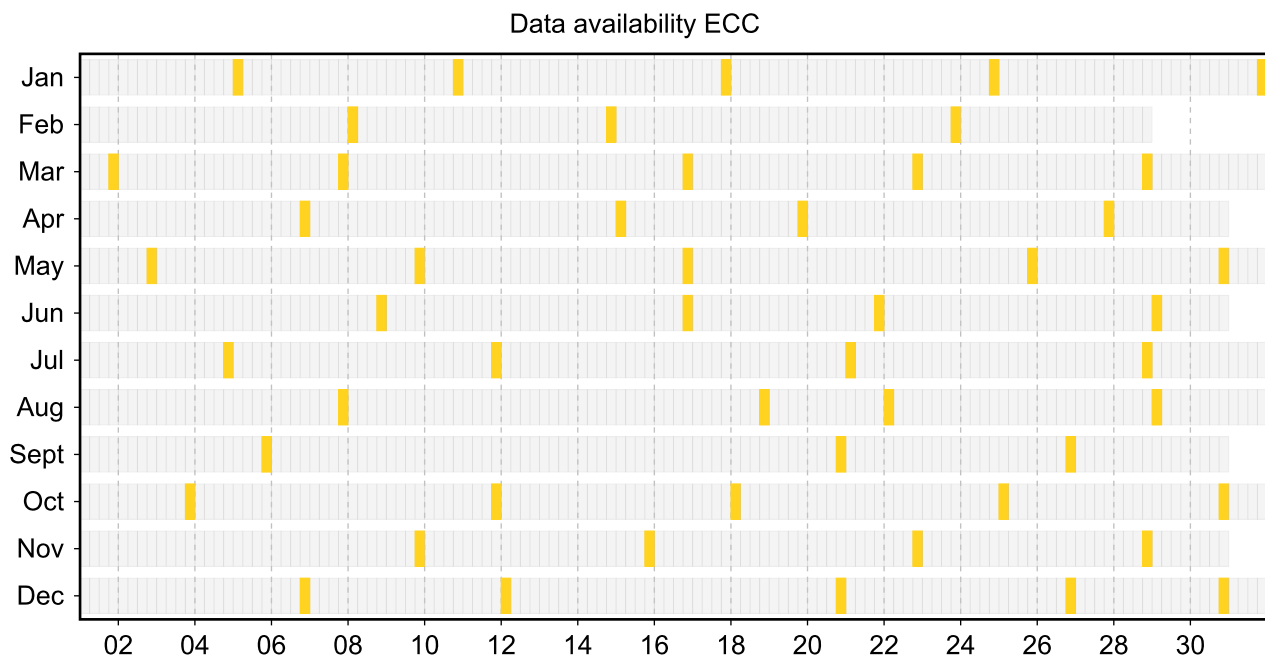
3.3 Availability of data products

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).

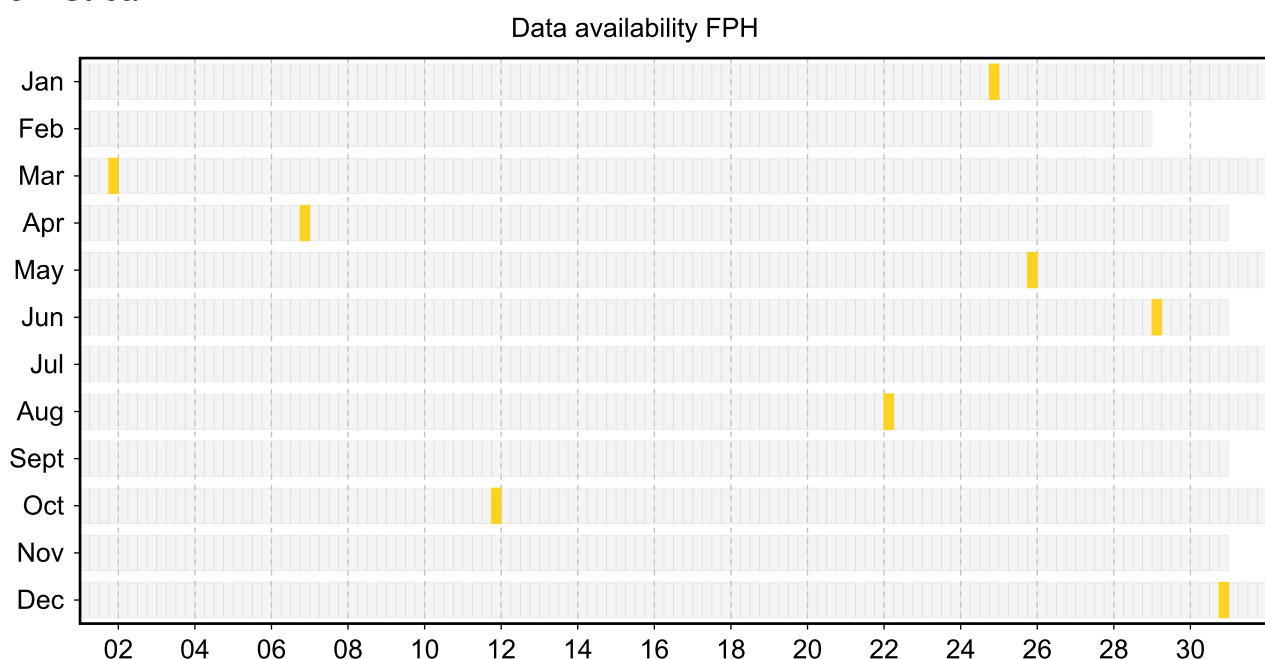
Unprocessed (yellow): The manufacturer-produced file with raw measurement data has been successfully converted into a GRUAN-standardized raw data format (NetCDF). The GRUAN data processing has not been performed or was aborted. Reasons for this may be a still missing GRUAN data processor or a processing-software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

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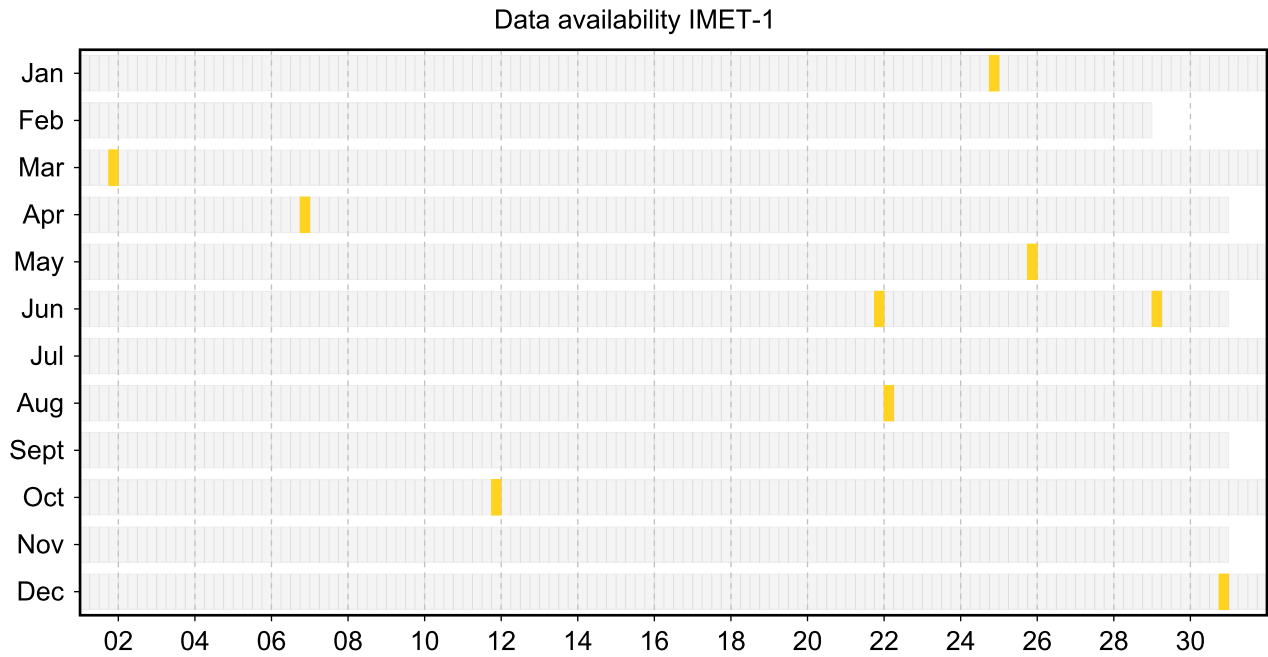
3.3.1 Stream: ECC



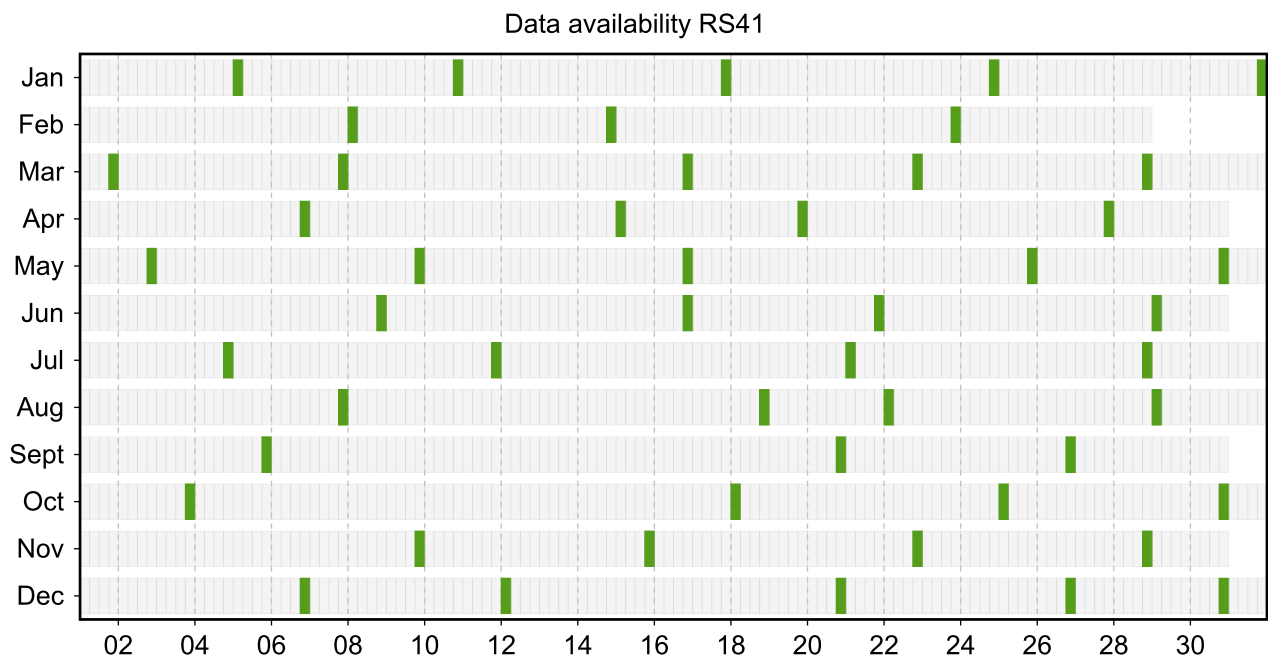
3.3.2 Stream: FPH



3.3.3 Stream: IMET-1



3.3.4 Stream: RS41



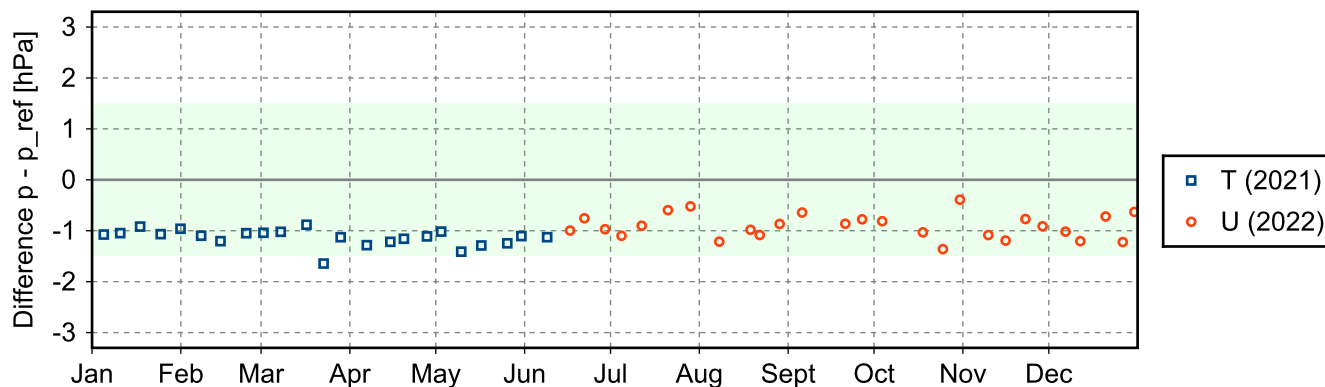
3.4 Instrument combinations of LAU-RS-01

Count	Instrument combination
1	ECC, FPH, IMET-1
7	ECC, FPH, IMET-1, RS41
1	ECC, IMET-1, RS41
42	ECC, RS41

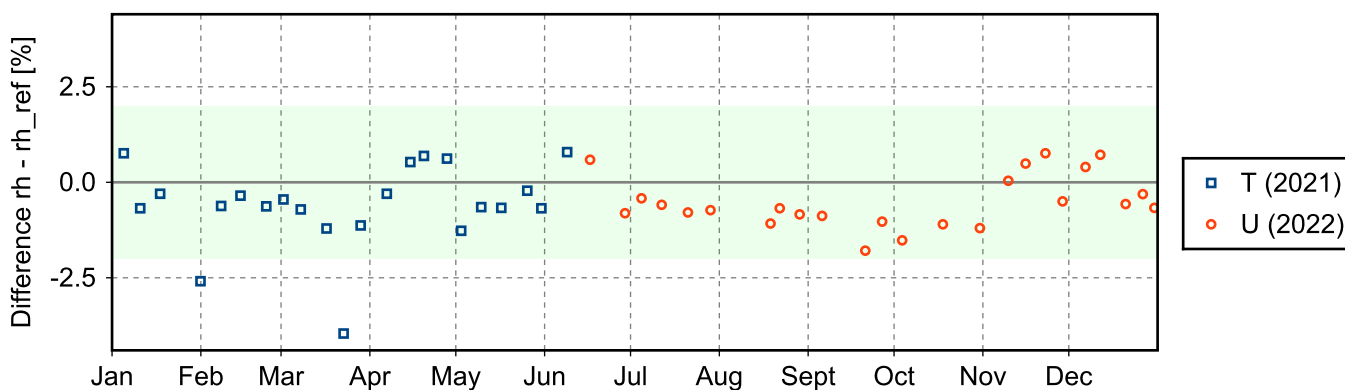
3.5 Instrument ground check

3.5.1 Stream: RS41

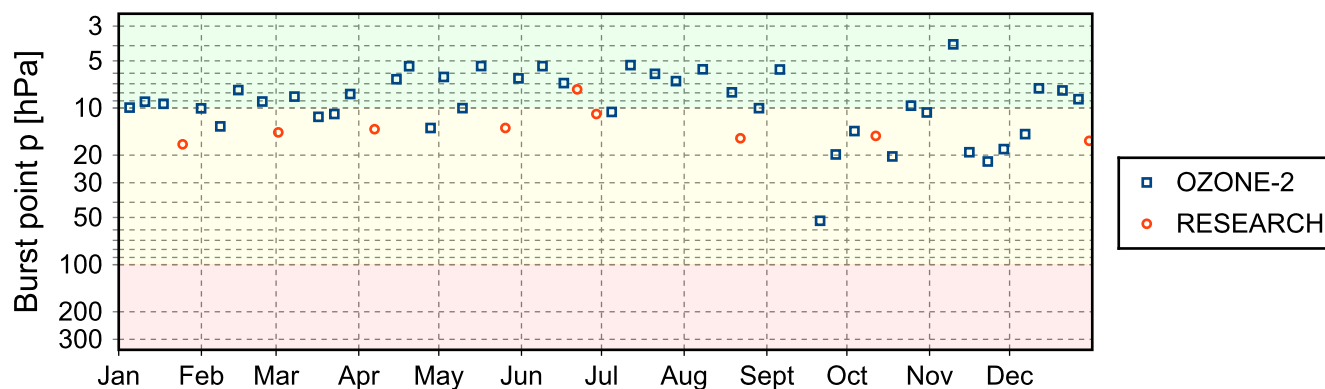
(1) GroundCheck: GC-RI41



(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.

There is good performance in terms of burst altitude which is regularly 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		778	778	
RS41-RAW	001		778	
RS41-EDT	001		778	
RS41-GDP	001		776	

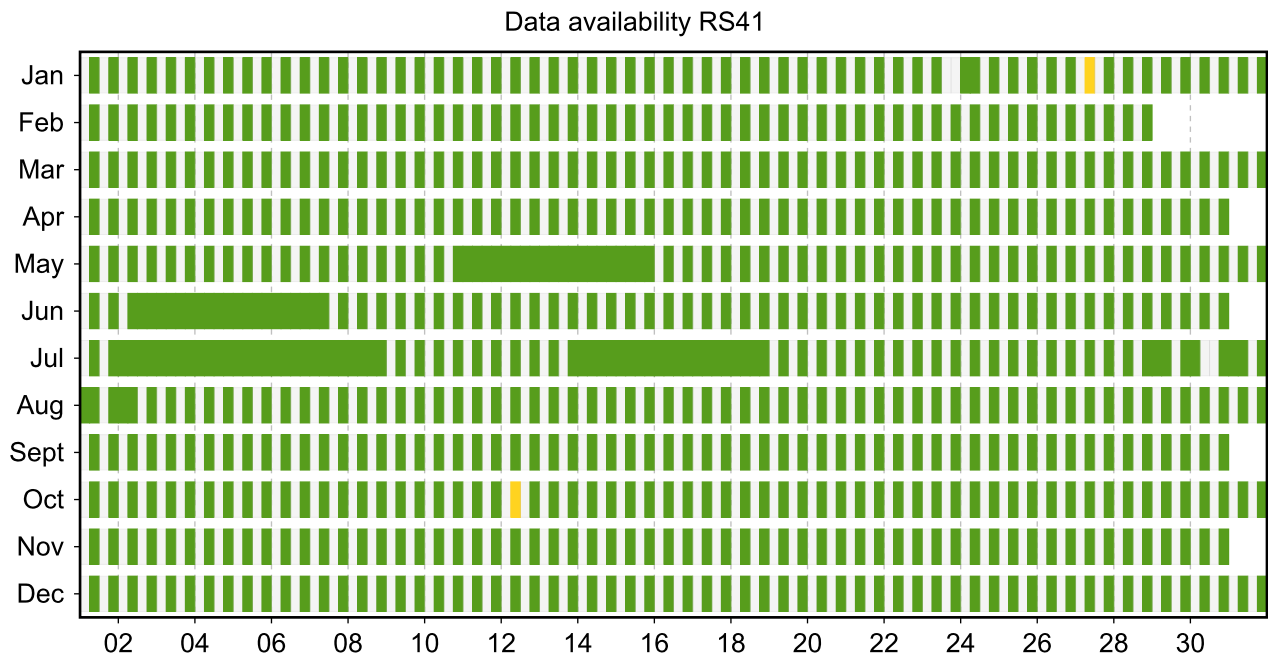
4.3 Availability of data products

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).

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4.3.1 Stream: RS41



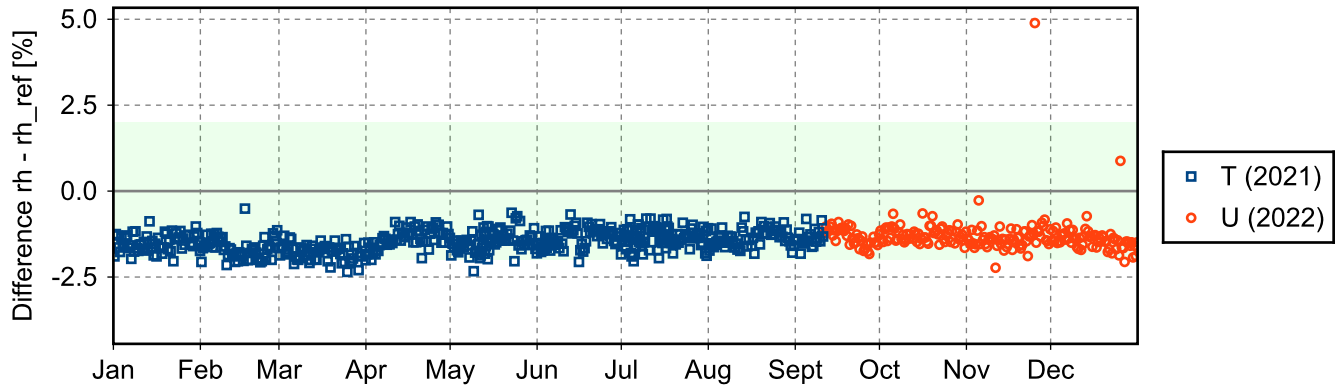
4.4 Instrument combinations of LAU-RS-02

Count	Instrument combination
778	RS41

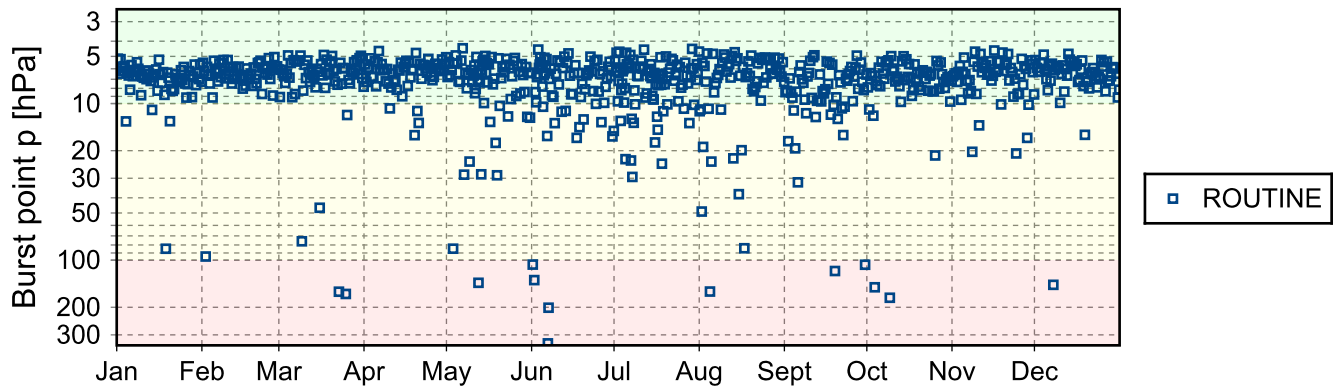
4.5 Instrument ground check

4.5.1 Stream: RS41

(1) GroundCheck: GC-SHC



4.6 Measurement events





GRUAN Site Report for Lauder (LAU), 2023

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Created by the Lead Centre

Version from 2024-03-01

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	53
LAU-RS-02	Radiosonde Launch Site (Invercargill)	Sounding Site	1	731

1.2 General comments from Lead Centre

1.2.1 General

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System type	GNSS (GN - GNSS)
Geographical position	-45.0380 °S, 169.6840 °E, 380.2 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

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Instrument contact	Querel, Richard
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Possible streams	ECC, FPH, IMET-1, RS41, RS92

3.1 Lead Centre comments

3.1.1 Dataflow

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3.2 GRUAN data products

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

3.2.1 Stream: ECC

ECC		53	53	
-----	--	----	----	--

3.2.2 Stream: FPH

FPH		5	5	
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3.2.3 Stream: IMET-1

IMET-1		5	5	
IMET-1-RAW	001		5	

3.2.4 Stream: RS41

RS41		53	53	
RS41-RAW	001		53	
RS41-EDT	001		53	
RS41-GDP	001		52	

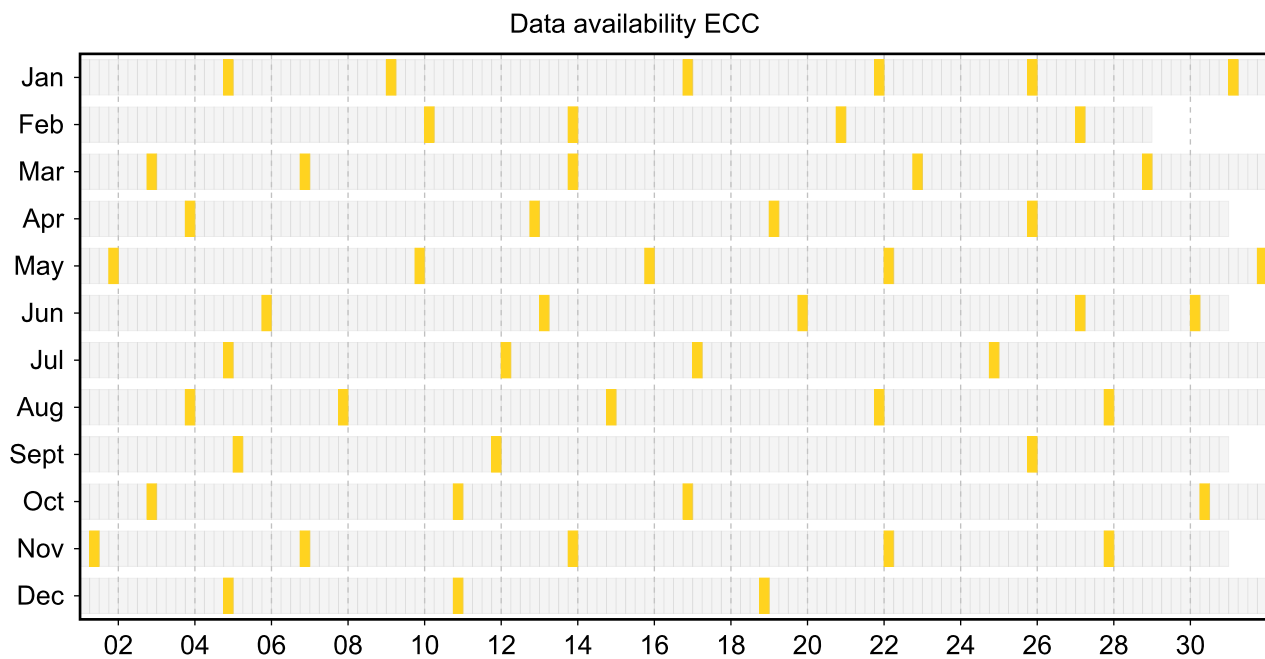
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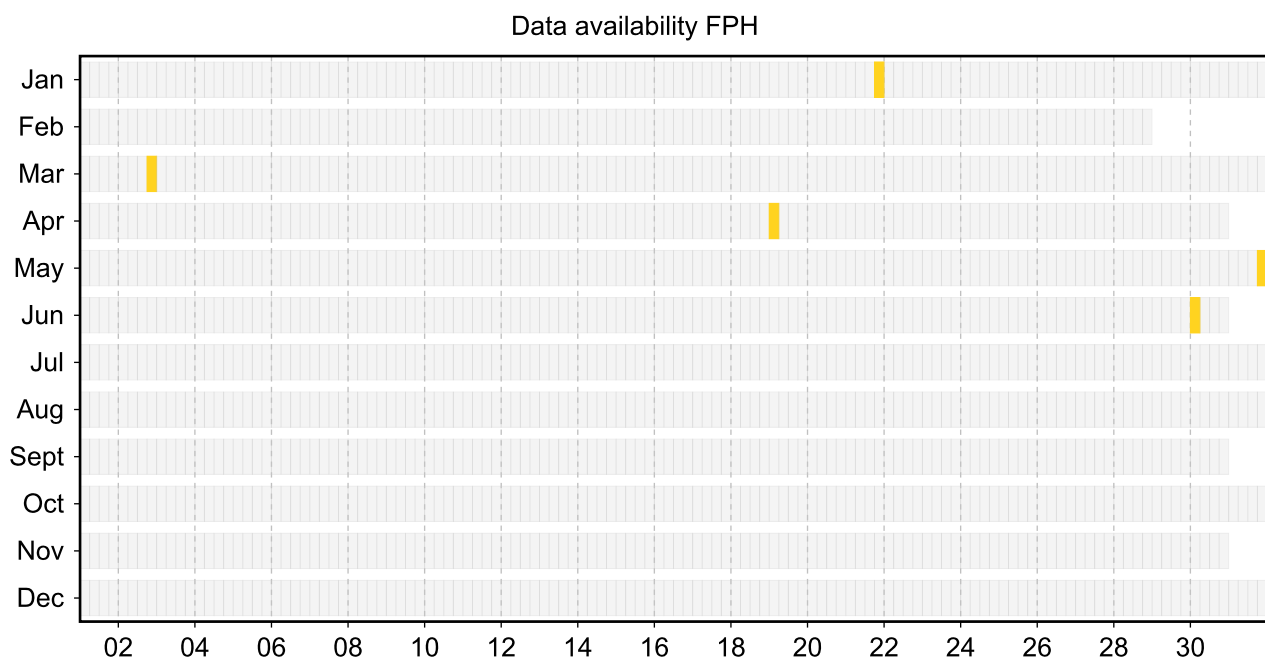
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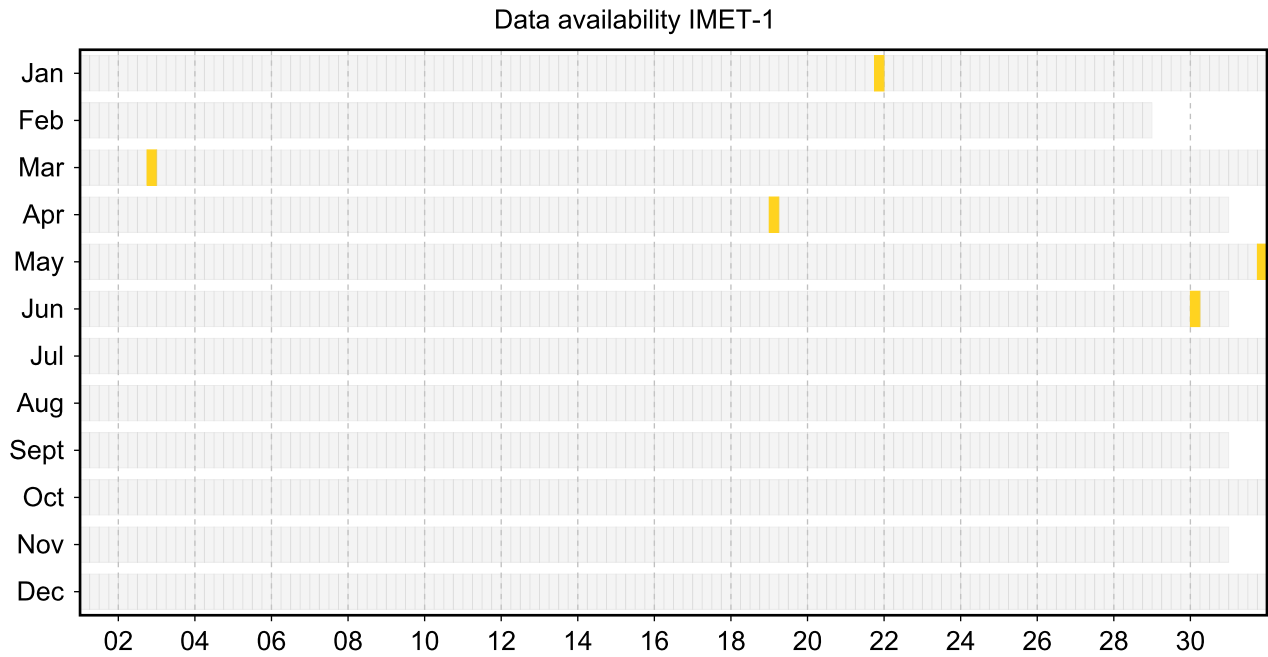
3.3.1 Stream: ECC



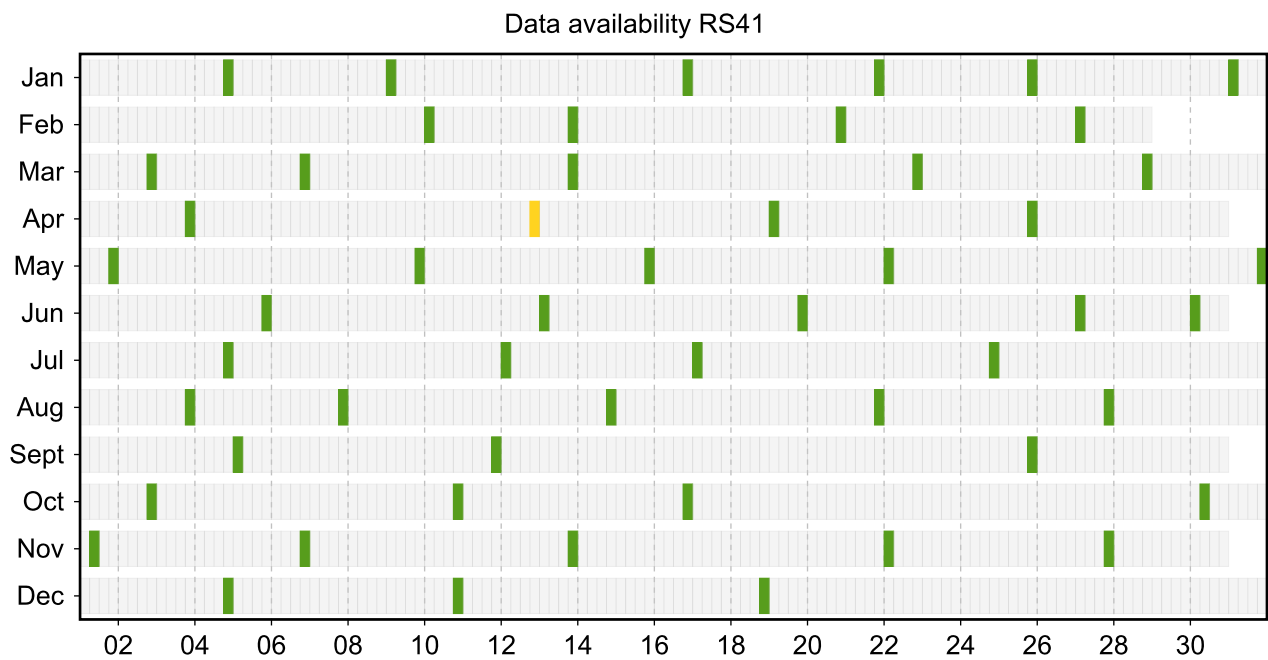
3.3.2 Stream: FPH



3.3.3 Stream: IMET-1



3.3.4 Stream: RS41



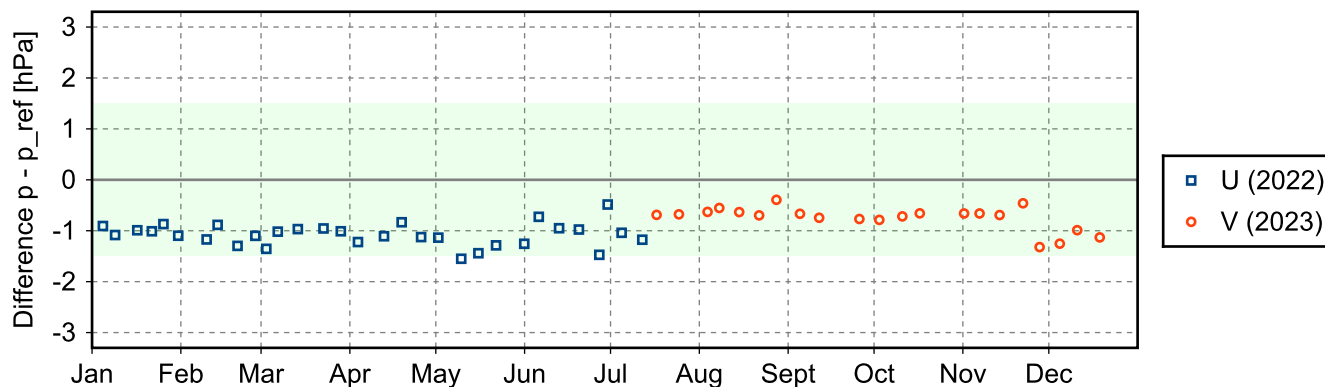
3.4 Instrument combinations of LAU-RS-01

Count	Instrument combination
5	ECC, FPH, IMET-1, RS41
48	ECC, RS41

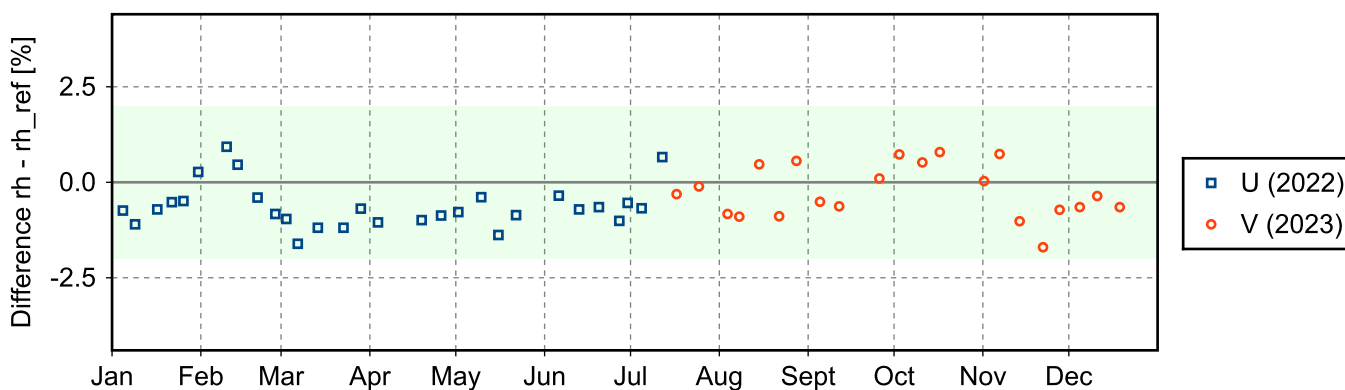
3.5 Instrument ground check

3.5.1 Stream: RS41

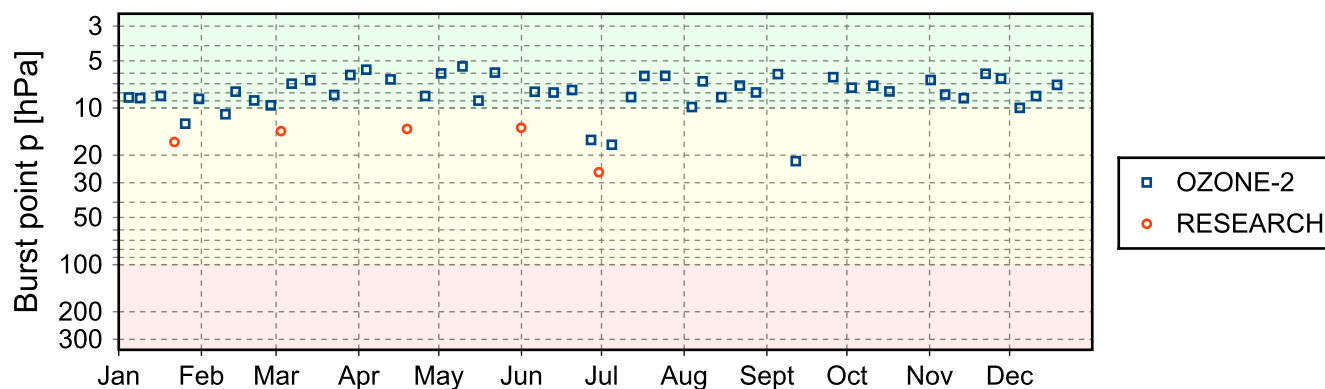
(1) GroundCheck: GC-RI41



(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 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		731	731	
RS41-RAW	001		731	
RS41-EDT	001		731	
RS41-GDP	001		726	

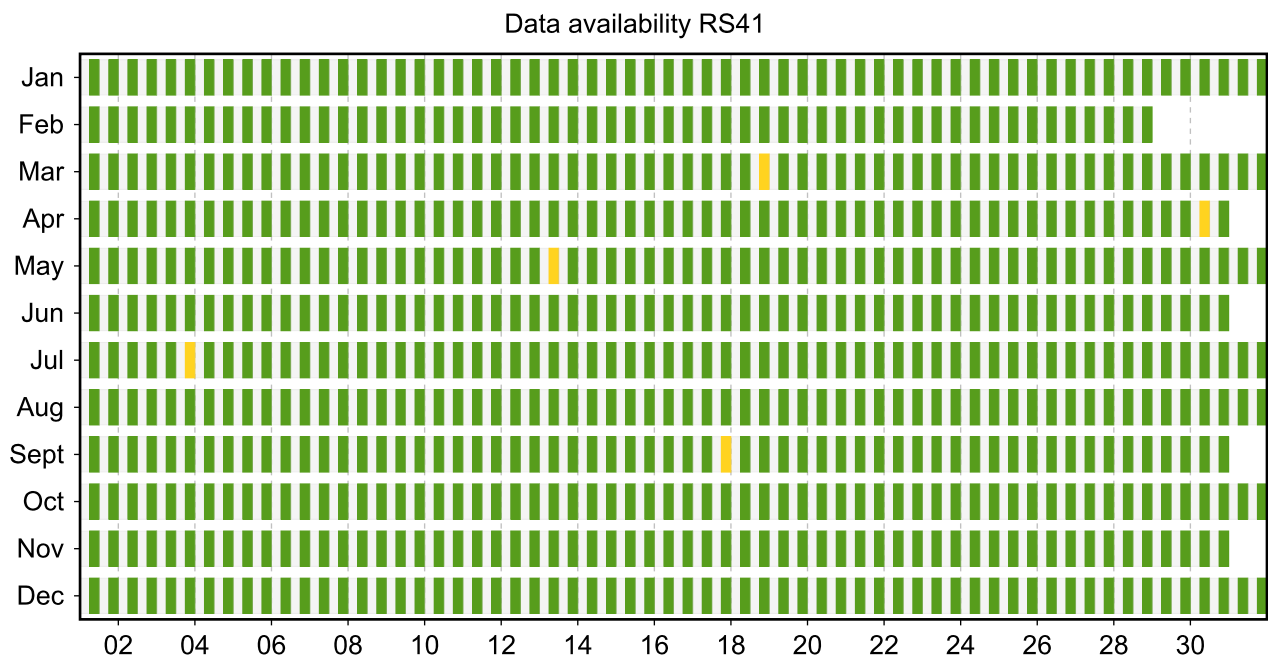
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4.3.1 Stream: RS41



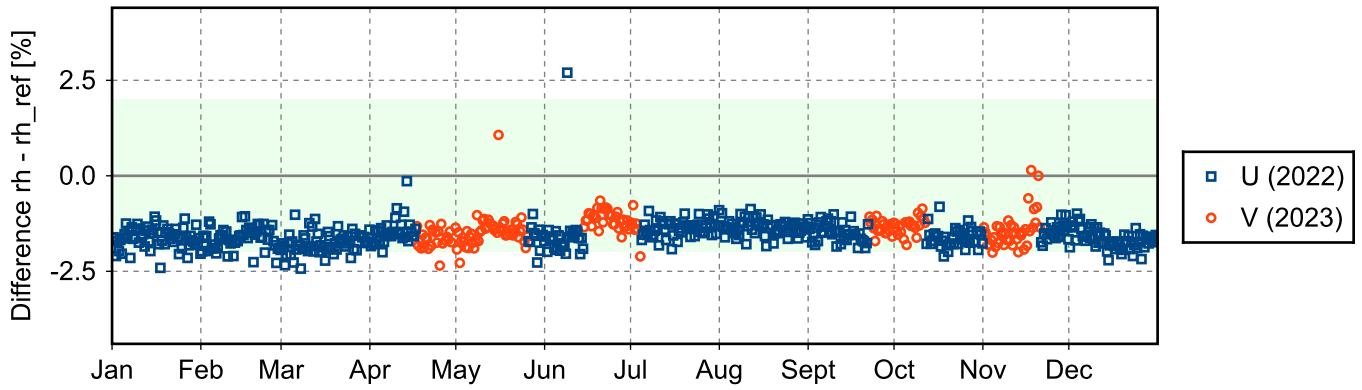
4.4 Instrument combinations of LAU-RS-02

Count	Instrument combination
731	RS41

4.5 Instrument ground check

4.5.1 Stream: RS41

(1) GroundCheck: GC-SHC



4.6 Measurement events

