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

15th GRUAN Implementation-Coordination Meeting (ICM-15)
Bern
11 March - 15 March 2024

Doc. 5.25
(19.II.2024)

Session 5

GRUAN Site Report for Singapore

(Submitted by Gavin Yeap)

Summary and Purpose of this Document

Report from the GRUAN site Singapore for the period January 2022 to December 2023.

Overview

Current measurement programmes contributing to the GRUAN data streams are:

- Twice-daily radiosonde soundings (Meisei iMS-100)
- Monthly ozonesonde soundings (Meisei RS-11G and ECC-ENSCI-Z)
- Hourly GNSS data files (Trimble T02)

Change and change management

Changes effected in the review period were:

- Operation: GNSS station name was renamed from MSS1 to SMS1 from July 2022
- Organisation: Mr Gavin Yeap has been assigned as site POC from December 2023

Resourcing

Significant price increase (about two-fold) for helium in 2022 and 2023, as a result of the outbreak of conflict over Europe in early 2022 which impacted production and supply.

Operations

Error in uploading the ozonesonde sounding data in the RsLaunchClient application due to switching of equipment.

Covid-19

With the overall pandemic situation easing in past two years, contingency measures such as split team arrangements had ceased, and operational launches had resumed normal.

Site assessment and certification

Site was recertified by GRUAN in October 2023.

GRUAN-related research

NIL

WG-GRUAN interface

NIL

Other archiving centers

Some measurement data are provided for the following organizations:

- GUAN
- GFZ German Research Centre for Geosciences, Germany (GNSS data files)
- Karlsruhe Institute of Technology, Germany (TEMP files in TAC)

Participation in campaigns

NIL

Future plans

MSS is planning on the implementation of an automated balloon launcher system.

GRUAN Site Report for Singapore (SNG), 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	Singapore
Unique GRUAN ID	SNG
Geographical position	1.3404 °N, 103.8880 °E, 21.0 m
Operated by	MSS | Meteorological Service Singapore, part of: NEA | National Enviroment Agency
Main contact	Yeap, Gavin
WMO no./name	48698 SINGAPORE/CHANGI AIRPORT
Operators	currently 9, changes +1 / -0
Sounding Site	1
GNSS	1

1.1 General information about GRUAN measurement systems

System	Name	Type	Setups	Measurements
SNG-GN-01	GNSS site MSS1	GNSS	1	operational
SNG-RS-01	Singapore Radiosonde Launch Site	Sounding Site	7	708

1.2 General comments from Lead Centre

No comments from Lead Centre.

2 System: GNSS site MSS1 (SNG-GN-01)

Object	Value
System name	GNSS site MSS1
Unique GRUAN ID	SNG-GN-01
System type	GNSS (GN - GNSS)
Geographical position	1.2026 °N, 103.5316 °E, 36.1 m
Operated by	MSS | Meteorological Service Singapore, part of: NEA | National Enviroment Agency
Instrument contact	Yeap, Gavin
Started at	2017-04-17
Defined setups	1 (HOURLY)
Possible streams	-

2.1 Lead Centre comments

2.1.1 Dataflow

This GNSS system was renamed in July 2022 from MSS1 to SMS1. The dataflow is not adjusted yet.

3 System: Singapore Radiosonde Launch Site (SNG-RS-01)

Object	Value
System name	Singapore Radiosonde Launch Site
Unique GRUAN ID	SNG-RS-01
System type	Sounding Site (RS - Radiosonde)
Geographical position	1.3404 °N, 103.8880 °E, 23.5 m
Operated by	MSS | Meteorological Service Singapore, part of: NEA | National Enviroment Agency
Instrument contact	Yeap, Gavin
Started at	-
Defined setups	7 (ROUTINE2, ROUTINE, OZONE, OZONE2, ROUTINE3, DUAL, OZONE3)
Possible streams	DFM-09, ECC, IMS-100, RS-11G, RS41

3.1 Lead Centre comments

3.1.1 Dataflow

Sonde dataflow to the GRUAN LC is operational since April 2016.

The dataflow includes twice daily operational soundings of Meisei iMS-100 radiosonde. Monthly comparison soundings between RS41 and iMS-100 are also part of the dataflow. All soundings are submitted using RsLaunchClient.

3.1.2 General

In general, there is very good performance in terms of burst altitude which is regularly around 5 hPa.

3.2 GRUAN data products

Product	Version	Soundings received	Available at LC	Distributed by NCEI
3.2.1 Stream: ECC				
ECC		4	4	
3.2.2 Stream: IMS-100				
IMS-100		704	704	
IMS-100-GDP	002		674	
3.2.3 Stream: RS-11G				
RS-11G		4	4	
3.2.4 Stream: RS41				
RS41		13	13	
RS41-RAW	001		13	
RS41-EDT	001		13	
RS41-GDP	001		13	

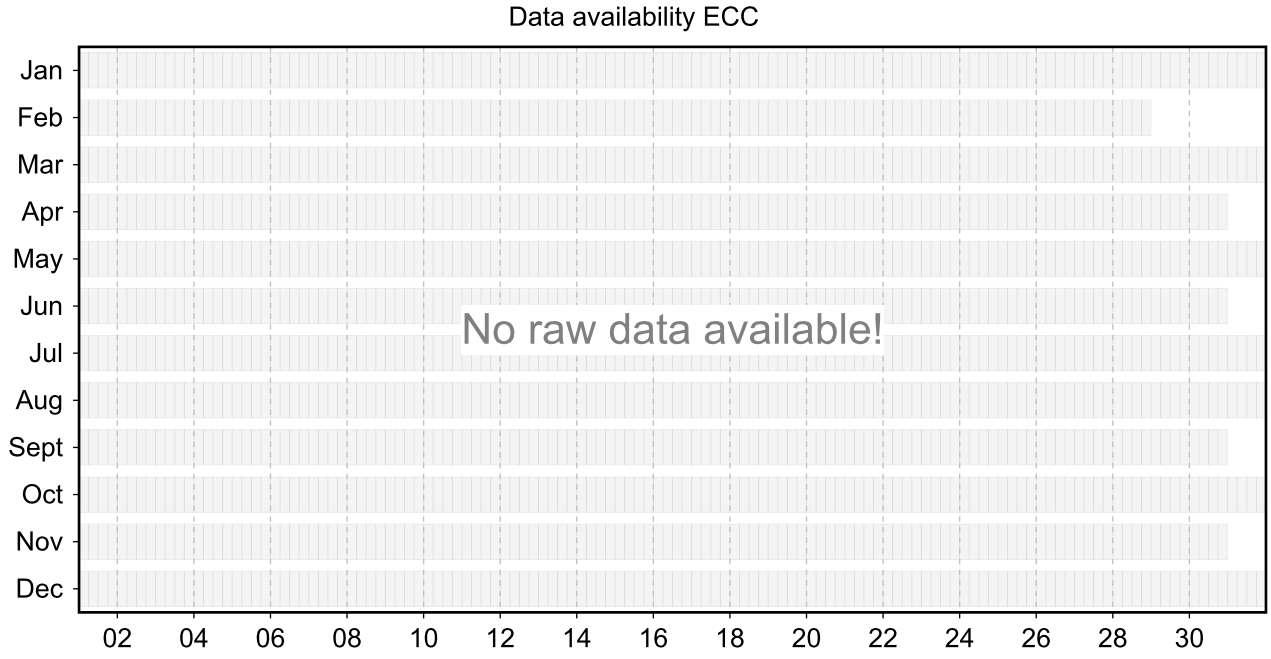
3.3 Availability of data products

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).

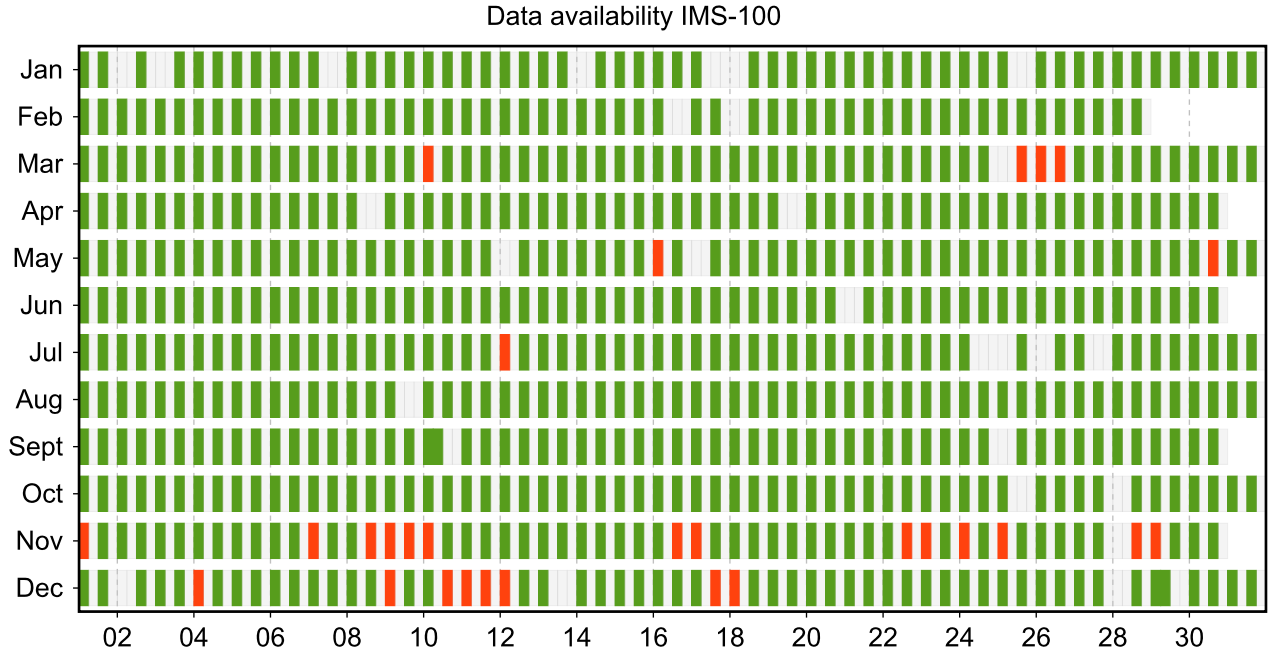
Unprocessed (yellow): The manufacturer-produced file with raw measurement data has been successfully converted into a GRUAN-standardized raw data format (NetCDF). The GRUAN data processing has not been performed or was aborted. Reasons for this may be a still missing GRUAN data processor or a processing-software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

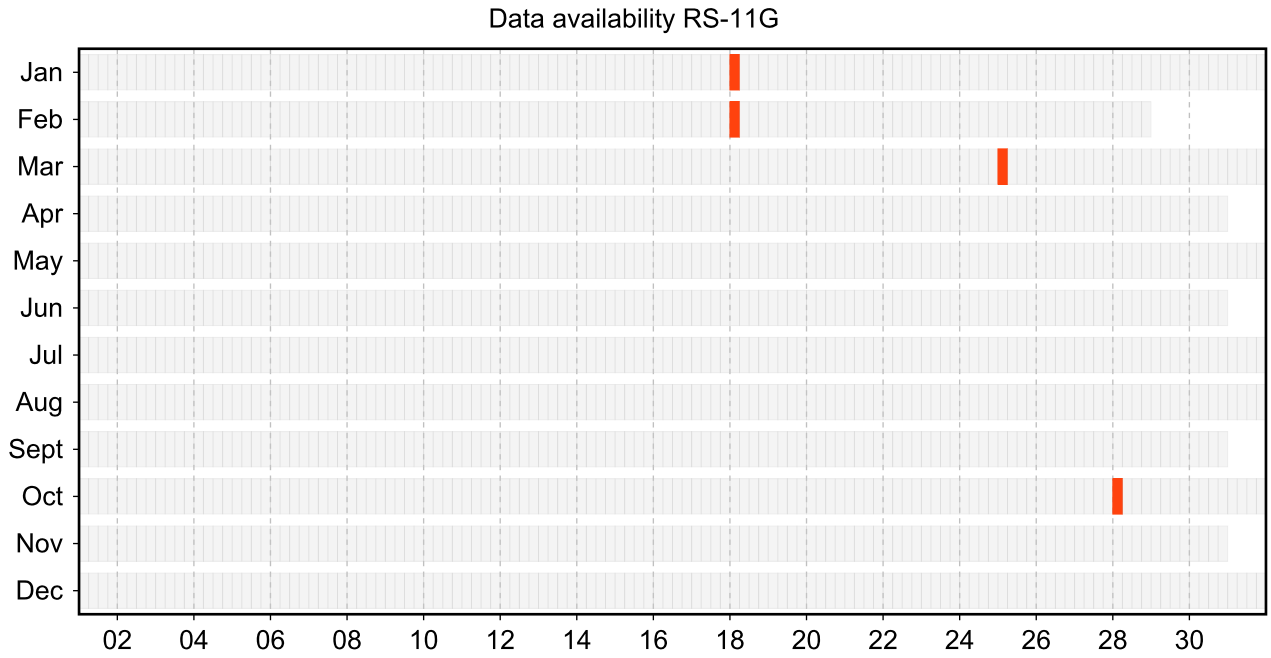
3.3.1 Stream: ECC



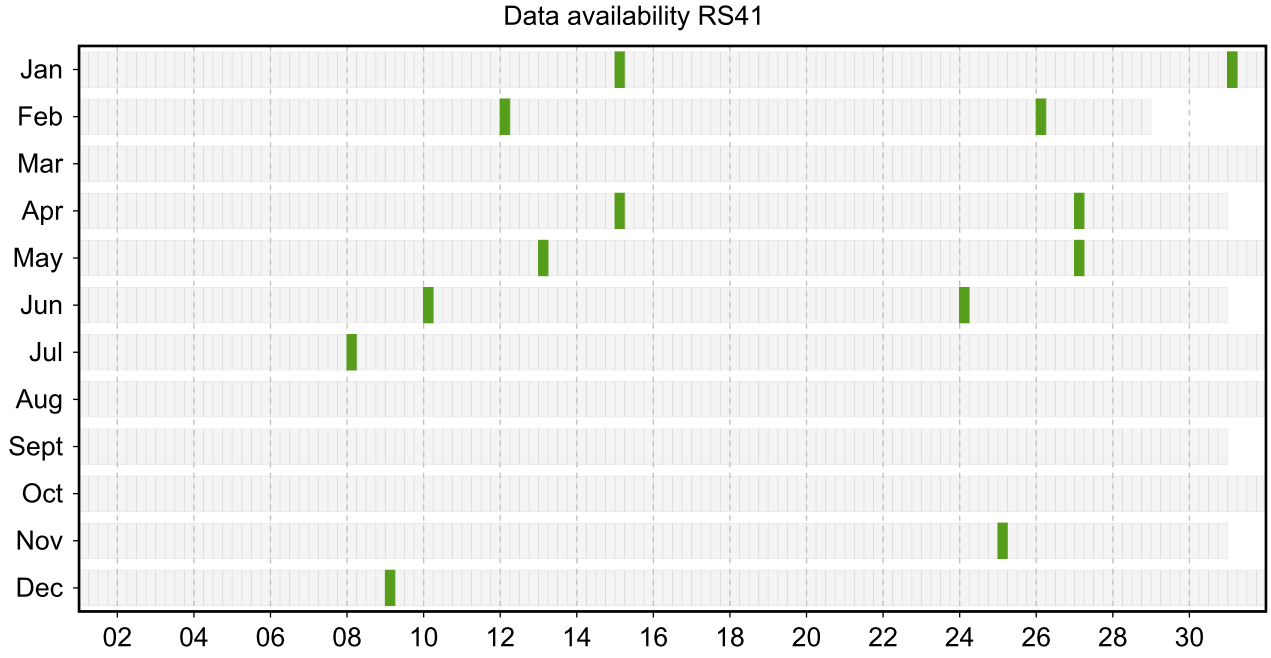
3.3.2 Stream: IMS-100



3.3.3 Stream: RS-11G



3.3.4 Stream: RS41



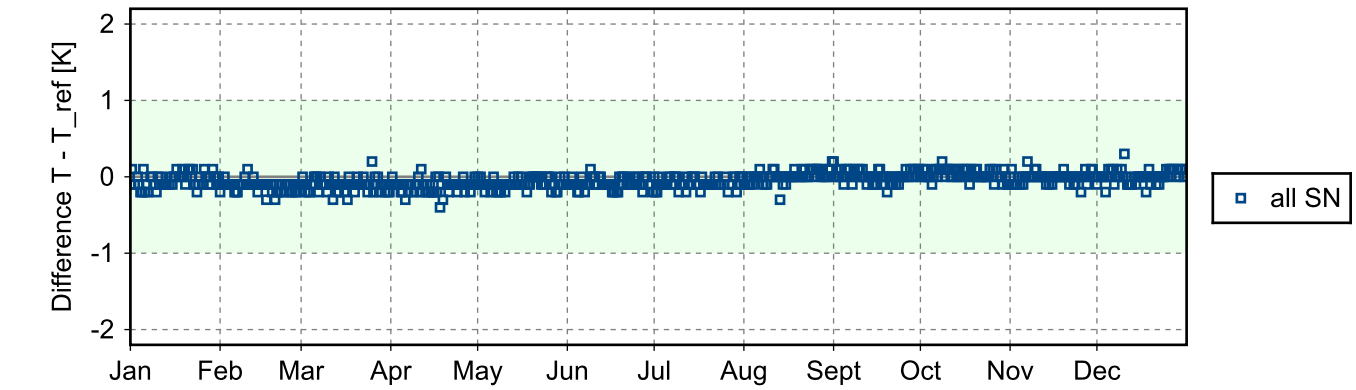
3.4 Instrument combinations of SNG-RS-01

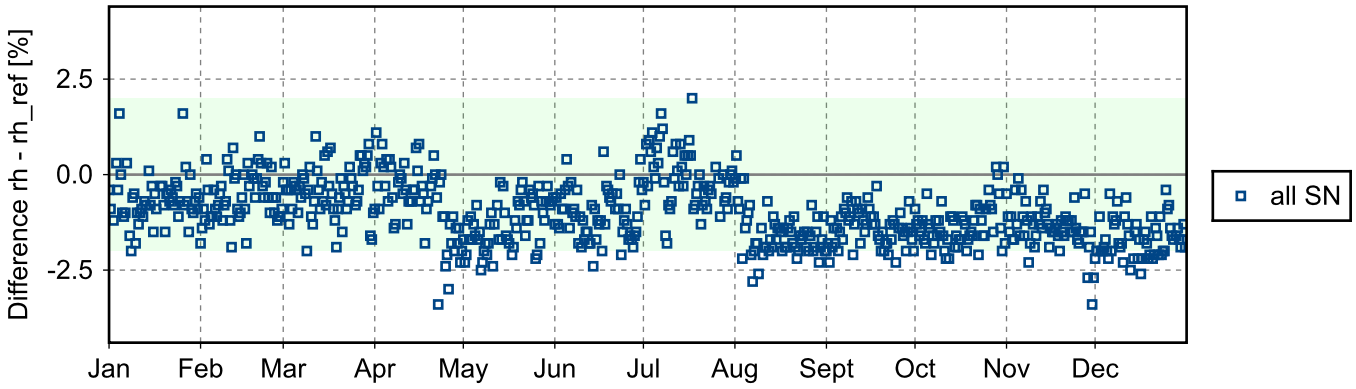
Count	Instrument combination
4	ECC, RS-11G
691	IMS-100
13	IMS-100, RS41

3.5 Instrument ground check

3.5.1 Stream: IMS-100

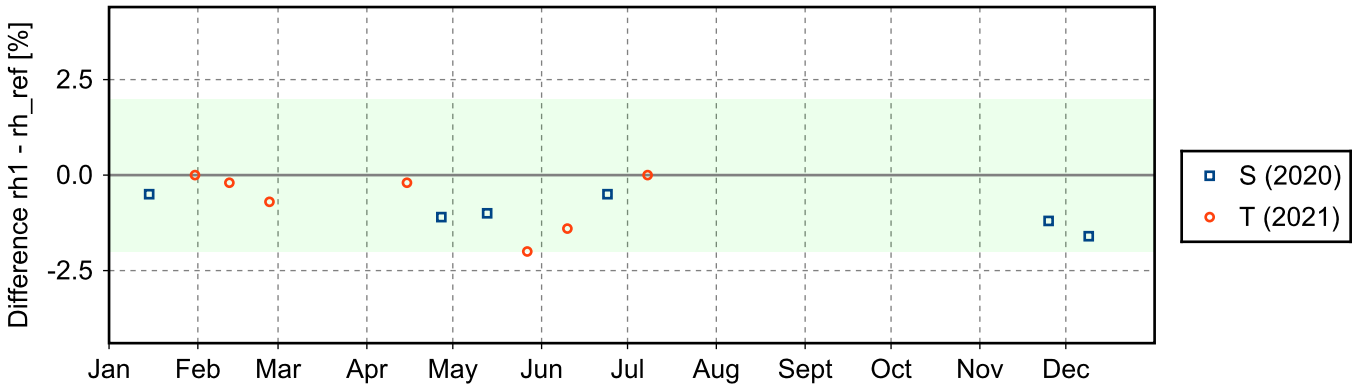
(1) GroundCheck: GC-TU(room)



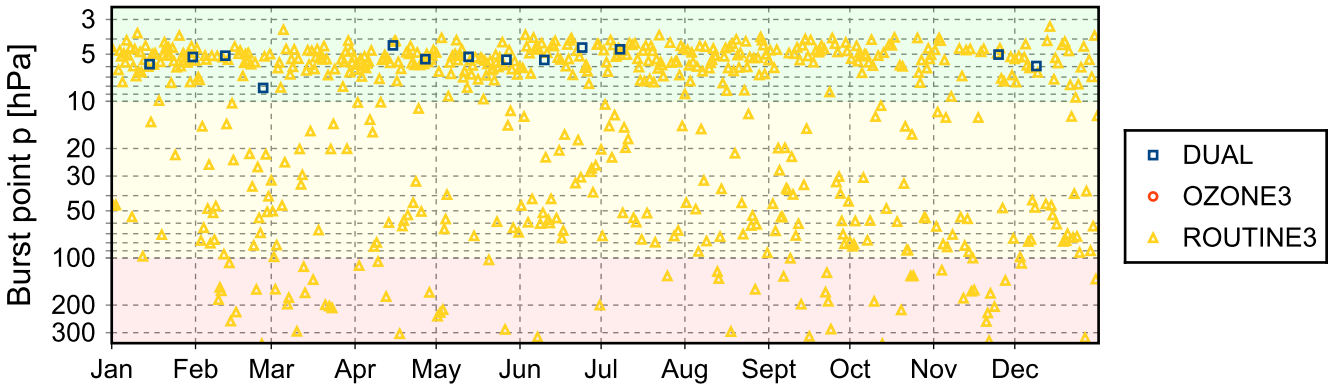


3.5.2 Stream: RS41

(1) GroundCheck: GC-SHC



3.6 Measurement events



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SNG-RS-01	Singapore Radiosonde Launch Site	Sounding Site	7	711

1.2 General comments from Lead Centre

No comments from Lead Centre.

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System name	GNSS site MSS1
Unique GRUAN ID	SNG-GN-01
System type	GNSS (GN - GNSS)
Geographical position	1.2026 °N, 103.5316 °E, 36.1 m
Operated by	MSS | Meteorological Service Singapore, part of: NEA | National Enviroment Agency
Instrument contact	Yeap, Gavin
Started at	2017-04-17
Defined setups	1 (HOURLY)
Possible streams	-

2.1 Lead Centre comments

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Possible streams	DFM-09, ECC, IMS-100, RS-11G, RS41

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3.2.2 Stream: IMS-100				
IMS-100		703	703	
IMS-100-GDP	002		692	
3.2.3 Stream: RS-11G				
RS-11G		8	8	
3.2.4 Stream: RS41				
RS41		12	12	
RS41-RAW	001		12	
RS41-EDT	001		12	
RS41-GDP	001		12	

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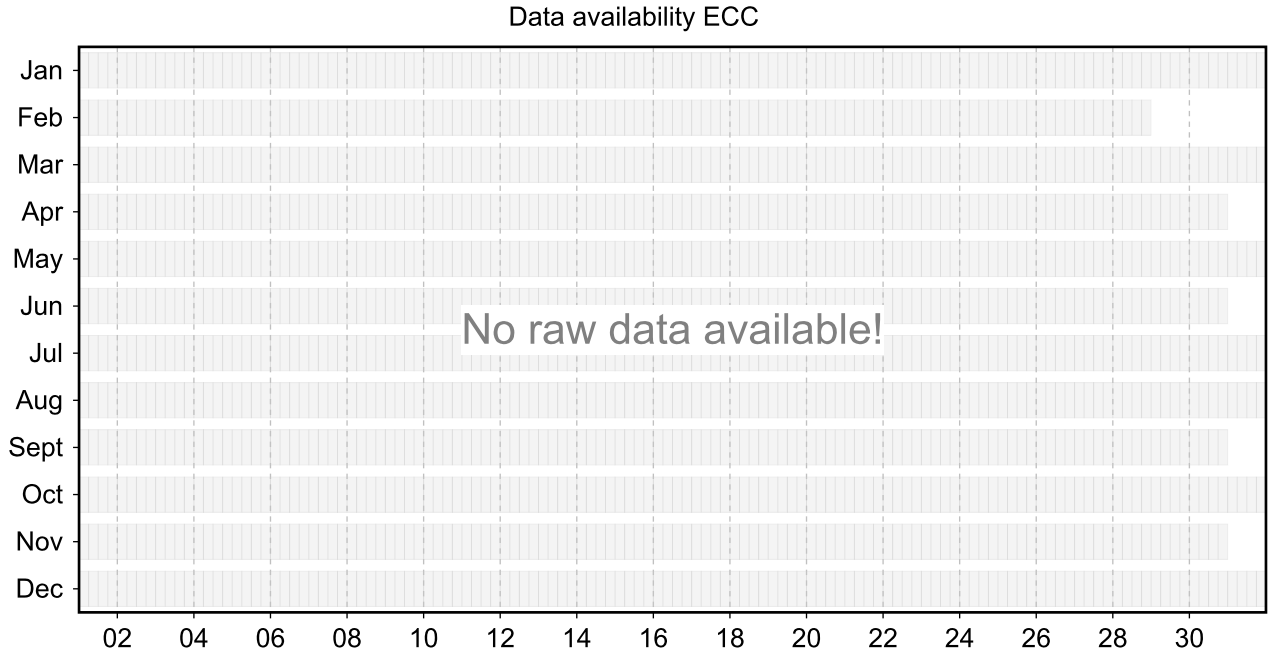
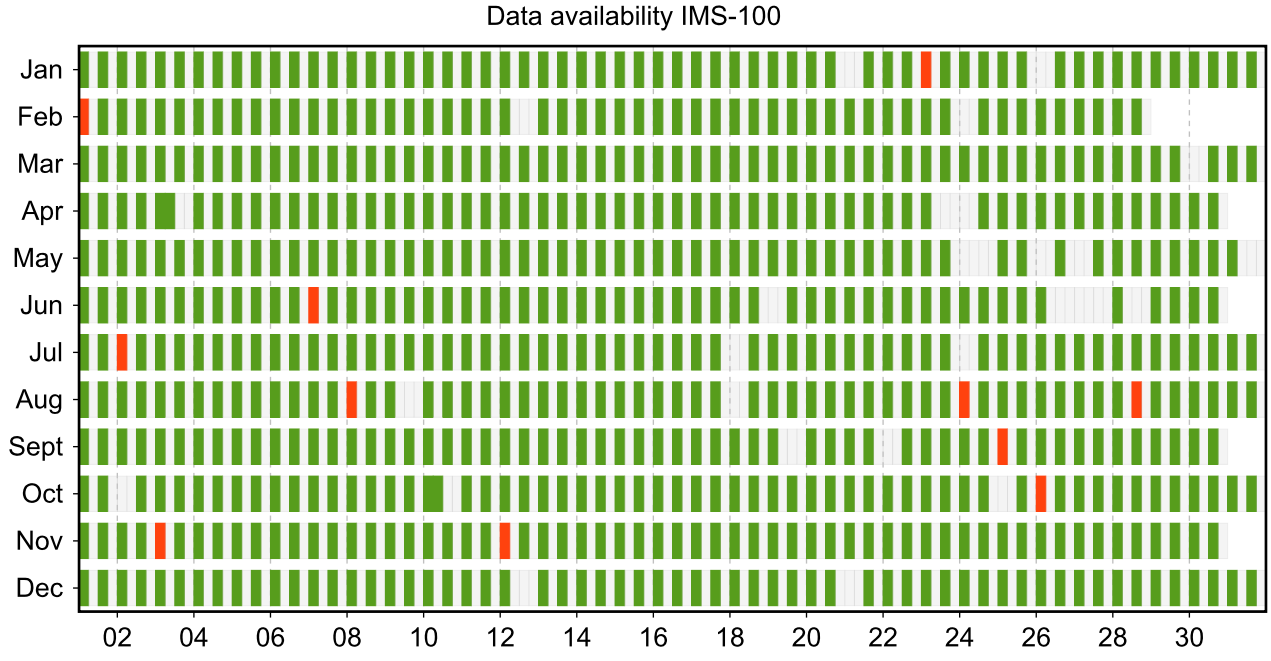
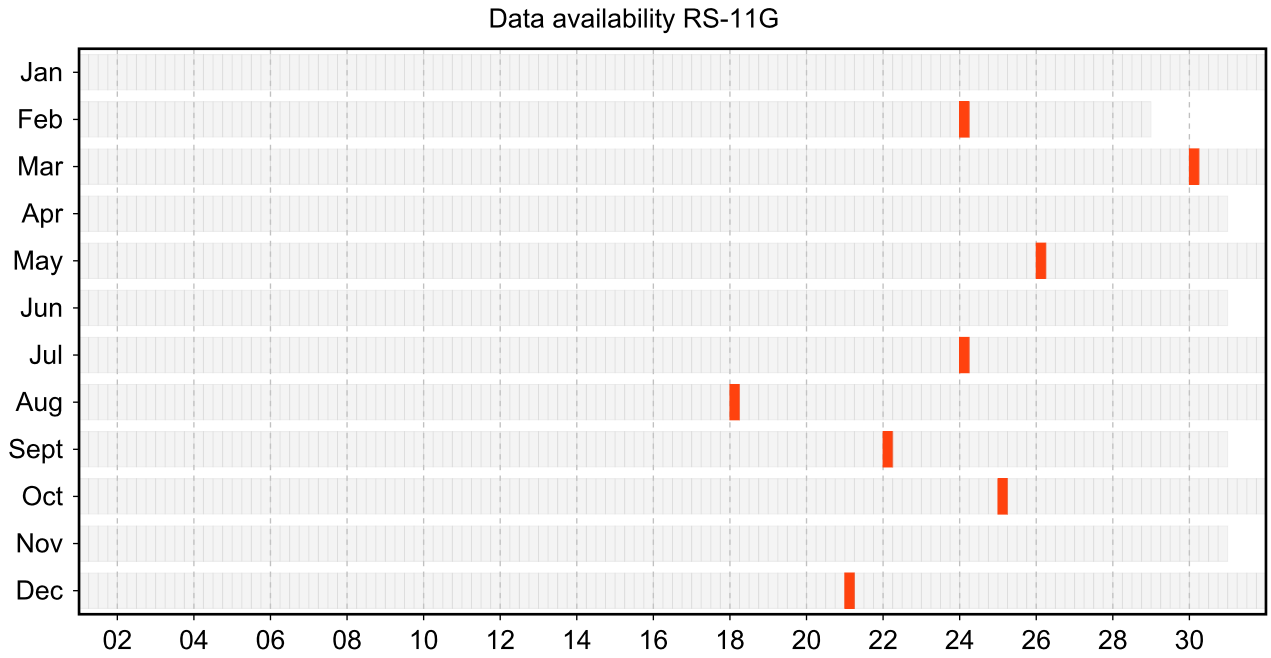


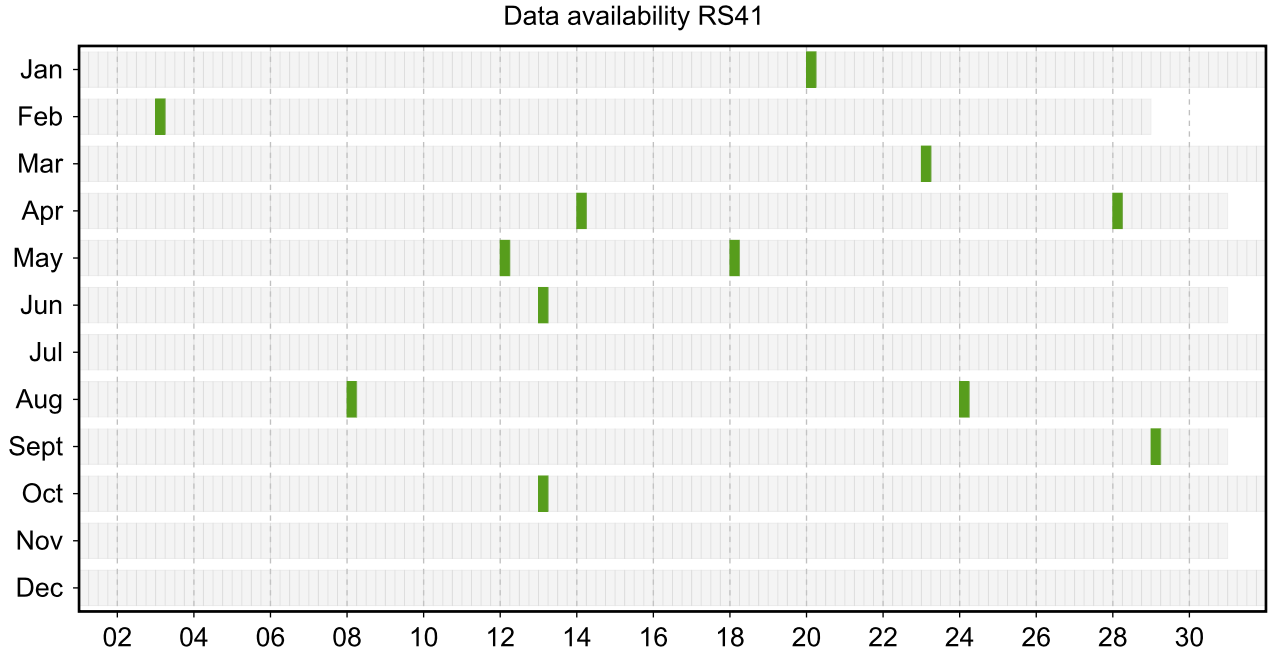
3.3.2 Stream: IMS-100



3.3.3 Stream: RS-11G



3.3.4 Stream: RS41



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3.5 Instrument ground check

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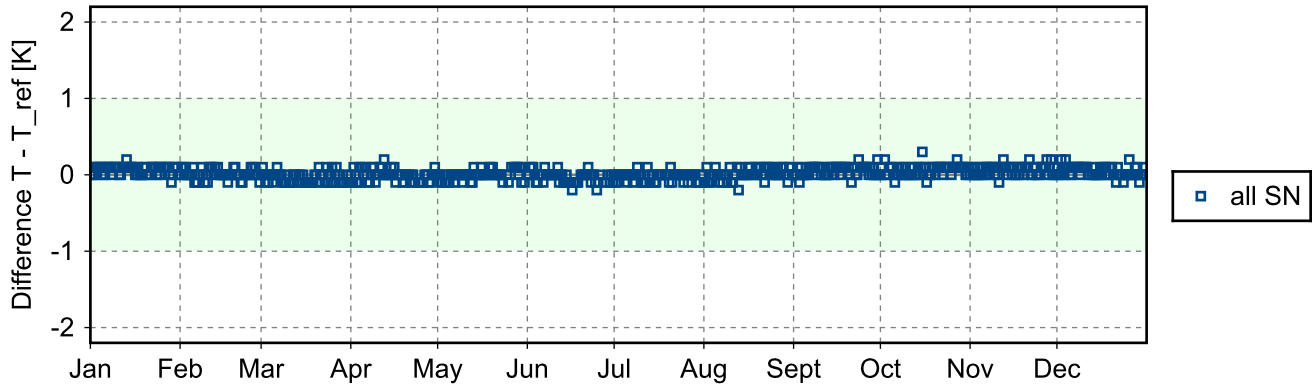
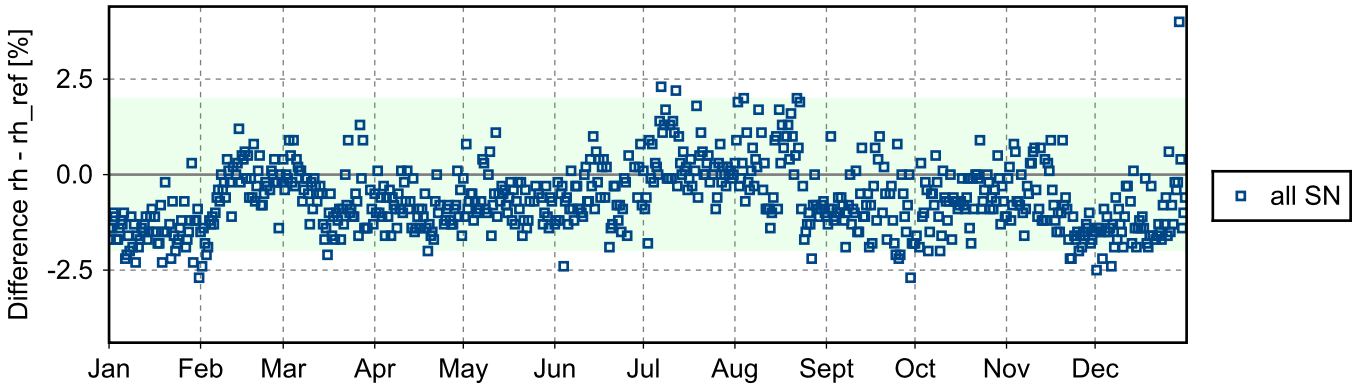
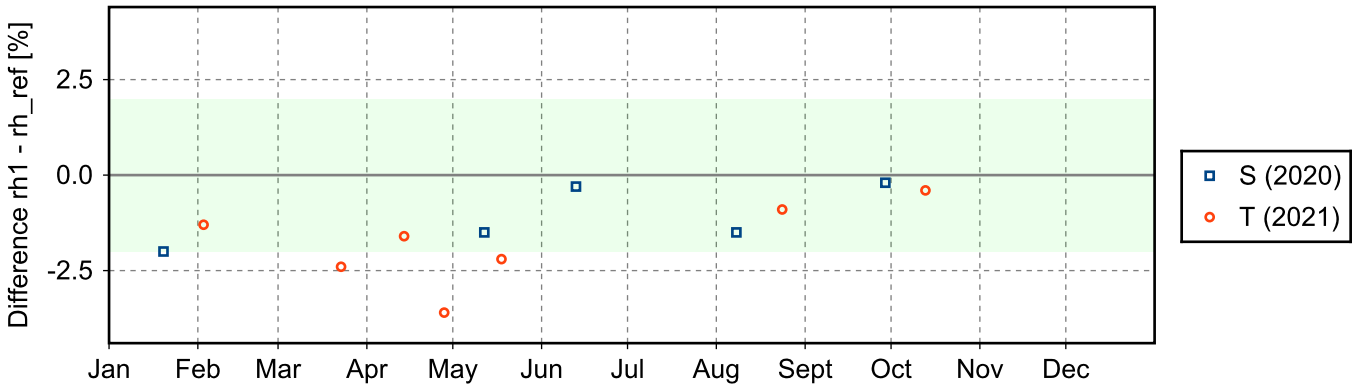




3.5.2 Stream: RS41

(1) GroundCheck: GC-SHC



3.6 Measurement events