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GLOBAL CLIMATE OBSERVING
SYSTEM (GCOS)

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Session 7

# GRUAN Site Report for Sodankylä

*(Submitted by Rigel Kivi)*

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**Summary and Purpose of this Document**

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

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## Overview

At Sodankylä both manual and automatic radiosonde launch systems have been operational. In total 28 manual soundings and 1036 automated soundings have been submitted during the reporting period, using the GRUAN operating procedures. The manual sounding dataflow includes Vaisala RS92-SGP, ECC ozonesonde, CFH water vapor, Intermet iMet-1, Vaisala RS80, Vaisala RS41. The data have been transmitted using the RsLaunchClient software. In addition the GNSS dataflow has been set up and the GNSS Site SODF is operational.

## Change and change management

Change from RS92 to RS41 was on March 30, 2017. Since then we have launched RS41 sondes on regular basis. The ozonesondes are flown using RS92. The CFH launches have involved iMet sondes, in the future we plan to reconfigure the CFH soundings and then RS41 will be used for telemetry and radiosonde PTU measurement. RS92 and RS41 comparison flights have been performed at Sodankylä. The comparison flights have included CFH as a reference instrument. There are also parallel flights using manual and autosonde system.

## Resourcing

Currently our budget funding is not able to cover all the research activities, therefore external funding is needed to continue with these activities.

## Operations

In order to reduce sounding costs, we haven't been able to use large sounding balloons in operational mode. Therefore soundings during summer have not systematically reached the 10 hPa threshold. However, we have been able to operate larger sounding balloons in winter and therefore the sounding altitudes have been better in winter relative to the summer period. In 2018 we were able to increase sounding frequency during February-March and July-August-September. Additional two soundings per day were performed during five months using external funding.

## Site assessment and certification

Our site has been certified.

## GRUAN-related research

GRUAN research is related to the work within the Radiosonde task team.

## WG-GRUAN interface

Letter of support is found to be useful from the Working Group on GRUAN.

## Items for ICM-11 plenary discussions

Discussion on change management issues, for example the case of RS92/RS41. Also external funding possibilities would be of interest to discuss with the GRUAN partners.

## Other archiving centers

Data are submitted to NDACC, WOUDC, TCCON, NILU and some project databases.

## Participation in campaigns

Campaigns of rig soundings of CFH, RS41, RS92. In 2018 we have hosted ESA campaign related to TROPOMI (FRM4GHG), participated in DLR CoMet aircraft campaign and hosted EU RINGO balloon campaign on AirCore sondes. Drone-based AirCore flights were performed in summer 2018. Additional radiosondes were launched during YOPP in February-March and July-September 2018. During these months we had 4 regular soundings per day.

## Future plans

We expect to improve instrumentation at the site and participate in the GRUAN task team activities. We also hope to contribute to the instrument development regarding additional sensors to be flown in the GRUAN payload. Some upcoming research activities will include drone based measurements.

# GRUAN Site Report for Sodankyla (SOD), 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 | Sodankyla |
| Unique GRUAN ID | SOD |
| Geographical position | 67.3700 °N, 26.6300 °E, 179.0 m |
| Operated by | FMI \| Ilmatieteen laitos |
| Main contact | Kivi, Rigel |
| WMO no./name | 02836 SODANKYLÄ |
| Operators | currently 8, changes +0 / -0 |
| Sounding Site | 2 |
| GNSS | 1 |

## 1.1 General information about GRUAN measurement systems

| System | Name | Type | Setups | Measurements |
|---|---|---|---|---|
| SOD-GN-01 | GNSS Site SODF | GNSS | 1 | operational |
| SOD-RS-01 | Sodankylä Radiosonde Launch Site | Sounding Site | 3 | 28 |
| SOD-RS-02 | Automatic Sodankylä Launch System (AUTOSONDE) | Sounding Site | 2 | 1036 |

## 1.2 General comments from Lead Centre

No comments available from Lead Centre.

# 2 System: GNSS Site SODF (SOD-GN-01)

| Object | Value |
|---|---|
| System name | GNSS Site SODF |
| Unique GRUAN ID | SOD-GN-01 |
| System type | GNSS (GN - GNSS) |
| Geographical position | 67.4209 °N, 26.3890 °E, 299.7 m |
| Operated by | FMI \| Ilmatieteen laitos |
| Instrument contact | Kivi, Rigel |
| Started at | - |
| 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.

# 3 System: Sodankylä Radiosonde Launch Site (SOD-RS-01)

| Object | Value |
|---|---|
| System name | Sodankylä Radiosonde Launch Site |
| Unique GRUAN ID | SOD-RS-01 |
| System type | Sounding Site (RS - Radiosonde) |
| Geographical position | 67.3700 °N, 26.6300 °E, 179.0 m |
| Operated by | FMI \| Ilmatieteen laitos |
| Instrument contact | Kivi, Rigel |
| Started at | - |
| Defined setups | 3 (RESEARCH, OZONE, ROUTINE2) |
| Possible streams | CFH, COBALD, RS41, RS80, RS92 |

## 3.1 Lead Centre comments

### 3.1.1 Dataflow

Dataflow to GRUAN LC is operational since October 2010. Dataflow includes: Vaisala RS41-SG, Vaisala RS92-SGP, ECC ozone sonde, CFH water vapour, Intermet IMET-1, and Vaisala RS80. The launches are transmitted using RsLaunchClient.

### 3.1.2 General

This is the manual launch site, used for ECC ozone sondes, CFH sondes and other manually released research sondes.

## 3.2 GRUAN data products

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

### 3.2.1 Stream: CFH

| | | | | |
|---|---|---|---|---|
| CFH | | 2 | 2 | |

### 3.2.2 Stream: ECC

| | | | | |
|---|---|---|---|---|
| ECC | | 28 | 28 | |

### 3.2.3 Stream: IMET-1

| | | | | |
|---|---|---|---|---|
| IMET-1 | | 2 | 2 | |

### 3.2.4 Stream: RS41

| | | | | |
|---|---|---|---|---|
| RS41 | | 1 | 1 | |
| RS41-RAW | 001 | | 1 | |
| RS41-EDT | 001 | | 1 | |
| RS41-GDP-ALPHA | 002 | | 1 | |

### 3.2.5 Stream: RS92

| | | | | |
|---|---|---|---|---|
| RS92 | | 28 | 28 | |
| RS92-RAW | 001 | | 28 | |
| RS92-RAW | 002 | | 28 | |
| RS92-EDT | 001 | | 27 | |
| RS92-GDP | 002 | | 25 | 20 |

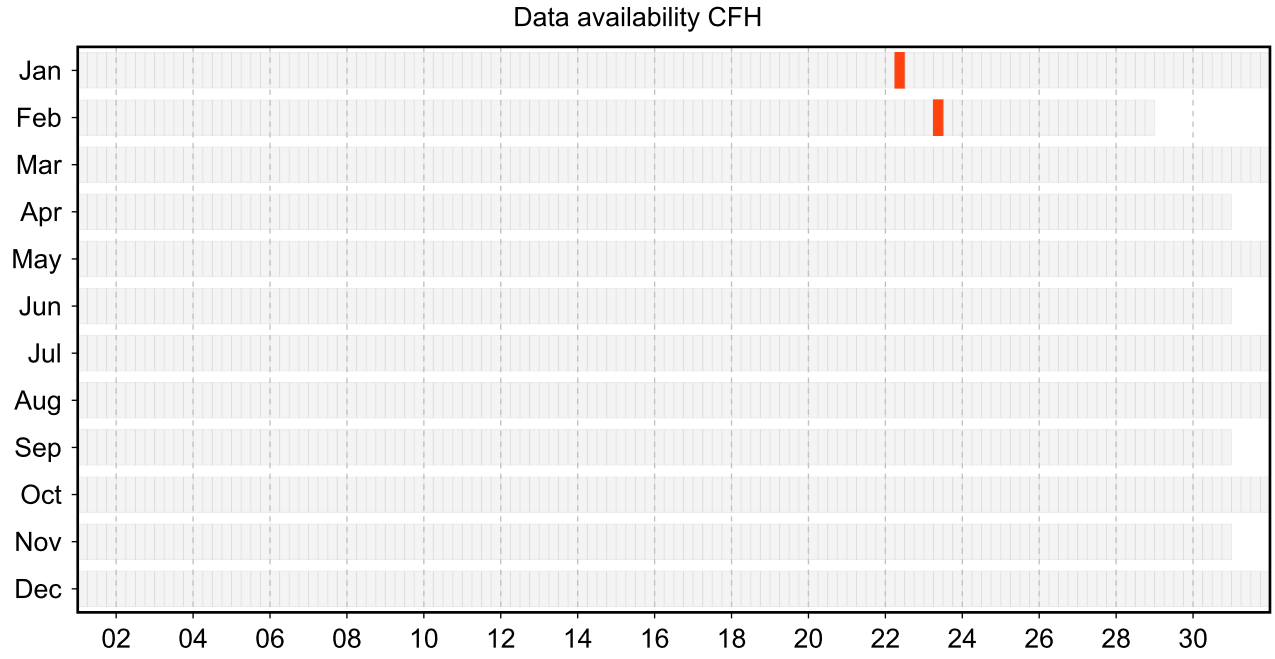
## 3.3 Data availability of data products

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).

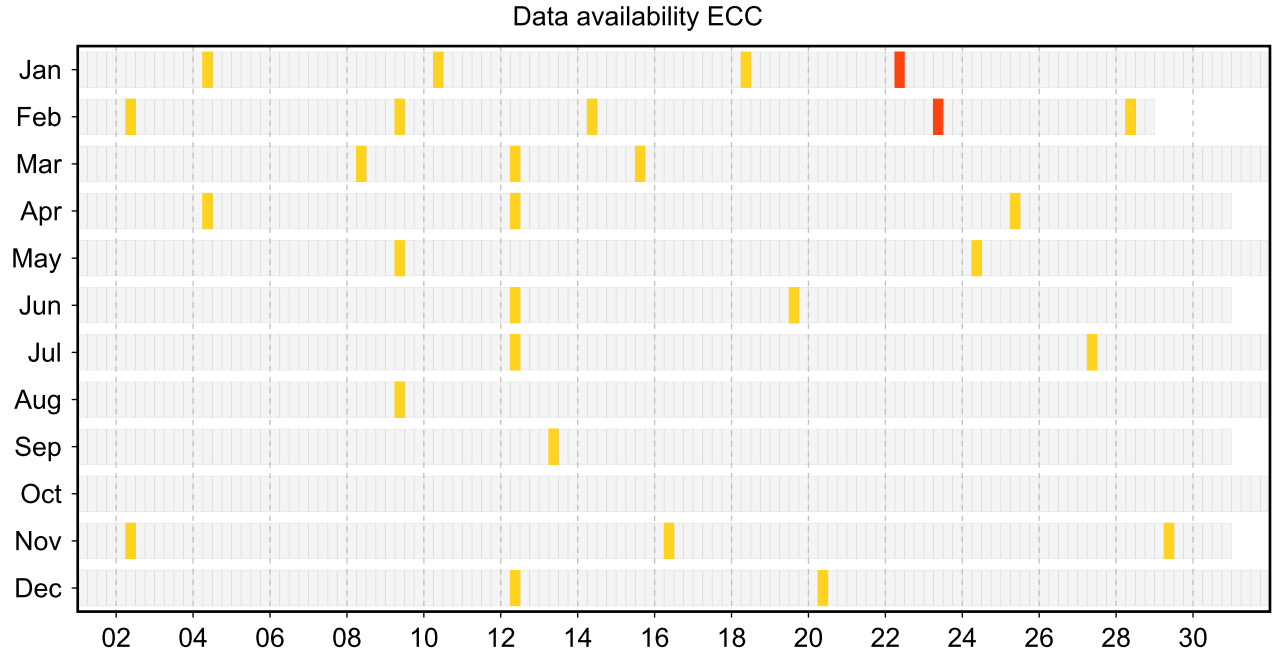
Unprocessed (yellow): The raw data file has been successfully converted to a GRUAN standardized raw data file format (NetCDF). The processing (e.g. GRUAN data processing) has not yet been done, or has not been completed. Reason may be a processing routine which does not yet exist, or software errors.

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.

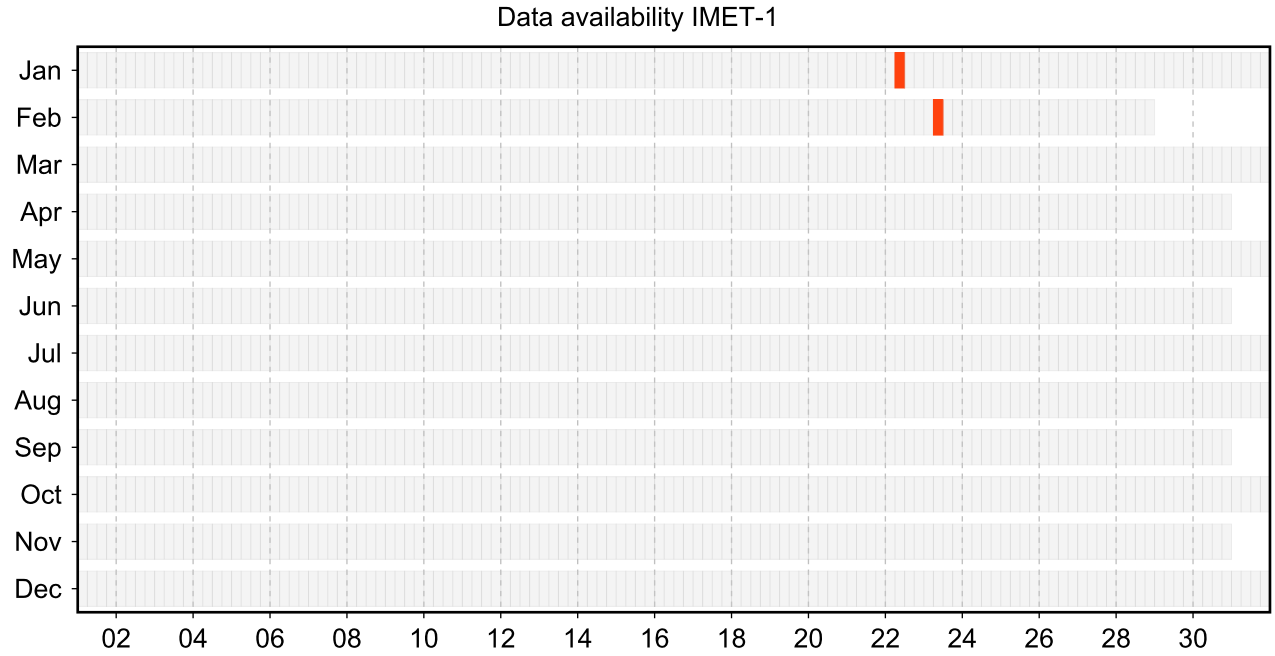
### 3.3.1 Stream: CFH



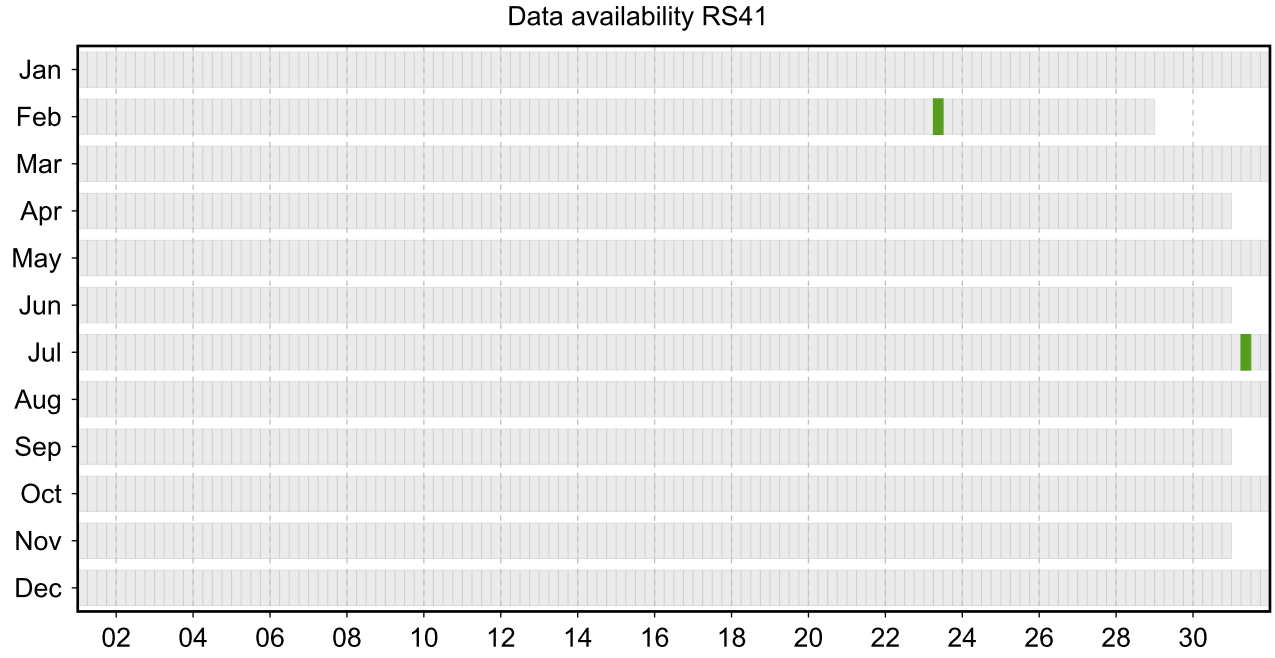

### 3.3.2 Stream: ECC



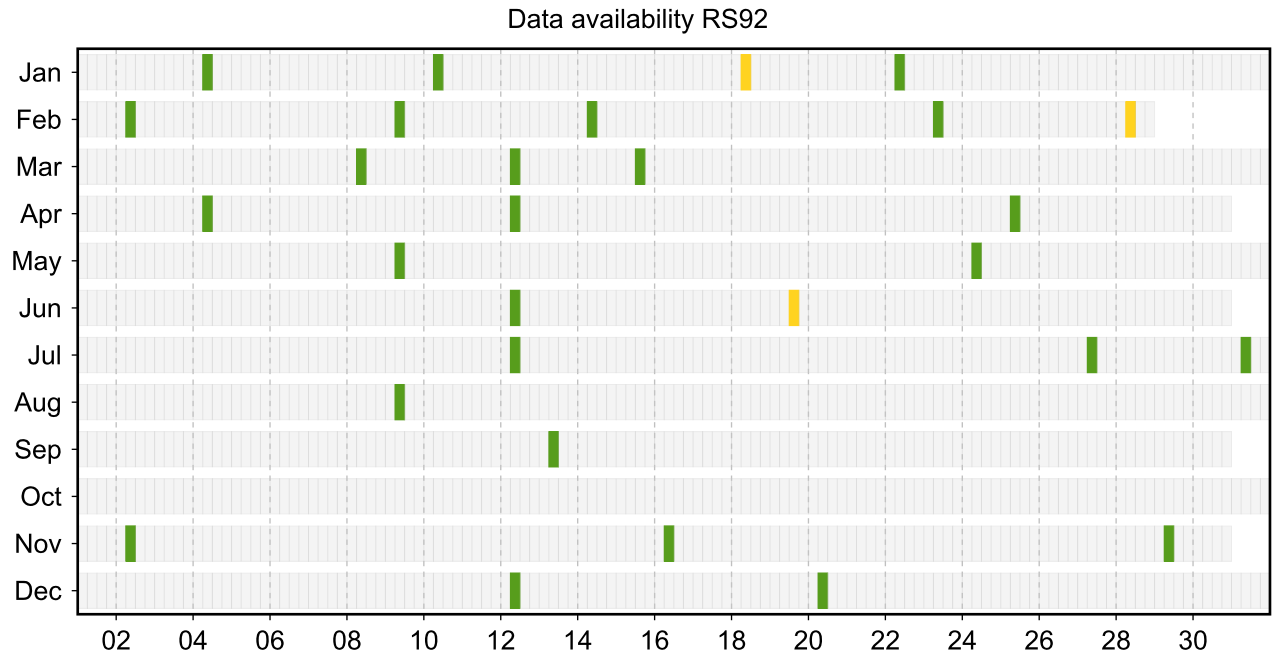
### 3.3.3 Stream: IMET-1




### 3.3.4 Stream: RS41



### 3.3.5 Stream: RS92

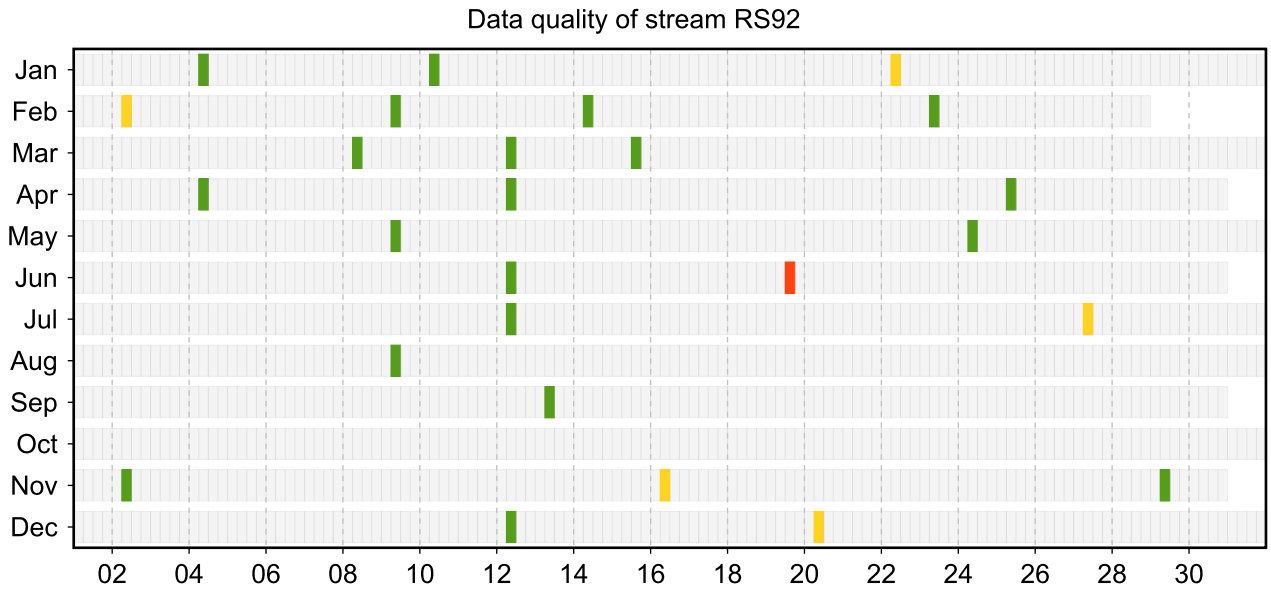


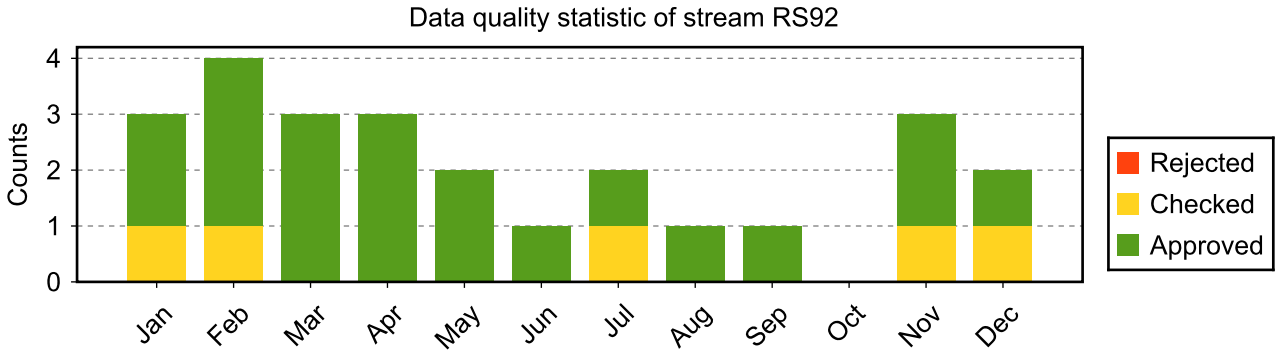
## 3.4 Data quality of current GRUAN data products

| 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 | 3 | 2 | 1 | | | | | | 2 |
| Feb | 4 | 3 | 1 | | | | | | 1 |
| Mar | 3 | 3 | | | | | | | |
| Apr | 3 | 3 | | | | | | | 1 |
| May | 2 | 2 | | | | | | | 1 |
| Jun | 1 | 1 | | | | | | | |
| Jul | 2 | 1 | 1 | | | | 1 | | |
| Aug | 1 | 1 | | | | | | | 1 |
| Sep | 1 | 1 | | | | | | | 1 |
| Oct | | | | | | | | | |
| Nov | 3 | 2 | 1 | | | | | | 3 |
| Dec | 2 | 1 | 1 | | | | 1 | | |
| **Sum** | **25** | **20** | **5** | | | | **2** | | **10** |



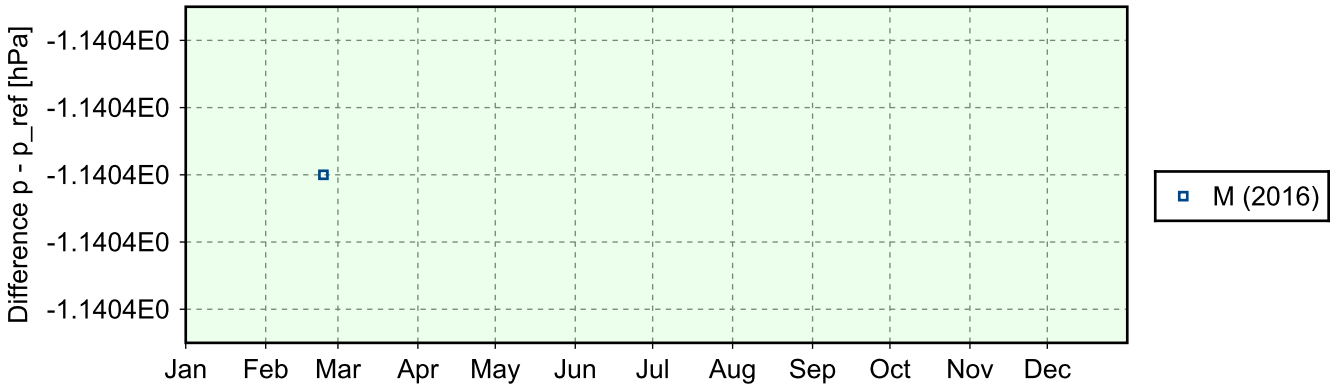
## 3.5 Instrument combinations of SOD-RS-01

| Count | Instrument combination |
|---|---|
| 1 | CFH, ECC, IMET-1, RS41, RS92 |
| 1 | CFH, ECC, IMET-1, RS92 |
| 26 | ECC, RS92 |

## 3.6 Instrument ground check

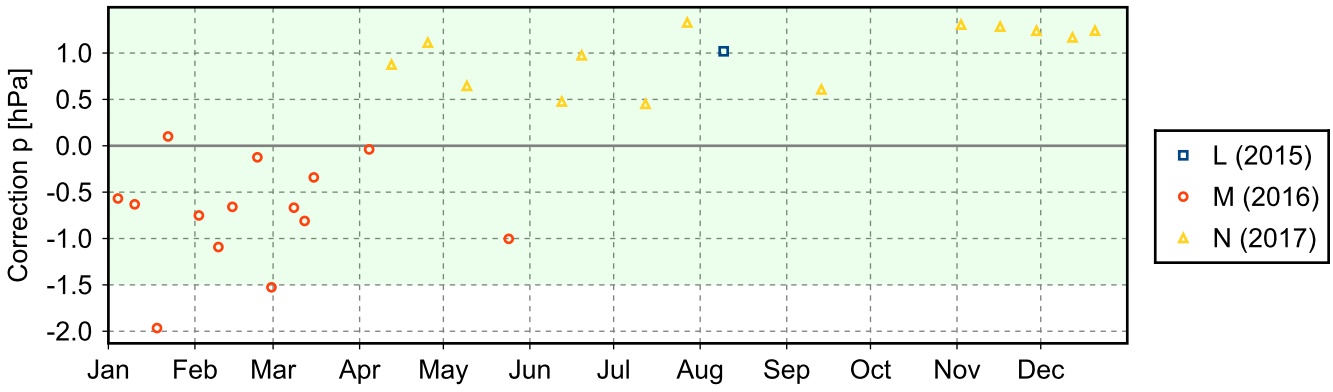
### 3.6.1 Stream: RS41

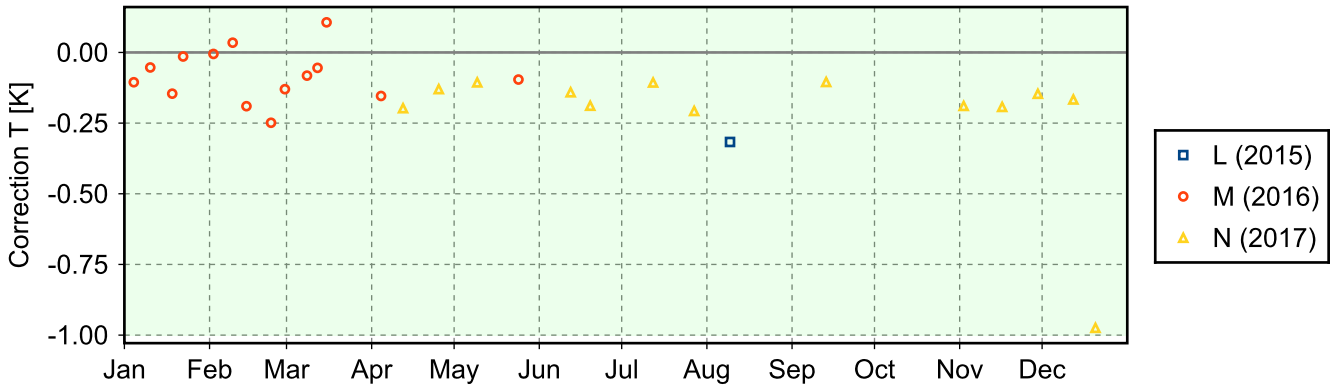
**(1) GroundCheck: GC-RI41**

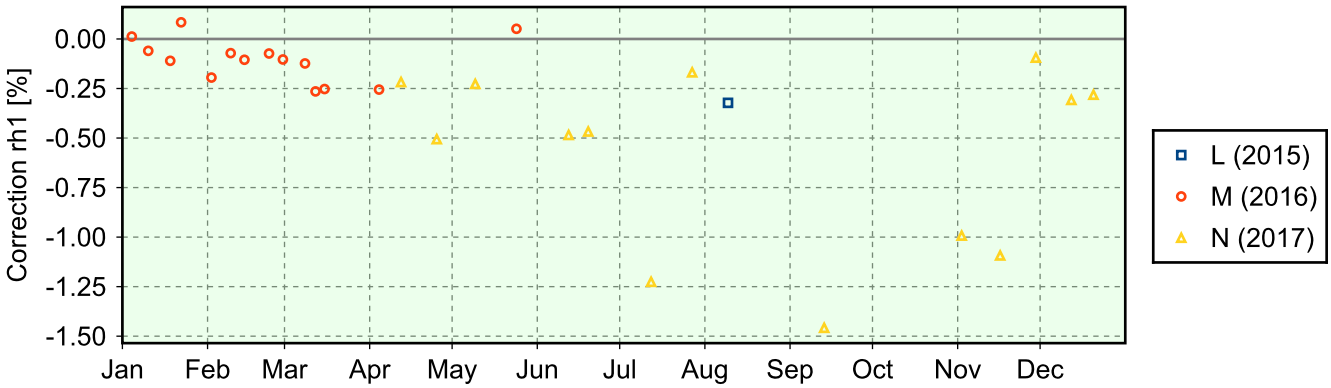


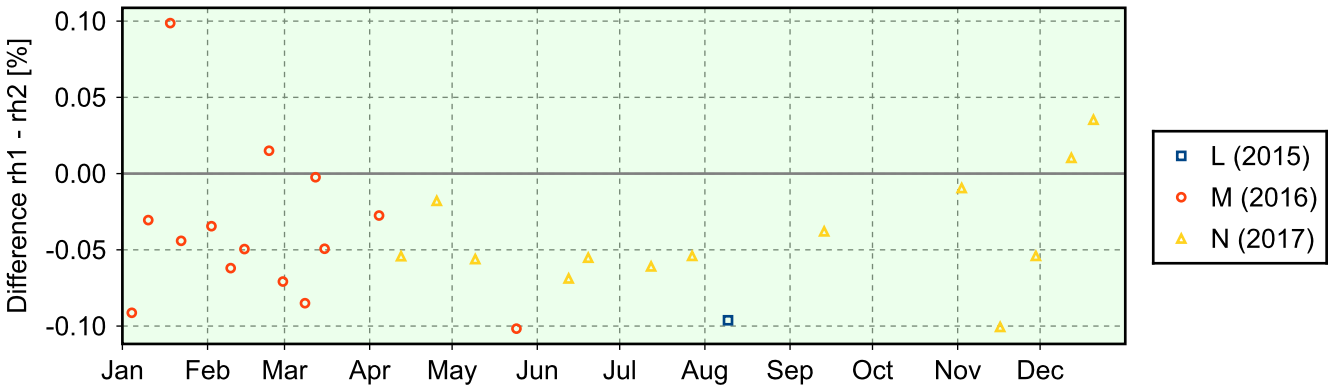

### 3.6.2 Stream: RS92

**(1) GroundCheck: GC-GC25**

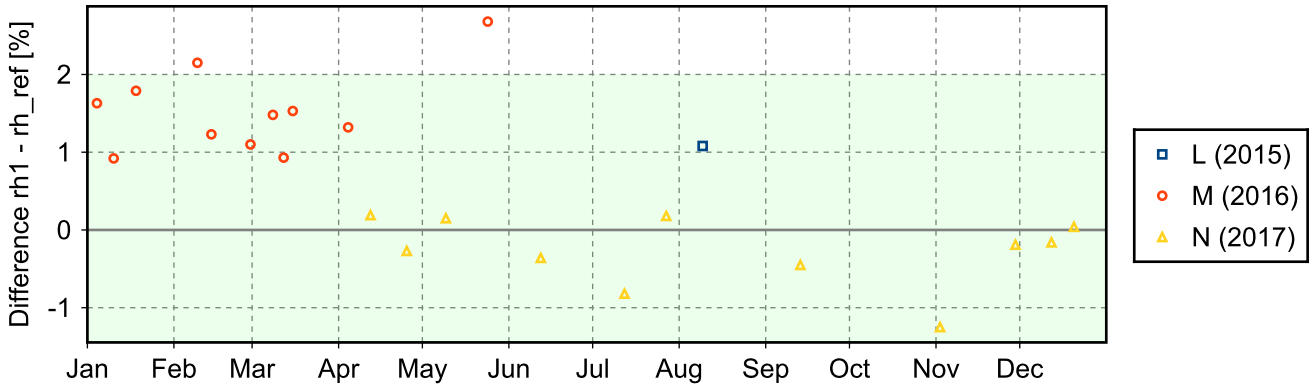


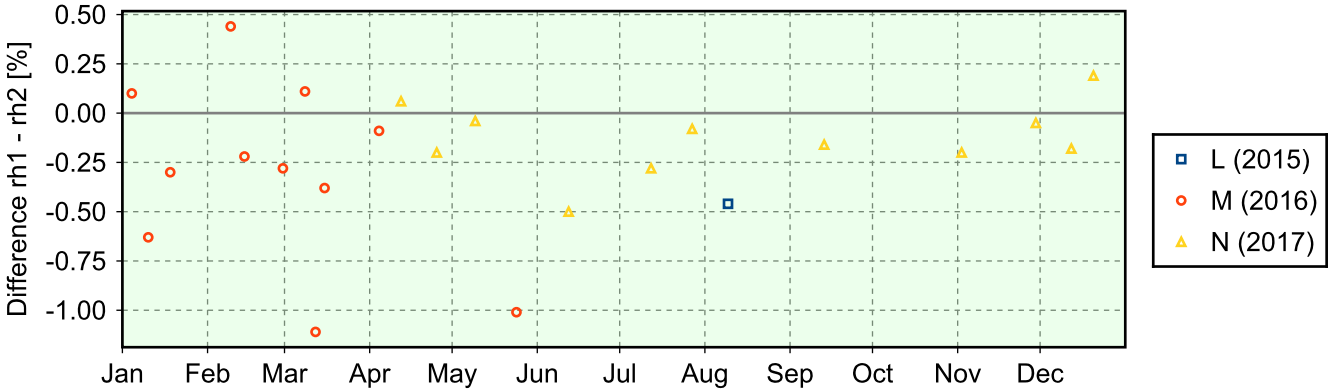





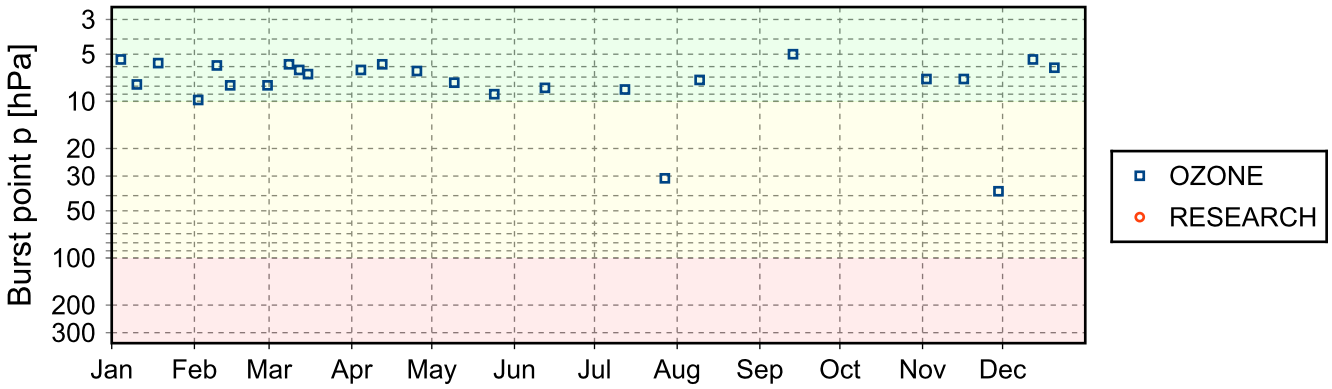




**(2) GroundCheck: GC-SHC**



## 3.7 Measurement events



# 4 System: Automatic Sodankylä Launch System (AUTOSONDE) (SOD-RS-02)

| Object | Value |
|---|---|
| System name | Automatic Sodankylä Launch System (AUTOSONDE) |
| Unique GRUAN ID | SOD-RS-02 |
| System type | Sounding Site (RS - Radiosonde) |
| Geographical position | 67.3663 °N, 26.6313 °E, 179.0 m |
| Operated by | FMI \| Ilmatieteen laitos |
| Instrument contact | Kivi, Rigel |
| Started at | 2008-01-01 |
| Defined setups | 2 (ROUTINE, ROUTINE3) |
| Possible streams | RS41, RS92 |

## 4.1 Lead Centre comments

### 4.1.1 Dataflow

Dataflow to GRUAN LC is operational since January 2011. Currently a weekly delivery to GRUAN LC is implemented.

### 4.1.2 General

This is the auto-launcher data stream.

Routine soundings using Vaisala RS41-SG are performed two times per day.

## 4.2 GRUAN data products

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

### 4.2.1 Stream: RS41

| | | | | |
|---|---|---|---|---|
| RS41 | | 1036 | 1036 | |
| RS41-RAW | 001 | | 1034 | |
| RS41-EDT | 001 | | 1027 | |
| RS41-GDP-ALPHA | 002 | | 774 | |

## 4.3 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.

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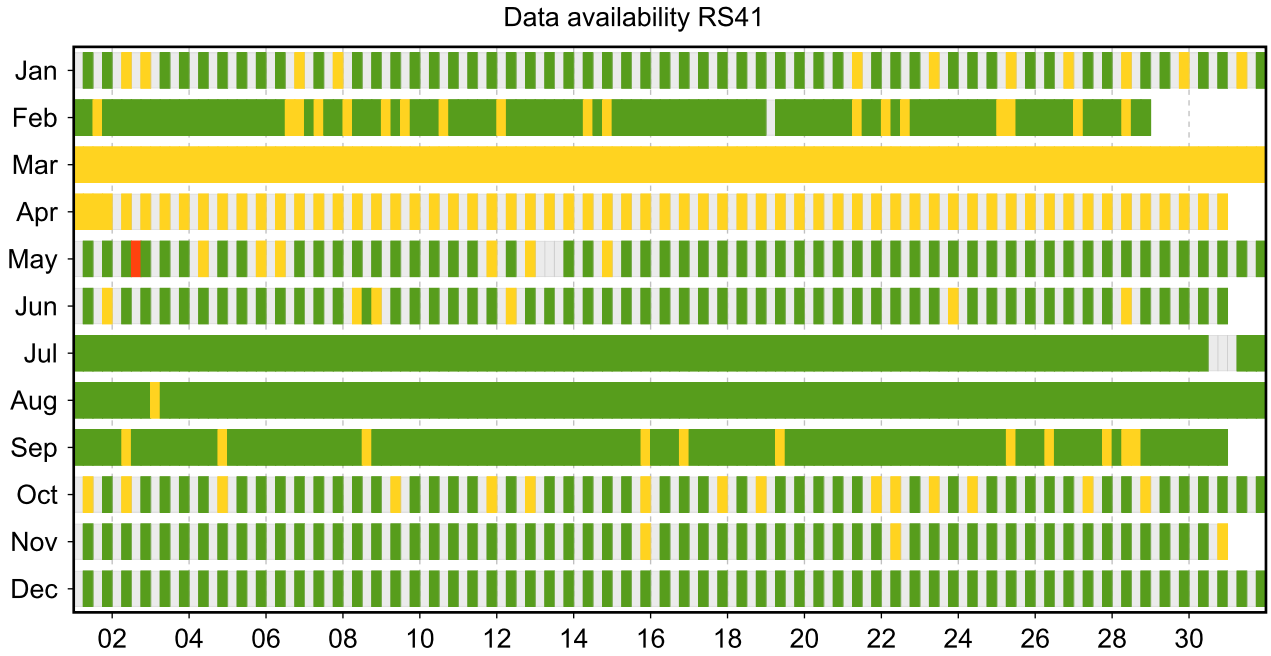
### 4.3.1 Stream: RS41




## 4.5 Instrument combinations of SOD-RS-02

| Count | Instrument combination |
|---|---|
| 1036 | RS41 |

## 4.7 Measurement events