



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

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**10th GRUAN Implementation-  
Coordination Meeting (ICM-10)**

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Session 7

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23 - 27 April 2018

## GRUAN Site Report for Barrow

*(Submitted by Douglas Sisterson)*

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### **Summary and Purpose of this Document**

Report from the GRUAN site Barrow for the period January to December 2017.

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# GRUAN Site Report for Barrow (BAR)

Reporting for the period January to December 2017

Date: 5-March-2018

Primary author: Douglas Sisterson  
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## Overview

The ARM Climate Research Facility provides radiosonde data from the SGP, the ENA Site in the Azores (manually launched), and NSA Barrow (Autosonde launcher) Sites and has provided data from the TWP Manus and Papua New Guinea (manually launched) before they were retired. Although the ARM Facility has radiosondes being manually launched from the OLI Oliktok, they are not being formally transmitted to GRUAN. In addition, ARM has manually launched radiosonde data from its mobile facilities that have not been transmitted to GRUAN.

## Change and change management

Change to the ARM Facility with regard to radiosonde operations during 2017 include upgrade of three systems at the SGP from MW21/MW31 to the new MW41 systems. C1, S01, S02 systems were upgraded to the Vaisala MW41 software and put into service on 12 April 2017. An MW41 system upgrade was installed at NSA S01 to replace the MW21 system on 8 August 2017. NSA S01 will launch RS92 radiosondes until the RIVAL campaign starts in Feb 2018. The OLI Oliktok MW31 was upgraded to MW41 and put into service on 19 May 2017. We have yet to conduct the upgrade for ENA Azores, and mobile sites AMF1, and AMF2, but these upgrades will happen in early 2018. The Vaisala upgrade of our NSA Autosonde took place in September 2017, but due to computer issues, began operations launching RS41 radiosondes on 18 October 2017.

The installation of the MAWS at each of the ARM Sites is ongoing. MAWS have been operational at the SGP, NSA Barrow, and Olikotk. The MAWS at the ENA was installed and put into service on 5 May 2017. MAWS will be implemented at the mobile facilities for land-based deployments, but not ship-based deployments.

Doug Sisterson is retiring this year after 43 years at Argonne National Laboratory. His replacement for GRUAN will be Nicki Hickmon, also at Argonne. Ms. Hickmon is the Associate Director of Operations for the ARM Climate Research Facility and a member of the ARM Infrastructure Management Board.

### MW41/RS41 Upgrade Summary:

| Site/Facility      | MW41 Software Upgrade | RS41 Start Date | Notes          |
|--------------------|-----------------------|-----------------|----------------|
| SGP C1             | 12-Apr-2017           | 13-Nov-2017     |                |
| SGP S01            | 12-Apr-2017           | 14-Jan-2018     |                |
| SGP S02            | 12-Apr-2017           |                 | RS92 for RIVAL |
| ENA C1             | [March 2018]          |                 |                |
| ENA S01            | 12-Apr-2017           |                 | RS92 for RIVAL |
| NSA C1 (Autosonde) | 12-Sep-2017           | 18-Oct-2017     |                |
| NSA S01            | 08-May-2017           | 27-Feb-2018     |                |
| NSA S02            | 12-Apr-2017           |                 | RS92 for RIVAL |
| AMF1 M1            | [March 2018]          |                 |                |
| AMF1 S5            | [March 2018]          |                 |                |
| AMF2               | [End of MARCUS]       |                 |                |
| AMF3               | 19-May-2017           |                 |                |

## Resourcing

Proposed budget is flat-funded for the ARM Climate Research Facility for Fiscal Year 2019. It is safe to assume that resources will be stable during this time.

## Operations

The ARM Facility senior management is considering the impacts of assuring that all ARM radiosondes reach 10 hPa. The budget impacts for purchasing 600 gram balloons, modification to the balloon launchers, and increase amount of Helium have been provided. In addition, ARM is planning to investigate the benefit increasing the burst height of its radiosondes with regard to the difference in the amount of integrated water vapour in the atmospheric column at the current and proposed heights of balloon bursts.

The ARM Facility has begun RS41 radiosondes at most all Sites. ARM is implementing RS41 radiosondes as the RS92 radiosonde supplies are depleted.

ARM is in the process of adding Alicat Scientific MC Series mass flow controllers to our fixed sites to control our helium use and to provide for consistent balloon fills and ascent rates. Controllers are

currently in use at Oliktok and SGP. Awaiting delivery at ENA and NSA (for manual launch use). The ARM Facility infrastructure is planning to submit a request to provide for a the RS41 and RS92 radiosonde humidity check at 100% RH prior to launch. A quotation request for three SHC1 units has been put in with Dr. Schultz and Partner in Germany.

## **Site assessment and certification**

The ARM Facility has submitted a formal proposal 6 March 2017 to have radiosondes certified at the SGP Site and is still under GRUAN consideration. Approval has not be received at the time of this report. Currently, the SGP Site remains a GRUAN "Candidate" Site.

## **GRUAN-related research**

Lori Borg is the Principle Investigator of a Field Campaign proposal submitted to ARM: Radiosonde Intercomparison & VALidation (RIVAL). The proposal was approved and site preparations were started/completed at SGP, NSA, and ENA. The first official RIVAL launch took place at the SGP on 13 February 2018.

### **Publications:**

Borg L, D. Tobin, A. Reale, R. Knuteson, M. Feltz, M. Liu, D.J. Holdridge, and J. Mather. 2017. ARM Radiosondes for National Polar-Orbiting Operational Environmental Satellite System Preparatory Project Validation Field Campaign Report. Ed. by Robert Stafford, ARM Climate Research Facility. DOE/SC-ARM-17-019. (<https://www.arm.gov/publications/programdocs/doe-sc-arm-17-019.pdf>)

## **WG-GRUAN interface**

It is unclear what process is needed to change the status of ARM Sites as "Candidate" GRUAN Sites. Assistance would be appreciated with regard to the ARM Facility Sites becoming "member" GRUAN Sites.

## **Items for ICM-10 plenary discussions**

There is still uncertainty about vendors for CFH launches. Understanding the GRUAN recommendations for CFH sondes and processing would be extremely useful. The SGP has been flying one CFH

per month but automating the data processing has been a challenge because the vendor is required to be involved and their processing algorithms are not made openly available its customers.

## Other archiving centers

ARM data is placed only in the ARM Data Archive:

<https://www.archive.arm.gov/discovery/>

## Participation in campaigns

Most supported field campaigns request radiosonde launches to support the targeted research.

All ARM field campaign information is available on the ARM website at:

<https://www.arm.gov/research/campaigns>

### GRUAN-related Campaigns:

1. RIVAL campaign is beginning at three ARM sites; SGP, NSA, and ENA in early 2018 to coincide with the launch of NOAA-20.

<https://www.arm.gov/research/campaigns/sgp2017rival>

2. JPSS satellite validation launches are continuing into the 6th year at SGP, NSA, and ENA.

<https://www.arm.gov/research/campaigns/sgp2017rdosnppjpss>

## Future plans

As in the case when facing potential reduction in budgets, that ARM Facility takes on a conservative stance on spending. The Facility attempts to assure that there are sufficient funds to maintain effort to ensure completeness and quality of the measurements provided to the User. This usually translates into the delaying of procurements related to significant upgrades and/or changes to established instruments and operating procedures. Once an annual budget target has been established, prioritized procurements are aggressively pursued. Preliminary planning for budgets takes place in the May time frame, but budget guidance and final budget approvals are not done until September.



# GRUAN Site Report for Barrow (BAR), 2017

Reported time range is Jan 2017 to Dec 2017

Created by the Lead Centre

Version from 2018-04-06

## 1 General GRUAN site information

| Object                | Value  |
|-----------------------|--|
| Station name          | Barrow   |
| Unique GRUAN ID       | BAR  |
| Geographical position | 71.3233 °N, -156.6158 °W, 8.0 m                              |
| Operated by           | ARM   US DOE Atmospheric Radiation Measurement (ARM) Program |
| Main contact          | Sisterson, Doug  |
| WMO no./name          | 70027 BARROW/POINT BARROW                                    |
| Operators             | currently 0, changes +0 / -0                                 |
| Sounding Site         | 2  |
| GNSS                  | 1  |

### 1.1 General information about GRUAN measurement systems

| System    | Name  | Type          | Setups | Measurements    |
|-----------|---|---------------|--------|-----------------|
| BAR-GN-01 | GNSS Site SG27                                  | GNSS          | 0      | not operational |
| BAR-RS-01 | Balloon-Borne Sounding System (SONDE) at Barrow | Sounding Site | 3      | 82              |
| BAR-RS-02 | Balloon-Borne Sounding System (SONDE) at Barrow | Sounding Site | 3      | 984             |

### 1.2 General comments from Lead Centre

#### 1.2.1 General

ARM site.

ARM is using an automated routine to transmit data and raw data. ARM is requested to inform the Lead Centre of all upcoming changes in equipment, launch schedule or procedures to be able to update the metadata database.

It is strongly recommended that the site uses a manufacturer independent ground check, e.g. SHC, for the RS92 radiosonde.

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## 2 System: GNSS Site SG27 (BAR-GN-01)

| <b>Object</b>         | <b>Value</b>   |
|-----------------------|--|
| System name           | GNSS Site SG27   |
| Unique GRUAN ID       | BAR-GN-01  |
| System type           | GNSS (GN - GNSS)   |
| Geographical position | 71.3229 °N, -156.6103 °W, 7.5 m                              |
| Operated by           | ARM   US DOE Atmospheric Radiation Measurement (ARM) Program |
| Instrument contact    | Sisterson, Doug  |
| Started at            | -  |
| Defined setups        | -  |
| Possible streams      | -  |

### 2.1 Lead Centre comments

#### 2.1.1 Dataflow

No GNSS dataflow to GRUAN LC as yet.



### 3 System: Balloon-Borne Sounding System (SONDE) at Barrow (BAR-

| Object                | Value  |
|-----------------------|--|
| System name           | Balloon-Borne Sounding System (SONDE) at Barrow              |
| Unique GRUAN ID       | BAR-RS-01  |
| System type           | Sounding Site (RS - Radiosonde)                              |
| Geographical position | 71.3233 °N, -156.6158 °W, 8.0 m                              |
| Operated by           | ARM   US DOE Atmospheric Radiation Measurement (ARM) Program |
| Instrument contact    | Sisterson, Doug  |
| Started at            | -  |
| Defined setups        | 3 (ROUTINE, ROUTINE2, ROUTINE3)                              |
| Possible streams      | RS41, RS92   |

#### 3.1 Lead Centre comments

##### 3.1.1 General

Manual launch site until February 2012.

This system is used mainly for NPOESS/NPP satellite validation launches and for backup if there is an Autosonde failure.

The facility code is S01.

#### 3.2 GRUAN data products

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

##### 3.2.1 Stream: RS92

|          |     |    |    |    |
|----------|-----|----|----|----|
| RS92     |     | 82 | 82 |    |
| RS92-INT | 001 |    | 82 |    |
| RS92-RAW | 002 |    | 82 |    |
| RS92-EDT | 001 |    | 82 |    |
| RS92-GDP | 002 |    | 47 | 24 |

### 3.3 Data availability of data products

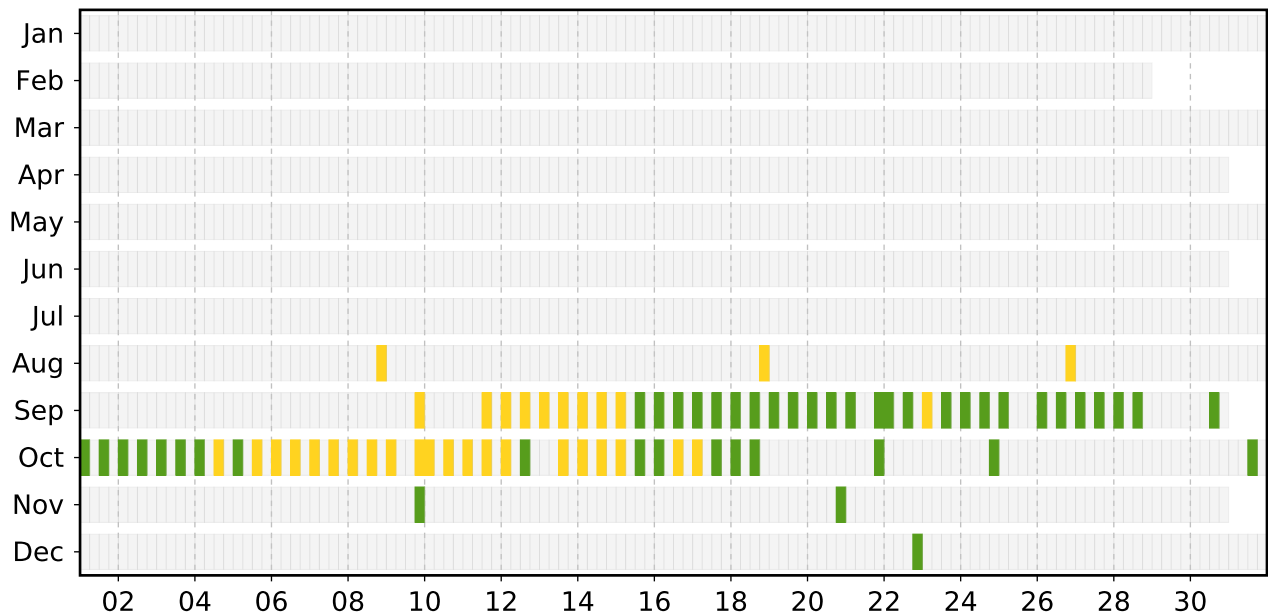
Available (green): All steps of processing have been successfully completed. The data file is available at LC (e.g. unapproved or uncertified GRUAN data products) and at NCEI (approved and certified GRUAN data products).

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: RS92

Data availability RS92



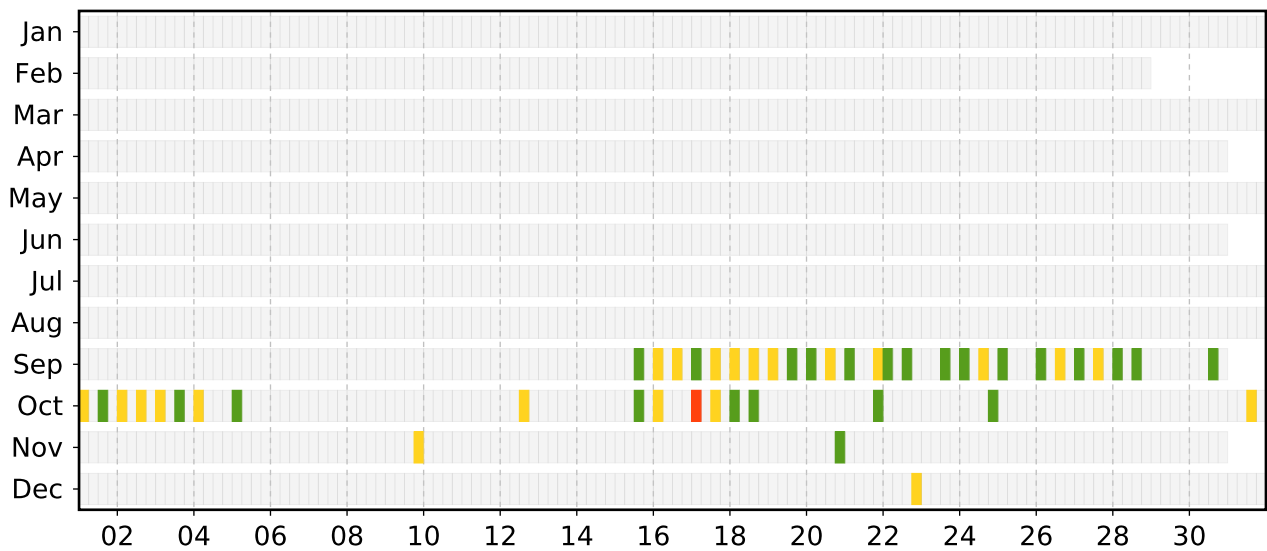
### 3.4 Data quality of current GRUAN data products

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

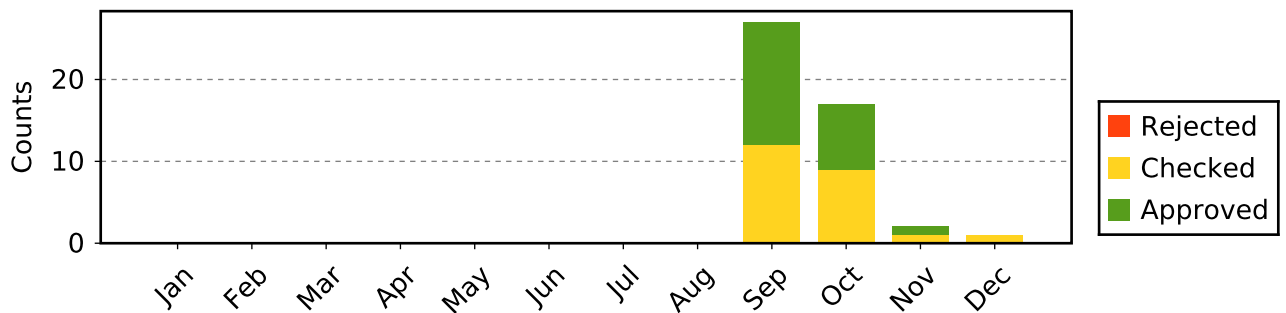
#### 3.4.1 Stream: RS92 (Product: RS92-GDP-002)

| Month      | Total     | Approved  | Checked   | Rejected | Meta-data | Process. | Press    | Temp | RH        |
|------------|-----------|-----------|-----------|----------|-----------|----------|----------|------|-----------|
| Jan        |           |           |           |          |           |          |          |      |           |
| Feb        |           |           |           |          |           |          |          |      |           |
| Mar        |           |           |           |          |           |          |          |      |           |
| Apr        |           |           |           |          |           |          |          |      |           |
| May        |           |           |           |          |           |          |          |      |           |
| Jun        |           |           |           |          |           |          |          |      |           |
| Jul        |           |           |           |          |           |          |          |      |           |
| Aug        |           |           |           |          |           |          |          |      |           |
| Sep        | 27        | 15        | 12        |          |           |          | 2        |      | 14        |
| Oct        | 17        | 8         | 9         |          |           |          |          |      | 10        |
| Nov        | 2         | 1         | 1         |          |           |          |          |      | 1         |
| Dec        | 1         |           | 1         |          |           |          |          |      | 1         |
| <b>Sum</b> | <b>47</b> | <b>24</b> | <b>23</b> |          |           |          | <b>2</b> |      | <b>26</b> |

Data quality of stream RS92



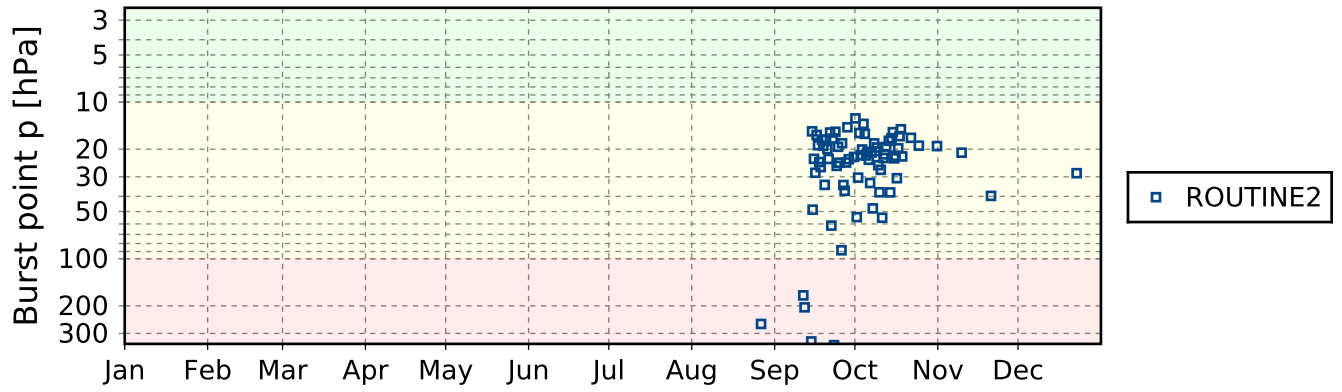
Data quality statistic of stream RS92



### 3.5 Instrument combinations of BAR-RS-01

| Count | Instrument combination |
|-------|------------------------|
| 82    | RS92                   |

### 3.7 Measurement events



## 4 System: Balloon-Borne Sounding System (SONDE) at Barrow (BAR-

| Object                | Value  |
|-----------------------|--|
| System name           | Balloon-Borne Sounding System (SONDE) at Barrow              |
| Unique GRUAN ID       | BAR-RS-02  |
| System type           | Sounding Site (RS - Radiosonde)                              |
| Geographical position | 71.3233 °N, -156.6158 °W, 8.0 m                              |
| Operated by           | ARM   US DOE Atmospheric Radiation Measurement (ARM) Program |
| Instrument contact    | Sisterson, Doug  |
| Started at            | 2012-02-08   |
| Defined setups        | 3 (AUTO1, AUTO2, AUTO3)                                      |
| Possible streams      | RS41, RS92   |

### 4.1 Lead Centre comments

#### 4.1.1 Dataflow

Dataflow is running fully automated from the ARM Archive to the GRUAN LC. Launch metadata are not checked manually. Equipment changes (e.g. balloon, unwinder, ...) are not recorded.

As a consequence it is essential that the Lead Centre is notified of all upcoming changes to be able to maintain a correct metadata record. (This comment applies to all ARM sites in GRUAN.)

Additional launches from the 'ARM Radiosondes for NPOESS/NPP Validation' field campaign are included in the dataflow.

### 4.2 GRUAN data products

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

#### 4.2.1 Stream: RS41

|          |     |     |     |  |
|----------|-----|-----|-----|--|
| RS41     |     | 122 | 122 |  |
| RS41-RAW | 001 |     | 122 |  |
| RS41-EDT | 001 |     | 117 |  |

#### 4.2.2 Stream: RS92

|          |     |     |     |     |
|----------|-----|-----|-----|-----|
| RS92     |     | 862 | 862 |     |
| RS92-INT | 001 |     | 72  |     |
| RS92-RAW | 001 |     | 554 |     |
| RS92-RAW | 002 |     | 625 |     |
| RS92-EDT | 001 |     | 622 |     |
| RS92-GDP | 002 |     | 542 | 292 |

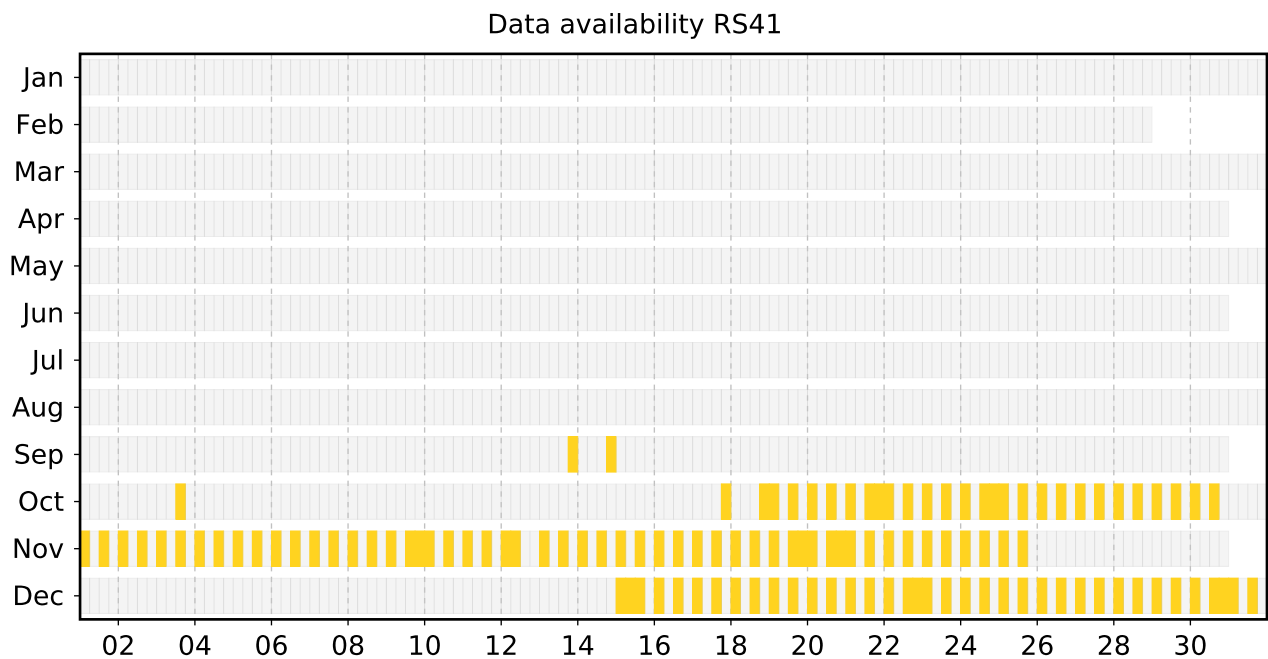
### 4.3 Data availability of data products

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).

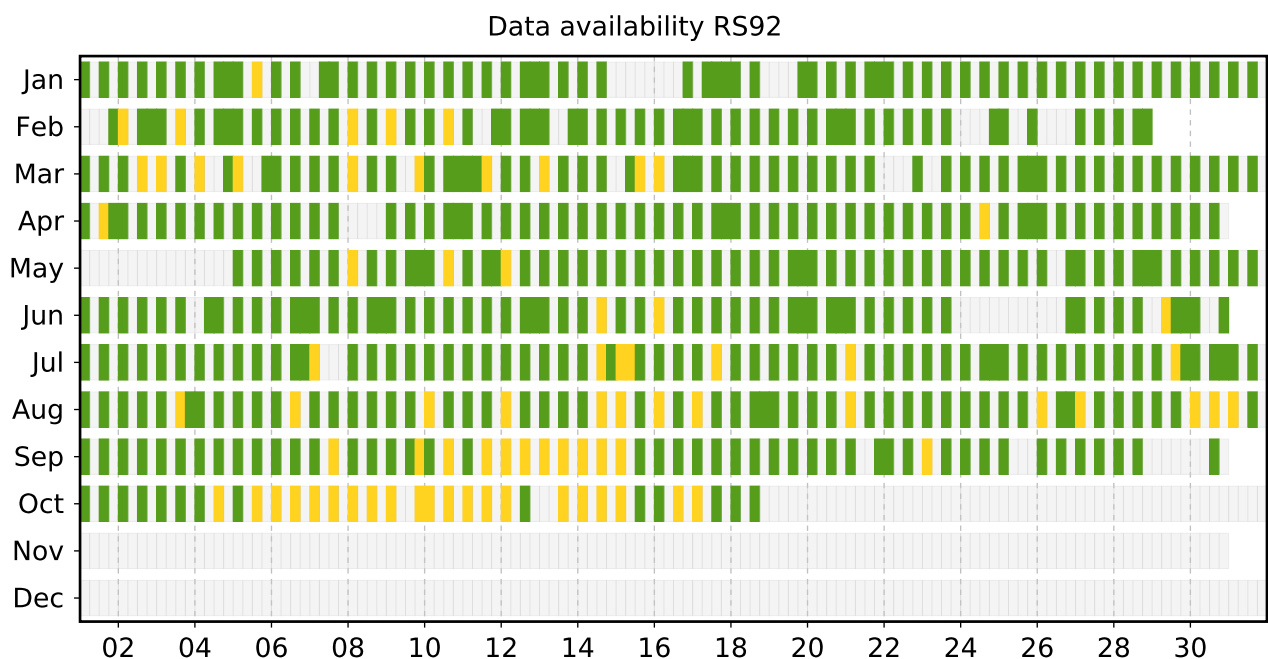
Unprocessed (yellow): The raw data file has been successfully converted to a GRUAN standardized raw data file format (NetCDF). The processing (e.g. GRUAN data processing) has not yet been done, or has not been completed. Reason may be a processing routine which does not yet exist, or software errors.

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.

#### 4.3.1 Stream: RS41



#### 4.3.2 Stream: RS92



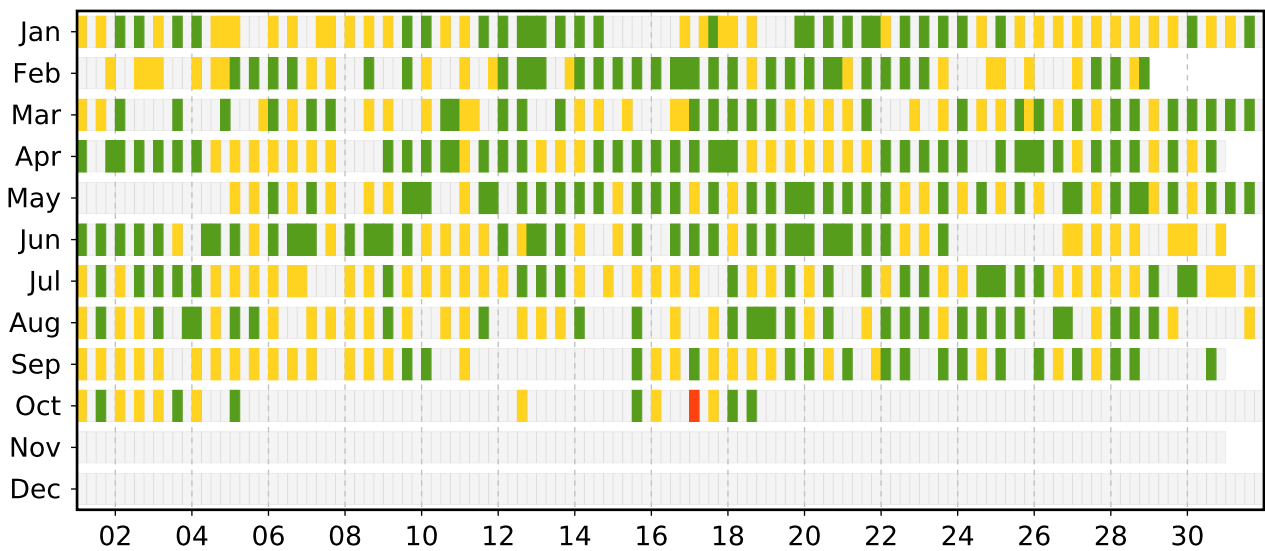
### 4.4 Data quality of current GRUAN data products

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

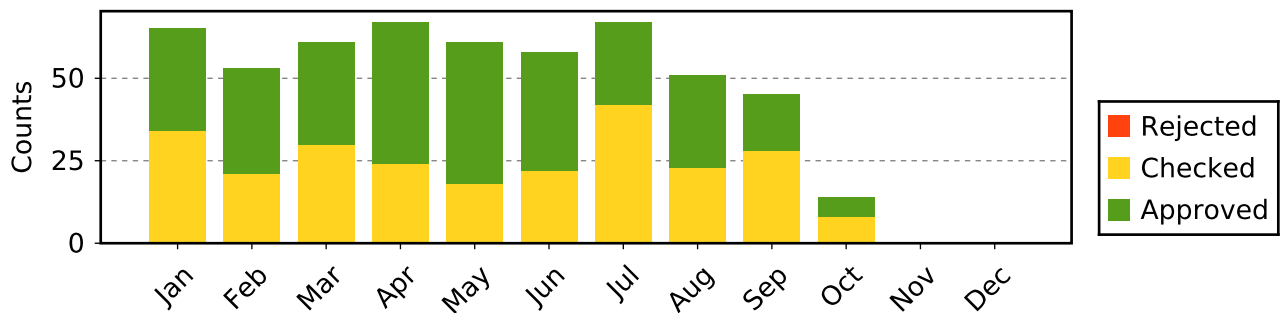
#### 4.4.1 Stream: RS92 (Product: RS92-GDP-002)

|            |            |            |            |  |  |  |           |  |            |
|------------|------------|------------|------------|--|--|--|-----------|--|------------|
| Jan        | 65         | 31         | 34         |  |  |  | 1         |  | 34         |
| Feb        | 53         | 32         | 21         |  |  |  | 6         |  | 19         |
| Mar        | 61         | 31         | 30         |  |  |  | 2         |  | 29         |
| Apr        | 67         | 43         | 24         |  |  |  | 11        |  | 20         |
| May        | 61         | 43         | 18         |  |  |  | 5         |  | 14         |
| Jun        | 58         | 36         | 22         |  |  |  | 4         |  | 23         |
| Jul        | 67         | 25         | 42         |  |  |  | 9         |  | 46         |
| Aug        | 51         | 28         | 23         |  |  |  | 8         |  | 18         |
| Sep        | 45         | 17         | 28         |  |  |  | 6         |  | 28         |
| Oct        | 14         | 6          | 8          |  |  |  |           |  | 9          |
| Nov        |            |            |            |  |  |  |           |  |            |
| Dec        |            |            |            |  |  |  |           |  |            |
| <b>Sum</b> | <b>542</b> | <b>292</b> | <b>250</b> |  |  |  | <b>52</b> |  | <b>240</b> |

Data quality of stream RS92



Data quality statistic of stream RS92



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## 4.5 Instrument combinations of BAR-RS-02

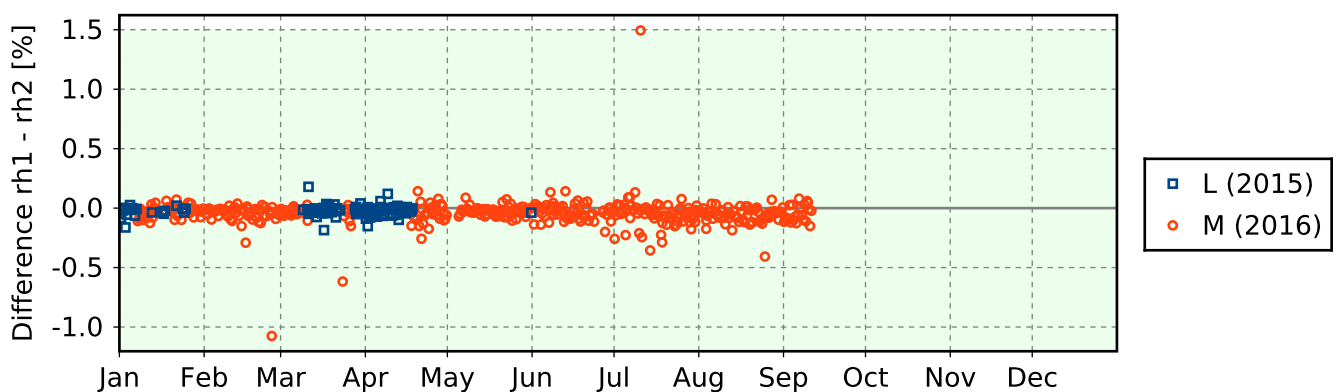
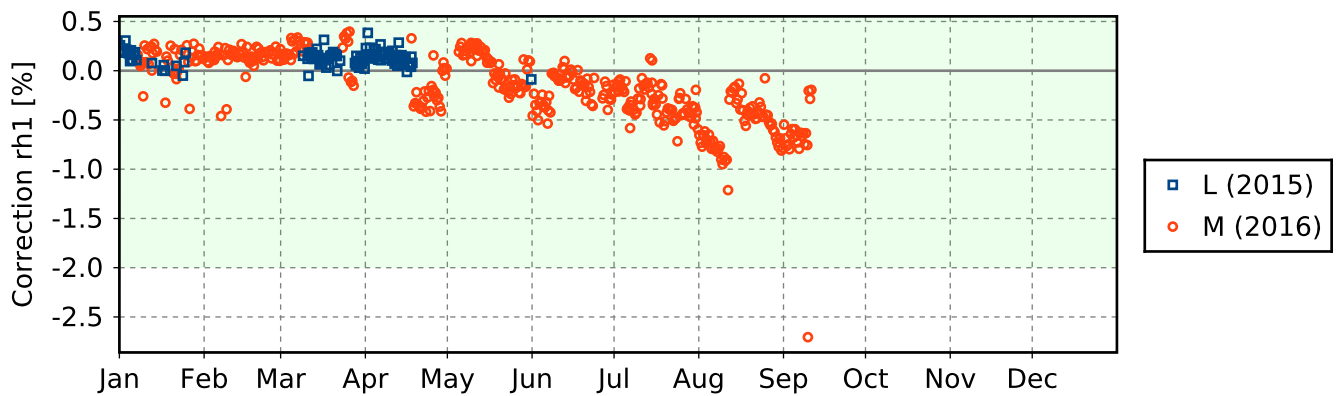
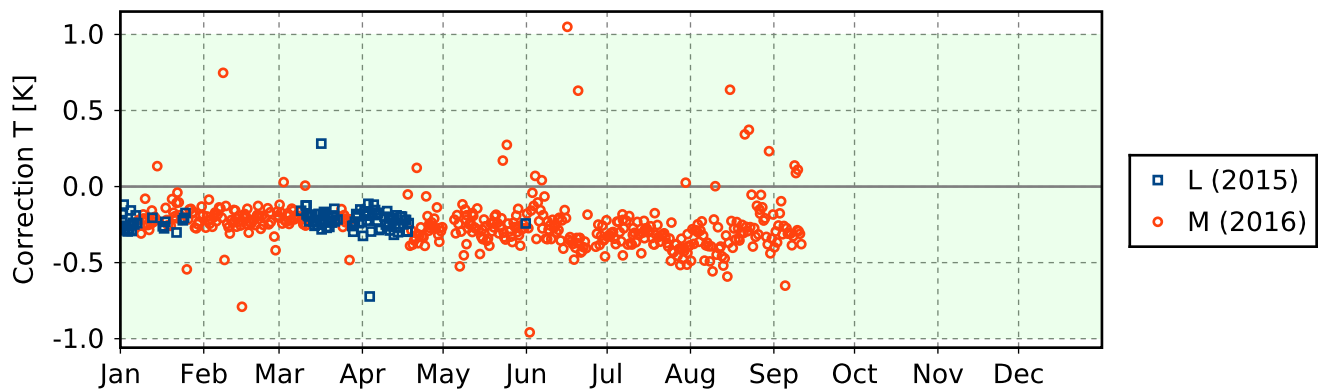
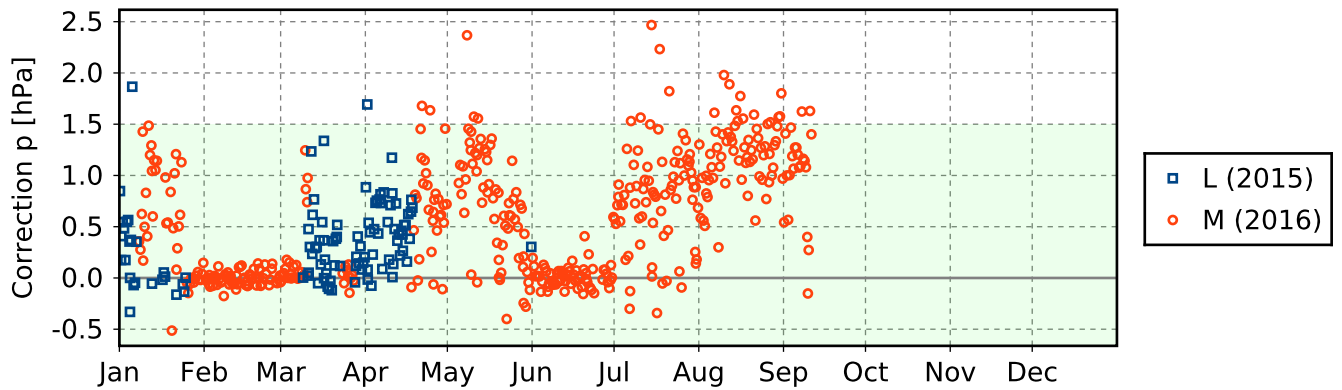
| <b>Count</b> | <b>Instrument combination</b> |
|--------------|-------------------------------|
| 122          | RS41                          |
| 862          | RS92                          |



### 4.6 Instrument ground check

#### 4.6.1 Stream: RS92

(1) GroundCheck: GC-GC25



### 4.7 Measurement events

