



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

Doc. 7.04  
(13.IV.2018)

---

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

---

Session 7

Potsdam, Germany

23 - 27 April 2018

## GRUAN Site Report for Boulder

*(Submitted by Dale Hurst)*

---

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

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

---





# GRUAN Site Report for Boulder (BOU)

Reporting for the period January to December 2017

Date: 13-March-2018

Primary author: Dale Hurst

([Dale.Hurst@noaa.gov](mailto:Dale.Hurst@noaa.gov))

## Overview

The Boulder GRUAN site continues to perform balloon soundings with weekly launches of a Vaisala RS41 radiosonde, an InterMet radiosonde and an EnSci ECC ozonesonde. Once per month a NOAA Frost Point Hygrometer (FPH) is added to the payload.

In February 2017 our Vaisala MW41 receiving system began experiencing intermittent software terminations, with the screen displaying a very informative message that the sounding program has quit. Approximately 50% of the RS41 soundings attempted during March-May 2017 resulted in the MW41 software shutting down before sonde launch, with subsequent difficulties in re-booting the system. Since that time we frequently sought advice from the Vaisala help desk regarding this problem. We believe this problem has now been solved by disconnecting the laptop running the MW41 software from the LAN, as NOAA's required frequent virus scans and patching of networked computers may have been interfering with attempted RS41 launches.

In September 2017 the laboratory containing our MW41 receiving system received considerable water damage from a burst pipe in the ceiling. After a thorough dry-out and visual inspection the system was powered on and tested, with seemingly positive results. However, since that time the system has intermittently experienced a number of errors thought to be related to cards and/or cables within the SRS. The errors typically occur during pre-flight sonde checkout at the launch site, so when unable to rapidly fix the problem, the RS41 was simply removed from the payload and the remaining sondes were launched.

Other data streams available in the future from the Boulder site include GNSS-IPW (at Marshall Field Site and the NCAR Foothills Lab in Boulder), FPH measurements of water vapor profiles, Dobson and FTIR measurements of column ozone, and FTIR measurements of column water vapor, carbon dioxide and methane.

## **Change and change management**

Other than efforts to make our MW41 system work in a consistent way there were no changes made to any systems or procedures.

## **Resourcing**

Although it is anticipated that budget cuts to NOAA by the current administration may significantly impact GRUAN operations at the Boulder site, this has not yet happened because the US Congress was unable to pass a budget for FY2017 and for FY2018 an approved budget looks unlikely.

## **Operations**

Balloon soundings with FPHs are intentionally prevented from bursting so that controlled descent is achieved for contamination-free water vapor measurements. This means that soundings with FPHs consistently do not reach 10 hPa, but those without FPHs do.

## **Site assessment and certification**

The Boulder GRUAN site is already certified.

## **GRUAN-related research**

The Boulder GRUAN site manager (Dale Hurst, NOAA) serves on the Working Group of GRUAN and is a co-chair of the task team of site representatives.

John Braun (NCAR) continues to serve as a member of the task team of GNSS-IPW measurements.

James Hannigan (NCAR) is a member of the task team of ancillary measurements for his expertise in solar FTIR measurements of water vapor and several trace gases.

## **GRUAN-related papers published in 2017:**

- Weatherhead, E.C., G.E. Bodeker, A. Fassò, K.-L Chang, J.K. Lazo, C.T.M. Clack, D.F. Hurst, B. Hassler, J.M. English, and S. Yorgun, Spatial coverage of monitoring networks: A climate observing system simulation experiment, *J. Appl. Meteor. Climatol.*, 56, 3211-3228, doi:10.1175/JAMC-D-17-0040.1, 2017.

- Davis, S.M., K.H. Rosenlof, D.F. Hurst, H.B. Selkirk, and H. Vömel, [Global Climate: Atmospheric Composition] Stratospheric Water Vapor, [in State of the Climate in 2016], Bull. Amer. Meteor. Soc., 98 (8), S51-S52, 2017.

## **WG-GRUAN interface**

We appreciate the continued support of the Boulder GRUAN site through presentations and papers that include data from Boulder, especially those in easy view of ESRL management and NOAA administrators.

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

It would be timely and informative for the Lead Center to present an update on the processing and quality control of MWX files from the RS41, including proposed data file formats and an anticipated date for the release of GRUAN-processed RS41 sounding data.

## **Other archiving centers**

ECC ozone and FPH water vapor data from the Boulder site are submitted to NDACC.

ECC ozone and FPH water vapor data from the Boulder site will soon be submitted to NOAA NCEI.

ECC ozone data from the Boulder site are submitted to WOUDC.

## **Participation in campaigns**

In mid-2017 the Boulder GRUAN site began monthly balloon launches coordinated with overpasses of the Stratospheric Aerosol and Gas Experiment (SAGE III) aboard the International Space Station (ISS) to validate its vertical profile measurements of ozone, water vapor and aerosols.

## **Future plans**

During 2018 the Boulder GRUAN site will continue to launch monthly balloon launches coordinated with overpasses of SAGE III - ISS.



# GRUAN Site Report for Boulder (BOU), 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	Boulder
Unique GRUAN ID	BOU
Geographical position	39.9500 °N, -105.2000 °W, 1743.0 m
Operated by	GMD   Global Monitoring Division, part of: ESRL   Earth System Research Laboratory, part of: NOAA   National Oceanic and Atmospheric Administration
Main contact	Hurst, Dale F.
WMO no./name	-
Operators	currently 5, changes +0 / -0
Sounding Site	1
GNSS	1

### 1.1 General information about GRUAN measurement systems

System	Name	Type	Setups	Measurements
BOU-GN-01	GNSS Site P041	GNSS	0	not operational
BOU-RS-01	Radiosonde Launch Site (Marshall)	Sounding Site	4	36

### 1.2 General comments from Lead Centre

No comments available from Lead Centre.

---

## 2 System: GNSS Site P041 (BOU-GN-01)

<b>Object</b>	<b>Value</b>
System name	GNSS Site P041
Unique GRUAN ID	BOU-GN-01
System type	GNSS (GN - GNSS)
Geographical position	39.9495 °N, -105.1943 °W, 1728.8 m
Operated by	GMD   Global Monitoring Division, part of: ESRL   Earth System Research Laboratory, part of: NOAA   National Oceanic and Atmospheric Administration
Instrument contact	Hurst, Dale F.
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: Radiosonde Launch Site (Marshall) (BOU-RS-01)

Object	Value
System name	Radiosonde Launch Site (Marshall)
Unique GRUAN ID	BOU-RS-01
System type	Sounding Site (RS - Radiosonde)
Geographical position	39.9500 °N, -105.2000 °W, 1743.0 m
Operated by	GMD   Global Monitoring Division, part of: ESRL   Earth System Research Laboratory, part of: NOAA   National Oceanic and Atmospheric Administration
Instrument contact	Hurst, Dale F.
Started at	-
Defined setups	4 (RESEARCH, OZONE, FPH-OZONE, FPH)
Possible streams	FPH, IMET-1, RS41, RS80, RS92

#### 3.1 Lead Centre comments

##### 3.1.1 Dataflow

A GRUAN data product for the frostpoint hygrometer is not yet available.

This dataflow includes data from the Vaisala RS41-SGP, RS92-SGP, ECC ozone sonde, FPH water vapour and Internet IMET-1. All soundings are submitted using the RsLaunchClient within a month after the launch.

The possibility to launch Vaisala RS41-SGP was added 2016.

#### 3.2 GRUAN data products

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

##### 3.2.1 Stream: ECC

ECC		36	36	
-----	--	----	----	--

##### 3.2.2 Stream: FPH

FPH		8	8	
-----	--	---	---	--

##### 3.2.3 Stream: IMET-1

IMET-1		36	36	
--------	--	----	----	--

##### 3.2.4 Stream: RS41

RS41		36	36	
RS41-RAW	001		36	
RS41-EDT	001		33	



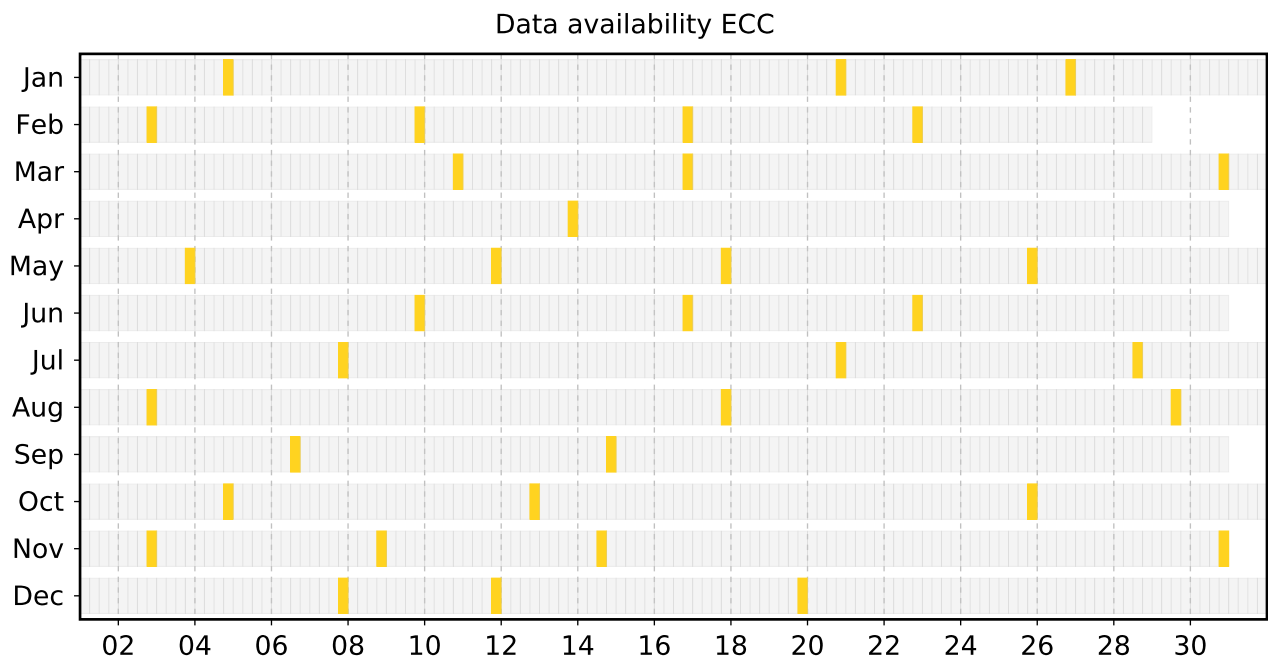
### 3.3 Data availability of data products

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).

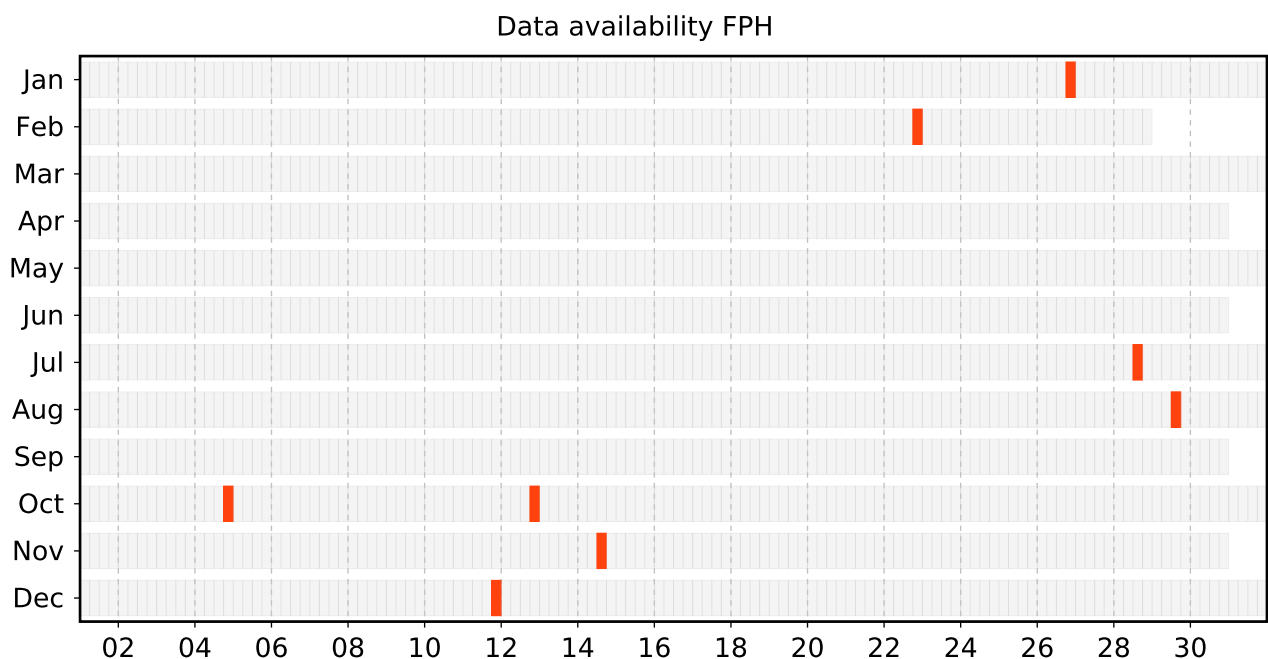
Unprocessed (yellow): The raw data file has been successfully converted to a GRUAN standardized raw data file format (NetCDF). The processing (e.g. GRUAN data processing) has not yet been done, or has not been completed. Reason may be a processing routine which does not yet exist, or software errors.

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.

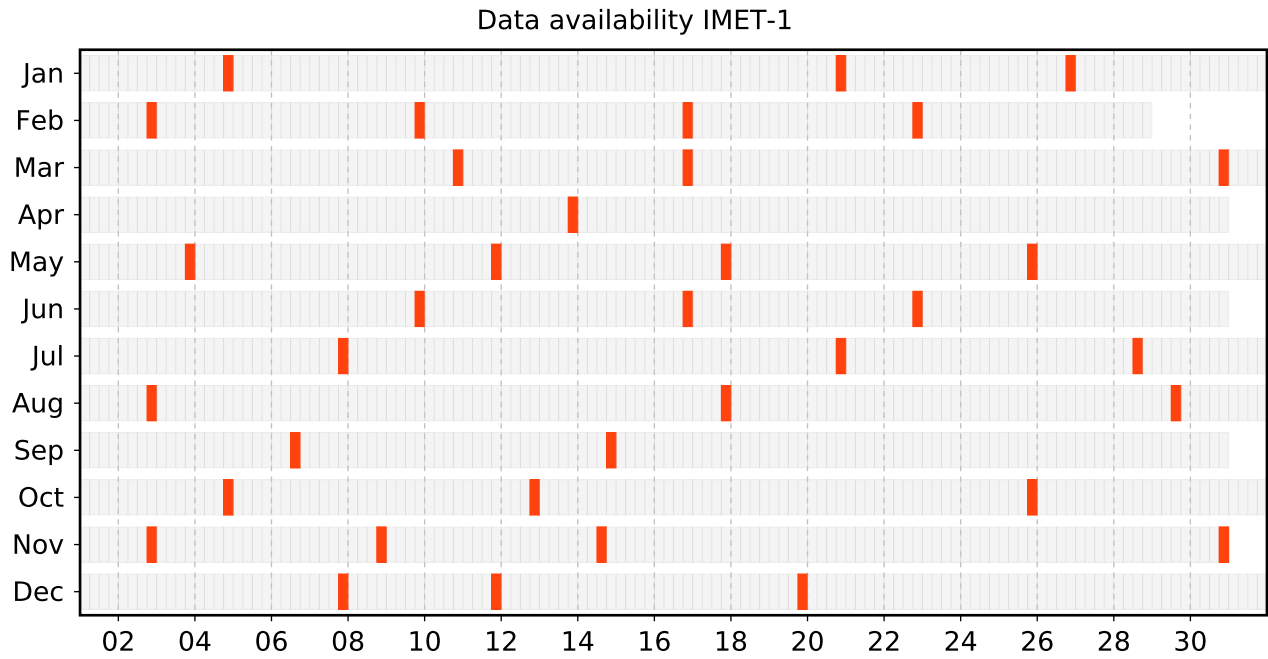
#### 3.3.1 Stream: ECC



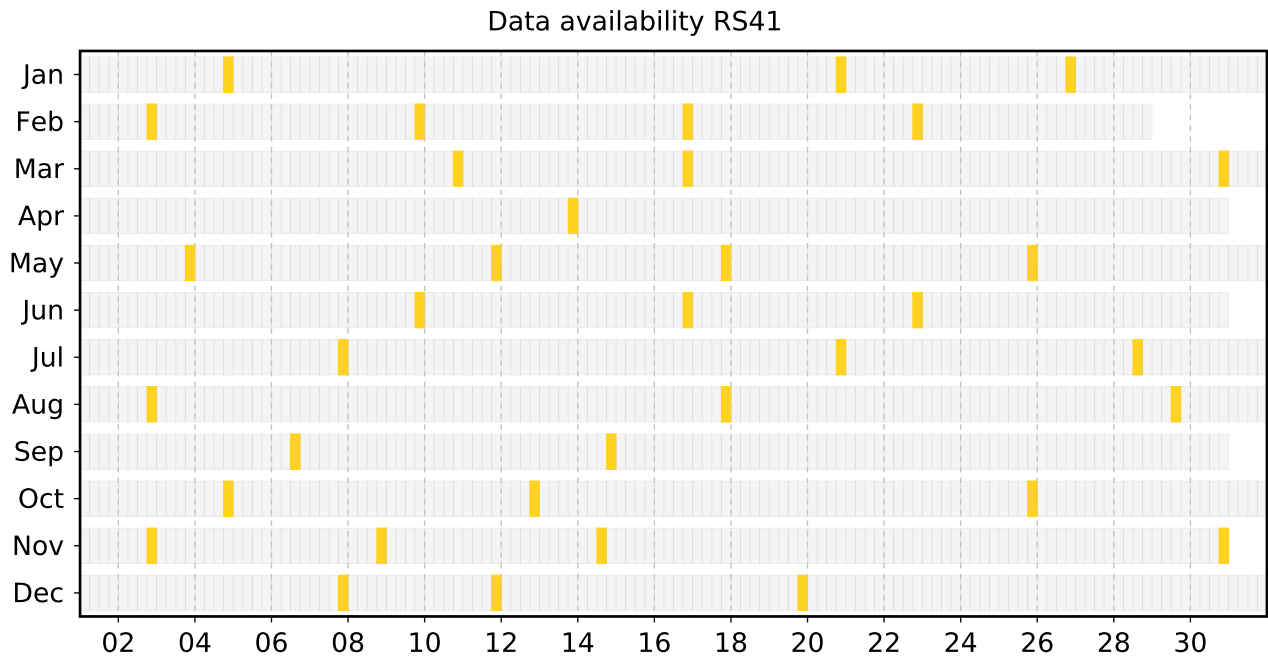
#### 3.3.2 Stream: FPH



### 3.3.3 Stream: IMET-1



### 3.3.4 Stream: RS41



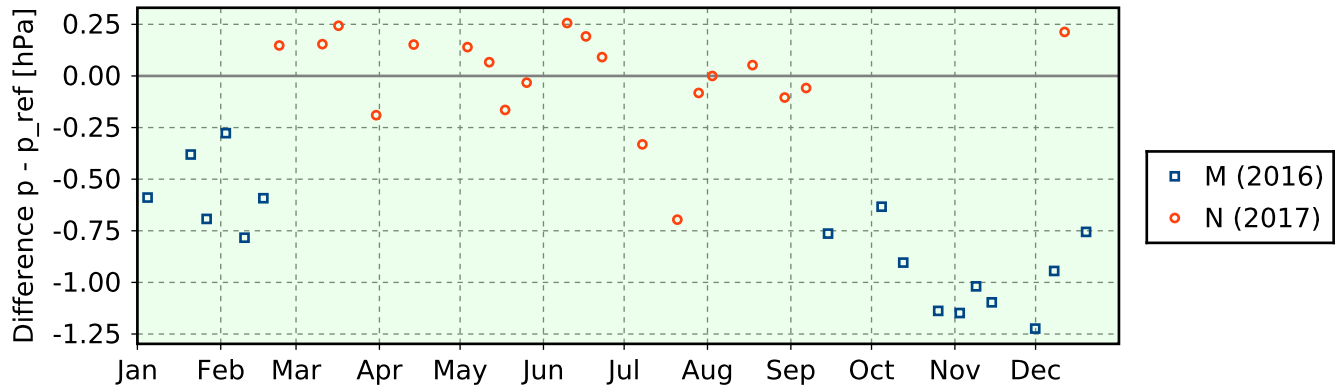
### 3.5 Instrument combinations of BOU-RS-01

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

### 3.6 Instrument ground check

#### 3.6.1 Stream: RS41

(1) GroundCheck: GC-RI41



(2) GroundCheck: GC-SHC

### 3.7 Measurement events

