



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

Doc. 5.10  
(05.III.2024)

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

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Session 5

Bern

11 March - 15 March 2024

## GRUAN Site Report for Graciosa

*(Submitted by Evan Keeler)*

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

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

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## **Overview**

The ARM Eastern North Atlantic (ENA) site in Graciosa, Portugal operated one Vaisala MW41 manual launch systems during 2022-2023. The system is designated C01. ENA conducts 2 flights per day, launching at 00Z and 12Z. All flight data is sent to the ARM Data Archive for processing and distribution.

## **Change and change management**

The site continues its normal operational launches described above as well as supporting the JPSS program.

The GRA sounding system was upgraded to Vaisala MW41 software version 2.19 in 2022-2023.

There was no significant change to the operating environment, staffing, or hardware.

## **Resourcing**

In 2022-2023 ENA continued launching RS-41 radiosondes without changes to the schedule.

## **Operations**

The operations at ENA deviate from GRUAN procedures in the burst height and the lack of a SHC manufacturer-independent ground check. A SHC manufacturer-independent ground check has been purchased and will be implemented at the site in 2024. Otherwise, the site experiences minimal operational difficulties.

## **Site assessment and certification**

The site is not certified. At the moment ARM is focusing efforts on implementing the SHC.

## **COVID-19**

Fortunately, ENA experienced minimal impact from COVID-19.

## **GRUAN-related research**

In 2022-2023 the ENA site continued its support of the following field campaigns: ARM Radiosondes for Joint Polar Satellite System (JPSS) Validation Field Campaign

- ARM Radiosondes for Joint Polar Satellite System (JPSS) Validation Field Campaign <https://www.arm.gov/research/campaigns/sgp2024jpssval>

## **WG-GRUAN interface**

No areas of support have been identified for the WG-GRUAN interface at ENA

## **Other archiving centers**

ARM data is placed only in the ARM Data Archive.

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

## **Participation in campaigns**

All ARM field campaign information is available on the ARM website at: <https://www.arm.gov/research/campaigns>

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

## **Future plans**

ARM plans to implement the SHC at ENA in 2024.



# GRUAN Site Report for Graciosa (GRA), 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	Graciosa
Unique GRUAN ID	GRA
Geographical position	39.0911 °N, -28.0266 °W, 30.5 m
Operated by	ARM   US DOE Atmospheric Radiation Measurement (ARM) Program
Main contact	Keeler, Evan
WMO no./name	-
Operators	currently 0, changes +0 / -0
Sounding Site	1
GNSS	1

### 1.1 General information about GRUAN measurement systems

System	Name	Type	Setups	Measurements
GRA-GN-01	GNSS site ENAO	GNSS	1	operational
GRA-RS-01	Balloon-Borne Sounding System (SONDE) at Graciosa	Sounding Site	4	784

### 1.2 General comments from Lead Centre

#### 1.2.1 General

ARM employs an automated procedure to transmit raw measurement data.

#### 1.2.2 Request

ARM is kindly requested to inform the Lead Centre of any (upcoming) changes in equipment, launch schedule, or procedures so that the metadata database can be kept up-to-date.

It is strongly recommended to use a manufacturer independent ground check (e.g. SHC) for the Vaisala radiosonde.

## 2 System: GNSS site ENAO (GRA-GN-01)

Object	Value
System name	GNSS site ENAO
Unique GRUAN ID	GRA-GN-01
System type	GNSS (GN - GNSS)
Geographical position	39.0528 °N, -28.0134 °W, 91.9 m
Operated by	ARM   US DOE Atmospheric Radiation Measurement (ARM) Program
Instrument contact	Keeler, Evan
Started at	2019-07-15
Defined setups	1 (HOURLY)
Possible streams	-

### 2.1 Lead Centre comments

#### 2.1.1 Dataflow

Dataflow of GNSS data to GRUAN LC and to the GRUAN GNSS processing centre at GFZ has started in July 2019. The current dataflow includes manufacturer raw data, converted raw data (RINEX), instrument logs, and processed data.

The operational processing as GNSS-PW-GDP is performed.

### 3 System: Balloon-Borne Sounding System (SONDE) at Graciosa (GRA-RS-

Object	Value
System name	Balloon-Borne Sounding System (SONDE) at Graciosa
Unique GRUAN ID	GRA-RS-01
System type	Sounding Site (RS - Radiosonde)
Geographical position	39.0911 °N, -28.0266 °W, 30.5 m
Operated by	ARM   US DOE Atmospheric Radiation Measurement (ARM) Program
Instrument contact	Keeler, Evan
Started at	2009-04-16
Defined setups	4 (ROUTINE, ROUTINE2, ROUTINE3, DUAL)
Possible streams	RS41, RS92

#### 3.1 Lead Centre comments

##### 3.1.1 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.)

The current operational radiosonde is the Vaisala RS41.

#### 3.2 GRUAN data products

Product	Version	Soundings received	Available at LC	Distributed by NCEI
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##### 3.2.1 Stream: RS41

RS41		784	784	
RS41-RAW	001		784	
RS41-EDT	001		783	
RS41-GDP	001		770	

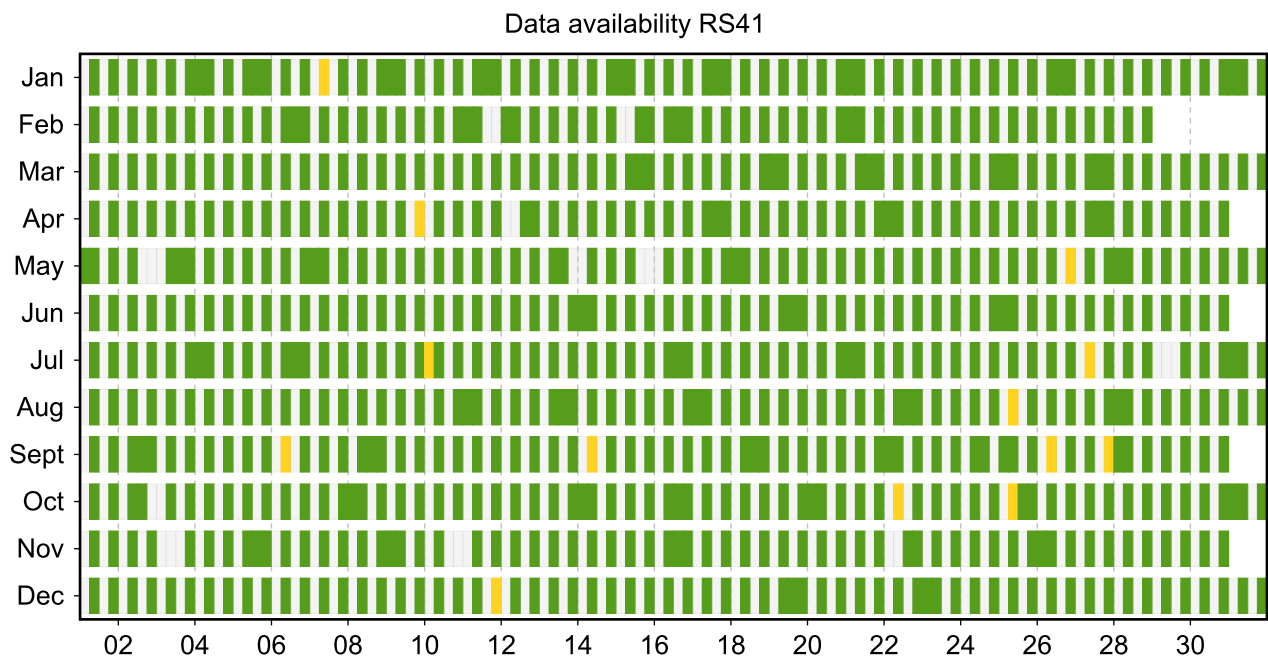
### 3.3 Availability of data products

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: RS41



### 3.4 Instrument combinations of GRA-RS-01

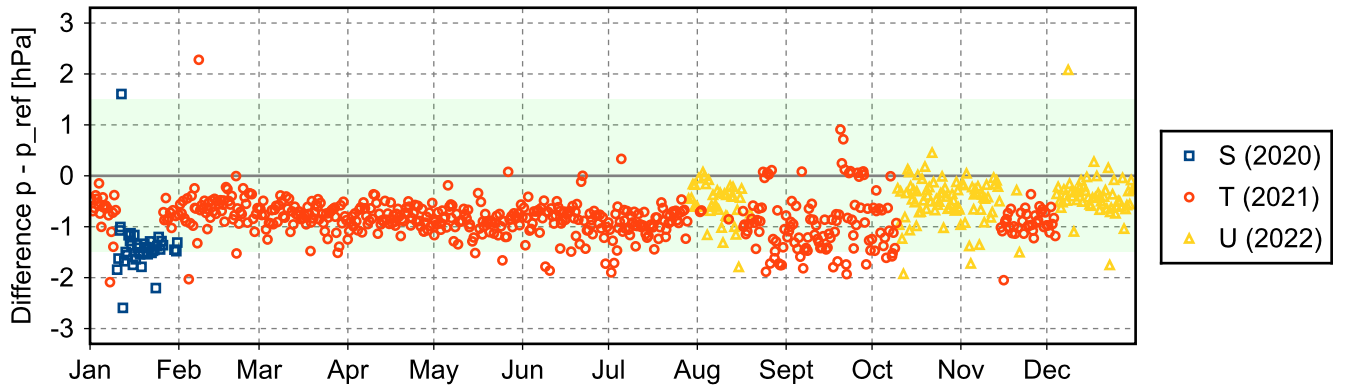
Count	Instrument combination
784	RS41



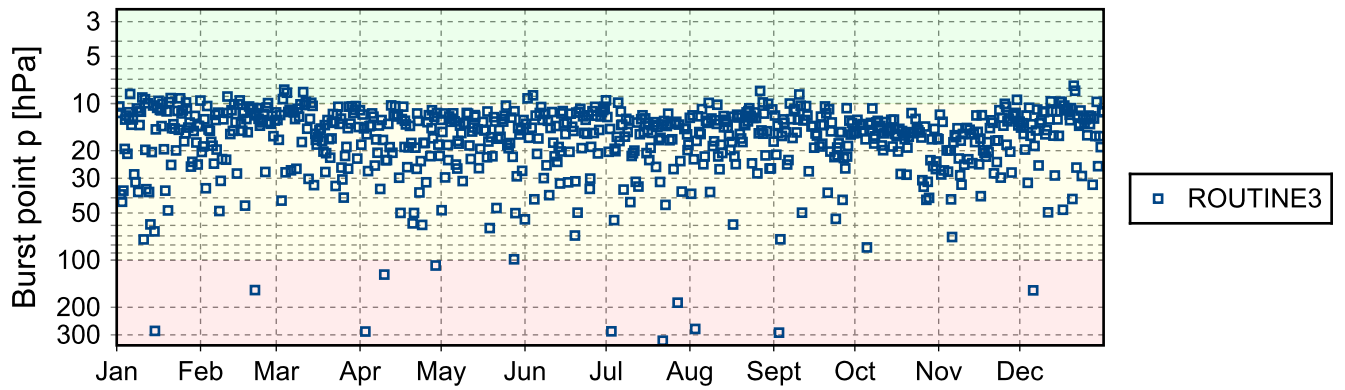
### 3.5 Instrument ground check

#### 3.5.1 Stream: RS41

##### (1) GroundCheck: GC-R141



### 3.6 Measurement events





# GRUAN Site Report for Graciosa (GRA), 2023

Reported time range is Jan 2023 to Dec 2023  
Created by the Lead Centre  
Version from 2024-03-01

## 1 General GRUAN site information

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Operated by	ARM   US DOE Atmospheric Radiation Measurement (ARM) Program
Main contact	Keeler, Evan
WMO no./name	-
Operators	currently 0, changes +0 / -0
Sounding Site	1
GNSS	1

### 1.1 General information about GRUAN measurement systems

System	Name	Type	Setups	Measurements
GRA-GN-01	GNSS site ENAO	GNSS	1	operational
GRA-RS-01	Balloon-Borne Sounding System (SONDE) at Graciosa	Sounding Site	4	405

### 1.2 General comments from Lead Centre

#### 1.2.1 General

ARM employs an automated procedure to transmit raw measurement data.

#### 1.2.2 Request

ARM is kindly requested to inform the Lead Centre of any (upcoming) changes in equipment, launch schedule, or procedures so that the metadata database can be kept up-to-date.

It is strongly recommended to use a manufacturer independent ground check (e.g. SHC) for the Vaisala radiosonde.

It is requested to reorganise the availability of file format MWX of RS41 data stream.

## 2 System: GNSS site ENAO (GRA-GN-01)

<b>Object</b>	<b>Value</b>
System name	GNSS site ENAO
Unique GRUAN ID	GRA-GN-01
System type	GNSS (GN - GNSS)
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Operated by	ARM   US DOE Atmospheric Radiation Measurement (ARM) Program
Instrument contact	Keeler, Evan
Started at	2019-07-15
Defined setups	1 (HOURLY)
Possible streams	-

### 2.1 Lead Centre comments

#### 2.1.1 Dataflow

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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.)

The current operational radiosonde is the Vaisala RS41.

The operational data flow of the RS41 soundings stopped in July 2023. This is due to missing files in MWX format, which have not been transferred since then.

#### 3.2 GRUAN data products

Product	Version	Soundings received	Available at LC	Distributed by NCEI
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##### 3.2.1 Stream: RS41

RS41		405	405	
RS41-RAW	001		405	
RS41-EDT	001		405	
RS41-GDP	001		395	

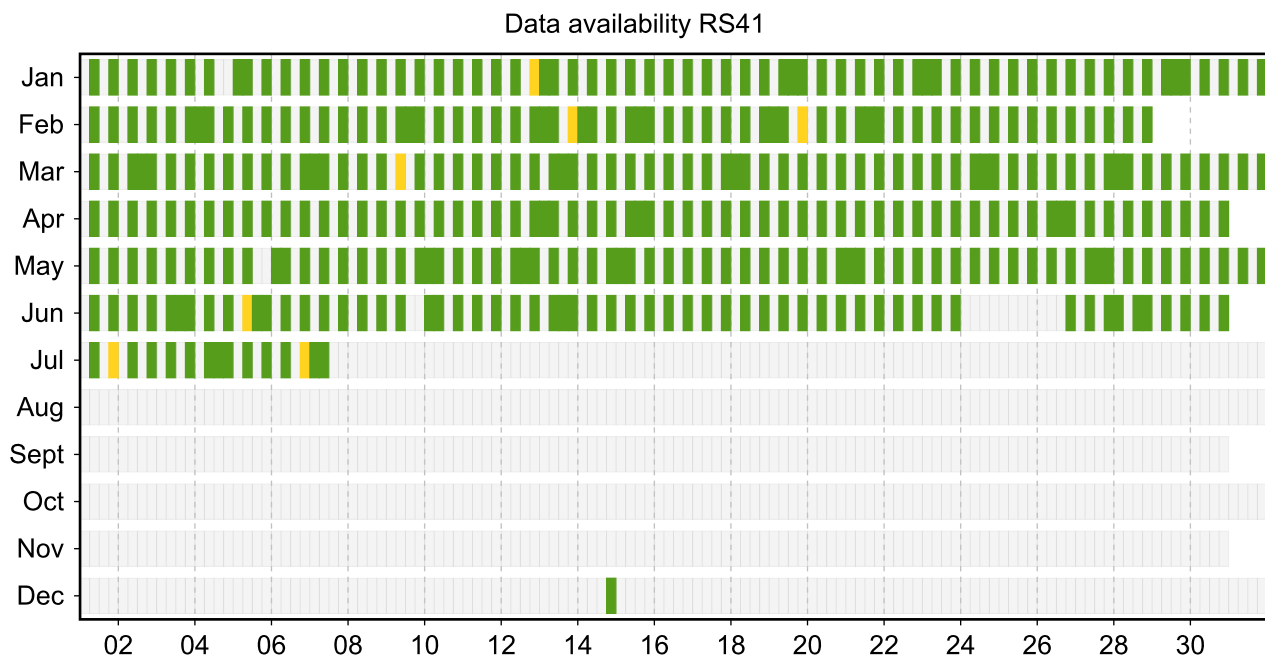
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#### 3.3.1 Stream: RS41



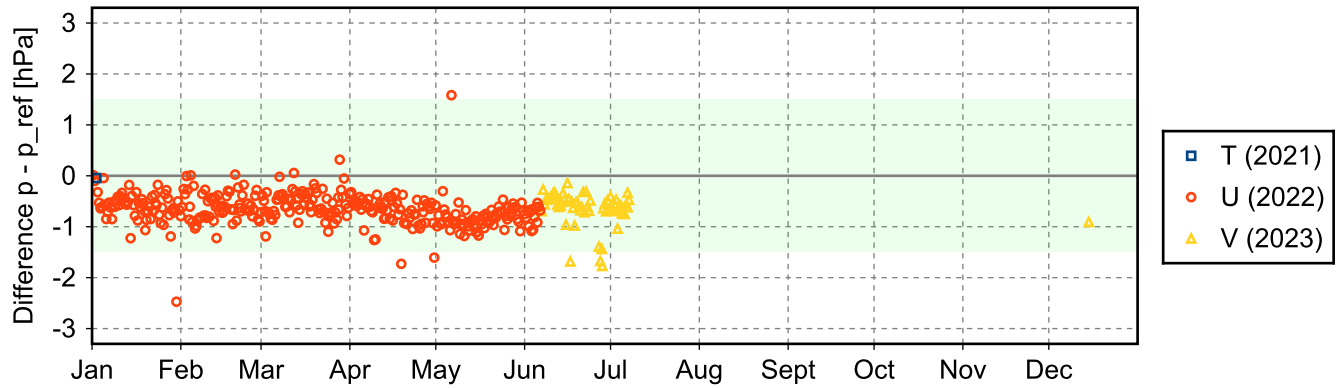
### 3.4 Instrument combinations of GRA-RS-01

Count	Instrument combination
405	RS41

### 3.5 Instrument ground check

#### 3.5.1 Stream: RS41

(1) GroundCheck: GC-RI41



### 3.6 Measurement events

