



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

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**13th GRUAN Implementation-  
Coordination Meeting (ICM-13)**

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Session 1

Virtual

15 November - 19 November 2021

## 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 to December 2020.

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## Overview

The ARM Eastern North Atlantic (ENA) site in Graciosa, Portugal operated two Vaisala MW41 manual launch systems during 2020. The systems are designated C1 and S01. Both manual launch systems share a single UHF-GPS antenna set. ENA conducts 2 flights per day, launching at 00Z and 12Z. These flights are primarily conducted with the C1 system, however the site has the capability to do dual launches. 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. Phase 9 of the JPSS/RIVAL program began with the first launch at Graciosa, Portugal with coordinated an overpass on September 7<sup>th</sup>, 2020.

In the summer of 2020 the S01 system was removed from Graciosa in order to support the upcoming TRACER campaign. The site no longer has the capability to launch RS-92 radiosondes.

In 2020 Evan Keeler has replaced Donna Holdridge as the ARM manager for all Radiosonde operations.

In the Fall of 2020 all ARM computers were upgraded to windows 10. This involved replacing older PC hardware where needed.

All ARM Vaisala sounding stations were upgraded to software version 2.16 in 2020.

## Resourcing

Currently at ENA intends to continue launching standard ARM radiosondes without changes to the schedule while continuing support of research projects. Resourcing needs have been identified for the burstpoint at or above 10 hPa and the 100% humidity chamber.

## Operations

The operations concerns at ENA are the need to modify the operations to include the 600g balloons to consistently reach 10mb and the incorporation of the 100% humidity chamber. Sufficient scientific justification has been identified and a request will be put forward in 2021 for the larger 600g balloons. The purchase of the 100% humidity chamber needs to be revisited, the last investigation reported that individual units could not be sold.

## Site assessment and certification

Graciosa certification status will require an internal review of ENAs capability to maintain certification. ARMs focus is bringing SGP up to requirements and certifying NSA.

## COVID-19

The Graciosa site experienced minimal interruptions due to COVID-19. All current observations can be completed with one person and no staffing issues were identified in 2020.

## GRUAN-related research

In 2020 the ENA site continued its support of the following field campaign with Lori Borg as the Principal Investigator:

- ARM Radiosondes for Joint Polar Satellite System (JPSS) Validation Field Campaign
  - <https://www.osti.gov/servlets/purl/1526023>

## WG-GRUAN interface

The working group has been able to supply sufficient documentation to put forth a request internal to ARM for 600g balloons in 2021.

## 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. The ARM radiosonde program will be heavily involved in the upcoming TRACER campaign, supplying 4 Vaisala ground stations to the campaign.

## **Future plans**

The ENA site will continue to support the JPSS radiosonde launches in 2021. The ENA site will also continue launching 2 radiosondes per day operationally.

A deficiency has been noted across all of the ARM sites involving the burst height not consistently reaching 10mb. A request will be put forward in 2021 to ARM management to begin utilizing 600g balloons in place of the 350g balloons we currently use. This request will be supported by the evidence supplied by other members of the GRUAN community.

Investigation into the purchase of SHC manufacturer-independent ground check will be completed.



# GRUAN Site Report for Graciosa (GRA), 2020

Reported time range is Jan 2020 to Dec 2020

Created by the Lead Centre

Version from 2021-04-27

## 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	804

### 1.2 General comments from Lead Centre

#### 1.2.1 General

ARM employs an automated procedure to transmit raw and processed measurement data.

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)

<b>Object</b>	<b>Value</b>
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-SG.

RS92 data were not processed because of invalid data files.

#### 3.1.2 General

Recommended burst altitude of 10 hPa is not reached on a regular basis.

### 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		802	802	
RS41-GCA	001		755	
RS41-RAW	001		802	
RS41-EDT	001		771	
RS41-GDP-ALPHA	003		248	
RS41-GDP-ALPHA	004		191	
RS41-GDP-BETA	001		765	
RS41-GDP-BETA	002		128	

#### 3.2.2 Stream: RS92

RS92		2	2	
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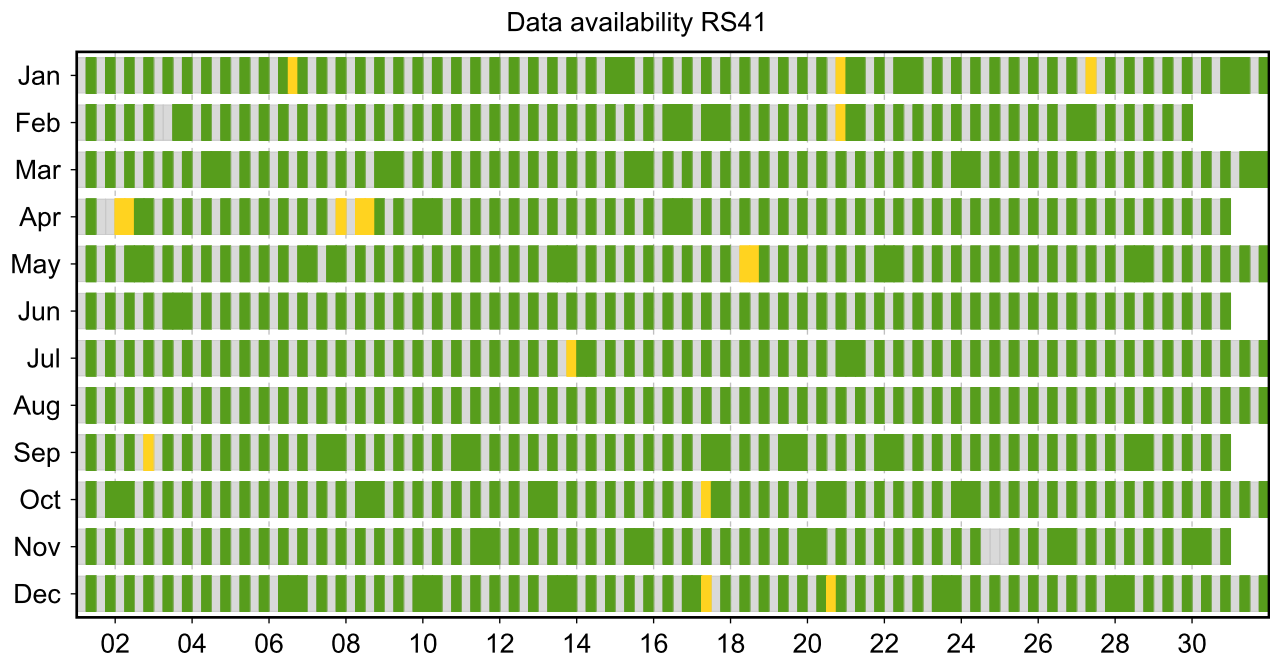
### 3.3 Availability of data products

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).

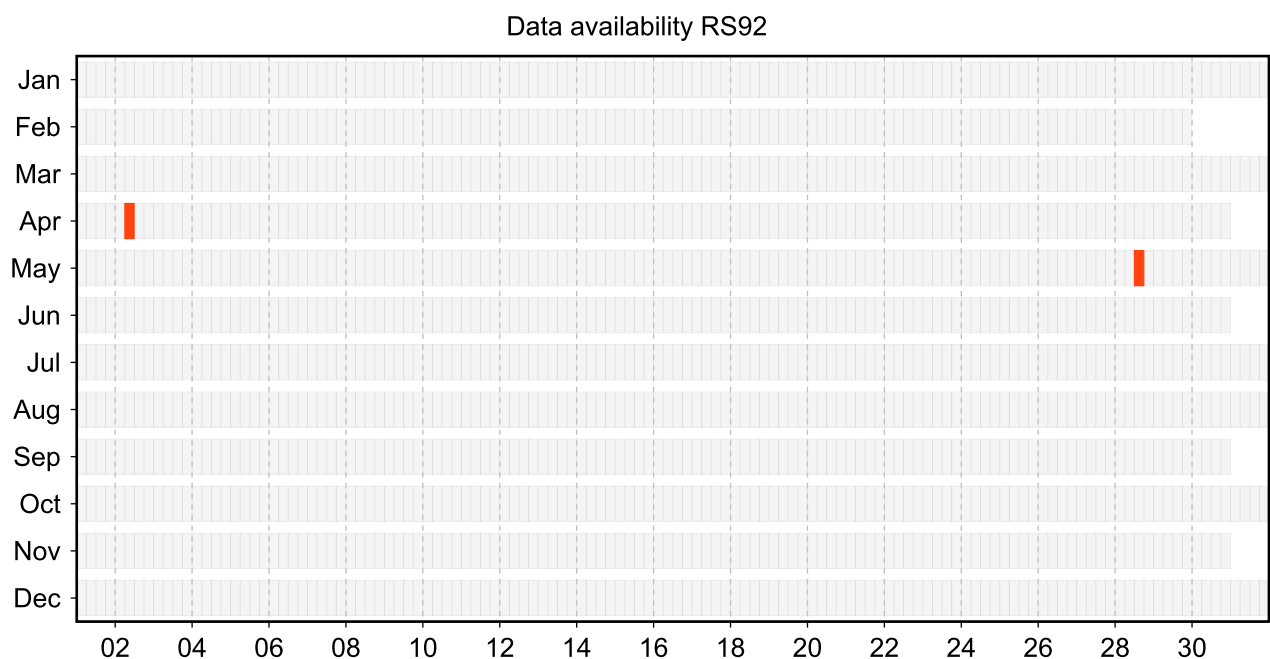
Unprocessed (yellow): The manufacturer-produced file with raw measurement data has been successfully converted into a GRUAN-standardized raw data format (NetCDF). The GRUAN data processing has not been performed or was aborted. Reasons for this may be a still missing GRUAN data processor or a processing-software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



#### 3.3.2 Stream: RS92



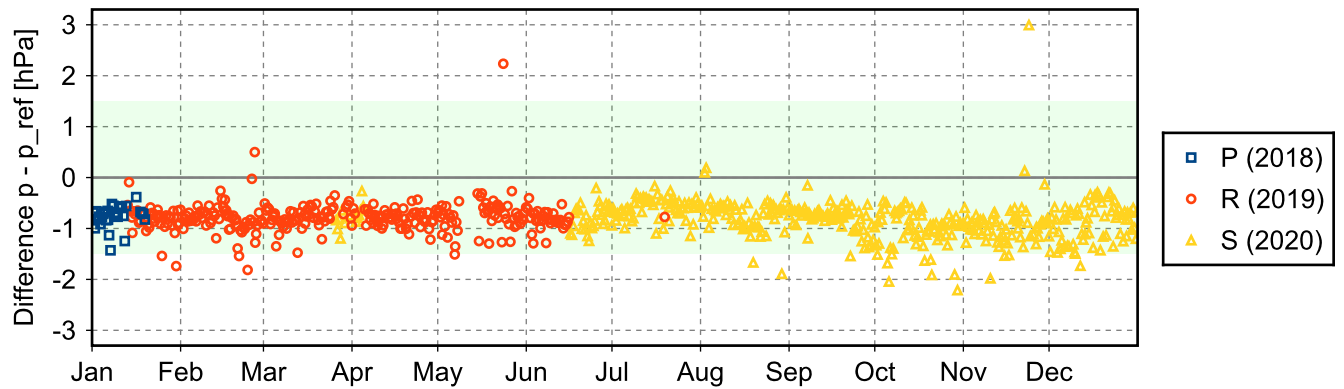
### 3.4 Instrument combinations of GRA-RS-01

Count	Instrument combination
802	RS41
2	RS92

### 3.5 Instrument ground check

#### 3.5.1 Stream: RS41

(1) GroundCheck: GC-R141



### 3.6 Measurement events

