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GLOBAL CLIMATE OBSERVING
SYSTEM (GCOS)

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GRUAN Site Report for Barrow, Alaska

(Submitted by Evan Keeler)

Summary and Purpose of this Document

Report from the GRUAN site Barrow, Alaska for the period January to December 2021.

Overview

The ARM Northern Slope of Alaska (NSA) site near Barrow, Alaska operated one Vaisala AS15 Autolauncher and one Vaisala MW41 manual launch systems during 2021. The systems are designated C1 (Vaisala AS15 Autosonde) and S01 (Vaisala MW41). NSA conducts 4 flights per day, launching at 00Z, 06Z, 12Z, and 18Z. The NSA site has a cooperative agreement with the National Weather Service (NWS). The 00Z and 12Z launch data are provided to the NWS for incorporation into their operational network. These flights are primarily conducted with the AS15 Autosonde system, however when the need arises the manual systems will be used. 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. The site is continuing its support of the JPSS/RIVAL program. In 2021 the site continued support of the JPSS phase 9 by launching single radiosondes from the Vaisala Autosonde, or synchronized launches with the Autosonde and the manual system.

All ARM Vaisala sounding stations were upgraded to software version 2.17 in 2021.

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

Resourcing

There are no resourcing issues to report at NSA. As always, the site is very remote so shipping items and expendables can sometimes take longer than desired. But we have not experienced any noteworthy issues with resourcing in 2021. Resourcing needs have been identified for the SHC manufacturer-independent ground check.

Operations

The site regularly experiences issues with the AS15 Autolauncher. These can cause extended outages in the C1 datastream. However, when the Autosonde is not functioning, the observers have the capability to launch the manual soundings on the MW41 platform. The manual system will output the data on the S01 datastream.

The ground check pressure difference has been noted and the ground check unit has been replaced. This did not seem to fix the issue. However, the replacement AS41 Autosonde will be installed in fall 2022 which should remedy the issue.

COVID-19

Due to the fact that we utilize an AS15 Autosonde and launches are generally conducted automatically, the site had minimal impact from COVID-19. However, the site did experience delays in maintenance as ARM typically has technicians travel to Barrow, AK from other locations.

Site assessment and certification

The site certification package for the NSA radiosonde operations has been sent to GRUAN for review.

GRUAN-related research

In 2021 the NSA site continued its support of the following field campaign:

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

WG-GRUAN interface

If available, guidance for the application of the SHC with the Autosonde platform would be appreciated.

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 is heavily involved in the TRACER campaign, supplying 4 Vaisala MW41 ground stations to the campaign.

The ARM program is also involved in the SAIL campaign with one Vaisala MW41 ground station.

Future plans

The ARM program plans to replace the aging AS15 Autosonde with the AS41 Autosonde. This change will likely take place in Fall of 2022. The AS41 will maintain the same launch schedule and utilize the same RS-41 radiosonde.



GRUAN Site Report for Barrow (BAR), 2021

Reported time range is Jan 2021 to Dec 2021

Created by the Lead Centre

Version from 2022-11-15

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	Keeler, Evan
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 UTQI	GNSS	1	operational
BAR-RS-01	Balloon-Borne Sounding System (SONDE) at Barrow	Sounding Site	4	139
BAR-RS-02	Balloon-Borne Sounding System (SONDE) at Barrow	Sounding Site	3	1287

1.2 General comments from Lead Centre

1.2.1 General

ARM employs an automated procedure to transmit raw 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 UTQI (BAR-GN-01)

Object	Value
System name	GNSS Site UTQI
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	Keeler, Evan
Started at	2017-07-28
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 2017. 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 Barrow (BAR-RS-01)

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	Keeler, Evan
Started at	-
Defined setups	4 (ROUTINE, ROUTINE2, ROUTINE3, DUAL)
Possible streams	RS41, RS92

3.1 Lead Centre comments

3.1.1 General

This system is mainly used as back up in case there is a failure with the autolaunch system.

The ARM facility code is S01.

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		139	139	
RS41-RAW	001		139	
RS41-EDT	001		139	
RS41-GDP	001		139	
RS41-GDP-BETA	002		52	
RS41-GDP-BETA	003		125	

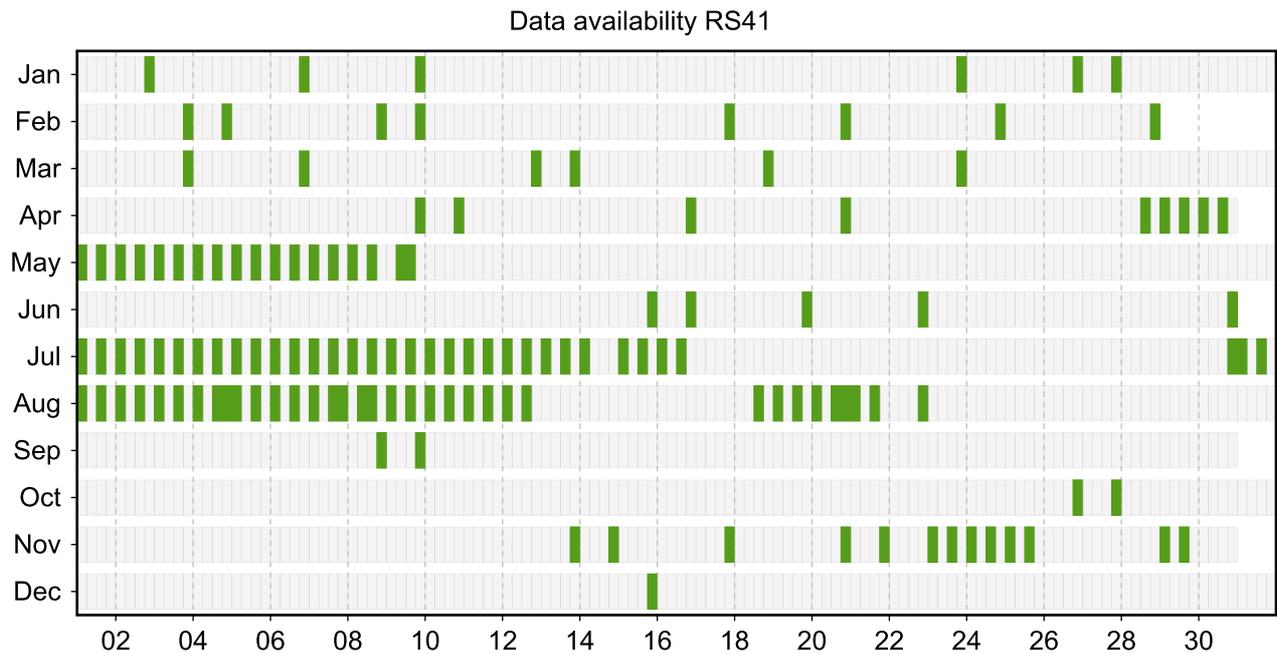
3.3 Availability of data products

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



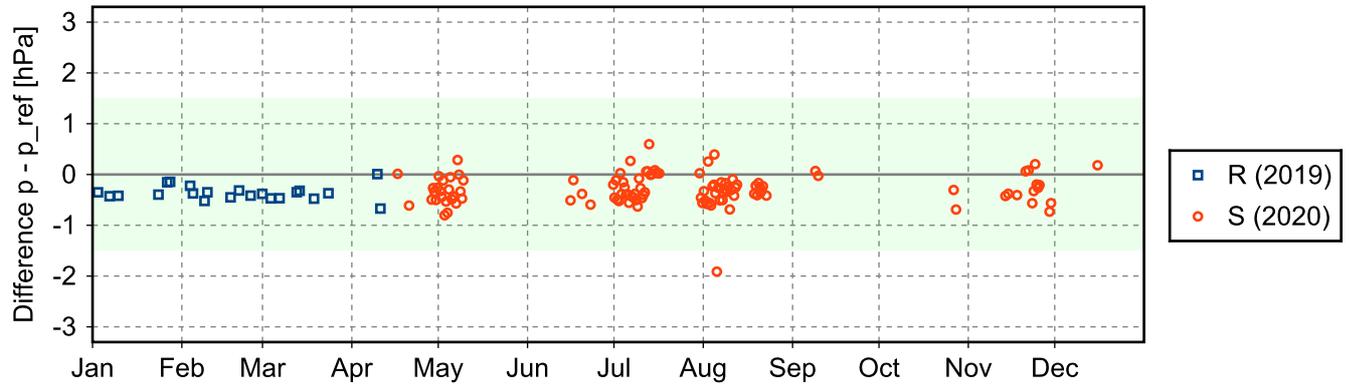
3.4 Instrument combinations of BAR-RS-01

Count	Instrument combination
139	RS41

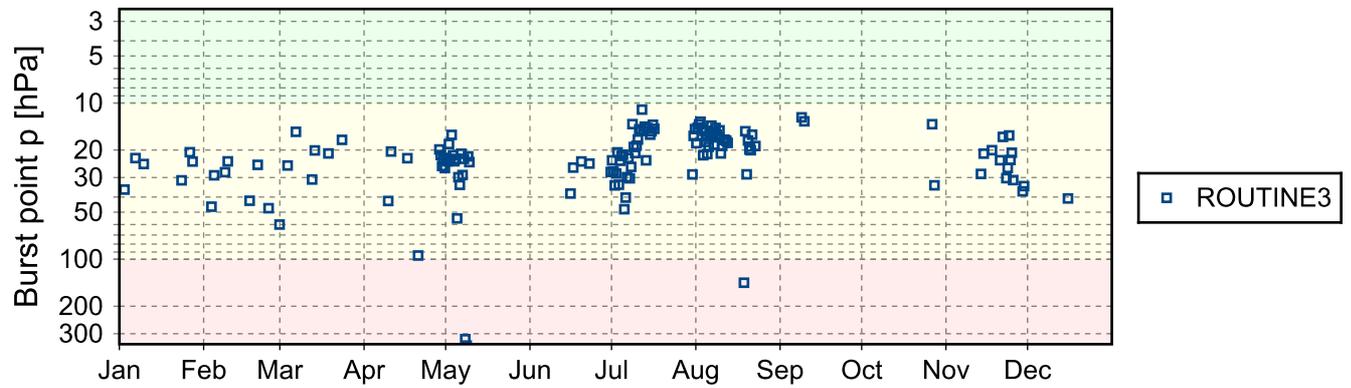
3.5 Instrument ground check

3.5.1 Stream: RS41

(1) GroundCheck: GC-R141



3.6 Measurement events



4 System: Balloon-Borne Sounding System (SONDE) at Barrow (BAR-RS-02)

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	Keeler, Evan
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.)

The current operational radiosonde is the Vaisala RS41.

RS92 data were not processed because of invalid data files.

4.1.2 Data quality

The reference pressure sensor seems to drift.

4.1.3 General

This is the autolauncher system.

The ARM facility code is C1.

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

4.2 GRUAN data products

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

RS41		1281	1281	
RS41-RAW	001		1281	
RS41-EDT	001		1258	
RS41-GDP	001		1249	
RS41-GDP-BETA	002		668	
RS41-GDP-BETA	003		1040	

4.2.2 Stream: RS92

RS92		6	6	
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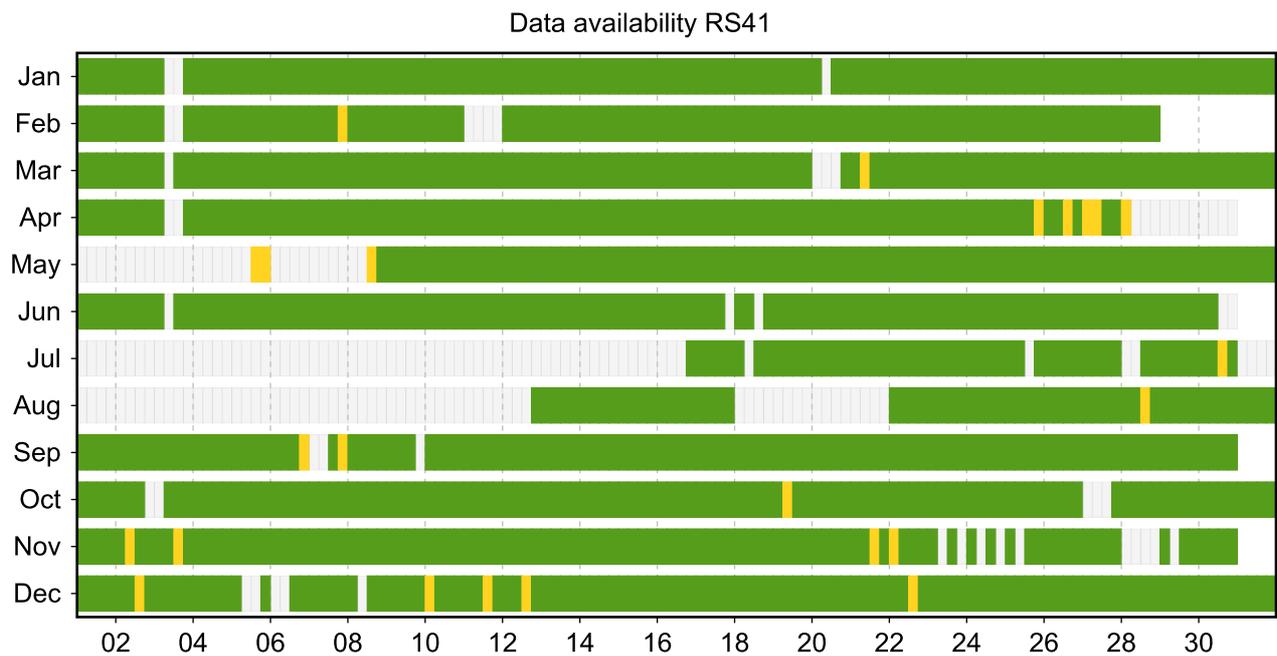
4.3 Availability of data products

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).

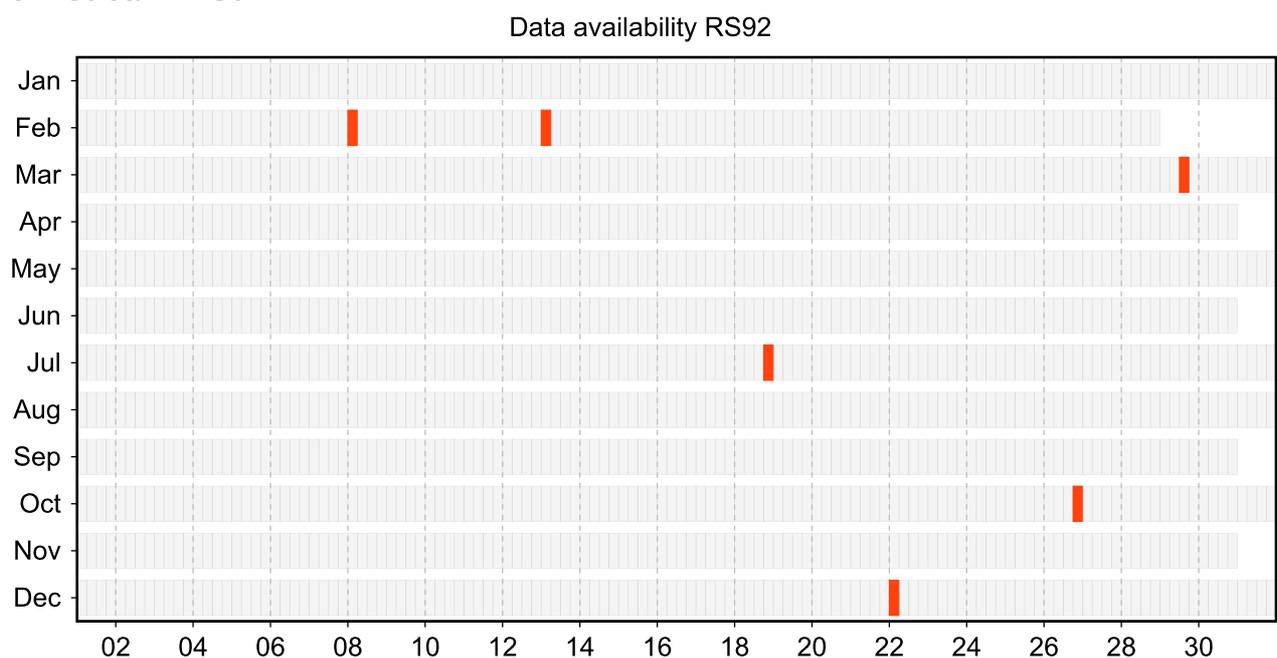
Unprocessed (yellow): The manufacturer-produced file with raw measurement data has been successfully converted into a GRUAN-standardized raw data format (NetCDF). The GRUAN data processing has not been performed or was aborted. Reasons for this may be a still missing GRUAN data processor or a processing-software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

4.3.1 Stream: RS41



4.3.2 Stream: RS92



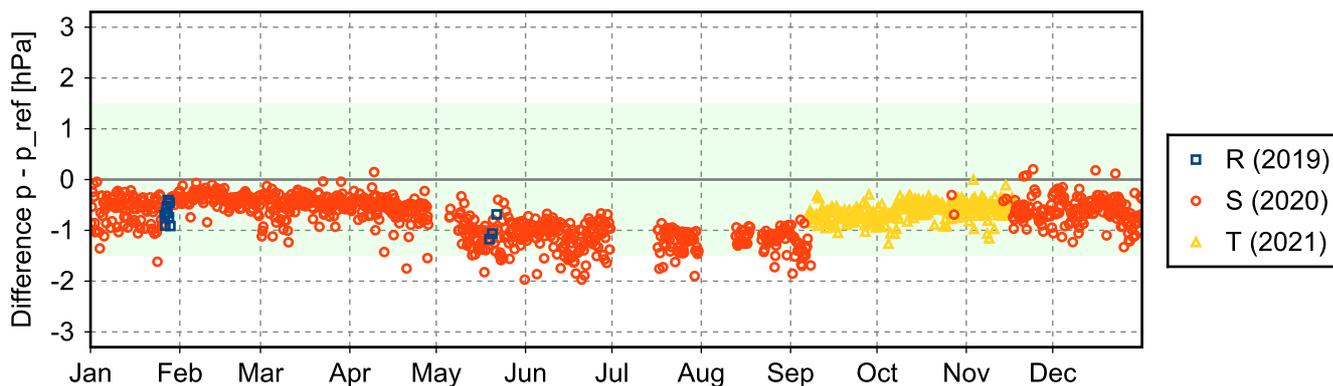
4.4 Instrument combinations of BAR-RS-02

Count	Instrument combination
1281	RS41
6	RS92

4.5 Instrument ground check

4.5.1 Stream: RS41

(1) GroundCheck: GC-RI41



4.6 Measurement events

