



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

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**9th GRUAN Implementation-
Coordination Meeting (ICM-9)**

Session 7

Helsinki, Finland

12 - 16 June 2017

GRUAN Site Report for Lindenberg

(Submitted by Ruud Dirksen)

Summary and Purpose of this Document

Report from the GRUAN site Lindenberg for the period March 2016 to April 2017.

Overview

Lindenberg contributes to GRUAN with the following operational data streams: RS92 radiosonde (4 times per day) and GNSS IPW. Other data streams, which are not official GRUAN products yet, include: Ozone, CFH, COBALD, Graw DFM-09, RS41. These additional soundings are performed at least once per month, depending on instrument type. All measurements are performed in accordance with GRUAN operational procedures, which in case of the radiosondes means the application of a manufacturer-independent ground check in an SHC at 100%RH prior to launch.

Change and change management

The procedures for the operational RS92 and GNSS data streams have not been altered. In March 2017 the RS92 has been replaced by the RS41 as operational radiosonde. In order to manage this change we have implemented an extensive intercomparison program to investigate the differences between both radiosondes. This intercomparison program is part of the GRUAN-wide effort in the RS92-RS41 change management; it consists of weekly dual soundings with RS92 & RS41 and was initiated in 2015. The Vaisala receiving systems have been upgraded to MW41. For research instruments such as CFH, COBALD and Ozone sonde, the RS41 has replaced the Internet iMet-1 as carrier sonde.

Resourcing

The situation at Lindenberg is good: we have stable (financial + personal) resources to perform 4 radiosoundings per day, as well as numerous research soundings with CFH, COBALD and alike.

Site assessment and certification

The Lindenberg site was GRUAN-certified (for the RS92 measurement program) in 2014, and is currently undergoing re-assessment of the certification.

GRUAN-related research

- RS92-RS41 intercomparison.
- Regular soundings with research instruments such as CFH, Ozone, COBALD, FLASH.
- Research soundings with the Aircore and Particle replicator instruments.

- Characterisation of radiosondes errors and uncertainties under laboratory conditions. E.g. characterisation of the time lag of the RH sensor for RS92, RS41, Graw DFM-09.
- Characterisation of the radiation error of the temperature sensor of various radiosondes.
- Development a GRUAN data product for RS41 and for the CFH (on-going work).
- Development of upgrade for RS92 data product (version 3).
- Cooperation with GFZ Potsdam in development of a GRUAN GNSS IPW data product.
- Participation in StratoClim campaign in India (July-August 2016)

WG-GRUAN interface

N/A

Items for ICM-9 plenary discussions

The increasing costs of CFH instruments, and the foreseeable ban on the cryogen needed for CFH.

Future plans

Continue RS41-RS92 intercomparison, continue sounding program with research/reference sondes (e.g. CFH). Develop new set-up to assess solar radiation error of radiosondes temperature sensor. Participate in and support international measurement campaigns.



GRUAN Station Report for Lindenberg (LIN), 2016/17

Reported time range is Mar 2016 to Apr 2017

Created by the Lead Centre

Version from 2017-06-06

1 General GRUAN station information

Info	Value
Station name	Lindenberg
Unique GRUAN ID	LIN
Geographical position	52.2100 °N, 14.1200 °E, 98.0 m
Operated by	MOL Meteorologisches Observatorium Lindenberg, part of: DWD Deutscher Wetterdienst
Main contact	Dirksen, Ruud
WMO no./name	10393 LINDENBERG
Operators	current 16, change +0 / -0
Sounding Site	1
GNSS	2

1.1 General information about GRUAN measurement systems

System	Type	Setups	Measurements	As scheduled
LIN-GN-01	GNSS	1	operational	complete
LIN-GN-02	GNSS	0	not operational	not scheduled
LIN-RS-01	Sounding Site	6	1755	91.41 %

1.2 General comments from Lead Centre

1.2.1 General

The site is requested to establish a GRUAN data product for the cryogenic frostpoint hygrometer.

2 System: GNSS Site LDB0 (LIN-GN-01)

Info	Value
System name	GNSS Site LDB0
Unique GRUAN ID	LIN-GN-01
System type	GNSS (GN - GNSS)
Geographical position	52.2096 °N, 14.1185 °E, 160.2 m
Operated by	GFZ Deutsches GeoForschungsZentrum GFZ, part of: HELMHOLTZ Helmholtz-Gemeinschaft
Instrument contact	Bisek, Krispin
Started at	2007-05-25
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 September 2013. The Lindenberg GNSS station is one of two test sites to implement the GNSS dataflow in GRUAN. The current dataflow includes manufacturer raw data, converted raw data (RINEX) and instrument logs, containing all equipment changes.

3 System: GNSS Site LDB2 (LIN-GN-02)

Info	Value
System name	GNSS Site LDB2
Unique GRUAN ID	LIN-GN-02
System type	GNSS (GN - GNSS)
Geographical position	52.2091 °N, 14.1209 °E, 159.5 m
Operated by	-
Instrument contact	Bisek, Krispin
Started at	-
Defined setups	-
Possible streams	-

3.1 Lead Centre comments

3.1.1 Dataflow

No GNSS dataflow to GRUAN LC as yet.

4 System: Lindenberg Launch Site (LIN-RS-01)

Info	Value
System name	Lindenberg Launch Site
Unique GRUAN ID	LIN-RS-01
System type	Sounding Site (RS - Radiosonde)
Geographical position	52.2100 °N, 14.1200 °E, 112.0 m
Operated by	MOL Meteorologisches Observatorium Lindenberg, part of: DWD Deutscher Wetterdienst
Instrument contact	Dirksen, Ruud
Started at	-
Defined setups	6 (RESEARCH, ROUTINE, OZONE, OZONE2, ROUTINE2, DUAL1)
Possible streams	CFH, COBALD, ECC, FPH, RS41, RS80, RS92

4.1 Lead Centre comments

4.1.1 Change management

Dual launches of Vaisala RS92-SGP and RS41-SGP are performed biweekly since December 2014 and weekly since August 2015.

4.1.2 Dataflow

Sonde dataflow to the GRUAN LC operational since January 2008.

Change of operational sonde from Vaisala RS92-SGP to Vaisala RS41-SGP was on 21 March 2017.

Now, the dataflow includes streams of the Vaisala RS41-SG(P), RS92-SGP, Graw DFM-09, ECC Ozone sonde, CFH water vapour, and Internet iMet-1. All launches are promptly recorded using the RsLaunchClient. The site is used as test bed for the RsLaunchClient.

4.1.3 General

Routine soundings are performed four times per day. Ozone soundings are performed once per week. Research soundings using CFH, ECC, iMet-1, and Vaisala RS92, RS41 are launched twice per month. Graw radiosondes have been used as redundant sonde during weekly dual soundings till July 2015 (after biweekly). Vaisala RS41 have been used as redundant sonde during biweekly dual soundings since December 2014 and weekly since August 2015. Various sonde combinations have been flown through the reporting period.

Change of operational sonde from Vaisala RS92-SGP to Vaisala RS41-SGP was on 21 March 2017.

4.2 GRUAN data products

Product	Version	Soundings received	Available at LC	Distributed by NCDC
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4.2.1 Stream: CFH

CFH		28	28	
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4.2.2 Stream: COBALD

COBALD		15	15	
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4.2.3 Stream: DFM-09

DFM-09		23	23	
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4.2.4 Stream: ECC

ECC		97	97	
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4.2.5 Stream: IMET-1

IMET-1		24	24	
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4.2.6 Stream: RS41

RS41		305	305	
RS41-RAW	001		302	
RS41-EDT	001		297	297

4.2.7 Stream: RS92

RS92		1613	1613	
RS92-RAW	001		1602	
RS92-RAW	002		1608	
RS92-EDT	001		1599	1599
RS92-GDP	002		1368	1178

4.2.8 Stream: SRS-C34

SRS-C34		5	5	
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4.3 Data availability of data products

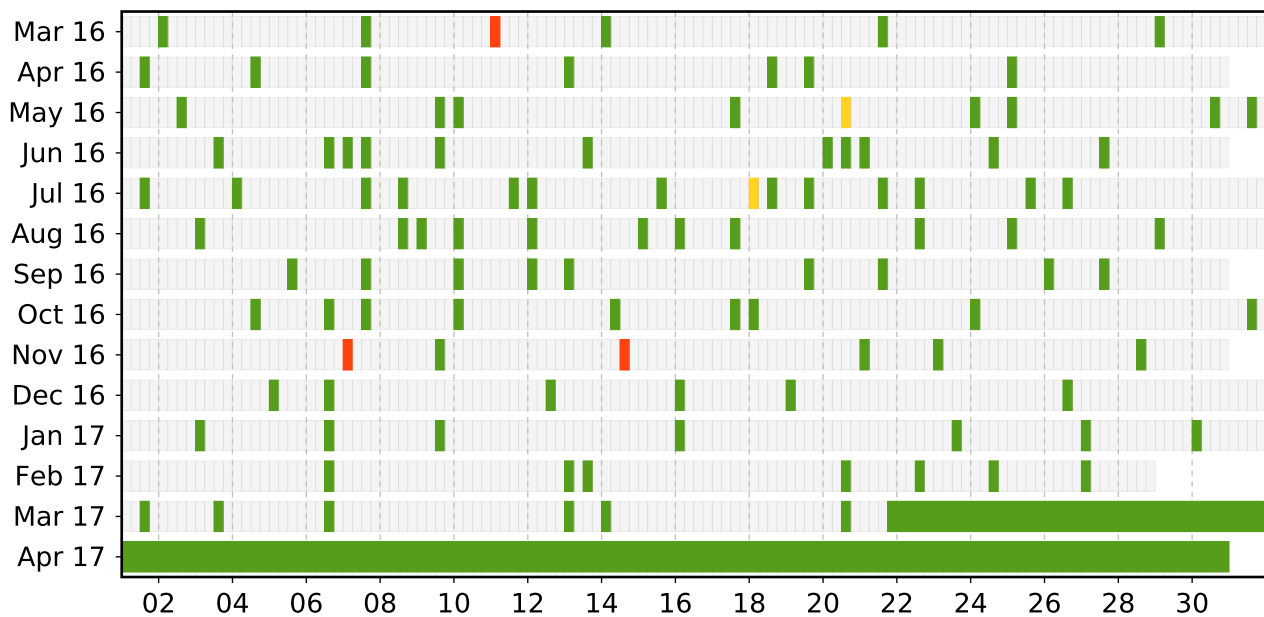
Available (green): All steps of processing have been successfully completed. The data file is available at NCEI (NCDC).

Unprocessed (yellow): The raw data file has been successfully converted to a GRUAN standardized raw data file format (NetCDF). The processing itself (e.g. extracting manufacturer data product or GRUAN data processing) is not done yet, or could not be completed. Reason may be missing raw data, or software bugs.

Failed (red): Raw data file could not be converted to a GRUAN standardized raw data file format (NetCDF). Reason may be a corrupt original raw data file, or software bugs.

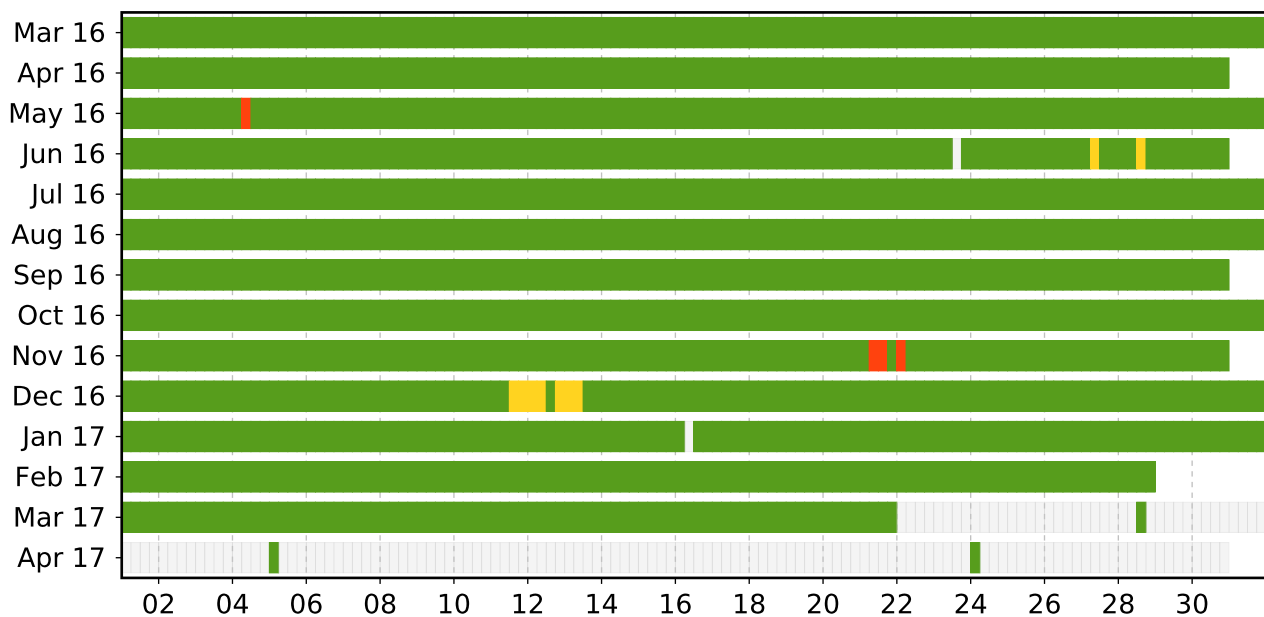
4.3.1 Stream: RS41 (Product: RS41-EDT-001)

Schedule data availability of stream RS41



4.3.2 Stream: RS92 (Product: RS92-EDT-001)

Schedule data availability of stream RS92



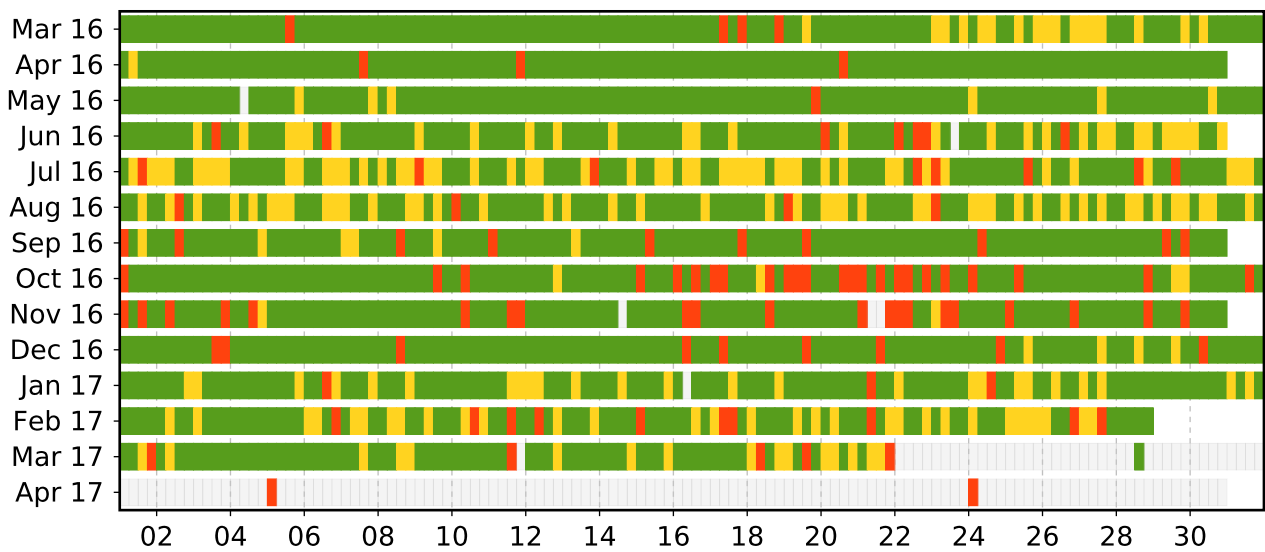
4.4 Data quality of current GRUAN data products

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

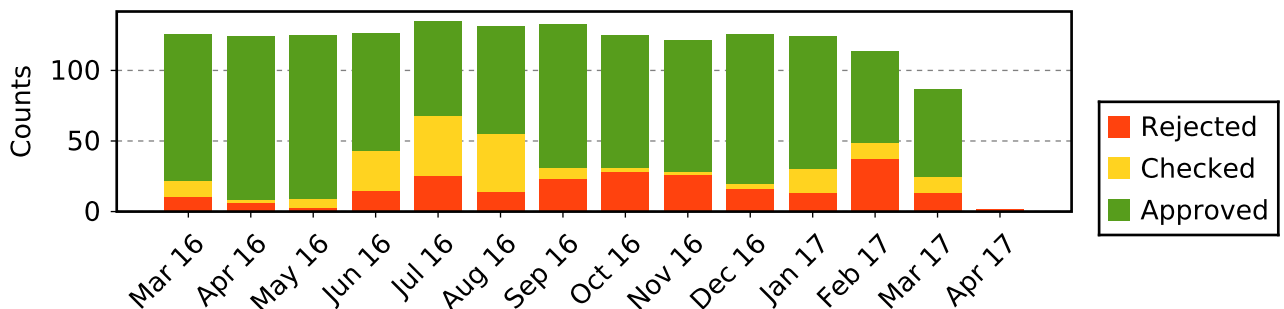
4.4.1 Stream: RS92 (Product: RS92-GDP-002)

Mar 16	126	104	12	10	2		17	9	28
Apr 16	124	116	2	6	4		2	15	18
May 16	125	116	6	3			6	14	8
Jun 16	126	83	28	15	12		30	13	13
Jul 16	135	67	43	25	17		49	10	9
Aug 16	131	76	41	14	9		45	19	5
Sep 16	133	102	8	23	7		15	7	55
Oct 16	125	94	3	28	22		5	11	38
Nov 16	121	93	2	26	13		1	3	64
Dec 16	126	106	4	16	9		8	4	59
Jan 17	124	94	17	13	3		27	2	9
Feb 17	114	65	12	37	7		38	11	22
Mar 17	87	62	12	13	3		18	10	19
Apr 17	2			2	1				
Total	1599	1178	190	231	109		261	128	347

Schedule data quality of stream RS92



Data quality statistic of stream RS92



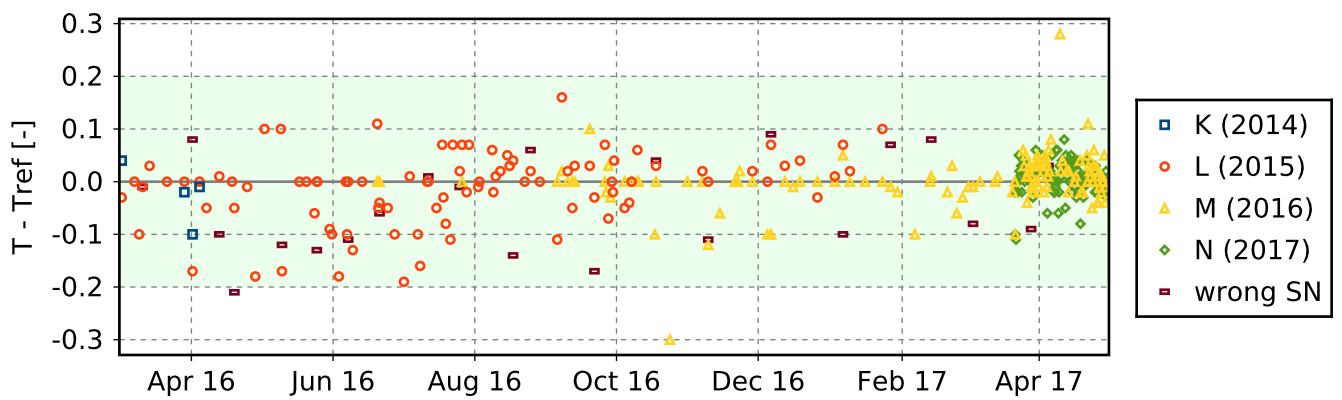
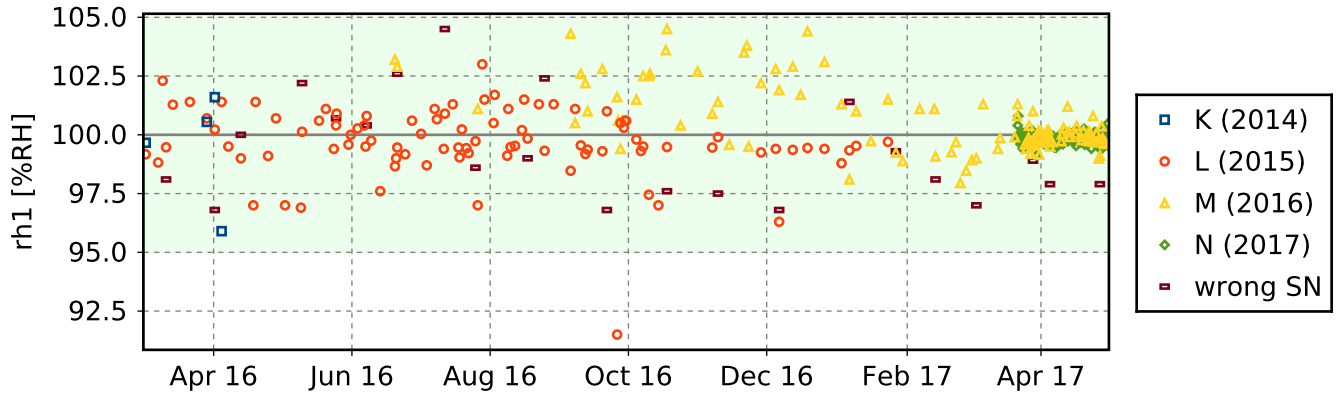
4.5 Instrument combinations of LIN-RS-01

Count	Instrument combination
1	CFH, COBALD, DFM-09, ECC, IMET-1, 2x RS41, RS92
6	CFH, COBALD, DFM-09, ECC, IMET-1, RS41, RS92
3	CFH, COBALD, DFM-09, ECC, RS41, RS92
1	CFH, COBALD, ECC, IMET-1, 2x RS41
2	CFH, COBALD, ECC, IMET-1, 2x RS41, RS92
1	2x CFH, DFM-09, ECC, IMET-1, 2x RS41, RS92
9	CFH, DFM-09, ECC, IMET-1, RS41, RS92
1	CFH, DFM-09, ECC, RS41, RS92
1	CFH, DFM-09, ECC, 2x RS41, RS92
2	CFH, ECC, IMET-1, RS41, RS92
1	COBALD, DFM-09, ECC, RS41
1	COBALD, RS41, RS92
1	ECC, 2x RS41
6	ECC, RS41
1	ECC, 2x RS41, RS92
61	ECC, RS92
1	IMET-1, RS41, RS92
1	IMET-1, RS92
159	RS41
61	RS41, RS92
1	2x RS41, RS92
18	2x RS41, 2x RS92
1	RS41, SRS-C34
3	4x RS92
1408	RS92
4	RS92, SRS-C34

4.6 Instrument ground check

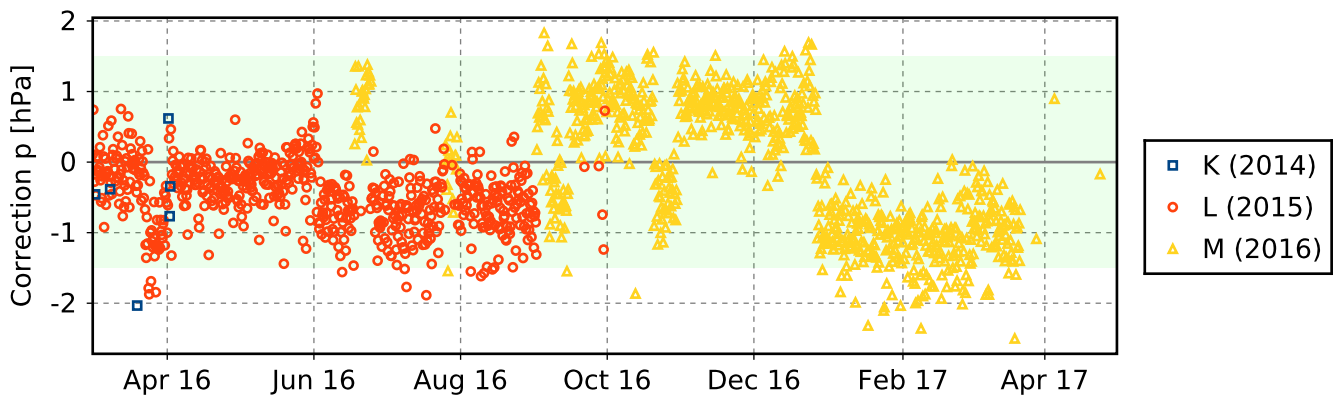
4.6.1 Stream: RS41

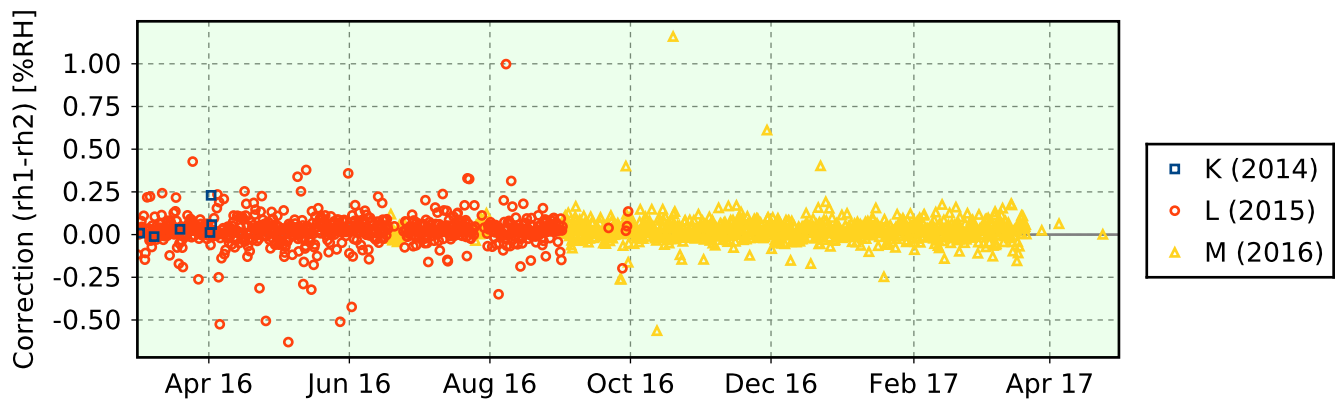
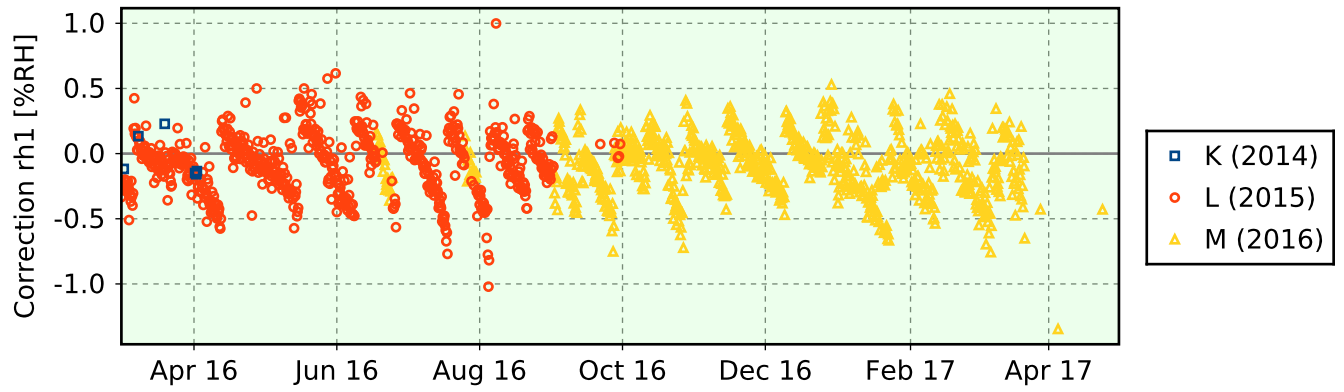
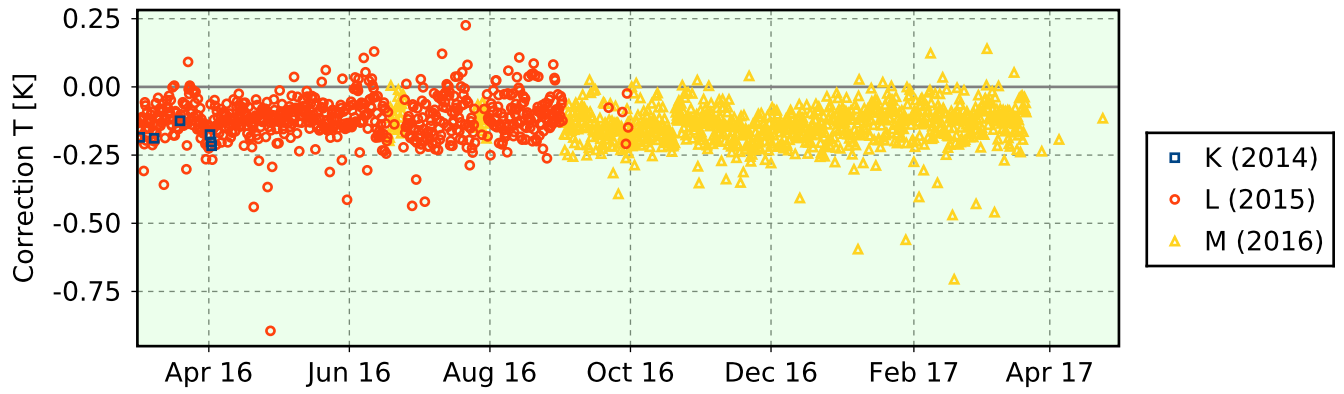
4.6.1.1 GroundCheck: SHC



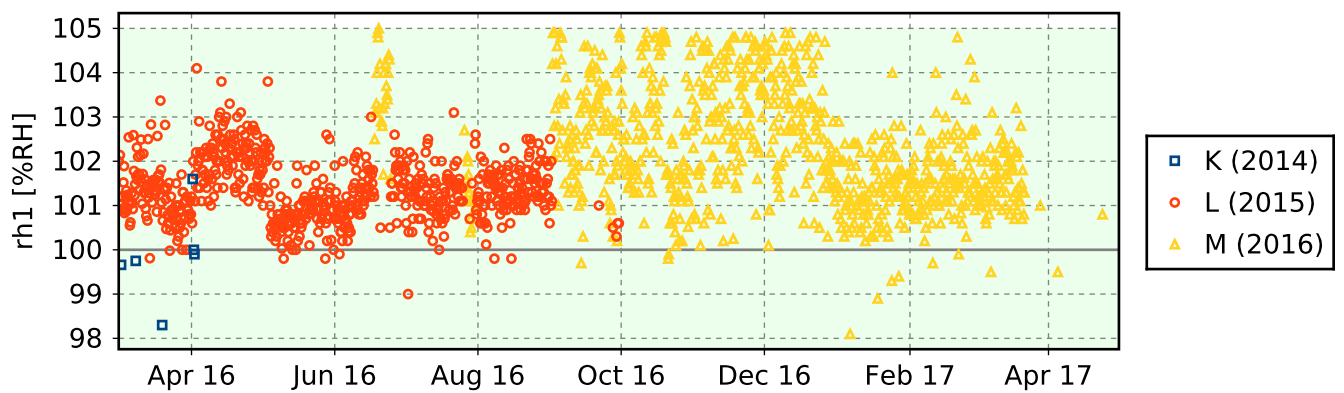
4.6.1 Stream: RS92

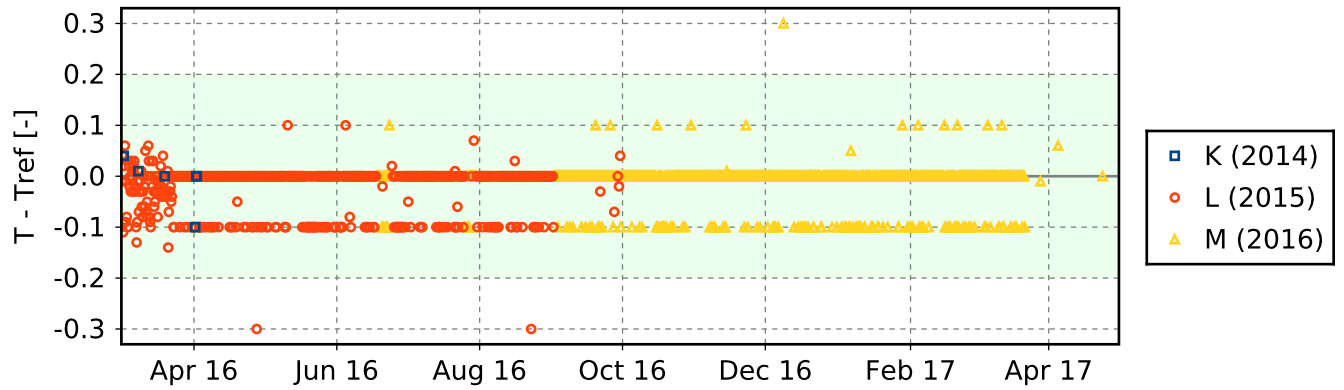
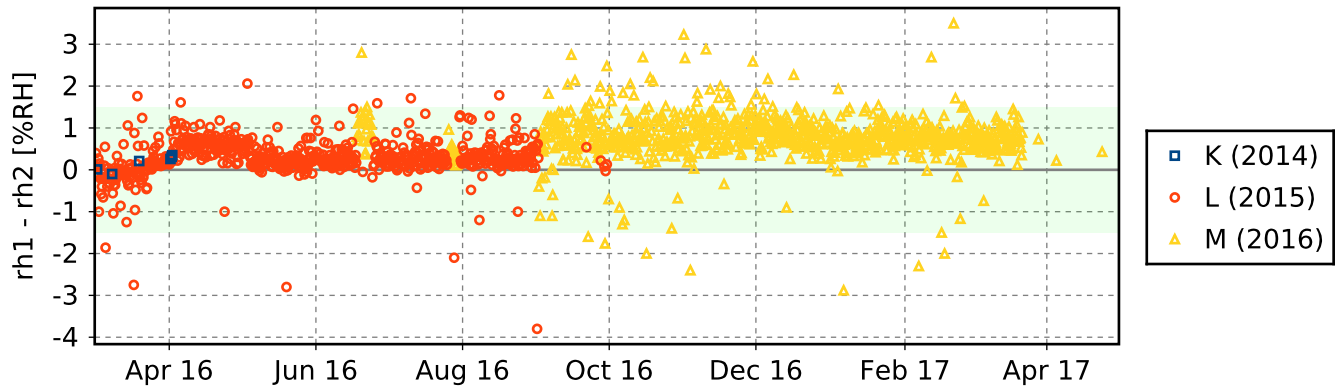
4.6.1.1 GroundCheck: GC25





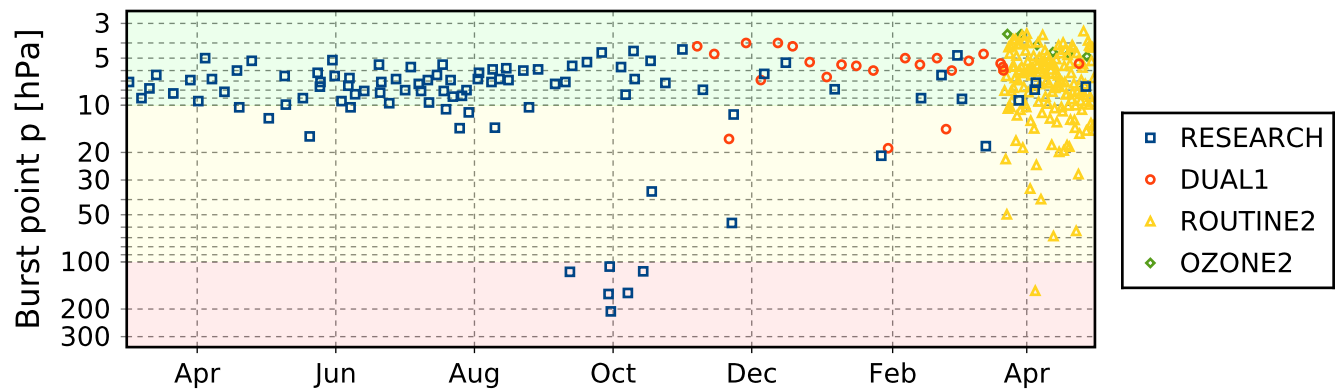
4.6.1.2 GroundCheck: SHC





4.7 Measurement events

4.7.1 Stream: RS41



4.7.1 Stream: RS92

