



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

Doc. 7.10
(30.V.2017)

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

Session 7

Helsinki, Finland

12 - 16 June 2017

GRUAN Site Report for Ny-Ålesund

(Submitted by Marion Maturilli)

Summary and Purpose of this Document

Report from the GRUAN site Ny-Ålesund for the period March 2016 to April 2017.

Overview

The Ny-Ålesund dataflow for RS92 soundings is settled and certified, and 1x daily RS92 radiosonde data have been provided to the GRUAN Lead Centre until 31 March 2017, 1x weekly afterwards. Since 1 April 2017, the standard radiosonde has changed to RS41, and 1x daily RS41 radiosonde data are regularly transferred to the GRUAN LC. In the frame of the change management concept, dual soundings of RS92 and RS41 have been performed weekly over the last year and will continue for a second year. All dual sounding data are transferred to the GRUAN LC. Soundings with cryogenic frostpoint hygrometers (CFH) were regularly performed every two months, including data transfer with RSLaunchClient. With the change to RS41, also the CFH payload set-up and data transmission has changed. The first CFH launch with new configuration was in March 2017. Dataflow of GNSS data to GRUAN LC and the GRUAN GNSS processing centre at GFZ has started in September 2013. The Ny-Ålesund GNSS station is one of the 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.

Once formal data products have been defined, the Ny-Ålesund site may contribute to GRUAN data streams with lidar data, microwave radiometer data and ozone sonde data.

Change and change management

With the switch to RS41 as standard radiosonde on 1 April 2017, the RS92 is now launched only once per week in a dual sounding with RS41. As also the ground receiving system has changed, all data are now received by a Vaisala MW41 Digicora system, providing mwx-files that are transferred to the GRUAN LC. The weekly RS92-RS41 dual soundings will be operated until end of March 2018. The daily standard radiosonde RS41 is operated with the established procedure of standard humidity chamber and weather hut outside condition measurement, and the radiosonde as well as auxiliary data are regularly transferred to the GRUAN LC. With the change of the standard radiosonde to RS41, also the set-up of the CFH payload and data receiving has changed. Before, the payload was mounted on a bar with [CFH / Imet radiosonde] on one side and [ECC ozone sonde / RS92 radiosonde] on the other side, transmitting data on 2 frequencies to 2 different receiving systems. With the new set-up, the payload is more compact and easier to handle. The data flow of both CFH and ECC ozone sonde are transmitted by the associated RS41 radiosonde, and no bar is required to assemble to payload. As a consequence, the payload can now be launched on a smaller balloon (TX1500) with external parachute. Data receiving is done with the Vaisala MW41 Digicora system. As these changes make the overall handling easier, the CFH launches are now operated by the site station personnel. While in spring 2017, the current station personnel got a technical introduction by the GRUAN LC, it is planned to have a profound technical preparation of the future personnel at AWI Potsdam from 2018

onwards. The schedule for CFH soundings in Ny-Ålesund remains with one launch every two months.

Resourcing

Currently, the Ny-Ålesund site is not facing financial problems.

Operations

Currently, we are not facing any operational challenges. Also, we are not aware of any deviations from GRUAN operating procedures.

Site assessment and certification

The site has been certified in 2012. We expect that the re-certification process will start soon.

GRUAN-related research

The Ny-Ålesund site is contributing to the GRUAN goal of documented RS92-RS41 dual soundings, by having a total of 2 years with once weekly dual soundings, transmitting all soundings data to the GRUAN Lead Centre using the RSLaunchClient. So far, no own research is done with these data, but M. Maturilli has contributed to the GRUAN Technical document Review of Multiple-payload Radiosonde Sounding Configurations for Determining Best-Practice Guidance for GRUAN Sites.

Radiosoundings are operated on a daily basis in Ny-Ålesund since 1992. Applying corrections to the early data and involving the GRUAN processed data, a Ny-Ålesund homogenized radiosonde data set was produced (doi: 10.1594/PANGAEA.845373). From these long-term observations, indications for Arctic climate change are analysed in

- Maturilli, M., and M. Kayser (2016): Arctic warming, moisture increase and circulation changes observed in the Ny-Ålesund homogenized radiosonde record. *Theor. Appl. Climatol.*, doi: 10.1007/s00704-016-1864-0.

Furthermore, the Ny-Ålesund long-term radiosonde data were applied in

- Kayser, M., M. Maturilli, R. M. Graham, S. R. Hudson, A. Rinke, L. Cohen, J.-H. Kim, S.-J. Park, W. Moon, and M. Granskog (2017): Vertical thermodynamic structure of the troposphere during the Norwegian young sea ICE expedition (N-ICE2015). *J. Geophys. Res. Atmos.*, 122, 119, doi: 10.1002/2016JD026089.

There is a long tradition of incorporating geodetic atmospheric parameters into meteorological and climatological models. Data from the CONT14 campaign were used in publication by Heinkelmann et al. (2016) as a test case for the comparison of atmospheric parameters and their corresponding formal errors obtained by VLBI with the following techniques: GNSS, DORIS, water vapor radiometer (WVR), and three different solutions obtained from the weather models NCEP and ECMWF. One of the test sites for this inter-comparison study was Ny-Ålesund.

- Heinkelmann, R., P. Willis, Z. Deng, G. Dick, T. Nilsson, B. Soja, F. Zus, W. Wickert, and H. Schuh (2016): Multi-technique comparison of atmospheric parameters at the DORIS co-location sites during CONT14, *Advances in Space Research*, 58, 27582773, doi: 10.1016/j.asr.2016.09.023

A careful reprocessing of the historical GNSS observations at Ny-Ålesund is currently going on at GFZ to obtain the long PWV time series suitable for climate applications. The special location of the stations and the long PWV time series from different techniques like radiosonde, GNSS, and VLBI makes it particularly interesting to analyse the temporal evolution of atmospheric water vapour for detecting climatic trends. An inter-comparison of the trend estimated from different data sets is also planned.

WG-GRUAN interface

We are grateful that the GRUAN Lead Centre provided a technical introductory to the CFH instrument and payload configuration to the Ny-Ålesund representative, technical staff and the current Ny-Ålesund station personal. It is planned to have the annual Ny-Ålesund station personal introduction to the technical issues of radiosoundings and CFH instrumentation at AWI Potsdam from next year onwards.

Items for ICM-9 plenary discussions

Since Ny-Ålesund has changed its standard radiosonde to RS41 we are interested in the time schedule for the RS41 GRUAN data product.

Future plans

Ny-Ålesund will keep the weekly RS92-RS41 dual soundings until end of March 2018. The Ny-Ålesund site will further contribute to WMOs Year of Polar Prediction (YOPP) by having 6-hourly radiosonde launches during the YOPP Northern Hemisphere Special Observation Periods (NH-SOPs) in February-March 2018 and July-August-September 2018.



GRUAN Station Report for NyAlesund (NYA), 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	NyAlesund
Unique GRUAN ID	NYA
Geographical position	78.9200 °N, 11.9400 °E, 5.0 m
Operated by	AWI Alfred-Wegener-Institut für Polarforschung, part of: HELMHOLTZ Helmholtz-Gemeinschaft
Main contact	Maturilli, Marion
WMO no./name	01004 NY-ALESUND II
Operators	current 14, change +6 / -6
Sounding Site	1
GNSS	1

1.1 General information about GRUAN measurement systems

System	Type	Setups	Measurements	As scheduled
NYA-GN-01	GNSS	1	operational	complete
NYA-RS-01	Sounding Site	8	477	96.56 %

1.2 General comments from Lead Centre

1.2.1 General

Good communications between station and GRUAN LC.

Yearly training of station staff by GRUAN LC.

2 System: GNSS Site NYA2 (NYA-GN-01)

Info	Value
System name	GNSS Site NYA2
Unique GRUAN ID	NYA-GN-01
System type	GNSS (GN - GNSS)
Geographical position	78.5136 °N, 11.5212 °E, 49.1 m
Operated by	GFZ Deutsches GeoForschungsZentrum GFZ, part of: HELMHOLTZ Helmholtz-Gemeinschaft
Instrument contact	Ramatschi, Markus
Started at	2000-03-13
Defined setups	1 (HOURLY)
Possible streams	-

2.1 Lead Centre comments

2.1.1 Dataflow

Dataflow of GNSS data to GRUAN LC and the GRUAN GNSS processing centre at GFZ has started in September 2013. This 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: Radiosonde Launch Site (NYA-RS-01)

Info	Value
System name	Radiosonde Launch Site
Unique GRUAN ID	NYA-RS-01
System type	Sounding Site (RS - Radiosonde)
Geographical position	78.9230 °N, 11.9227 °E, 15.7 m
Operated by	AWI-POTSDAM Forschungsstelle Potsdam, part of: AWI Alfred-Wegener-Institut für Polarforschung, part of: HELMHOLTZ Helmholtz-Gemeinschaft
Instrument contact	Maturilli, Marion
Started at	-
Defined setups	8 (ROUTINE, OZONE, FLASH, CFH, ROUTINE2, OZONE2, CFH2, DUAL1)
Possible streams	CFH, ECC, RS41, RS92

3.1 Lead Centre comments

3.1.1 Change management

Weekly dual launches of Vaisala RS92-SGP and RS41-SGP are performed since March 2016 and submitted to the GRUAN LC.

3.1.2 Dataflow

Sonde dataflow to the GRUAN LC is operational since April 2012.

Now, the dataflow includes streams of the Vaisala RS41-SGP, RS92-SGP, ECC Ozone sonde, CFH water vapour, and Internet IMET-1. All launches are promptly submitted using the RsLaunchClient.

3.1.3 General

Change of operational sonde from Vaisala RS92-SGP to Vaisala RS41-SGP was on 1 April 2017.

3.2 GRUAN data products

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

3.2.1 Stream: CFH

CFH		7	7	
-----	--	---	---	--

3.2.2 Stream: ECC

ECC		92	92	
-----	--	----	----	--

3.2.3 Stream: RS41

RS41		87	87	
RS41-RAW	001		86	
RS41-EDT	001		86	86

3.2.4 Stream: RS92

RS92		452	452	
RS92-RAW	001		451	
RS92-RAW	002		451	
RS92-EDT	001		444	444
RS92-GDP	002		408	375

3.3 Data availability of data products

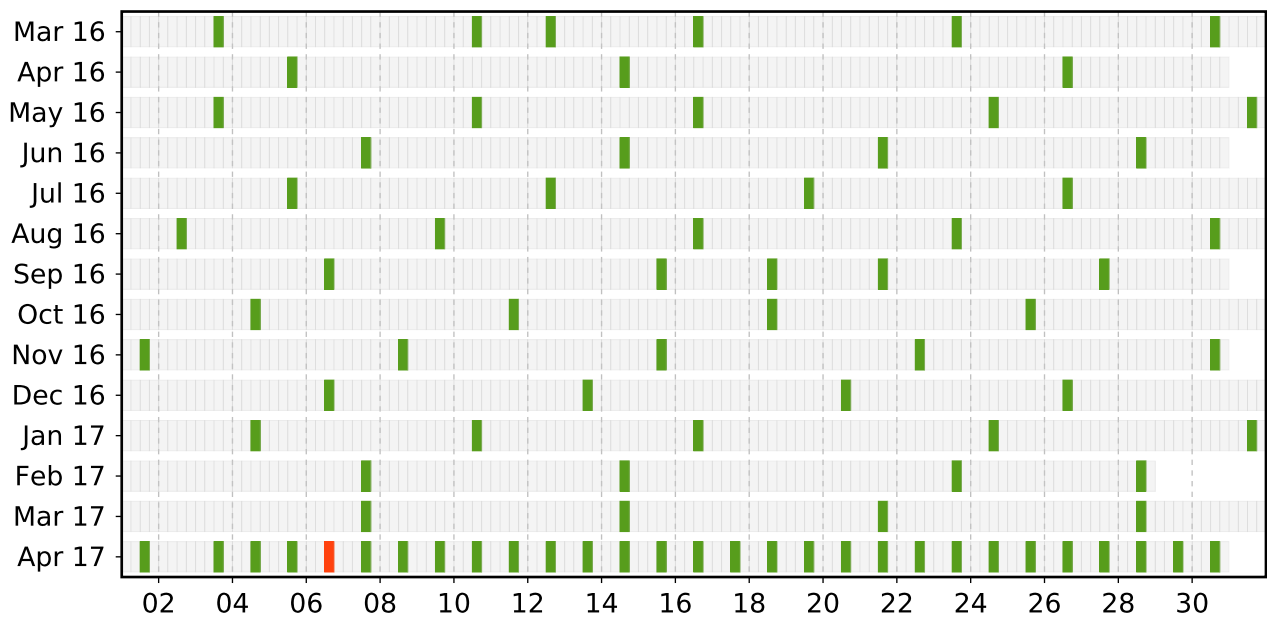
Available (green): All steps of processing have been successfully completed. The data file is available at NCEI (NCDC).

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.

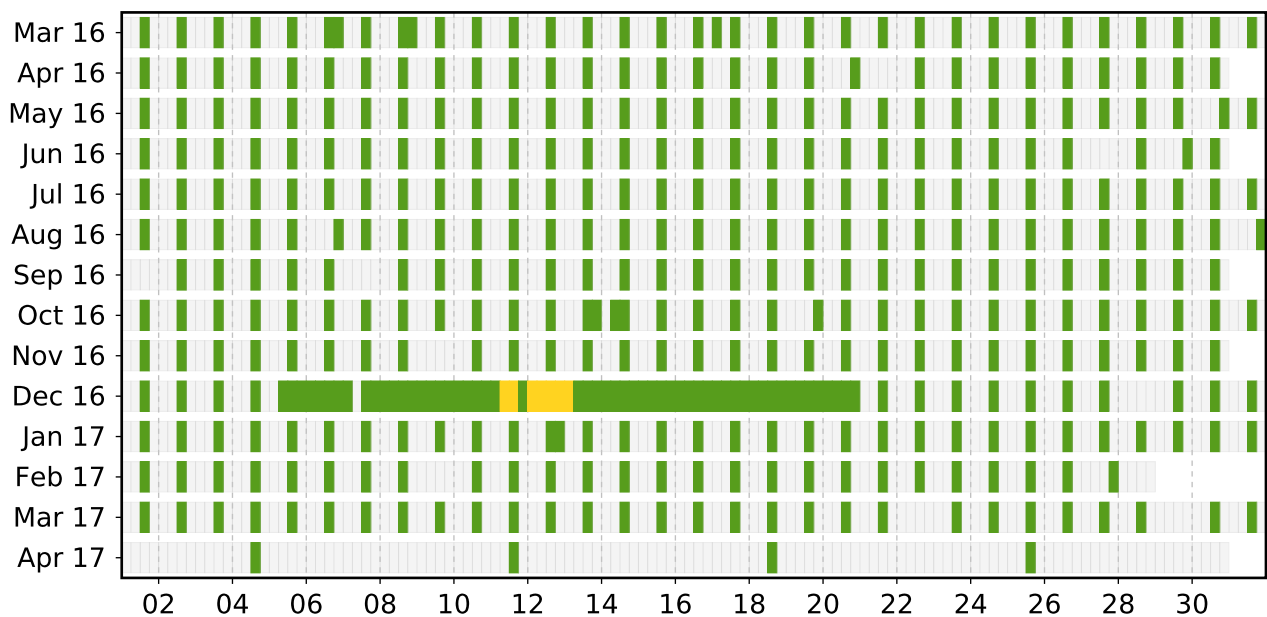
3.3.1 Stream: RS41 (Product: RS41-EDT-001)

Schedule data availability of stream RS41



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

Schedule data availability of stream RS92



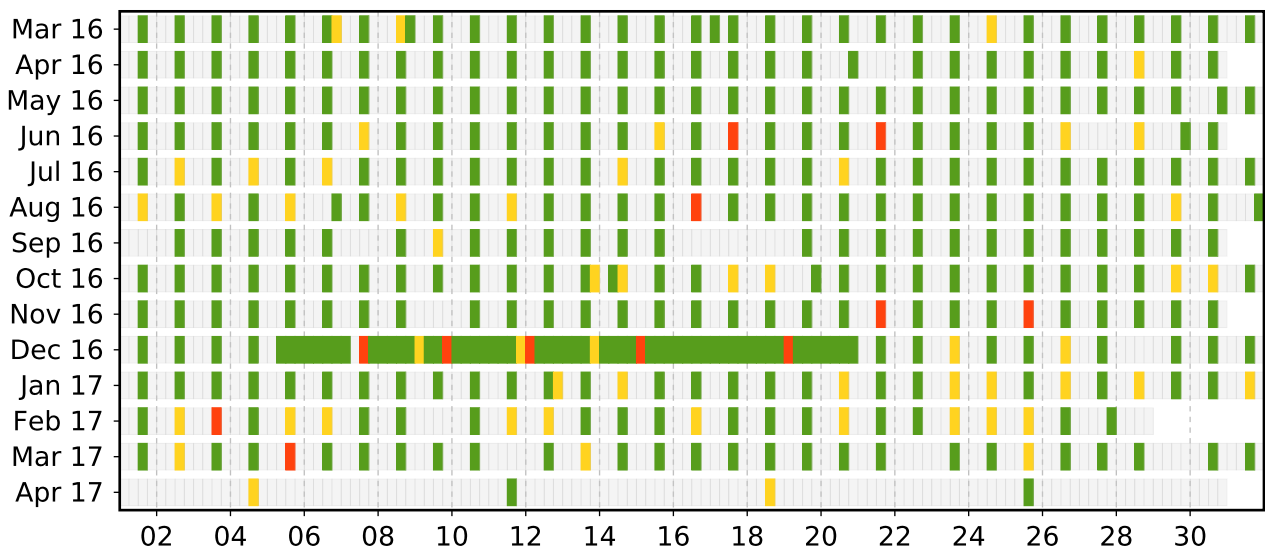
3.4 Data quality of current GRUAN data products

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

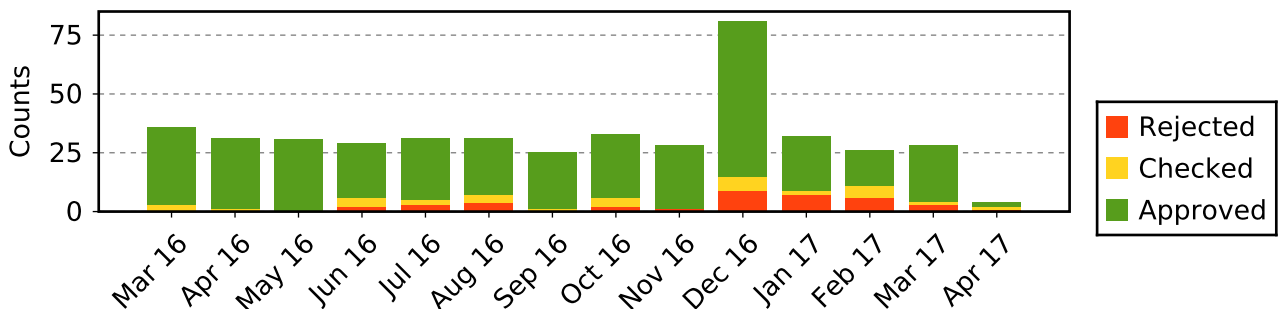
3.4.1 Stream: RS92 (Product: RS92-GDP-002)

Mar 16	36	33	3				2	1	7
Apr 16	31	30	1				1		1
May 16	31	31							
Jun 16	29	23	4	2			4		2
Jul 16	31	26	2	3			5		1
Aug 16	31	24	3	4			6		1
Sep 16	25	24	1				1		4
Oct 16	33	27	4	2			6		3
Nov 16	28	27		1					10
Dec 16	81	66	6	9			6		28
Jan 17	32	23	2	7			8		7
Feb 17	26	15	5	6			10		11
Mar 17	28	24	1	3			3		4
Apr 17	4	2	1	1			2		
Total	446	375	33	38			54	1	79

Schedule data quality of stream RS92



Data quality statistic of stream RS92



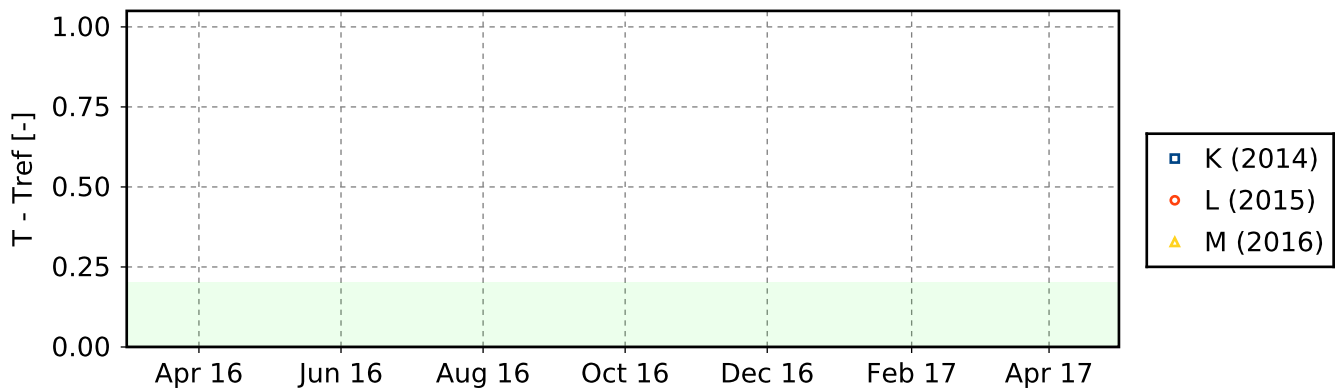
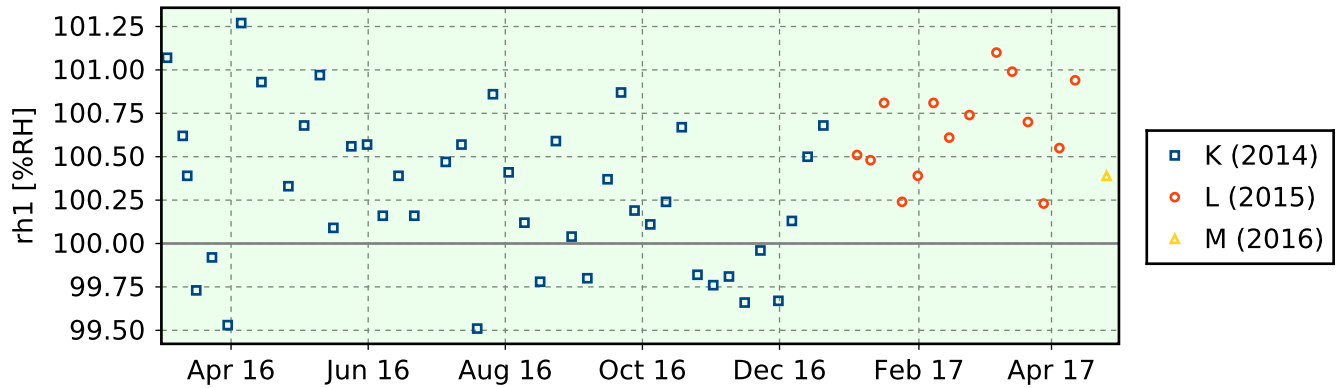
3.5 Instrument combinations of NYA-RS-01

Count	Instrument combination
7	CFH, ECC, RS92
4	ECC, RS41
1	2x ECC, RS41, RS92
79	ECC, RS92
21	RS41
61	RS41, RS92
304	RS92

3.6 Instrument ground check

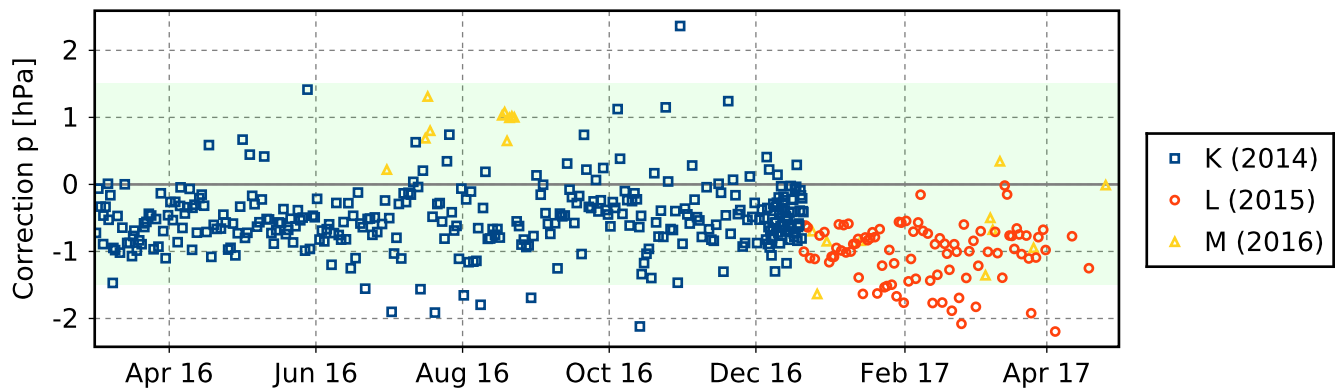
3.6.1 Stream: RS41

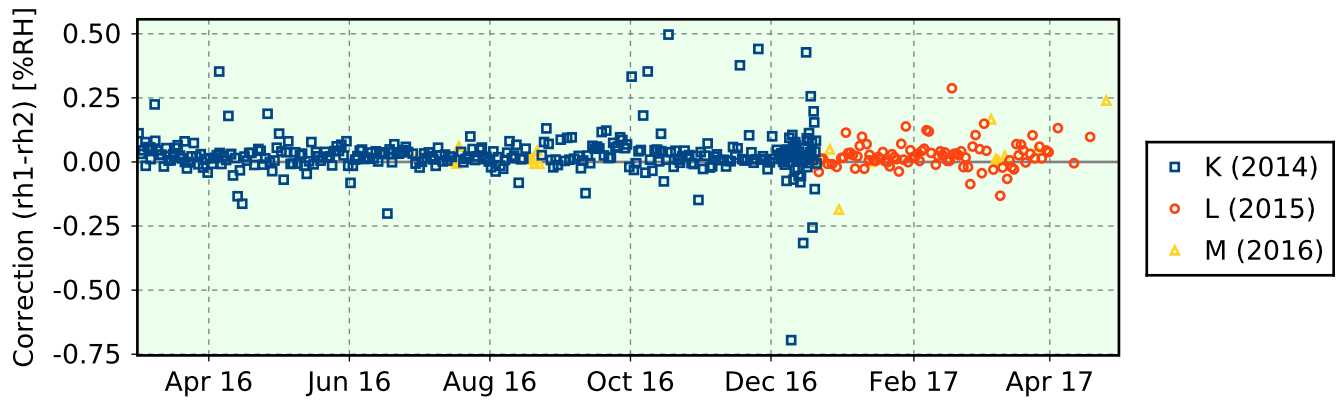
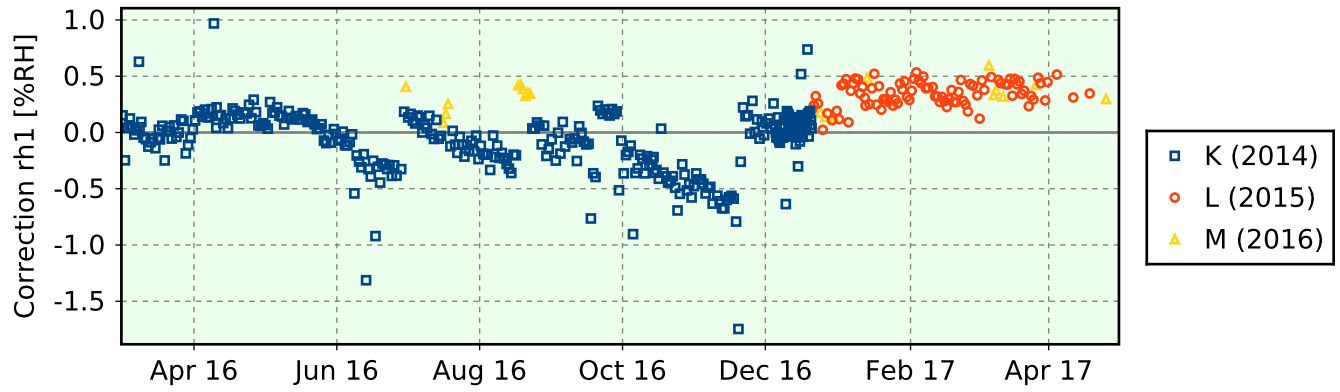
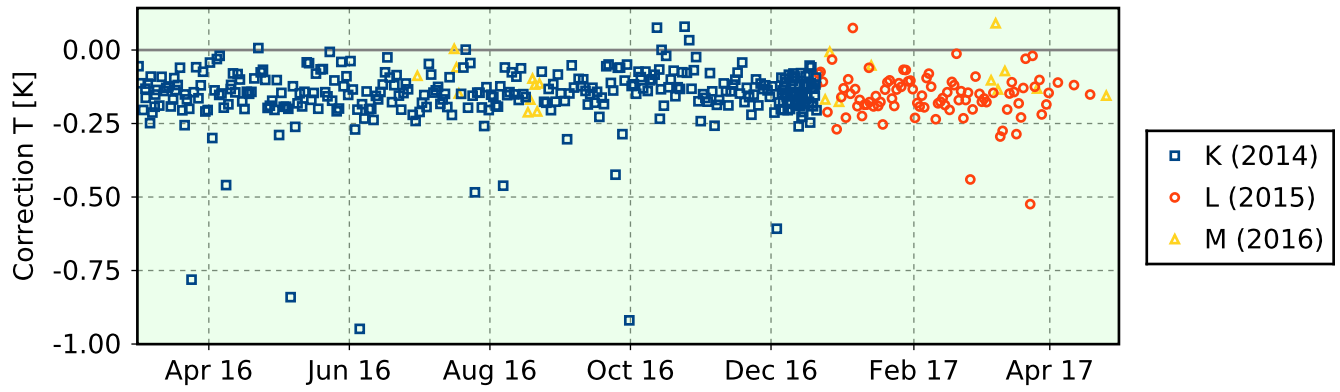
3.6.1.1 GroundCheck: SHC



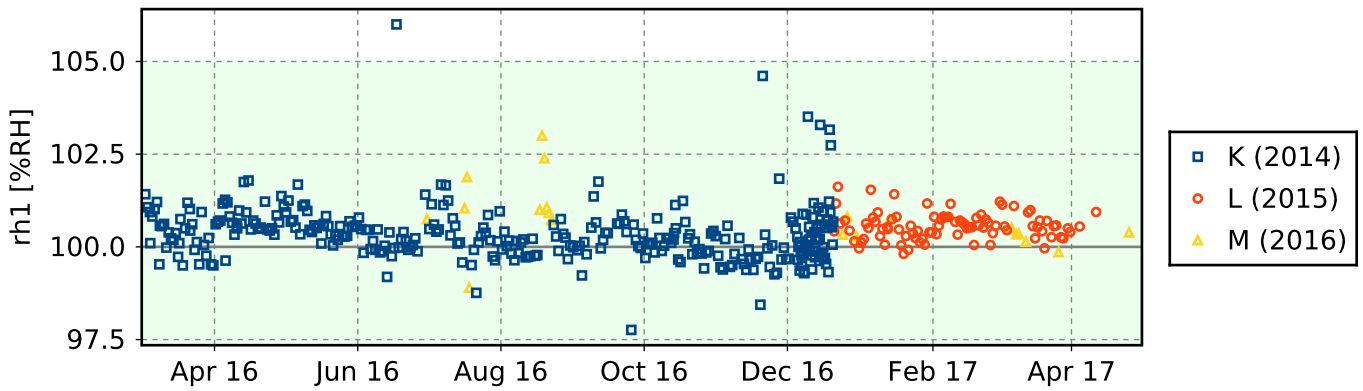
3.6.1 Stream: RS92

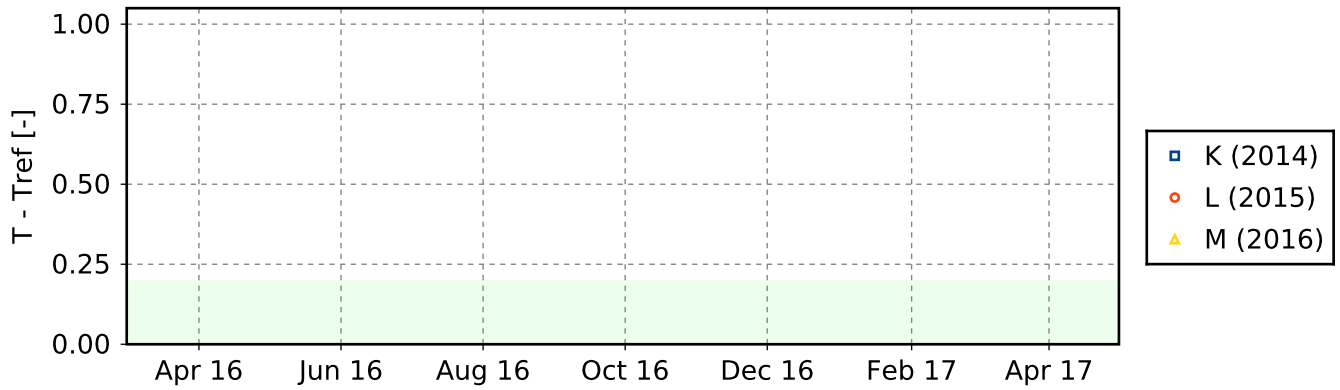
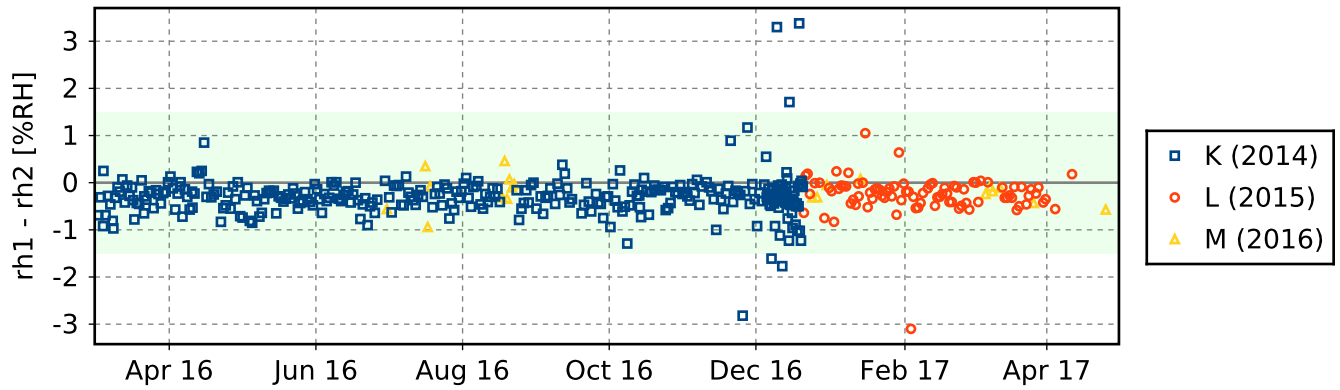
3.6.1.1 GroundCheck: GC25





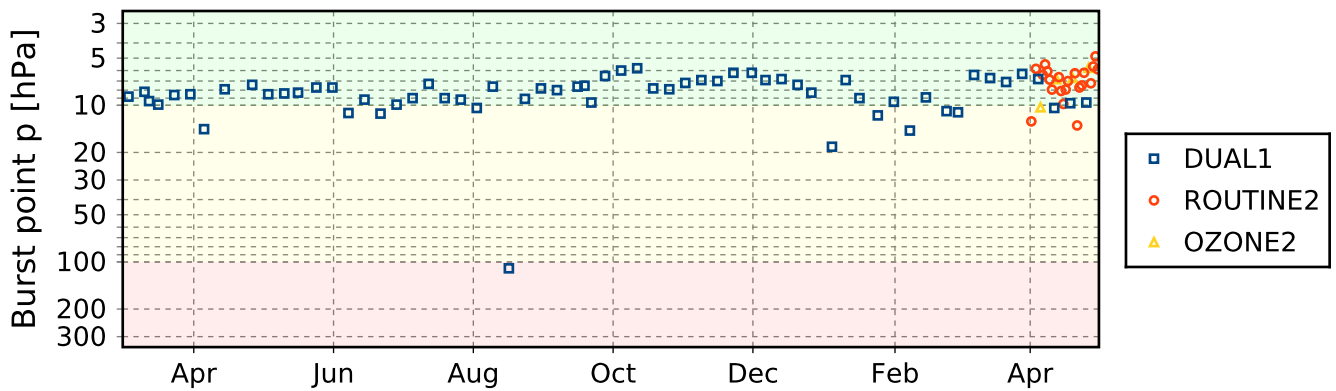
3.6.1.2 GroundCheck: SHC





3.7 Measurement events

3.7.1 Stream: RS41



3.7.1 Stream: RS92

