APPENDIX A: PROOF OF PERFORMANCE (POP) FORMS

SECTION A1: STATION INFORMATION

Station name	CARE
Reference town	EGBERT, ONTARIO
Station latitude	44° 14' 0.3294" N
Station longitude	-79° 46' 45.3282" W
Station elevation in metres	251

A Site Layout is required indicating the location of SPICE references and all instruments, including distances and the direction of the prevailing winter winds.

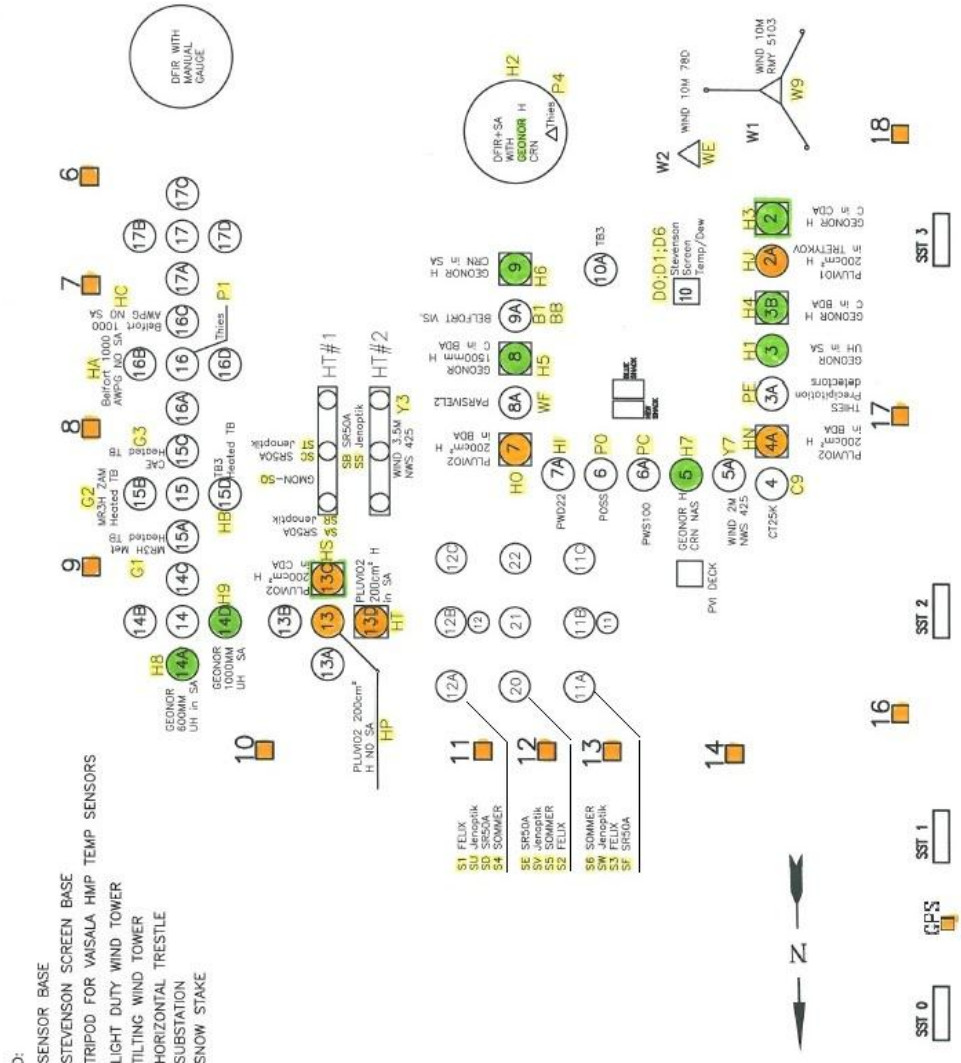
The CARE site layout and photos of the overall site installation are included below.

The direction of the prevailing winter winds is NW.

Track changes record:

Issuing date	**Report version**	**Author**	**Comments** (what has changed from the previous version)
Oct 29, 2013	V0	Amal Samanter	Original version
Jun 03, 2014	V1	Lillian Yao	1. Added the following sensors & info to the report: - New CARE site layout - Pluvio² Precipitation Gauges (HO, HP, HS) - Vaisala Ceilometer CT25K (C9) - Felix Snow Depth sensors (S1, S2, S3) - SR50A Snow Depth sensors (SD, SE, SF) - Sommer Snow Depth sensors (S4, S5, S6) - Jenoptik Snow Depth sensors (SU, SV, SW) - Thies Precipitation monitor (P4) - Thies Precipitation detector (PE) - Data plots of sensors newly added to report 2. Updated content of the sensors below: - Pluvio2 Precipitation Gauges (HT, HN) - Rain Gauge PMB25R (G3) - TB TBH,TBH-LP (GB) - TB MR3H-FC (G1) - YSI44212 (D0) - Vaisala HMP155 (D6) - PTB220 barometer (PT) - NWS425 Wind sensor (Y4, Y7) - Precipitation Occurrence Detector POSS (P0, PA) - Rosemount Ice Detector (N6, NG) - SR50A at HT#1 (SA, SB, SC) - Instrument Data validation table
Jul 11, 2014	V2	Lillian Yao	Removed contents related to Rosemount Ice Detector (N6, NG)
Jul 22, 2014	V3	Lillian Yao	Correction: - Changed “Data sampling frequency” value related to G1, G2, and GB from “6 sec” to “1 minute”. - Changed Belfort visibility sensor model # Reduced the document size by 70%

Site layout


LEGEND:
SENSOR BASE
STEVENSON SCREEN BASE
TRIPOD FOR VAISALA HMP TEMP SENSORS
W1 LIGHT DUTY WIND TOWER
W2 TILTING WIND TOWER
HT HORIZONTAL TRESTLE
SST SUBSTATION
SNOW STAKE
HT#1
HT#2
DFIR WITH MANUAL GAUGE
DFIR+SA WITH GEONOR
WIND 10M 78D
WIND 10M RMY 5103
THIES Precipitation detectors
GPS
N

Site installation photos (1 of 4)

From North:

Site installation photos (2 of 4)

From East:

Site installation photos (3 of 4)

From South:

Site installation photos (4 of 4)

From West:

SECTION A2: SPICE FIELD WORKING REFERENCE SYSTEM CONFIGURATION

Field Reference Type R1 (Manual)

Measurement frequency, planned	The manual gauge is read twice per day, nominally at 0800 and 1600 local time, 7 days per week.
Measurement methodology planned (volume, weight, etc)	A Tretyakov Gauge consists of two parts: 1) a wind shield and 2) a collector located inside the wind shield. The weather observer is provided with two collectors (and on them is written either Number 1 or Number 2). Once daily, the collector is removed from its base within the DFIR. The empty collector is set quickly onto the base. If the collector is empty, Zero is written as the amount of liquid precipitation recorded for the relevant measuring time period. If any snow is adhering to the outside of the collector, it is removed. All snow that is on top of the gauge is left alone (even if is above the rim height). If the collector is not empty go to the location where the weighing scale is located. Before measuring, wait for a minute and wipe the outside of the cup with a cloth. Place the Collector onto the weighing scale, and record the measurement (in grams to 2 decimal places) and the time of measurement, the time when the collector was removed and which collector is used. Once this is done, all the snow is evacuated from the collector, the insides are cleaned with a cloth to remove moisture, and the collector is left inside the shed so as to be used again when the next SWE measurement is performed.

Additional information required: Provide details of the planned measurement procedure.

Configuration of the DFIR fence

Description of surrounding obstacles (including distance/direction from, height, and type)	Distance between the outer DFIR fence and Yankee hot plate is 8 meters. Please refer to site layout.
Diameter (Outer Fence)	12 m

Height of the outer fence (measured at the top)	3.5 m
Height of the inner fence (measured at the top)	3m
Length of slats	1.5 m (4 ' 11")
Width of slats	2 5/8" (Spacing 2 5/8 ")
Slat material	Pressure Treated wood

Collector and shield specifications

Model	N/A
Inlet area	200 cm^2
Installation height (measured at the top of the collector)	3 m
Number of collectors available for the experiment	2
Shield type	Tretyakov Shield

Photo of installation – DFIR shield

Photo of installation – manual collector in Tretyakov shield

Field Reference Type R2 (Automatic)

Configuration of the DFIR fence

Description of surrounding obstacles (including distance/direction from, height, and type)	Distance between 2 DFIRs (R1 and R2) is 22m (73 ft). Please refer to site layout.
Diameter	12 m
Height of the outer fence (measured at the top)	3.5 m
Height of the inner fence (measured at the top)	3 m
Length of slats	1.5 m (4 ' 11")
Width of slats	2 5/8" (Spacing 2 5/8 ")
Slat material	Pressure Treated wood

Single Alter shield

According to the SPICE instructions?	☒ Yes ☐ No
Attached to the post of the weighing gauge?	☐ Yes ☒ No
If different, provide details:	

Weighing gauge (WG)

Instrument owner/provider	Site
Make and model	Geonor T-200B3, 600 mm
Serial number	North Transducer: 19705 South East Transducer: 42405 South West Transducer: 22805

Firmware version (if applicable)	N/A
Number of transducers (if applicable)	3
Height of installation (measured from the top of the gauge)	3 m
Heater configuration and algorithm	**Heater Location** Two Minco, Model HR23937 heaters are fixed to the Geonor orifice in the following locations: • Outside of orifice cylinder at top • Outside of orifice cylinder at bottom (inside housing) **Temperature Measurement** The ambient temperature is measured using a YSI44212 temperature sensor mounted near the Geonor gauge. The rim temperature is monitored at the top of the Geonor orifice using a YSI44003 thermistor. The temperature is monitored at the bottom of the Geonor orifice for information purposes only (note: this bottom thermistor is not required for CRN heating). **Heating Control** The heating status of the both heaters is controlled using the ambient temperature and upper rim temperature. The heating turns on when the ambient temperature is within -5 °C to +5 °C and the upper rim temperature is below +2 °C. Heating 'ON': IF {-5 °C <= ambient temperature <= +5 °C} AND {upper rim temperature <= +2 °C} Heating activation range (ambient temperature): -5 °C to +5 °C Rim set temperature: +2 °C **Heating Power** Both heaters are powered in parallel using a DC power supply. • Power supply: 12VDC • Heater resistance: ~5.1 Ω (each heater) • Heater power: ~28.2 W (each heater)
Output data message format	[Logger time][STIN][Precipitation Cumulative 1] [Frequency Transducer 1][Precipitation Cumulative 2][Frequency Transducer 2] [Precipitation

	Cumulative 3][Frequency Transducer 3][RimUpperTemp][RimLowerTemp][Air Temp][UpperHeaterOn][LowerHeaterOn] [LoggerBatteryVolt][LoggerTemp]
Frequency of data sampling	6 sec (pulse counting: 250 pulses/6sec)

Precipitation detector

Instrument owner/provider	Site
Make and model	Vaisala DRD11A
Serial number	C49248
Output data message format	[Logger time][STIN][DRD][Precipitation][DRD Percent]
Data sampling frequency	6 sec
Height of installation (at or above gauge height to avoid measuring blowing snow)	1.5 m
Location of installation relative to WG in reference system. Close proximity (without obstructing flow) is desired, but central location also possible. IOC recommended installation outside the wind shield, depending on specific configuration employed.	Installed on Base 3. Please refer to site layout.

Photo of installation – DFIR shield

Photo of installation – Geonor gauge in single-Alter shield

Photo of installation – precipitation detector

Field Reference Type R3 (Automatic)

Presence of a WG with a single Alter shield?	☒ Yes ☐ No
Presence of a WG with no shield?	☒ Yes ☐ No
Description of surrounding obstacles (including distance/direction from, height, and type)	5 meters from adjacent bases/instruments.
Distance between WGs (as close as possible, but exceeding minimum distance between gauges for a Class 1 siting configuration (as per WMO guidelines): Generally a flat area within 10m of instrument. This area surrounded by generally open space with a slope of less than 1:3 (19°) that is considered to be representative of the large scale area.	10 m

Weighing gauge (1 of 2)

Instrument owner/provider	Site
Make and model	Geonor T-200B3, 600 mm (Single Alter)
Serial number	North Transducer: 73109 South East Transducer: 73009 South West Transducer: 73209
Firmware version (if applicable)	N/A
Number of transducers (if applicable)	3
Location on site	Base 9 (refer to site layout)
Prefix	H6
Height of installation (measured from the top of the gauge)	2 m
Heater configuration and algorithm	**Heater Location**

	Two Minco, Model HR23937 heaters are fixed to the Geonor orifice in the following locations: • Outside of orifice cylinder at top • Outside of orifice cylinder at bottom (inside housing) **Temperature Measurement** The ambient temperature is measured using a YSI44212 temperature sensor mounted near the Geonor gauge. The rim temperature is monitored at the top of the Geonor orifice using a YSI44003 thermistor. The temperature is monitored at the bottom of the Geonor orifice for information purposes only (note: this bottom thermistor is not required for CRN heating). **Heating Control** The heating status of the both heaters is controlled using the ambient temperature and upper rim temperature. The heating turns on when the ambient temperature is within -5 °C to +5 °C and the upper rim temperature is below +2 °C. Heating 'ON': IF {-5 °C <= ambient temperature <= +5 °C} AND {upper rim temperature <= +2 °C} Heating activation range (ambient temperature): -5 °C to +5 °C Rim set temperature: +2 °C **Heating Power** Both heaters are powered in parallel using a DC power supply. • Power supply: 12VDC • Heater resistance: ~5.1 Ω (each heater) • Heater power: ~28.2 W (each heater)
Output data message format	[Logger time][STIN][Precipitation Cumulative 1] [Frequency Transducer 1][Precipitation Cumulative 2][Frequency Transducer 2] [Precipitation Cumulative 3][Frequency Transducer 3][RimUpperTemp][RimLowerTemp][Air Temp][UpperHeaterOn][LowerHeaterOn] [LoggerBatteryVolt][LoggerTemp]
Frequency of data sampling	6 sec (pulse counting: 250 pulses/6sec)

Weighing gauge (2 of 2)

Instrument owner/provider	Site
Make and model	Geonor T-200B3, 600 mm (No Shield)
Serial number	North Transducer: 76609 South East Transducer: 76709 South West Transducer: 76809
Firmware version (if applicable)	N/A
Number of transducers (if applicable)	3
Location on site	Base 5 (refer to site layout)
Prefix	H7
Height of installation (measured from the top of the gauge)	2 m
Heater configuration and algorithm	**Heater Location** Two Minco, Model HR23937 heaters are fixed to the Geonor orifice in the following locations: • Outside of orifice cylinder at top • Outside of orifice cylinder at bottom (inside housing) **Temperature Measurement** The ambient temperature is measured using a YSI44212 temperature sensor mounted near the Geonor gauge. The rim temperature is monitored at the top of the Geonor orifice using a YSI44003 thermistor as shown in Figure 6. The temperature is monitored at the bottom of the Geonor orifice for information purposes only (note: this bottom thermistor is not required for CRN heating). **Heating Control** The heating status of the both heaters is controlled using the ambient temperature and upper rim temperature. The heating turns on when the ambient temperature is within -5 °C to +5 °C and the upper rim temperature is below +2 °C. Heating 'ON': IF {-5 °C <= ambient temperature <= +5 °C} AND {upper rim temperature <= +2 °C} Heating activation range (ambient temperature): -5 °C to +5 °C

	Rim set temperature: +2 °C **Heating Power** Both heaters are powered in parallel using a DC power supply. • Power supply: 12VDC • Heater resistance: ~5.1 Ω (each heater) • Heater power: ~28.2 W (each heater)
Output data message format	[Logger time][STIN][Precipitation Cumulative 1][Frequency Transducer 1][Precipitation Cumulative 2][Frequency Transducer 2][Precipitation Cumulative 3][Frequency Transducer 3][RimUpperTemp][RimLowerTemp][Air Temp][UpperHeaterOn][LowerHeaterOn] [LoggerBatteryVolt][LoggerTemp]
Frequency of data sampling	6 sec (pulse counting: 250 pulses/6sec)

Single Alter shield

According to the SPICE instructions?	☒ Yes ☐ No
Attached to the post of the weighing gauge?	☒ Yes ☐ No
If different, provide details:	

Precipitation detector

Instrument owner/provider	Site
Make and model	Vaisala DRD11A
Serial Number	C49248
Data output format	[Logger time][STIN][DRD][Precipitation][DRD

	Percent]
Data sampling frequency	6 sec
Height of installation (at or above gauge height to avoid measuring blowing snow)	1.5 m
Location of installation relative to WGs in reference system. Close proximity (without obstructing flow) is desired, but central location also possible. IOC recommended installation outside the wind shield, depending on specific configuration employed.	Installed on Base 3 (refer to site layout.)

Photo of installation – shielded gauge (single-Alter)

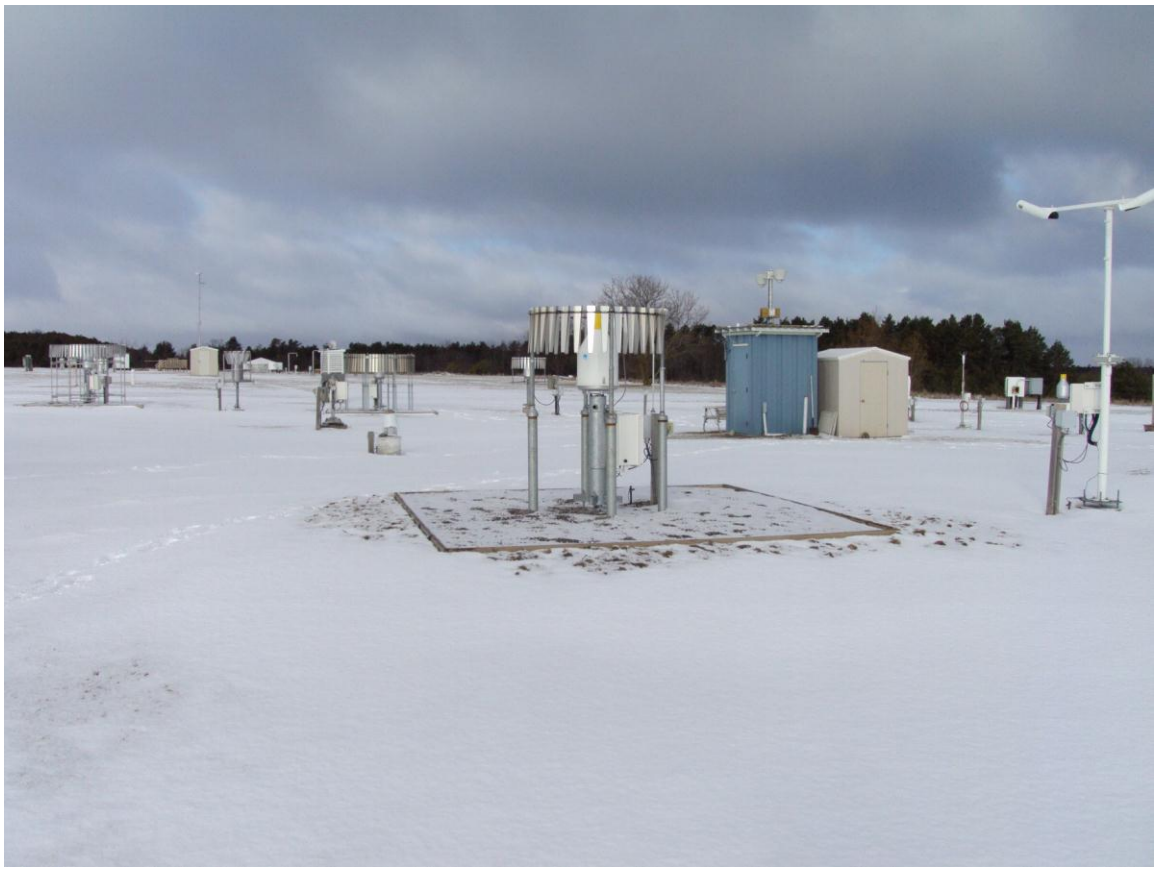


Photo taken from E

Photo of installation – unshielded gauge:

Photo taken from S

Field Reference for the Measurement of Snow on the Ground

Method used	Manual Readings
Equipment used	Wooden Stakes
Frequency of measurement	Daily

SECTION A3: INSTRUMENT METADATA REPORT

For each instrument under test and each instrument used to provide ancillary measurements, an Instrument Metadata Report should be completed in full and submitted as part of the POP Report.

Instrument Metadata Report

Instrument Name: __Pluvio²_____
Instrument number ___1___ of ___5___

Manufacturer	OTT
Instrument provider/owner	OTT
Model	Pluvio², 200 cm², 1500 mm
Serial number	297319
Firmware version (if applicable)	V1.30.1
File Prefix	HT

Field configuration

Location on site	Base 13D (Please refer to Layout)
Orientation	N/A
Height (measured at top)	2 m
Shield (if applicable)	Single-Alter
Heating (if applicable)	**Heater Location** Heating is applied to the rim. **Temperature Measurement** The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors. **Heating Control** The heating is controlled by the load cell temperature and rim temperature. The heating turns on when the load cell temperature is within -40 °C to +8 °C and the rim temperature is below +2 °C. The heating power is variable within the active range to achieve the desired rim set temperature. The heating power is determined by

	the load cell temperature and rim temperature with greatest heating power supplied for low load cell temperatures. Heating 'ON': IF {-40 °C <= load cell temperature <= +8 °C} AND {rim temperature <= +2 °C} Heating activation range (load cell temperature): -40 °C to +8 °C Rim set temperature: +2 °C **Heating Power** The rim heater is powered using a separate OTT 24VDC power supply. The heating power is determined by the load cell temperature and the rim temperature. The maximum rim heating power is approximately 53 Watts. • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)

Data output

Data communication protocol	Digital Output
Output data message format (include description of fields)	[Logger time] [STIN] [Prec Intensity RT] [Prec Accumulation] [Prec Accumulation NRT] [Prec Accum Total NRT] [Bucket Amount RT] [Bucket Amt NRT] [Load Temperature] [Heating status] [Status]
Data sampling frequency	6 sec

Photo of installation – Pluvio² (1 of 5)

Photo taken from N

Instrument Metadata Report

Instrument Name: ___Pluvio² _____
Instrument number ___2___ of ___5___

Manufacturer	OTT
Instrument provider/owner	OTT
Model	Pluvio², 200 cm², 1500 mm
Serial number	291314
Firmware version (if applicable)	V1.30.1
Prefix	HN

Field configuration

Location on site	Base 4 A (See layout)
Orientation	N/A
Height (measured at top)	2 m
Shield (if applicable)	Belfort double-Alter
Heating (if applicable)	**Heater Location** Heating is applied to the rim. **Temperature Measurement** The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors. **Heating Control** The heating is controlled by the load cell temperature and rim temperature. The heating turns on when the load cell temperature is within -40 °C to +8 °C and the rim temperature is below +2 °C. The heating power is variable within the active range to achieve the desired rim set temperature. The heating power is determined by the load cell temperature and rim temperature with greatest heating power supplied for low load cell temperatures. Heating 'ON': IF {-40 °C <= load cell temperature <= +8 °C} AND {rim temperature <= +2 °C} Heating activation range (load cell temperature): -40 °C to +8 °C

	Rim set temperature: +2 °C **Heating Power** The rim heater is powered using a separate OTT 24VDC power supply. The heating power is determined by the load cell temperature and the rim temperature. The maximum rim heating power is approximately 53 Watts. • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)

Data output

Data communication protocol	Digital Output
Output data message format (include description of fields)	[Logger time] [STIN] [Prec Intensity RT] [Prec Accumulation] [Prec Accumulation NRT] [Prec Accum Total NRT] [Bucket Amount RT] [Bucket Amt NRT] [Load Temperature] [Heating status] [Status]
Data sampling frequency	6 sec

Photo of installation – Pluvio² (2 of 5)

Photo taken from N

Instrument Metadata Report

Instrument Name:: _____Pluvio²_____
Instrument number: ___3____ of ____5____

Manufacturer	OTT
Instrument provider/owner	OTT
Model	Pluvio², 200 cm², 1500 mm
Serial number	291315
Firmware version (if applicable)	V1.30.1
File Prefix	HO

Field configuration

Location on site	Base 7 (Please refer to Layout)
Orientation	N/A
Height (measured at top)	2 m
Shield (if applicable)	Belfort Double Alter
Heating (if applicable)	**Heater Location** Heating is applied to the rim. **Temperature Measurement** The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors. **Heating Control** The heating is controlled by the load cell temperature and rim temperature. The heating turns on when the load cell temperature is within -40 °C to +8 °C and the rim temperature is below +2 °C. The heating power is variable within the active range to achieve the desired rim set temperature. The heating power is determined by the load cell temperature and rim temperature with greatest heating power supplied for low load cell temperatures. Heating 'ON': IF {-40 °C <= load cell temperature <= +8 °C} AND {rim temperature <= +2 °C} Heating activation range (load cell temperature): -40 °C to +8 °C

	Rim set temperature: +2 °C **Heating Power** The rim heater is powered using a separate OTT 24VDC power supply. The heating power is determined by the load cell temperature and the rim temperature. The maximum rim heating power is approximately 53 Watts. • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)

Data output

Data communication protocol	Digital Output
Output data message format (include description of fields)	[Logger time] [STIN] [Prec Intensity RT] [Prec Accumulation] [Prec Accumulation NRT] [Prec Accum Total NRT] [Bucket Amount RT] [Bucket Amt NRT] [Load Temperature] [Heating status] [Status]
Data sampling frequency	6 sec

Photo of Installation – Pluvio² (3 of 5)

Photo taken from NE

Instrument Metadata Report

Instrument Name: ___Pluvio²_____
Instrument number: ___4 ___of __5___

Manufacturer	OTT
Instrument provider/owner	OTT
Model	Pluvio², 200 cm², 1500 mm
Serial number	296130
Firmware version (if applicable)	V1.30.1
File Prefix	HP

Field configuration

Location on site	Base 13 (Please refer to Layout)
Orientation	N/A
Height (measured at top)	2 m
Shield (if applicable)	No Shield
Heating (if applicable)	**Heater Location** Heating is applied to the rim. **Temperature Measurement** The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors. **Heating Control** The heating is controlled by the load cell temperature and rim temperature. The heating turns on when the load cell temperature is within -40 °C to +8 °C and the rim temperature is below +2 °C. The heating power is variable within the active range to achieve the desired rim set temperature. The heating power is determined by the load cell temperature and rim temperature with greatest heating power supplied for low load cell temperatures. Heating 'ON': IF {-40 °C <= load cell temperature <= +8 °C} AND {rim temperature <= +2 °C} Heating activation range (load cell temperature): -40 °C to +8 °C

	Rim set temperature: +2 °C **Heating Power** The rim heater is powered using a separate OTT 24VDC power supply. The heating power is determined by the load cell temperature and the rim temperature. The maximum rim heating power is approximately 53 Watts. • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)

Data output

Data communication protocol	Digital Output
Output data message format (include description of fields)	[Logger time] [STIN] [Prec Intensity RT] [Prec Accumulation] [Prec Accumulation NRT] [Prec Accum Total NRT] [Bucket Amount RT] [Bucket Amt NRT] [Load Temperature] [Heating status] [Status]
Data sampling frequency	6 sec

Photo of Installation - Pluvio² (4 of 5)

Photo taken from S

Instrument Metadata Report

Instrument Name: _____Pluvio²_____
Instrument number ___5___ of ___5___

Manufacturer	OTT
Instrument provider/owner	OTT
Model	Pluvio², 200 cm², 1500 mm
Serial number	297318
Firmware version (if applicable)	V1.30.1
File Prefix	HS

Field configuration

Location on site	Base 13C (Please refer to Layout)
Orientation	N/A
Height (measured at top)	2 m
Shield (if applicable)	Double Alter
Heating (if applicable)	**Heater Location** Heating is applied to the rim. **Temperature Measurement** The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors. **Heating Control** The heating is controlled by the load cell temperature and rim temperature. The heating turns on when the load cell temperature is within -40 °C to +8 °C and the rim temperature is below +2 °C. The heating power is variable within the active range to achieve the desired rim set temperature. The heating power is determined by the load cell temperature and rim temperature with greatest heating power supplied for low load cell temperatures. Heating 'ON': IF {-40 °C <= load cell temperature <= +8 °C} AND

	{rim temperature <= +2 °C} Heating activation range (load cell temperature): -40 °C to +8 °C Rim set temperature: +2 °C **Heating Power** The rim heater is powered using a separate OTT 24VDC power supply. The heating power is determined by the load cell temperature and the rim temperature. The maximum rim heating power is approximately 53 Watts. • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)

Data output

Data communication protocol	Digital Output
Output data message format (include description of fields)	[Logger time] [STIN] [Prec Intensity RT] [Prec Accumulation] [Prec Accumulation NRT] [Prec Accum Total NRT] [Bucket Amount RT] [Bucket Amt NRT] [Load Temperature] [Heating status] [Status]
Data sampling frequency	6 sec

Photo of Installation - Pluvio² (5 of 5)

Photo taken from SE

Instrument Metadata Report

Instrument Name: ___ Rain Gauge PMB25R_____
Instrument number ___1____ of ___1___

Parameter measured	Precipitation Rate, Accumulation
Instrument provider/owner	CAE S.P.A
Manufacturer	CAE S.P.A
Model	PMB25R
Serial number	38041/38852
Firmware version (if applicable)	Not Available
File prefix	G3

Field configuration

Location on site	Base 15C
Orientation	N/A
Height (measured at top)	1.5 m
Shield (if applicable)	None
Heating (if applicable)	**Heating Algorithm** The PMB25R has a microcontroller ARM9 that manages the three heating zones (Funnel, Top Ring, Bucket) independently. The rain gauge maintains the temperature of the funnel and top ring to 2 degrees above zero. Top ring is heated by 110 W (Temperature < 2 °C) Funnel is heated by 150 W(Temperature < 2 °C) Bucket is heated by 40 W Total maximum heating power is 300 W.

Data output

Data communication protocol	RS485
Output data message format (include description of fields)	[Logger Time] [STIN] [UTC day (dd)

	[UTC month (mm)] [UTC year (yy)] [UTC time (hhmmss)] [UTC time zone offset (not used)] [Cumulative Measurement ID] [Cumulative Rainfall] [UTC day (dd) 2] [UTC month (mm) 2] [UTC year (yyyy) 2] [UTC time (hhmmss) 2] [UTC time zone offset (not used) 2] [Intensity Measurement ID] [Rain Intensity] [UTC day (dd) 3] [UTC month (mm) 3] [UTC year (yyyy) 3] [UTC time (hhmmss) 3] [UTC time zone offset (not used) 3] [Diagnostic Value Measurement ID] [Heater controller lock] [Heater Power (24VAC)] [Funnel Heater Temperature Option] [Funnel Heater Current Option] [Ring Heater Temperature Option] [Ring Heater Current Option] [Minimum Consumption Option] [Maximum Consumption Option] [Heater Power Voltage (VAC)] [Funnel Heater Temperature] [Funnel Heater Current] [Ring Heater Temperature] [Ring Heater Current] [Minimum Consumption] [Maximum Consumption] [Checksum]
Data sampling frequency	1 minute.

Photo of installation - Rain Gauge PMB25R

Photo taken from W

Instrument Metadata Report

Instrument Name: ___Heated Tipping Bucket TBH/TBH-LP_____
Instrument number ___1____ of ___1___

Parameter measured	Precipitation Rate
Instrument provider/owner	Hydrological Services America
Manufacturer	Hydrological Services America
Model	TBH/TBH-LP
Serial number	12-393
Firmware version (if applicable)	N/A
File Prefix	GB

Field configuration

Location on site	Base 15D (Please refer to layout)
Orientation	n/a
Height (measured at top)	1.5 m
Shield (if applicable)	None
Heating (if applicable)	**Heating Algorithm** When ambient temperature sensor detects the temperature falling below +4°C, the system becomes "Active" and the snow sensor is enabled. When the snow sensor detects the snow for 5 seconds continuously, the heater element is turned on and the block temperature sensor is monitored. The heaters are controlled so that the temperature inside the funnel reaches the set point temperature +10°C. When snow is last detected, a timer is left running, to keep the heater cycling so that any snow built up on the funnel will be melted. The heater will cycle on and off for a Snow Run on time (factory pre-set to 18 minutes) or while ever snow is detected. The funnel and bucket are heated by 70 Watts.

Data output

Data communication protocol	**For the TB3:** Analogue Output - Pulse (Reed Relay) **For the TB Heater:** Data Protocol: SDI-12
Output data message format (include description of fields)	[Logger Time] [STIN] [Precipitation Rate] [Air Temperature] [Block Temperature] [Temperature Units] [Snow Detection] [Snow Sensor] [Heater Element] [Control Status] [Cycle Status] [Heating Time Left]
Data sampling frequency	1 minute

Photo of installation - Heated Tipping Bucket TBH/TBH-LP

Photo taken from N

Instrument Metadata Report

Instrument Name: ___MR3H-FC _____
Instrument number ____1____ of __ 2____

Parameter measured	Precipitation Rate
Instrument provider/owner	Meteoservis
Manufacturer	Meteoservis
Model	MR3H-FC
Serial number	1685
Firmware version (if applicable)	N/A
File prefix	G1

Field configuration

Location on site	Base 15A (Please refer to site layout)
Orientation	N/A
Height (measured at top)	1.5 m
Shield (if applicable)	None
Heating (if applicable)	**Heating Algorithm** **Section A** The temperature of the funnel (measured by 3 temperature sensors) is maintained at 13.5°C (± 2°C). **Section B** The temperature of the middle part of the funnel (measured by 3 sensors) is maintained at 8°C (± 2°C). **Section C** The temperature at the level of the tipping bucket is (measured by 1 sensor) is maintained at 14.5°C (± 2°C). **All Sections** The temperature sensor placed on the internal side of the rain gauge shell controls the heating of all three sections. If the Ambient temperature exceeds 19°C (± 2°C), the heating of all three sections are switched off.

	<u>AH01 Unit</u> The additional outflow heating unit is an independent unit and its temperature is maintained at 18°C (± 3°C). **Total heating power for Section A, B, C, AH-01 are is 555 W Max.**

Data output

Data communication protocol	Analogue Output: Pulse (Reed Relay)
Output data message format (include description of fields)	[Logger time] [STIN] [Preciptation Rate] Note: PrecipRate is in mm/hr
Data sampling frequency	1 minute

Photo of installation - MR3H-FC

Photo taken from W

Instrument Metadata Report

Instrument Name: ____MR3H-FC ZAMG_____
Instrument number ___2____ of ___2___

Parameter measured	Precipitation Rate
Instrument provider/owner	Zentralanstalt für meteorologie und geodynamik (ZAMG)
Manufacturer	Meteoservis
Model	MR3H-FC ZAMG
Serial number	856
Firmware version (if applicable)	Not Available
File prefix	G2

Field configuration

Location on site	Base 15B (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.5m
Shield (if applicable)	N/A
Heating (if applicable)	**Heating Algorithm** **Section A** The temperature of the funnel (measured by 3 temperature sensors) is maintained at 8.5°C (± 2°C). **Section B** The temperature of the middle part of the funnel (measured by 3 sensors) is maintained at 8°C (± 2°C). **Section C** The temperature at the level of the tipping bucket is (measured by 1 sensor) is maintained at 14.5°C (± 2°C). **All Sections** The temperature sensor placed on the internal side of the rain gauge shell controls the heating of all three sections. If the Ambient temperature exceeds 6°C (± 2°C), the heating of all three

	sections are switched off. **AH01 Unit** The additional outflow heating unit is an independent unit and its temperature is maintained at 18°C (± 3°C). **Total heating power for Section A, B, C, AH-01 are is 555 W Max.**

Data output

Data communication protocol	Analogue Output: Pulse (Reed Relay)
Output data message format (include description of fields)	[Logger time] [STIN] [Preciptation Rate] Note: PrecipRate is in mm/hr
Data sampling frequency	1 minute

Photo of installation - MR3H-FC ZAMG

Photo taken from N

Instrument Metadata Report

Instrument Name: ___Vaisala Laser Ceilometer___
Instrument number: ___1___ of ___1___

Parameter measured	Cloud height and vertical visibility
Manufacturer	Vaisala
Model	CT25K
Serial number	V09230
Firmware version (if applicable)	Not available
Prefix	C9

Field configuration

Location on site	Base 4 (Refer to site layout)
Orientation	N/A
Height (measured at top)	1 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	RS232
Output data message format (include description of fields)	[Logger Time] [STIN] [Detection Status] [Warnings and Alarm] [Lowest Cloud Base Height] [Second Lowest Cloud Base Height] [Highest Cloud Base Height] [Internal Status] [Parameter Scale] [Measurement Mode] [Laser Pulse Energy] [Laser Temperature] [Receiver Sensitivity] [Window Contamination] [Tilt Angle] [Background Light]

	[Measurement Parameters] [Detected Backscatter]
Data sampling frequency	1 minute

Photo of Installation - Vaisala Laser Ceilometer

Photo taken from SE

Instrument Metadata Report

Instrument Name: _____ Thies Laser Precipitation Monitor _____
Instrument number ___1___ of ___1___

Parameter measured	Precipitation rate, amount, particle size and velocity
Manufacturer	THIES Clima
Instrument provider/owner	THIES Clima
Model	5.4110_11_100
Serial number	12120007
Firmware version (if applicable)	Not available
File Prefix	P4

Field configuration

Location on site	Inside DFIR (Please refer to Layout)
Orientation	N/A
Height (measured at top)	2.25
Shield (if applicable)	N/A
Heating	N/A

Data output

Data communication protocol	RS422, connected to the datalogger
Output data message format (include description of fields)	[Logger time] [STIN] [Device Address] [Serial Number] [Software Version] [Date of the Sensor] [Time of the Sensor] [5 Min SYNOP Tab. 4677] [5 Min SYNOP Tab. 4680] [5 Min METAR Tab. 4678] [5 Min AVG Precip Rate] [1 Min SYNOP Tab. 4677] [1 Min SYNOP Tab. 4680] [1 Min METAR Tab. 4678] [1 Min AVG Total Precip Rate]

	[1 Min AVG Liq Precip Rate] [1 Min AVG Solid Precip Rate] [Precipitation Amount] [1 Min Visibility in Precip] [1 Min Radar Reflectivity] [Measuring Quality] [Maximum Diameter Hail] [Laser Status] [Signal Satus] [Laser Temp Status (AG)] [Laser Temp Status (DG)] [Laser Current Status (AG)] [Laser Current Status (DG)] [Sensor Supply Status] [Laser Head Heating Current Status] [Laser Rx Head Heating Current Status] [Temp Sensor Status] [Heating Supply Status] [Housing Heating Current Status] [Heads Heating Current Status] [Carriers Heating Current Status] [Output Laser PWR Control Status] [Reserve Status] [Interior Temp] [Laser Drive Temp] [Mean Laser Current] [Control Voltage] [Optical Control Output] [Voltage Sensor Supply] [Laser Head Heating Current] [Laser Rx Head Heating Current] [Ambient Temp] [Heating Voltage Supply] [Housing Heating Current] [Heads Heating Current] [Carriers Heating Current] [# of All Particles] [Internal Data AMP] [# of Particles speed < 0.15m/s] [Internal Data 0.15] [# of Particles speed > 20m/s] [Internal Data 20m/s] [# of Particles diameter < 0.15mm] [Internal Data 0.15mm] [# of Particles no Hydrometeor] [Total Vol No Hydrometeor] [# of Particles with Unknown Class] [Total Vol Unknown Class] [# of Particles Class 1] [Total Vol Class 1] [# of Particles Class 2] [Total Vol Class 2] [# of Particles Class 3] [Total Vol Class 3] [# of Particles Class 4]

	[Total Vol Class 4] [# of Particles Class 5] [Total Vol Class 5] [# of Particles Class 6] [Total Vol Class 6] [# of Particles Class 7] [Total Vol Class 7] [# of Particles Class 8] [Total Vol Class 8] [# of Particles Class 9] [Total Vol Class 9] [Size/Velocity Map] [Ambient Temp (EX)] [Rel. Humidity] [Wind Speed] [Wind Direction] [Checksum] [Comma]
Data sampling frequency	1 minute

Photo of Installation - Thies Laser Precipitation Monitor

Photo taken from SE

Instrument Metadata Report

Instrument Name: ___Thies Precipitation Detector___
Instrument number ___1___ of ___1___

Parameter measured	Precipitation rate and amount,
Manufacturer	THIES Clima
Instrument provider/owner	THIES Clima
Model	5.4103.20.041
Serial number	Four sensors: 10131526, 10131527, 10131531, 10131532
Firmware version (if applicable)	Not available
File Prefix	PE

Field configuration

Location on site	Base 3A (Please refer to Layout)
Orientation	N/A
Height (measured at top)	1 m, 2 m, 3 m, 4 m (height is different for sensors)
Shield (if applicable)	N/A
Heating	N/A

Data output

Data communication protocol	Analog current, 4 – 20 mA
Output data message format (include description of fields)	[Logger time] [STIN] [ID] [1 minute average at 1 meter (West)] [1 minute average at 2 meter (East)] [1 minute average at 3 meter (South)] [1 minute average at 4 meter (North)] [Maximum sample in last minute at 1 meter (West)] [Maximum sample in last minute at 2 meter (East)] [Maximum sample in last minute at 3 meter (South)] [Maximum sample in last minute at 4 meter (North)] [Minimum sample in last minute at 1 meter (West)] [Minimum sample in last minute at 2 meter (East)] [Minimum sample in last minute at 3 meter (South)] [Minimum sample in last minute at 4 meter (North)] [Precipitation Rate 1 minute at 1 m]

	[Precipitation Rate 1 minute at 2 m] [Precipitation Rate 1 minute at 3 m] [Precipitation Rate 1 minute at 4 m] [Heater control] [Datalogger Battery Voltage] [Logger Temperature]
Data sampling frequency	1 minute

Photo of installation - Thies Precipitation Detector

Photo taken from W

Instrument Metadata Report

Instrument Name: ____YSI44212_____
Instrument number ___1___ of ___1___

Parameter measured	Air temperature (Deg C)
Manufacturer	YSI
Model	YSI44212
Serial number	N/A
Firmware version (if applicable)	N/A
Prefix	D0

Field configuration

Location on site	Base 10 (Refer to site layout)
Orientation	The Stevenson screen door must face north.
Height (measured at top)	1.5m
Shield (if applicable)	Stevenson Screen; Ventilated.
Heating (if applicable)	N/A

Data output

Data communication protocol	Voltage output connected to the datalogger.
Output data message format (include description of fields)	[Logger Time] [STIN] [Temperature] [Temperature ID] [Temperature Status]
Data sampling frequency	30 seconds

Photo of installation – base, data logger, and Stevenson screen

Photo of installation – inside Stevenson screen

Instrument Metadata Report

Instrument Name: __Vaisala HUMICAP Humidity and Temperature Probe HMP155_____
Instrument number ___1___ of ___1___

Parameter measured	RH
Manufacturer	Vaisala
Model	HMP155
Serial number	F0930028
Firmware version (if applicable)	Not available
File prefix	D6

Field configuration

Location on site	Base 10 inside a Stevenson screen (refer to site layout)
Orientation	The Stevenson screen door must face north.
Height (measured at top)	1.5m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	Voltage output connected to the datalogger.
Output data message format (include description of fields)	[Logger Time] [STIN] [Temperature] [Relative Humidity]
Data sampling frequency	1 Minute

Photos of installation – same as above for YSI44212

Instrument Metadata Report

Instrument Name: _____PTB220 Digital Barometer_____
Instrument number ___1____ of ___1____

Parameter measured	Atmospheric Pressure
Manufacturer	Vaisala
Model	PTB220
Serial number	W0840023
Firmware version (if applicable)	Not Available
Prefix	PT

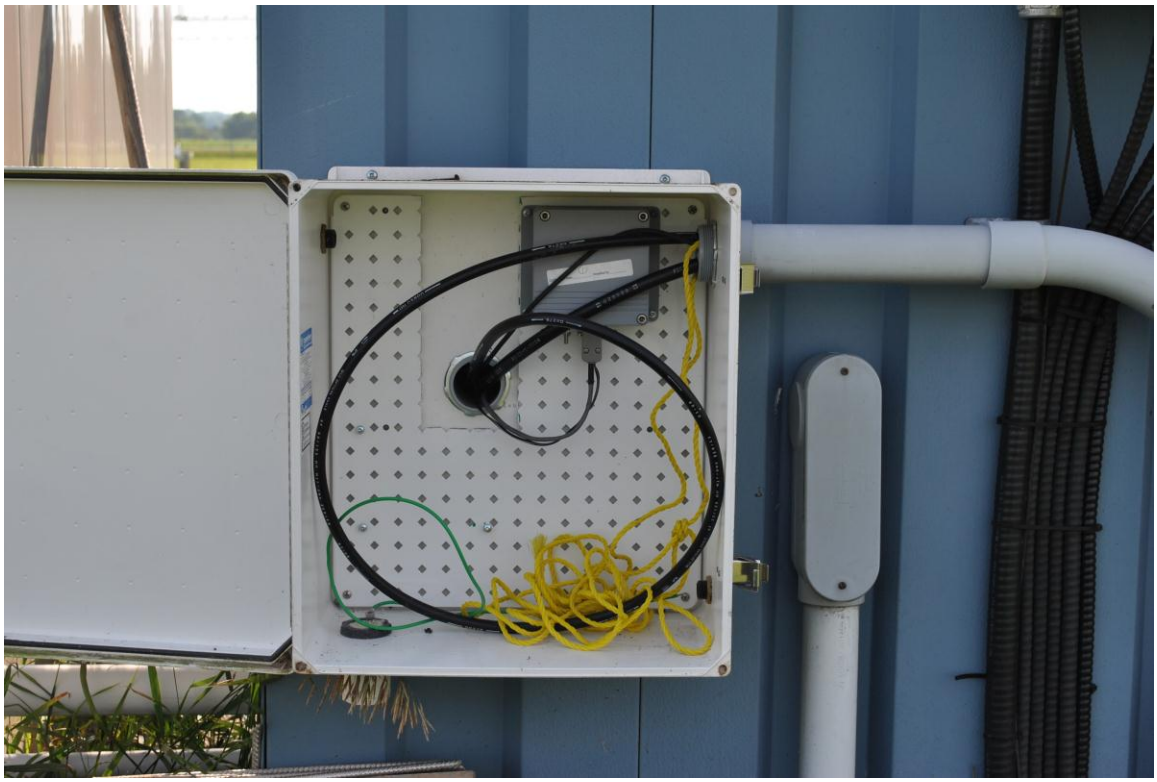
Field configuration

Location on site	In a box, outside of the blue shack on the west side.
Orientation	Horizontally or vertically using the mounting holes to mount the sensor.
Height (measured at top)	75 cm from the ground.
Shield (if applicable)	N/A.
Heating (if applicable)	N/A.

Data output

Data communication protocol	**Serial Digital Output:** RS-232
Output data message format (include description of fields)	[Logger Time] [STIN] [Transducer P1] [Transducer P2] [Transducer P3] [Average P]
Data sampling frequency	1 minute

Photo of installation - PTB220 Digital Barometer



Instrument Metadata Report

Instrument Name: _____R.M. Young Wind Monitor_____
Instrument number ____1___ of ___1___

Parameter measured	Wind Velocity and Direction
Manufacturer	RM Young
Model	5103
Serial number	WM66051
Firmware version (if applicable)	N/A
Prefix	W9

Field configuration

Location on site	Base W1 (Refer to site layout)
Orientation	Junction Box faces South
Height (measured at top)	10 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	Analog. DC Voltage output connected to the data logger.
Output data message format (include description of fields)	[Logger Time] [STIN] [Wind direction] [Wind Speed]
Data sampling frequency	6 seconds.

Photo of installation - R.M. Young Wind Monitor

Instrument Metadata Report

Instrument Name: ____Vaisala WINDCAP Ultrasonic Wind Sensor NWS425_____
Instrument number ___1____ of ___1___

Parameter measured	Wind Velocity and Direction
Manufacturer	Vaisala
Model	NWS425
Serial number	B1220013
Firmware version (if applicable)	Not available
Prefix	Y4, Y7

Field configuration

Location on site	Base 5A (Refer to site layout)
Orientation	The N-S transducer heads of the ultrasonic wind sensor are exactly in line with the True North and True South
Height (measured at top)	2m
Shield (if applicable)	N/A
Heating (if applicable)	The WL Command sets the heater function to be automatically controlled by the sensor. Enclosure and Transducer tubes are heated to 150Watts Max.

Data output

Data communication protocol	**Serial Digital Output:** RS-232
Output data message format (include description of fields)	Output data format Message divided into files. Y4, and Y7 **Y4** [Logger Time] [STIN] [Sensor ID] [Command ID] [Status]

	[Avg. Wind Direction] [Wind Direction] [Time Freq. Speed Direction] [Avg. Time Freq. Gust] [Avg. Wind Speed Knots] [Wind Gusts(Knots)][Knots] [Signal Quality] [Checksum] **Y7** [Logger Time] [STIN] [Wind Direction] [Wind Speed] [Wind Gust] [Nr. Of Samples]
Data sampling frequency	5 seconds (Y4), 1 Min (Y7)

Photo of installation - Vaisala WINDCAP Ultrasonic Wind Sensor NWS425

Instrument Metadata Report

Instrument Name: _____ Precipitation Occurrence Sensor System_____
Instrument number ____1___ of ___1___

Parameter measured	Precipitation occurrence, type of precipitation
Manufacturer	MSC
Model	POSS
Serial number	053
Firmware version (if applicable)	Not available
Prefix	P0, PA, PM

Field configuration

Location on site	Base 6 (refer to site layout)
Orientation	Sensor head facing upwards.
Height (measured at top)	2m
Shield (if applicable)	N/A
Heating (if applicable)	The POSS is heated to 144 Watts Max.

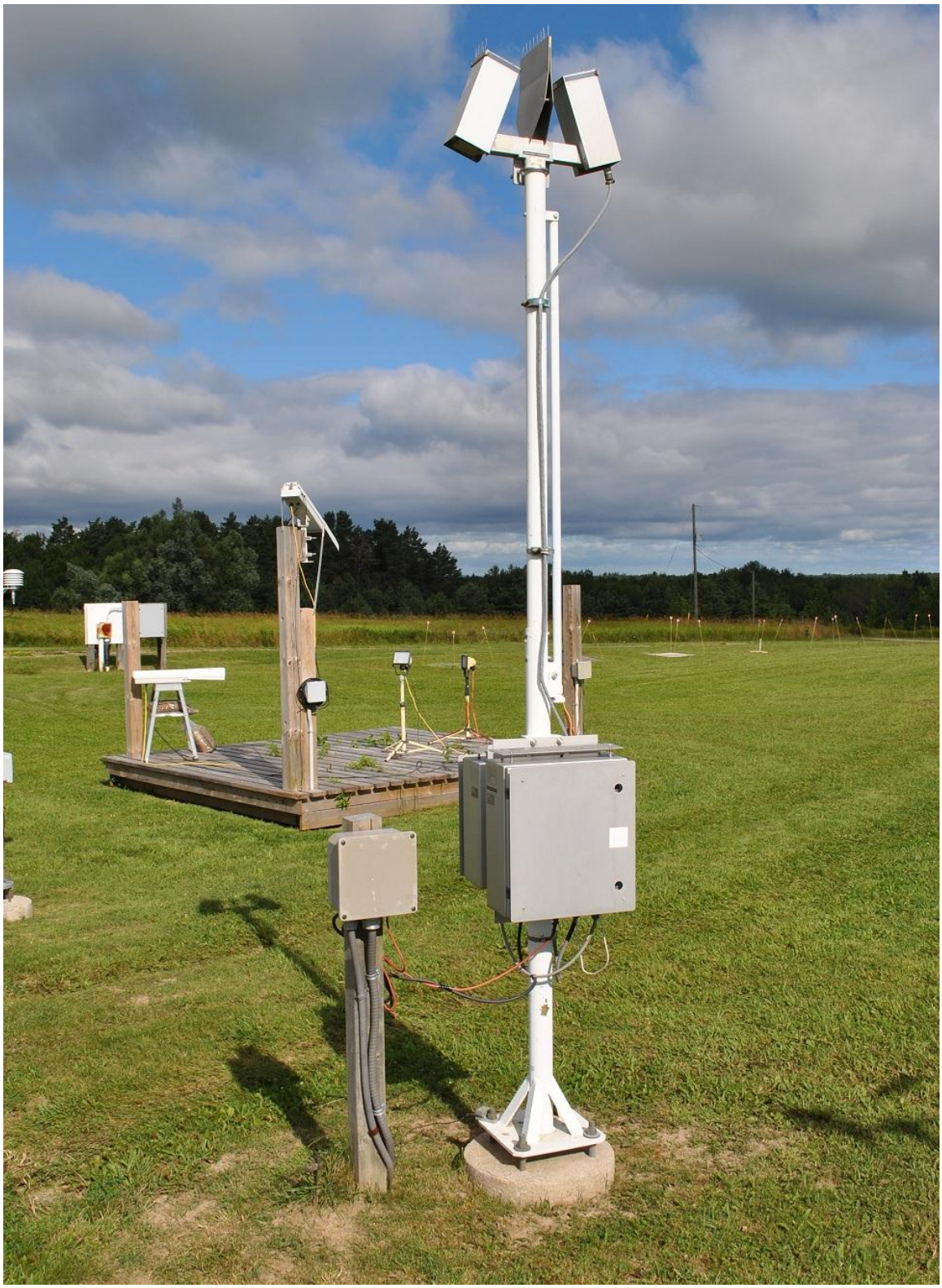
Data output

Data communication protocol	Analog. Peripheral Interface
Output data message format (include description of fields)	The output data format divided into 3 files. P0, PA and PM. P0 [Logger Time] [Mean Frequency] [Standard Deviation Frequency] [Mode Frequency] [Mode Power] [Total Power] [Average In Seconds] [Temperature] [Spectra Percent Average] [Accumulated Precipitation Amt] [Precipitation Rate] [Precipitation Type Intensity]

	PA [Logger Time] [Start Of Message Label] [Thermal Count] [Noise Threshold] [Power Mean Total] [Power Standard Deviation] [Power Median] [Power Minimum] [Power Maximum] [Skew Cal] [Skew New] [Frequency Peak Spectral] [Temperature Air] [Weather] [Spectrum Count] [Precipitation Rate Dsd] [Precipitation Rate Zr] [Impact Count] [AD Impact Samples Deleted] [Noise Spectra Count 4] [Noise Spectra Count Spectrum] [Mode Frequency] [Mode Power] [Doppler Mean Frequency] [Doppler Standard Deviation Freq] [Mean N Mode Frequency] [Standard Deviation N Mode Freq] [Median N Mode Frequency] [Minimum N Mode Frequency] [Maximum N Mode Frequency] [Skew N Frequency] [Mean N Power 32] [Standard Deviation N Power 32] [Median N Mode Power 32] [Minimum N Mode Power 32] [Maximum N Mode Power 32] [Skew N Power 32] [Mode Frequency Histogram Count] [Spectra Thermals Count Label] [Spectra Thermals Count] [Spectra Splash Rejected Cnt Label] [Spectra Splash Rejected Cnt] PM

	POSS Matrix
Data sampling frequency	1 minute

Photo of installation - Precipitation Occurrence Sensor System (POSS)



Instrument Metadata Report

Instrument Name: _____SR50A Sonic Ranging Sensor_____
Instrument number ___1___ of ___ 1 ____

Parameter measured	Snow Depth
Manufacturer	Campbell Scientific
Model	SR50A
Serial number	C4273, C4767, C4189
Firmware version (if applicable)	N/A
Prefix	SA, SB, SC

Field configuration

Location on site	HT#1 (Refer to site layout)
Orientation	SA – North, SB – West, SC - East
Height (measured at top)	1.9 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	**Serial Digital Output:** RS-232
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Quality Number]
Data sampling frequency	15 Seconds

Photo of installation – trestle assembly

Photo of installation(s) – SR50A gauges (blue) mounted on trestle

Instrument Metadata Report

Instrument Name: ___Felix SL300-SD Snow Depth Sensor___
Instrument number: ___1___ of ___3___

Parameter measured	Snow Depth
Manufacturer	Felix Technology Inc
Model	SL300-SD
Serial number	20120192
Firmware version (if applicable)	Not available
File Prefix	S1

Field configuration

Location on site	Base 12A (Please refer to layout)
Orientation	N/A
Height (measured at top)	2.07 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	SDI-12, connected to the datalogger
Output data message format (include description of fields)	[Logger time] [STIN] [Snow Depth]
Data sampling frequency	30 seconds

Photo of Installation - Felix SL300-SD Snow Depth Sensor (1 of 3)

(Installed sensor is indicated in the red frame)

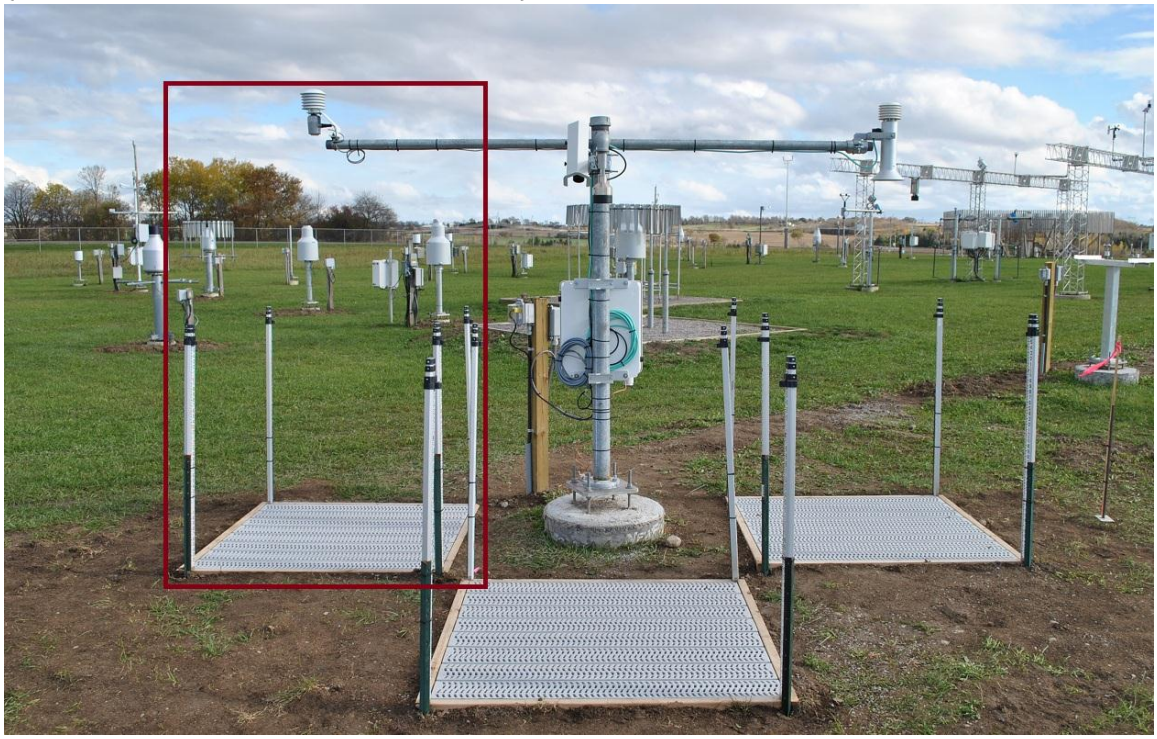


Photo taken from NW

Instrument Metadata Report

Instrument Name: ___Felix SL300-SD Snow Depth Sensor___
Instrument number ___2 ___ of ___3___

Parameter measured	Snow Depth
Manufacturer	Felix Technology Inc
Model	SL300-SD
Serial number	20120190
Firmware version (if applicable)	Not available
File Prefix	S2

Field configuration

Location on site	Base 20 (Please refer to layout)
Orientation	Not available
Height (measured at top)	2.06 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	SDI-12, connected to the datalogger
Output data message format (include description of fields)	[Logger time] [STIN] [Snow Depth]
Data sampling frequency	30 seconds

Photo of Installation - Felix SL300-SD Snow Depth Sensor (2 of 3)

(Installed sensor is indicated in the red frame)

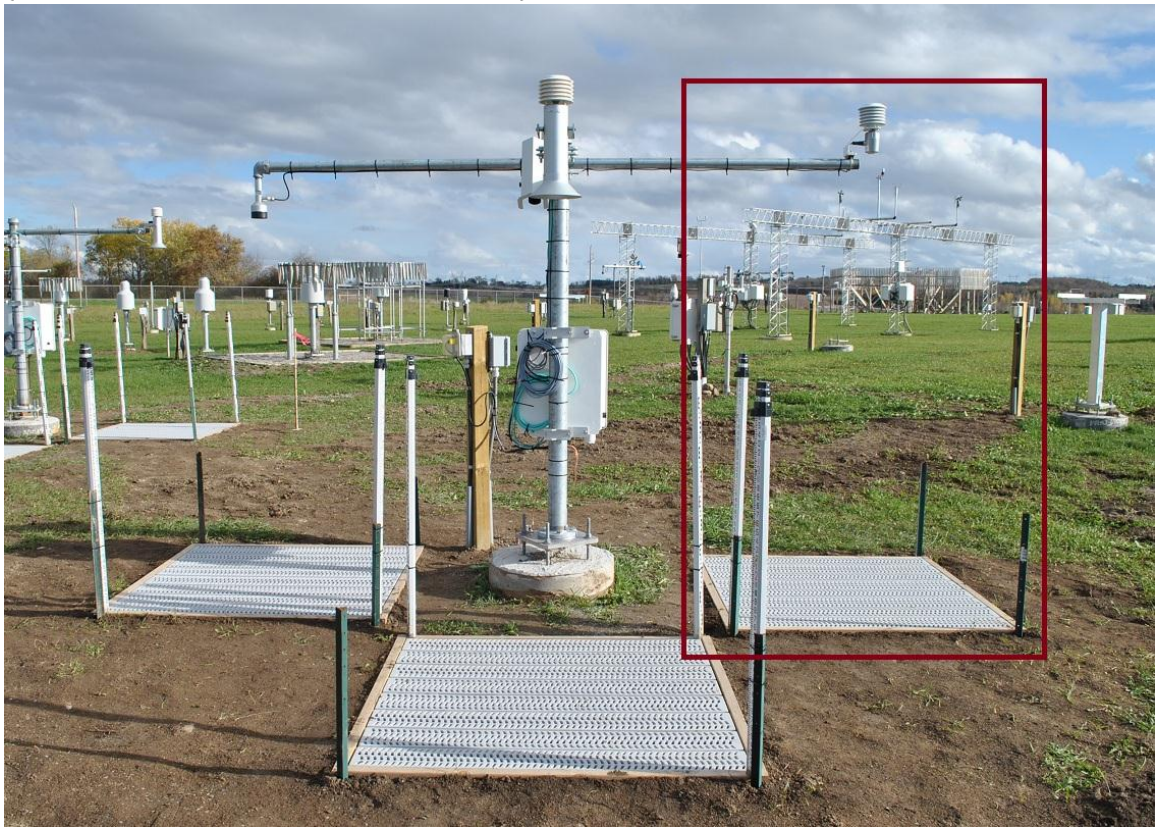


Photo taken from NW

Instrument Metadata Report

Instrument Name: ___Felix SL300-SD Snow Depth Sensor___
Instrument number: ___3___ of ___3___

Parameter measured	Snow Depth
Manufacturer	Felix Technology Inc
Model	SL300-SD
Serial number	20120191
Firmware version (if applicable)	Not available
File Prefix	S3

Field configuration

Location on site	Base 11A (Please refer to layout)
Orientation	N/A
Height (measured at top)	1.92 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	SDI-12 protocol, connected to the datalogger
Output data message format (include description of fields)	[Logger time] [STIN] [Snow Depth]
Data sampling frequency	30 seconds

Photo of installation - Felix SL300-SD Snow Depth Sensor (3 of 3)

(Installed sensor is indicated in the red frame)

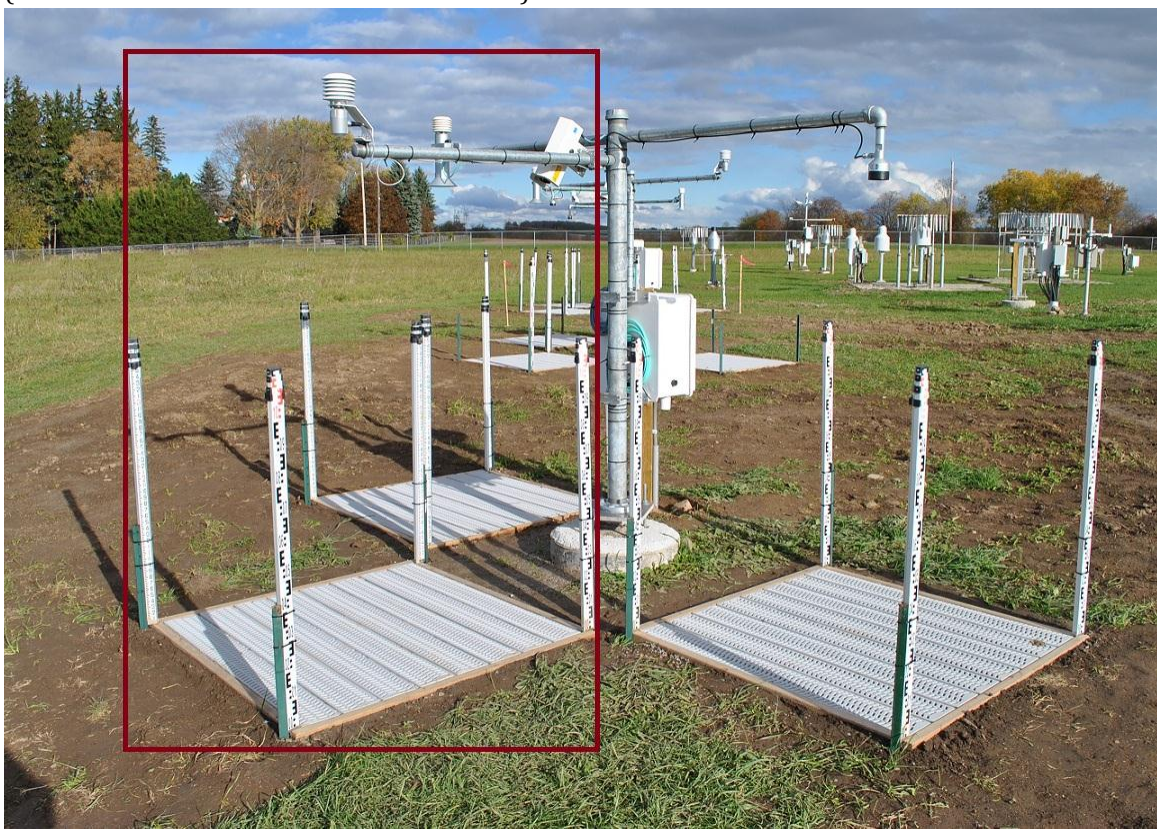


Photo taken from W

Instrument Metadata Report

Instrument Name: ___SR50A Sonic Ranging Sensor_____
Instrument number ___1___ of ___3___

Parameter measured	Snow Depth
Manufacturer	Campbell Scientific
Model	SR50A
Serial number	2471
Firmware version (if applicable)	Not available
Prefix	SD

Field configuration

Location on site	Base 12A (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.67 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	SDI-12, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Quality Number]
Data sampling frequency	30 Seconds

Photo of Installation - SR50A Sonic Ranging Sensor (1 of 3)

(Installed sensor is indicated in the red frame)

Photo taken from W

Instrument Metadata Report

Instrument Name: ___SR50A Sonic Ranging Sensor_____
Instrument number: ___2___ of ___3 ____

Parameter measured	Snow Depth
Manufacturer	Campbell Scientific
Model	SR50A
Serial number	5206
Firmware version (if applicable)	Not available
Prefix	SE

Field configuration

Location on site	Base 20 (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.72 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	SDI-12, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Quality Number]
Data sampling frequency	30 Seconds

Photo of Installation - SR50A Sonic Ranging Sensor (2 of 3)

(Installed sensor is indicated in the red frame)

Photo taken from N

Instrument Metadata Report

Instrument Name: ___SR50A Sonic Ranging Sensor_____
Instrument number: ___3___ of ___3 ____

Parameter measured	Snow Depth
Manufacturer	Campbell Scientific
Model	SR50A
Serial number	5203
Firmware version (if applicable)	Not available
Prefix	SF

Field configuration

Location on site	Base 11A (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.75 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	SDI-12, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Quality Number]
Data sampling frequency	30 Seconds

Photo of Installation – SR50A Sonic Ranging Sensor (3 of 3)

(Installed sensor is indicated in the red frame)

Photo taken from W

Instrument Metadata Report

Instrument Name: ___USH-8 Snow Depth Sensor_____
Instrument number ___1___ of ___3 ____

Parameter measured	Snow Depth
Manufacturer	Sommer Messtechnik
Model	USH-8
Serial number	32120822
Firmware version (if applicable)	Not available
Prefix	S4

Field configuration

Location on site	Base 12A (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.84 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	RS232, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Status]
Data sampling frequency	30 Seconds

Photo of Installation - USH-8 Snow Depth Sensor (1 of 3)

(Installed sensor is indicated in the red frame)

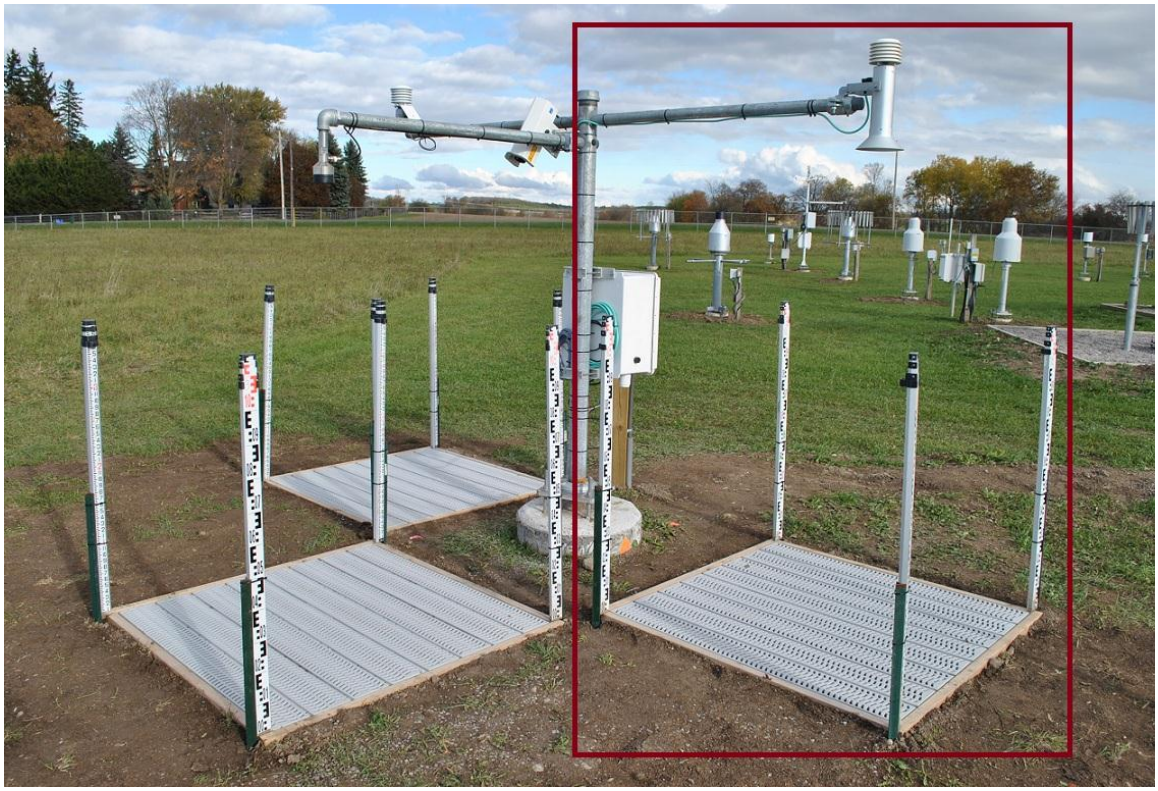


Photo taken from W

Instrument Metadata Report

Instrument Name: ____USH-8 Snow Depth Sensor_____
Instrument number ___2___ of ___3 ____

Parameter measured	Snow Depth
Manufacturer	Sommer Messtechnik
Model	USH-8
Serial number	32120823
Firmware version (if applicable)	Not available
Prefix	S5

Field configuration

Location on site	Base 20 (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.76 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	RS232, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Status]
Data sampling frequency	30 Seconds

Photo of Installation - USH-8 Snow Depth Sensor (2 of 3)

(Installed sensor is indicated in the red frame)

Photo taken from W

Instrument Metadata Report

Instrument Name: ___USH-8 Snow Depth Sensor_____
Instrument number: ___3___ of ___3 ____

Parameter measured	Snow Depth
Manufacturer	Sommer Messtechnik
Model	USH-8
Serial number	32120810
Firmware version (if applicable)	Not available
Prefix	S6

Field configuration

Location on site	Base 11A (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.80 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	RS232, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Status]
Data sampling frequency	30 Seconds

Photo of Installation - USH-8 Snow Depth Sensor (3 of 3)

(Installed sensor is indicated in the red frame)

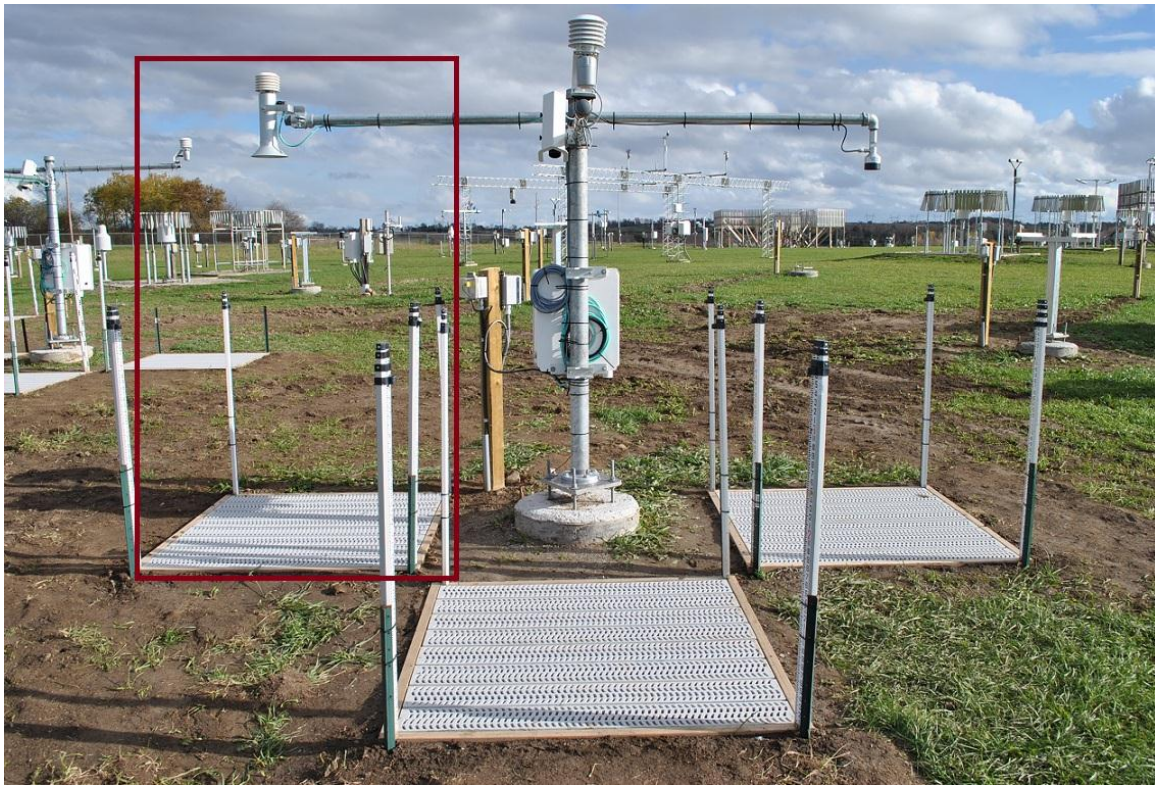


Photo taken from NW

Instrument Metadata Report

Instrument Name: ___SHM30 Snow Depth Sensor_____
Instrument number: __1___ of ___3 ____

Parameter measured	Snow Depth
Manufacturer	Jenoptik
Model	SHM30
Serial number	121883
Firmware version (if applicable)	9.08
Prefix	SU

Field configuration

Location on site	Base 12A (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.70 m
Shield (if applicable)	N/A
Heating (if applicable)	Heating is available Heating control: 1. Heater will be turned on if temperature is below 3°C 2. Heater will be turned off if temperature is above 12°C

Data output

Data communication protocol	RS232, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Signal Strength] [Error Code]
Data sampling frequency	30 Seconds

Photo of Installation - SHM30 Snow Depth Sensor (1 of 3)

(Installed sensor is indicated in the red frame)

Photo taken from N

Instrument Metadata Report

Instrument Name: _____ SHM30 Snow Depth Sensor_____
Instrument number ___2___ of ___ 3 ____

Parameter measured	Snow Depth
Manufacturer	Jenoptik
Model	SHM30
Serial number	130875
Firmware version (if applicable)	9.08
Prefix	SV

Field configuration

Location on site	Base 20 (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.72 m
Shield (if applicable)	N/A
Heating (if applicable)	Heating is available Heating control: 1. Heater will be turned on if temperature is below 3°C 2. Heater will be turned off if temperature is above 12°C

Data output

Data communication protocol	RS232, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Signal Strength] [Error Code]
Data sampling frequency	30 Seconds

Photo of Installation - SHM30 Snow Depth Sensor 2 of 3)

(Installed sensor is indicated in the red frame)

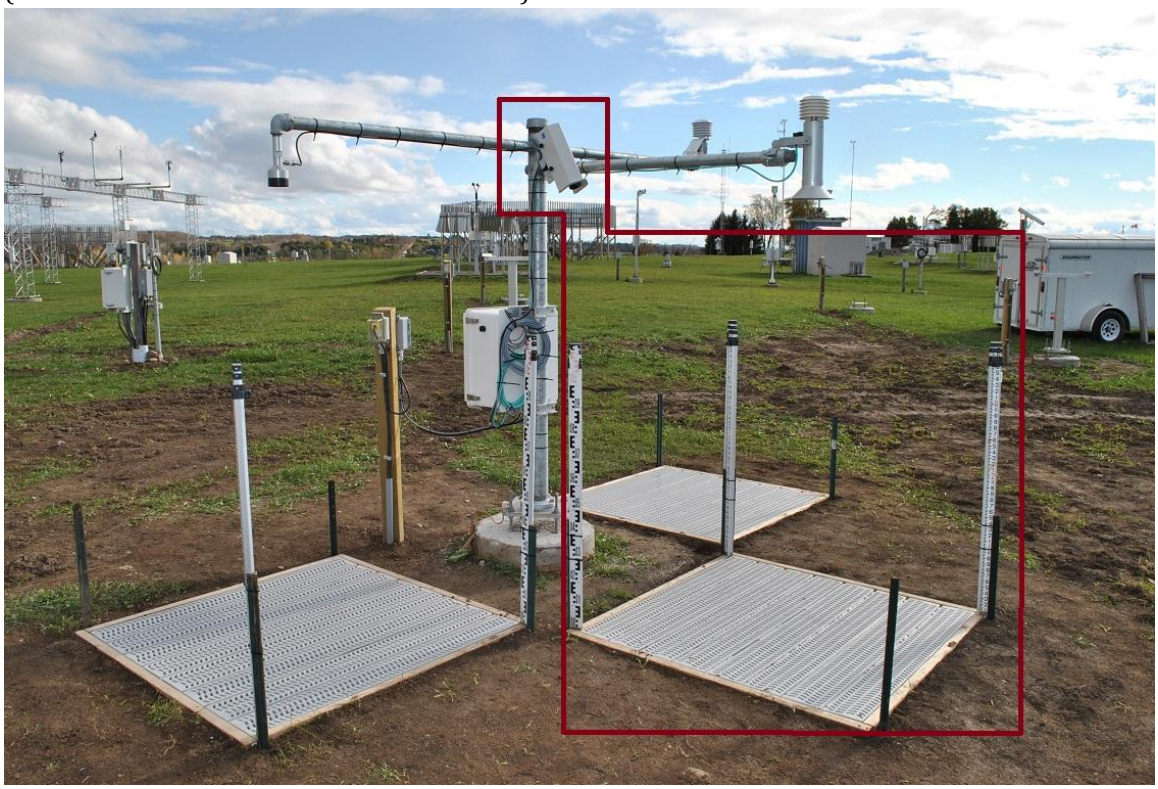


Photo taken from N

Instrument Metadata Report

Instrument Name: ___SHM30 Snow Depth Sensor_____
Instrument number: __3___ of ___3 ____

Parameter measured	Snow Depth
Manufacturer	Jenoptik
Model	SHM30
Serial number	130874
Firmware version (if applicable)	9.08
Prefix	SW

Field configuration

Location on site	Base 11A (Refer to site layout)
Orientation	N/A
Height (measured at top)	1.75 m
Shield (if applicable)	N/A
Heating (if applicable)	Heating is available Heating control: 1. Heater will be turned on if temperature is below 3°C 2. Heater will be turned off if temperature is above 12°C

Data output

Data communication protocol	RS232, connected to the datalogger
Output data message format (include description of fields)	[Logger Time] [STIN] [Snow Depth] [Signal Strength] [Error Code]
Data sampling frequency	30 Seconds

Photo of Installation - SHM30 Snow Depth Sensor (3 of 3)

(Installed sensor is indicated in the red frame)

Photo taken from W

Instrument Metadata Report

Instrument Name: _____Visibility Belfort 6210_____
Instrument number ___1 ____ of ___1___

Parameter measured	Visibility
Manufacturer	Belfort Instruments
Model	6210
Serial number	590
Firmware version (if applicable)	N/A
Prefix	B1, BB

Field configuration

Location on site	Base 9A (refer to site layout)
Orientation	Receiver Pointed to True North.
Height (measured at top)	2.2m
Shield (if applicable)	N/A
Heating (if applicable)	Yes. Two windows heated to 5 Watts each.

Data output

Data communication protocol	**Serial Digital Output:** RS-232
Output data message format (include description of fields)	The output data message consists of 2 files. B1 and BB. B1 Logger Time STIN Sensor ID Sensor Diagnostic Status Extinction Coefficient Day Night Status Checksum BB Logger Time

	STIN 10 minute Avg 10 minute Min/Max Last minute Vis AWOS minute after top of hour 10 minute Buffer
Data sampling frequency	1 Minute

Photo of installation - Visibility Belfort 6210

Photo taken from E

Instrument Metadata Report

Instrument Name: _____PTZ 214 Axis Surveillance Camera_____
Instrument number ___1 and 2____

Manufacturer	Axis Communication
Model	PTZ 214
Serial number	Not Available
Firmware version (if applicable)	Not Available

Field configuration

Location on site	Top of the blue shack.
Orientation	Camera 1 facing west , Camera 2 facing east
Height (measured at top)	3.3m
Shield (if applicable)	N/A
Heating (if applicable)	Yes. Heated housing.

Data output

Data communication protocol	LAN
Output data message format (include description of fields)	Still Images
Data sampling frequency	One/Hour/Instrument

Photo of installation - PTZ 214 Axis Surveillance Camera

Photo taken from N

SECTION A4: CONFIRMATION OF EXPERIMENT CONFIGURATION

TEST 1: INSTRUMENT CALIBRATION AND CHECKS

The Site Manager will organize the check and calibration of each instrument included in the experiment (as part of the reference, or as an instrument under test). The check sheet and the calibration results will become part of the POP Report, Section A5, Site Documentation.

- The calibration and check of the WG used as part of the reference will be conducted based on the guidelines adopted by the SPICE IOC.
- The calibration and check of the instruments under test will be conducted as specified by the manufacturer prior to the installation on the SPICE site, as well as following the installation in the field.

SPICE CARE Geonor R2 R3 Field Verification Results
July 15 - 26, 2013

CARE Geonor Transducer Coefficients

Reference Type	Gauge Prefix	Base	Serial #	Transducer Coefficients		
				A	B	f0
R3 Single Alter in DFIR	H2	DFIR	N: 12512	0.0167911	9.14335E-06	1051.7
			SE: 12812	0.0166180	9.16127E-06	1063.6
			SW: 13312	0.0166875	9.13974E-06	1064.3
R2 Single Alter	H6	9	N: 73109	0.0166800	9.19660E-06	1041.1
			SE: 73009	0.0166600	9.18470E-06	1039.0
			SW: 73209	0.0166930	9.17570E-06	1041.7
R2 No Shield	H7	5	N: 76609	0.0165630	9.19730E-06	1049.5
			SE: 76709	0.0167870	9.16090E-06	1044.6
			SW: 76809	0.0169330	9.14920E-06	1051.7

H2 Field Verification Data (Serial #: N - 12512, SE - 12812, SW - 13312)
Date: July 24, 2013
Scale uncertainty (+/-): 0.1 g

	Approx. Water Volume	Applied Mass		Measured Transducer Frequency						Total Applied Precipitation [Δmflask/20] (mm)		Measured Precipitation						
		mflask, full	mflask, empty	North (Hz)		Southeast (Hz)		Southwest (Hz)				North (mm)		Southeast (mm)		Southwest (mm)		
Time (UTC)	(L)	(g)	(g)	Value	+ / -	Value	+ / -	Value	+ / -	Value	+/-	Value	+/-	Value	+/-	Value	+/-	Notes
14:33:19	0	-	-	1065.9	0.04	1066.2	0.08	1074.6	0.05	0	0.00	2.403	0.001	0.433	0.001	1.729	0.001	0 kg
14:46:26	1	2309.62	1314.94	1320.4	0.04	1327.1	0.05	1333.1	0.05	49.73	0.01	51.719	0.001	50.149	0.001	51.460	0.001	Water

Note: Geonor correction has not been applied to derive measured precipitation where empty bucket frequency difference exceeds 10 Hz (applies to N & SW transducers)

H6 Field Verification Data (Serial #: N - 73109, SE - 73009, SW - 73209)
Date: July 24, 2013
Scale uncertainty (+/-): 0.1 g

	Approx. Water Volume	Applied Mass		Measured Transducer Frequency						Total Applied Precipitation [Δmflask/20] (mm)		Measured Precipitation						
		mflask, full	mflask, empty	North (Hz)		SE (Hz)		SW (Hz)				North (mm)		Southeast (mm)		Southwest (mm)		
Time (UTC)	(L)	(g)	(g)	Value	+ / -	Value	+ / -	Value	+ / -	Value	+/-	Value	+/-	Value	+/-	Value	+/-	Notes
18:44:19	0	-	-	1058.0	0.06	1068.7	0.06	1059.1	0.13	0	0.00	2.850	0.001	5.032	0.001	2.933	0.002	0 kg
18:54:19	1	2315.96	1312.40	1315.0	0.03	1325.7	0.03	1315.2	0.03	50.18	0.01	52.596	0.001	55.308	0.001	52.521	0.001	Water

Note: Geonor correction has not been applied to derive measured precipitation where empty bucket frequency difference exceeds 10 Hz (applies to N, SE & SW transducers)

H7 Field Verification Data (Serial #: N - 76609, SE - 76709, SW - 76809)
Date: July 22, 2013
Scale uncertainty (+/-): 0.1 g

	Approx. Water Volume	Applied Mass		Measured Transducer Frequency						Total Applied Precipitation [Δmflask/20] (mm)		Measured Precipitation						
		mflask, full	mflask, empty	North (Hz)		SE (Hz)		SW (Hz)				North (mm)		Southeast (mm)		Southwest (mm)		
Time (UTC)	(L)	(g)	(g)	Value	+ / -	Value	+ / -	Value	+ / -	Value	+/-	Value	+/-	Value	+/-	Value	+/-	Notes
15:39:10	0	-	-	1052.9	0.04	1041.5	0.28	1045.5	0.11	0	0.00	0.572	0.001	-0.522	0.005	-1.053	0.002	0 kg
13:50:55	1	2310.70	1312.40	1314.0	0.03	1300.0	0.08	1305.6	0.07	49.92	0.01	50.247	0.001	48.847	0.002	48.888	0.002	Water

H7 Field Verification Data After Bucket Relevelled (Serial #: N - 76609, SE - 76709, SW - 76809)
Date: July 23, 2013
Scale uncertainty (+/-): 0.1 g

	Approx. Water Volume	Applied Mass		Measured Transducer Frequency						Total Applied Precipitation [Δmflask/20] (mm)		Measured Precipitation						
		mflask, full	mflask, empty	North (Hz)		SE (Hz)		SW (Hz)				North (mm)		Southeast (mm)		Southwest (mm)		
Time (UTC)	(L)	(g)	(g)	Value	+ / -	Value	+ / -	Value	+ / -	Value	+/-	Value	+/-	Value	+/-	Value	+/-	Notes
13:07:39	0	-	-	1050.6	0.04	1042.2	0.04	1051.7	0.04	0	0.00	0.176	0.001	-0.409	0.001	-0.006	0.001	0 kg
13:17:00	1	2308.56	1315.86	1312.8	0.02	1296.5	0.02	1308.6	0.02	49.64	0.01	49.977	0.000	48.109	0.000	49.532	0.000	Water

TEST 2: INSTRUMENT VALIDATION

After the field installation of each instrument (both those that are part of the reference and those that are instruments under test), at the minimum, a **continuous 48 hour data set** of the entire test setup will be stored and examined as an indication of instrument performance**.** The data sets for each instrument included in the intercomparison will be reviewed for data integrity and representativeness, against the predefined data format.
It is recommended that the evaluation of the instrument performance at this stage is conducted using time series plots.

Any discrepancies will be investigated, addressed, and documented. Following the resolution of the discrepancies, the 48-hour end to end (e2e) test will be repeated. The readiness state of each instrument will be reported using the table format below and included in Section A5, Site Documentation.

Instrument Data Validation[1]

Instrument	Readiness (if Yes, indicate the date)	Comments
1) GEONOR T200B 600 mm in the DFIR (R2) 2) GEONOR T200B 600 mm Heated, Single Alter (R3) 3) GEONOR T200B 600 mm Heated, Unshielded (R3)	November 9, 2012	
4) Pluvio2 200cm^2 Heated, Belfort Double Alter 5) Pluvio2 200cm^2 Heated, Single Alter	November 9, 2012	

[1] It is strongly recommended that the evaluation of instrument performance is completed using time series plots.

6) HSA– TBH/TBH-LP 7) CAE S .P A – PMB25R 8) Meteoservis – MR3H-FC 9) ZAMG – MR3H-FC 10) YSI44212 11) HMP155 12) PTB220 13) RM Young 5103 (10 m) 14) Vaisala NWS425 (2m) 15) MSC POSS (Precipitation Occurrence Sensor System) 16) SR50A (North, West and East) 17) Visibility Belfort 6210	November 9, 2012	
18) Pluvio² 200cm² (HO, HP, HS) 19) Felix SL300-SD (S1, S2, S3) 20) SR50A (SD, SE, SF) 21) Sommer USH-8 (S4, S5, S6) 22) Jenoptik SHM30 (SU, SV, SW) 23) Vaisala CT25K 24) Thies Precipitation Monitor 25) Thies Precipitation Detector	October 23, 2013	

SECTION A5: SITE DOCUMENTATION

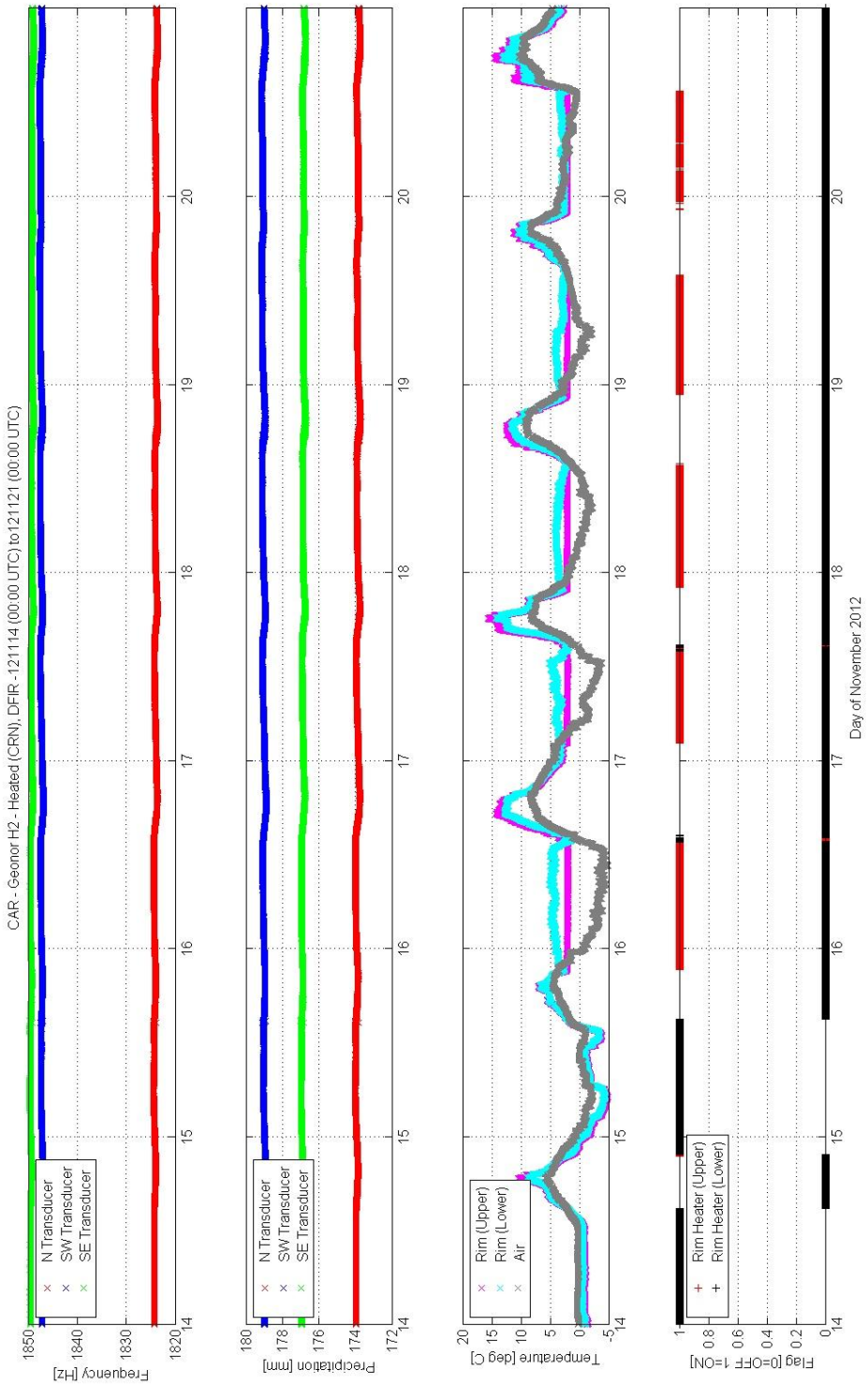
The site documentation will include all documents, data sets , and plots referenced in sections A1 to A4, details of any workarounds, and a complete set of pictures documenting the overall site installation (views from N, NE, NW, S, SE, SW E, W) and each instrument installation.
A **Site Documentation Checklist** is provided below to track the requisite documentation.

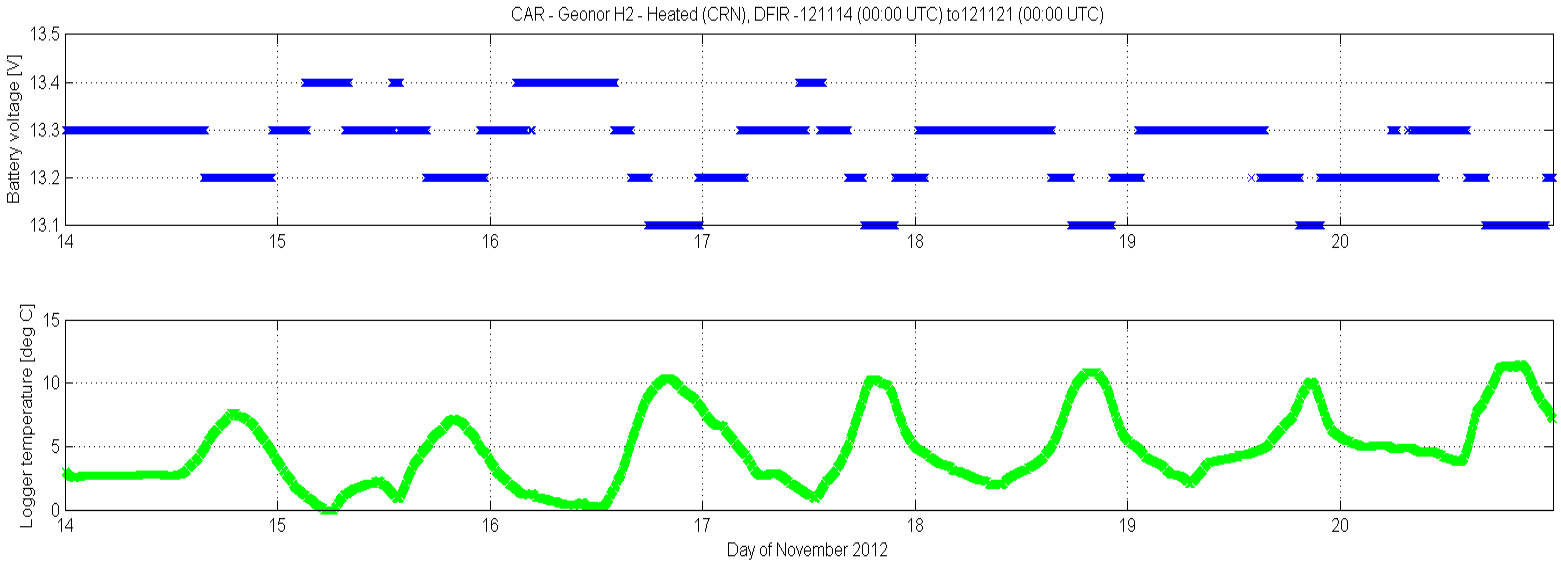
Site Documentation Checklist

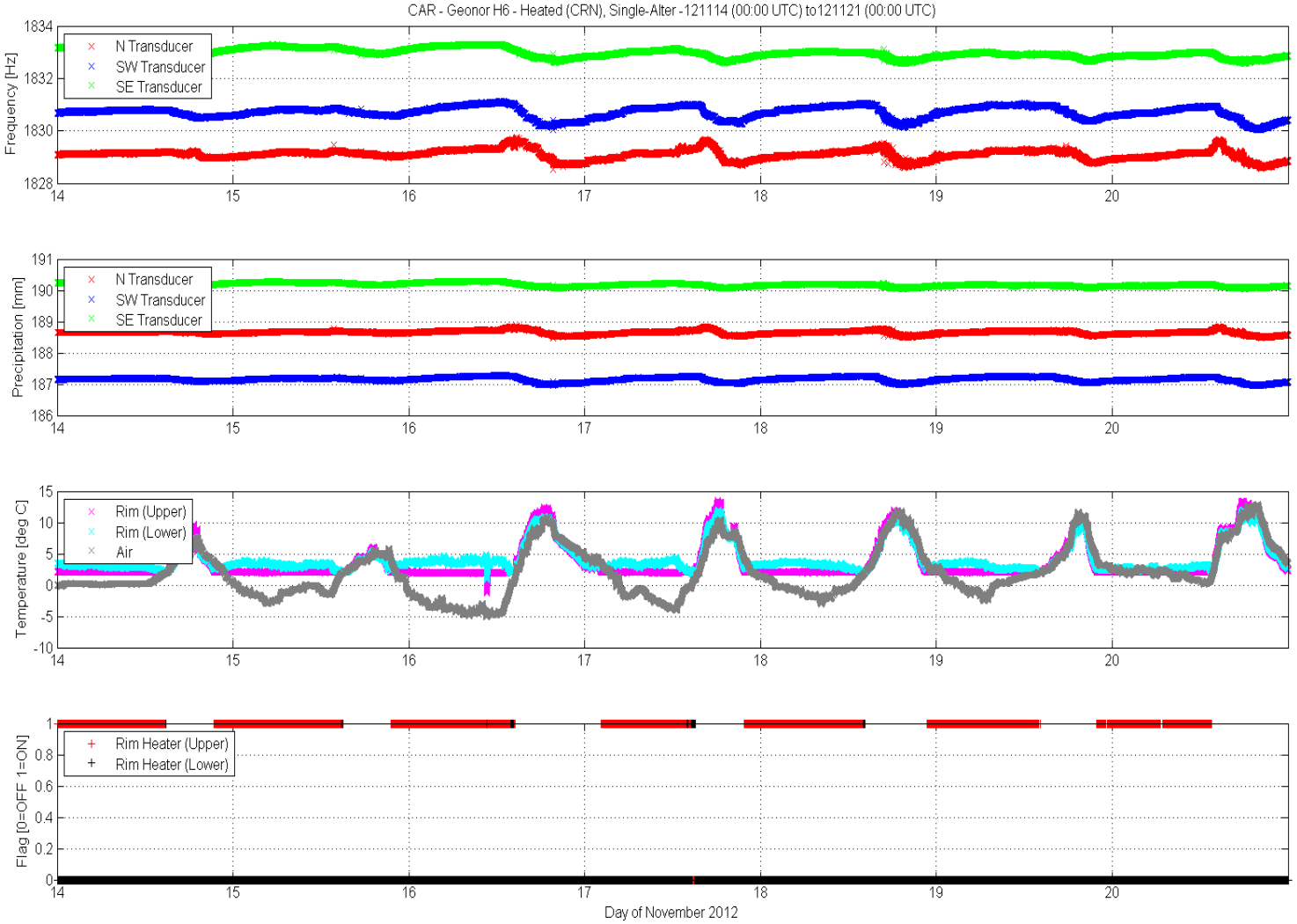
Site information and layout	☒ Included
Details of manual measurement procedure	☒ Included ☐ Not Applicable
Instrument Metadata Reports for all instruments under test and all instruments used to provide ancillary measurements	☒ Included
Calibration results and check sheets for all instruments	☒ Included
Instrument data validation: datasets, daily time series plots	☒ Included
Instrument data validation: discrepancy reports	☐ Included ☒ Not Applicable
End-to-end data validation: datasets daily time series plots for 1 week.	☒ Included
End-to-end data validation: discrepancy reports	☐ Included ☒ Not Applicable

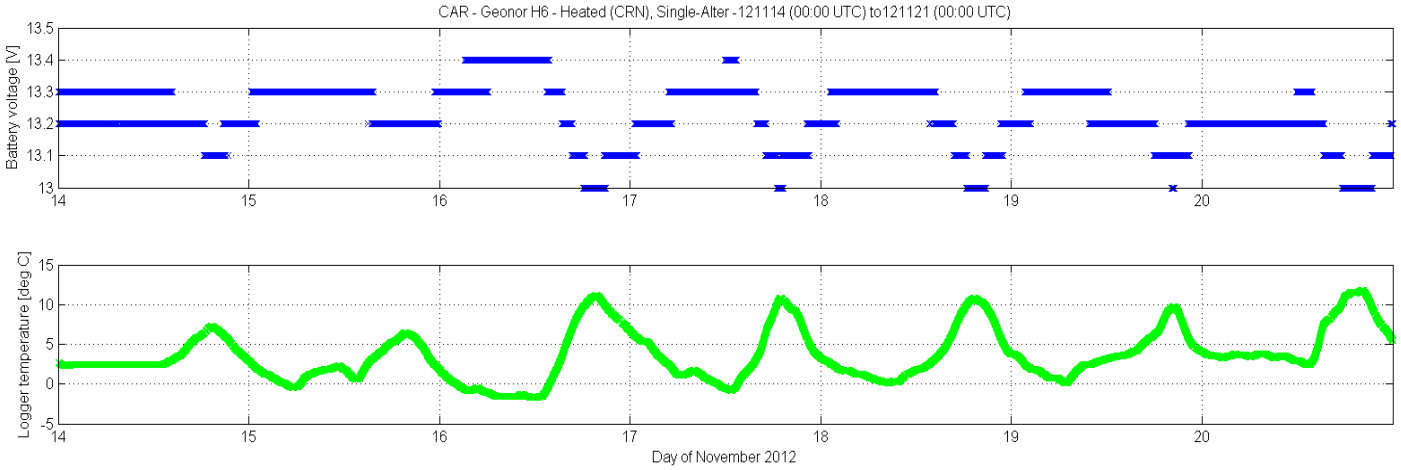
Details of any workarounds	☐ Included ☒ Not Applicable
Complete set of pictures documenting the overall site installation (views from N, S, E, W) and individual instrument installations	☒ Included

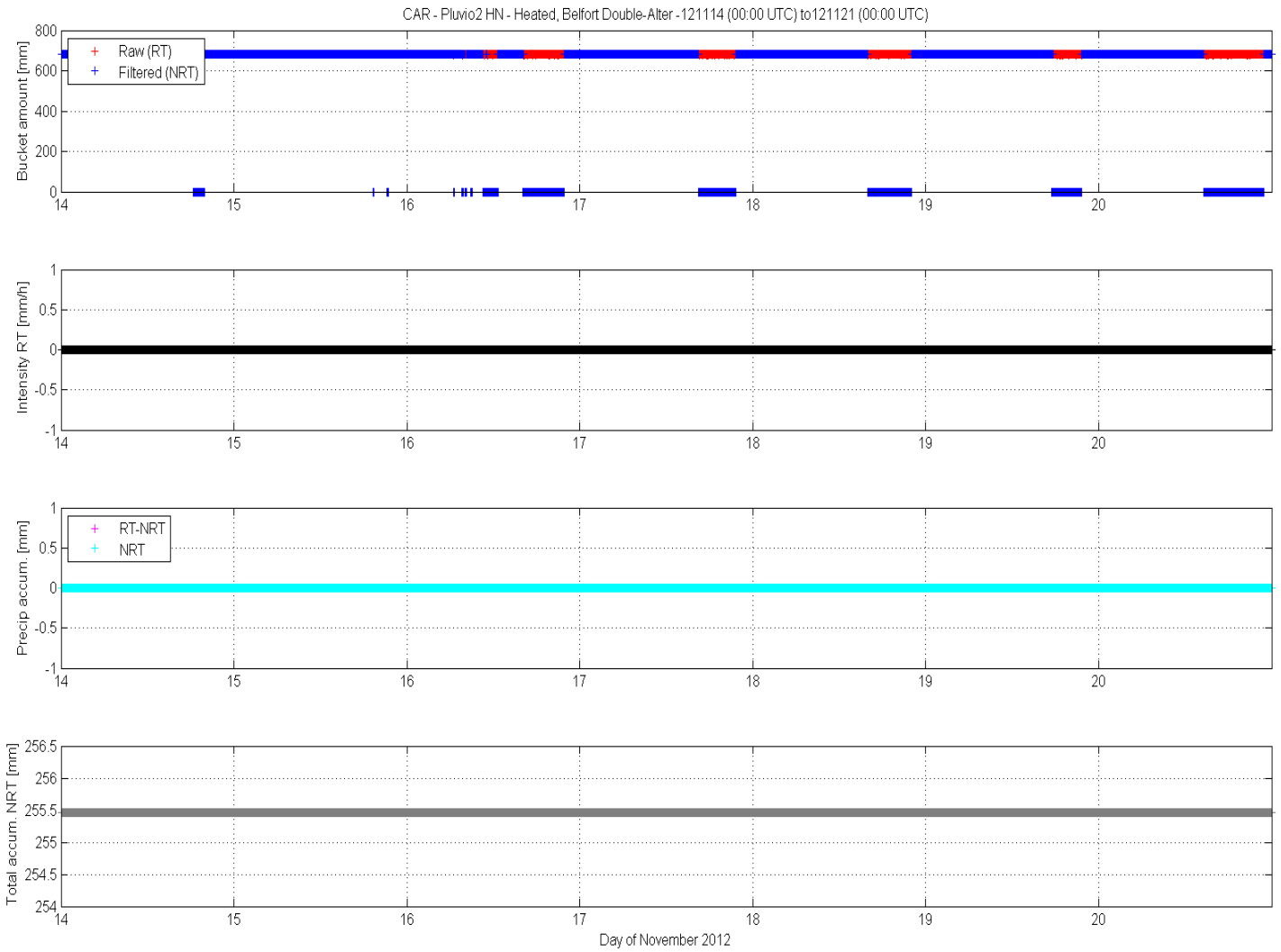
END-TO-END DATA VALIDATION: WEEKLY PLOTS

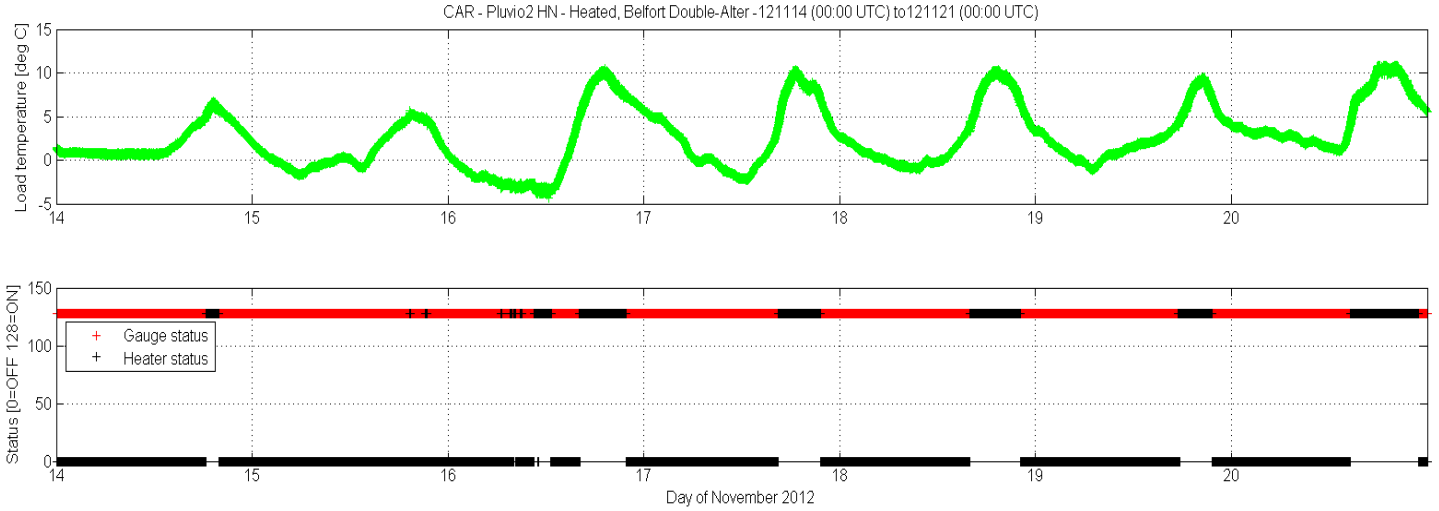


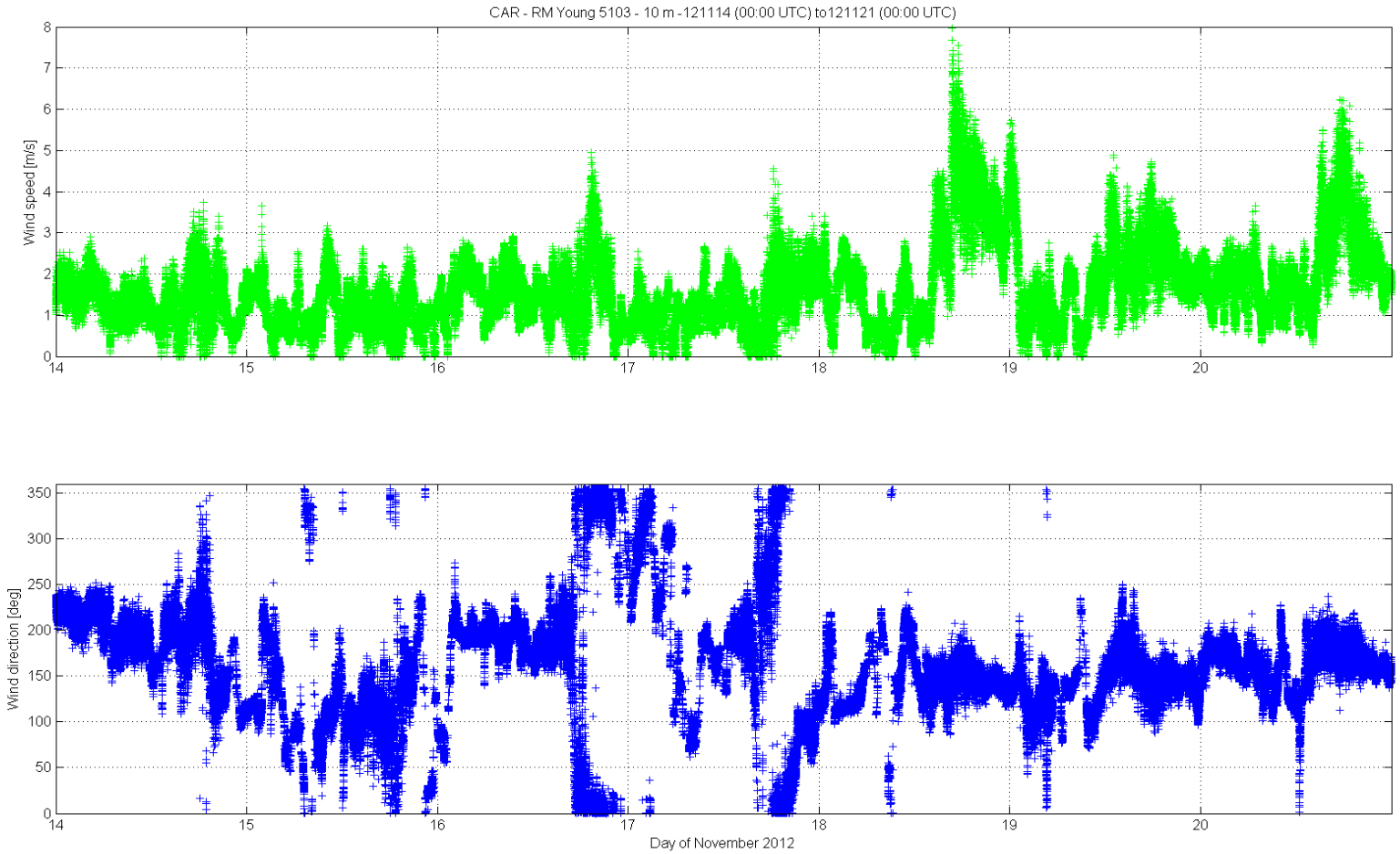

CAR - Geonor H2 - Heated (CRN), DFIR - 121114 (00:00 UTC) to121121 (00:00 UTC)
Battery voltage [V]
13.5
13.4
13.3
13.2
13.1
14
15
16
17
18
19
20
Logger temperature [deg C]
15
10
5
0
Day of November 2012


CAR - Geonor H6 - Heated (CRN), Single-Alter -121114 (00:00 UTC) to121121 (00:00 UTC)
Frequency [Hz]
N Transducer
SW Transducer
SE Transducer
Precipitation [mm]
Temperature [deg C]
Rim (Upper)
Rim (Lower)
Air
Flag [0=OFF 1=ON]
Rim Heater (Upper)
Rim Heater (Lower)
Day of November 2012

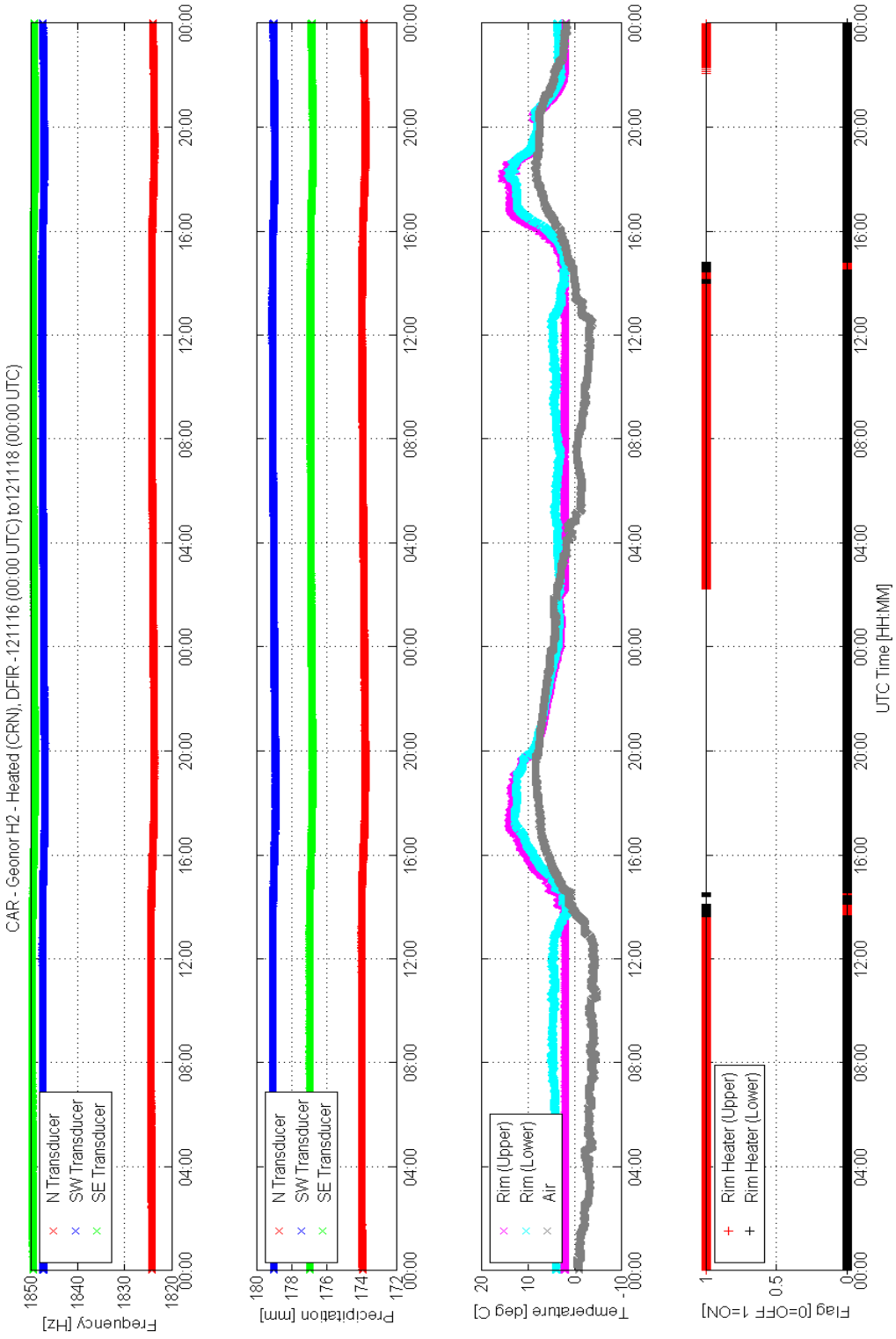

CAR - Geonor H6 - Heated (CRN), Single-Alter -121114 (00:00 UTC) to121121 (00:00 UTC)
Battery voltage [V]
13.5
13.4
13.3
13.2
13.1
13
14
15
16
17
18
19
20
Logger temperature [deg C]
15
10
5
0
-5
Day of November 2012

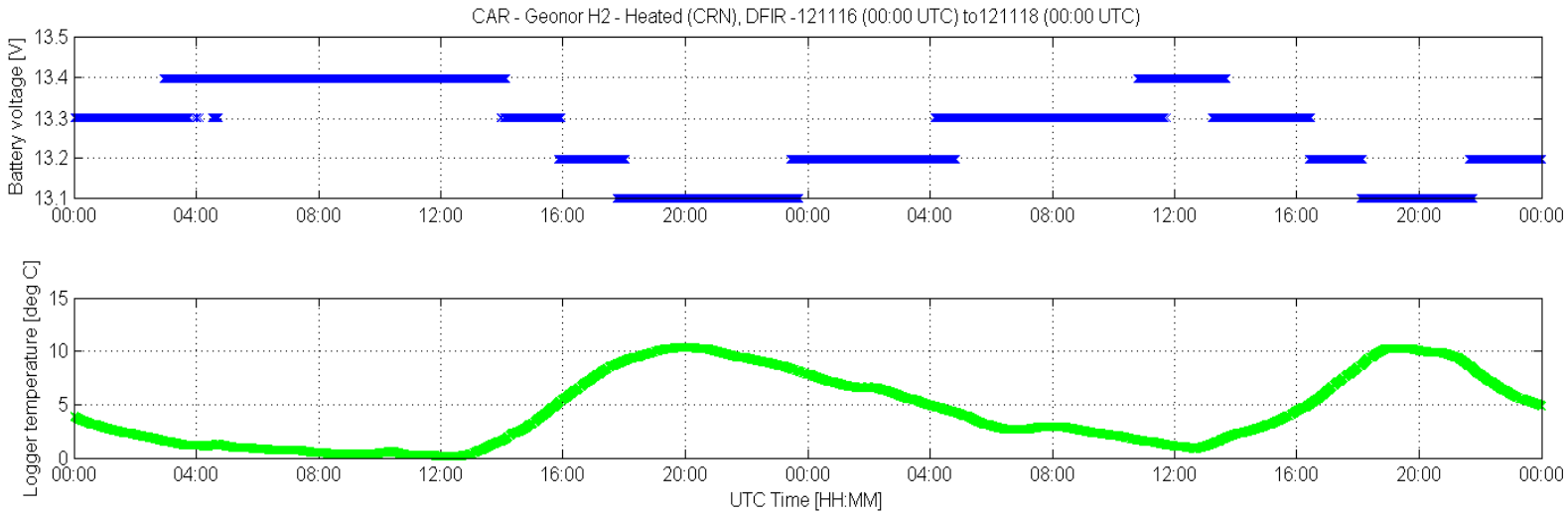

CAR - Pluvio2 HN - Heated, Belfort Double-Alter -121114 (00:00 UTC) to121121 (00:00 UTC)
Bucket amount [mm]
Raw (RT)
Filtered (NRT)
Intensity RT [mm/h]
Precip accum. [mm]
RT-NRT
NRT
Total accum. NRT [mm]
Day of November 2012

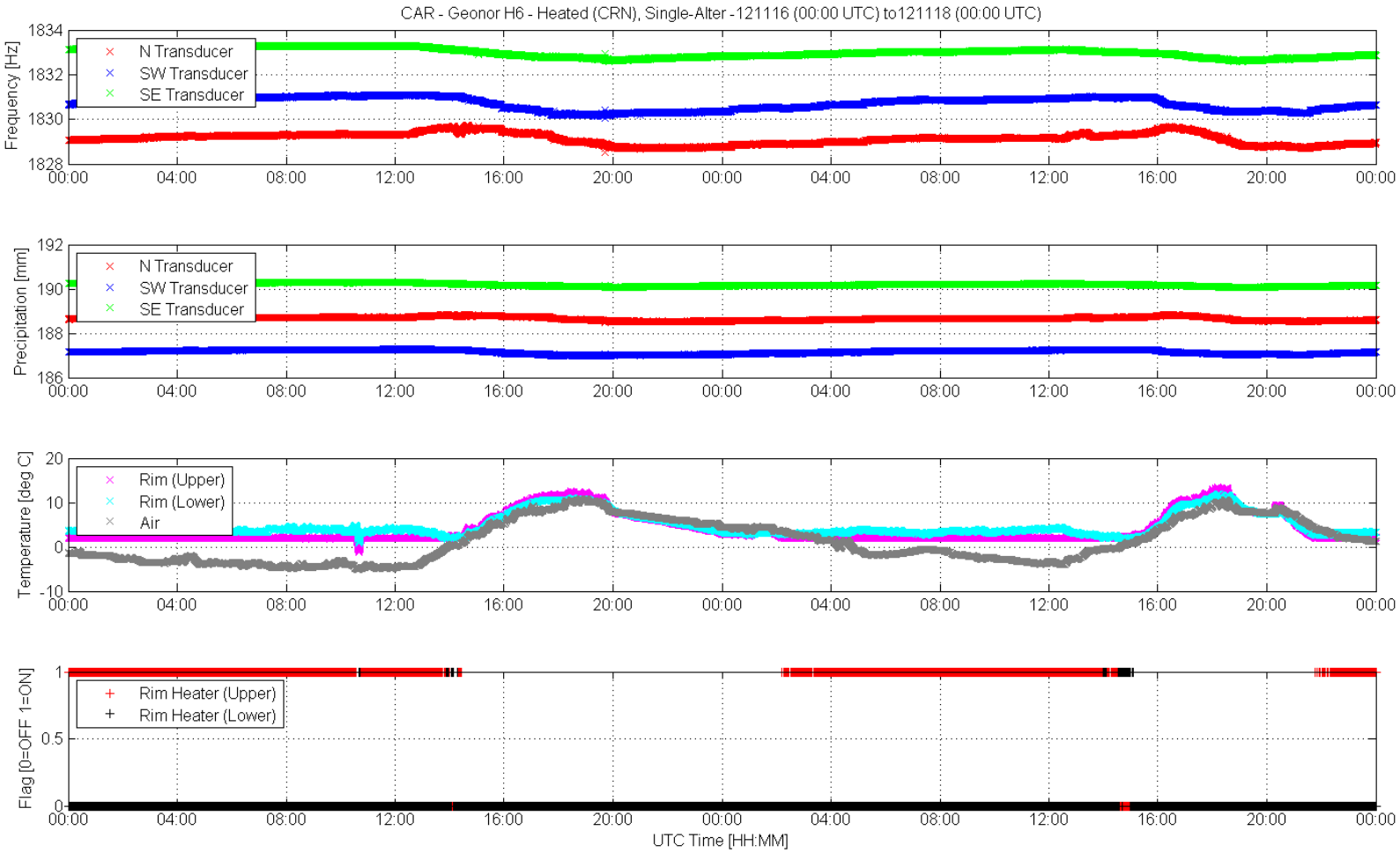

CAR - Pluvio2 HN - Heated, Belfort Double-Alter -121114 (00:00 UTC) to121121 (00:00 UTC)
Load temperature [deg C]
15
10
5
0
-5
14
15
16
17
18
19
20
Status [0=OFF 128=ON]
150
100
50
0
Gauge status
Heater status
Day of November 2012

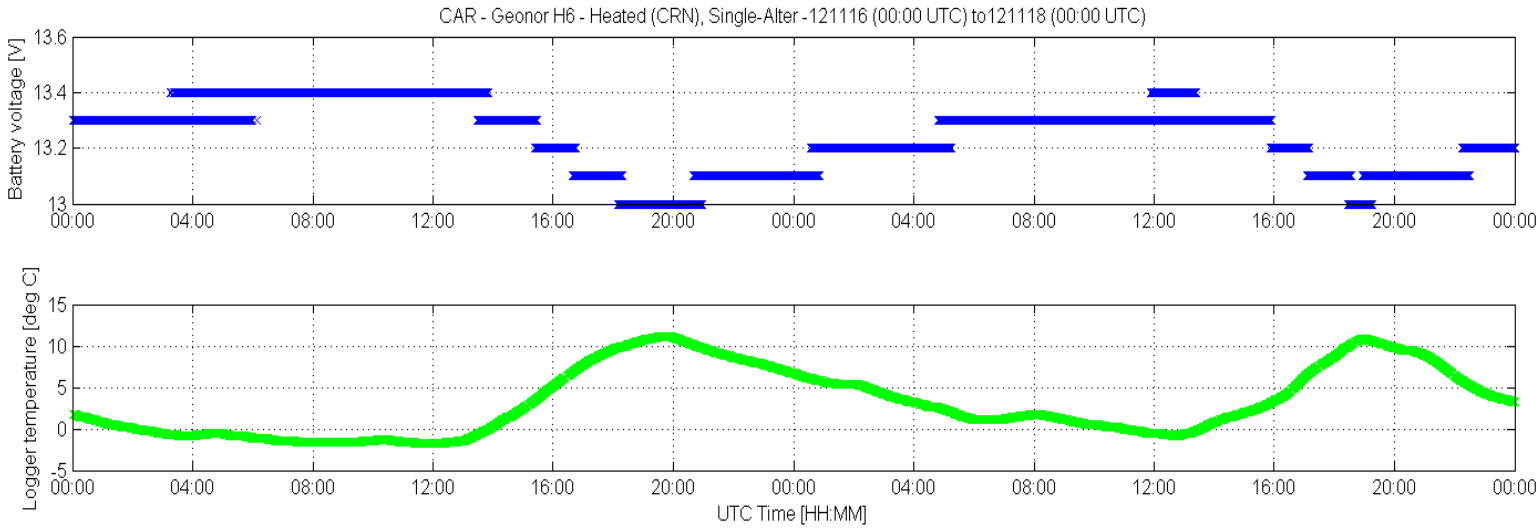

CAR - RM Young 5103 - 10 m -121114 (00:00 UTC) to121121 (00:00 UTC)
Wind speed [m/s]
Wind direction [deg]
Day of November 2012
14
15
16
17
18
19
20

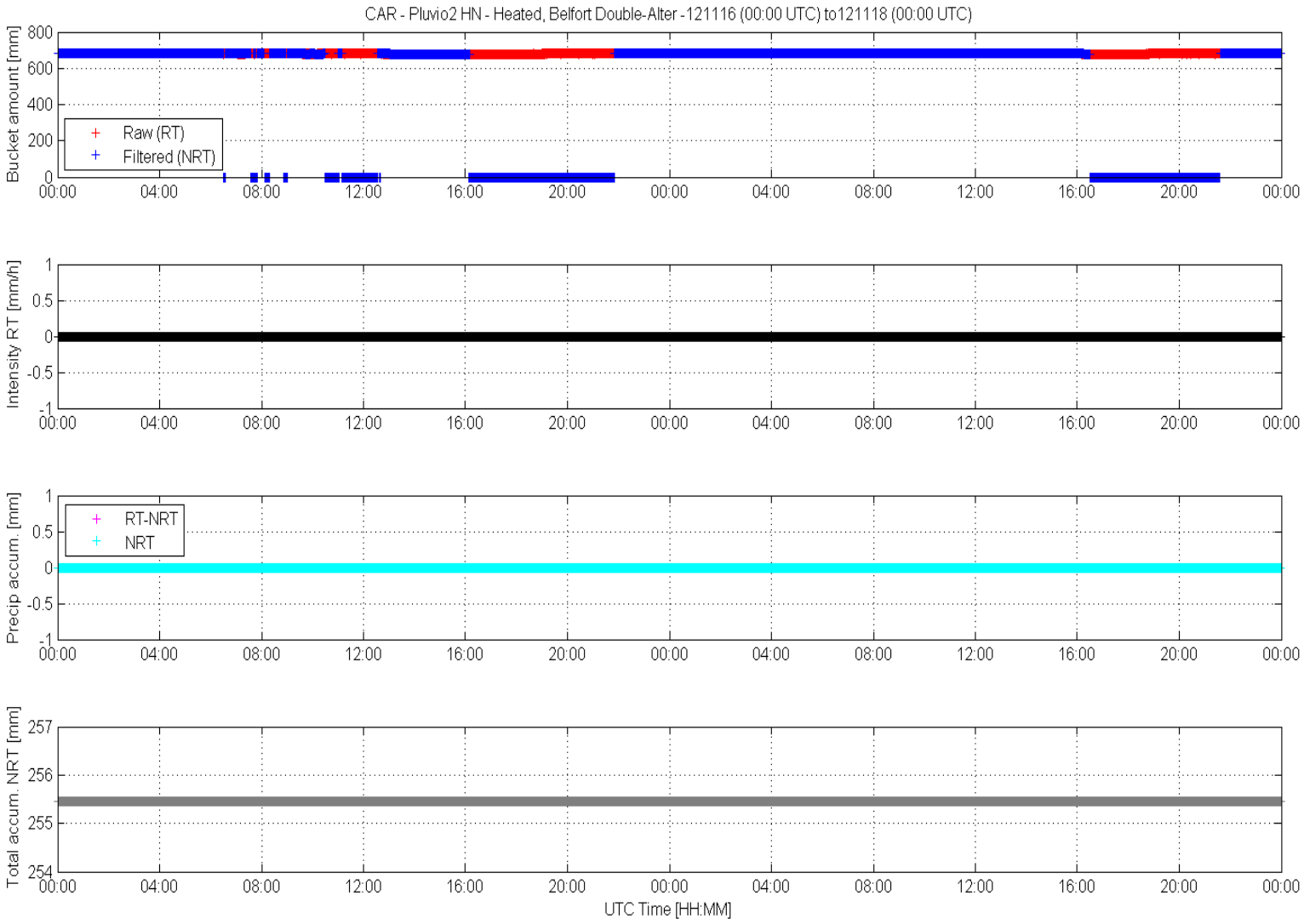
INSTRUMENT DATA VALIDATION: 48 HOUR PLOTS

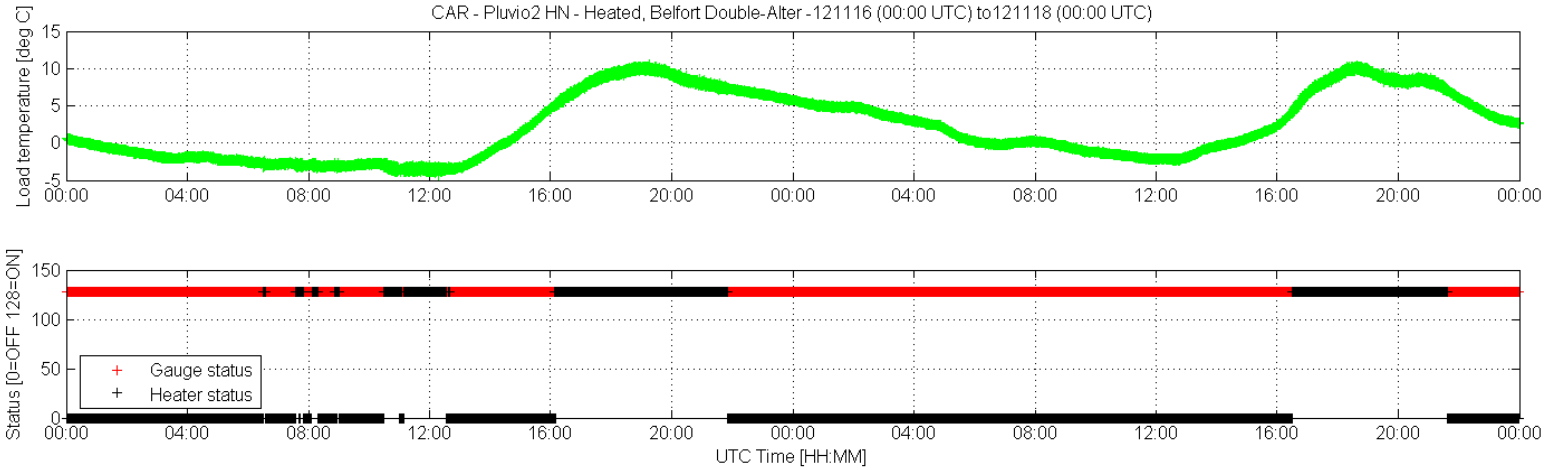


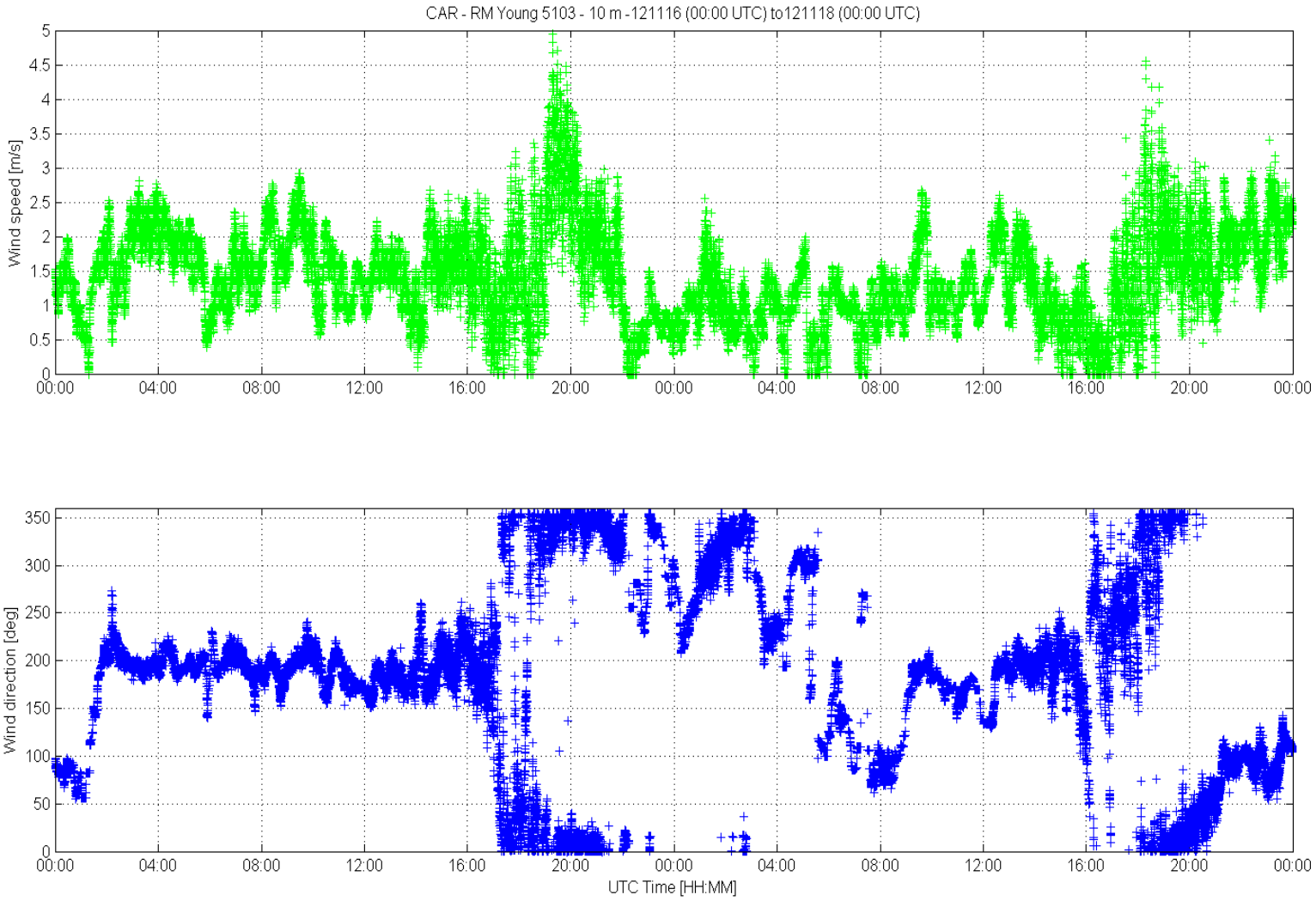

CAR - Geonor H2 - Heated (CRN), DFIR -121116 (00:00 UTC) to121118 (00:00 UTC)
Battery voltage [V]
13.5
13.4
13.3
13.2
13.1
00:00
04:00
08:00
12:00
16:00
20:00
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Logger temperature [deg C]
15
10
5
0
00:00
04:00
08:00
12:00
16:00
20:00
00:00
04:00
08:00
12:00
16:00
20:00
00:00
UTC Time [HH:MM]


CAR - Geonor H6 - Heated (CRN), Single-Alter -121116 (00:00 UTC) to121118 (00:00 UTC)
Frequency [Hz]
1834
1832
1830
1828
N Transducer
SW Transducer
SE Transducer
Precipitation [mm]
192
190
188
186
Temperature [deg C]
20
10
0
-10
Rim (Upper)
Rim (Lower)
Air
Flag [0=OFF 1=ON]
1
0.5
0
Rim Heater (Upper)
Rim Heater (Lower)
00:00
04:00
08:00
12:00
16:00
20:00
UTC Time [HH:MM]


CAR - Geonor H6 - Heated (CRN), Single-Alter -121116 (00:00 UTC) to121118 (00:00 UTC)
Battery voltage [V]
13.6
13.4
13.2
13
00:00
04:00
08:00
12:00
16:00
20:00
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Logger temperature [deg C]
15
10
5
0
-5
00:00
04:00
08:00
12:00
16:00
20:00
00:00
04:00
08:00
12:00
16:00
20:00
00:00
UTC Time [HH:MM]

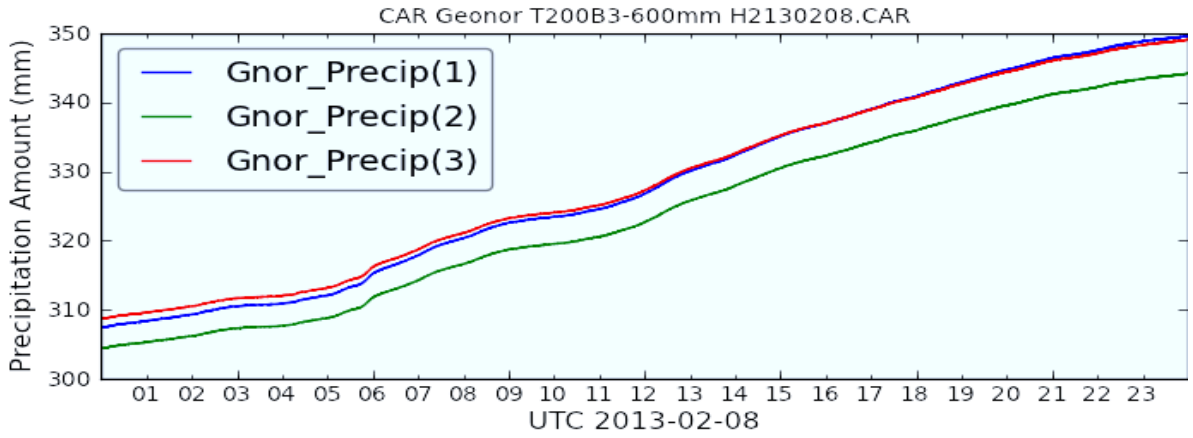

CAR - Pluvio2 HN - Heated, Belfort Double-Alter -121116 (00:00 UTC) to121118 (00:00 UTC)
Bucket amount [mm]
800
600
400
200
0
Raw (RT)
Filtered (NRT)
Intensity RT [mm/h]
1
0.5
0
-0.5
-1
Precip accum. [mm]
RT-NRT
NRT
Total accum. NRT [mm]
257
256
255
254
00:00
04:00
08:00
12:00
16:00
20:00
UTC Time [HH:MM]

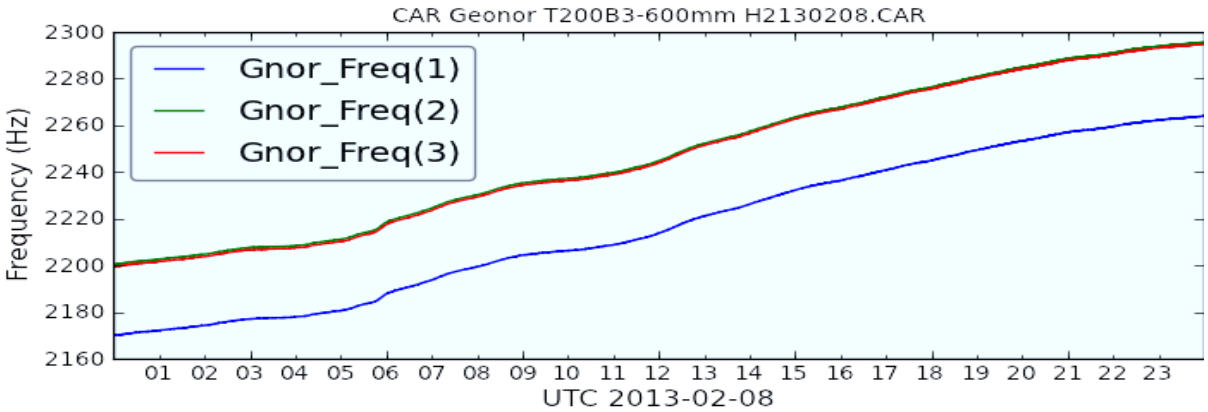

CAR - Pluvio2 HN - Heated, Belfort Double-Alter -121116 (00:00 UTC) to121118 (00:00 UTC)
Load temperature [deg C]
15
10
5
0
-5
00:00
04:00
08:00
12:00
16:00
20:00
00:00
04:00
08:00
12:00
16:00
20:00
00:00
Status [0=OFF 128=ON]
150
100
50
0
Gauge status
Heater status
00:00
04:00
08:00
12:00
16:00
20:00
00:00
04:00
08:00
12:00
16:00
20:00
00:00
UTC Time [HH:MM]

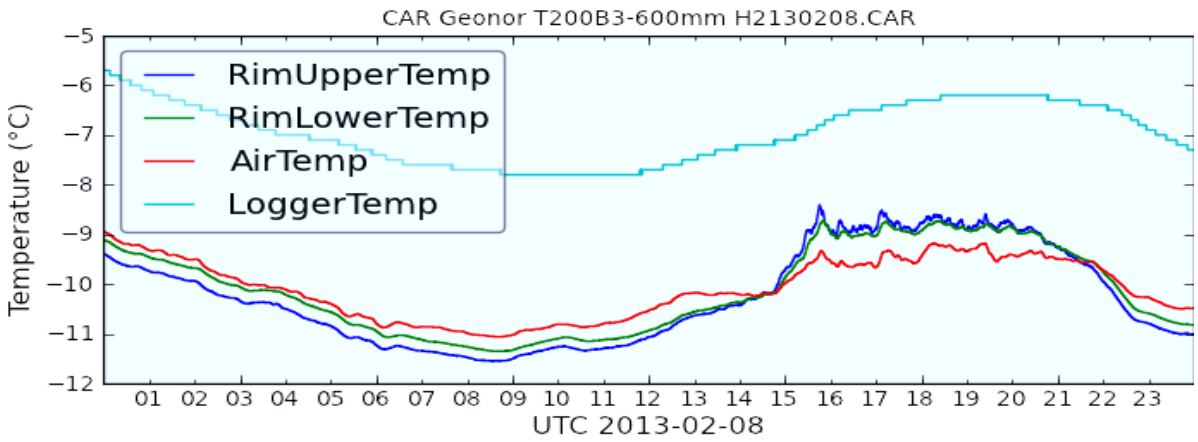

CAR - RM Young 5103 - 10 m -121116 (00:00 UTC) to121118 (00:00 UTC)
Wind speed [m/s]
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
Wind direction [deg]
0
50
100
150
200
250
300
350
00:00
04:00
08:00
12:00
16:00
20:00
00:00
04:00
08:00
12:00
16:00
20:00
00:00
UTC Time [HH:MM]

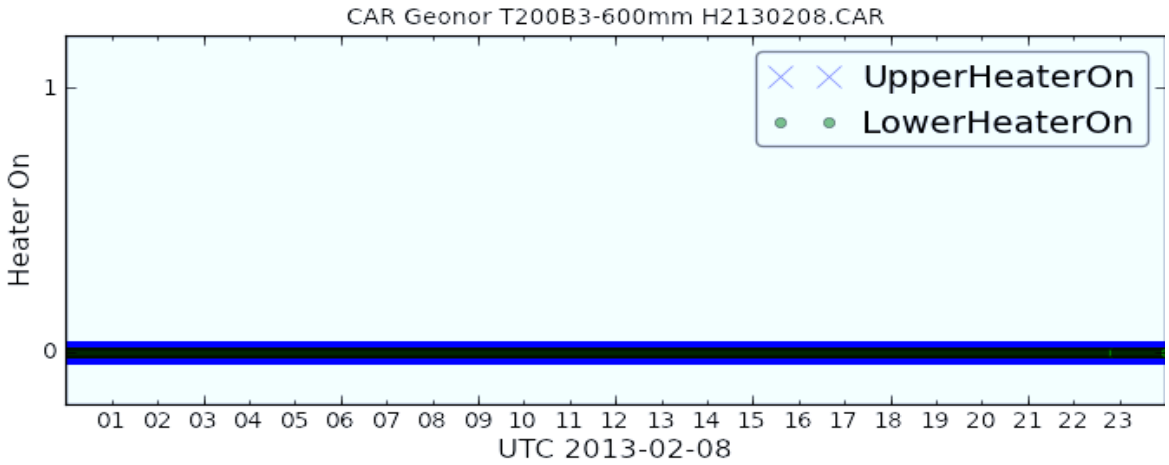
INSTRUMENT DATA VALIDATION – REFERENCE GAUGES: 24 HOUR PLOTS

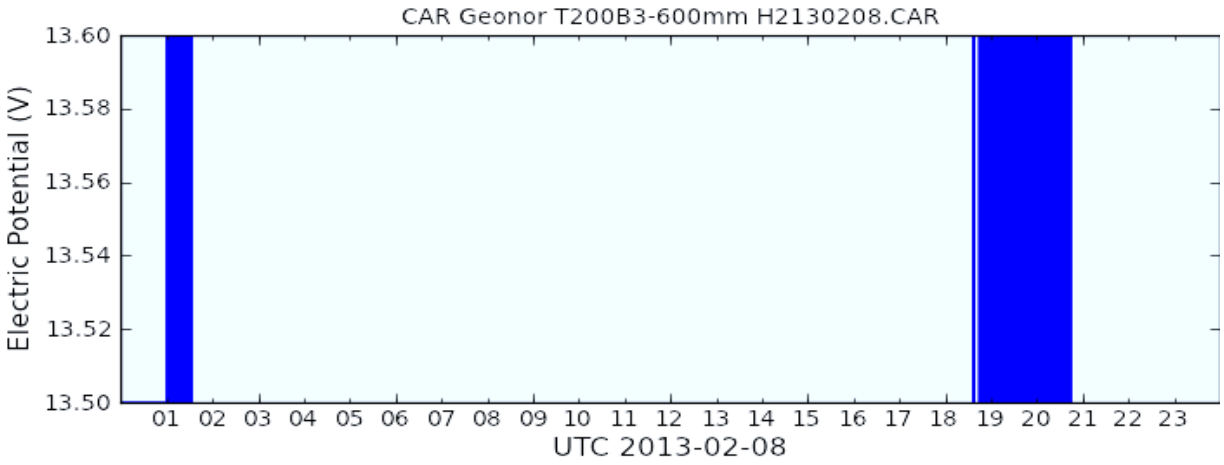
CAR H2- R2 Reference - Geonor- Heated (CRN), DFIR - 08/02/13



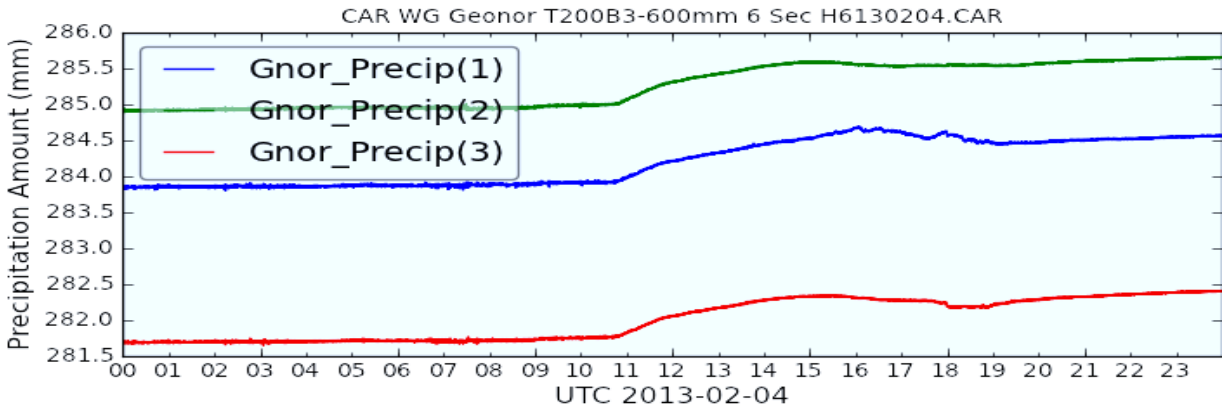


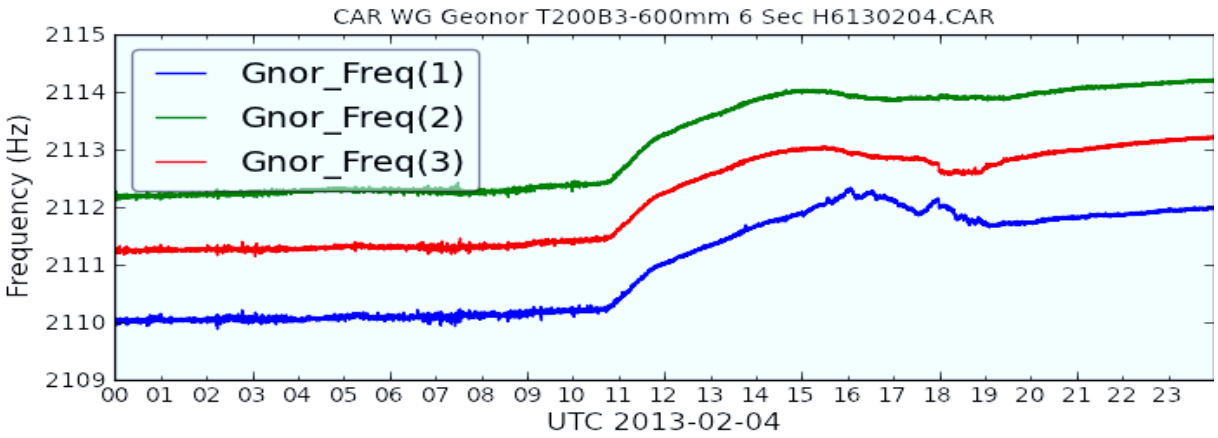

CAR Geonor T200B3-600mm H2130208.CAR
RimUpperTemp
RimLowerTemp
AirTemp
LoggerTemp
Temperature (°C)
−5
−6
−7
−8
−9
−10
−11
−12
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-02-08

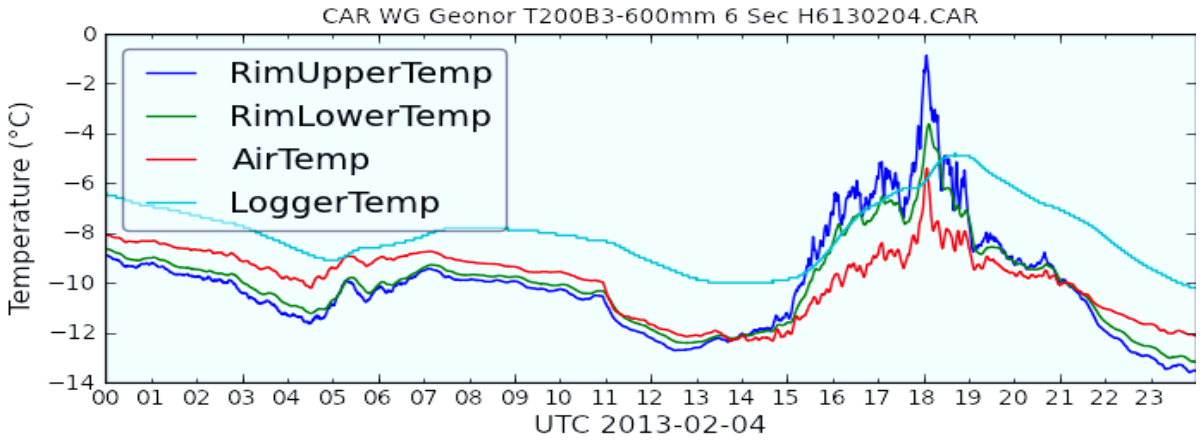

CAR Geonor T200B3-600mm H2130208.CAR
UpperHeaterOn
LowerHeaterOn
Heater On
1
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-02-08

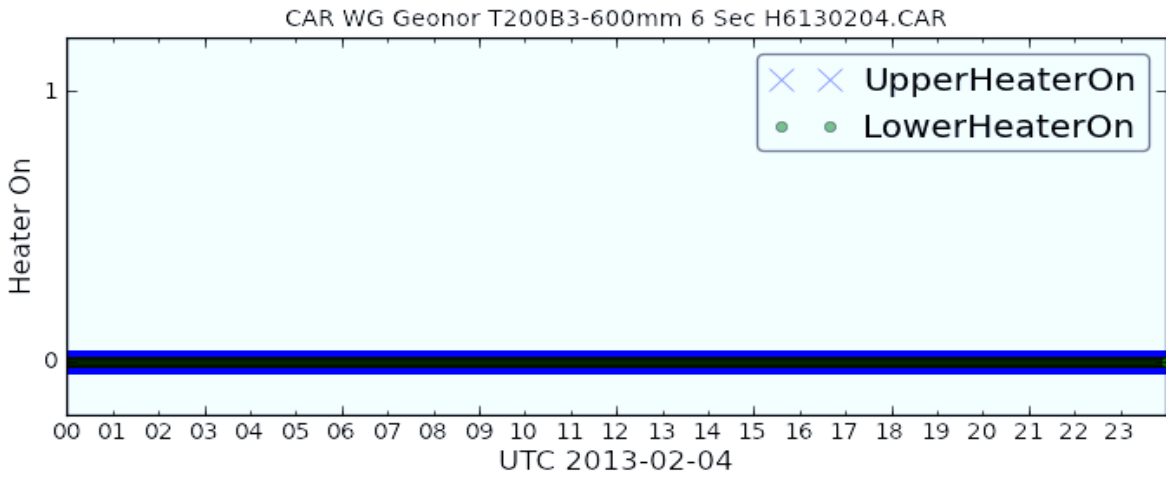

CAR Geonor T200B3-600mm H2130208.CAR
Electric Potential (V)
13.60
13.58
13.56
13.54
13.52
13.50
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-02-08

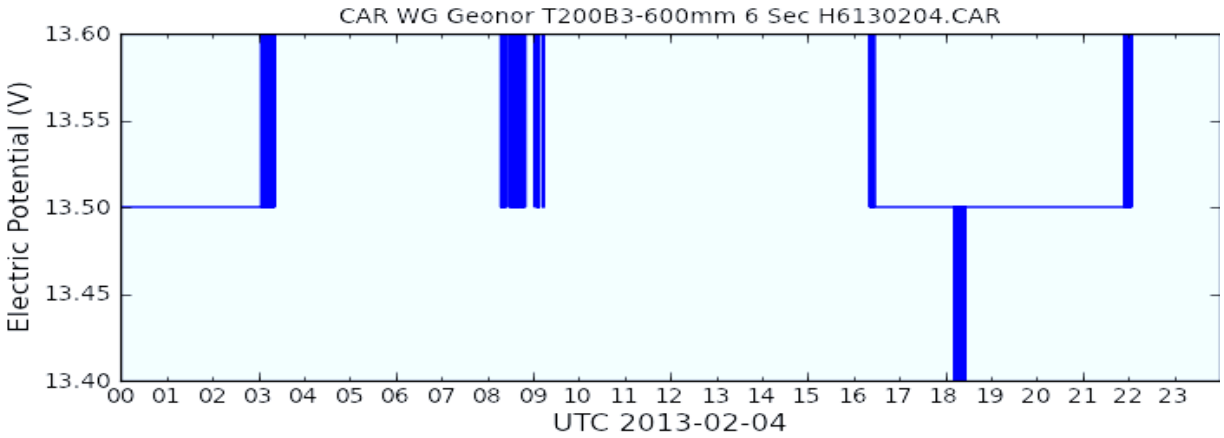
CAR H6- R3 Reference - Geonor- Heated (CRN), Single Alter - 04/02/13



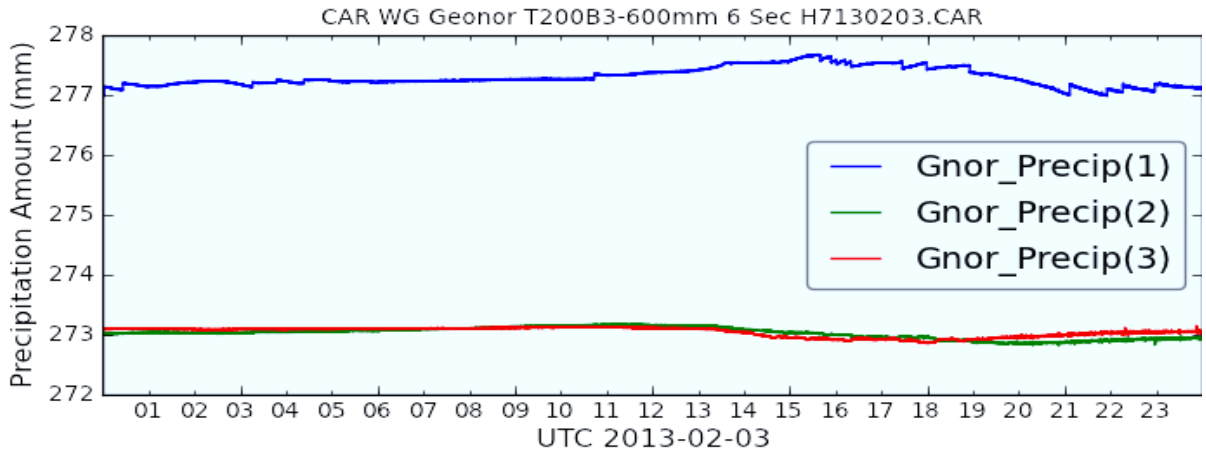


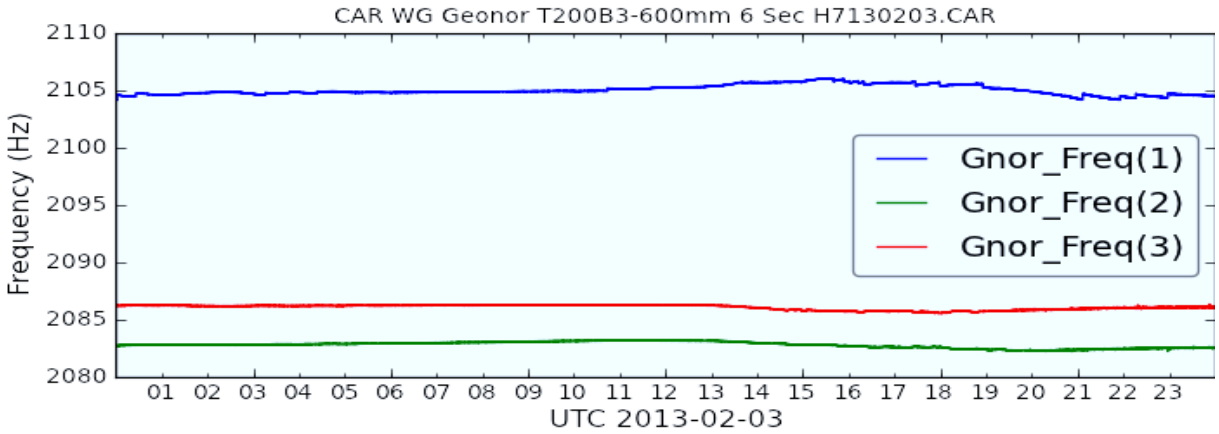


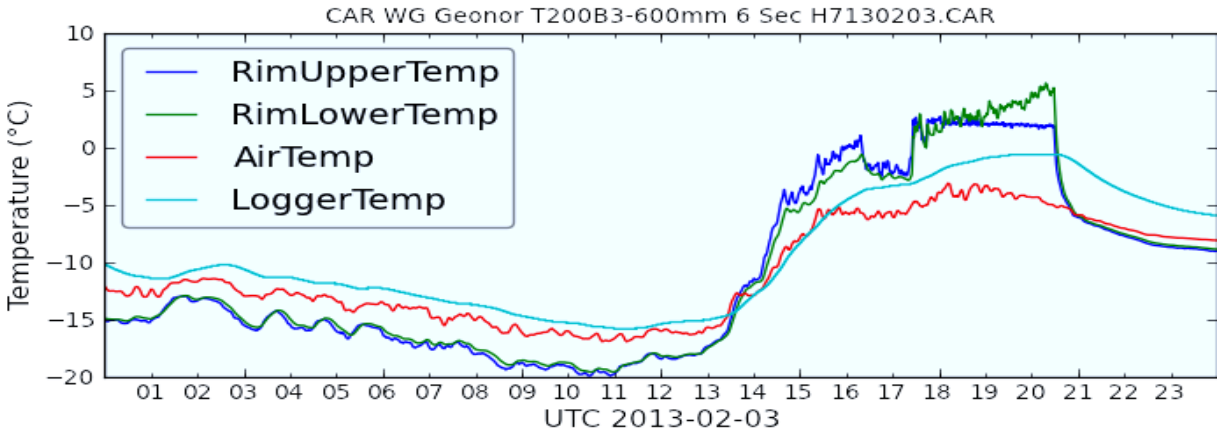

CAR WG Geonor T200B3-600mm 6 Sec H6130204.CAR
UpperHeaterOn
LowerHeaterOn
Heater On
1
0
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-02-04

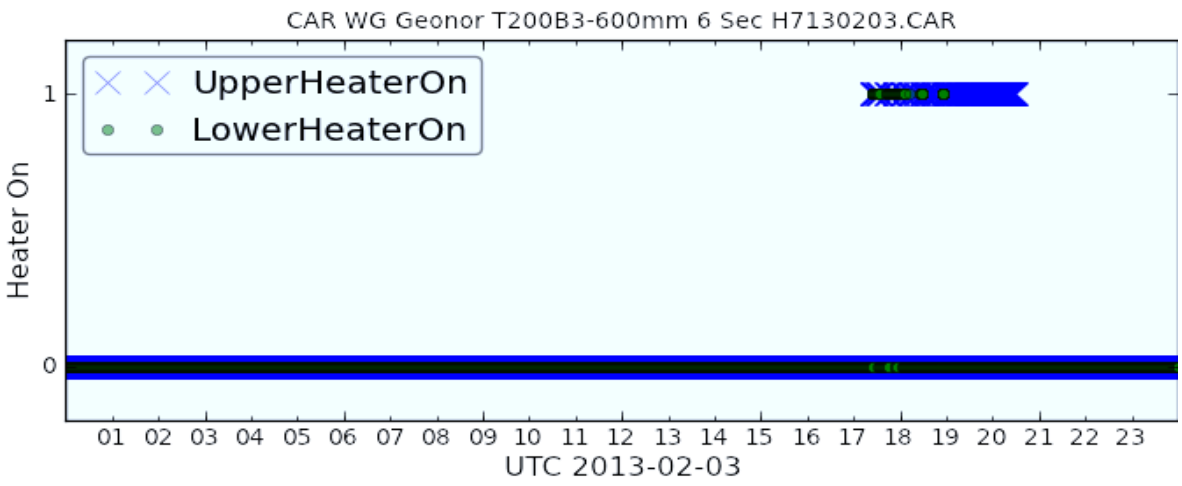

CAR WG Geonor T200B3-600mm 6 Sec H6130204.CAR
Electric Potential (V)
13.60
13.55
13.50
13.45
13.40
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-02-04

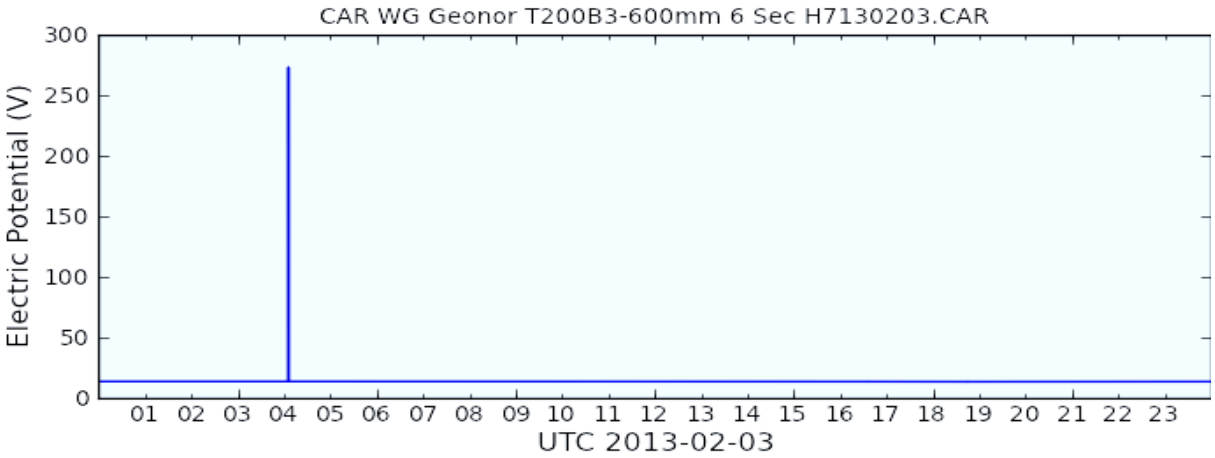
CAR H6- R3 Reference - Geonor- Heated (CRN), No Shield - 03/02/13





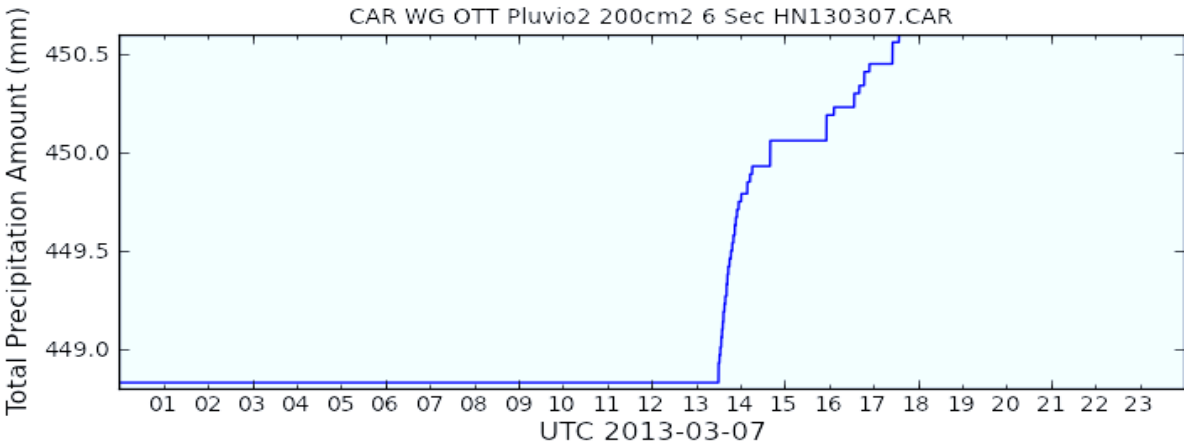


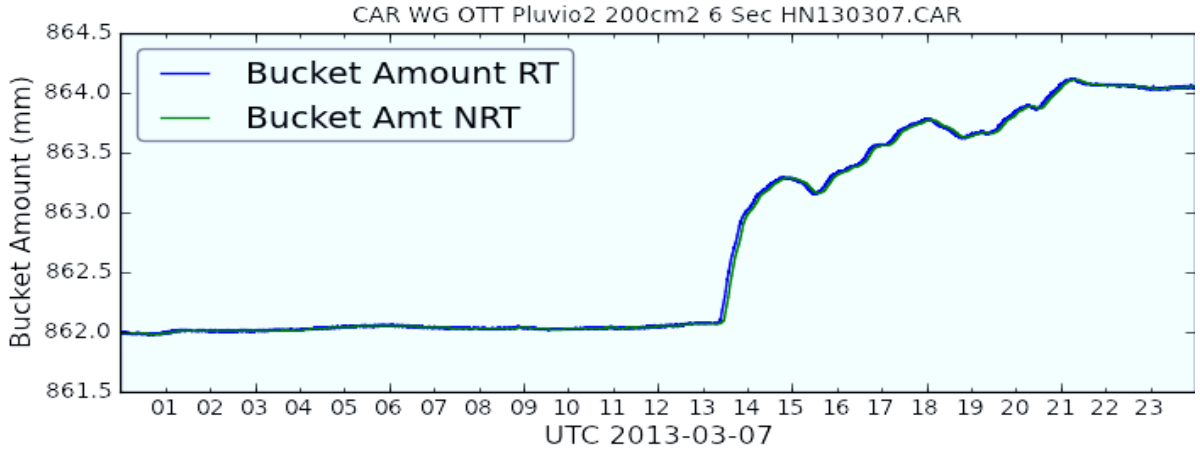

CAR WG Geonor T200B3-600mm 6 Sec H7130203.CAR
UpperHeaterOn
LowerHeaterOn
Heater On
1
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-02-03

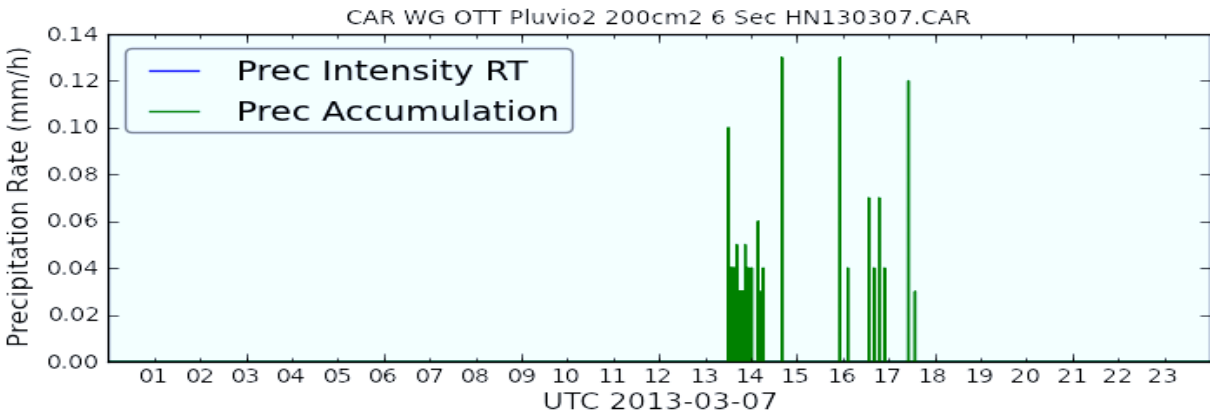

CAR WG Geonor T200B3-600mm 6 Sec H7130203.CAR
Electric Potential (V)
300
250
200
150
100
50
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-02-03

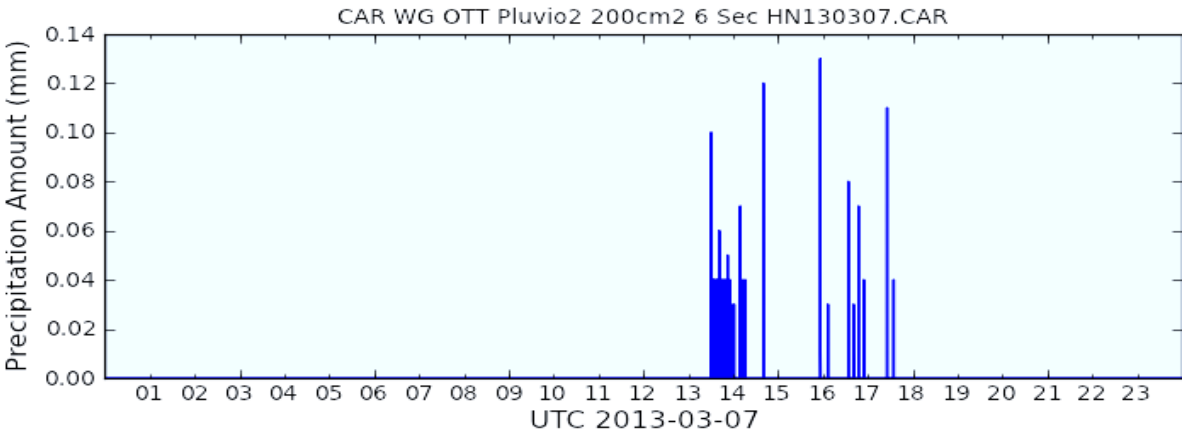
INSTRUMENT DATA VALIDATION – INSTRUMENTS UNDER TEST: 24 HOUR PLOTS

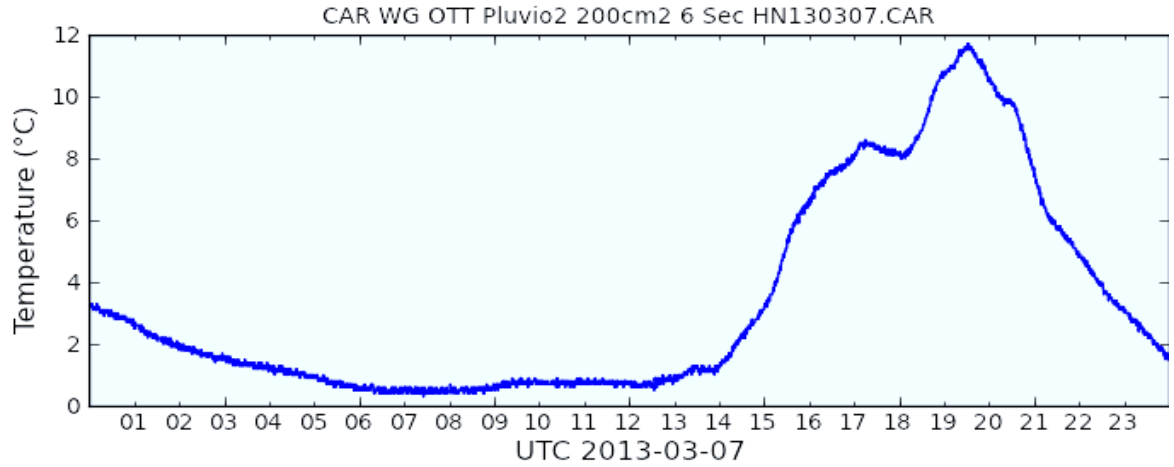
CAR HN- Pluvio2 200 cm^2- Heated, Belfort Double Alter - 07/03/13



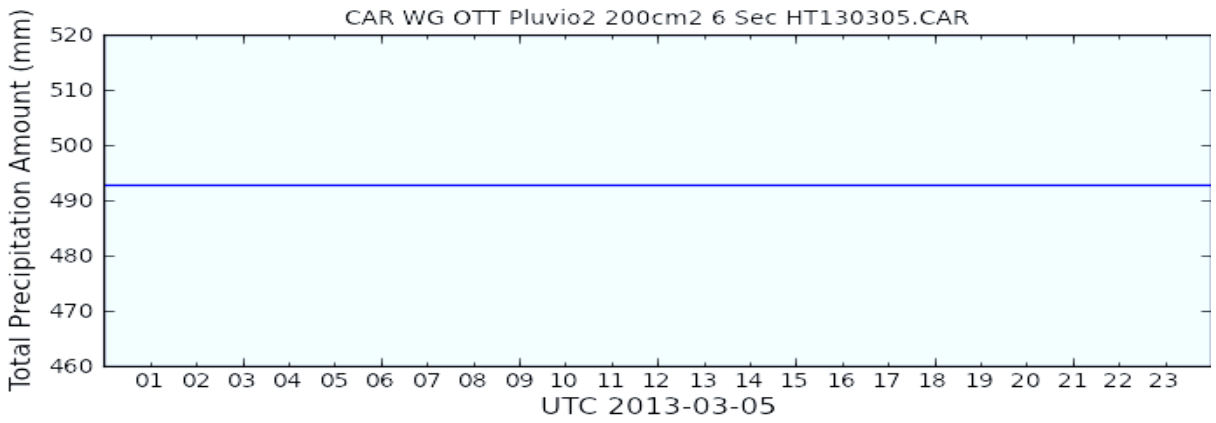


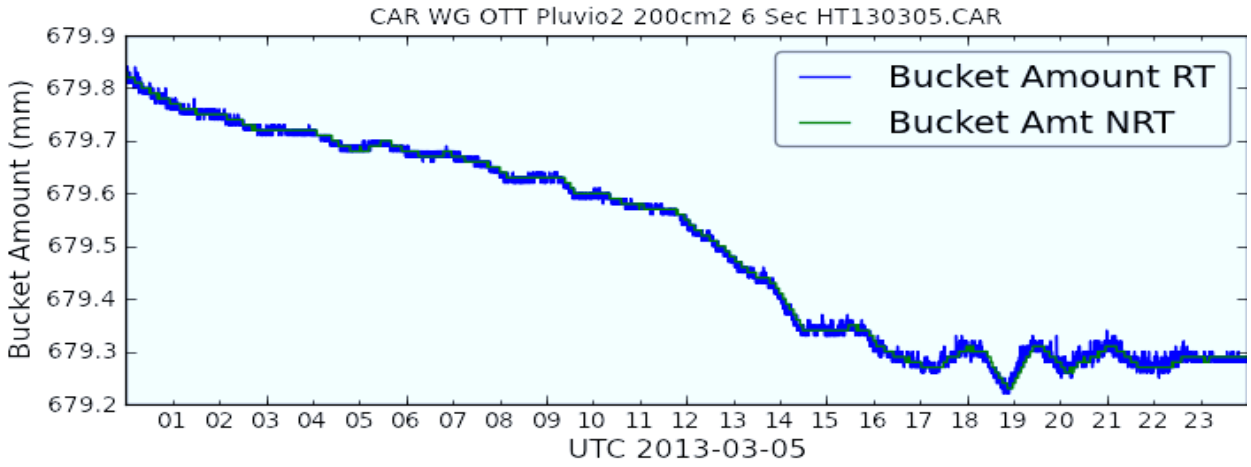

CAR WG OTT Pluvio2 200cm2 6 Sec HN130307.CAR
Prec Intensity RT
Prec Accumulation
Precipitation Rate (mm/h)
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-03-07

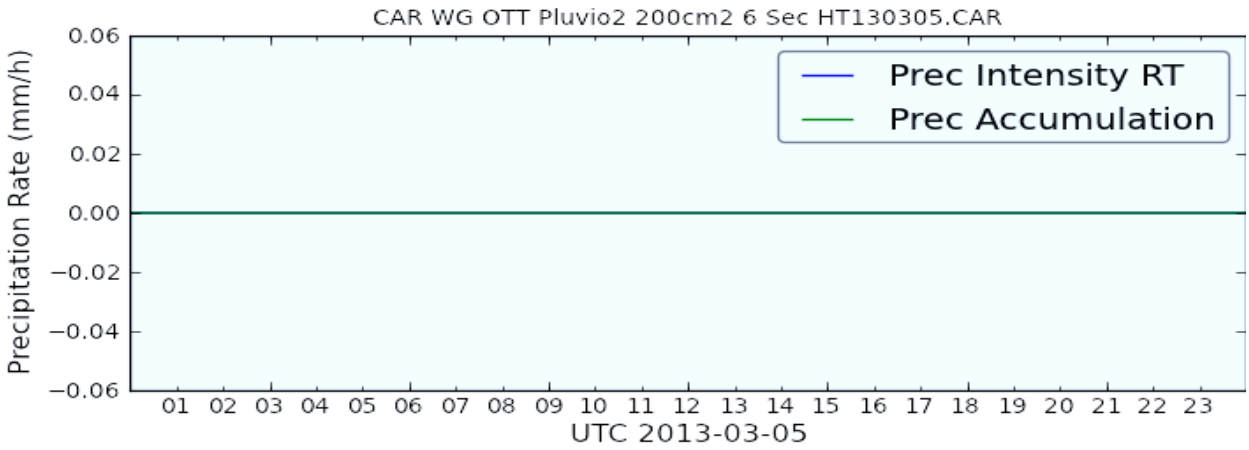

CAR WG OTT Pluvio2 200cm2 6 Sec HN130307.CAR
Precipitation Amount (mm)
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-03-07

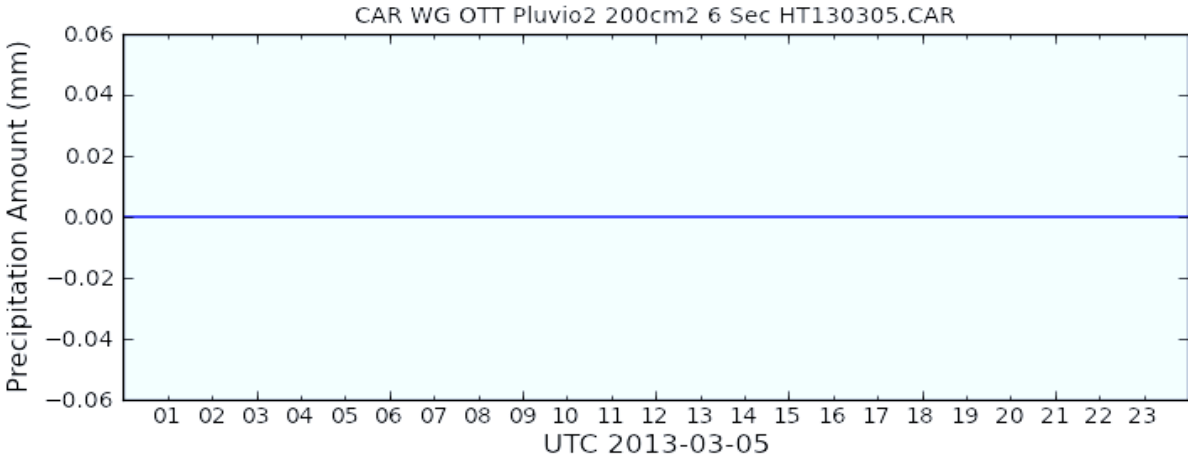

CAR WG OTT Pluvio2 200cm2 6 Sec HN130307.CAR
Temperature (°C)
12
10
8
6
4
2
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-03-07

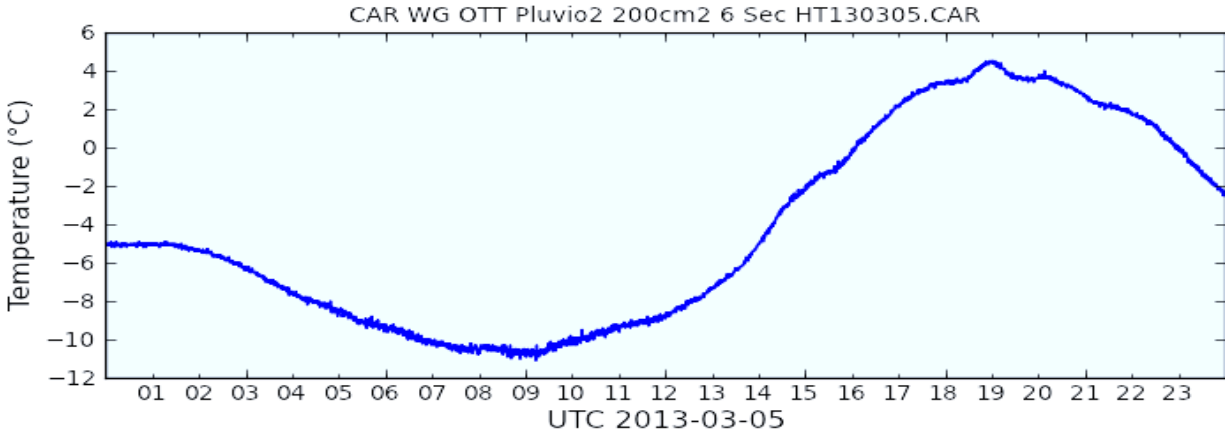
CAR HT - Pluvio2 200 cm^2- Heated, Single Alter 05/03/13



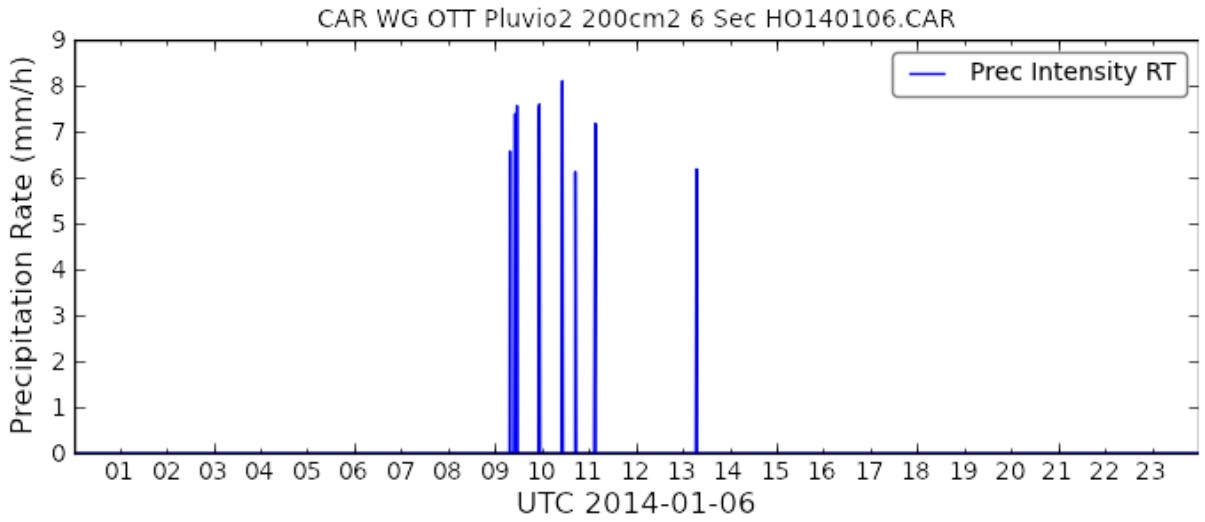


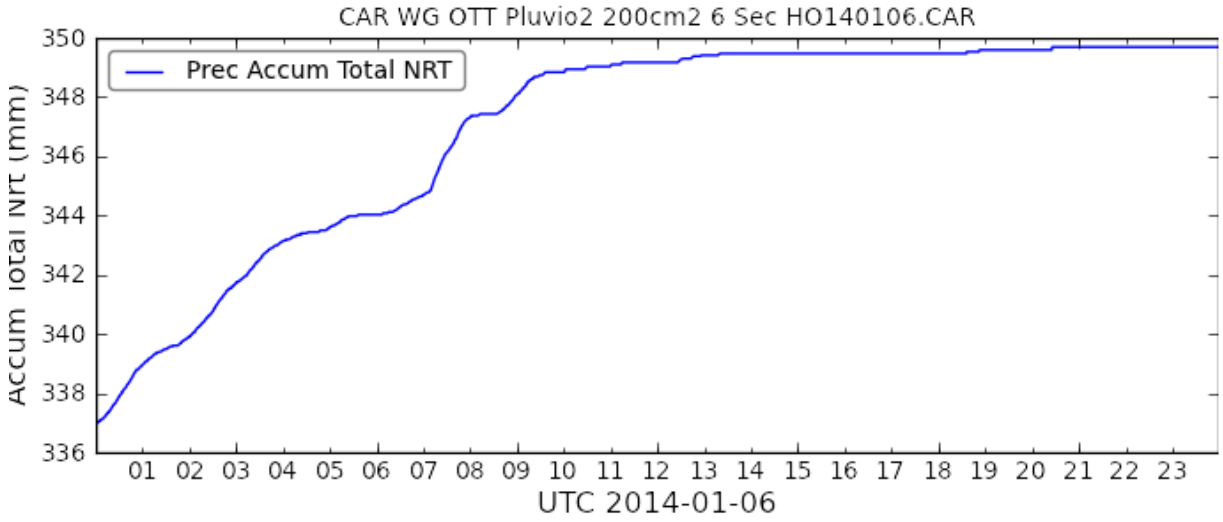


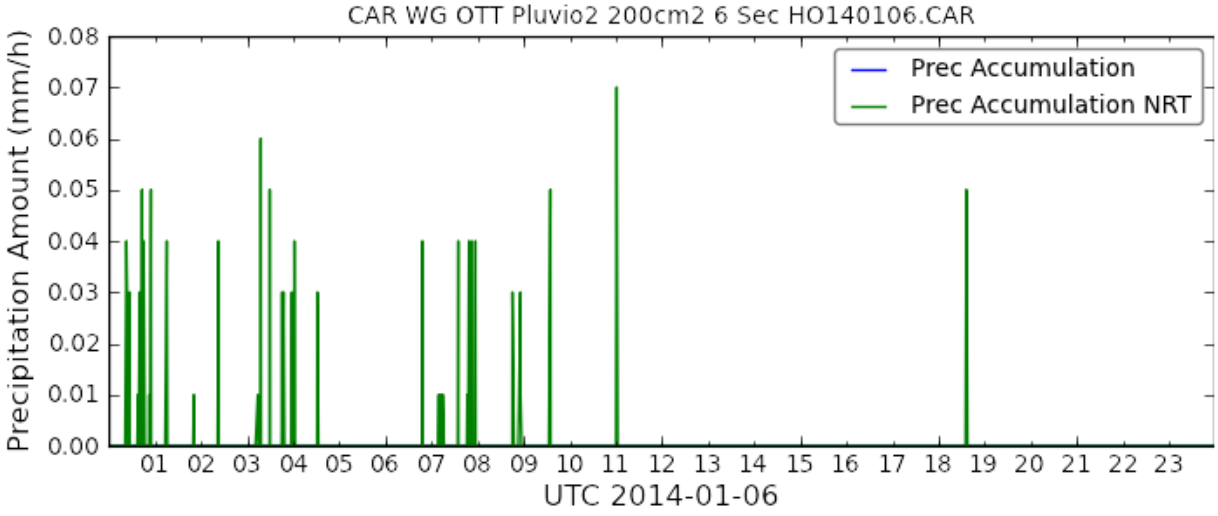

CAR WG OTT Pluvio2 200cm2 6 Sec HT130305.CAR
Precipitation Amount (mm)
0.06
0.04
0.02
0.00
−0.02
−0.04
−0.06
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-03-05

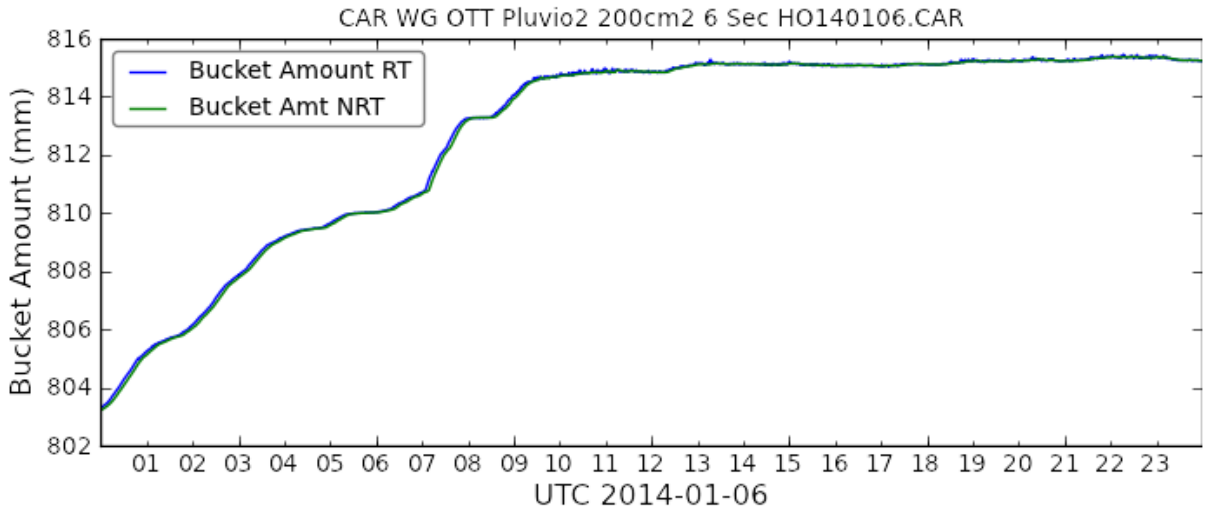

CAR WG OTT Pluvio2 200cm2 6 Sec HT130305.CAR
Temperature (°C)
6
4
2
0
−2
−4
−6
−8
−10
−12
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2013-03-05

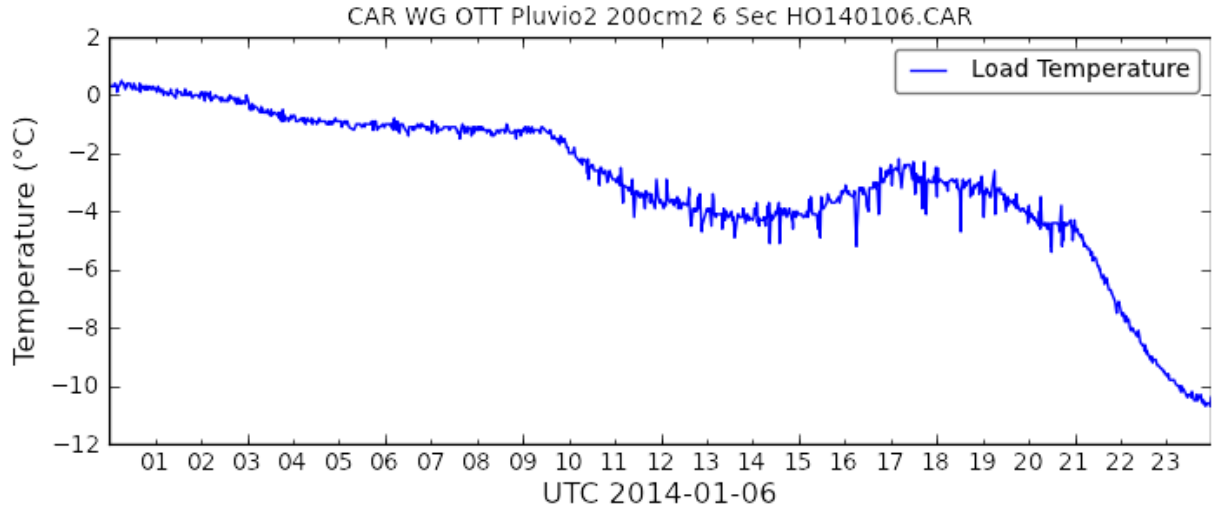
CAR HO - Pluvio2 200 cm^2- Heated, Belfort Double Alter 06/01/14



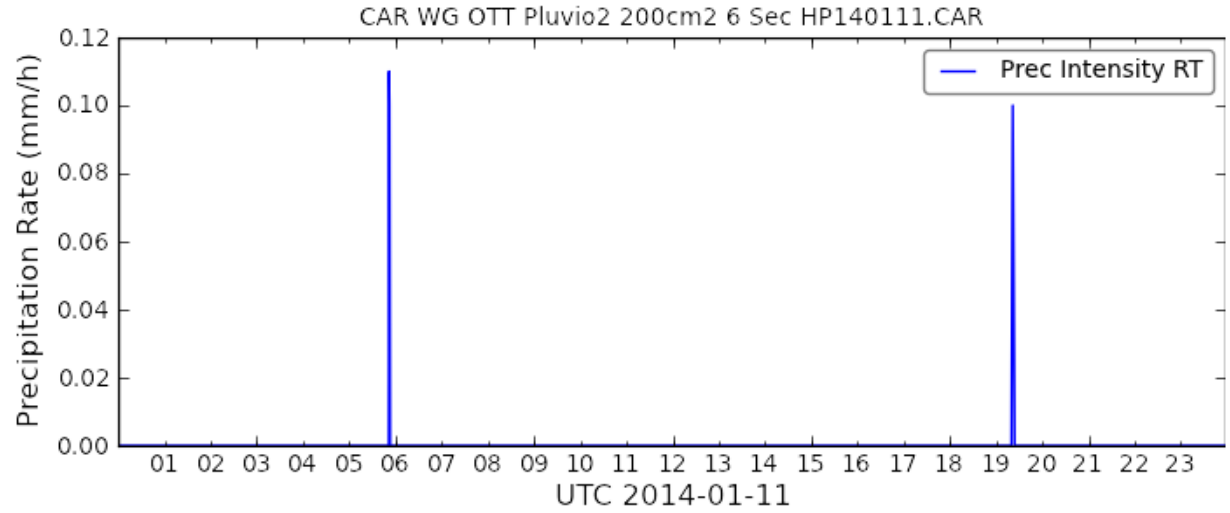


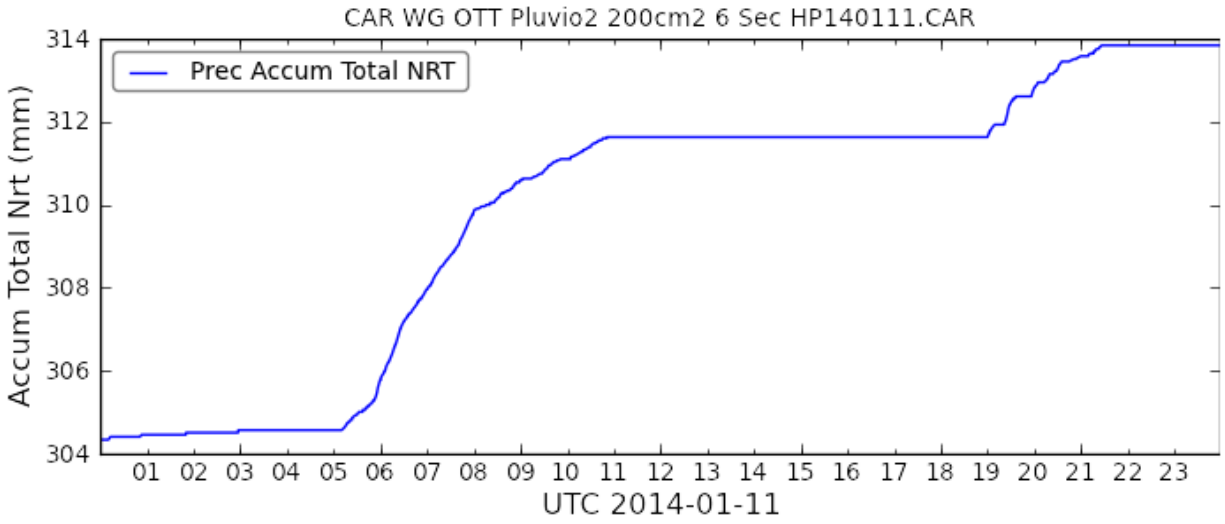


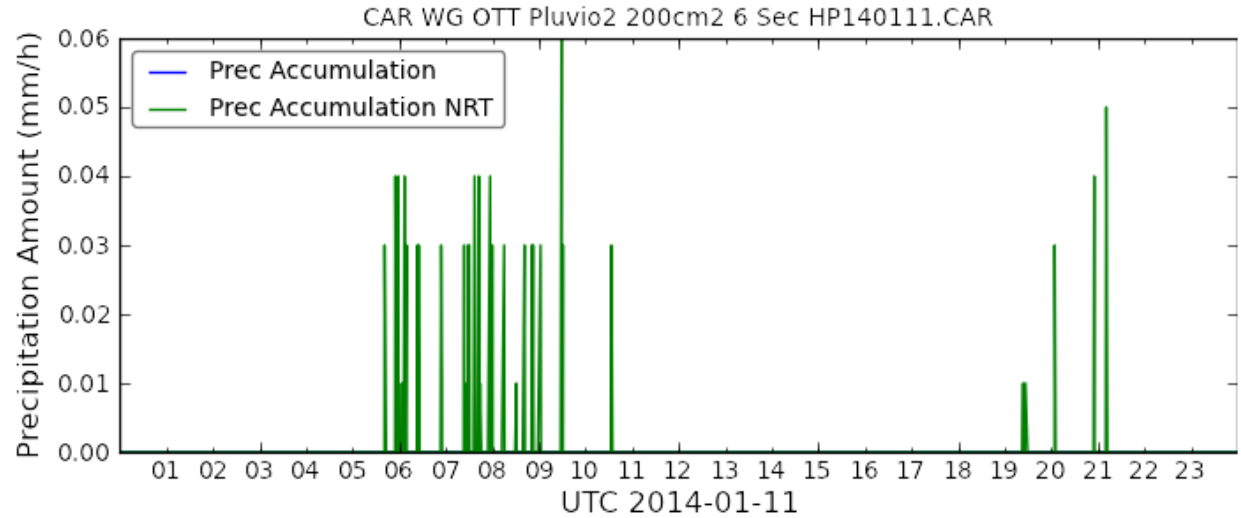

CAR WG OTT Pluvio2 200cm2 6 Sec HO140106.CAR
Bucket Amount RT
Bucket Amt NRT
Bucket Amount (mm)
816
814
812
810
808
806
804
802
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-06

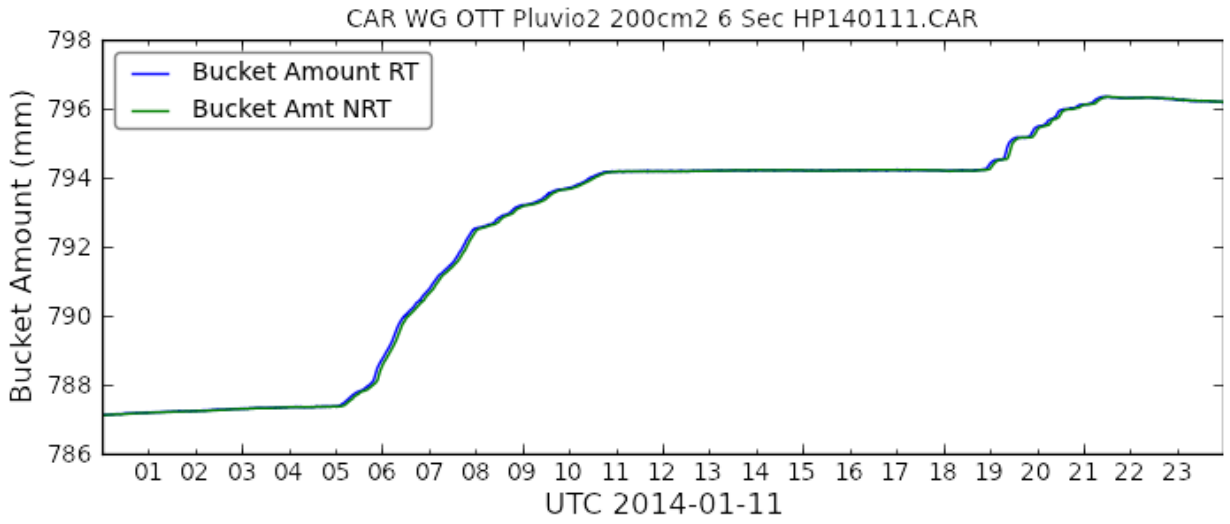

CAR WG OTT Pluvio2 200cm2 6 Sec HO140106.CAR
Load Temperature
Temperature (°C)
2
0
−2
−4
−6
−8
−10
−12
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-06

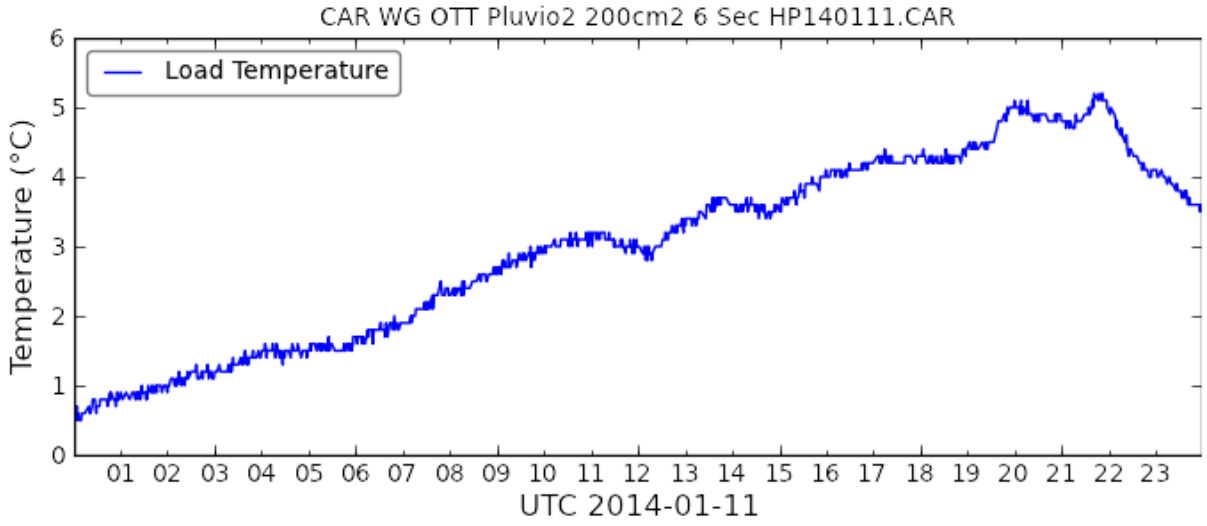
CAR HP - Pluvio2 200 cm^2- Heated, No shield 11/01/14



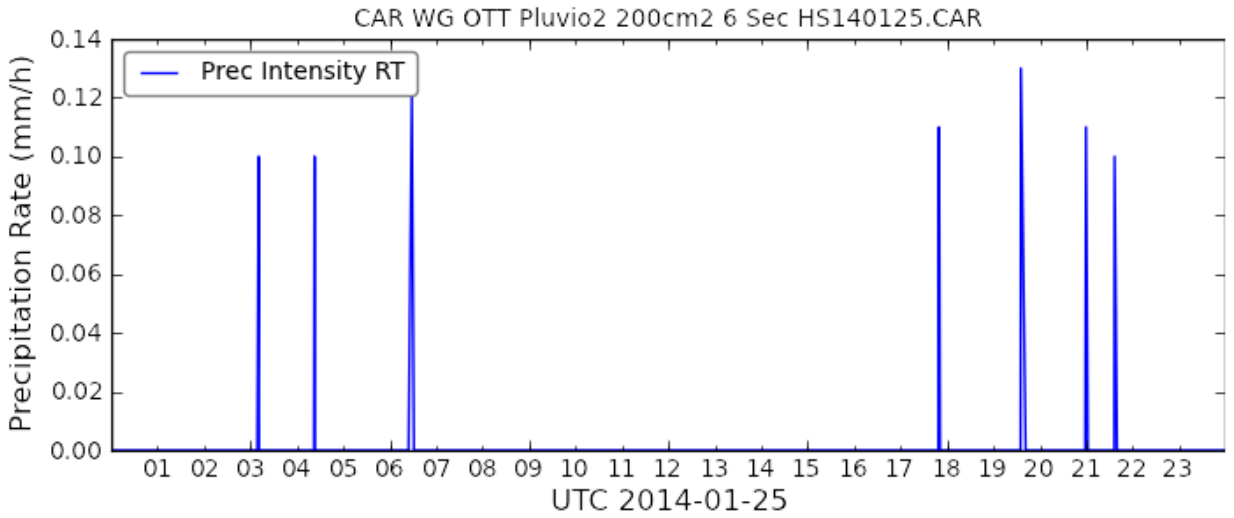


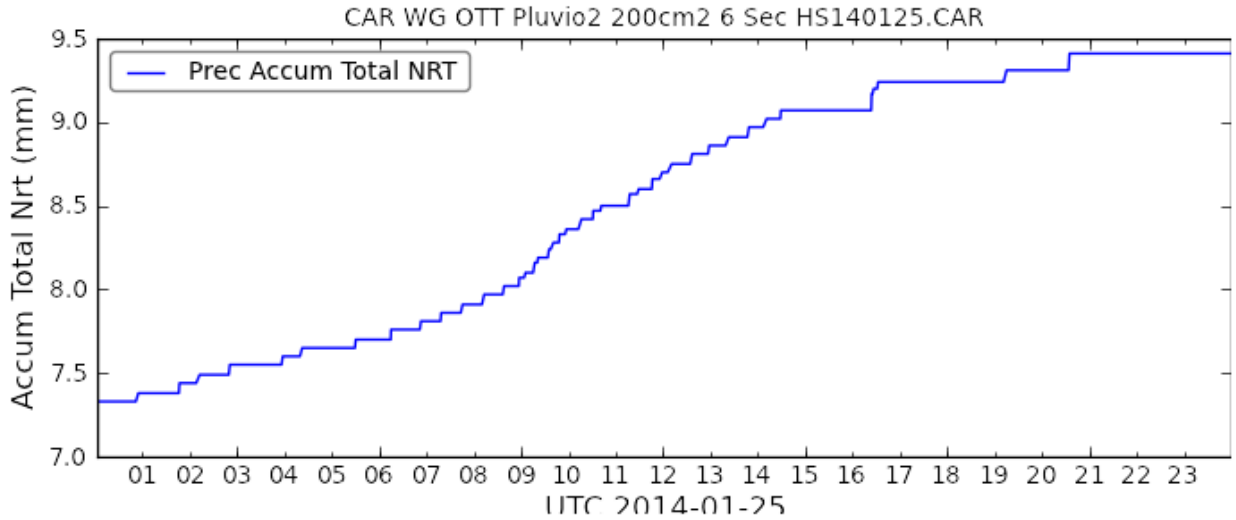


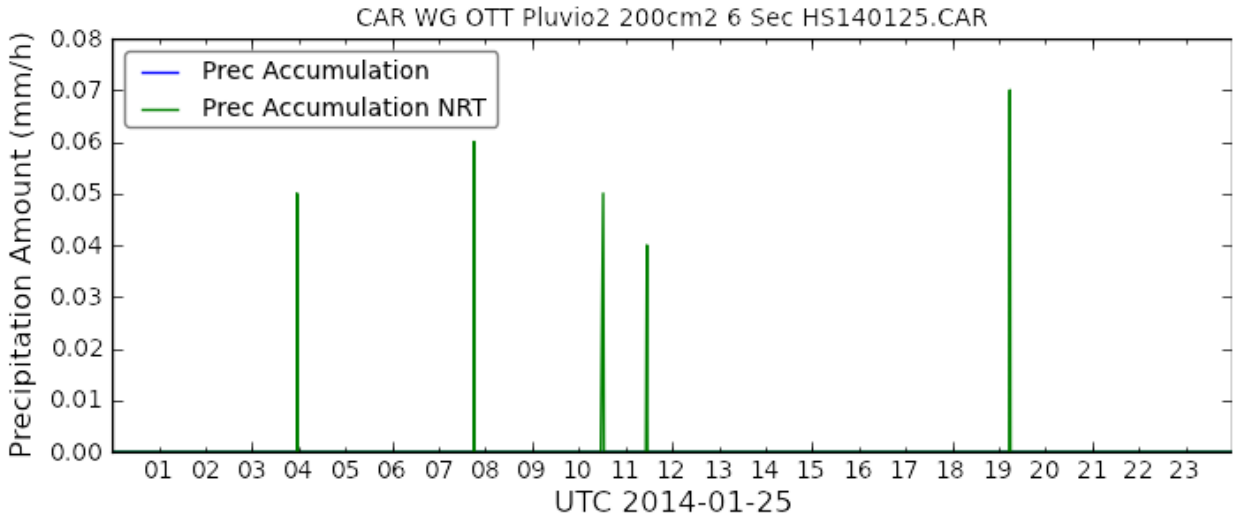

CAR WG OTT Pluvio2 200cm2 6 Sec HP140111.CAR
Bucket Amount RT
Bucket Amt NRT
Bucket Amount (mm)
798
796
794
792
790
788
786
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-11

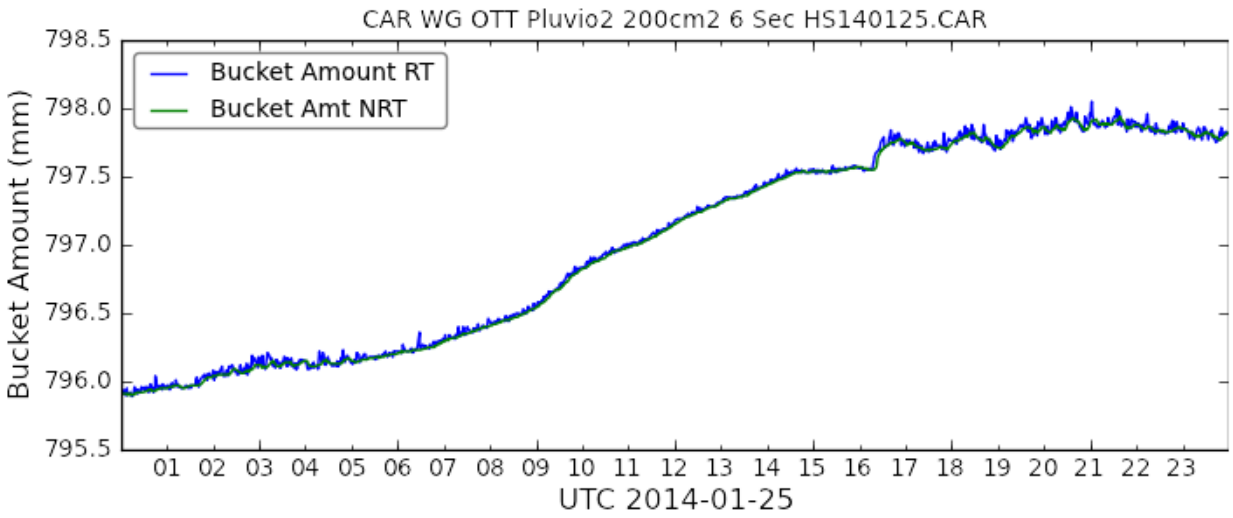

CAR WG OTT Pluvio2 200cm2 6 Sec HP140111.CAR
Load Temperature
Temperature (°C)
6
5
4
3
2
1
0
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-11

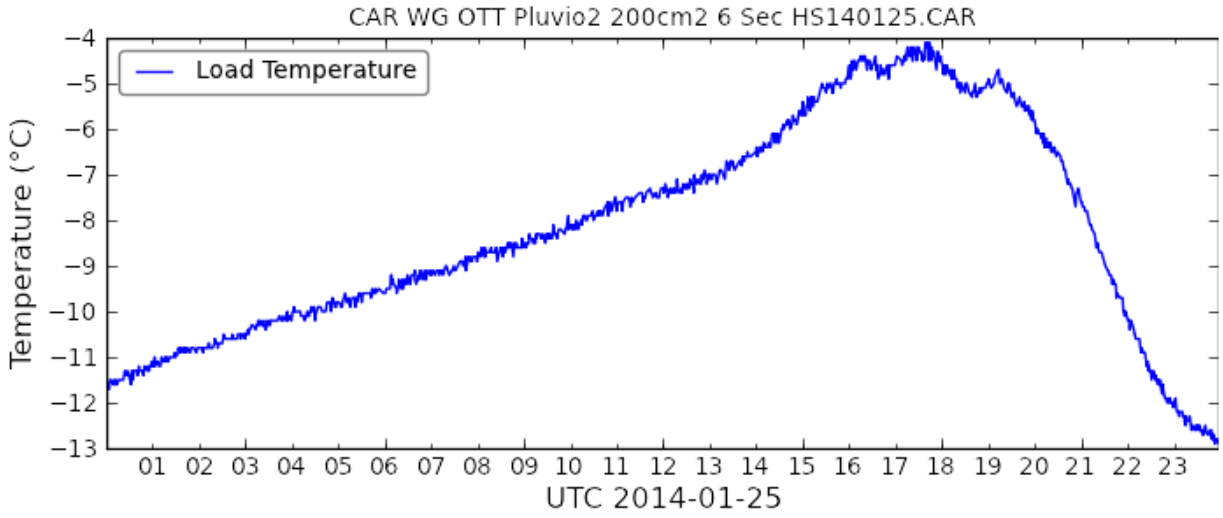
CAR HS - Pluvio2 200 cm^2- Heated, Double Alter 25/01/14



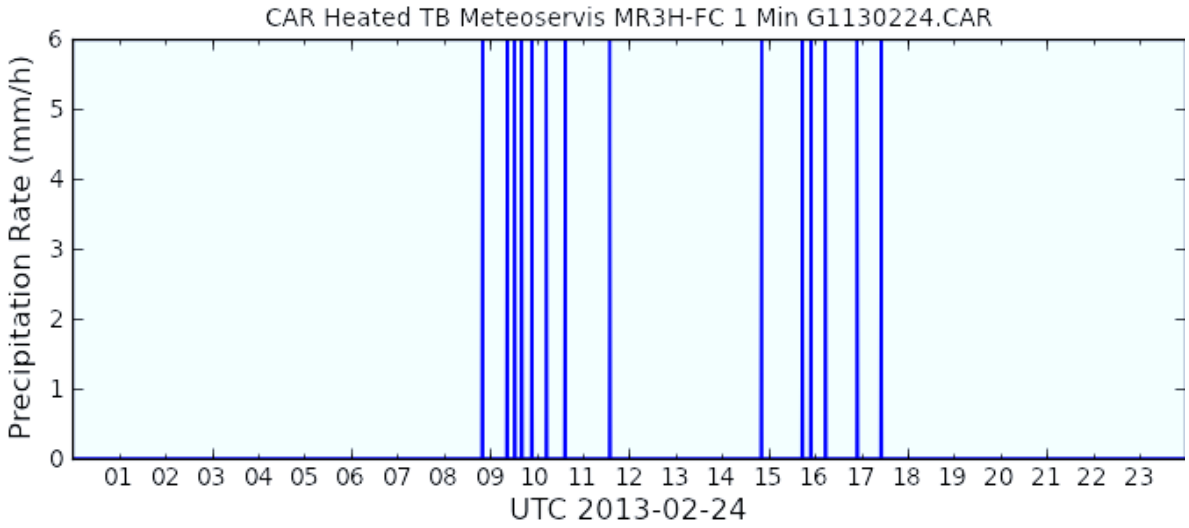




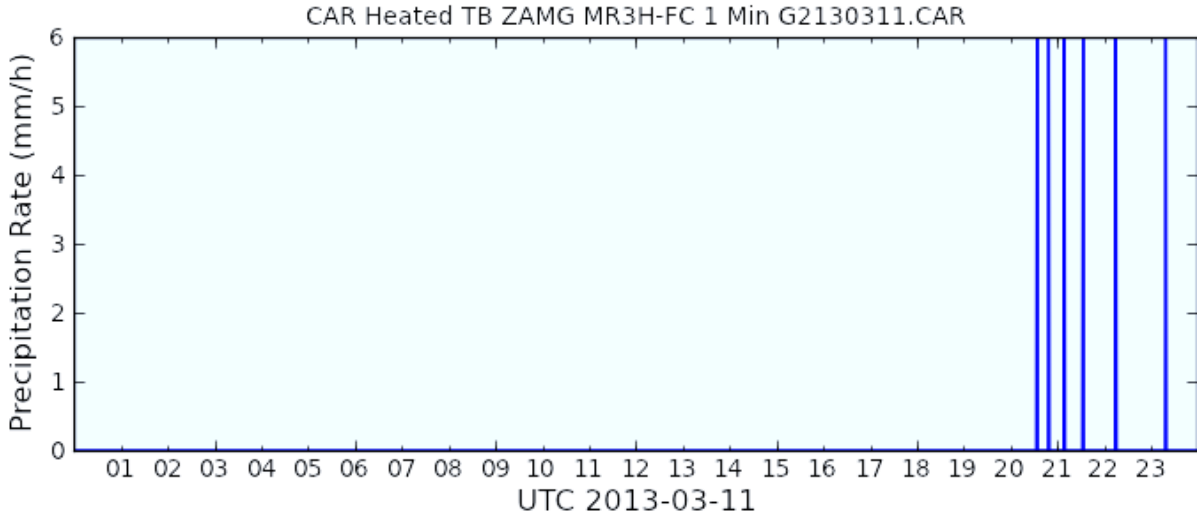

CAR WG OTT Pluvio2 200cm2 6 Sec HS140125.CAR
Bucket Amount RT
Bucket Amt NRT
Bucket Amount (mm)
798.5
798.0
797.5
797.0
796.5
796.0
795.5
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-25


CAR WG OTT Pluvio2 200cm2 6 Sec HS140125.CAR
Load Temperature
Temperature (°C)
−4
−5
−6
−7
−8
−9
−10
−11
−12
−13
01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-25

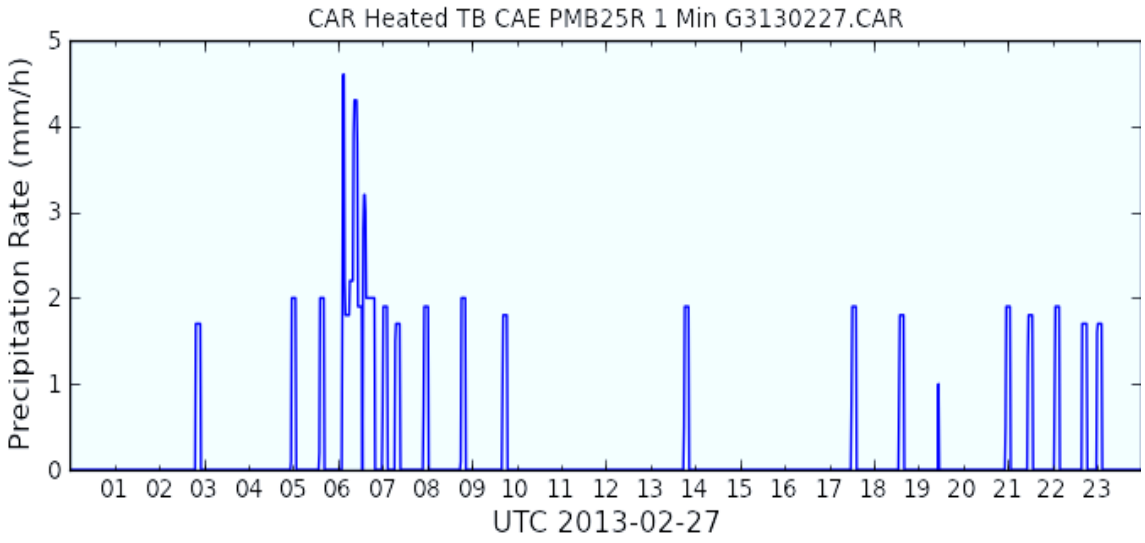
CAR G1 – Meteoservis MR3H-FC Tipping Bucket - 24/02/13

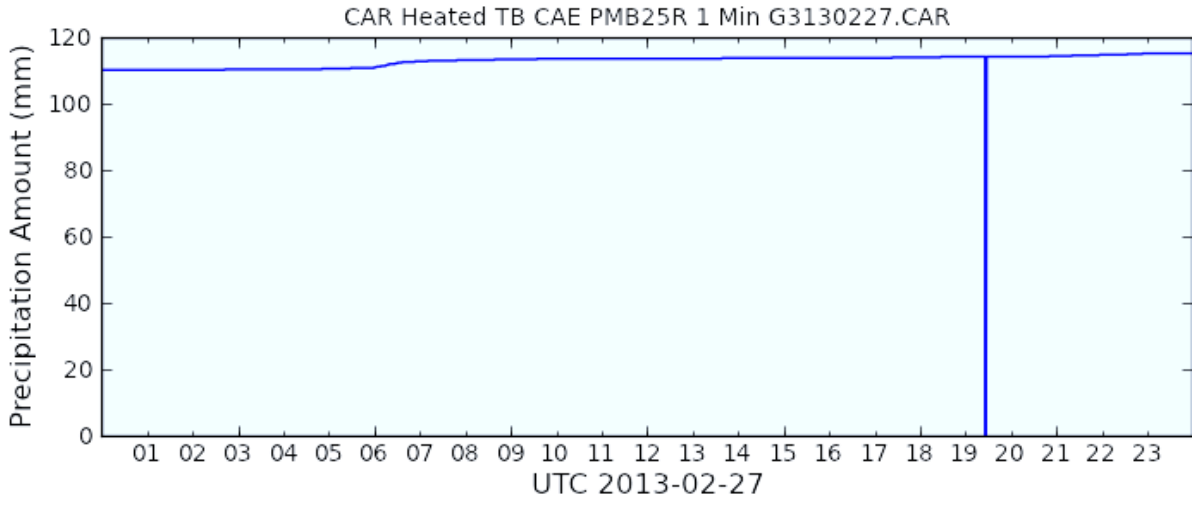


CAR G2 – ZAMG MR3H-FC Tipping Bucket - 11/03/13

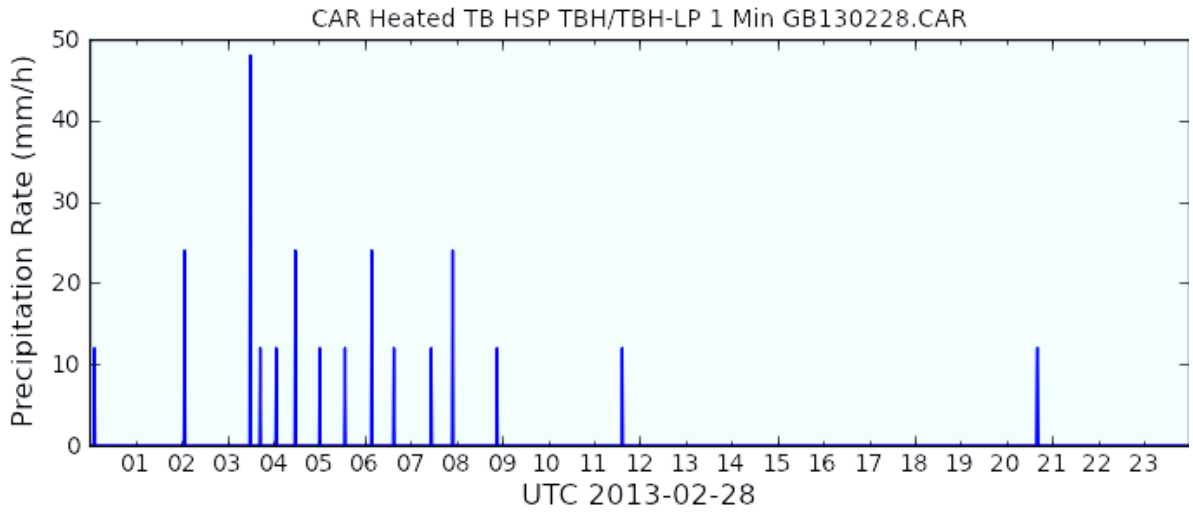


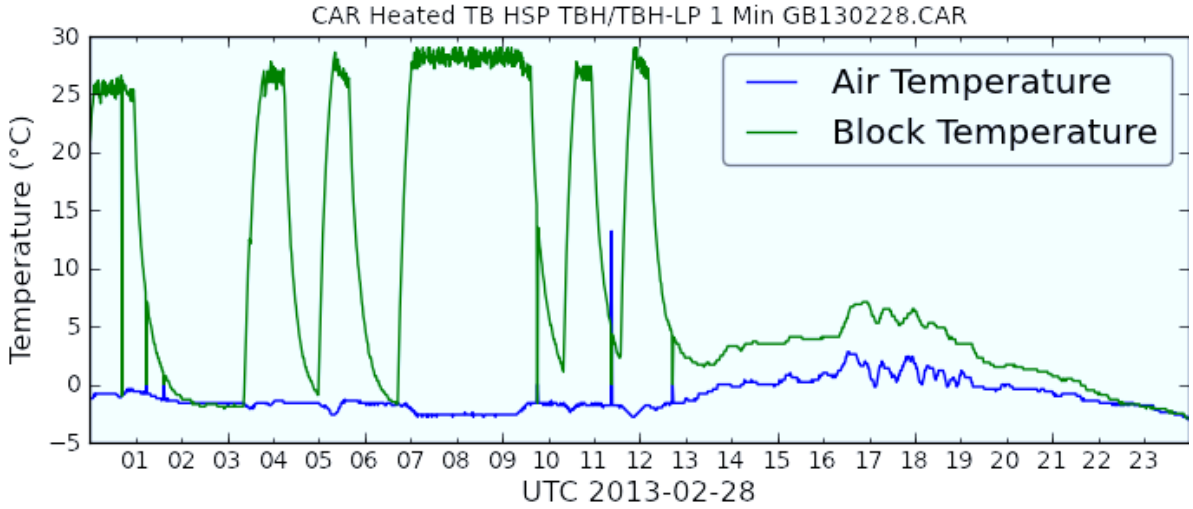
CAR G3 – CAE S.P A PMB25R Tipping Bucket - 27/02/13





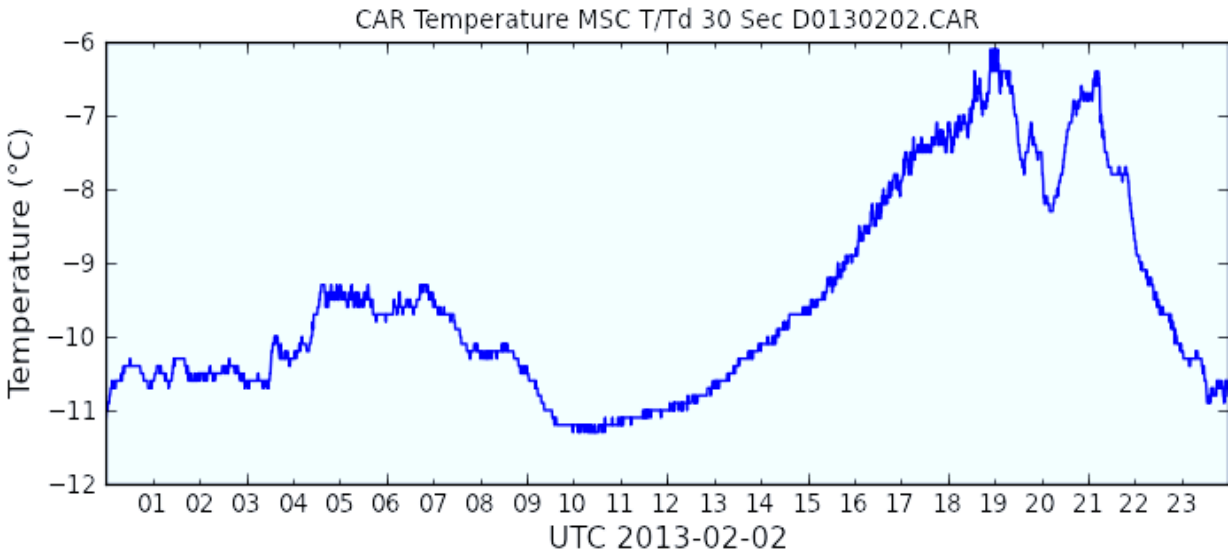
CAR GB – HSA TBH/TBH-LP Tipping Bucket - 28/02/13



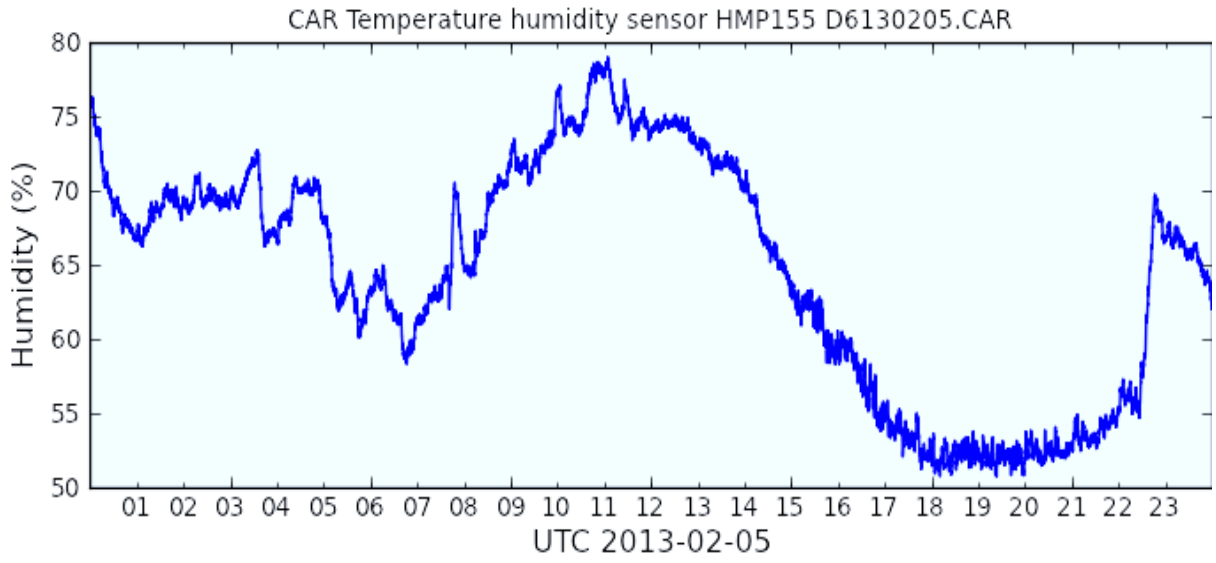


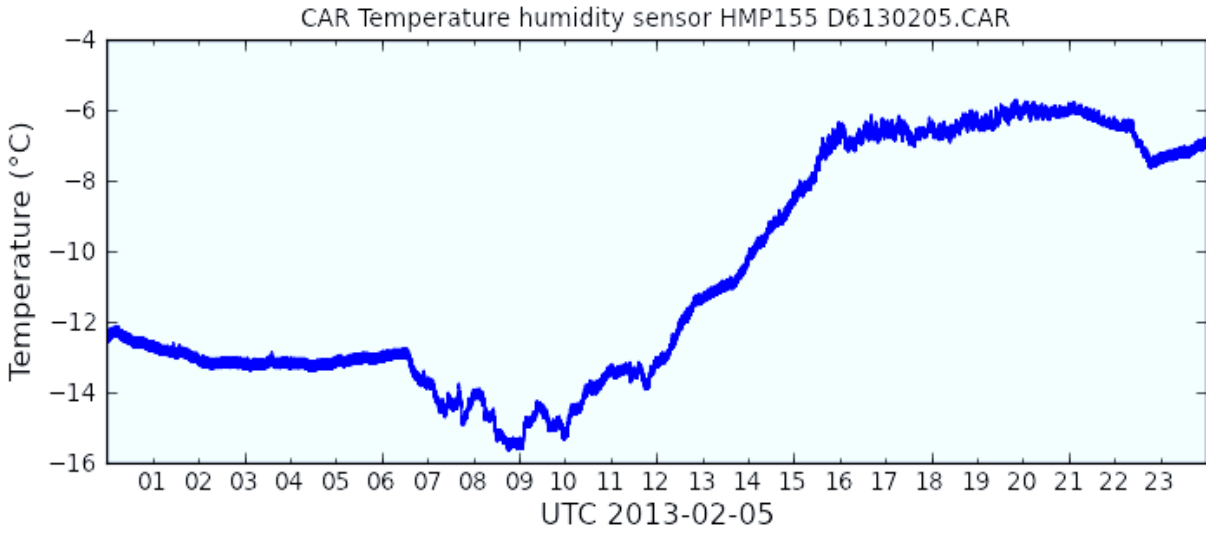
INSTRUMENT DATA VALIDATION – ANCILLARY MEASUREMENTS: 24 HOUR PLOTS

CAR D0 – YSI44212 – Air Temperature - 02/02/13

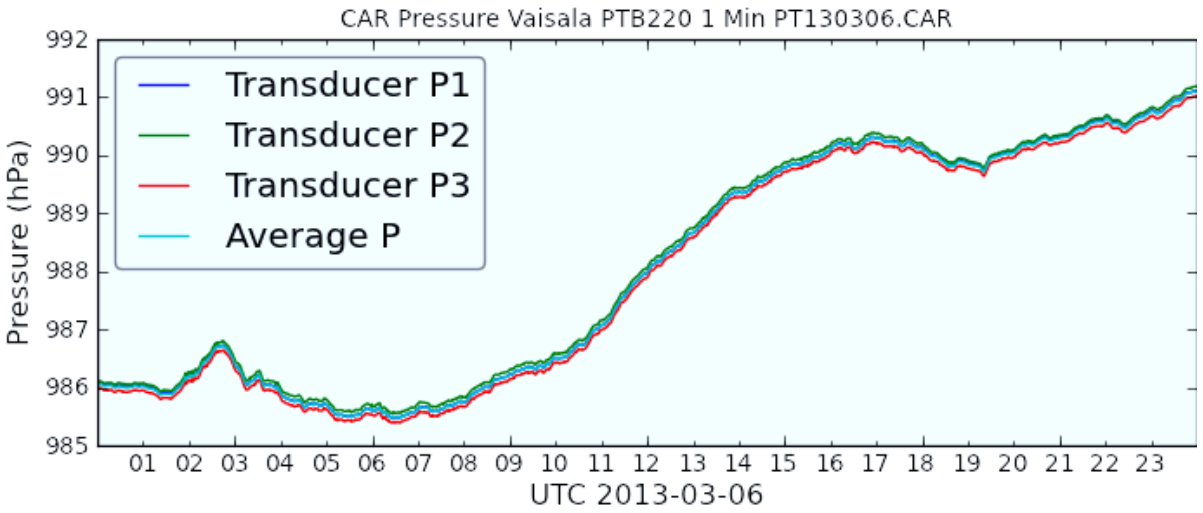


CAR D6 – HMP155 – Relative Humidity, Temperature - 05/02/13

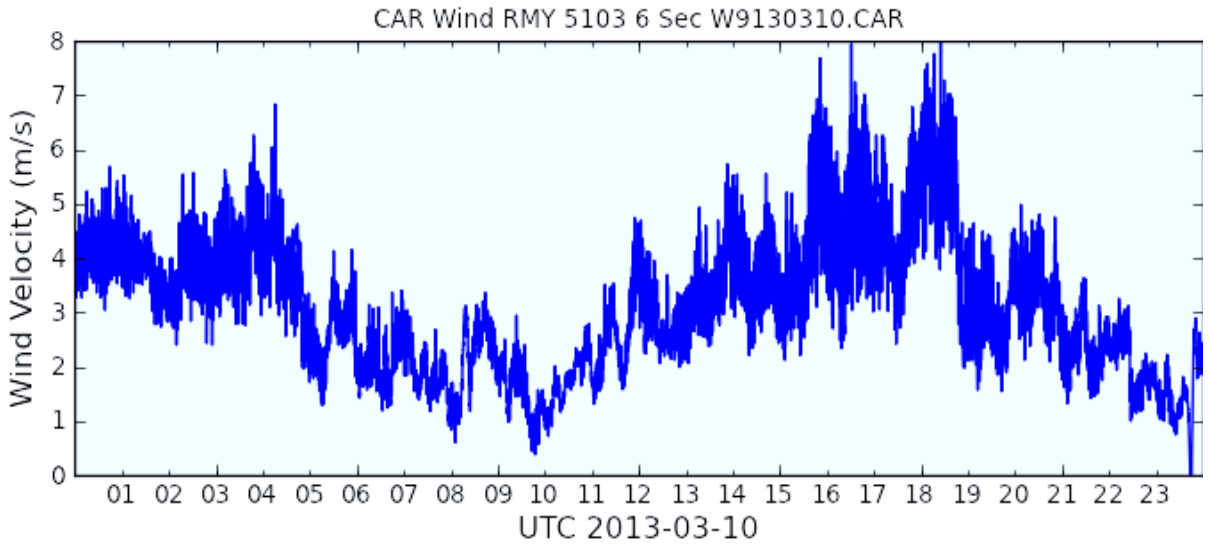


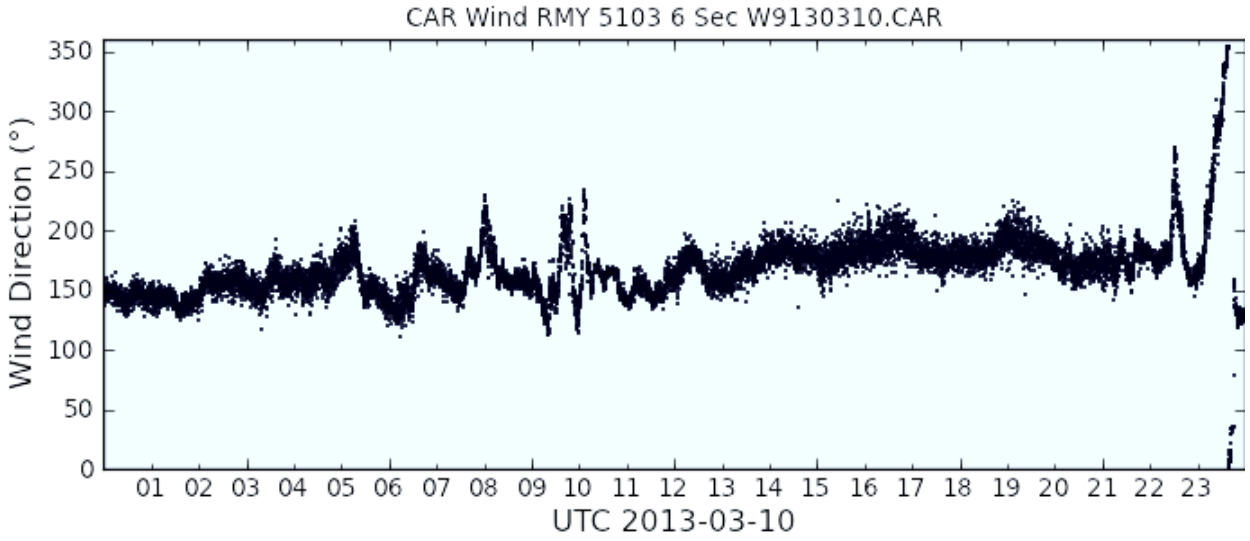


CAR PT – PTB220 – Atmospheric Pressure - 06/03/13

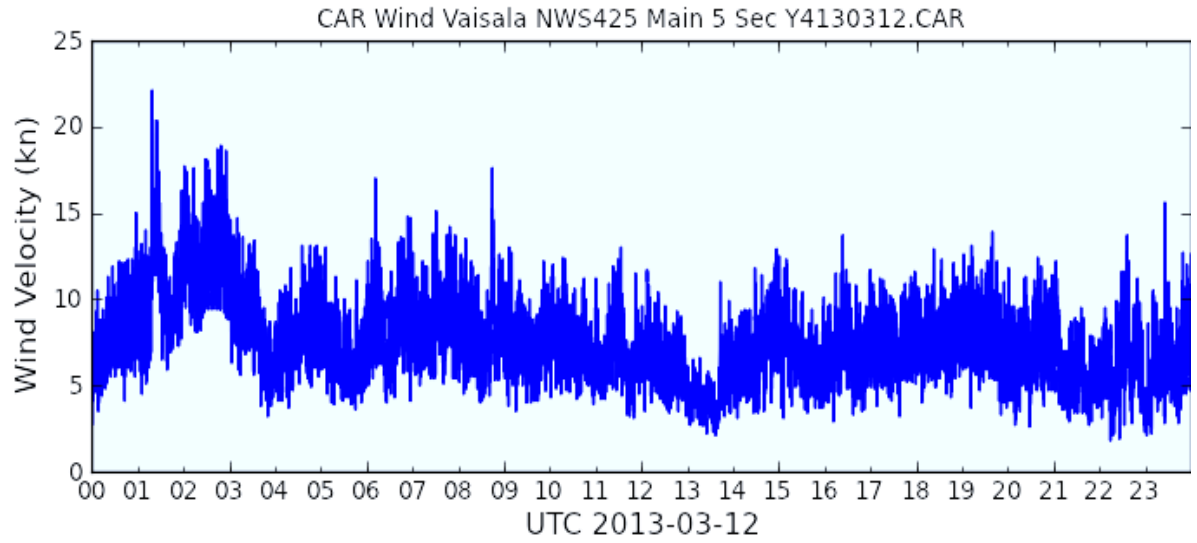


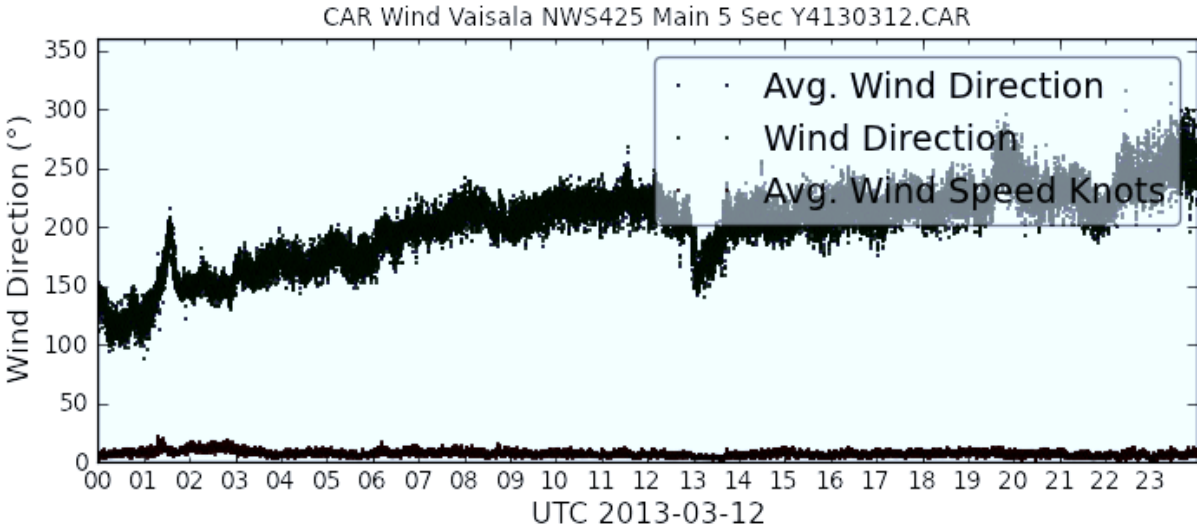
CAR W9 – RM YOUNG 5103 – 2D WIND - 10/03/13



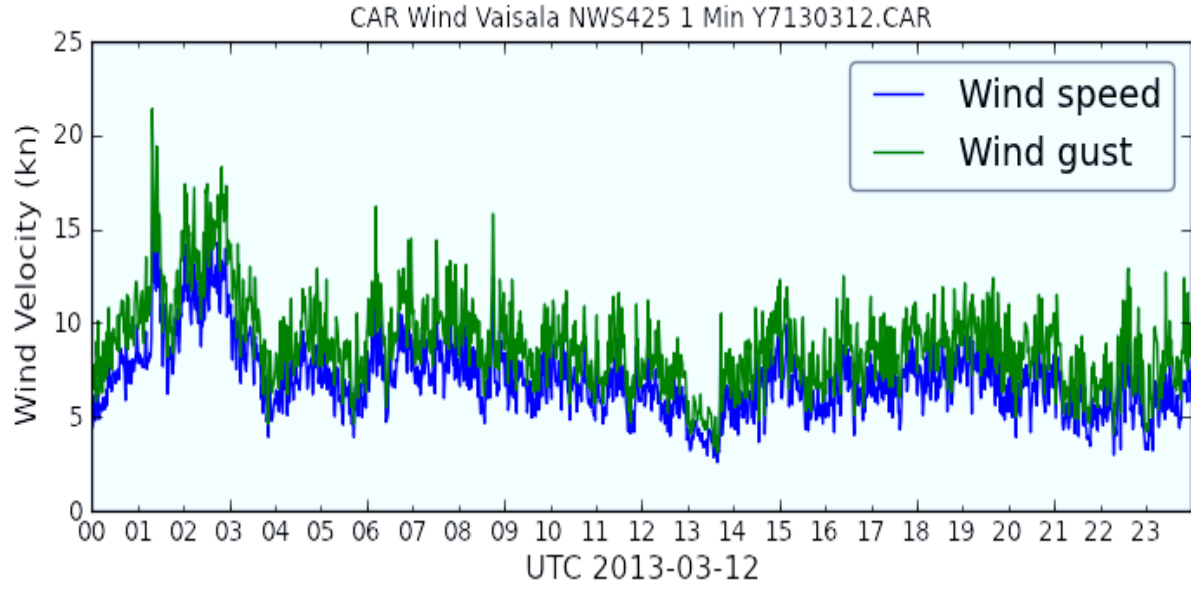


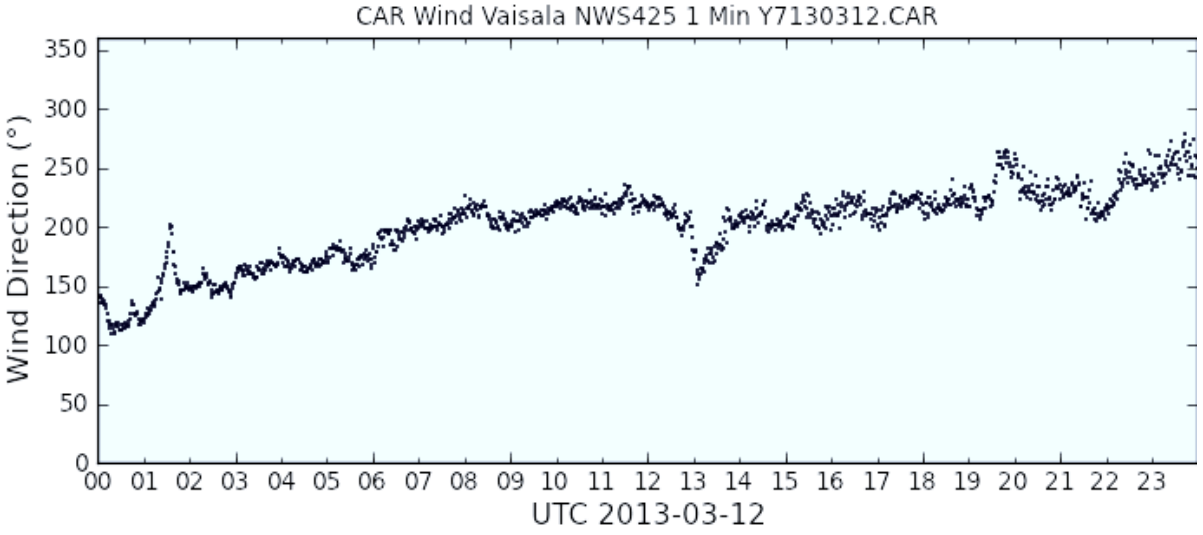
CAR Y4 – NWS425 – 2D WIND (5 Sec) - 12/03/13



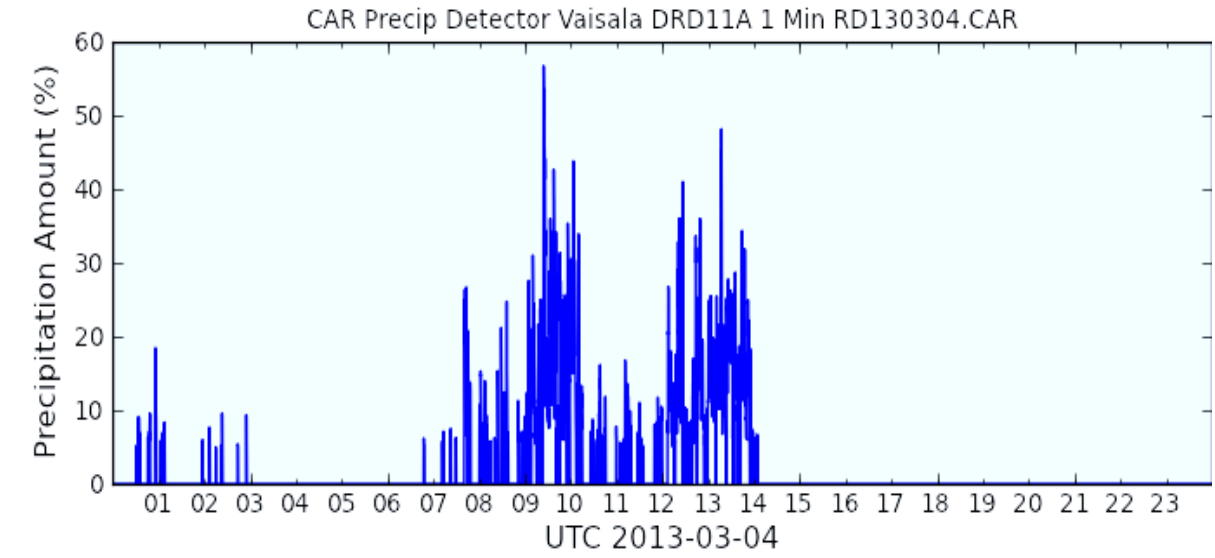


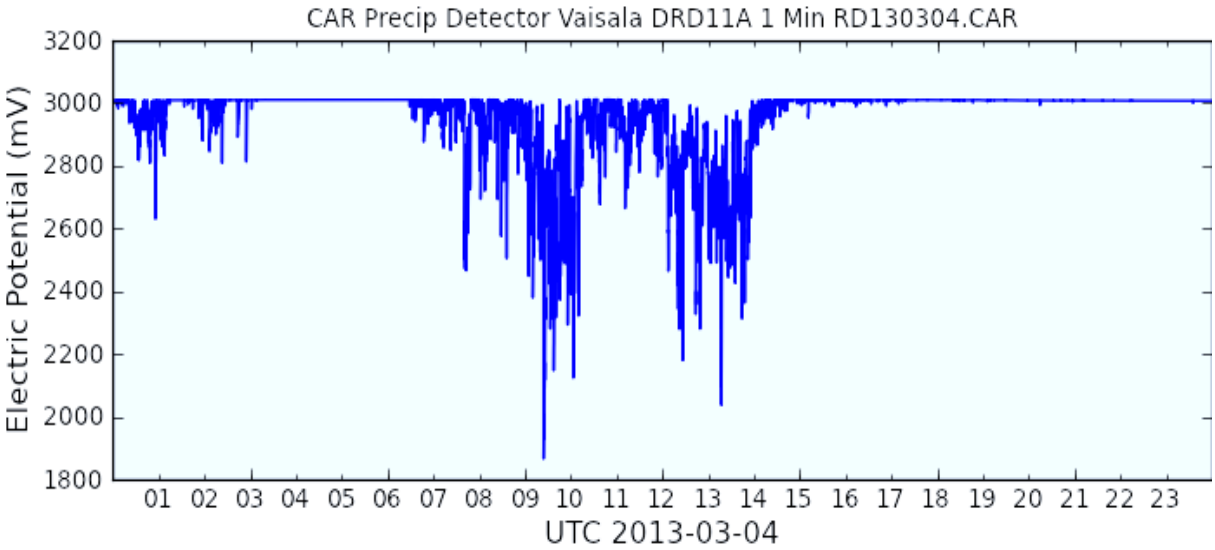
CAR Y7 – NWS425 – 2D WIND (12 Sample Average) - 12/03/13



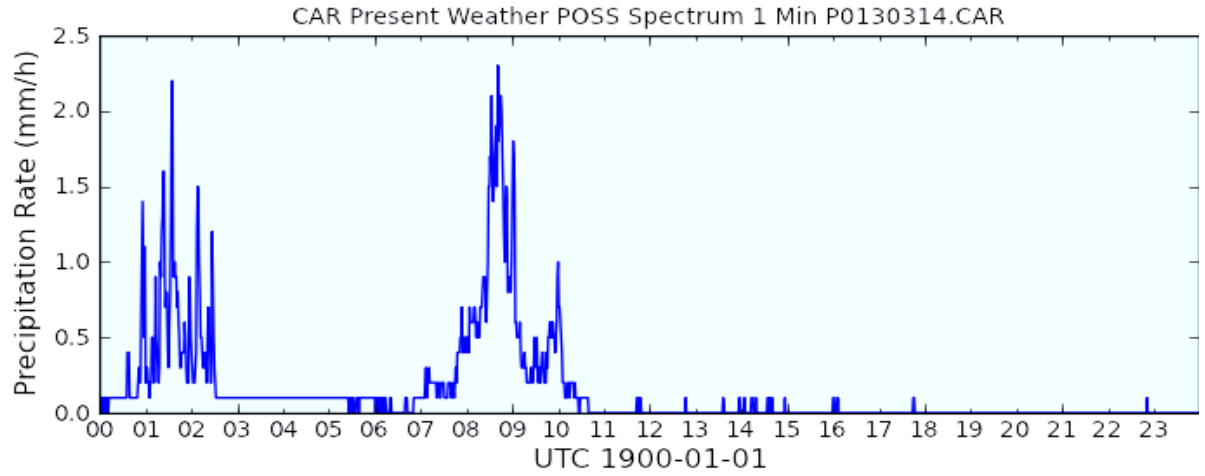


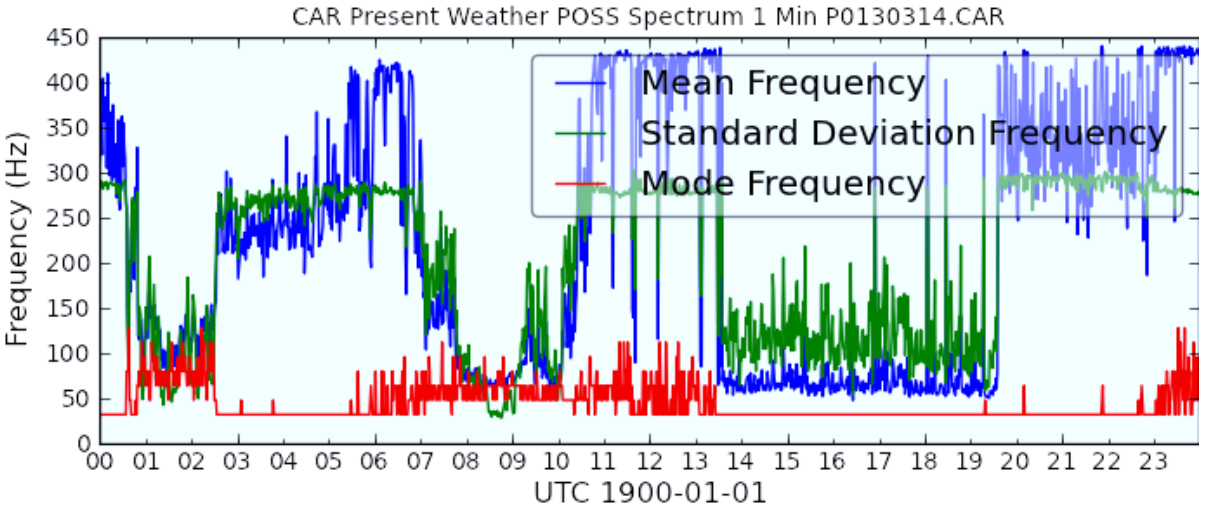
CAR RD – DRD11A – Precipitation Detector - 04/03/13

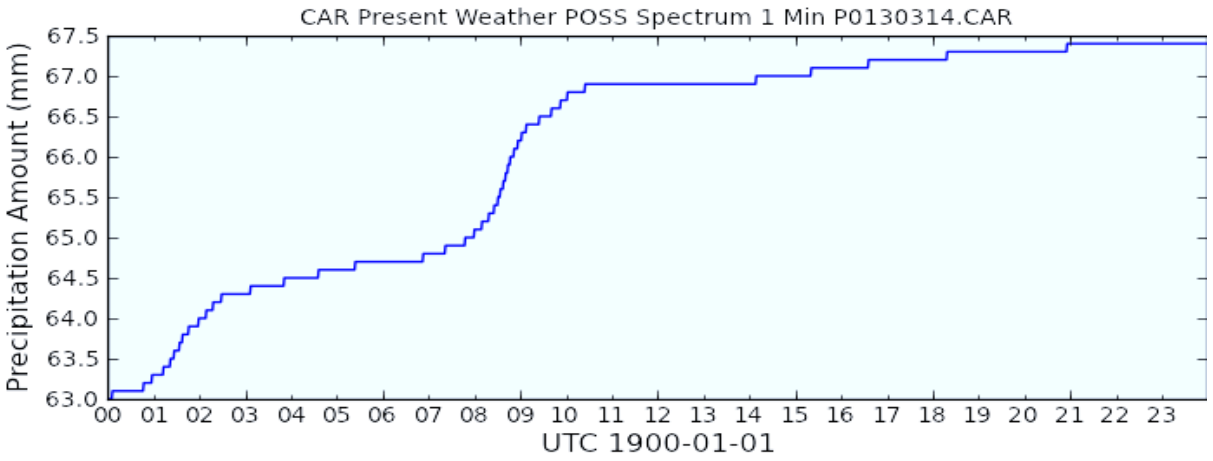


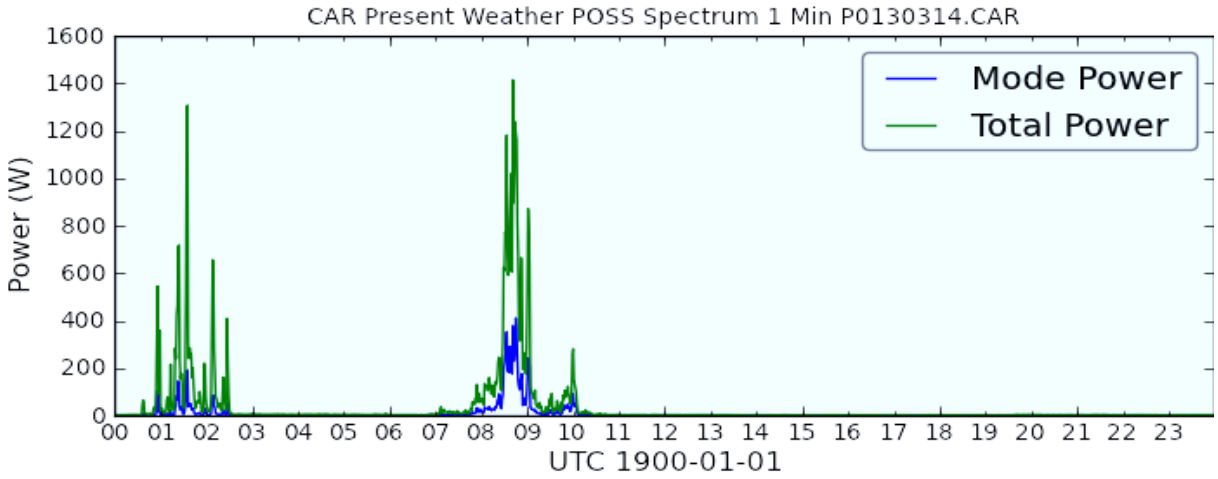


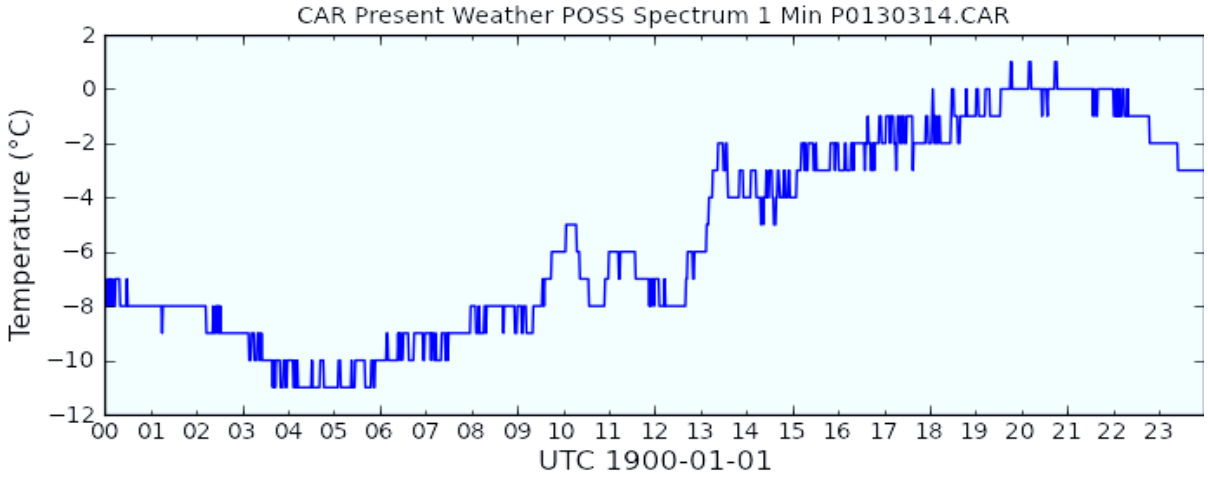
CAR P0 – Precipitation Occurrence Sensor System (POSS) Spectrum - 14/03/13





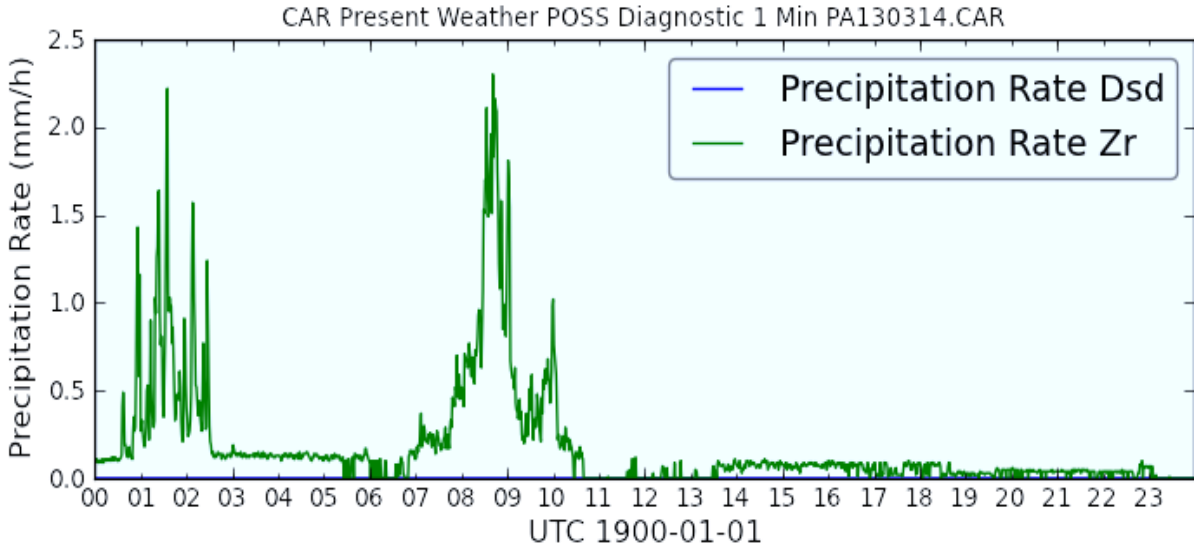


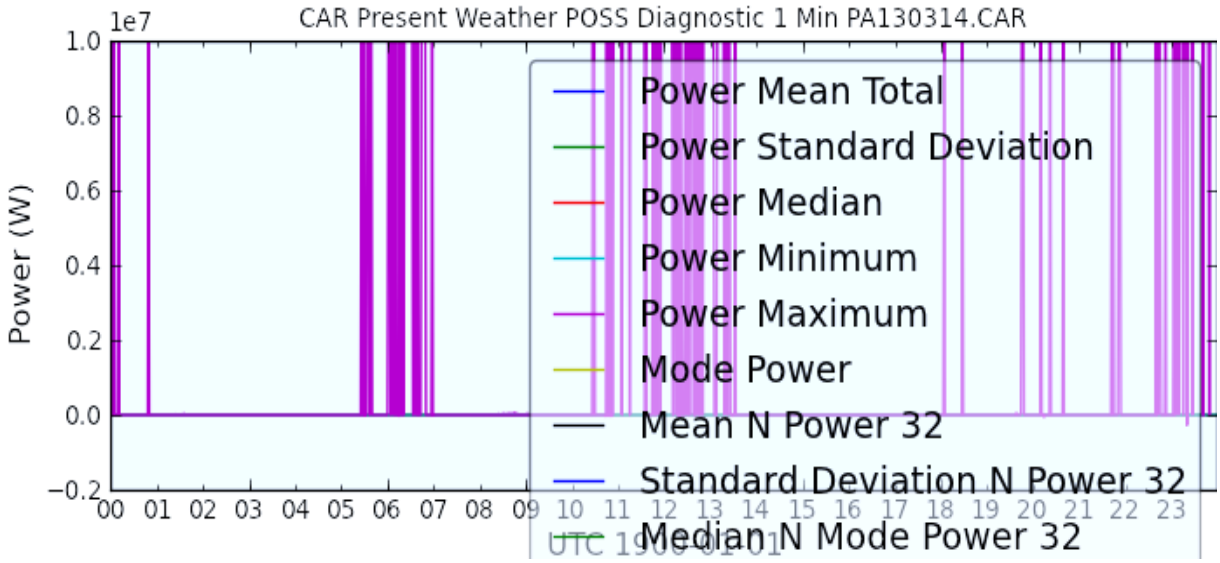


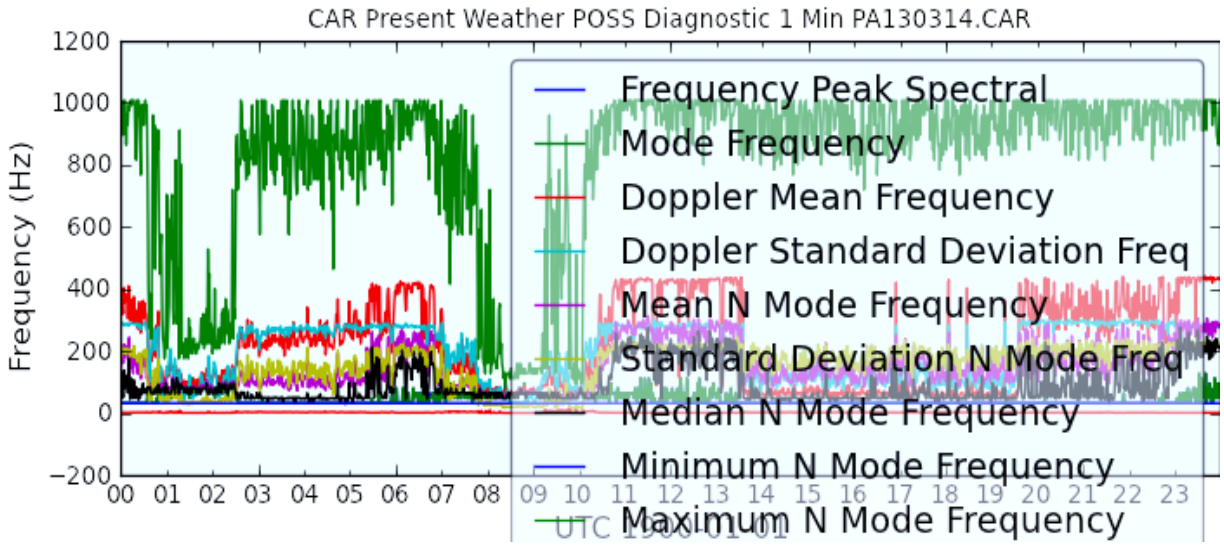


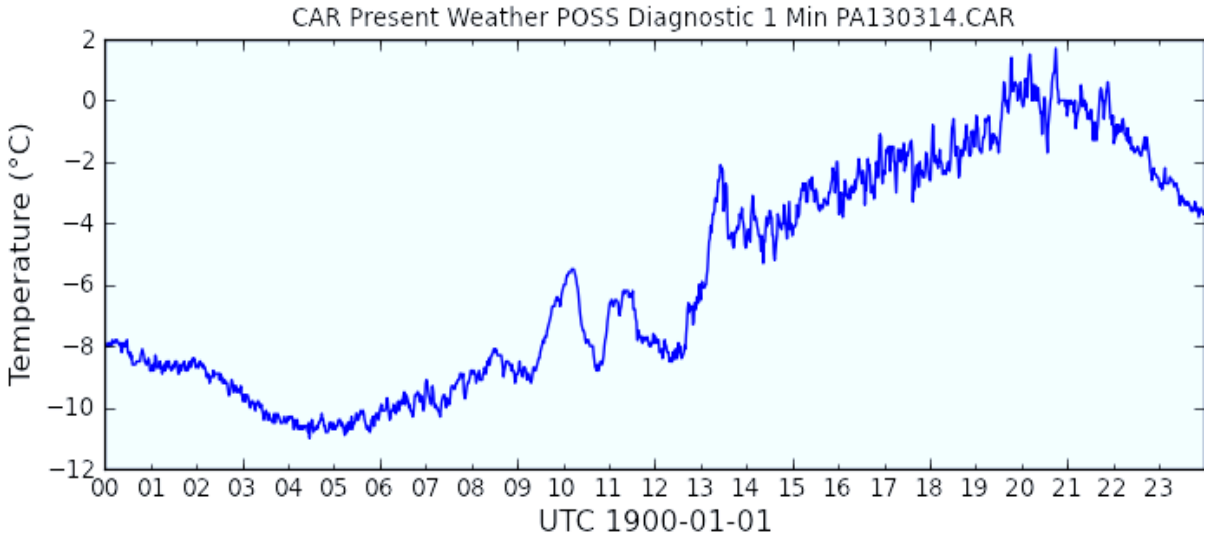
Note: Data files for the POSS do not include the date in YYYY/MM/DD format, resulting in label errors when plotting.

CAR PA – Precipitation Occurrence Sensor System (POSS) Diagnostics - 14/03/13

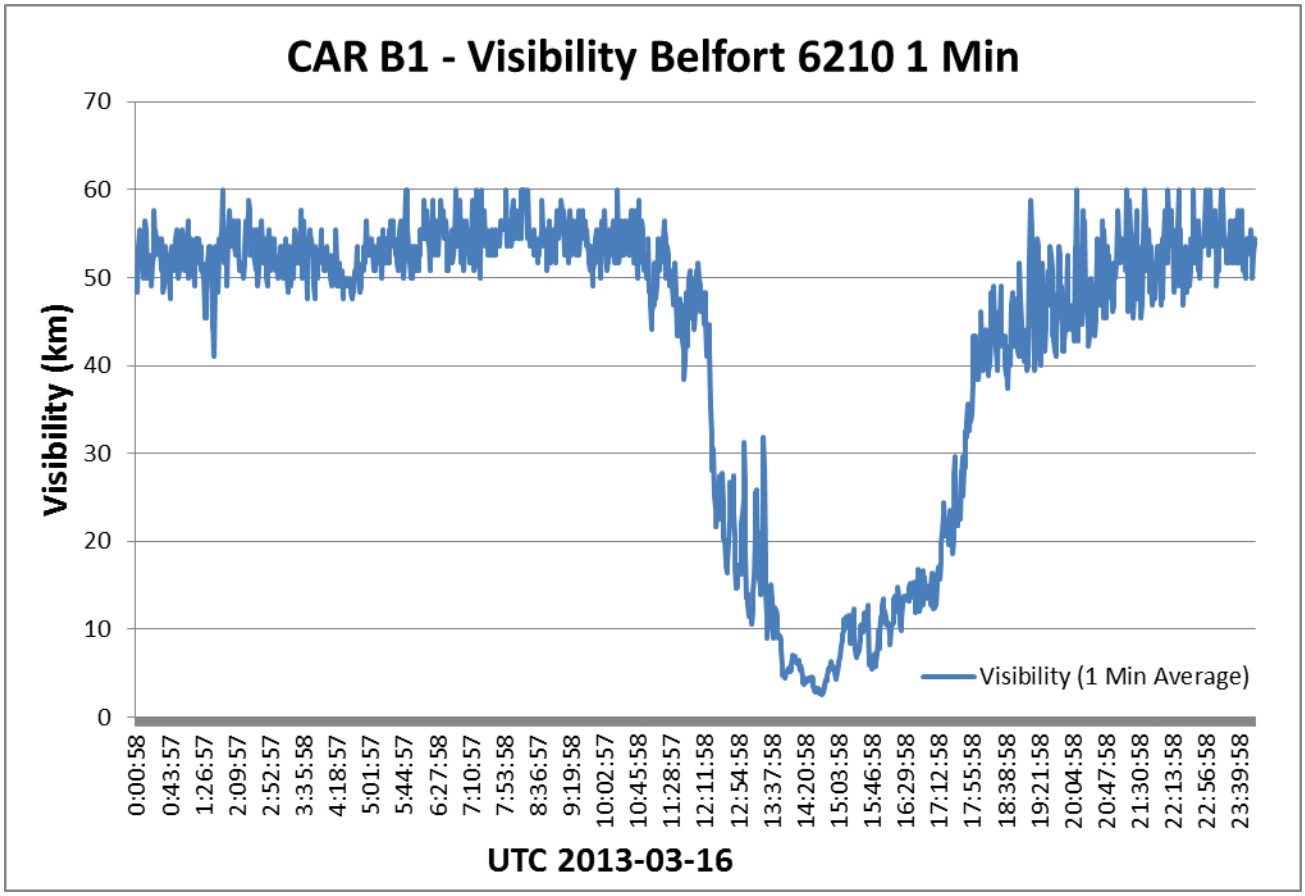




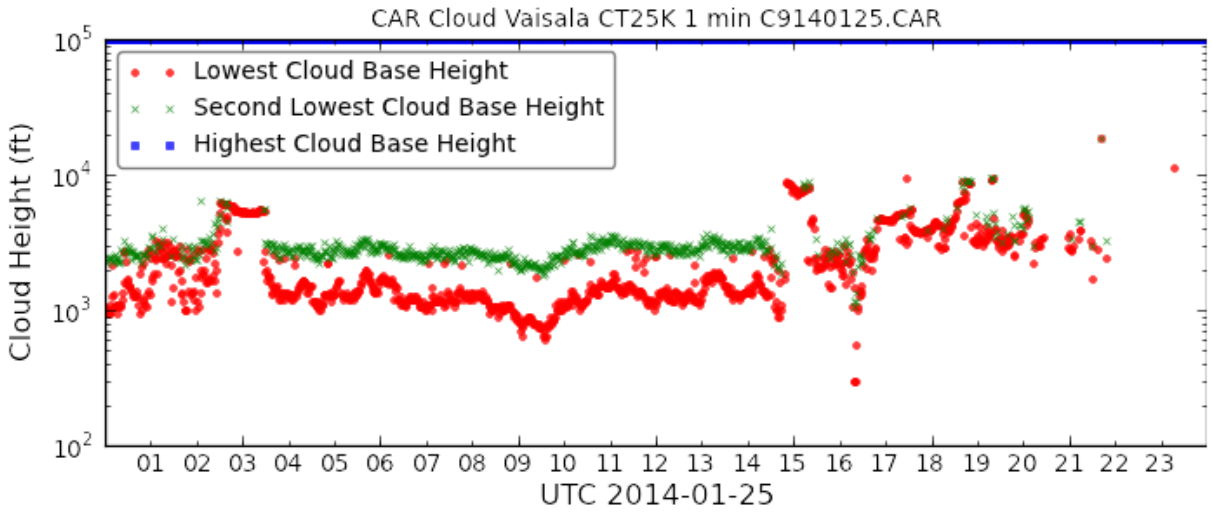

CAR Present Weather POSS Diagnostic 1 Min PA130314.CAR
Frequency (Hz)
1200
1000
800
600
400
200
0
−200
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
Frequency Peak Spectral
Mode Frequency
Doppler Mean Frequency
Doppler Standard Deviation Freq
Mean N Mode Frequency
Standard Deviation N Mode Freq
Median N Mode Frequency
Minimum N Mode Frequency
Maximum N Mode Frequency


CAR Present Weather POSS Diagnostic 1 Min PA130314.CAR
Temperature (°C)
2
0
−2
−4
−6
−8
−10
−12
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 1900-01-01

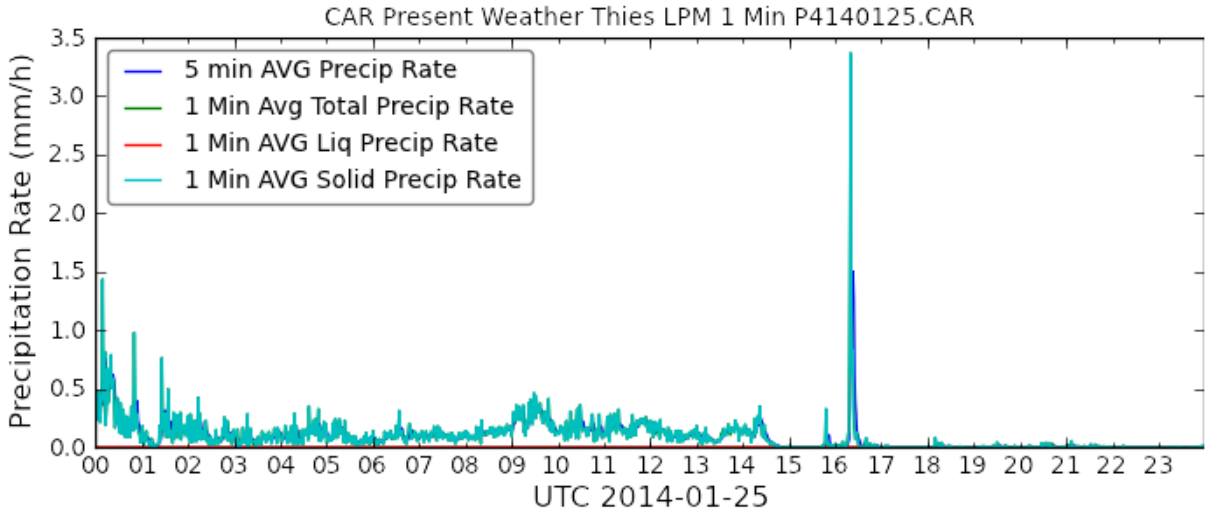
CAR B1 – Visibility Belfort 6210 - 16/03/13

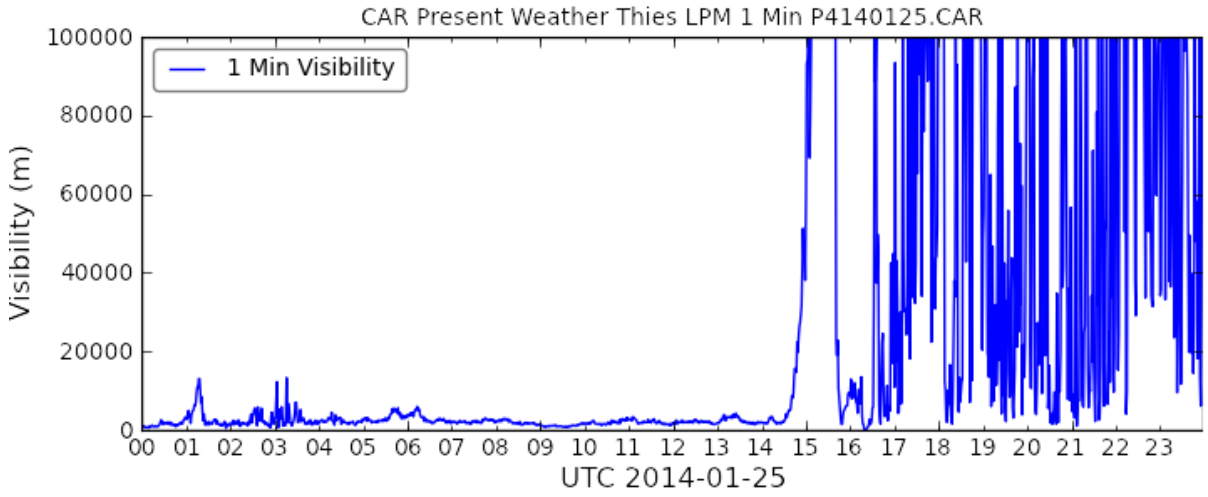


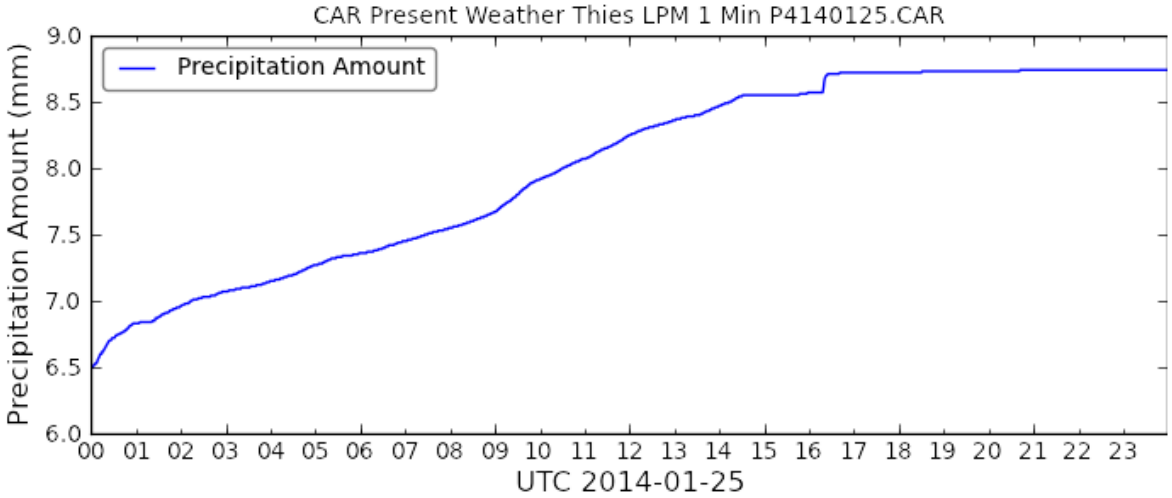
CAR C9 – Vaisala – CT25K Laser Ceilometer - 25/01/14

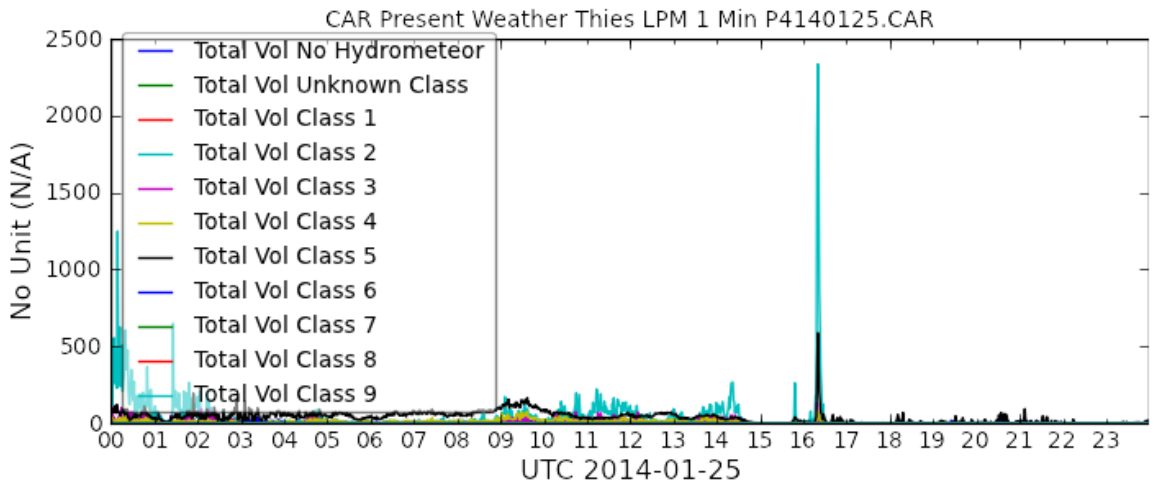


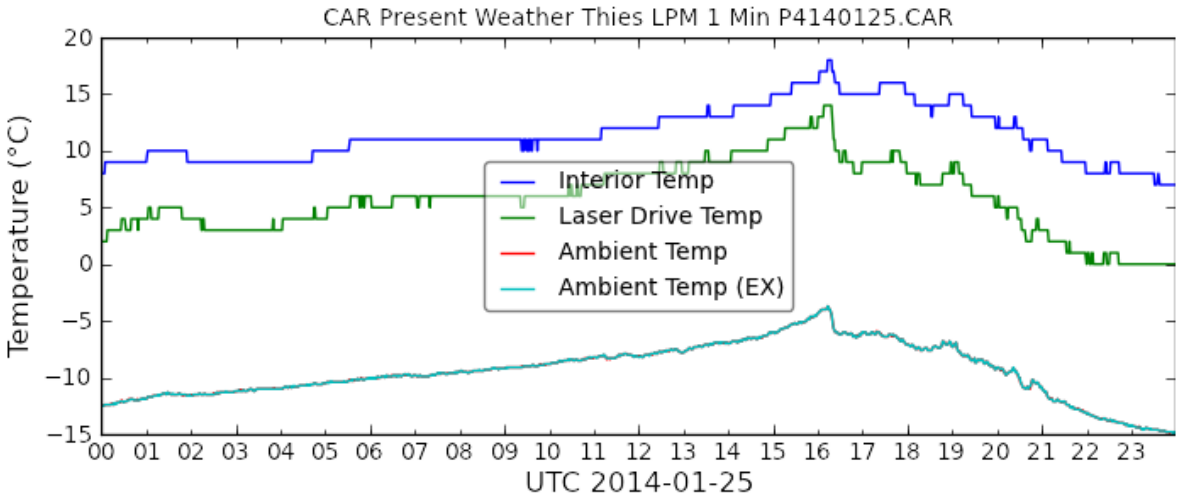
CAR P4 – Thies – Precipitation Monitor - 25/01/14



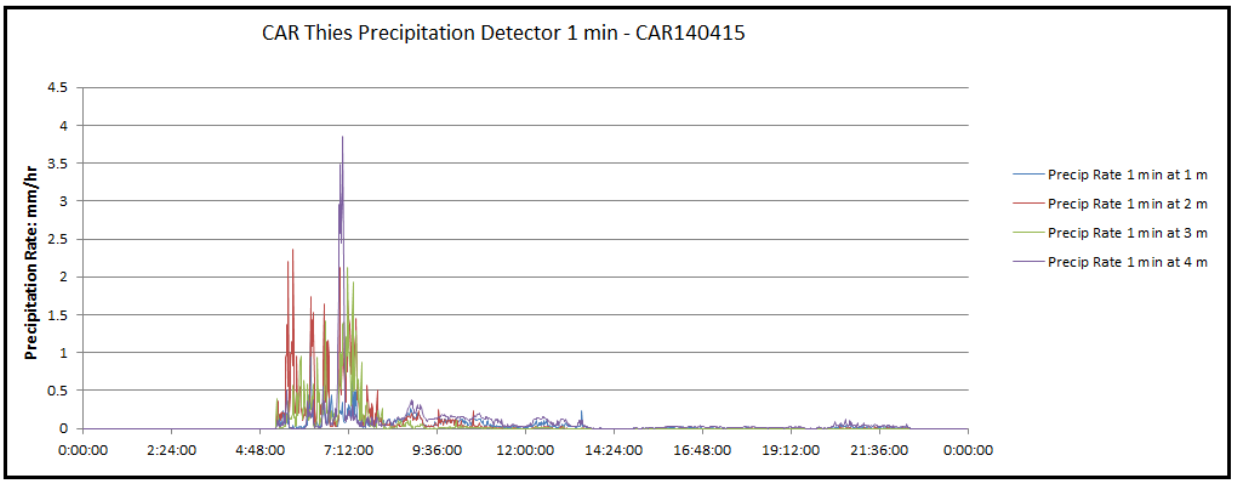




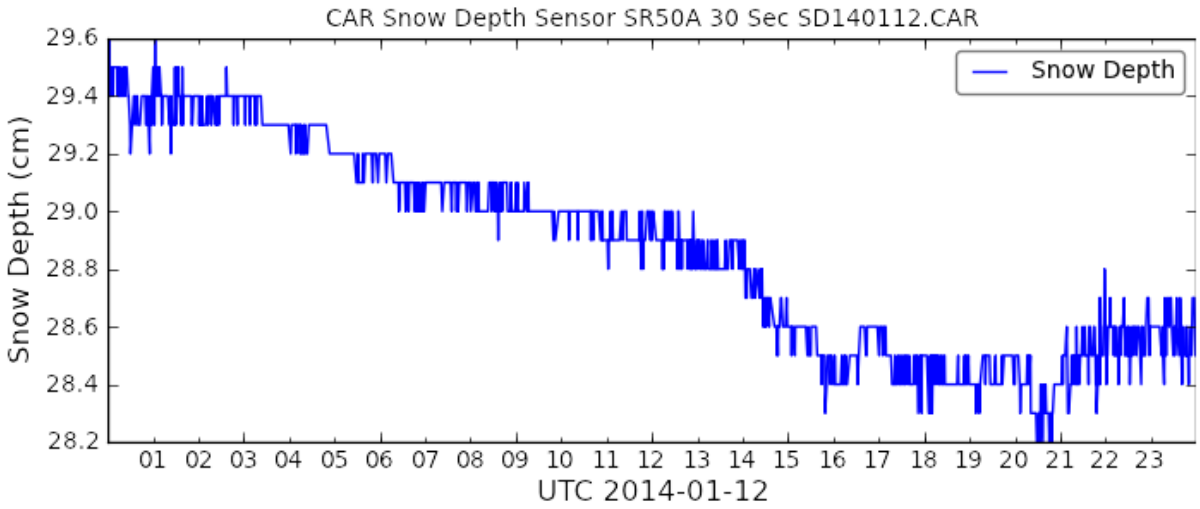

CAR Present Weather Thies LPM 1 Min P4140125.CAR
Total Vol No Hydrometeor
Total Vol Unknown Class
Total Vol Class 1
Total Vol Class 2
Total Vol Class 3
Total Vol Class 4
Total Vol Class 5
Total Vol Class 6
Total Vol Class 7
Total Vol Class 8
Total Vol Class 9
No Unit (N/A)
2500
2000
1500
1000
500
0
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-25


CAR Present Weather Thies LPM 1 Min P4140125.CAR
Interior Temp
Laser Drive Temp
Ambient Temp
Ambient Temp (EX)
Temperature (°C)
20
15
10
5
0
−5
−10
−15
00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23
UTC 2014-01-25

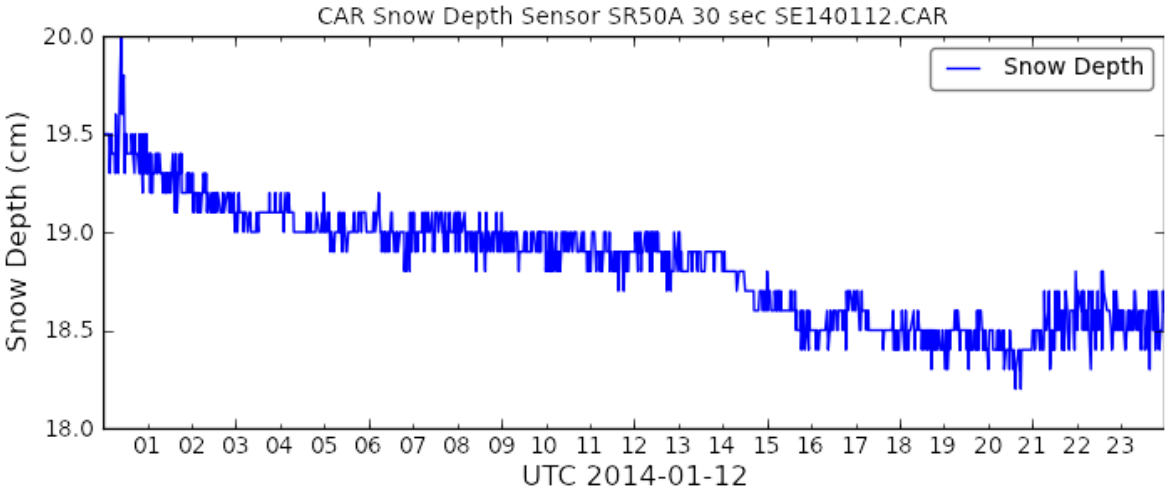
CAR PE – Thies – Precipitation Detector - 15/04/14



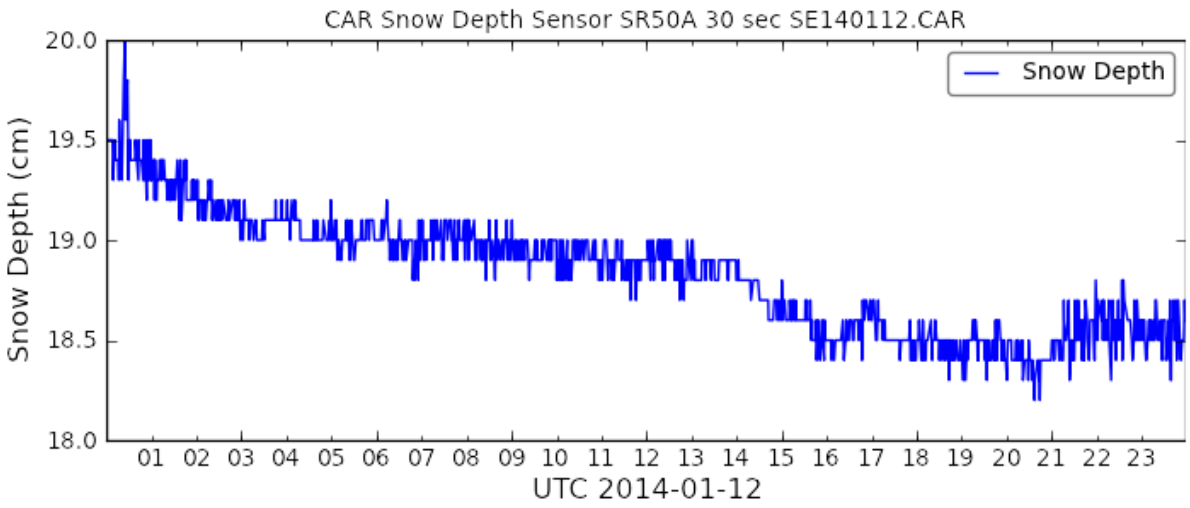
CAR SD – SR50A - Snow Depth Sensor - 12/01/14



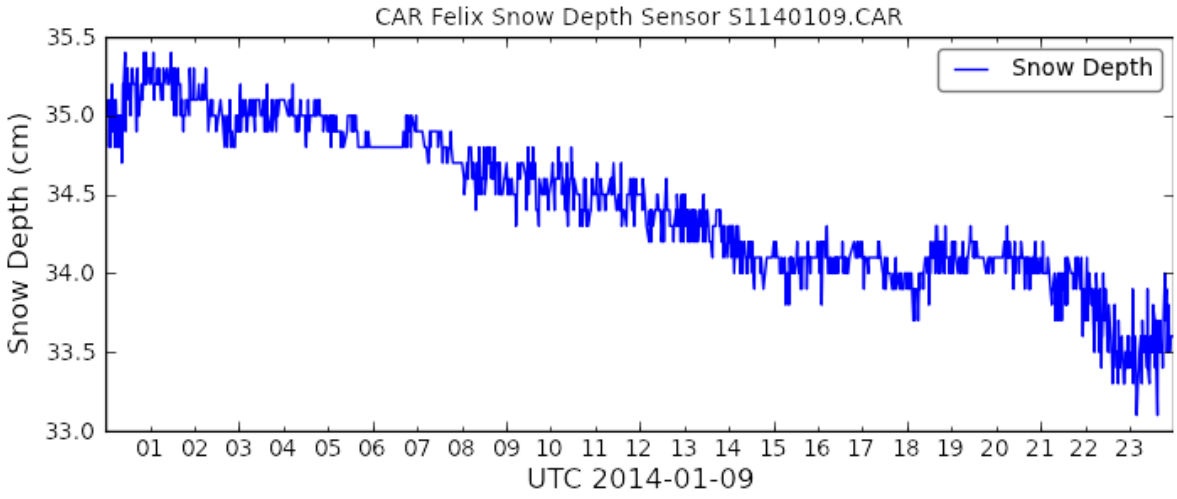
CAR SE – SR50A - Snow Depth Sensor - 12/01/14



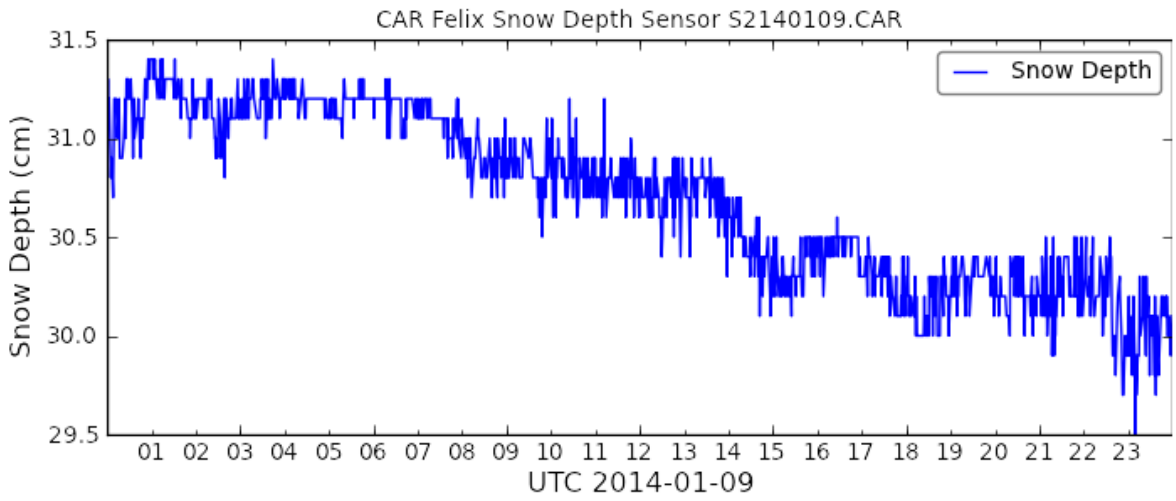
CAR SF – SR50A - Snow Depth Sensor - 12/01/14



CAR S1 – Felix - Snow Depth Sensor - 09/01/14



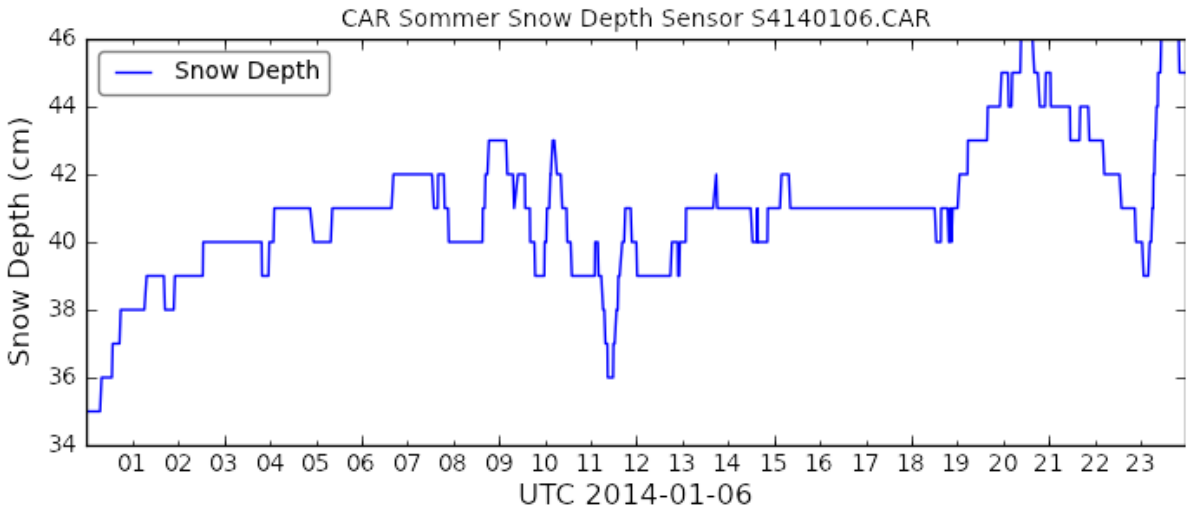
CAR S2 – Felix - Snow Depth Sensor - 09/01/14



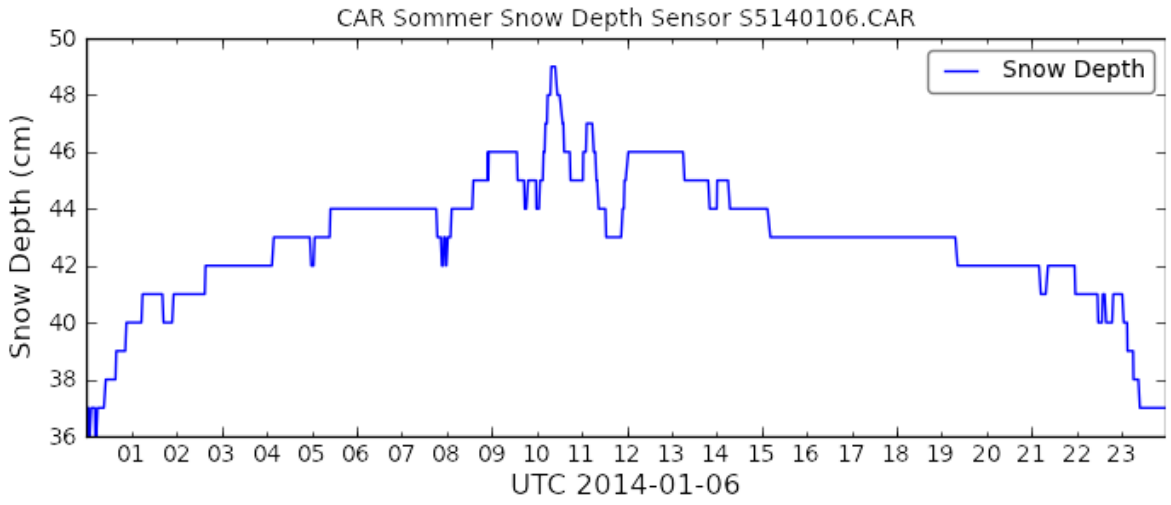
CAR S3 – Felix - Snow Depth Sensor -

(Not available)

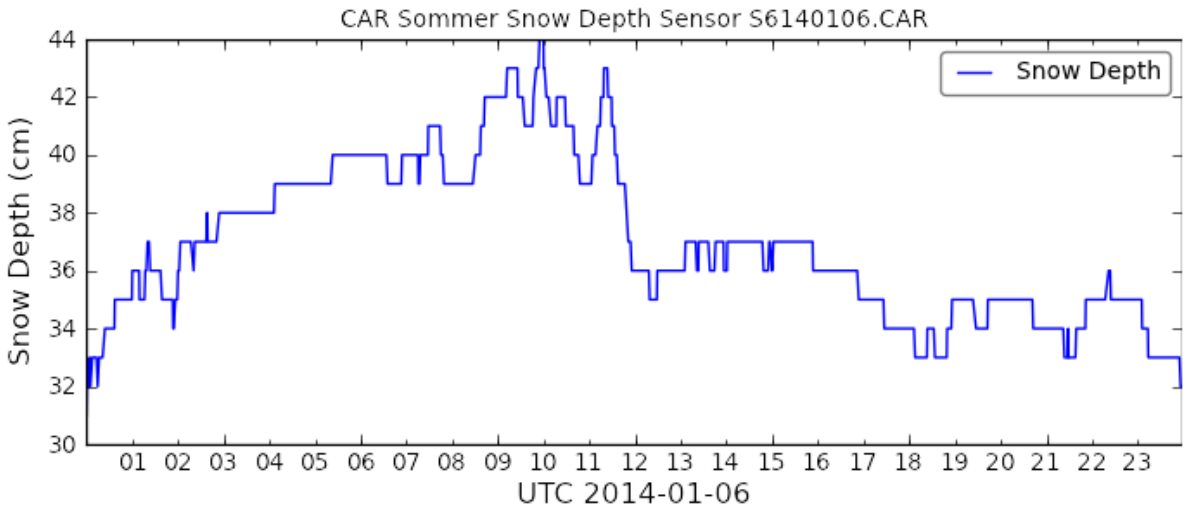
CAR S4 – Sommer - Snow Depth Sensor - 06/01/14



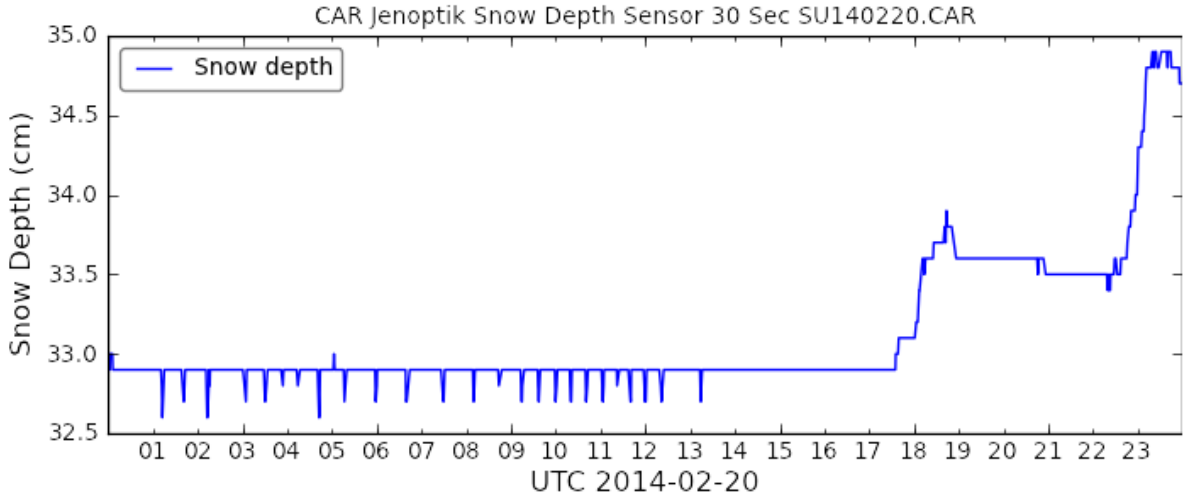
CAR S5 – Sommer - Snow Depth Sensor - 06/01/14

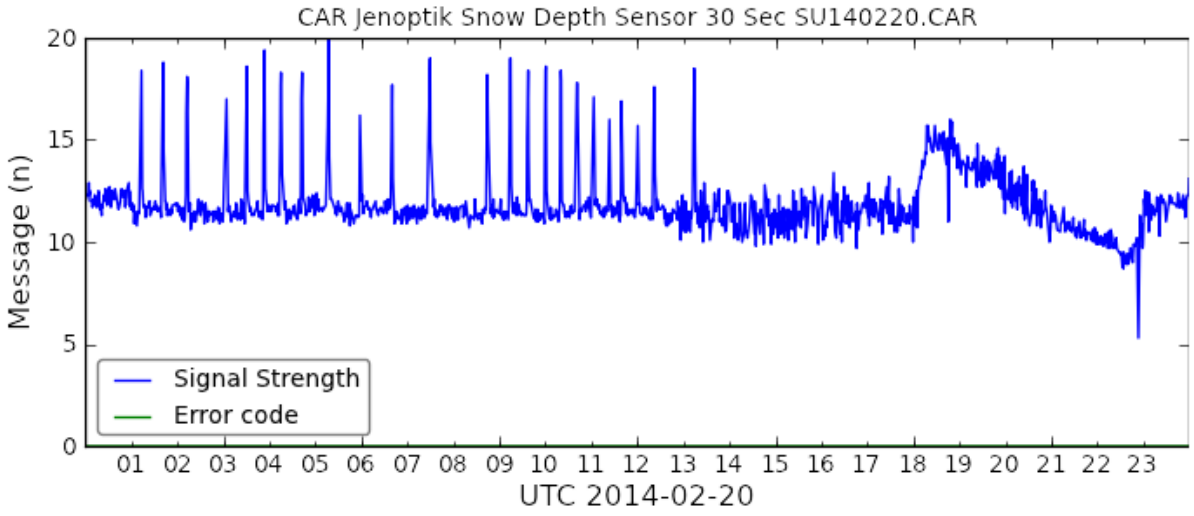


CAR S6 – Sommer - Snow Depth Sensor - 06/01/14

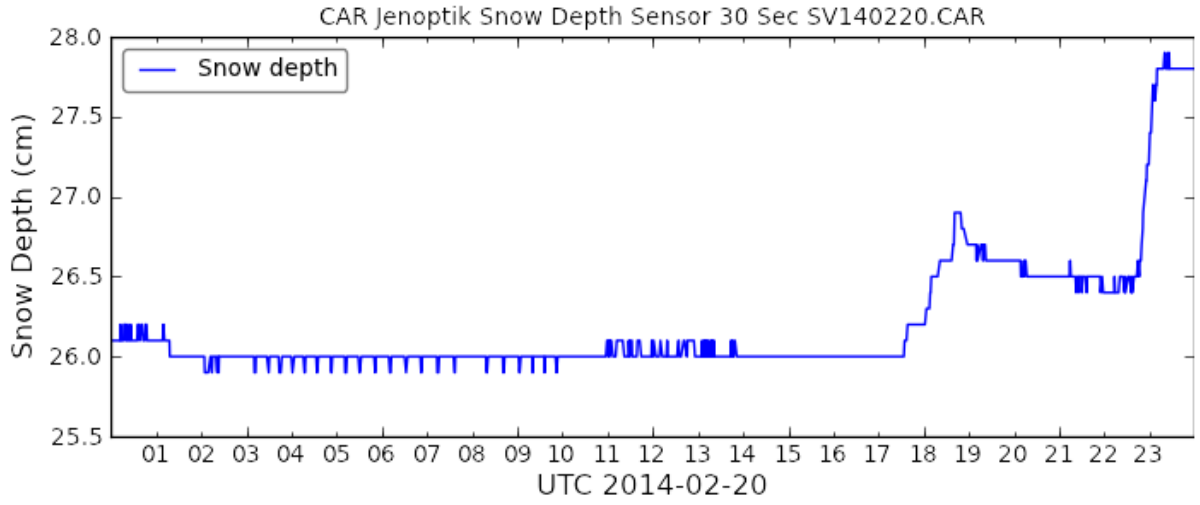


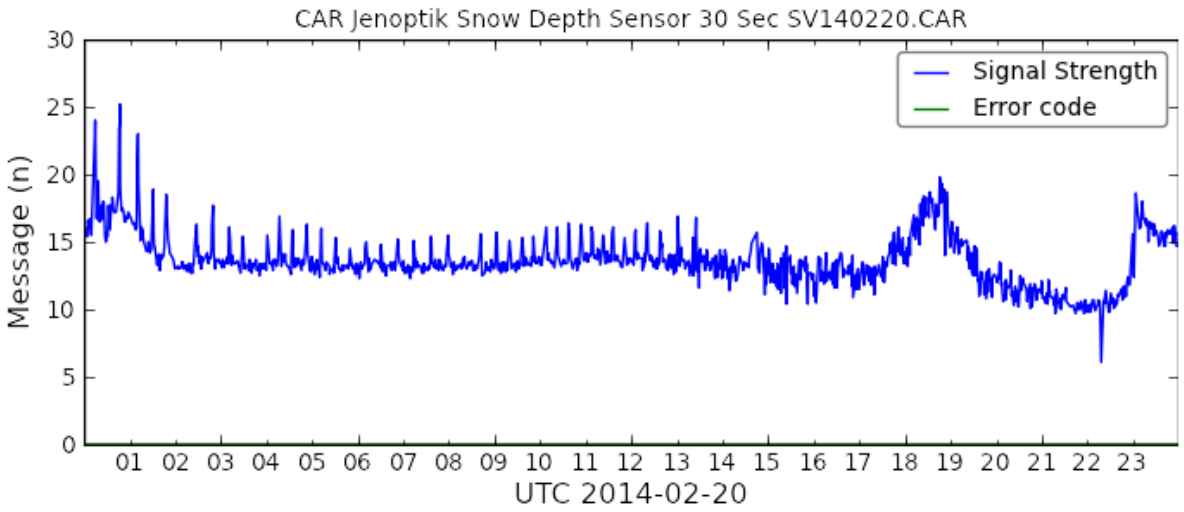
CAR SU – Jenoptik - Snow Depth Sensor - 20/02/14



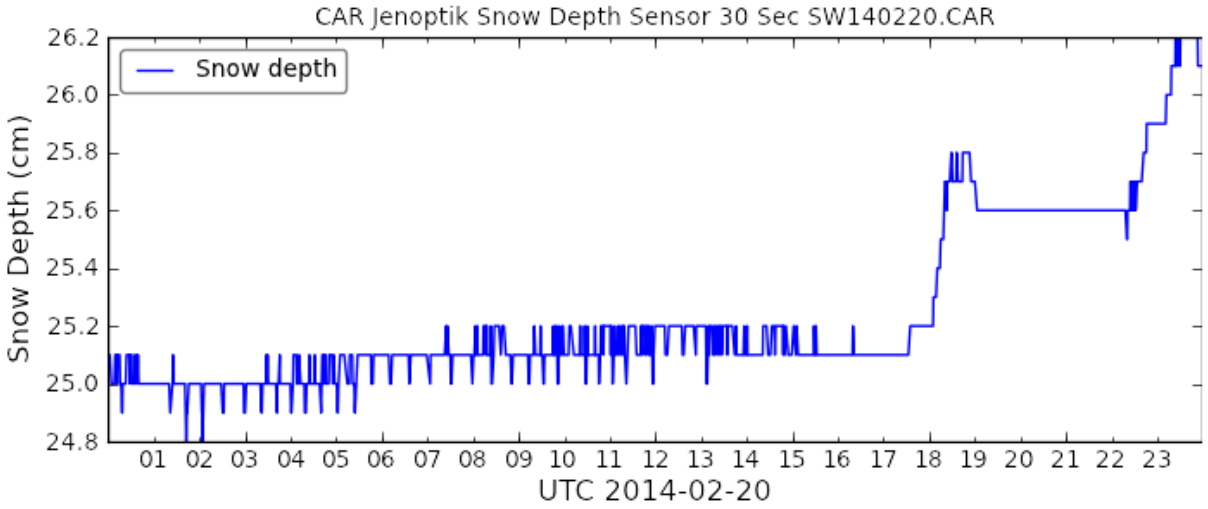


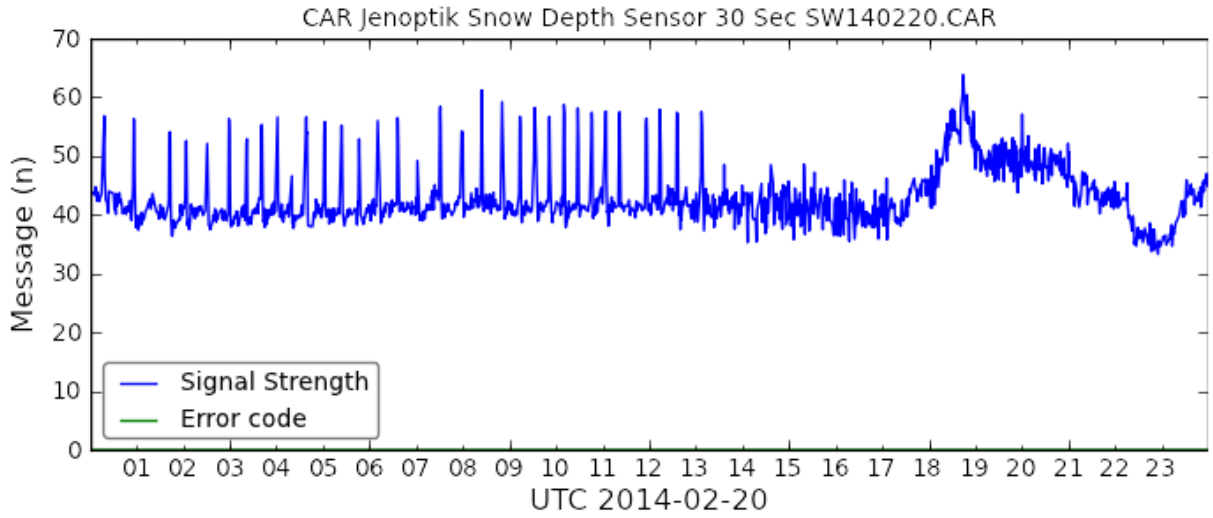
CAR SV – Jenoptik - Snow Depth Sensor - 20/02/14



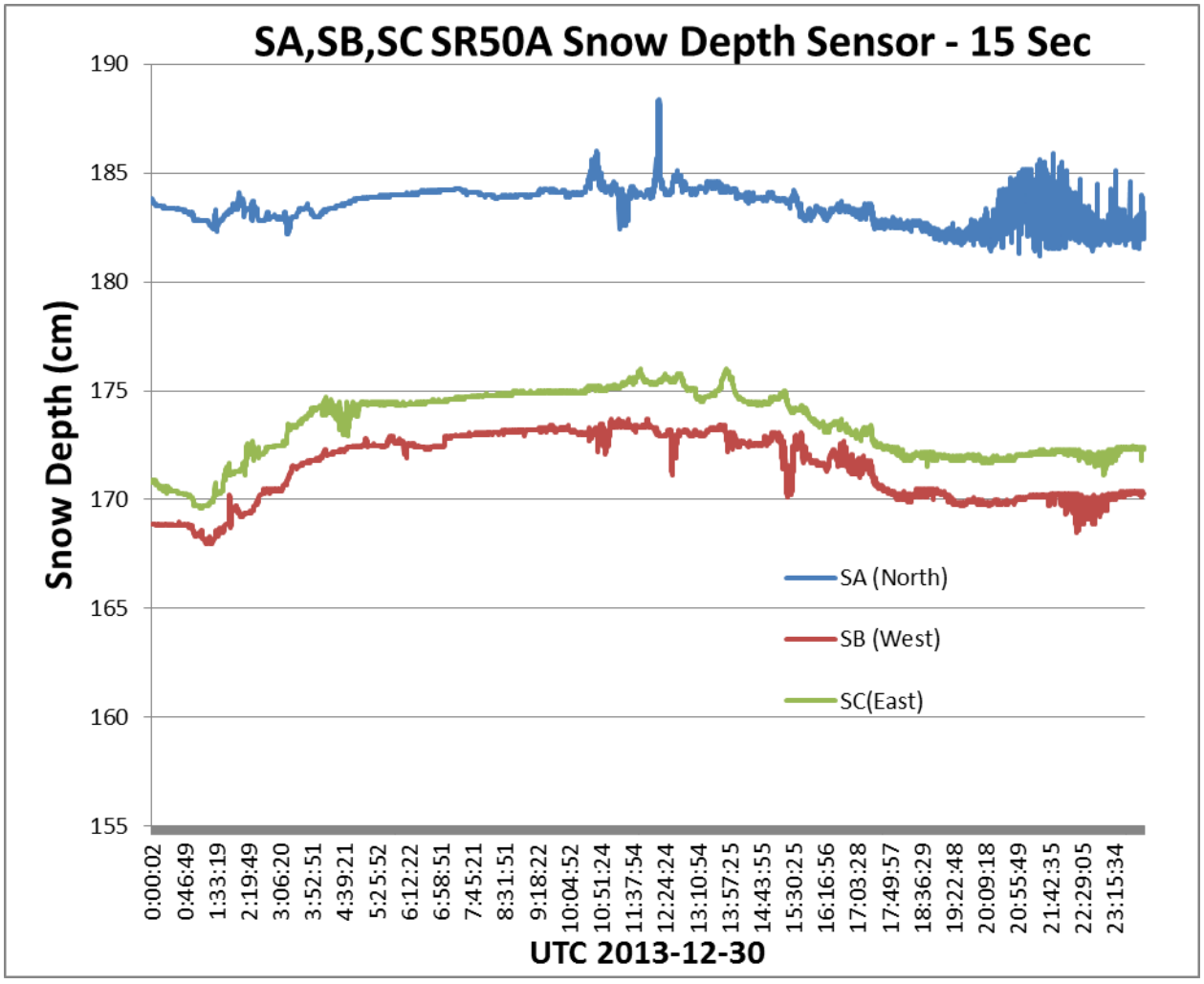


CAR SW – Jenoptik - Snow Depth Sensor - 20/02/14





CAR SA, SB, SC – SR50A- Snow Depth Sensor - 30/12/12



Centre for Atmospheric Research Experiments (CARE) Site Team

Rodica Nitu (Site Manager)

Dr. Paul Joe

Sorin Pinzariu

Dr. Michael Earle

Jeffery Hoover

Amal Samanter

Dr. Kai Wong

Dr. Faisal Boudala

Hagop Mouradian

Phil Raczynski

Jeff Anderson

Charmaine Hrynkiw