

APPENDIX A: PROOF OF PERFORMANCE (POP) FORMS

SECTION A1: STATION INFORMATION

Station name	Joetsu
Reference town	Joetsu
Station latitude	37° 06' 56"
Station longitude	138° 16' 24"
Station elevation in metres	11 m

Insert here a Site Layout indicating the location of SPICE references and all instruments, including distances and the direction of the prevailing winter winds.



Insert here a set of pictures documenting the overall site installation (views from N, E, S, W).

It is suggested to submit here also a horizon / sky view diagram taken with a camera, if available

E-S-W



W-N-E



SECTION A2: SPICE FIELD WORKING REFERENCE SYSTEM CONFIGURATION

Field Reference Type R2 (Automatic)

Configuration of the DFIR fence

Description of surrounding obstacles (including distance/direction from, height, and type)	
Diameter	12.0 m
Height of the outer fence (measured at the top)	4.0 m
Height of the inner fence (measured at the top)	3.5 m
Length of slats	150 cm
Width of slats	5 cm
Slat material	Wood, white painted

Single Alter shield

According to the SPICE instructions?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Attached to the post of the weighing gauge?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
If different, provide details:	Similar to Fig. 2 of WMO-SPICE: GEONOR Calibration and

	Configuration, Dec 5, 2012.
--	-----------------------------

Weighing gauge (WG)

Make and model	Geonor T-200B-MD-3-W
Serial number	100613, 100713, 100813
Firmware version (if applicable)	N/A
Number of transducers (if applicable)	3
Height of installation (measured from the top of the gauge)	3.5 m
Heater configuration and algorithm	<p>Heating location: the rim of the inlet</p> <p>Temperature measurement: None</p> <p>Heating control: the heating is controlled by a bimetal thermostat integrated with the flexible heater attached on the rim of the inlet. The heating turns on (off) when the thermostat temperature is below +3dC (above 10dC). The heating power is 15Watts.</p> <p>Heating power: the rim heater is powered using a separate 100VAC power supply. The heating power is 15 Watts.</p>
Output data message format	CSV, 1-min average weight of each sensor
Frequency of data sampling	1 min

Precipitation detector

Make and model	JOANNEUM RESEARCH 2D-Video Disdrometer
output data message format	(TBD)particle diameter, particle volume, particle falling velocity, and particle oblateness
Data sampling frequency	1 min
Height of installation. <i>DAT team recommend the following place for an optical precipitation detector or precipitation type sensor inside the DFIR:</i>	<p>2014 winter: inlet height at 3.0m above ground with no wind shield.</p> <p>2015 winter (planned): inside 3m x 3m wind shield net, with inlet height below 1.0m from the rim of the wind shield.</p>
Location of installation relative to WG in reference system. <i>DAT team recommend to locate the optical precipitation detector or precipitation type:</i>	Outside DFIR. Approximately 35m NNW from the WG in the DFIR

different places to account for different wind directions.

- *in the middle between Alter and inner fence*

Picture. Field Reference Type R2 (Automatic)

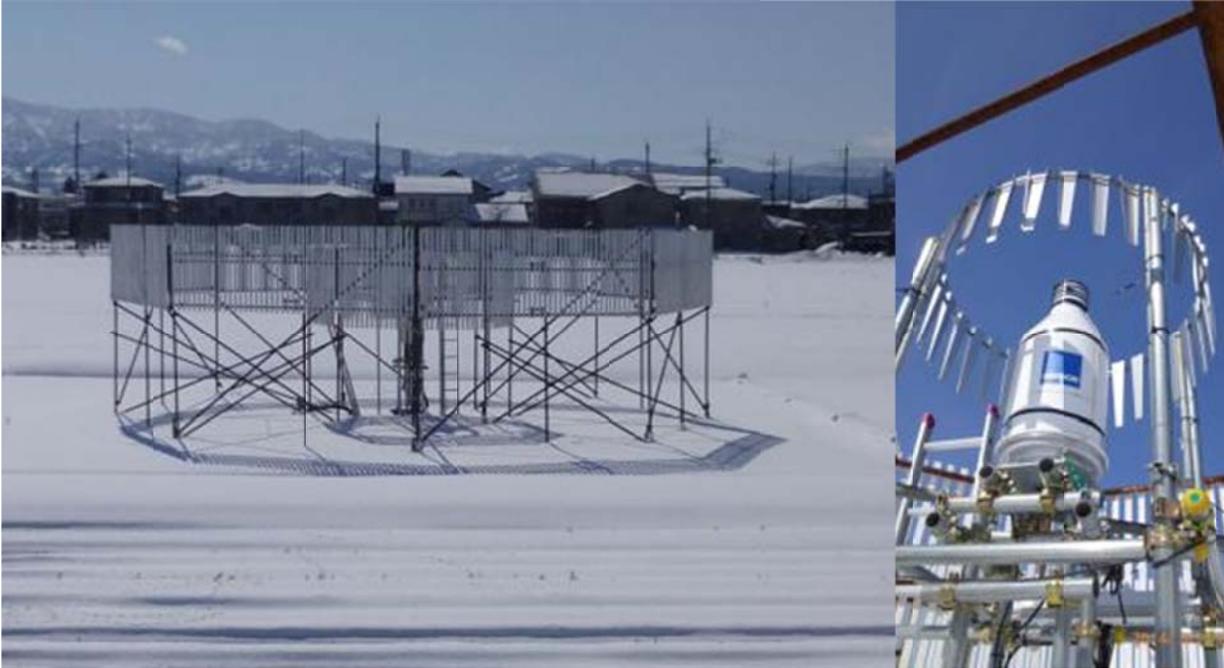
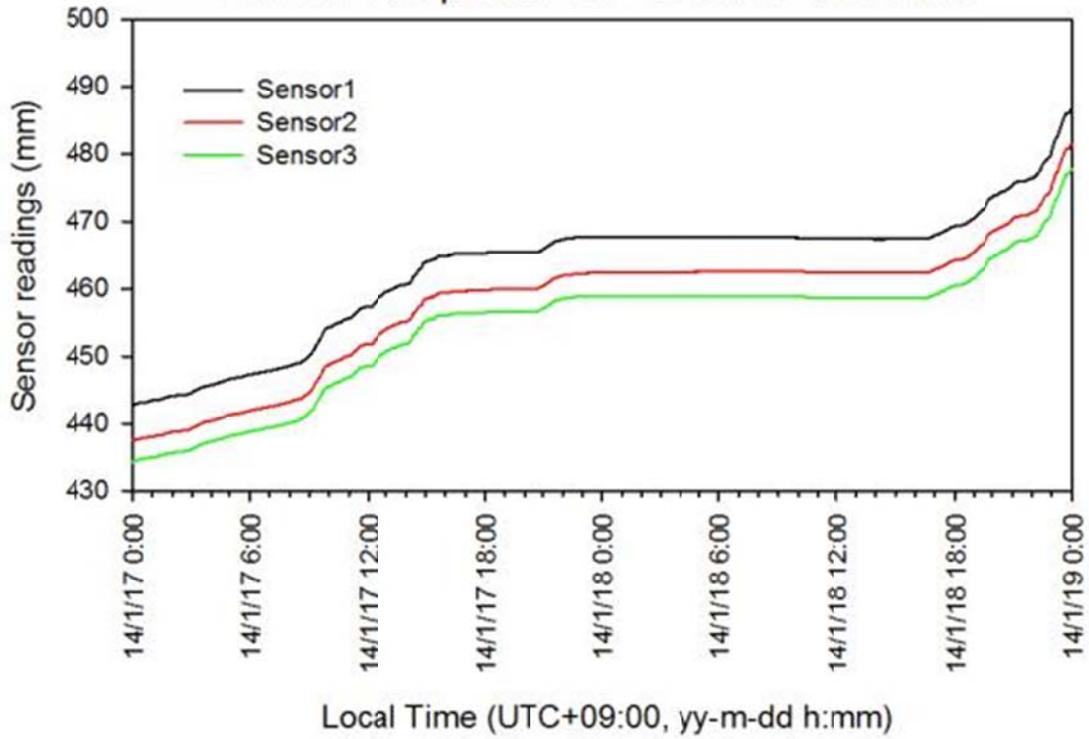


Table. Field Calibration of Reference Type R2 (Automatic)

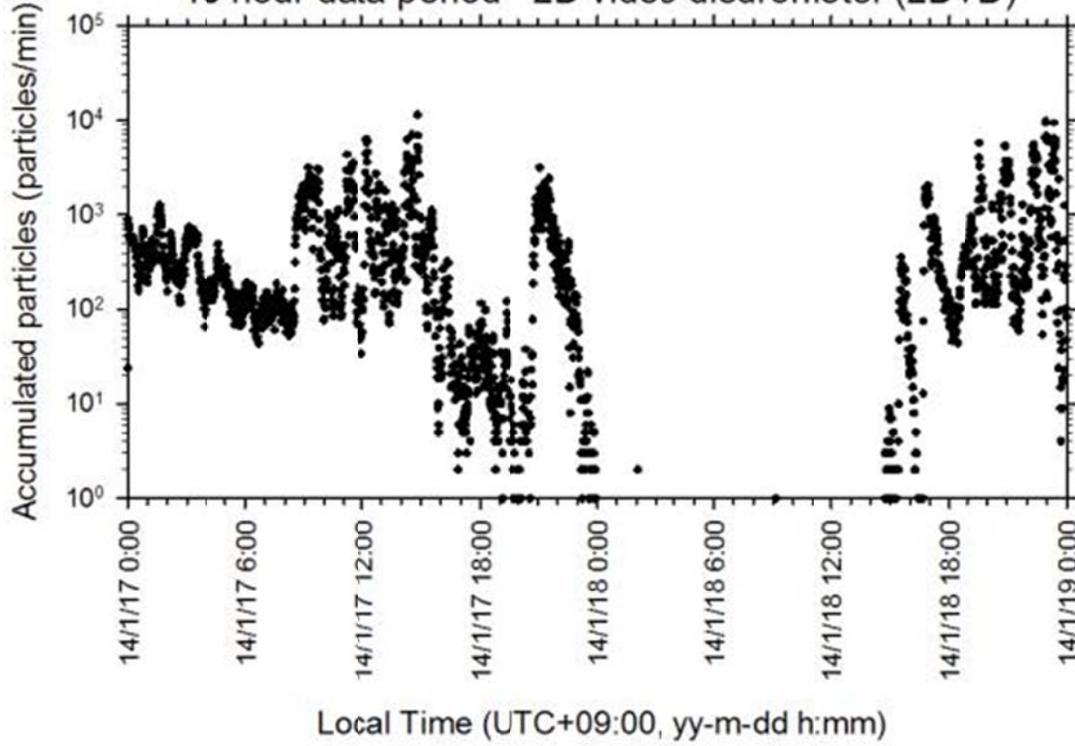
Not available. The distributor (Climatec Inc., Tokyo) made laboratory calibration of the sensor output from half of bucket capacity to the full amount in 100 cm³ intervals.

48h Plot. Field Reference Type R2 (Automatic)

48 hour data period - DFIR Geonor with heater



48 hour data period - 2D video disdrometer (2DVD)



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

IMPORTANT: Please copy this form (as necessary) and complete separately for each instrument under test and each instrument that will be used to provide ancillary measurements during WMO SPICE.

Instrument Name: Tipping Bucket Rain Gauge (RT-3)

Instrument number 1 (w/ wind shield) and 2 (w/o wind shield) of 11

Manufacturer	Ogasawara Keiki Co.
Model	RT-3
Serial number	134403(w/o wind shield) 2410(w/ wind shield)
Firmware version (if applicable)	N/A

Field configuration

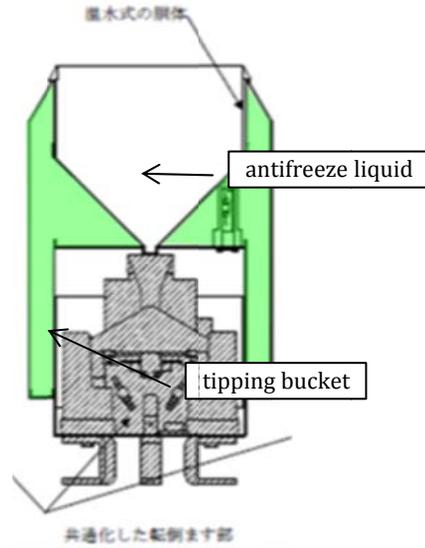
Location on site	Outside DFIR. See the site layout
Orientation	--
Height (measured at top)	3.5 m above the ground
Shield (if applicable)	One gauge is with a cylinder type shield, and another is without the shield.
Heating (if applicable)	Shell contains antifreeze liquid heated at 5 degrees

Data output

Data communication protocol	TCP/IP (via Campbell CR1000+NL115)
Output data message format (include description of fields)	CSV, column data with date/time at first column
Data sampling frequency	1 min

Instrument Picture.

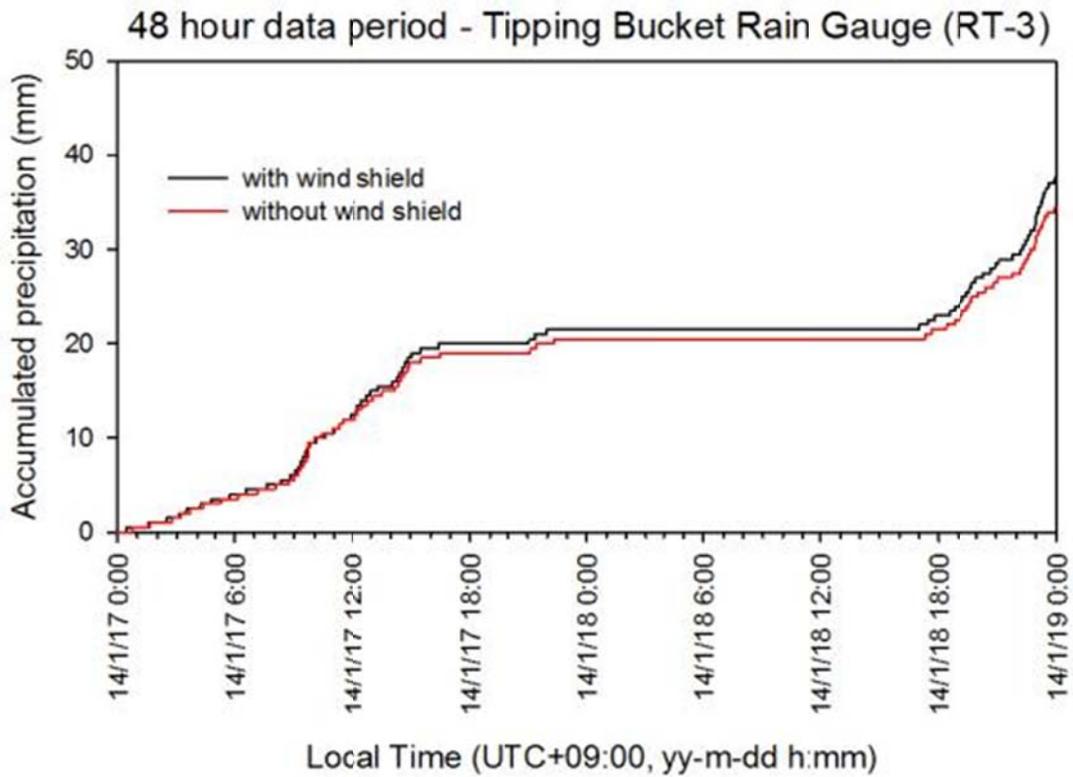
The picture and diagram of a RT-3 rain gauge are shown below. Two RT-3 gauges, one of which is with a wind shield and other is without the shield, will be installed over the observation experiment field at 3.5 m above from the ground level.



Field calibration (if any).

These instruments are calibrated at the RIC Tsukuba, one of the WMO Regional Instrument Centres, whose home page can be found at http://www.jma.go.jp/jma/jma-eng/jma-center/ric/RIC_HP.html.

48h Plot.



Instrument Name: Tipping Bucket Rain Gauge (RT-4)
 Instrument number 3 (w/ wind shield) and 4 (w/o wind shield) of 11

Manufacturer	Yokogawa Denshikiki Co.
Model	RT-4
Serial number	80466B(w/o wind shield) 13024(w/ wind shield)
Firmware version (if applicable)	N/A

Field configuration

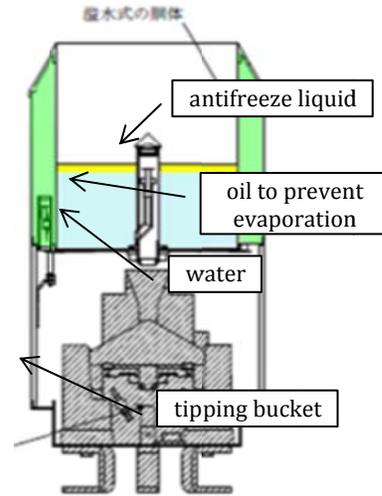
Location on site	Outside DFIR. See the site layout.
Orientation	--
Height (measured at top)	3.5 m above the ground
Shield (if applicable)	One gauge is with a cylinder type shield, and another is without the shield.
Heating (if applicable)	Reservoir and Shell containing antifreeze liquid heated at 10 degrees

Data output

Data communication protocol	TCP/IP (via Campbell CR1000+NL115)
Output data message format (include description of fields)	CSV, column data with date/time at first column
Data sampling frequency	1 min

Instrument Picture.

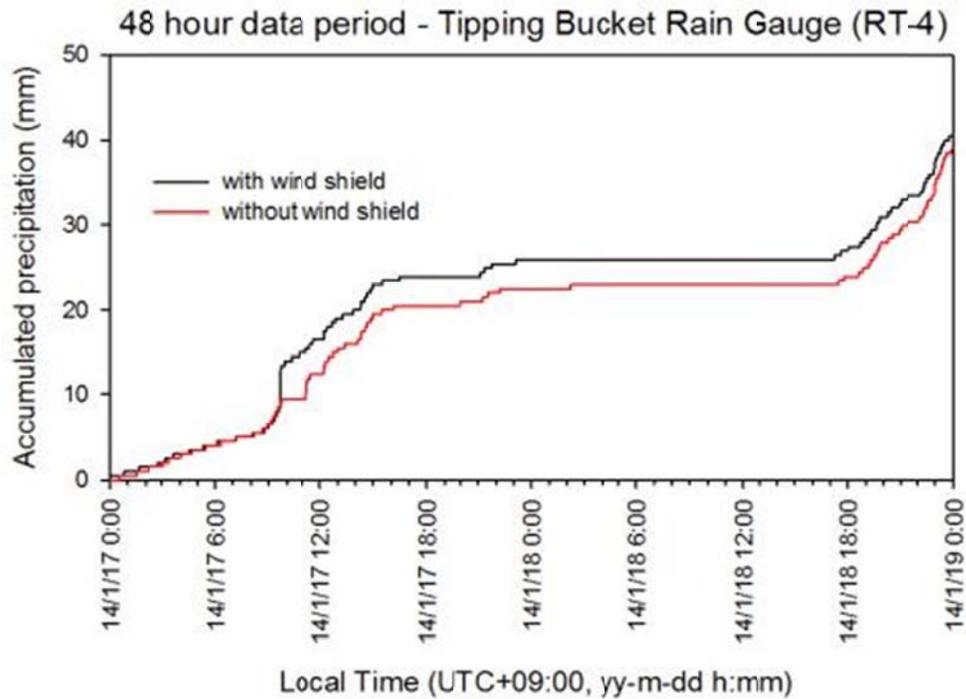
The picture and diagram of a RT4 rain gauge are shown below. Two RT-4 gauges, one of which is with a wind shield and other is without the shield, will be installed over the observation experiment field at 3.5 m above from the ground level.



Field calibration (if any).

These instruments are calibrated at the RIC Tsukuba, one of the WMO Regional Instrument Centres, whose home page can be found at http://www.jma.go.jp/jma/jma-eng/jma-center/ric/RIC_HP.html.

48h Plot.



Instrument Name: Tamura snow-rain intensity meter

Instrument number 5 of 11

Manufacturer	Sanyo Kogyo Co.
Model	CSYK-SR2-N
Serial number	(TBD)
Firmware version (if applicable)	N/A

Field configuration

Location on site	Outside DFIR. See the site layout.
Orientation	--
Height (measured at top)	3.5 m above the ground
Shield (if applicable)	No
Heating (if applicable)	Temperature of the funnel surface to collect snow is automatically kept at 13 degrees by heater.

Data output

Data communication protocol	TCP/IP (via Campbell CR1000+NL115)
Output data message format (include description of fields)	CSV, column data with date/time at first column
Data sampling frequency	1 min

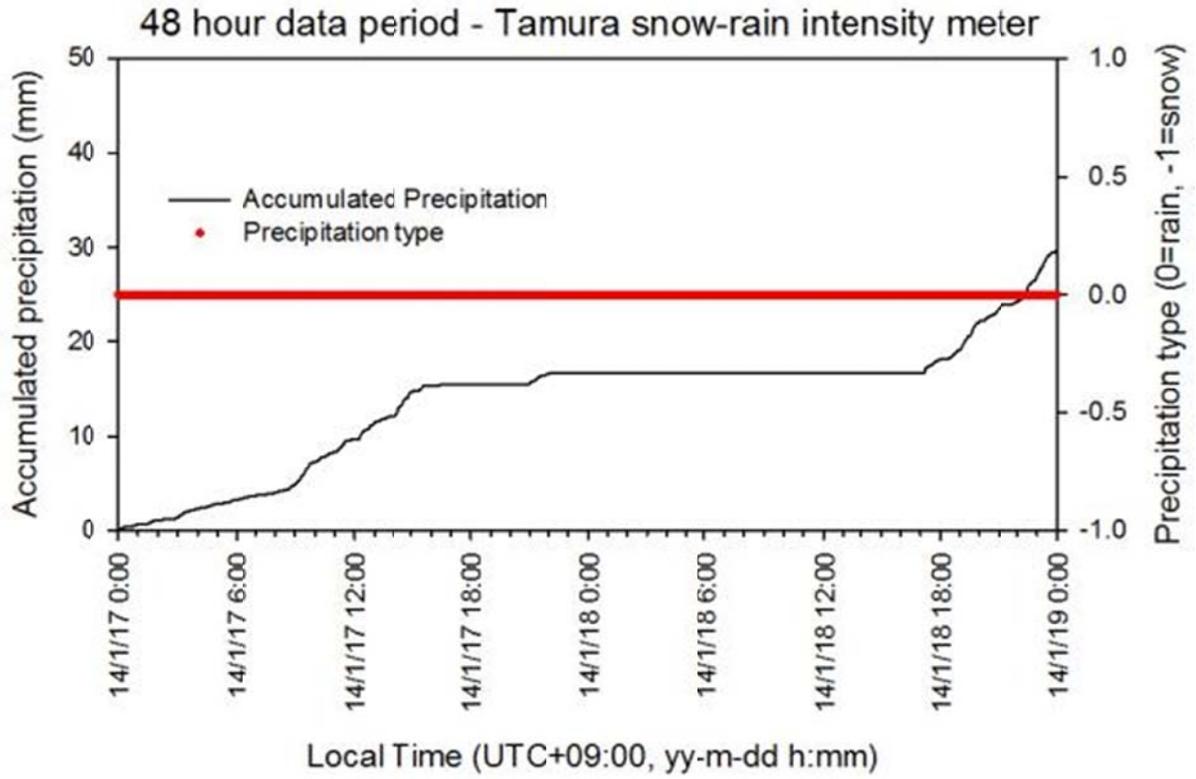
Instrument Picture.



Sensor to judge snow or rain

Field
N/A

48h Plot.



Instrument Name: Laser Precipitation Monitor

Instrument number 6 of 11

Manufacturer	Adolf Thies GmbH & Co. KG
Model	5.4110.01.000
Serial number	10130030
Firmware version (if applicable)	252

Field configuration

Location on site	Outside DFIR. The instrument is installed on the observation facility container. See the site layout.
Orientation	Horizontal laser sheet surface perpendicular to the prevailing wind direction
Height (measured at top)	3.5 m above the ground
Shield (if applicable)	--
Heating (if applicable)	Heating for whole sensor body is integrated.

Data output

Data communication protocol	RS422, full duplex
Output data message format (include description of fields)	521-column csv (converted using site specific software)
Data sampling frequency	1min

Instrument Picture.

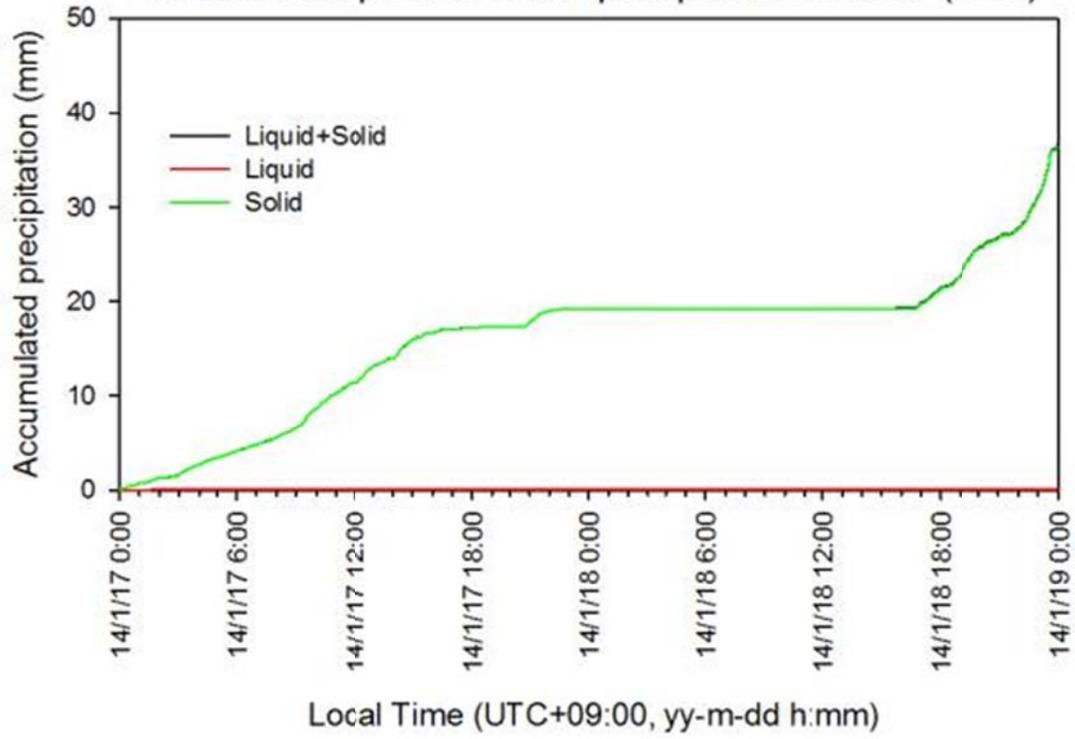


Field calibration (if any).

N/A

48h Plot.

48 hour data period - Laser precipitation Monitor (LPM)



Instrument Name: Windmill type anemometer

Instrument number 7 of 11

Manufacturer	Young Co.
Model	CYG-5103AP
Serial number	129433
Firmware version (if applicable)	N/A

Field configuration

Location on site	Outside DFIR. The instrument is installed on the observation facility container. See the site layout.
Orientation	No
Height (measured at top)	4.0m above the ground
Shield (if applicable)	No
Heating (if applicable)	No

Data output

Data communication protocol	TCP/IP (via Campbell CR1000+NL115)
Output data message format (include description of fields)	Csv, WindSpeed and WindDirection
Data sampling frequency	1 min

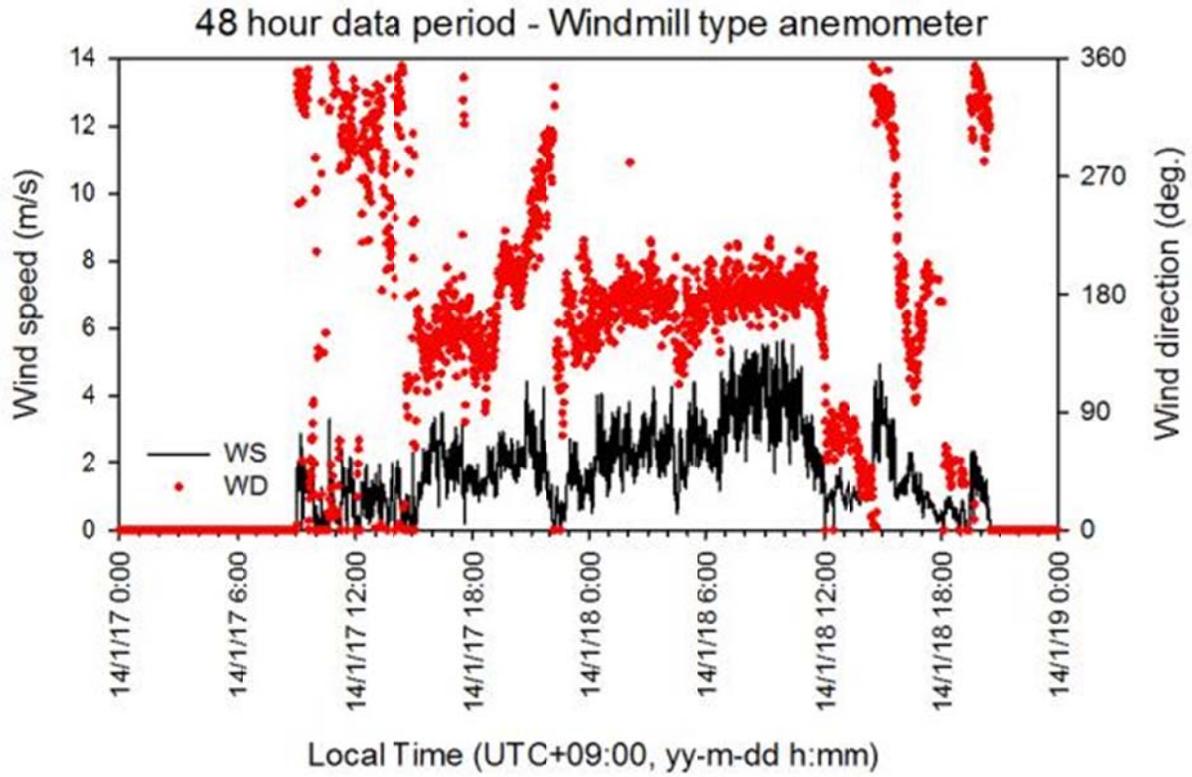
Instrument Picture.



Field calibration (if any).

N/A

48h Plot.



Instrument Name: Ventilated thermohygrometer ____
Instrument number 8 of 11

Manufacturer	Climatec Co.
Model	C-PT-10, CVS-HMP155D
Serial number	131102(C-PT-10), J4040055(CVS-HMP155D)
Firmware version (if applicable)	N/A

Field configuration

Location on site	Outside DFIR. The instrument is installed on the observation facility container. See the site layout.
Orientation	--
Height (measured at top)	2.5 m above the ground
Shield (if applicable)	Ventilated shield (Prede PVC-04)
Heating (if applicable)	N/A

Data output

Data communication protocol	TCP/IP (via Campbell CR1000+NL115)
Output data message format (include description of fields)	csv, Temperature and RelativeHumidity ?
Data sampling frequency	1min

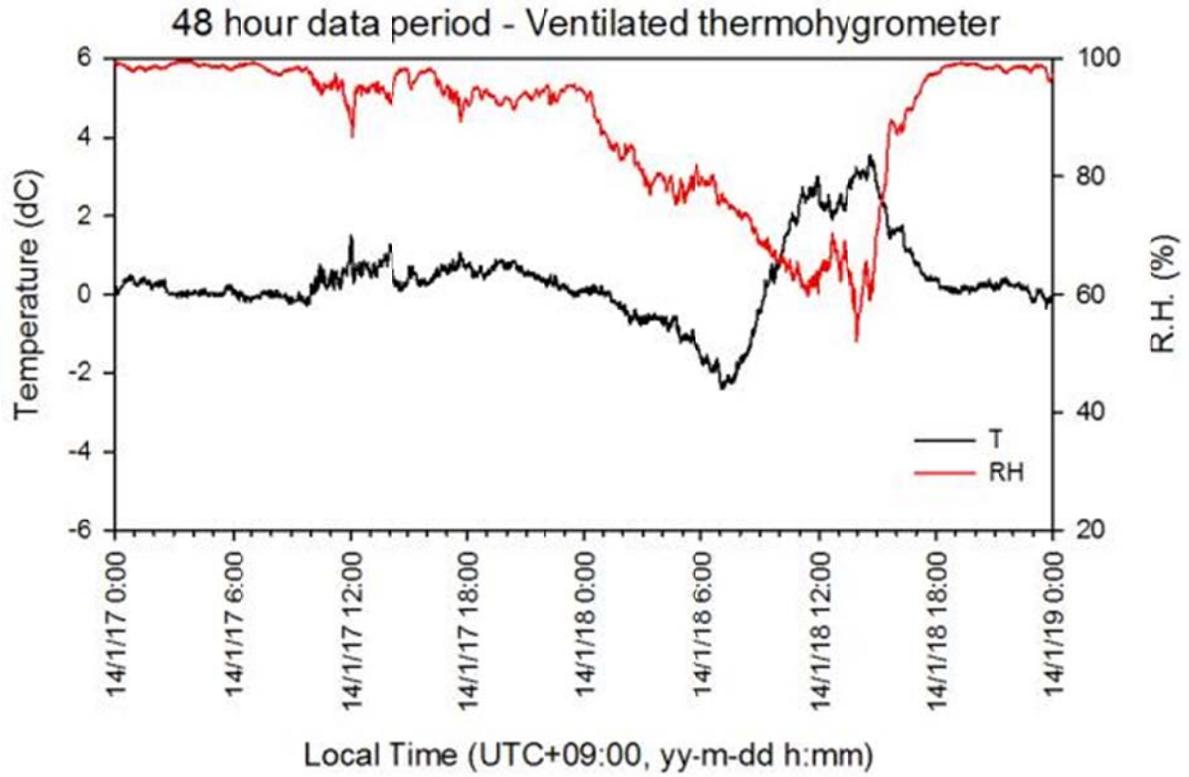
Instrument Picture.



Field calibration (if any).

N/A

48h Plot.



Instrument Name: Automatic weather station

Instrument number 9 of 11

Manufacturer	Lufft Co.
Model	WS600-UMB compact weather station
Serial number	075.0813.0701.035
Firmware version (if applicable)	(TBD)

Field configuration

Location on site	Outside DFIR. See the site layout.
Orientation	N/A
Height (measured at top)	3.5 m above from the ground
Shield (if applicable)	No
Heating (if applicable)	40VA at 24VDC

Data output

Data communication protocol	RS485, 2-wire, half-duplex
Output data message format (include description of fields)	Csv (Air temperature, relative humidity, precipitation intensity, precipitation type, precipitation quality, air pressure, wind direction, and wind speed)
Data sampling frequency	1 min

Instrument Picture.

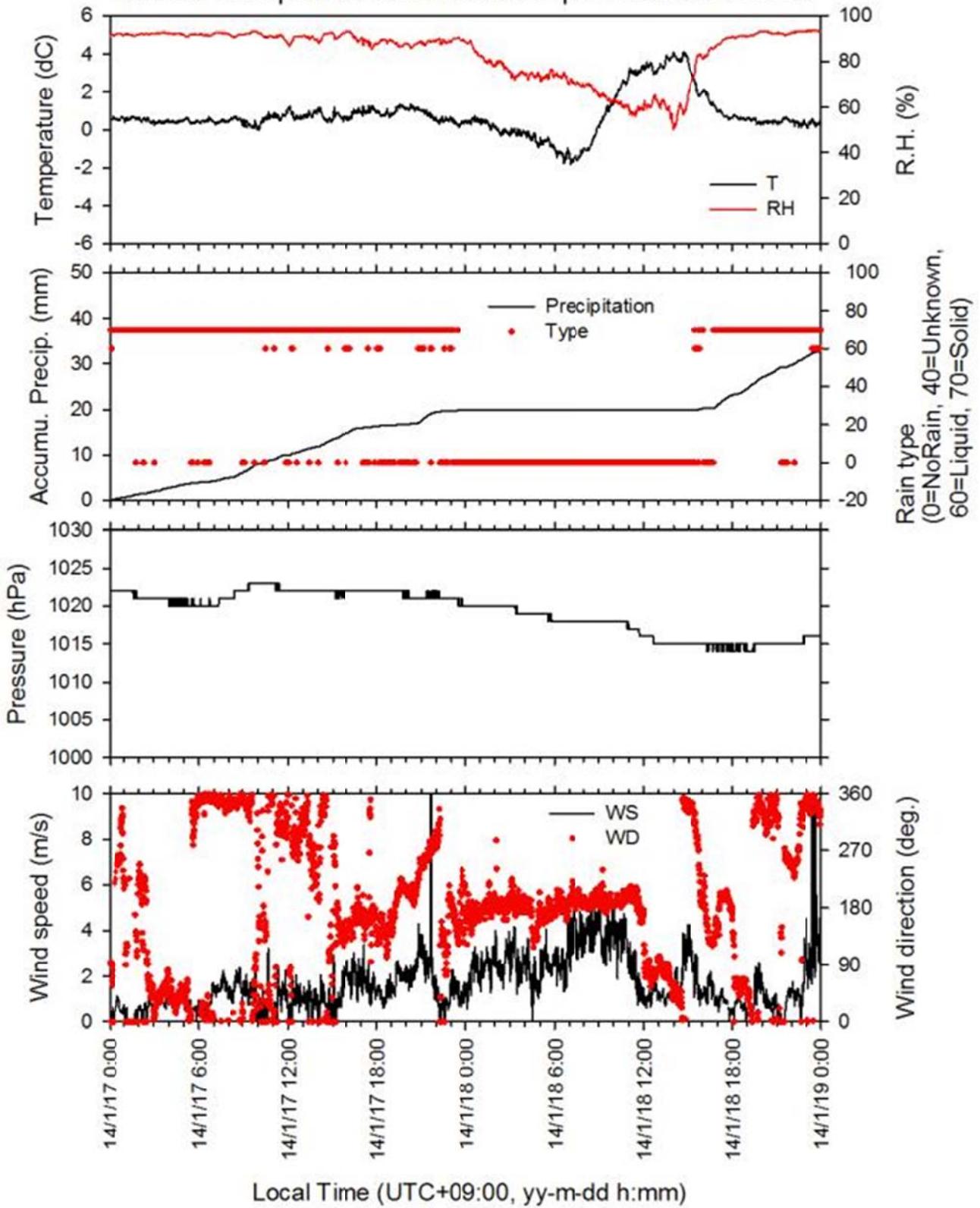


Field calibration (if any).

N/A

48h Plot.

48 hour data period - Automated compact weather station



Instrument Name: Microwave radiometer

Instrument number 10 of 11

Manufacturer	Radiometrics Co.
Model	MP-3000A
Serial number	MP-3164A
Firmware version (if applicable)	7.00

Field configuration

Location on site	Outside DFIR. The instrument is installed on the observation facility container. See the site layout.
Orientation	scanning approximately NNW-SSE
Height (measured at top)	3.5m above from the ground
Shield (if applicable)	No
Heating (if applicable)	blower with no heating

Data output

Data communication protocol	RS422 57600 kb/s 8N1 (?)
Output data message format (include description of fields)	ASCII CSV (7 files separated by comma variables)
Data sampling frequency	>10sec

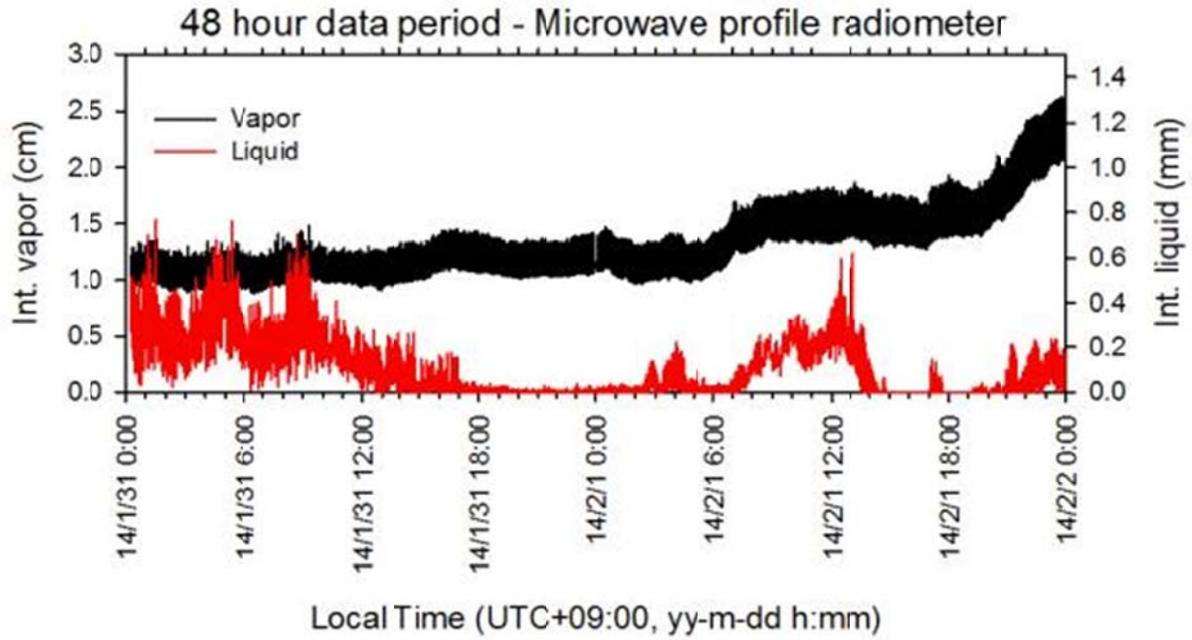
Instrument Picture.



Field calibration (if any).

N/A

48h Plot.



Instrument Name: Micro rain radar
Instrument number 11 of 11

Manufacturer	METEK Co.
Model	MRR-2
Serial number	MRR 050609 4151
Firmware version (if applicable)	6.10

Field configuration

Location on site	Outside DFIR. The instrument is installed on the observation facility container. See the site layout.
Orientation	No
Height (measured at top)	2.5 m(container height) +1.0m above from the ground
Shield (if applicable)	No
Heating (if applicable)	Yes

Data output

Data communication protocol	RS-232C
Output data message format (include description of fields)	ASCII-TEXT (3 files; Raw data, Processed data, and 1 min Ave data)
Data sampling frequency	10s

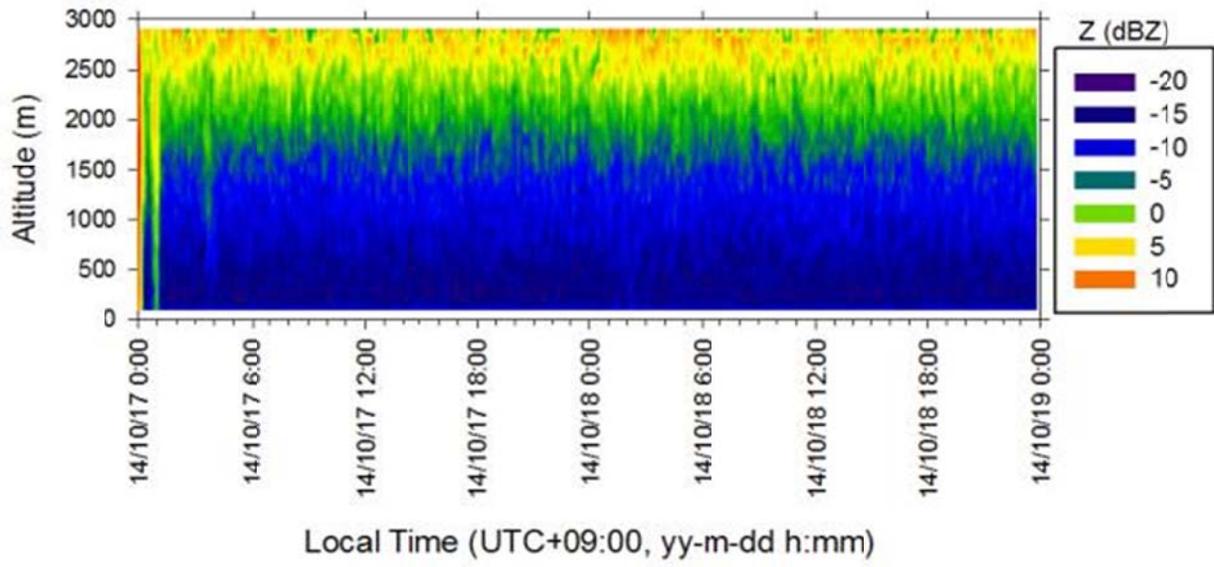
Instrument Picture.



Field calibration (if any).

N/A

48h Plot.



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 sheets and calibration results will be included in the designated areas of Sections A2 and A3.

- 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.

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.

The evaluation of the instrument performance at this stage will be conducted using the 48 hour time series plots provided in Sections A2 and A3. The readiness state of each instrument will be reported in the Instrument Data Validation table below.

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. Notes, plots, logs, will be appended to the POP table of the reference/instrument under test, and the readiness state and date will be updated in the Instrument Data Validation table.

TEST 3: SITE-TO-ARCHIVE TRANSFER VALIDATION

Once the transfer of site data files to the SPICE Data Archive at NCAR has been initiated, compare the site data with those received at the SPICE Data Archive for a 24 hour period to ensure that no errors occurred during archival or transmission.

If any errors occur, log them and following the resolution of the discrepancies, repeat the 24-hour validation test.

When the Test 3 is passed mark the check box YES in the Instrument Data Validation table below (this means that they have been also validated), with the starting date of the data transfer.

If Test 3 is not passed at the time of the Commissioning Report tick the checkbox NO and provide the expected date.

(Plots, datasets, errors logs, referred to Test 3 are **NOT** included in this document but archived by the site manager if further tests or analysis are required),

*IMPORTANT:
Test 2 and Test 3 may be conducted simultaneously, depending on the site configuration.*

Instrument Data Validation

Instrument	Readiness (if Yes, indicate the date)	Data transfer to NCAR archive (Test 3) (If the answer is No report the expected date)	Comments
GEONOR T-200B	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: January, 2015	Data is contained in the S2 (sensor group 2) file.
2D-Video Disdrometer	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: TBD	What kind of data do we transfer to NCAR archive?
Tipping Bucket Rain Gauge (RT-3 and RT-3 with wind shield)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: January, 2015	Data is contained in the S3 (sensor group 3) file.
Tipping Bucket Rain Gauge (RT-4 and RT-4 with wind shield)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: January, 2015	Data is contained in the S3 (sensor group 3) file.
Tamura snow-rain intensity meter	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: January, 2015	Data is contained in the S3 (sensor group 3) file.
Laser Precipitation Monitor	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: January, 2015	Data is contained in the S1 (sensor group 1) file.
Windmill anemometer	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date:	Data is contained in the S1 (sensor group 1) file.

		January, 2015	
Ventilated thermohygrometer	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: January, 2015	Data is contained in the S1 (sensor group 1) file.
Automatic weather station	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: January, 2015	Data is contained in the S3 (sensor group 3) file.
Microwave radiometer	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Date: January 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date:TBD	Does it need to transfer to NCAR archive?
Micro rain radar	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date:October 17, 2014	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date:TBD	Does it need to transfer to NCAR archive?

SECTION A5: SITE DOCUMENTATION CHECKLIST

A **Site Documentation Checklist** is provided below to track the inclusion of requisite documentation, data plots, and photos in sections A1 to A4.

Site Documentation Checklist

Site information and layout (Section A1)	<input checked="" type="checkbox"/> Included
Complete set of pictures documenting the overall site installation - views from N, E, S, W (Section A1)	<input checked="" type="checkbox"/> Included
Details of manual measurement procedure (Section A2)	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not Applicable
Instrument Metadata Reports for all instruments under test and all instruments used to provide ancillary measurements (Section A3)	<input checked="" type="checkbox"/> Included
Calibration results and check sheets for all instruments (Sections A2, A3)	<input type="checkbox"/> Included
Instrument data validation: 48h time series plots (Sections A2, A3)	<input checked="" type="checkbox"/> Included
Instrument data validation table (Section A4)	<input checked="" type="checkbox"/> Included
48h Instrument data validation: discrepancy reports (Section A4)	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not Applicable
Pictures of installations of all reference instruments, instruments under test, and instruments used to provide ancillary measurements (Sections A2, A3)	<input checked="" type="checkbox"/> Included
End-to-end data validation (Section A4; see Instrument data validation table).	<input type="checkbox"/> Full (all gauges) <input type="checkbox"/> Partial (some gauges) <input checked="" type="checkbox"/> No
SPICE archive end-to-end data validation: discrepancy reports (Section A4)	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Details of any workarounds (Sections A2, A3, A4)	<input type="checkbox"/> Included <input checked="" type="checkbox"/> Not Applicable
--------------------------------------------------	--------------------------------------------------------------------------------------