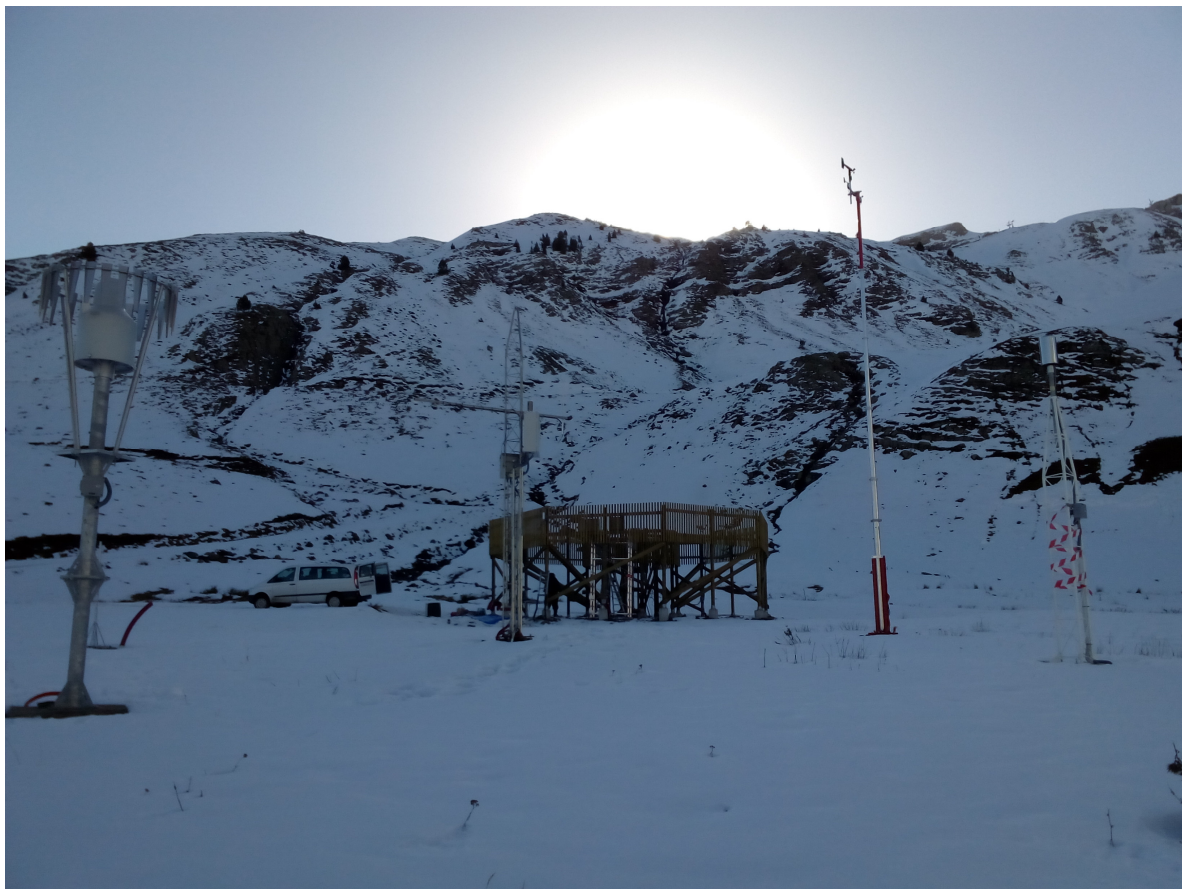


AEMET - SPAIN

COMMISSIONING REPORT OF SITE

FORMIGAL



Javier Alastrué, José Luís Collado, Samuel Buisán, Amadeo Uriel

AEMET – Spanish Meteorology Agency

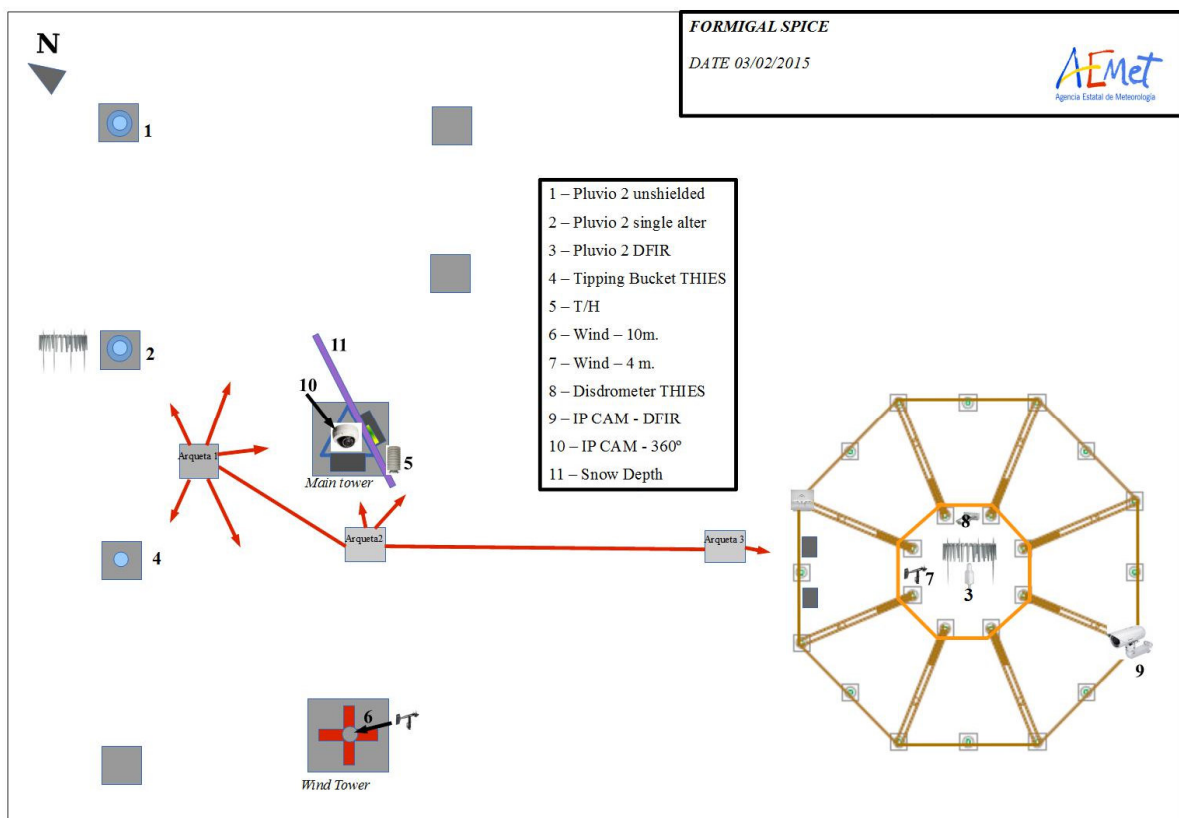
Date of issuing	Version	Authors	Comments
January 2014	1	José Luís Collado , Javier Alastrué, Amadeo Uriel, Samuel Buisán	
May 2014	2	José Luís Collado , Javier Alastrué, Samuel Buisán	Change of snow depth sonic sensor on February 2014. New sensor SR50A – Campbell installed Page 15
May 2015	3	José Luís Collado , Javier Alastrué, Samuel Buisán	Instruments associated with DFIR installation: Pluvio2 Laser PM Young Monitor Alpine

APPENDIX A: PROOF OF PERFORMANCE (POP) FORMS

SECTION A1: STATION INFORMATION

Station name	Aramon-Formigal-AEMET, ARAGON, SPAIN
Reference town	Formigal
Station latitude	42.76146
Station longitude	-0.39243
Station elevation in metres	1800 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.



Prevailing winds: NW

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



PANORAMIC VIEW FROM EAST



PANORAMIC VIEW FROM WEST

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)	75 m
Diameter	12
Height of the outer fence (measured at the top)	4
Height of the inner fence (measured at the top)	3.5
Length of slats	1495 mm
Width of slats	55 mm
Slat material	Pine treated wood

Single Alter shield

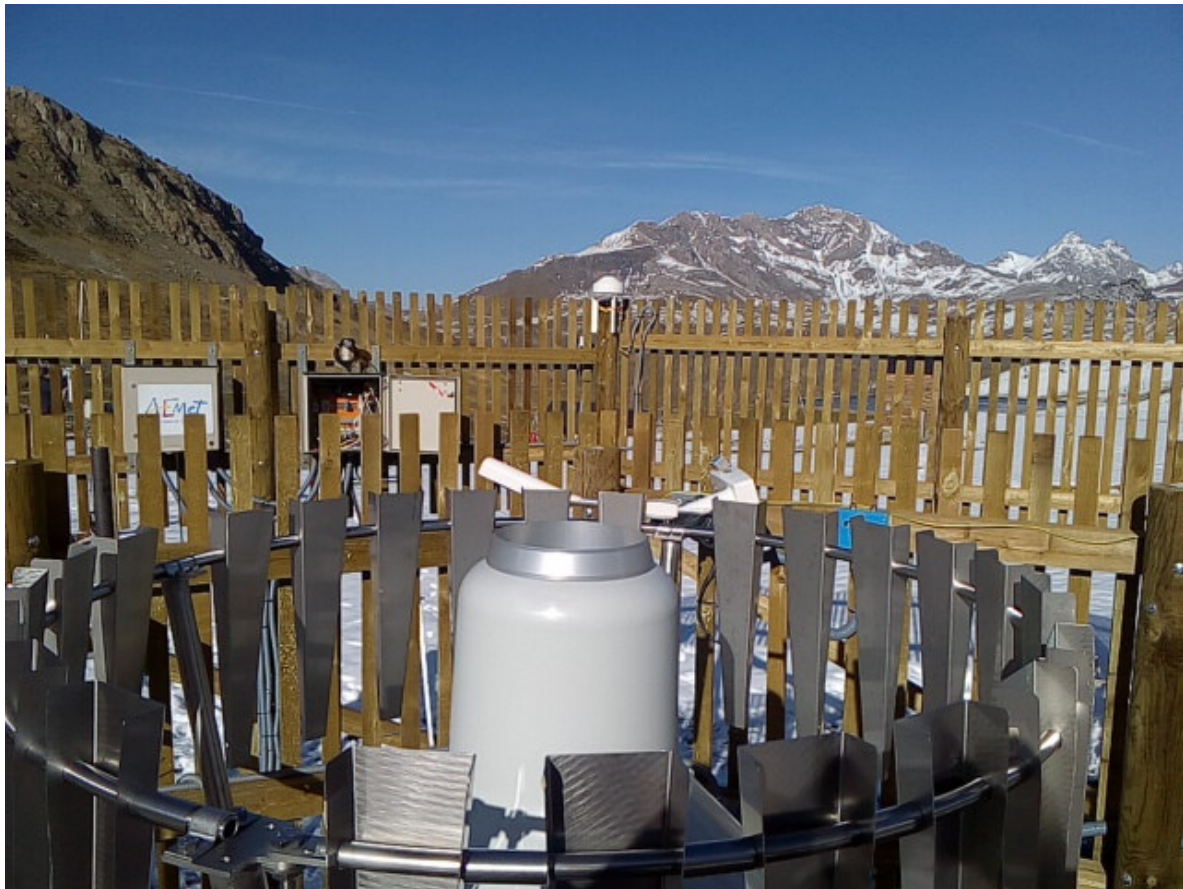
According to the SPICE instructions?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Attached to the post of the weighing gauge?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If different, provide details:	

Weighing gauge (WG)

Make and model	OTT Pluvio2, 200 cm ² , 1500 mm
Serial number	3547999
Firmware version (if applicable)	V1.30.1
Number of transducers (if applicable)	N/A
Height of installation (measured from the top of the gauge)	3.5 m

Heater configuration and algorithm	<p>Heater Location Heating is applied to the rim.</p> <p>Temperature Measurement The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors.</p> <p>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.</p> <p>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</p> <p>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.</p> <ul style="list-style-type: none"> • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)
Output data message format	<p>[Intensity RT] [Accumulated RT/NRT] [Accumulated NRT] [Accumulated total NRT] [Bucket RT] [Bucket NRT] [Temperature load cell] [Heating status] [Status] [Temperature electronics unit] [Supply voltage] [Temperature orifice ring rim]</p>
Frequency of data sampling	Scan 6 sec. Integration 1 min

Instrument Picture.



Field calibration (if any).

Calibration test successful

Precipitation detector

Make and model	THIES LPM disdrometer , 5.4110.xx.x00, V2.5x STD
Serial number	060529 / 0000093
Firmware version (if applicable)	
Number of transducers (if applicable)	
Height of installation (measured from the top of the gauge)	3.5 m
output data message format	[1M SYNOP Tab.4677] [1M SYNOP Tab.4680] [1M METAR Tab.4678] [1M Intensity (mm/h) total precipitation] [1M Intensity (mm/h) liquid precipitation] [1M (mm/h) solid precipitation] [Precipitation amount (mm)] [1M Visibility in precipitation] [1M Measuring quality] [Status Laser] [Static signal] [Status Laser temperature (digital)] [Status Laser current (digital)] [Status Sensor supply] [Status Current pane heating laser head] [Status Current pane heating receiver head] [Status Temperature sensor] [Status Heating supply] [Status Current heating housing] [Status Current heating heads] [Status Current heating carriers] [Status Control output laser power] [Interior temperature (°C)]
Data sampling frequency	Laser beam : 109 kHz. Resulting precipitation events collected each minute.
Data acquisition interval	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> <ul style="list-style-type: none"> • <i>Inside the inner fence</i> • <i>75 cm below the gauge opening, corresponds to half way down the inner fence</i> 	YES

<p>Location of installation relative to WG in reference system. <i>DAT team recommend to locate the optical precipitation detector or precipitation type:</i></p> <ul style="list-style-type: none"> • <i>perpendicular to the main wind direction</i> • <i>if possible using two precipitation sensors at different places to account for different wind directions.</i> • <i>in the middle between Alter and inner fence</i> 	<p>YES</p>
--	------------

Picture. Field Reference Type R2 (Automatic)



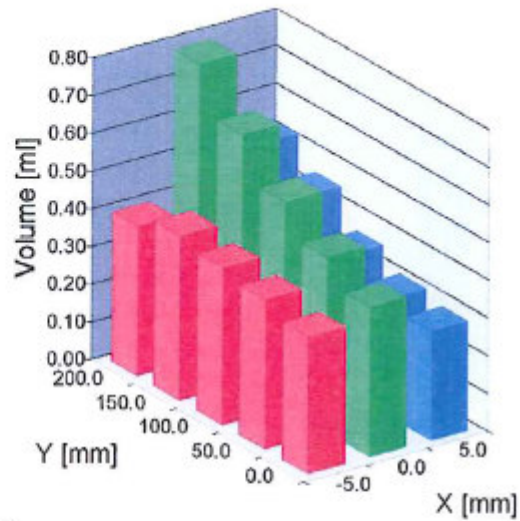
Field Calibration of Reference Type R2 (Automatic)
 Calibrated from manufacturer

Amount measurement

X-Position [mm]	Y-Position [mm]	Volume [ml]
-5,00	0,00	0,36
0,00	0,00	0,40
5,00	0,00	0,29
-5,00	50,00	0,40
0,00	50,00	0,46
5,00	50,00	0,31
-5,00	100,00	0,42
0,00	100,00	0,55
5,00	100,00	0,36
-5,00	150,00	0,44
0,00	150,00	0,66
5,00	150,00	0,45
-5,00	200,00	0,40
0,00	200,00	0,78
5,00	200,00	0,53

Average value: 0,453ml
 Nominal volume: 0,448ml
 Allowed variation: $\pm 5\%$ (0,426ml .. 0,471ml)

Amount assignment



4.3.2014

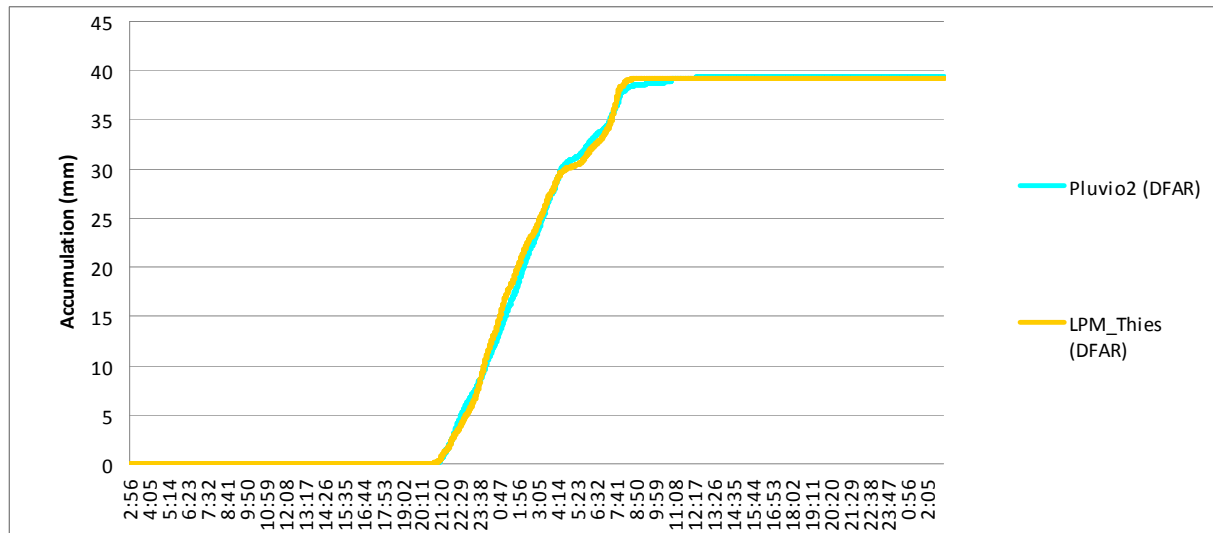
Date

Adolf Thies
 Signature

ADOLF THIES GmbH & Co.KG

Hauptstraße 76 37083 Göttingen Germany
 Postfach 3536 + 3541 37025 Göttingen
 Tel.: (0551) 79001-0 Fax: (0551) 79001-65
 Internet: <http://www.thiesclima.com> eMail: info@thiesclima.com

48h Plot. Field Reference Type R2 (Automatic)



Field Reference Type R3 (Automatic)

Presence of a WG with a single Alter shield?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Presence of a WG with no shield?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Description of surrounding obstacles (including distance/direction from, height, and type)	75 m
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.	10m

Weighing gauge (1 of 2)- Z4

Make and model	OTT Pluvio2, 200 cm ² , 1500 mm
Serial number	338172
Firmware version (if applicable)	V1.30.1
Number of transducers (if applicable)	N/A
Height of installation (measured from the top of the gauge)	3.5 m
Heater configuration and algorithm	<p>Heater Location Heating is applied to the rim.</p> <p>Temperature Measurement The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors.</p> <p>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</p>

	<p>heating power is determined by the load cell temperature and rim temperature with greatest heating power supplied for low load cell temperatures.</p> <p>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</p> <p>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.</p> <ul style="list-style-type: none"> • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)
Output data message format	[Intensity RT] [Accumulated RT/NRT] [Accumulated NRT] [Accumulated total NRT] [Bucket RT] [Bucket NRT] [Temperature load cell] [Heating status] [Status] [Temperature electronics unit] [Supply voltage] [Temperature orifice ring rim]
Frequency of data sampling	Scan 6 sec. Integration 1 min

Weighing gauge (2 of 2) - Z3

Make and model	OTT Pluvio2, 200 cm ² , 1500 mm
Serial number	338173
Firmware version (if applicable)	V1.30.1
Number of transducers (if applicable)	N/A
Height of installation (measured from the top of the gauge)	3.5 m
Heater configuration and algorithm	<p>Heater Location Heating is applied to the rim.</p> <p>Temperature Measurement The temperature of the load cell and the rim temperature are measured using OTT's built-in temperature sensors.</p> <p>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</p>

	<p>+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.</p> <p>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</p> <p>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.</p> <ul style="list-style-type: none"> • Power supply: 24VDC • Heater resistance: ~10.9 Ω (rim heater) • Heater power: ~0 - 53 W (rim heater)
Output data message format	[Intensity RT] [Accumulated RT/NRT] [Accumulated NRT] [Accumulated total NRT] [Bucket RT] [Bucket NRT] [Temperature load cell] [Heating status] [Status] [Temperature electronics unit] [Supply voltage] [Temperature orifice ring rim]
Frequency of data sampling	Scan 6 sec. Integration 1 min

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 checked="" type="checkbox"/> Yes <input type="checkbox"/> No
If different, provide details:	

Pictures. Field Reference Type R3 (Automatic).



Weighing Gauge 1



Weighing Gauge 2

Table. Field Calibration of Reference Type R3 (Automatic) Weighing Gauges 1 and 2

The calibration test was performed by a calibration laboratory. All parameters were successful



C/13300811
Página 3 de 3 páginas

7.- RESULTADOS

* Rango de calibración: 0 a 10000 g

* PRUEBA DE REPETIBILIDAD

VALOR NOMINAL g	VALOR MEDIO g	DESVIACION TIPICA g	CORRECCION g	INCERTIDUMBRE g
500,0	499,7	0,19	+0,3	0,25
1000,0	999,7	0,10	+0,3	0,33
2000,0	1999,1	0,10	+0,9	0,59
5000,0	4997,5	0,10	-2,5	1,4
10000,0	9996,5	0,10	-3,5	2,9

* PRUEBA DE HISTERESIS

VALOR NOMINAL g	VALOR MEDIO CRECIENTE g	VALOR MEDIO DECRECIENTE g	HISTERESIS g
100,0	100,0	100,0	0,00
1100,0	1099,6	1099,6	0,00
3100,0	3098,6	3098,6	0,00
5100,0	5097,8	5097,8	0,00
9100,0	9096,6	9096,6	0,00

* PRUEBA DE EXCENRICIDAD

VALOR NOMINAL g	1	2	3	4	5	RECORRIDO g
	g					
7000,0	6999,4	7006,2	7000,6	6996,0	6994,4	12,0

2	5
	1
3	4

Corrección: cantidad a sumar algebraicamente a la lectura del instrumento para obtener el valor convencionalmente verdadero.

Para el cálculo de la incertidumbre no se ha tenido en cuenta la corrección, ni las componentes debidas a la histéresis ni excentricidad.

Observaciones:

- No se han realizado ajustes al instrumento.

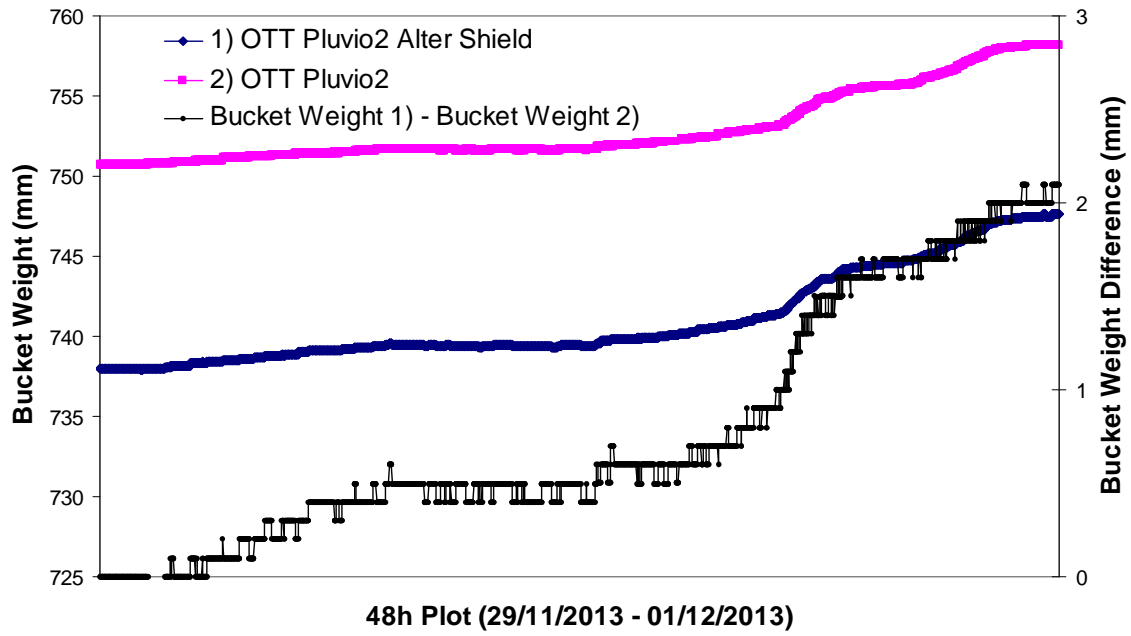
- La realización de cualquier ajuste del instrumento realizado con posterioridad a la calibración puede invalidar los resultados del presente certificado.

- Conversión realizada para la obtención de los resultados del presente certificado, según especificaciones del manual de usuario del instrumento: 1 mm = 20 g.

- El equipo dispone de una célula de carga marca HBM, modelo Z6FC4/50KGOTT-1 y s/n 311 32927.

Fin de certificado

48h Plots. Field Reference Type R3 (Automatic). Weighing Gauges 1 and 2



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: **Gauge tipping bucket**

Instrument Status : Under test

Type of measurement : Automatic

Parameter measured : Accumulated precipitation

Manufacturer	THIES
Model	5.403235228
Serial number	N/A
Firmware version (if applicable)	N/A

Field configuration

Location on site	4
Orientation	--
Height (measured at top)	1.5 m
Shield (if applicable)	No
Heating (if applicable)	Yes. When ambient temperature sensor detects the temperature falling below +5°C, the system becomes "Active"

Data output

Data communication protocol	Analogue Output Pulse (Reed Relay)
Output data message format (include description of fields)	Analogue Output Pulse (Reed Relay) [PrecipRate]
Data sampling frequency	1 min

Instrument Picture.



Field calibration (if any).

N/A

Instrument Name: Wind Monitor

Instrument Status : Ancillary measurement
Type of measurement : Automatic
Parameter measured : Wind speed and direction

Manufacturer	YOUNG
Model	Alpine 05103-45
Serial number	WM00125769
Firmware version (if applicable)	N/A

Field configuration

Location on site	6
Orientation	Box facing South
Height (measured at top)	10 m
Shield (if applicable)	N/A

Heating (if applicable)	N/A
-------------------------	-----

Data output

Data communication protocol	Analog
Output data message format (include description of fields)	[Wind speed] [Wind direction]
Data sampling frequency	1 min

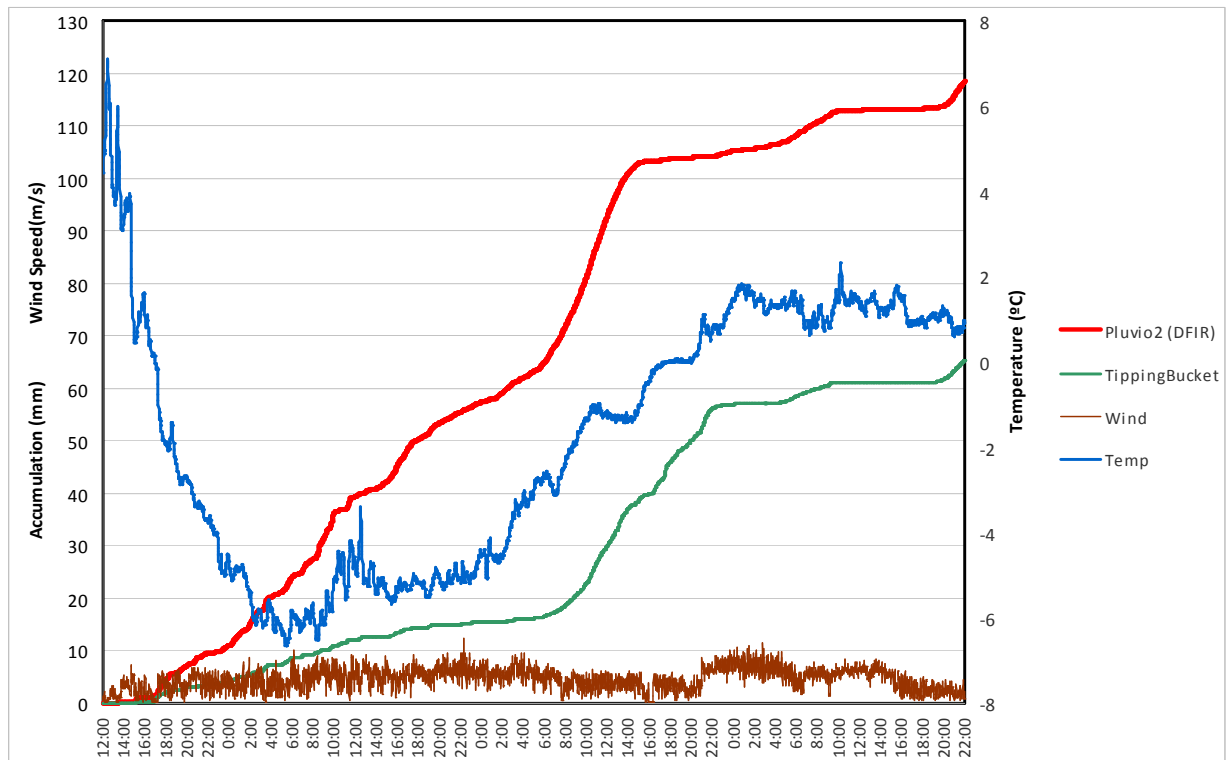
Instrument Picture.



Field calibration (if any).

N/A

48h Plot (Tipping Bucket, Pluvio2(DFIR), Wind, Temperature)



Instrument Name: Wind Monitor

Instrument Status : Ancillary measurement
Type of measurement : Automatic
Parameter measured : Wind speed and direction

Manufacturer	YOUNG
Model	Alpine 05103-45
Serial number	WM00133226
Firmware version (if applicable)	N/A

Field configuration

Location on site	7
Orientation	Box facing South
Height (measured at top)	4 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Data output

Data communication protocol	Analog
Output data message format (include description of fields)	[Wind speed] [Wind direction]
Data sampling frequency	1 min

Instrument Picture



Field calibration (if any).

N/A

48h Plot.

N/A

Instrument Name: **Snow depth sonic ranging sensor**

Instrument Status : Under test
Type of measurement : Automatic
Parameter measured : Snow depth

Field configuration Location on site	11
Orientation	
Height (measured at top)	4.2 m
Shield (if applicable)	N/A
Heating (if applicable)	N/A

Manufacturer	Campbell
Model	SR50A
Serial number	05691

Data communication protocol	SDI-12
Output data message format	[snow depth] [internal temp] [quality]
Data sampling frequency	1 min

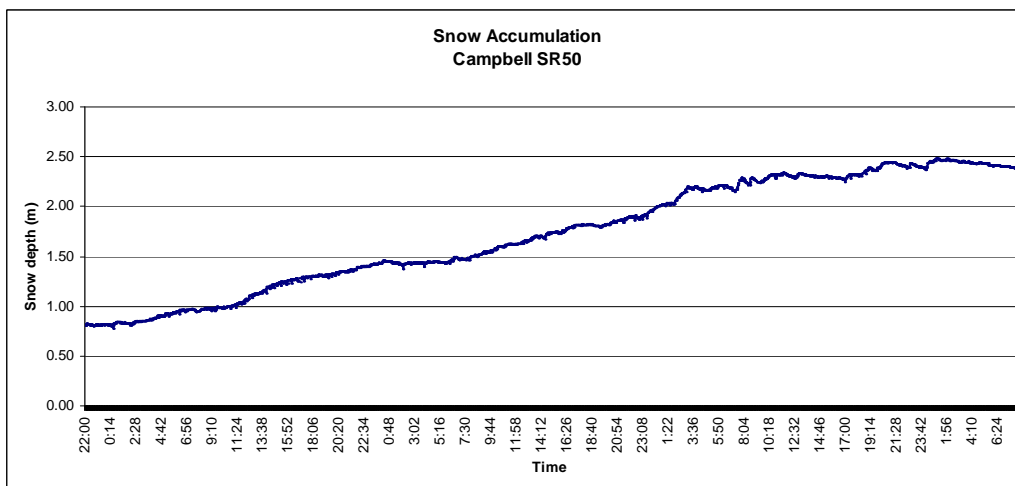
Instrument Picture.



Field calibration (if any).

N/A

48h Plot



Instrument Name: **Thermo Hygrometer**

Instrument Status : Ancillary measurement

Type of measurement : Automatic

Parameter measured : Temperature, Relative Humidity

Manufacturer	THIES
Model	1.1005.54.700
Serial number	88820
Firmware version (if applicable)	N/A

Field configuration

Location on site	5
Orientation	N
Height (measured at top)	4 m
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)	[Temperature] [Relative Humidity]
Data sampling frequency	1 min

Instrument Picture.



Field calibration (if any).

N/A

48h Plot.

Previous plot

SECTION A4: CONFIRMATION OF EXPERIMENT 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
ALL INSTRUMENTS	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: May 2015	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Date: May 2015	

SECTION A5: SITE DOCUMENTATION CHECKLIST

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 type="checkbox"/> Included
Instrument data validation table (Section A4)	<input type="checkbox"/> Included
48h Instrument data validation: discrepancy reports (Section A4)	<input type="checkbox"/> Included <input 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

<p>End-to-end data validation (Section A4; see Instrument data validation table).</p>	<p><input type="checkbox"/> Full (all gauges) <input type="checkbox"/> Partial (some gauges)</p> <p><input type="checkbox"/> No</p>
<p>SPICE archive end-to-end data validation: discrepancy reports (Section A4)</p>	<p><input type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>Details of any workarounds (Sections A2, A3, A4)</p>	<p><input type="checkbox"/> Included <input type="checkbox"/> Not Applicable</p>