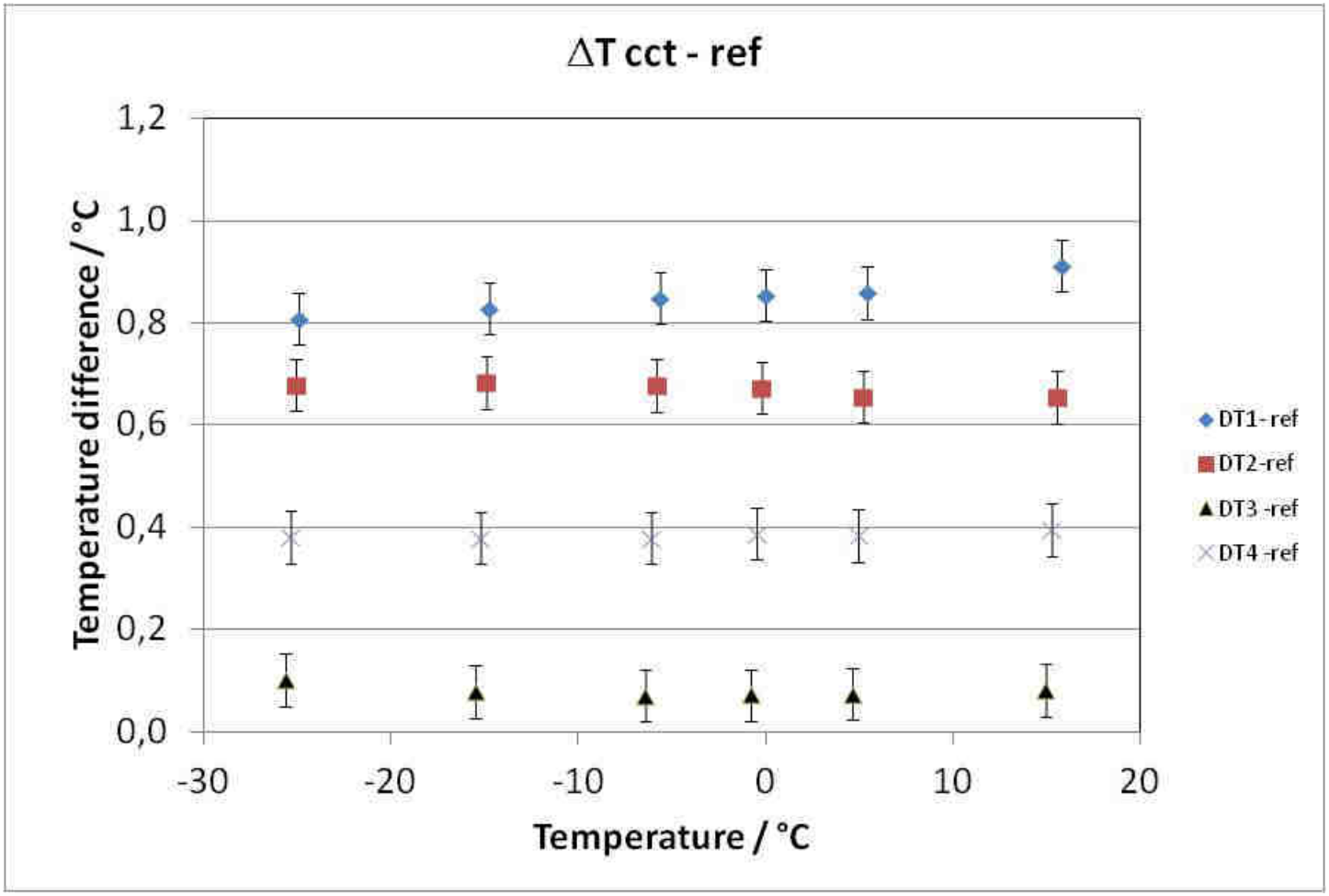

ΔT cct - ref
Temperature difference / °C
1,2
1,0
0,8
0,6
0,4
0,2
0,0
-30
-20
-10
0
10
20
Temperature / °C
DT1 - ref
DT2 -ref
DT3 -ref
DT4 -ref

Calibration uncertainty

Uncertainty contribution	°C
Reference sensor calibration	0,020
Chamber uniformity	0,005
Sensor under calibration stability	0,009
Calibration curve	0,012
Standard Uncertainty	**0,026**
Expanded Uncertainty (*k*=2)	**0,051**

Difference vs T1 uncertainty

Uncertainty contribution	°C
T1 sensor stabiliity	0,009
Chamber uniformity	0
Sensor under calibration stability	0,009
Calibration curve	0,014
Standard Uncertainty	**0,019**
Expanded Uncertainty (*k*=2)	**0,038**

Uncertainty on gradient in cct

Uncertainty contribution	°C
Relative correction curve t2	0,02
Relative correction curve t3	0,02
Relative correction curve t4	0,02
T1 sensor stabiliity	0,009
Standard Uncertainty	**0,036**
Expanded Uncertainty (*k*=2)	**0,072**

Metrology lab

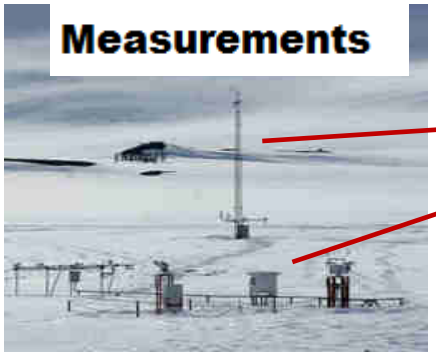
Andrea Merlone

METEOMET

METEOMET

Metrology for Meteorology

EURAMET



le cnam

PTB Physikalisch Technische Bundesanstalt

CEM CENTRO ESPAÑOL DE METROLOGÍA

MIKES Centre for metrology and accreditation

pmod wrc

SP

INRiM ISTITUTO NAZIONALE DI RICERCA METROLOGICA

Seconda Università degli Studi di Napoli SUN

DANISH TECHNOLOGICAL INSTITUTE

METEOMET
Metrology for Meteorology

Metrology lab

Andrea Merlone

METEOMET
Metrology for Meteorology

Metrology lab

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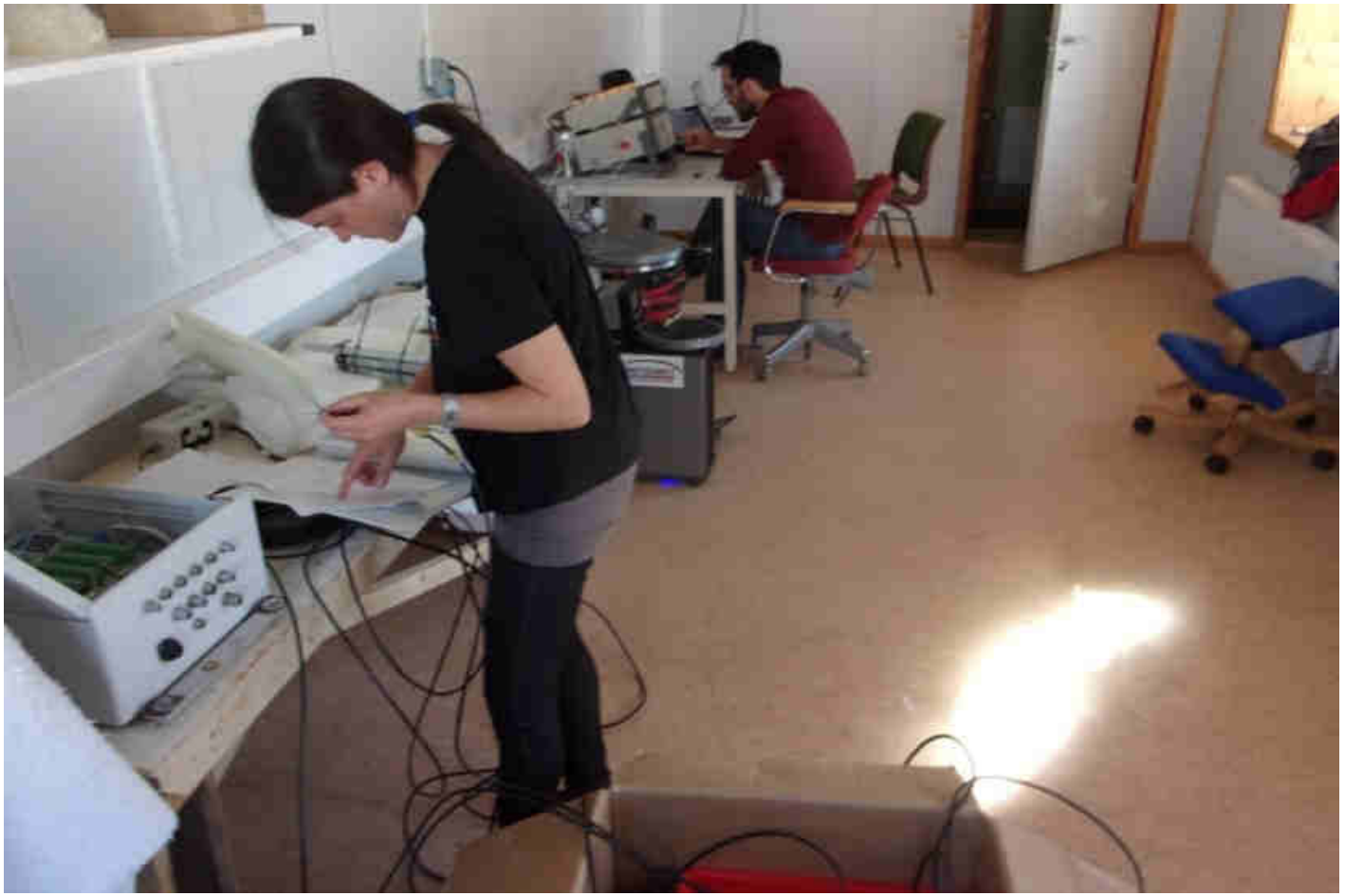


METEOMET
Metrology for Meteorology

Andrea Merlone

Permafrost boreholes

On site calibration at

Sommeiller pass

METEOMET
Metrology for Meteorology

Andrea Merlone

2015-2017
On site permafrost temperature sensors calibration

PIEMONTE Arpa Agenzia Regionale per la Protezione Ambientale

METEOMET
Metrology for Meteorology

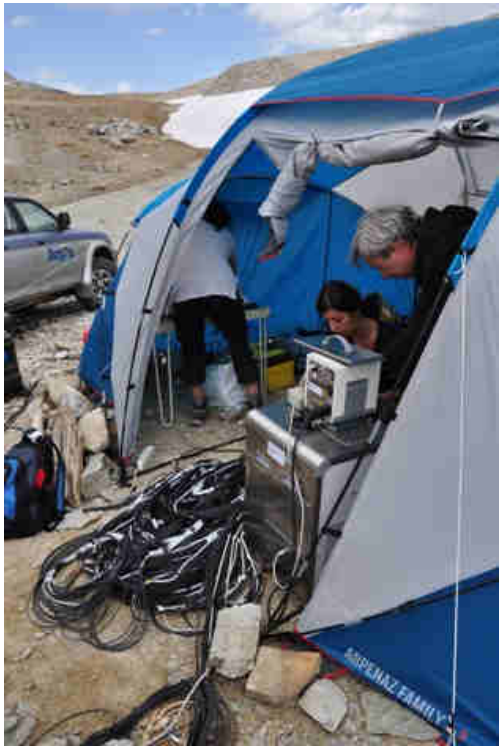
Laboratory calibration
And system test

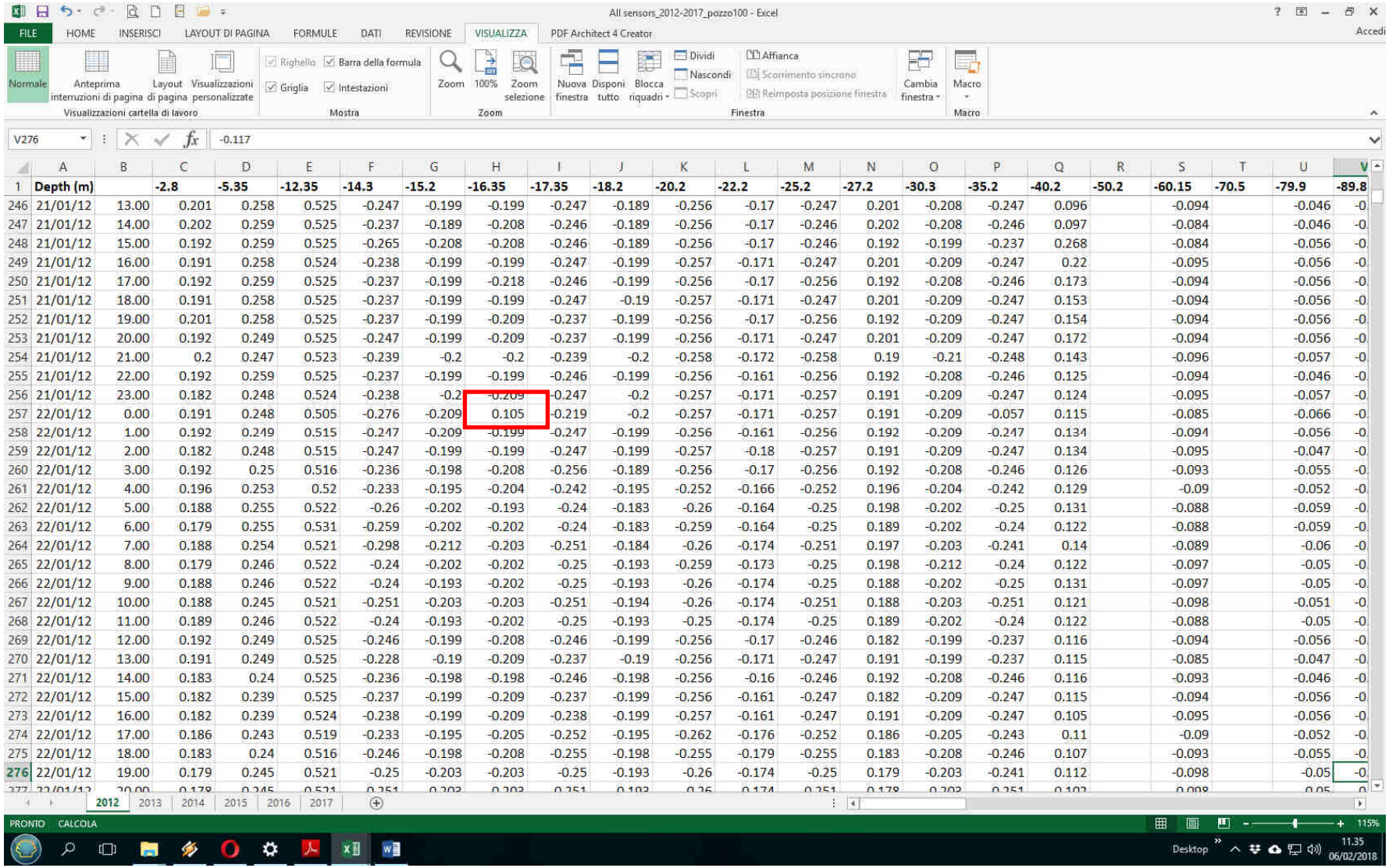
July 2017. A metrology lab at 3000 m

July 2017. A metrology lab at 3000 m

July 2017. A metrology lab at 3000 m

July 2017. A metrology lab at 3000 m





All sensors_2012-2017_pozzo100 - Excel

FILE HOME INSERISCI LAYOUT DI PAGINA FORMULE DATI REVISIONE VISUALIZZA PDF Architect 4 Creator

Normale | Anteprima interruzioni di pagina | Layout di pagina | Visualizzazioni personalizzate — Visualizzazioni cartella di lavoro

Righello | Barra della formula | Griglia | Intestazioni — Mostra

Zoom | 100% | Zoom selezione — Zoom

Nuova finestra | Disponi tutto | Blocca riquadri | Dividi | Nascondi | Scopri | Affianca | Scorrimento sincrono | Reimposta posizione finestra | Cambia finestra — Finestra

Macro — Macro

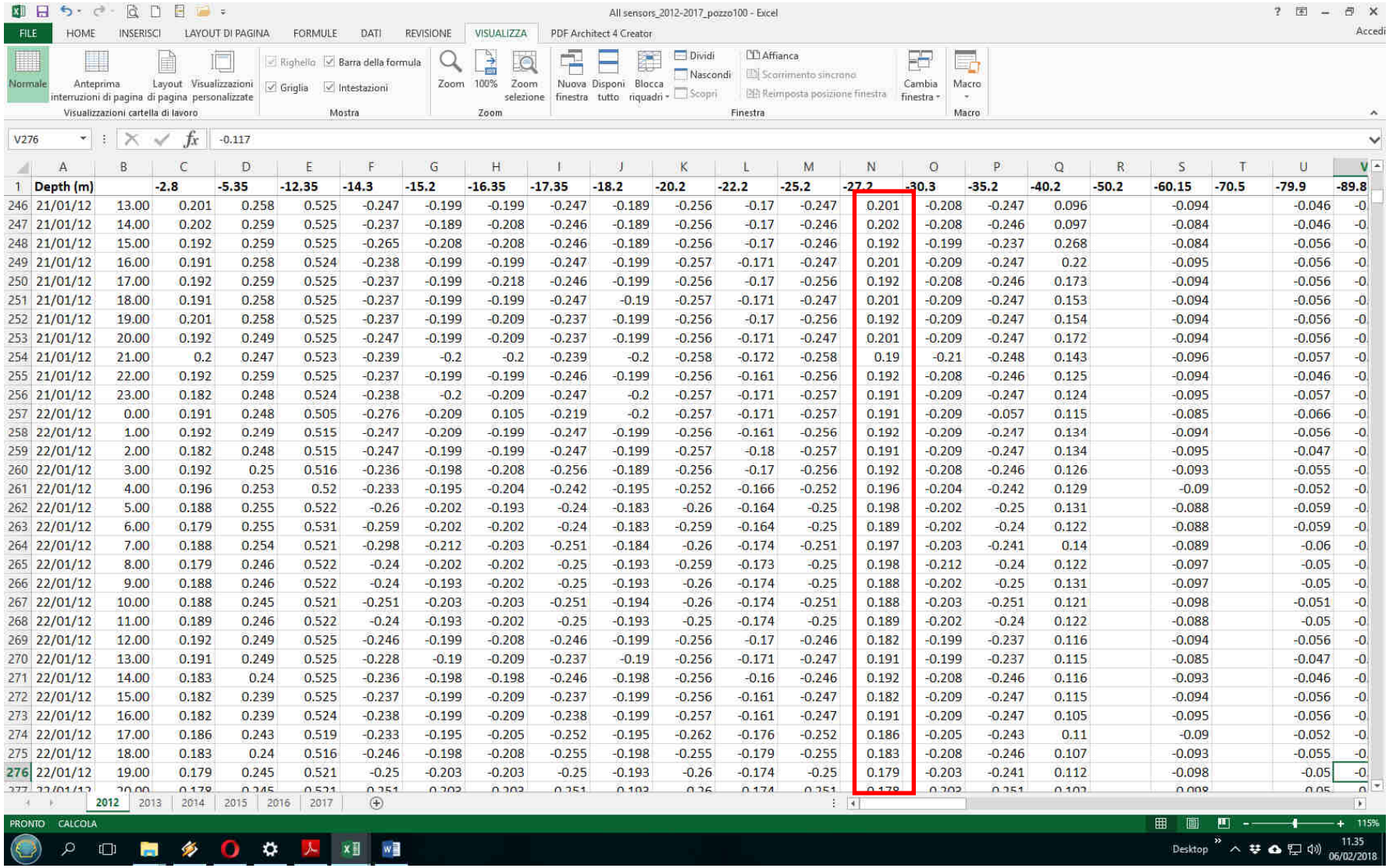
V276 -0.117

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Depth (m)		-2.8	-5.35	-12.35	-14.3	-15.2	-16.35	-17.35	-18.2	-20.2	-22.2	-25.2	-27.2	-30.3	-35.2	-40.2	-50.2	-60.15	-70.5	-79.9	-89.8
246	21/01/12	13.00	0.201	0.258	0.525	-0.247	-0.199	-0.199	-0.247	-0.189	-0.256	-0.17	-0.247	0.201	-0.208	-0.247	0.096		-0.094		-0.046	-0
247	21/01/12	14.00	0.202	0.259	0.525	-0.237	-0.189	-0.208	-0.246	-0.189	-0.256	-0.17	-0.246	0.202	-0.208	-0.246	0.097		-0.084		-0.046	-0
248	21/01/12	15.00	0.192	0.259	0.525	-0.265	-0.208	-0.208	-0.246	-0.189	-0.256	-0.17	-0.246	0.192	-0.199	-0.237	0.268		-0.084		-0.056	-0
249	21/01/12	16.00	0.191	0.258	0.524	-0.238	-0.199	-0.199	-0.247	-0.199	-0.257	-0.171	-0.247	0.201	-0.209	-0.247	0.22		-0.095		-0.056	-0
250	21/01/12	17.00	0.192	0.259	0.525	-0.237	-0.199	-0.218	-0.246	-0.199	-0.256	-0.17	-0.256	0.192	-0.208	-0.246	0.173		-0.094		-0.056	-0
251	21/01/12	18.00	0.191	0.258	0.525	-0.237	-0.199	-0.199	-0.247	-0.19	-0.257	-0.171	-0.247	0.201	-0.209	-0.247	0.153		-0.094		-0.056	-0
252	21/01/12	19.00	0.201	0.258	0.525	-0.237	-0.199	-0.209	-0.237	-0.199	-0.256	-0.17	-0.256	0.192	-0.209	-0.247	0.154		-0.094		-0.056	-0
253	21/01/12	20.00	0.192	0.249	0.525	-0.247	-0.199	-0.209	-0.237	-0.199	-0.256	-0.171	-0.247	0.201	-0.209	-0.247	0.172		-0.094		-0.056	-0
254	21/01/12	21.00	0.2	0.247	0.523	-0.239	-0.2	-0.2	-0.239	-0.2	-0.258	-0.172	-0.258	0.19	-0.21	-0.248	0.143		-0.096		-0.057	-0
255	21/01/12	22.00	0.192	0.259	0.525	-0.237	-0.199	-0.199	-0.246	-0.199	-0.256	-0.161	-0.256	0.192	-0.208	-0.246	0.125		-0.094		-0.046	-0
256	21/01/12	23.00	0.182	0.248	0.524	-0.238	-0.2	-0.209	-0.247	-0.2	-0.257	-0.171	-0.257	0.191	-0.209	-0.247	0.124		-0.095		-0.057	-0
257	22/01/12	0.00	0.191	0.248	0.505	-0.276	-0.209	0.105	-0.219	-0.2	-0.257	-0.171	-0.257	0.191	-0.209	-0.057	0.115		-0.085		-0.066	-0
258	22/01/12	1.00	0.192	0.249	0.515	-0.247	-0.209	-0.199	-0.247	-0.199	-0.256	-0.161	-0.256	0.192	-0.209	-0.247	0.134		-0.094		-0.056	-0
259	22/01/12	2.00	0.182	0.248	0.515	-0.247	-0.199	-0.199	-0.247	-0.199	-0.257	-0.18	-0.257	0.191	-0.209	-0.247	0.134		-0.095		-0.047	-0
260	22/01/12	3.00	0.192	0.25	0.516	-0.236	-0.198	-0.208	-0.256	-0.189	-0.256	-0.17	-0.256	0.192	-0.208	-0.246	0.126		-0.093		-0.055	-0
261	22/01/12	4.00	0.196	0.253	0.52	-0.233	-0.195	-0.204	-0.242	-0.195	-0.252	-0.166	-0.252	0.196	-0.204	-0.242	0.129		-0.09		-0.052	-0
262	22/01/12	5.00	0.188	0.255	0.522	-0.26	-0.202	-0.193	-0.24	-0.183	-0.26	-0.164	-0.25	0.198	-0.202	-0.25	0.131		-0.088		-0.059	-0
263	22/01/12	6.00	0.179	0.255	0.531	-0.259	-0.202	-0.202	-0.24	-0.183	-0.259	-0.164	-0.25	0.189	-0.202	-0.24	0.122		-0.088		-0.059	-0
264	22/01/12	7.00	0.188	0.254	0.521	-0.298	-0.212	-0.203	-0.251	-0.184	-0.26	-0.174	-0.251	0.197	-0.203	-0.241	0.14		-0.089		-0.06	-0
265	22/01/12	8.00	0.179	0.246	0.522	-0.24	-0.202	-0.202	-0.25	-0.193	-0.259	-0.173	-0.25	0.198	-0.212	-0.24	0.122		-0.097		-0.05	-0
266	22/01/12	9.00	0.188	0.246	0.522	-0.24	-0.193	-0.202	-0.25	-0.193	-0.26	-0.174	-0.25	0.188	-0.202	-0.25	0.131		-0.097		-0.05	-0
267	22/01/12	10.00	0.188	0.245	0.521	-0.251	-0.203	-0.203	-0.251	-0.194	-0.26	-0.174	-0.251	0.188	-0.203	-0.251	0.121		-0.098		-0.051	-0
268	22/01/12	11.00	0.189	0.246	0.522	-0.24	-0.193	-0.202	-0.25	-0.193	-0.25	-0.174	-0.25	0.189	-0.202	-0.24	0.122		-0.088		-0.05	-0
269	22/01/12	12.00	0.192	0.249	0.525	-0.246	-0.199	-0.208	-0.246	-0.199	-0.256	-0.17	-0.246	0.182	-0.199	-0.237	0.116		-0.094		-0.056	-0
270	22/01/12	13.00	0.191	0.249	0.525	-0.228	-0.19	-0.209	-0.237	-0.19	-0.256	-0.171	-0.247	0.191	-0.199	-0.237	0.115		-0.085		-0.047	-0
271	22/01/12	14.00	0.183	0.24	0.525	-0.236	-0.198	-0.198	-0.246	-0.198	-0.256	-0.16	-0.246	0.192	-0.208	-0.246	0.116		-0.093		-0.046	-0
272	22/01/12	15.00	0.182	0.239	0.525	-0.237	-0.199	-0.209	-0.237	-0.199	-0.256	-0.161	-0.247	0.182	-0.209	-0.247	0.115		-0.094		-0.056	-0
273	22/01/12	16.00	0.182	0.239	0.524	-0.238	-0.199	-0.209	-0.238	-0.199	-0.257	-0.161	-0.247	0.191	-0.209	-0.247	0.105		-0.095		-0.056	-0
274	22/01/12	17.00	0.186	0.243	0.519	-0.233	-0.195	-0.205	-0.252	-0.195	-0.262	-0.176	-0.252	0.186	-0.205	-0.243	0.11		-0.09		-0.052	-0
275	22/01/12	18.00	0.183	0.24	0.516	-0.246	-0.198	-0.208	-0.255	-0.198	-0.255	-0.179	-0.255	0.183	-0.208	-0.246	0.107		-0.093		-0.055	-0
276	22/01/12	19.00	0.179	0.245	0.521	-0.25	-0.203	-0.203	-0.25	-0.193	-0.26	-0.174	-0.25	0.179	-0.203	-0.241	0.112		-0.098		-0.05	-0

2012 2013 2014 2015 2016 2017

PRONTO CALCOLA 115%

Desktop 11.35 06/02/2018



All sensors_2012-2017_pozzo100 - Excel

FILE HOME INSERISCI LAYOUT DI PAGINA FORMULE DATI REVISIONE VISUALIZZA PDF Architect 4 Creator

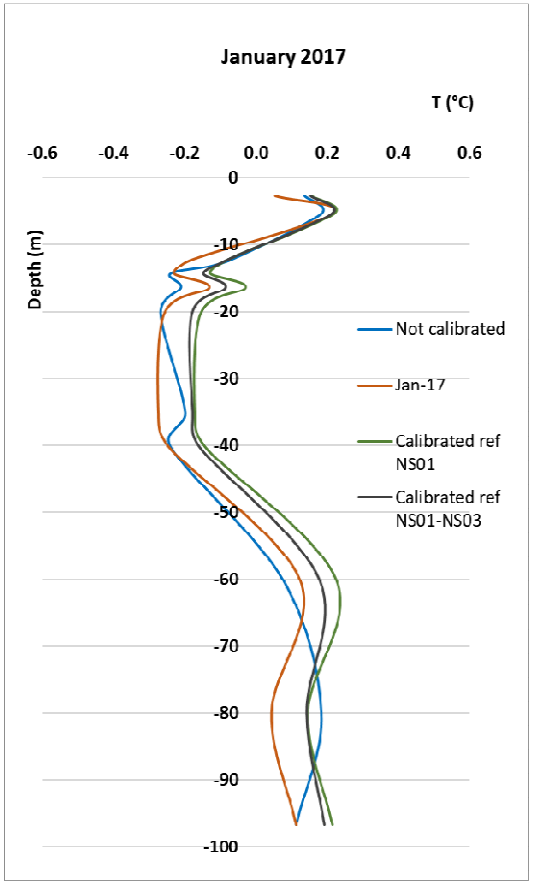
V276 -0.117

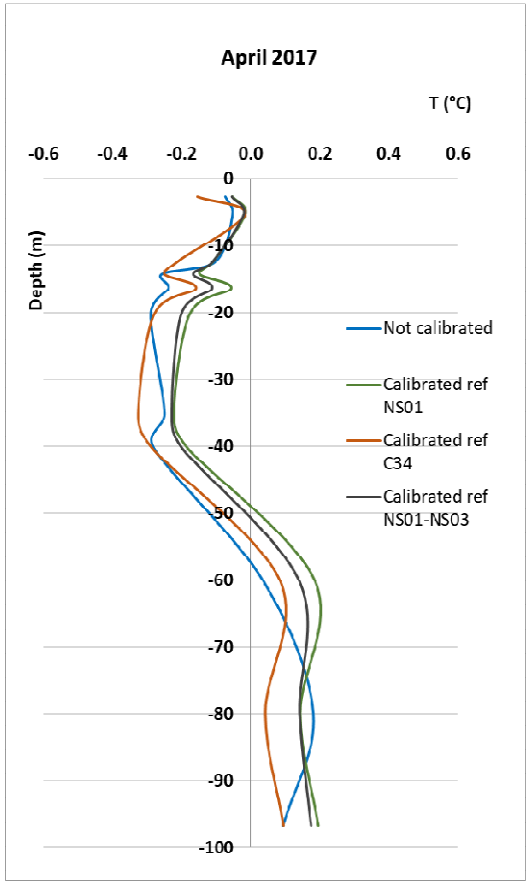
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	Depth (m)		-2.8	-5.35	-12.35	-14.3	-15.2	-16.35	-17.35	-18.2	-20.2	-22.2	-25.2	-27.2	-30.3	-35.2	-40.2	-50.2	-60.15	-70.5	-79.9	-89.8
246	21/01/12	13.00	0.201	0.258	0.525	-0.247	-0.199	-0.199	-0.247	-0.189	-0.256	-0.17	-0.247	0.201	-0.208	-0.247	0.096		-0.094		-0.046	-0
247	21/01/12	14.00	0.202	0.259	0.525	-0.237	-0.189	-0.208	-0.246	-0.189	-0.256	-0.17	-0.246	0.202	-0.208	-0.246	0.097		-0.084		-0.046	-0
248	21/01/12	15.00	0.192	0.259	0.525	-0.265	-0.208	-0.208	-0.246	-0.189	-0.256	-0.17	-0.246	0.192	-0.199	-0.237	0.268		-0.084		-0.056	-0
249	21/01/12	16.00	0.191	0.258	0.524	-0.238	-0.199	-0.199	-0.247	-0.199	-0.257	-0.171	-0.247	0.201	-0.209	-0.247	0.22		-0.095		-0.056	-0
250	21/01/12	17.00	0.192	0.259	0.525	-0.237	-0.199	-0.218	-0.246	-0.199	-0.256	-0.17	-0.256	0.192	-0.208	-0.246	0.173		-0.094		-0.056	-0
251	21/01/12	18.00	0.191	0.258	0.525	-0.237	-0.199	-0.199	-0.247	-0.19	-0.257	-0.171	-0.247	0.201	-0.209	-0.247	0.153		-0.094		-0.056	-0
252	21/01/12	19.00	0.201	0.258	0.525	-0.237	-0.199	-0.209	-0.237	-0.199	-0.256	-0.17	-0.256	0.192	-0.209	-0.247	0.154		-0.094		-0.056	-0
253	21/01/12	20.00	0.192	0.249	0.525	-0.247	-0.199	-0.209	-0.237	-0.199	-0.256	-0.171	-0.247	0.201	-0.209	-0.247	0.172		-0.094		-0.056	-0
254	21/01/12	21.00	0.2	0.247	0.523	-0.239	-0.2	-0.2	-0.239	-0.2	-0.258	-0.172	-0.258	0.19	-0.21	-0.248	0.143		-0.096		-0.057	-0
255	21/01/12	22.00	0.192	0.259	0.525	-0.237	-0.199	-0.199	-0.246	-0.199	-0.256	-0.161	-0.256	0.192	-0.208	-0.246	0.125		-0.094		-0.046	-0
256	21/01/12	23.00	0.182	0.248	0.524	-0.238	-0.2	-0.209	-0.247	-0.2	-0.257	-0.171	-0.257	0.191	-0.209	-0.247	0.124		-0.095		-0.057	-0
257	22/01/12	0.00	0.191	0.248	0.505	-0.276	-0.209	0.105	-0.219	-0.2	-0.257	-0.171	-0.257	0.191	-0.209	-0.057	0.115		-0.085		-0.066	-0
258	22/01/12	1.00	0.192	0.249	0.515	-0.247	-0.209	-0.199	-0.247	-0.199	-0.256	-0.161	-0.256	0.192	-0.209	-0.247	0.134		-0.094		-0.056	-0
259	22/01/12	2.00	0.182	0.248	0.515	-0.247	-0.199	-0.199	-0.247	-0.199	-0.257	-0.18	-0.257	0.191	-0.209	-0.247	0.134		-0.095		-0.047	-0
260	22/01/12	3.00	0.192	0.25	0.516	-0.236	-0.198	-0.208	-0.256	-0.189	-0.256	-0.17	-0.256	0.192	-0.208	-0.246	0.126		-0.093		-0.055	-0
261	22/01/12	4.00	0.196	0.253	0.52	-0.233	-0.195	-0.204	-0.242	-0.195	-0.252	-0.166	-0.252	0.196	-0.204	-0.242	0.129		-0.09		-0.052	-0
262	22/01/12	5.00	0.188	0.255	0.522	-0.26	-0.202	-0.193	-0.24	-0.183	-0.26	-0.164	-0.25	0.198	-0.202	-0.25	0.131		-0.088		-0.059	-0
263	22/01/12	6.00	0.179	0.255	0.531	-0.259	-0.202	-0.202	-0.24	-0.183	-0.259	-0.164	-0.25	0.189	-0.202	-0.24	0.122		-0.088		-0.059	-0
264	22/01/12	7.00	0.188	0.254	0.521	-0.298	-0.212	-0.203	-0.251	-0.184	-0.26	-0.174	-0.251	0.197	-0.203	-0.241	0.14		-0.089		-0.06	-0
265	22/01/12	8.00	0.179	0.246	0.522	-0.24	-0.202	-0.202	-0.25	-0.193	-0.259	-0.173	-0.25	0.198	-0.212	-0.24	0.122		-0.097		-0.05	-0
266	22/01/12	9.00	0.188	0.246	0.522	-0.24	-0.193	-0.202	-0.25	-0.193	-0.26	-0.174	-0.25	0.188	-0.202	-0.25	0.131		-0.097		-0.05	-0
267	22/01/12	10.00	0.188	0.245	0.521	-0.251	-0.203	-0.203	-0.251	-0.194	-0.26	-0.174	-0.251	0.188	-0.203	-0.251	0.121		-0.098		-0.051	-0
268	22/01/12	11.00	0.189	0.246	0.522	-0.24	-0.193	-0.202	-0.25	-0.193	-0.25	-0.174	-0.25	0.189	-0.202	-0.24	0.122		-0.088		-0.05	-0
269	22/01/12	12.00	0.192	0.249	0.525	-0.246	-0.199	-0.208	-0.246	-0.199	-0.256	-0.17	-0.246	0.182	-0.199	-0.237	0.116		-0.094		-0.056	-0
270	22/01/12	13.00	0.191	0.249	0.525	-0.228	-0.19	-0.209	-0.237	-0.19	-0.256	-0.171	-0.247	0.191	-0.199	-0.237	0.115		-0.085		-0.047	-0
271	22/01/12	14.00	0.183	0.24	0.525	-0.236	-0.198	-0.198	-0.246	-0.198	-0.256	-0.16	-0.246	0.192	-0.208	-0.246	0.116		-0.093		-0.046	-0
272	22/01/12	15.00	0.182	0.239	0.525	-0.237	-0.199	-0.209	-0.237	-0.199	-0.256	-0.161	-0.247	0.182	-0.209	-0.247	0.115		-0.094		-0.056	-0
273	22/01/12	16.00	0.182	0.239	0.524	-0.238	-0.199	-0.209	-0.238	-0.199	-0.257	-0.161	-0.247	0.191	-0.209	-0.247	0.105		-0.095		-0.056	-0
274	22/01/12	17.00	0.186	0.243	0.519	-0.233	-0.195	-0.205	-0.252	-0.195	-0.262	-0.176	-0.252	0.186	-0.205	-0.243	0.11		-0.09		-0.052	-0
275	22/01/12	18.00	0.183	0.24	0.516	-0.246	-0.198	-0.208	-0.255	-0.198	-0.255	-0.179	-0.255	0.183	-0.208	-0.246	0.107		-0.093		-0.055	-0
276	22/01/12	19.00	0.179	0.245	0.521	-0.25	-0.203	-0.203	-0.25	-0.193	-0.26	-0.174	-0.25	0.179	-0.203	-0.241	0.112		-0.098		-0.05	-0

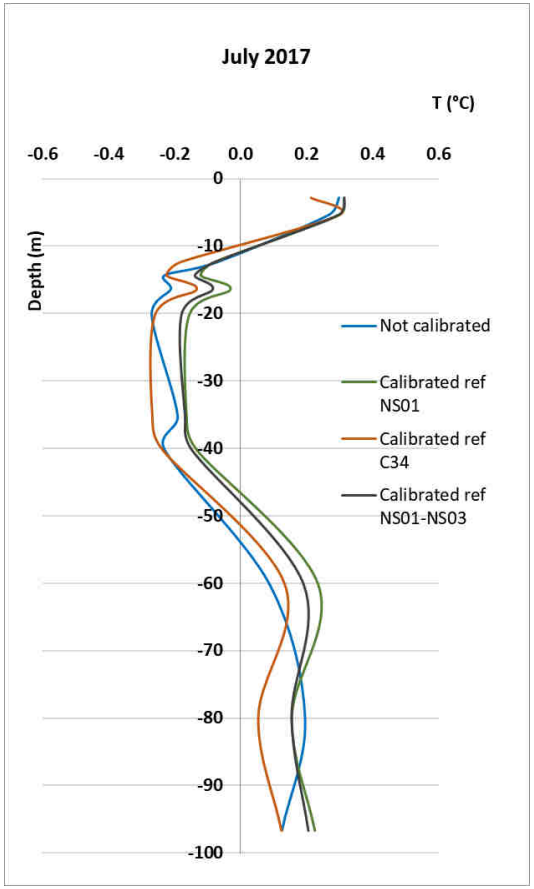
2012 2013 2014 2015 2016 2017

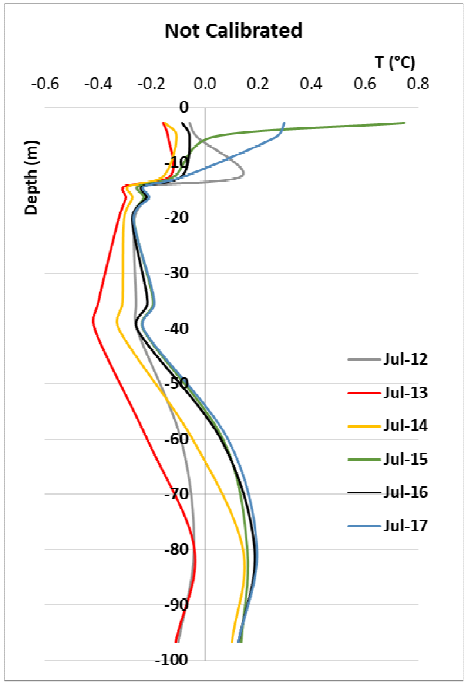
PRONTO CALCOLA 115%

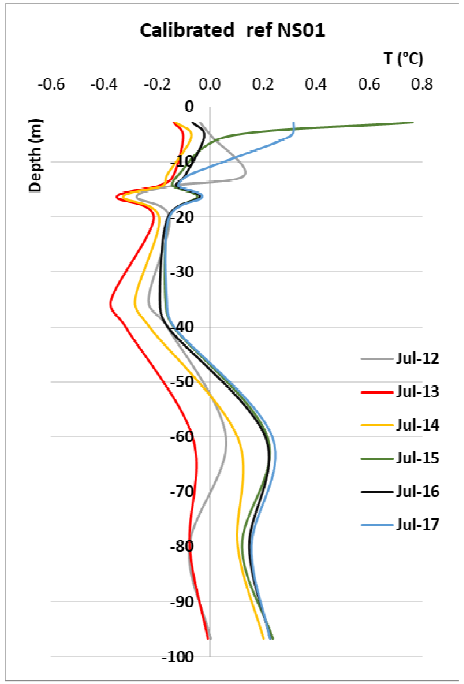
Desktop 11.35 06/02/2018

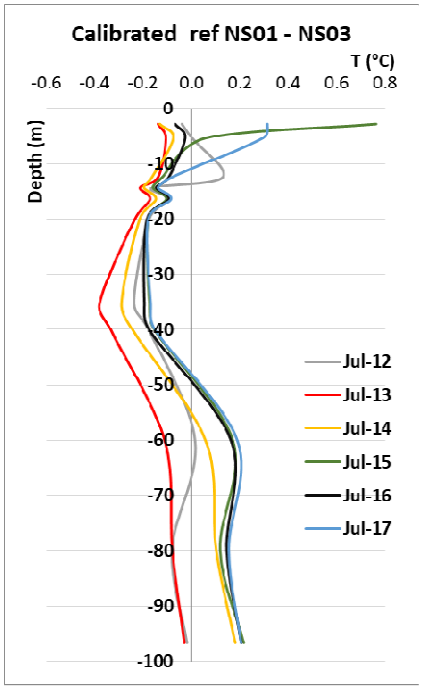

January 2017
T (°C)
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6
Depth (m)
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100
Not calibrated
Jan-17
Calibrated ref NS01
Calibrated ref NS01-NS03

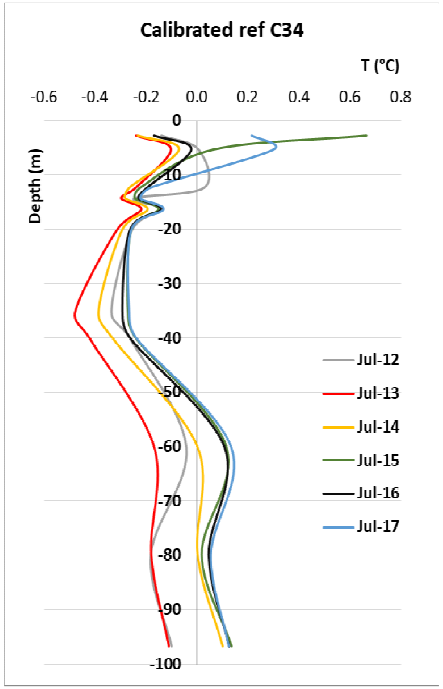

April 2017
T (°C)
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6
Depth (m)
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100
Not calibrated
Calibrated ref NS01
Calibrated ref C34
Calibrated ref NS01-NS03


July 2017
T (°C)
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6
Depth (m)
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100
Not calibrated
Calibrated ref NS01
Calibrated ref C34
Calibrated ref NS01-NS03


Not Calibrated
T (°C)
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8
Depth (m)
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100
Jul-12
Jul-13
Jul-14
Jul-15
Jul-16
Jul-17


Calibrated ref NS01
T (°C)
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8
Depth (m)
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100
Jul-12
Jul-13
Jul-14
Jul-15
Jul-16
Jul-17


Calibrated ref NS01 - NS03
T (°C)
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8
Depth (m)
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100
Jul-12
Jul-13
Jul-14
Jul-15
Jul-16
Jul-17

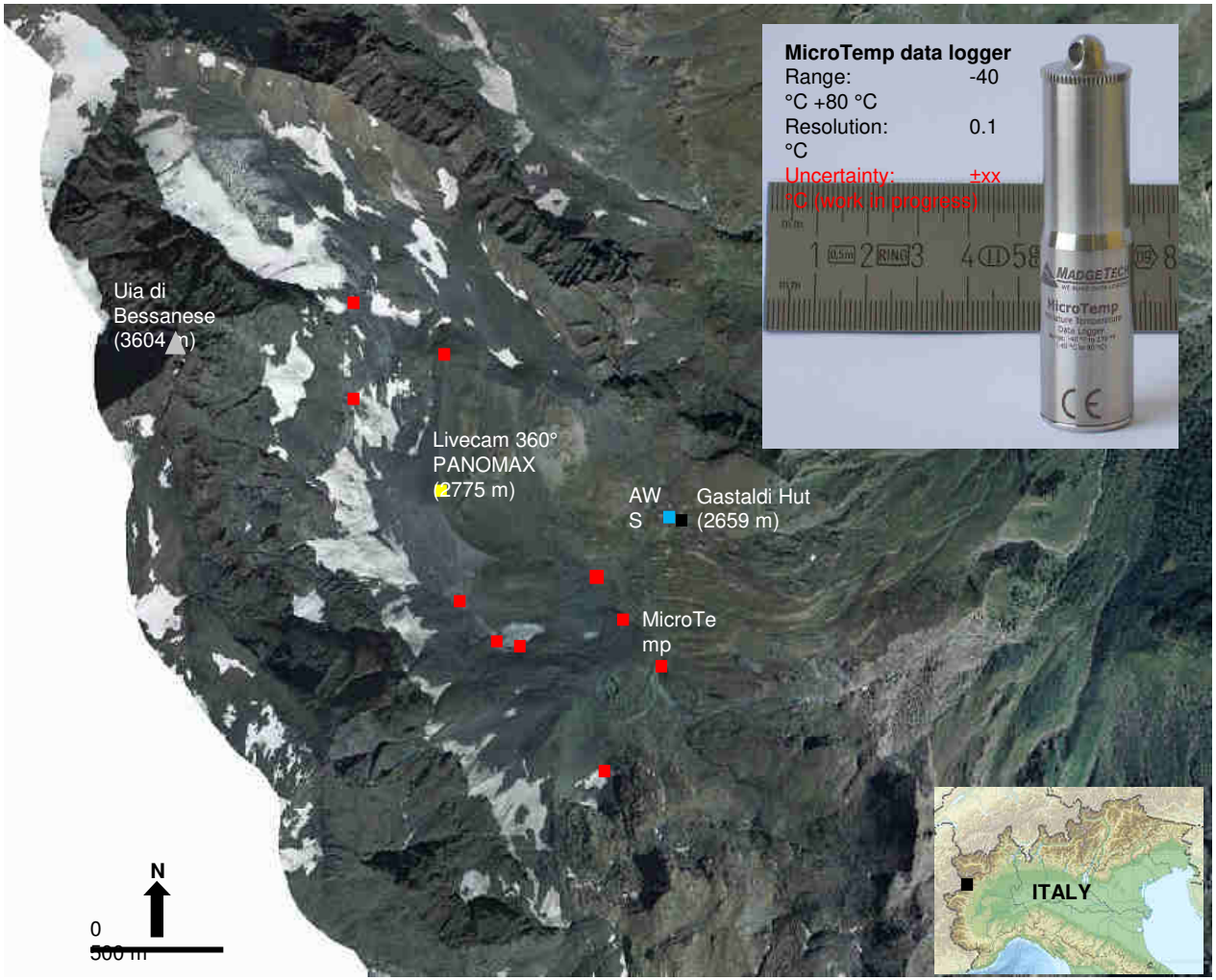

Calibrated ref C34
T (°C)
-0.6 -0.4 -0.2 0.0 0.2 0.4 0.6 0.8
Depth (m)
0 -10 -20 -30 -40 -50 -60 -70 -80 -90 -100
Jul-12
Jul-13
Jul-14
Jul-15
Jul-16
Jul-17

METEOMET
Metrology for Meteorology

Andrea Merlone

RIST project

The «RiST Project: Scientific and Technological Research at the Bessanese glacial basin»



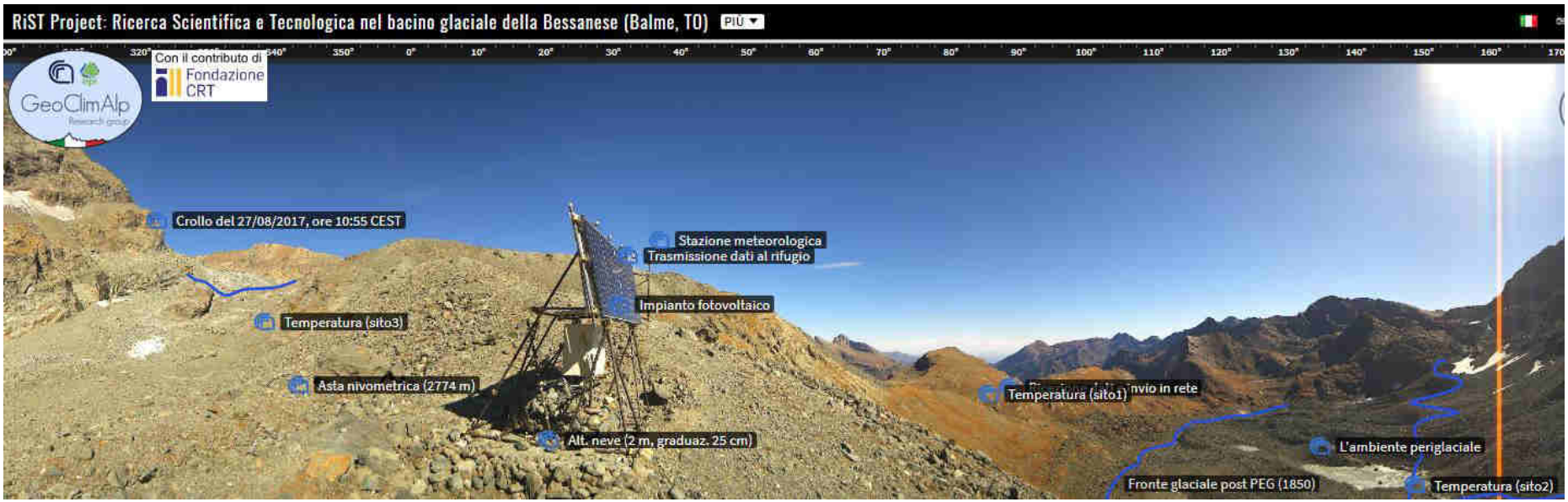
Base map: ortophoto 2010, Regione Piemonte

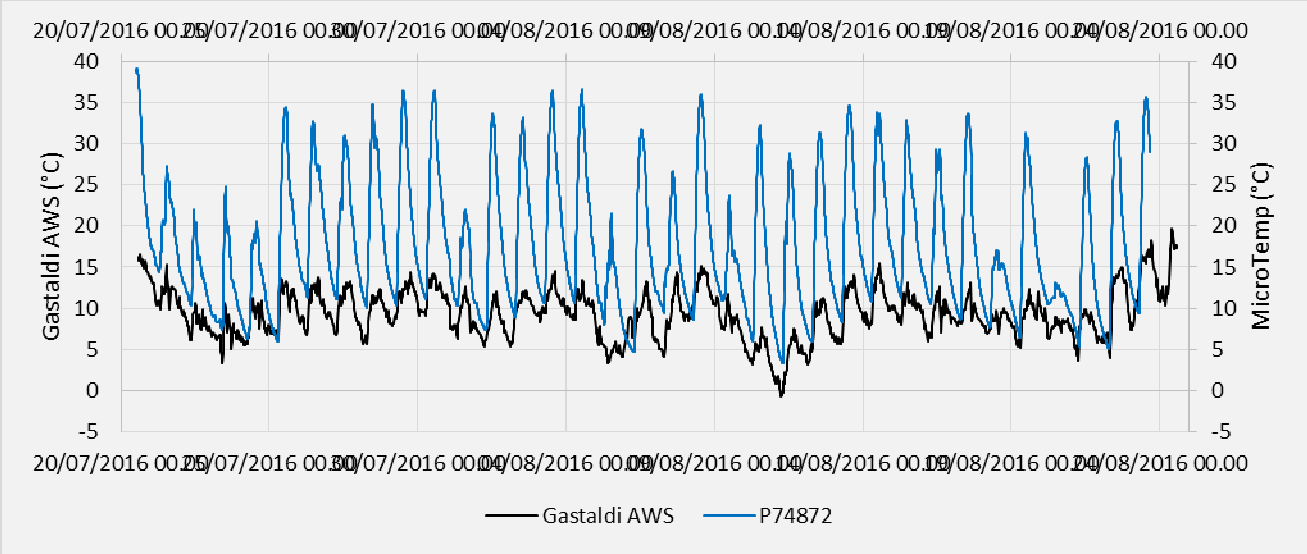
Realizzazione di un sito per messa a punto di misure di riferimento in ambiente glaciale e periglaciale

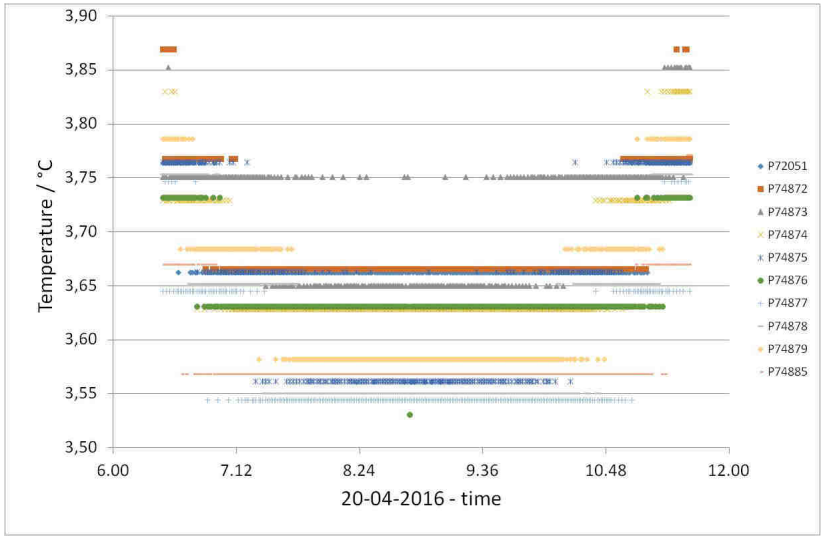
Valutazione di incertezze di misura

Studio parametri di significatività dei dati e confrontabilità

Promozione di un sito per "turismo scientifico"




20/07/2016 00.00
25/07/2016 00.00
30/07/2016 00.00
04/08/2016 00.00
09/08/2016 00.00
14/08/2016 00.00
19/08/2016 00.00
24/08/2016 00.00
Gastaldi AWS (°C)
MicroTemp (°C)
40
35
30
25
20
15
10
5
0
-5
Gastaldi AWS
P74872

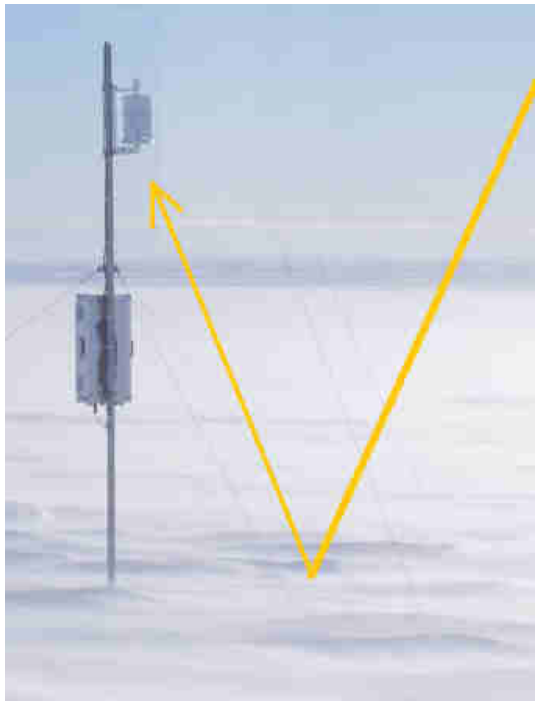

Temperature / °C
3,90
3,85
3,80
3,75
3,70
3,65
3,60
3,55
3,50
6.00
7.12
8.24
9.36
10.48
12.00
20-04-2016 - time
P72051
P74872
P74873
P74874
P74875
P74876
P74877
P74878
P74879
P74885

METEOMET
Metrology for Meteorology

Andrea Merlone

Snow albedo as uncertainty on near surface air temperature measurements

High mountains observations: permafrost and albedo (INRIM, BEV)



Air temperature instruments are effected by radiative extra heating when exposed to snow covered surface .

Temperature records can be different from air temperature value, due to warming of sensor by conduction and convection, inside the shields.

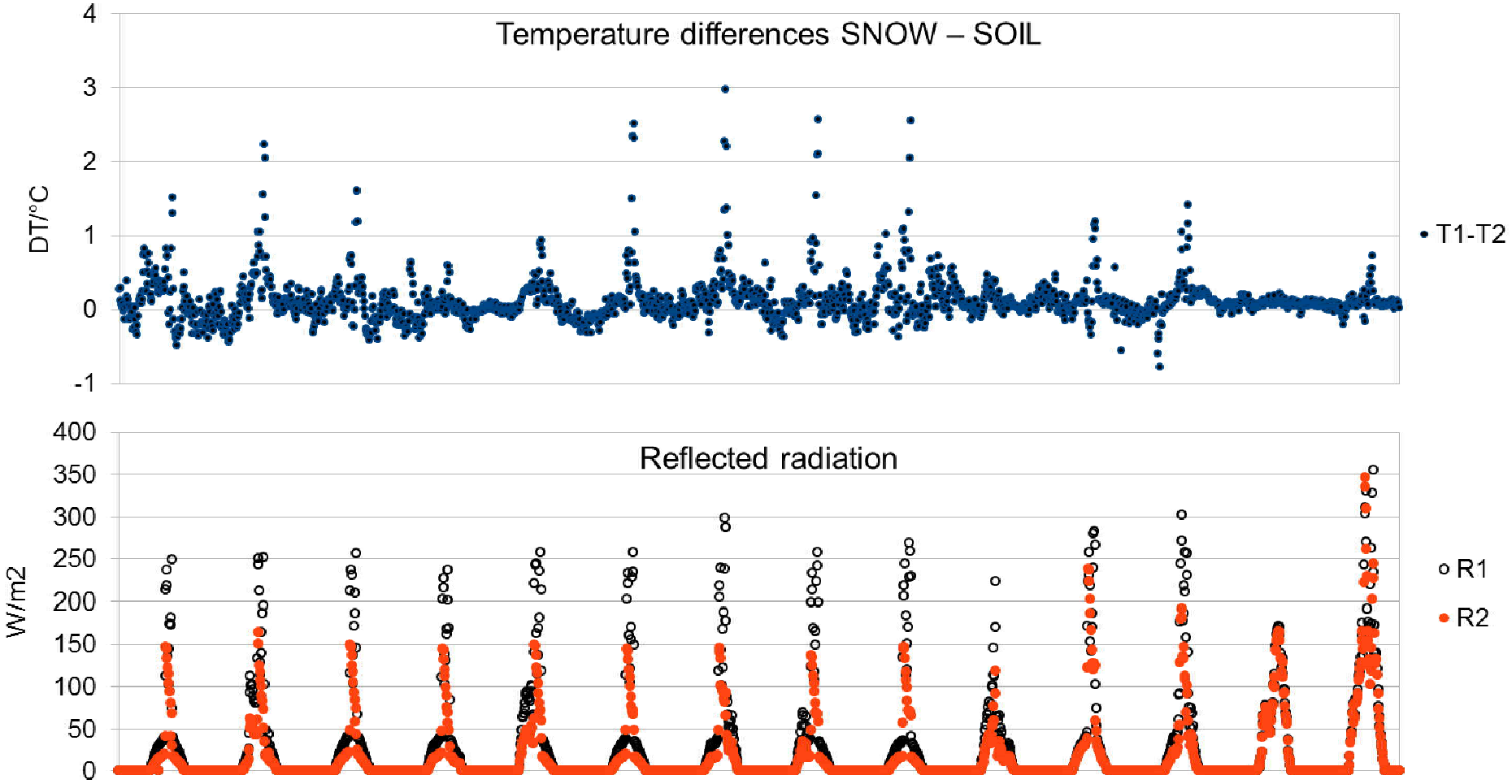
Different instrument show different magnitude of this effect. The evaluation of this effect, in terms of correction and/or uncertainty on air temperature measurements is the **scope of this work.**

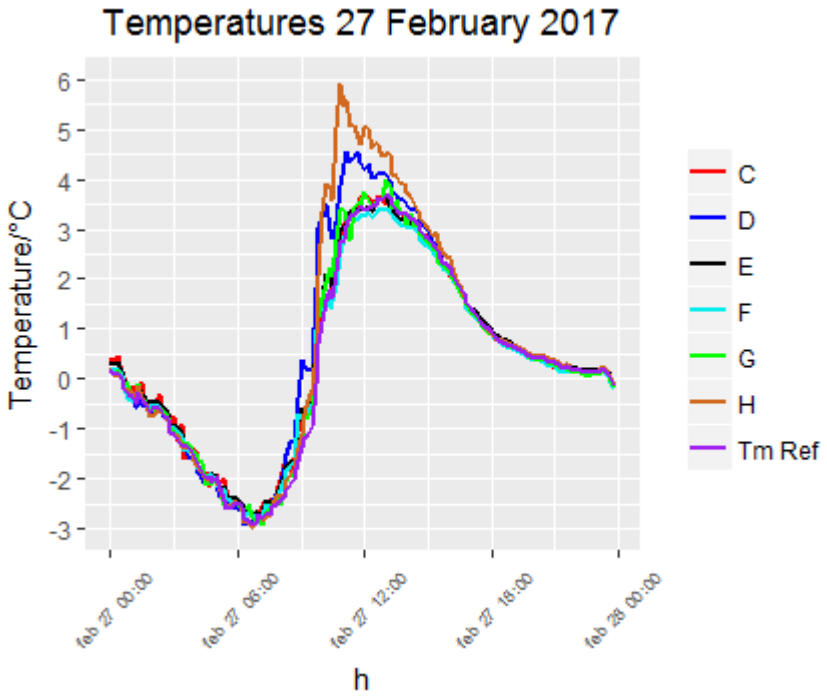
Method: evaluation of the difference between the readings of couples of identical sensors exposed to snow covered surface or to natural soil, in the same site.

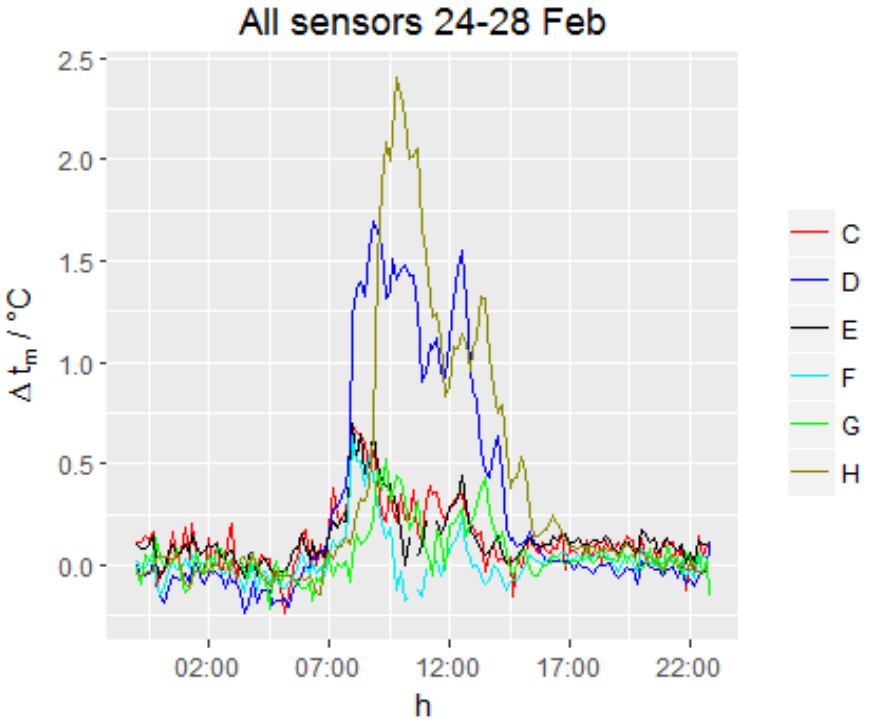
•Albedo

Andrea Merlone

Preliminary results




Temperatures 27 February 2017
Temperature/°C
6
5
4
3
2
1
0
-1
-2
-3
feb 27 00:00
feb 27 06:00
feb 27 12:00
feb 27 18:00
feb 28 00:00
h
C
D
E
F
G
H
Tm Ref


All sensors 24-28 Feb
Δ t_m / °C
2.5
2.0
1.5
1.0
0.5
0.0
02:00
07:00
12:00
17:00
22:00
h
C
D
E
F
G
H

2) Collection of instruments from manufacturers

Six manufacturers agreed to take part in the experiment, sending couples of identical sensors, shields and loggers.

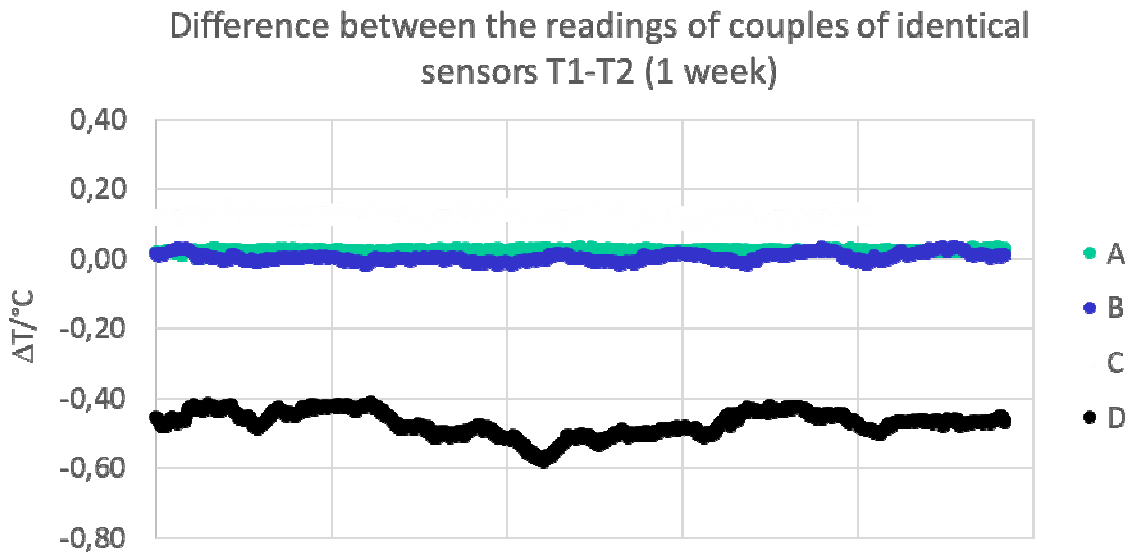
Different solutions were considered to cover most commonly used devices.

Each participant was requested to also provide at least one extra sensors wind speed and direction, thermo hygrometer, albedometers, ...

3) Laboratory characterisation of sensors and complete systems

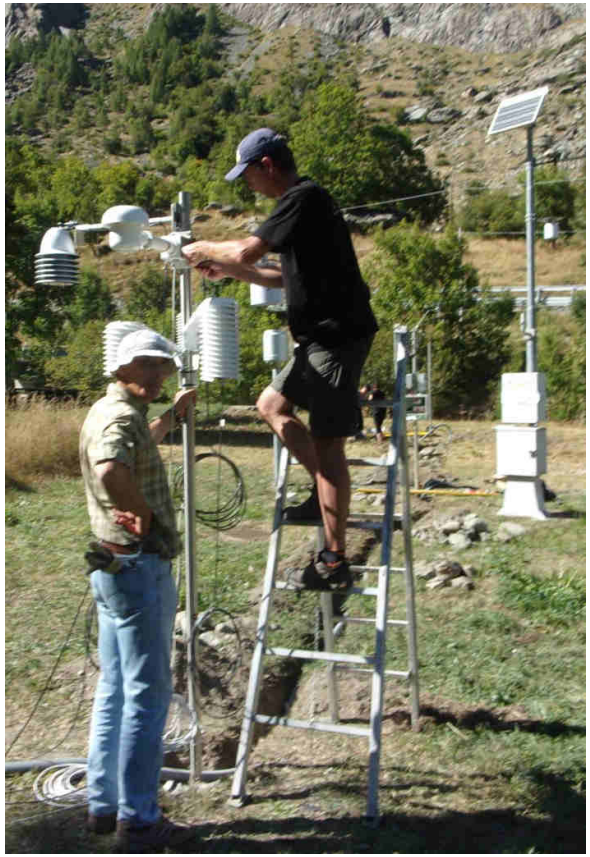
Study of the different dataloggers, evaluation of best mounting solutions.

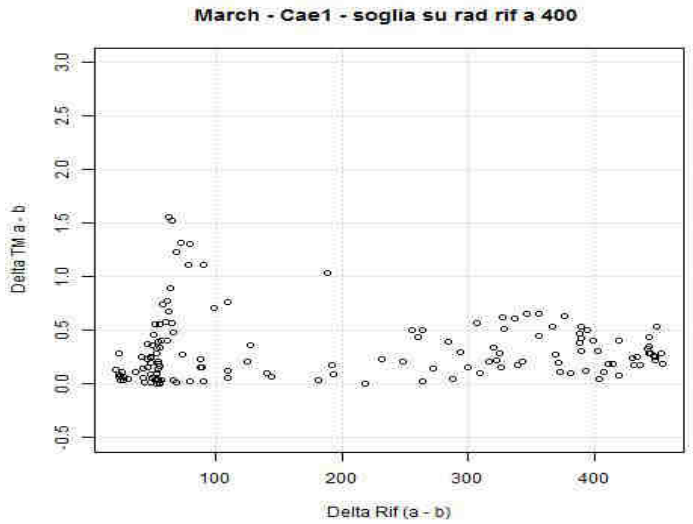
Evaluations of difference between couples of sensors, including shields, in a controlled environment with slow temperature change.

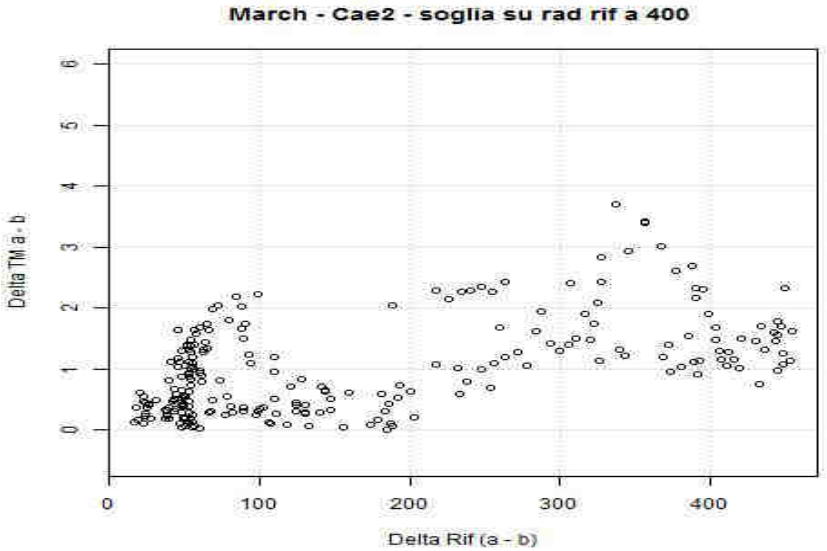


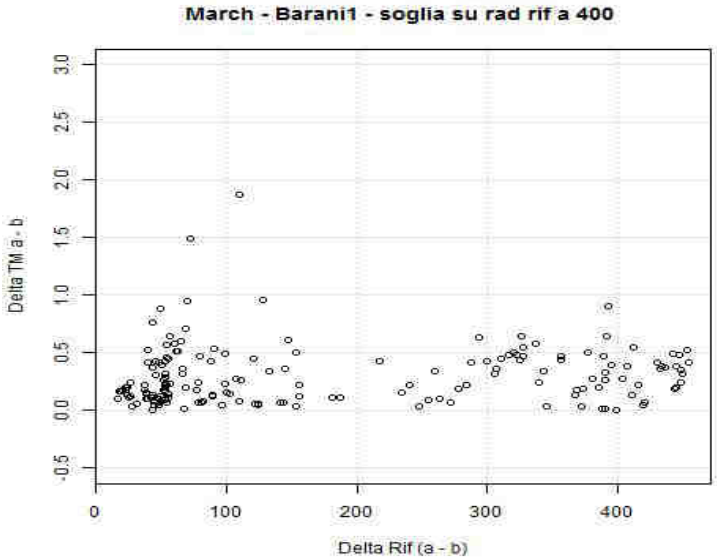
Climate Data Quality Lab at IRPI

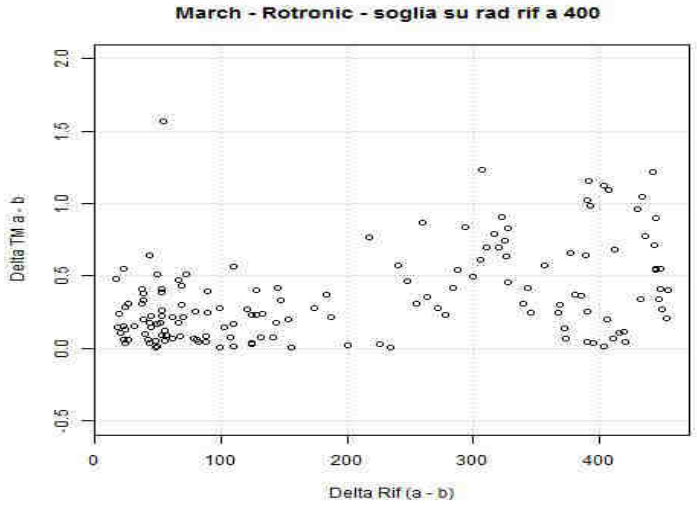
An example: the albedo effect on air *T* values

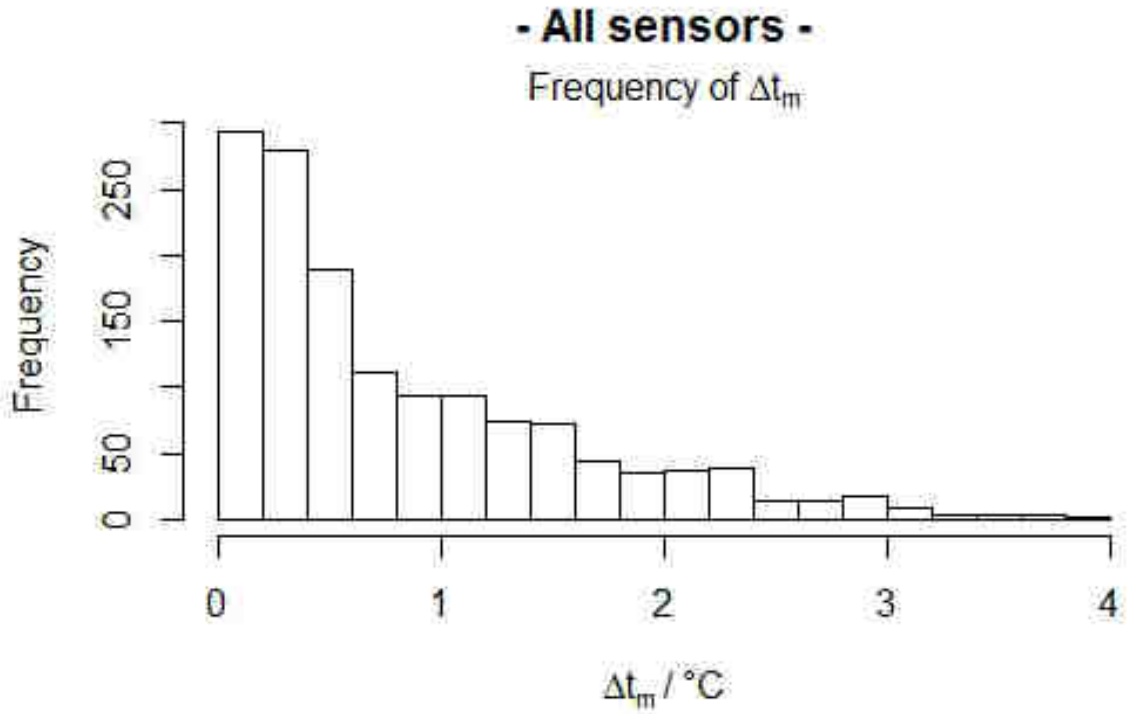



March - Cae1 - soglia su rad rif a 400
Delta TM a - b
Delta Rif (a - b)


March - Cae2 - soglia su rad rif a 400
Delta TM a - b
Delta Rif (a - b)


March - Barani1 - soglia su rad rif a 400
Delta TM a - b
Delta Rif (a - b)


March - Rotronic - soglia su rad rif a 400
Delta TM a - b
Delta Rif (a - b)


- All sensors -
Frequency of Δt_m
Frequency
0
50
150
250
0
1
2
3
4
Δt_m / °C

The effect of the snow albedo effect on near ground air temperature measurements was investigated both theoretically and experimentally. On site experimental comparison of solar shields by parallel observations of six pairs of instruments exposed and not-exposed to snow albedo showed a maximum temperature difference between couples of identical instruments of 3 °C; the uncertainty of the temperature differences, evaluated in field conditions, is 0.3 °C (k=2).

The contribution of the snow albedo to the uncertainty of near ground air temperature measurements was estimated to be **1.73 °C** (k=2). These results led to two recommendations addressed to the end users and to manufacturers of atmospheric temperature sensors.

METEOMET
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Cold rain as uncertainty on near surface air temperature measurements

Influence of rain on thermometers (DTI)

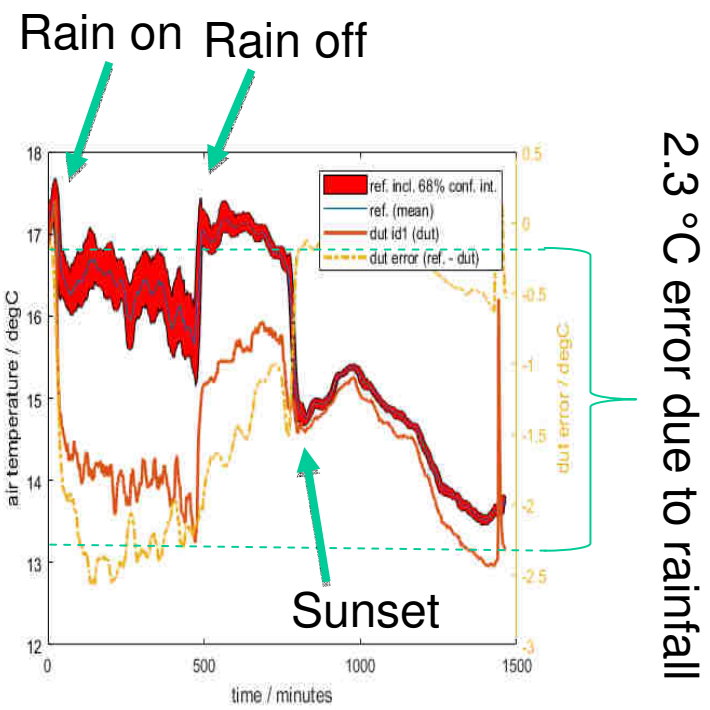
DANISH TECHNOLOGICAL INSTITUTE

When rain starts, air temperature decreases.

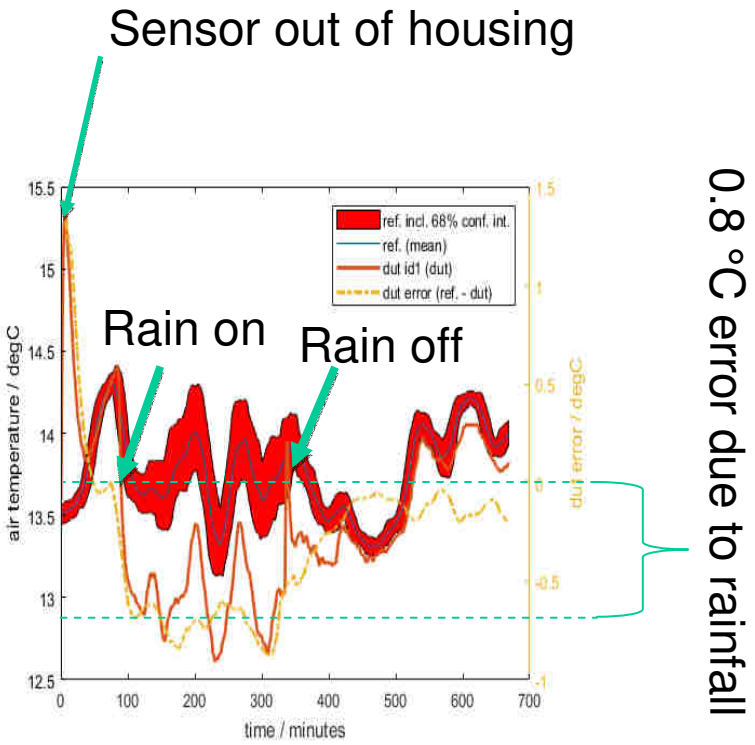
Drops of rain are colder than the air.

Convection, then conduction cause extra cooling (errors) in temperature measurements.

Weather station without active ventilation



Rain temperature ≈ 6.5 °C



Rain temperature ≈ 12 °C

From the preliminary results analysis (May 2017)

- Cooling effect is highly dependent on temperature difference between air and water

- Takes hours for the cooling effect to wear off, after the end of the rainfall

- Latency in the sensors can be significant

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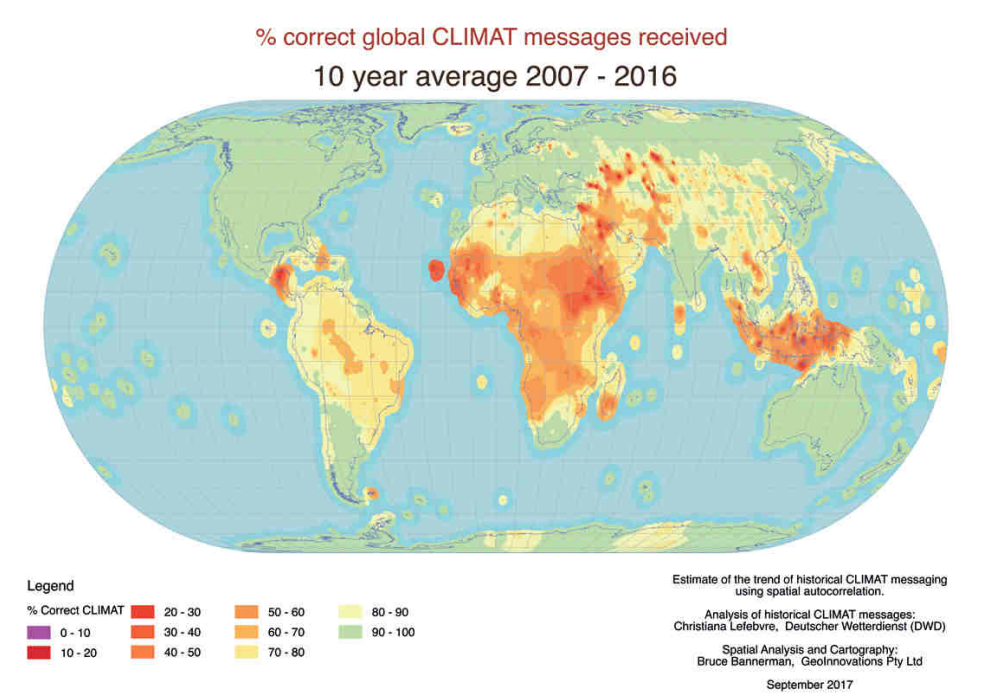
GSRN:
the GCOS Climate Reference Netwok

November 2017 starts the **GCOS Surface Reference Network**

WEATHER CLIMATE WATER
TEMPS CLIMAT EAU

Mission:

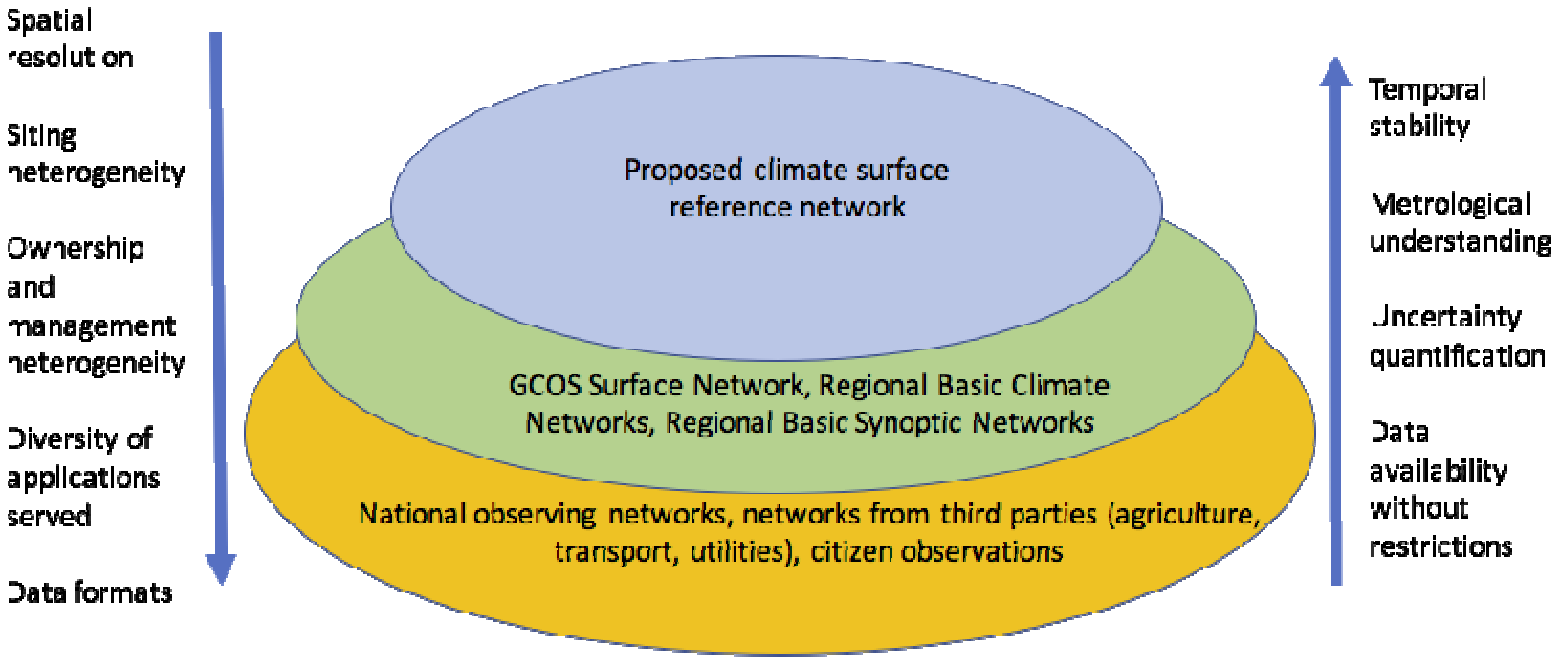
Creating global dataset

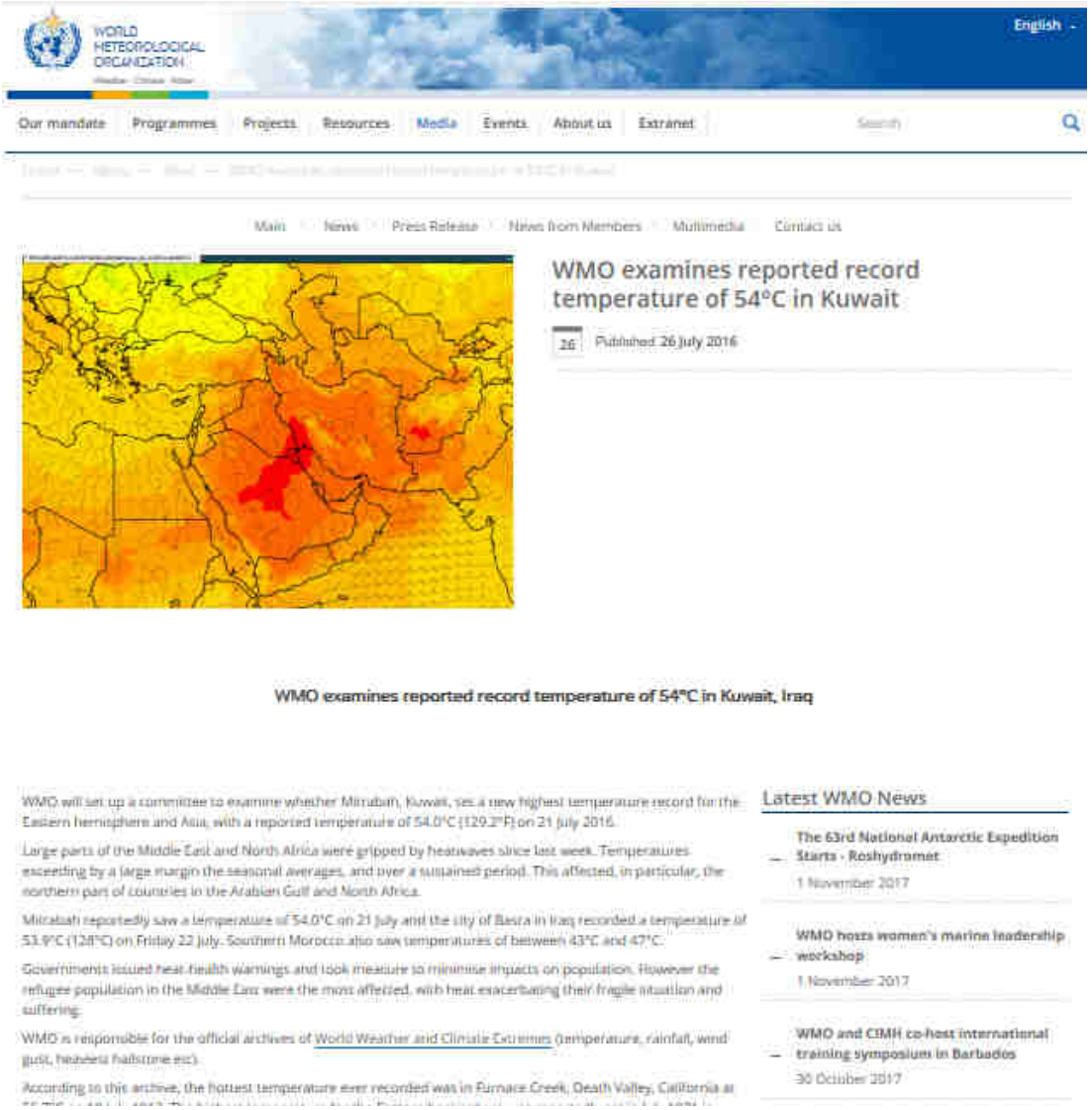


WMO OMM

World Meteorological Organization
Organisation météorologique mondiale

Peer Hechler
Data Management Applications Division
Climate and Water Department


Spatial resolut on
Siting neterogeneity
Ownership and management neterogeneity
Diversity of applications served
Data formats
Proposed climate surface reference network
GCOS Surface Network, Regional Basic Climate Networks, Regional Basic Synoptic Networks
National observing networks, networks from third parties (agriculture, transport, utilities), citizen observations
Temporal stability
Metrological understanding
Uncertainty quantification
Data availability without restrictions



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WMO examines reported record temperature of 54°C in Kuwait

26 Published 26 July 2016

WMO examines reported record temperature of 54°C in Kuwait, Iraq

WMO will set up a committee to examine whether Mitrabah, Kuwait, set a new highest temperature record for the Eastern hemisphere and Asia, with a reported temperature of 54.0°C (129.2°F) on 21 July 2016.

Large parts of the Middle East and North Africa were gripped by heatwaves since last week. Temperatures exceeding by a large margin the seasonal averages, and over a sustained period. This affected, in particular, the northern part of countries in the Arabian Gulf and North Africa.

Mitrabah reportedly saw a temperature of 54.0°C on 21 July and the city of Basra in Iraq recorded a temperature of 53.9°C (128°C) on Friday 22 July. Southern Morocco also saw temperatures of between 43°C and 47°C.

Governments issued heat-health warnings and took measure to minimise impacts on population. However the refugee population in the Middle East were the most affected, with heat exacerbating their fragile situation and suffering.

WMO is responsible for the official archives of World Weather and Climate Extremes (temperature, rainfall, wind gust, heaviest hailstone etc).

According to this archive, the hottest temperature ever recorded was in Furnace Creek, Death Valley, California at

Latest WMO News

- The 63rd National Antarctic Expedition Starts - Roshydromet
  1 November 2017
- WMO hosts women's marine leadership workshop
  1 November 2017
- WMO and CIMH co-host international training symposium in Barbados
  30 October 2017