atmosphere

MDPI

Article

COAT Project: Intercomparison of Thermometer Radiation Shields in the Arctic

Carmen García Izquierdo [1,*], Sonia Hernandez [1], Marina Parrondo [1], Alberto Casas [1], Angelo Viola [2,†], Mauro Mazzola [2], Andrea Merlone [2,3] and Yves-Alain Roulet [4]

Data quality control

CEM developed a specific software to convert the Pt-100 resistance values into temperature values in degrees Celsius, applying the corresponding calibration curve of each sensor. This software also performs a quality control of all the resistance values to avoid any corruption of this comparison conclusions by the possible wrong data.

The quality control consisted in removing the data when:

1. Null data. For Pt-100 null data is considered when the resistance value is equal to zero or when the resistance value is void. In the case of thermometers with digital output, null data is considered when there is not data
2. Erroneous data. Erroneous data is only applicable to Pt-100 and it is the data having exactly the same figure as the previous one. The fluke dataloggers record resistance values with a resolution of 0.1 mΩ (~0.25 mK). The probability of having two consecutive resistance values with the same figure is considered negligible and this fact was contemplated as a wrong value.
3. Inconsistency data: Resistance values out of the temperature range (-40, 40) °C
4. High variability of the data: Data variation higher than 5 °C regarding the previous value.

Table 1 shows the percetange of removed data per thermometer and per month of intercompariosn period. This information is also showed in figure 1, where the percentage of removed data is also linked to the dattaloger involved

Table S1. Percentage of the removed data for each thermometer and for each month of the comparison as a result of applying the quality data control .

		jul-22	aug-2022	sep-22	oct-22	nov-22	dec-2022	Jan-2023	feb-23	mar-23	Apr-2023	may-23	jun-23	jul-23	aug-2023
fluke 2	P1-01	63.8	1.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	2.0	12.8	0.1	0.2
fluke 2	P1-02	63.8	1.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	2.0	12.8	0.2	0.1
fluke 2	P1-03b	63.8	1.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	2.0	12.8	0.1	0.2
fluke 2	P2-01	63.8	1.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.7	12.8	0.1	0.1
fluke 3	P3-01b	62.9	1.2	0.1	0.2	0.7	0.2	0.6	0.5	0.7	42.8	48.2	14.3	0.1	0.1
fluke 2	P4-own	63.8	1.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	1.8	12.8	0.2	0.2
fluke 2	P4-01	63.8	1.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	1.8	12.9	0.2	0.3
fluke 2	P4-02b	63.8	1.4	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.1	1.8	12.9	0.2	0.2
fluke 2	P5-01	63.8	1.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.8	12.8	0.1	0.1
fluke 2	P5-02	63.8	1.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.8	12.8	0.1	0.2
fluke 2	P5-03b	63.8	1.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	1.8	12.8	0.1	0.2
fluke 2	P6-01	63.8	1.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.7	12.8	0.1	0.1
fluke 2	P7-01b	63.8	1.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	1.7	12.8	0.1	0.1
fluke 2	P8-01	63.8	1.3	0.1	0.1	0.0	0.0	0.0	0.0	-	-	-	-	-	-
fluke 2	P8-02	63.8	1.3	0.2	0.1	0.0	0.0	0.0	0.0	-	-	-	-	-	-
fluke 2	P8-03b	63.8	1.3	0.2	0.1	0.1	0.0	0.0	0.0	-	-	-	-	-	-
fluke 2	P9-01	63.8	1.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.8	12.8	0.2	0.2
fluke 2	P9-02	63.8	1.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.1	1.7	12.8	0.1	0.1
fluke 2	P9-03b	63.8	1.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	1.8	12.8	0.1	0.1
fluke 3	P10-01	63.0	1.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	41.9	47.2	12.8	0.2	0.1
fluke 3	P10-02	62.9	1.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.1	0.2
fluke 3	P10-03b	63.0	1.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.2	0.2
logger A	P11-own	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.4	0.0	0.0
fluke 3	P12-01	63.0	1.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	41.9	47.1	12.7	0.1	0.2
fluke 3	P12-02b	63.0	1.3	0.2	0.1	0.1	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.2	0.2
fluke 3	P13-own	62.9	1.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.1	0.1
fluke 3	P14-01	62.9	1.3	0.2	0.1	0.0	0.0	0.0	0.0	0.0	41.9	47.2	12.8	0.1	0.2
fluke 2	P15-01	-	-	-	-	-	-	-	1.6	0.0	0.0	0.8	0.2	0.2	0.2
fluke 2	P15-02	-	-	-	-	-	-	-	1.6	0.0	0.0	0.8	0.2	0.1	0.2
fluke 2	P15-03b	-	-	-	-	-	-	-	1.6	0.0	0.0	0.8	0.1	0.2	0.2
fluke 3	P16-01	63.0	1.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.1	0.1
fluke 3	P16-02	63.0	1.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.1	0.2
fluke 3	P16-03b	62.9	1.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.1	0.2
fluke 3	P17-01	63.7	1.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	41.9	47.2	12.8	0.1	0.2
logger B	P17-own_1	4.5	3.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.8	3.9	6.4	3.0	5.4
logger B	P17-own_2	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0
fluke 3	P18-01	63.0	1.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.2	0.1
fluke 3	P18-02	62.9	1.3	0.1	0.0	0.1	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.1	0.2
fluke 3	P18-03b	62.9	1.2	0.1	0.0	0.1	0.0	0.0	0.0	0.0	41.9	47.2	12.7	0.2	0.2
fluke 1	SS-01	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.4	0.2	0.1	0.2
fluke 1	SS-02	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.1	0.2
logger A	P19-sonic	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0	31.7	-	-	-

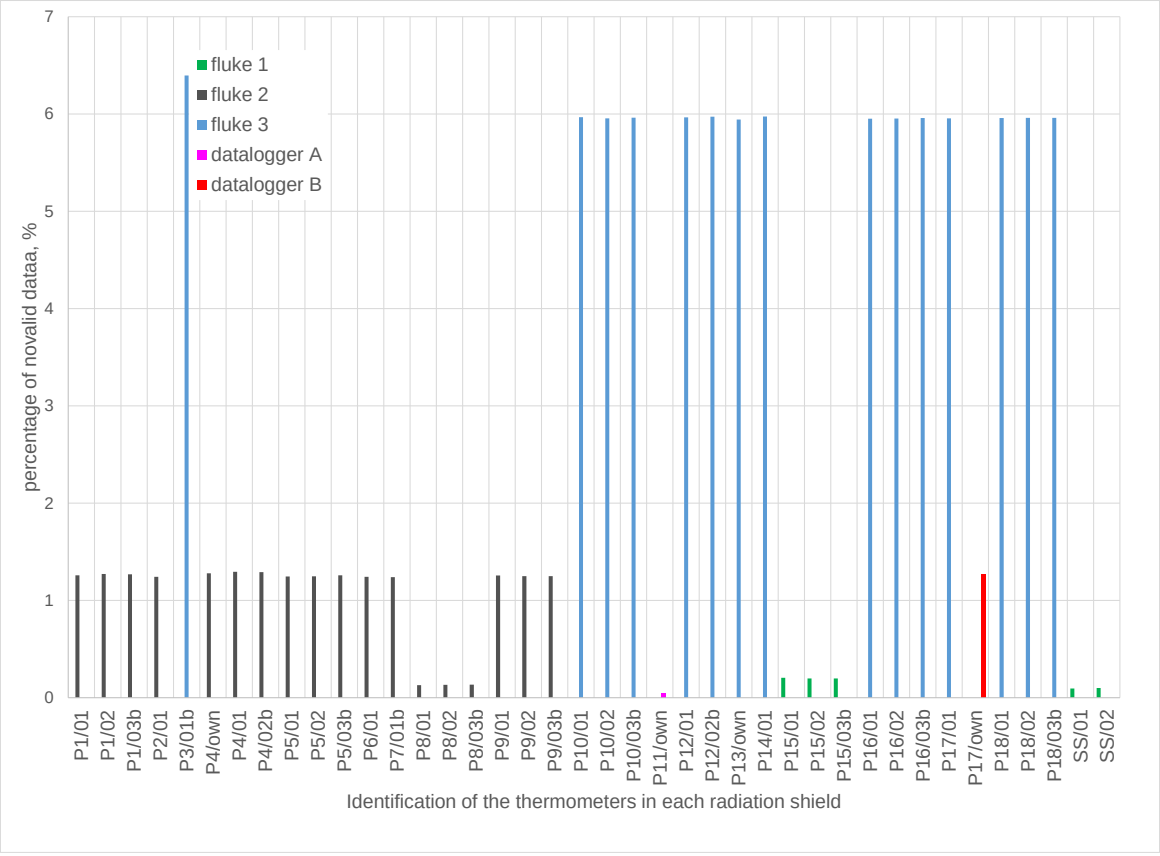


Figure S1. Percentage of the data that did not pass the quality control with the indication of the associated datalogger.

The data quality control showed that a high percentage of July 2022 data did not pass the quality control, so July 2022 was not considered in the analysis here presented. The reason of this high percentage of failure was the incompatibility of the IP address configuration of the five dataloggers involved in the comparison, (three fluke dataloggers, datalogger A and datalogger B). The communication between the computer and the dataloggers was remotely optimized. In addition, and as previously described, unregular dataloggers behaviour was observed in April 2023 and May 2023, with higher visibility in datalogger 3. The normal working of the dataloggers was reached after clearing out the internal memory of the three fluke dataloggers.