

AIR TEMPERATURE INSTRUMENTS IN THE ARCTIC: RESULTS FROM ON-SITE CALIBRATION IN NY-ÅLESUND

G. Coppa ¹, C. Musacchio ¹, F. Becherini², M. Mazzola ³, A. Merlone ¹

¹ *Istituto Nazionale di Ricerca Metrologica (INRiM), Turin, Italy*

² *Consiglio Nazionale delle Ricerche – Istituto di Scienze Polari (CNR-ISP), Venice, Italy*

³ *Consiglio Nazionale delle Ricerche – Istituto di Scienze Polari (CNR-ISP), Bologna, Italy*

E-mail (corresponding author): g.coppa@inrim.it

The Arctic serves as a vital location for conducting environmental measurements, primarily due to its limited human presence and heightened susceptibility to climate change. The Svalbard islands are an exceptionally valuable site for these measurements, owing to its accessibility and the presence of the Ny-Ålesund research center.

Measurement devices often lack the design to endure prolonged periods in harsh environments like the Arctic; consequently, the likelihood of malfunctions, drift, and inaccuracies is greater than in other regions. Consistent and thorough maintenance and calibration of these sensors are essential to prevent compromised data quality or even data loss.

In the EURAMET EMRP project "MeteoMet 2", the temperature sensors on the Climate Change Tower (CCT), a unique research installation created to observe lower-atmospheric profiles of various meteorological factors, underwent dedicated on site calibration. The calibration process revealed sensor errors reaching up to 1 °C and facilitated the correction of measurements, restoring the accuracy of the vertical atmospheric temperature profiles, up to 30 m from the ground. The absolute calibration uncertainties were calculated to be approximately 0.2 °C, which is less than half of the manufacturer's stated values, while the assessment of relative uncertainties, among the various thermometers positioned at different heights on the climate change tower, yielded values of only a few 0.01 °C. This experience spurred the development of an on-site calibration facility, benefiting the entire scientific community located in Ny-Ålesund.