

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

## Albedo effect on near surface air temperature measurement

### This is the author's manuscript

*Original Citation:*

*Availability:*

This version is available <http://hdl.handle.net/2318/1712356> since 2019-09-25T15:36:48Z

*Terms of use:*

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

<i>Topic</i>	T9.
<i>Oral or Poster Presentation</i>	Poster

## ALBEDO EFFECT ON NEAR SURFACE AIR TEMPERATURE MEASUREMENT

Chiara Musacchio <sup>1</sup>, Graziano Coppa <sup>1</sup>, Gaber Beges <sup>2</sup>, Christina Hofstaetter-Mohler <sup>3</sup>, Laura Massano <sup>4</sup>, Guido Nigrelli <sup>5</sup>, Francesca Sanna <sup>1,6</sup>, Andrea Merlone <sup>1</sup>

<sup>1</sup> *Istituto Nazionale di Ricerca Metrologica (INRiM), Torino, Italy*

<sup>2</sup> *Univerza v Ljubljani – Laboratorij za Metrologijo in Kakovost, Ljubljana, Slovenia*

<sup>3</sup> *Bundesamt für Eich- und Vermessungswesen, Wien, Austria*

<sup>4</sup> *Università degli studi di Torino, Torino, Italy*

<sup>5</sup> *Istituto di Ricerca per la Protezione Idrogeologica - Consiglio Nazionale delle Ricerche (IRPI-CNR), Torino, Italy*

<sup>6</sup> *Istituto Macchine Agricole e Movimento Terra - Consiglio Nazionale Ricerche (IMAMOTER-CNR), Torino, Italy*

*E-mail: c.musacchio@inrim.it*

Focusing on temperature measurements for meteorology and climate an open issue concerns the evaluation of air temperature measurement uncertainty. The work presented faces one of the aspects of this problem related to the siting conditions.

The presence of snow-cover soil on a meteorological measurement site causes an increase of the fraction of reflected radiation on instruments. Solar shields used in modern meteorological thermometers and compact weather stations are mainly designed for protecting temperature sensors from incident solar radiation but their behaviour regarding to backwards radiation is often not guaranteed or declared. Therefore, reflection due to snow presence on the ground could cause an extra heating of the sensor producing a bias on near-surface air temperature records.

This work presents a method for the evaluation of this bias and an on-site experiment conducted to quantify the snow albedo effect on temperature readings of meteorological instruments.

The experiment, conducted in the frame of the MeteoMet project, involved instruments equipped with different temperature sensors and solar shields. A six-month measurement campaign was conducted in a selected site on the Italian Alps measuring the difference of temperature readings,  $\Delta t$ , between identical instruments placed on snow-covered surface and on natural soil. The experimental results show that the snow albedo effect can range up to a  $\Delta t$  of 3 °C and recommendations to end users and manufacturers are addressed on adding a proper component to the near surface air temperature uncertainty budget related to this effect.