

GIACOMO TRAVERSA <sup>1,2</sup>, DAVIDE FUGAZZA <sup>2</sup>, ANTONELLA SENESE <sup>2\*</sup> &  
GUGLIELMINA A. DIOLAIUTI <sup>2</sup>

## PRELIMINARY RESULTS ON ANTARCTIC ALBEDO FROM REMOTE SENSING OBSERVATIONS

**ABSTRACT:** TRAVERSA G., FUGAZZA D., SENESE A. & DIOLAIUTI G.A., *Preliminary results on Antarctic albedo from remote sensing observations.* (IT ISSN 0391-9838, 2019).

The aim of the study is to analyse the surface albedo of the Antarctica and investigate eventual signals of variations in space and time between summer 2000/2001 and 2011/2012 by means of the GLASS albedo product. We followed a step-by-step procedure from micro- to macro-scale. At first, we analysed 95 glaciers around the continent, and we found limited temporal variability. Then, looking at spatial variations, we divided Antarctica based on oceanic basins and by continentality. We found spatial signals, since mean albedo values range between 0.79 (Pacific and Atlantic basins) and 0.82 (Indian basin) and between 0.76 (along the shore) and 0.81 (inner continent). An increasing variability was found from the inner continent to the shore, and heterogeneous patterns among the basins, most likely due to meteorological and environmental conditions (mainly: temperature, precipitation, katabatic winds).

Finally, the general patterns observed (considering the specific glaciers, the three basins and the three continentality sectors) were verified by the analysis of the whole continent and we did not find a significant change of summer averages over time, as they range between 0.79 and 0.80.

**KEY WORDS:** Antarctic albedo, Remote sensing, GLASS.

**RIASSUNTO:** TRAVERSA G., FUGAZZA D., SENESE A. & DIOLAIUTI G.A., *Risultati preliminari sull'albedo dell'Antartide da osservazioni di telerilevamento.* (IT ISSN 0391-9838, 2019).

Lo scopo dello studio è analizzare l'albedo dell'Antartide e studiare eventuali segnali di sue variazioni nello spazio e nel tempo tra l'estate 2000/2001 e 2011/2012 mediante il prodotto albedo di GLASS. Abbiamo seguito una procedura "step by step" dalla micro alla macro scala. Inizialmente, abbiamo analizzato un campione di ghiacciai in tutto il conti-

nente e abbiamo riscontrato una limitata variabilità temporale. Successivamente, investigando l'eventuale presenza di variazioni spaziali, abbiamo suddiviso l'Antartide in base ai bacini oceanici e per caratteristiche di continentalità. I valori medi di albedo variano tra 0.79 (bacini Pacifico e Atlantico) e 0.82 (bacino Indiano) e tra 0.76 (lungo la costa) e 0.81 (continente interno), confermando quindi la presenza di trend spaziali. È stata riscontrata una crescente variabilità dal continente interno verso la costa e si osservano situazioni eterogenee tra i bacini, molto probabilmente a causa delle condizioni meteorologiche e ambientali (principalmente: temperatura, precipitazioni, venti catabatici).

Infine, gli andamenti generali osservati (considerando i ghiacciai specifici, i tre bacini e i tre settori di continentalità) sono stati verificati dall'analisi di tutto il continente e non abbiamo riscontrato un cambiamento significativo delle medie estive nel tempo, poiché variano tra 0.79 e 0.80.

**TERMINI CHIAVE:** Albedo antartica, Telerilevamento, GLASS.

### INTRODUCTION

Antarctica is the fourth continent by width and is almost entirely covered by snow and ice (King & Turner, 1997). The inner continent presents almost entirely snow as superficial cover and the coastline shows only 5% (1656 km) of rock surface (Drewry, 1983). Antarctica is one of the widest and most reflective surfaces of the planet and thus an eventual variation of its albedo could be a crucial issue in the Earth energy balance, by controlling the absorption of solar radiation at the surface, leading to significant effects on sea level. The continent is a heat sink for the Southern Hemisphere and thus exerts considerable control over the circulation of the atmosphere at high and mid-latitudes (King & Turner, 1997). Unlike the high latitude landmasses of the Northern Hemisphere, characterized by large areas of seasonal snow cover, and thus a rapid response to temperature changes, the Antarctica is covered by a permanent highly reflective surface. For these reasons, albedo is an important feature that needs to be investigated in detail, considering its relations with surface variations from a spatial and temporal point of view. In particular, here

<sup>1</sup> Department of Physical Sciences, Earth and Environment (DSFTA), Università degli Studi di Siena, Siena, 53100, Italy.

<sup>2</sup> Department of Environmental Science and Policy (ESP), Università degli Studi di Milano, Milan, 20133, Italy.

\* Corresponding author: A. Senese (antonella.senese@unimi.it)

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