

Evaluation the MOD10A1 daily snow albedo product (v. 6) on Livingston Island, Antarctica



Alejandro Corbea-Pérez¹, Javier Fernández-Calleja², Carmen Recondo¹ and Susana Fernández³

- 1. Remote Sensing Applications (RSApps) Research Group, Department of Mining Exploitation and Prospecting, University of Oviedo, 33600 Mieres, Spain.
- 2. Remote Sensing Applications (RSApps) Research Group, Department of Physics, University of Oviedo, 33007 Oviedo, Spain.

3. Mathematical Modelling (MOMA) Research Group, Department of Geology, University of Oviedo, 33005 Oviedo, Spain ACKNOWLEDGEMENTS: This work has been made possible by the following Ph.D. Grants: "Severo Ochoa" from the Government of **CORRESPONDENCE:** the Principality of Asturias [BP17-151] and "Predoctoral Grant" from the University of Oviedo. corbeaalejandro@uniovi.es Albedo: proportion of incident radiation that is reflected from the earth surface **NEED FOR EVALUATIONS OF SATELLITE MEASUREMENTS** The albedo decrease is associated Albedo in-situ data Snow albedo daily data with a temperature increase and a AWS Johnson Glacier MOD10A1 (v.6) snow cover decrease, mainly in (each 10 min) (the best observation) the polar areas. The snow albedo Several authors have recommended updating Quality filter: daily product of NDSI Snow Cover Basic QA=0 the analyses based on version 6 data (Box et al. **MODIS** 2012, Casey et al. 2017), as they are more (MOD10A1) has Other filters: accurate. been evaluated SZA<75° (Wang and Zender, using version 5 2011) **Antarctica** data (Calleja et al. 2019). Albedo trend Clearness index of the sky clr<0.3 **Locally Weighted** (clr) cloudy sky Wang and Zender 2011 **Scatterplot Smothing** The temporal clr = dir/ (dir + dif) **Automatic Weather Station** (LOWESS) Where: variability of the dir - direct radiation (AWS): Johnson Glacier **MODIS** data has dif - diffuse radiation clr>0.7 **Spanish Meteorological** clear sky been reported to be **Agency (AEMET)** due to the fact that **MODIS** does not completely All days Clear days Clear days eliminate the effects R=0,92RMSE=0.013 of cloudiness (Box **Cloudy days** et al.2012). R=0,58RMSE=0.060 Albedo data (December 2006 to January 2015). Above, Scatter plot of the albedo in-situ data and albedo values of in-situ (black triangles), MOD10A1 (v.6) MOD10A1 data for all days (left), and cloudy and (blue points) and MOD10A1(v.5) data (red points). Down, clear days (right). In clear days the results of albedo trend of in-situ (black line), MOD10A1 (v.6) (blue MOD10A1 are much better related to in-situ data. line) and MOD10A1 (v.5) data (red line).

Above, RGB composite of MOD09GA of Livingston Island (left) and MOD10A1 image of Livingston Island (right) of 15/01/2007, where clr=0,0.

Down, RGB composite of MOD09GA of Livingston Island (left) and MOD10A1 image of Livingston Island(right) of 07/01/2008, where clr=0,5.

REFERENCES:

1781-1795.

Box, J. E., Fettweis, X., Stroeve, J. C., Tedesco, M., Hall, D. K., & Steffen, K. (2012). Greenland ice sheet albedo feedback: thermodynamics and atmospheric drivers. The Cryosphere, 6(4), 821-839.

Calleja, J. F., Corbea-Pérez, A., Fernández, S., Recondo, C., Peón, J., & de Pablo, M. Á. (2019). Snow Albedo Seasonality and Trend from MODIS Sensor and Ground Data at Johnsons Glacier, Livingston Island, Maritime Antarctica. Sensors, 19(16), 3569.

Casey, K. A., Polashenski, C. M., Chen, J., & Tedesco, M. (2017). Impact of MODIS sensor calibration updates on Greenland Ice Sheet surface reflectance and albedo trends. The Cryosphere, 11(4),

Wang, X., & Zender, C. S. (2011). Arctic and Antarctic diurnal and seasonal variations of snow albedo from multiyear Baseline Surface Radiation Network measurements. Journal of Geophysical Research: Earth Surface, 116(F3).