



Glacier albedo decrease in the Italian Alps and ice-albedo feedback

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The albedo is a fundamental component of the surface energy balance of glaciers, determining the amount of net solar radiation available for melt, and its reduction has a strong influence on the global energy budget, with an increase of heat absorption in the earth system. In the last decades, glacier albedo worldwide has suffered a strong reduction due to the increased occurrence of dust on the surface. In this work, we retrieve the albedo of the glacierized areas of the Ortles-Cevedale group (Lombardy Alps, Italy), using four satellite images from the Landsat ETM+ sensors at 30 m resolution, and investigate its temporal evolution in the last three decades. The retrieval method includes correction steps for all the processes that influence the relationship between the satellite signal and the albedo: radiometric calibration, atmospheric correction using the 6S radiative transfer code, correction for local topographic effects and for the anisotropy of the reflected radiation over the hemisphere. We found a strong reduction of ice albedo in the glacier melting area, which is a further proof of the ongoing glacier darkening phenomenon. We also investigate the ice-albedo feedback for the glaciers in the Ortles-Cevedale group, finding a significant impact of the increased dust occurrence on the glacier microclimate.