



Offset Tracking procedure applied to the Viedma Glacier, Patagonian Andes, Argentina

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ABSTRACT

Offset Tracking is a technique used to estimate the surface displacements occurred between two Synthetic Aperture Radar (SAR) acquisitions. It is well suited when the displacements produced in the area of interest are greater than those measurable by interferometric techniques (i.e. DInSAR). Thus, this method is useful for estimating the displacements produced in glaciers because of the typical rapid ice flow motion. Application of this indirect technique for glaciers monitoring is relatively fast and economic if compared with traditional surveying methods as stakes or GPS. This fact is relevant for the Patagonian glaciers (Argentina) because they are located in remote places where access is difficult or impossible.

Although this technique is well known worldwide, it has not been widely applied in Argentinean glaciers. Herein the Offset Tracking method is applied to the Viedma Glacier (Santa Cruz, Argentina), one of the largest uncovered ice bodies in the South Patagonian Ice Field with an ice area that reaches 945km². In this work, the Offset Tracking algorithm is applied to several pairs of COSMO-SKYMED SAR acquisitions to estimate displacement fields over the glacier. The images were acquired between April 2012 and July 2012 in ascending and descending orbits. The time span between acquisitions varies between 1, 16, and 32 days. The high spatial resolution of the scenes ($\sim 1.25 \times 2.40$ m) allows us to detect great detail onto the surface of the glacier. The estimated displacements map define areas or units with different flowing velocities. Faster displacements are located in the glacier tongue, while minor displacements seem to be correlated with the topography of the area, constraining basal displacement in coincidence with changes in the glacier direction. Displacement maps are compared with the results of previous research works (Svkarca et al., 1995; Aniya et al., 1998). However, a full comparison is impossible because of the lack of an ice mass velocity estimation over the glacier in those works.

Keywords: Offset Tracking, glacier dynamics, Patagonian Ice Field

References:

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