Geophysical Research Abstracts
Vol. 12, EGU2010-689, 2010
EGU General Assembly 2010

Monitoring ice shelf velocities from repeat MODIS and Landsat data. A test study on the Larsen C ice shelf, Antarctic Peninsula, and application to 10 other ice shelves around Antarctica

Torborg Haug (1), Andreas Kääb (1), and Pedro Skvarca (2)
(1) University of Oslo, Norway (torborgh@geo.uio.no), (2) Instituto Antartico Argentino, Argentina

We investigate the velocity field of the Larsen C ice shelf, Antarctic Peninsula, over the periods 2002-2006 and 2006-2009 based on repeat optical satellite data. The velocity field of the entire ice shelf is measured using repeat low resolution MODIS data (250 m). The measurements are validated for two ice shelf sections against repeat medium resolution Landsat 7 ETM+ pan data (15 m). Horizontal surface velocities are obtained through image matching in both frequency and spatial domain, and the two methods compared. The uncertainty in the velocities turns out to be less than 70 m for the MODIS derived data, and less than 15 m for the Landsat derived ones. The difference between MODIS and Landsat based speeds is -15.4 m/a and 13.0 m/a for the first period for the two different validation sections on the ice shelf, and -26.7 m/a and 27.9 m/a for the second period for the same sections. This is within the uncertainty level, and leads us to conclude that repeat MODIS images are well suited to measure ice shelf velocity fields and monitor their changes over time. The frequency domain image correlation method seems better suited for this purpose because it is faster, produces less mismatches, and is able to match images with regular noise and data voids. The latter makes it possible to match Landsat 7 ETM+ images even after the 2003 failure of the Scan Line Corrector (SLC off) that leaves significant image sections with no data. We also applied our method successfully to other ice shelves around Antarctica.