Ice motion, grounding-line position, and ice discharge of the entire Antarctic continent from InSAR data

Eric Rignot (1), Jeremie Mouginot (2), and Bernd Scheuchl (2)

(1) University of California Irvine, Earth System Sciences, Irvine, and NASA's Jet Propulsion Laboratory, United States (erignot@uci.edu), (2) University of California Irvine

We present the first nearly complete map of land ice motion in Antarctica that combines satellite radar interferometry data from ESA's Earth Remote Sensing Satellites ERS-1/2, ESA's Envisat ASAR, JAXA's PALSAR and CSA's Radarsat-1 and 2 acquired between 1996 and 2009. Ice motion is mapped at a high spatial resolution (150 m), high precision (a few m/yr) around the entire coast of the frozen continent. In the vast interior, a few regions are still eluding measurements due to high signal temporal decorrelation or poor signal to noise ratio or poor satellite coverage. In addition, we also mapped interferometrically with a quadruple difference technique the entire grounding line of Antarctica; a critical effort especially along ice stream outlets where prior mappings were only approximate. Version 1 of this product will be distributed at the University of California Irvine and at the NSIDC data center, Boulder Colorado in the coming months. An improved version will be made available by the end of 2011. The result highlights all major glaciers of Antarctica, their ice velocity and strain rates, how far inland ice streams initiate, the detailed distribution of tributaries nourishing major ice streams, complex ice flow divides, as well as revised estimates of total ice shelf area. In combination with information on ice thickness (Griggs and Bamber, 2010) this provides a complete assessment of grounding line ice discharge and ice-shelf front iceberg production. In combination with surface mass balance data from RACMO2 (Leneart et al. 2010) this product also helps constrain net ice-shelf melt water production and the exact partitioning between ice-shelf melting and iceberg calving. This project is funded by NASA Measures program and uses satellite data collected in the framework of IPY.