Università degli Studi di Udine

Dottorato di Ricerca in Scienze dell'Ingegneria Energetica e Ambientale

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"Remote sensing studies of land water and ice mass from space: results and implications"

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Abstract - Remote sensing from airborne and space borne platforms are critical to understand physical processes affecting the Earth system from the regional to the global scale. Time series of time-variable monthly gravity data from the Gravity Recovery and Climate Experiment (GRACE) mission (2002-2017) have revolutionized the way we look at water/ice mass changes at the surface of the Earth. Using GRACE data, we have established the mass balance of the Antarctic ice sheet and demonstrated that the mass loss was increasing with time. In Greenland, the first comprehensive, monthly estimates of mass balance showed that the mass loss has spread around the entire ice sheet and is accelerating with time. Comparison with surface mass balance products from climate models is used to evaluate these climate models. For the mountain glaciers and ice caps of the World (GIC), GRACE provides comprehensive estimates showing a large mass loss, with an acceleration in mass loss, and a dominance of the mass loss from the Arctic. On Land, the GRACE data have been instrumental to constrain changes in terrestrial water storage. We derived a GRACE-derived drought severity index and studied drought impacts on ecosystem functioning using complimentary data from SMAP and GPM. We evaluate how water supply influences the spatiotemporal variations in vegetation productivity as a function of seasonal timing and climate condition. We explore the potential of using these data in combination with other remote sensing data for monitoring vegetation response to drought and improving drought impact predictability.

CV - Isabella Velicogna is a Professor of Earth System Sciences at the University of California Irvine and a Faculty Part Time at NASA/Caltech's Jet Propulsion Laboratory, Pasadena, CA. She uses novel geophysical methods and satellite remote sensing techniques to understand the physical processes governing ice sheet and glacier mass balance and the hydrologic cycle of high mountain regions, with an emphasis on time-variable gravity from the Gravity Recovery and Climate Experiment (GRACE) mission, follow-on gravity missions, other geophysical data (GPS, precipitation reanalysis, regional climate models, in situ observations), and remote sensing data (laser altimetry, active microwave, passive microwave).