Geophysical Research Abstracts
Vol. 12, EGU2010-6647, 2010
EGU General Assembly 2010

Assimilation of wide swath altimetry to improve modelling of the Ob river, in western Siberia

Sylvain Biancamaria (1), Michael Durand (2), Kostas Andreadis (2), Paul Bates (3), Aaron Boone (4), Nelly Mognard (1), Ernesto Rodriguez (5), Doug Alsdorf (2), and Dennis Lettenmaier (6)

(1) Laboratoire d'Etudes en Géophysique et Océanographie Spatiales, Toulouse, FR, (2) School of Earth Sciences, Byrd Polar Research Center, The Climate, Water, & Carbon Program, Ohio State University, Columbus OH, USA, (3) School of Geographical Sciences, University of Bristol, Bristol, UK, (4) GAME/CNRM, Meteo-France, Toulouse, FR, (5) Jet Propulsion Laboratory, California Institute of Technology, Pasadena CA, USA, (6) Civil and Environmental Engineering, University of Washington, Seattle WA, USA

Variations in the hydrologic cycle of Arctic rivers, due to climate change, have far-reaching consequences on the global water and carbon cycles, as well as the thermohaline circulation in the ocean. Thus, being able to monitor and accurately model Arctic rivers is a crucial issue for the understanding of changes in the Arctic water cycle. The Ob River is one of the largest rivers in the Arctic, contributing nearly 15% of total freshwater flow into the Arctic Ocean. A model of the lower Ob River has been implemented, by coupling the land surface scheme ISBA (Interactions between Soil, Biosphere and Atmosphere), developed by the CNRM (Centre National de Recherche Meteorologique, France), with the flood inundation model LISFLOOD-FP, developed by the University of Bristol, UK.

The scarcity of in situ data in the Ob River basin leads to large errors in the modelling. The forecast error has been assumed to be only due to uncertainties on forcing data (precipitation and air temperature). These errors can be reduced by implementing an Ensemble Kalman smoother for assimilating remotely sensed water levels from satellite altimeters. Data from the future Surface Water and Ocean Topography (SWOT) satellite wide swath altimeter mission will be particularly well adapted to improve the modelling of the Arctic rivers. Every few days, the Ka Radar Interferometer (KaRIN) on board SWOT will provide, for the first time, a global estimate of surface water elevation (with a vertical accuracy of a few cm). The SWOT data have been simulated and assimilated to estimate and quantify their potential to reduce the modelling errors. Preliminary results, using a local Ensemble Kalman Smoother over a 3 day time frame, show that assimilation of SWOT measurements (for a 22-day repeat orbit) leads to a decrease of model prediction errors by a factor of 2.4.