Geophysical Research Abstracts
Vol. 18, EGU2016-5851, 2016
EGU General Assembly 2016

Full 2D observation of water surface elevation from SWOT under different flow conditions

Alessio Domeneghetti (1), Guy Schumann (2,3), Wei Rui (4), Michael Durand (4), and Tamlin Pavelsky (5)

(1) University of Bologna, School of Engineering, DICAM, Italy (alessio.domeneghetti@unibo.it), (2) Remote Sensing Solutions Inc., United States, (3) School of Geographical Sciences, University of Bristol, UK, (4) School of Earth Sciences, The Ohio State University, United States, (5) Department of Geological Sciences, University of North Carolina, United States

The upcoming Surface Water and Ocean Topography (SWOT) satellite mission is a joint project of NASA, Centre National d'Etudes Spatiales (CNES, France), the Canadian Space Agency, and the Space Agency of the UK that will provide a first global, high-resolution observation of ocean and terrestrial water surface heights. Characterized by an observation swath of 120 km and an orbit repeat interval of about 21 days, SWOT will provide unprecedented bi-dimensional observations of rivers wider than 50-100 m. Despite many research activities that have investigated potential uses of remotely sensed data from SWOT, potentials and limitations of the spatial observations provided by the satellite mission for flood modeling still remain poorly understood and investigated. In this study we present a first analysis of the spatial observation of water surface elevation that is expected from SWOT for a 140 km reach of the middle-lower portion of the Po River, in Northern Italy. The river stretch is characterized by a main channel varying from 200-500 m in width and a floodplain that can be as wide as 5 km and that is delimited by a system of major embankments. The reconstruction of the hydraulic behavior of the Po River is performed by means of a quasi-2d model built with detailed topographic and bathymetric information (LiDAR, 2 m resolution), while the simulation of the spatial observation sensed by SWOT is performed with a SWOT simulator that mimics the satellite sensor characteristics. Referring to water surface elevations associated with different flow conditions (maximum, minimum and average flow reproduced by means of the quasi-2d numerical model) this work provides a first characterization of the spatial observations provided by SWOT and highlights the strengths and limitations of the expected products. By referring to a real river reach the analysis provides a credible example of the type of spatial observations that will be available after launch of SWOT and offers a first evaluation of the possible effects of river embankments, river width and river topography under different hydraulic conditions. Results of the study characterize the expected accuracy of the upcoming SWOT mission and provide additional insights towards more appropriate exploitation of future potential hydrologic data.