Geophysical Research Abstracts
Vol. 17, EGU2015-13097, 2015
EGU General Assembly 2015

Investigating the uncertainty of ERS-2 and ENVISAT altimetry data for hydrodynamic modelling

Alessio Domeneghetti (1), Attilio Castellarin (1), Angelica Tarpanelli (2), and Tommaso Moramarco (2)

(1) University of Bologna, School of Engineering, DICAM, Bologna, Italy (alessio.domeneghetti@unibo.it), (2) Research Institute for Geo-Hydrological Protection, National Research Council, Perugia, Italy

Over last decades remotely sensed altimetry data are increasingly used in many hydrologic applications and recent studies demonstrate their suitability for the calibration of hydraulic models (i.e. 1D or quasi-2D models) implemented for rivers wherein traditionally observed data are sparse or totally absent. Nevertheless, the literature concerning the statistical properties of satellite altimetry errors and their possible effect on hydraulic applications is still sparse. This study investigates the effect of ERS and ENVISAT uncertainty on the calibration of a quasi-twodimensional (quasi-2D) model. We refer to extended satellite altimetry datasets ($\sim$16 years of observations) to investigate the effect of (i) data uncertainty (i.e. altimetry measurements errors) and (ii) record length (i.e. number of satellite measurements at a given satellite track) on the calibration of the quasi-2D model. We first present an assessment of ERS and ENVISAT altimetry errors and then investigate the effect of satellite data uncertainty by generating synthetic altimetry datasets in a Monte Carlo framework. The results of our analysis further emphasise the suitability of satellite data for the calibration of hydraulic models, providing also a quantitative assessment of the effect of altimetry data uncertainty. The analysis highlights the higher accuracy of ENVISAT data, which ensures a stable calibration with $\sim$1.5 years of data (Mean Absolute Error, MAE, lower than 0.4 m, $\sim$0.2 m of which result directly from the uncertainty of ENVISAT data). ERS-based calibrations become stable with longer series ($\sim$3.5-5 years of data) and the negative effect of uncertainty in ERS data is higher (i.e. MAE of 0.6$\div$0.9 m, of which 0.4$\div$0.6 m are ascribable to the uncertainty of ERS measurements). Although the analysis refers to a specific case study and a limited number of satellite tracks it provides useful insights on the evaluation and quantification of how the uncertainty of satellite altimetry data affects the calibration of hydrodynamic models and simulated water levels.