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Seine estuary modelling and AirSWOT measurements validation

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In the context of global climate change, knowing water fluxes and storage, from the global scale to the local scale, is a crucial issue. The future satellite SWOT (Surface Water and Ocean Topography) mission, dedicated to the surface water observation, is proposed to meet this challenge.
SWOT main payload will be a Ka-band Radar Interferometer (KaRIn). To validate this new kind of measurements, preparatory airborne campaigns (called AirSWOT) are currently being designed. AirSWOT will carry an interferometer similar to Karin: Kaspar-Ka-band SWOT Phenomenology Airborne Radar. Some campaigns are planned in France in 2014. During these campaigns, the plane will fly over the Seine River basin, especially to observe its estuary, the upstream river main channel (to quantify river-aquifer exchange) and some wetlands.
The present work objective is to validate the ability of AirSWOT and SWOT, using a Seine estuary hydrodynamic modelling. In this context, field measurements will be collected by different teams such as GIP (Public Interest Group) Seine Aval, the GPMR (Rouen Seaport), SHOM (Hydrographic and Oceanographic Service of the Navy), the IFREMER (French Research Institute for Sea Exploitation), Mercator-Ocean, LEGOS (Laboratory of Space Study in Geophysics and Oceanography), ADES (Data Access Groundwater) ... . These datasets will be used first to validate
locally AirSWOT measurements, and then to improve a hydrodynamic simulations (using tidal boundary conditions, river and groundwater inflows ...) for AirSWOT data 2D validation. This modelling will also be used to estimate the benefit of the future SWOT mission for mid-latitude river hydrology.
To do this modelling,the TUGOm barotropic model (Toulouse Unstructured Grid Ocean model 2D) is used. Preliminary simulations have been performed by first modelling and then combining to different regions: first the Seine River and its estuarine area and secondly the English Channel. These two simulations h are currently being improved, by testing different roughness coefficients, adding tributary inflows. Groundwater contributions will also be introduced (digital TUGOm development in progress) .
The model outputs will be validated using data from the GPMR tide gauge data and measurements from the Topex/Poseidon and Jason-1/-2 altimeters for year 2007.