USE OF T-UGOM TO SIMULATE THE SEINE ESTUARY WATER STOCKS : VALIDATION OF SWOT/AIRSWOT MISSION

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INTRODUCTION

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 SWOT (Surface Water and Ocean Topography) satellite mission, dedicated to the surface water observation, is proposed to meet this challenge. SWOT will provide maps of water levels in rivers wider than 100m and water areas greater than 250m².

SWOT main payload will be the 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 AirSWOT campaigns are planned in France in 2014. During these campaigns, the plane will fly over the Seine River basin to observe its estuary, the upstream river main channel (to quantify river-aquifer exchange) and some wetlands.

OBJECTIVES

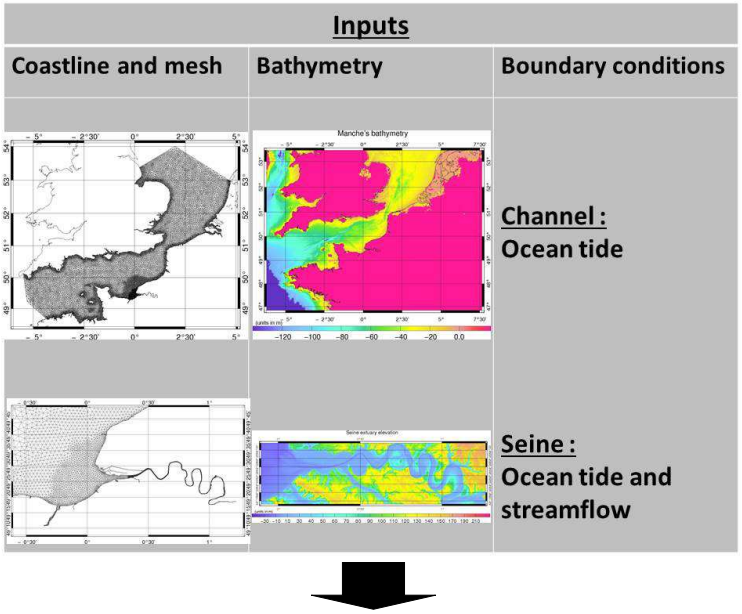
The work objectives of this work are to estimate benefits of AirSWOT and SWOT data study estuary hydrodynamic by:

- (i) modelling interactions between water stocks in the Seine estuary
- (ii) then evaluating the benefit of the future SWOT mission for mid-latitude river hydrology

METHODS

Interaction between water stocks in the Seine estuary will be modelled using the T-UGOm barotropic model (Toulouse Unstructured Grid Ocean model 2D).
To evaluate the benefits of the future SWOT/AirSWOT mission for mid-latitude river, virtual AirSWOT/SWOT data will be computed using a SWOT simulator available at LEGOS and then will be assimilated to correct T-UGOm model errors.

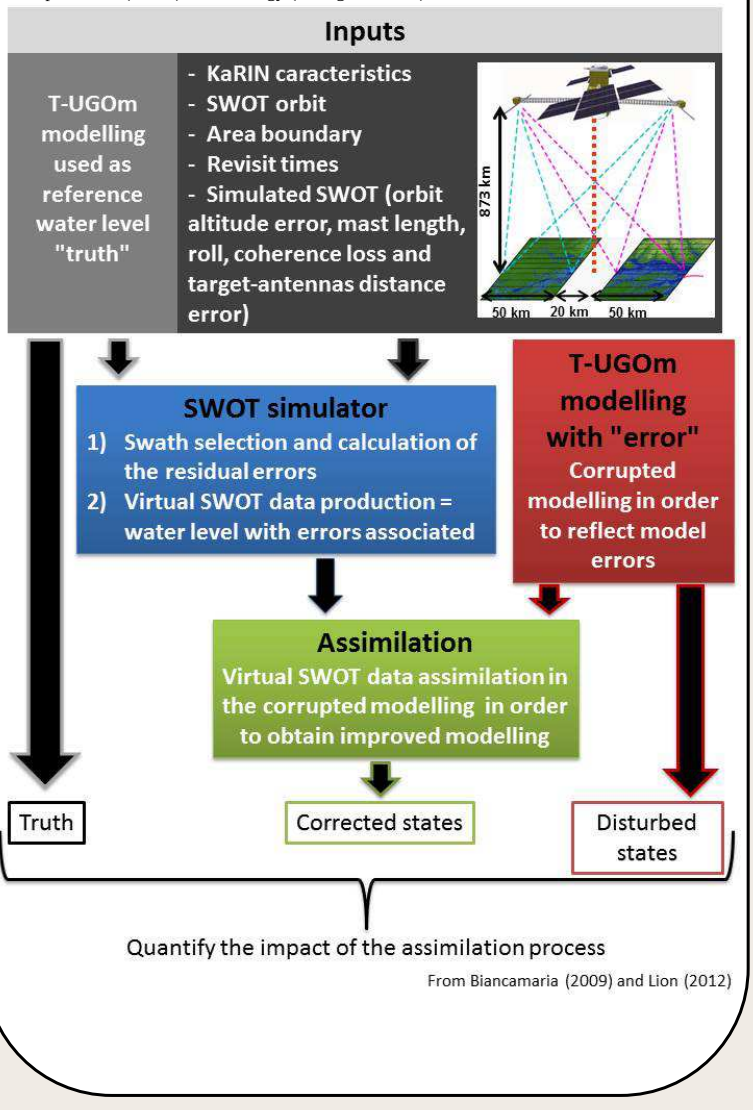
(I) MODELLING INTERACTION BETWEEN WATER STOCKS IN THE SEINE ESTUARY



RMSE between modelled and Topex/Poseidon satellite water elevations on the English Channel are between 10 to 30 cm.
Seine modelling will be compared to tidal gauge data, when these data will be treated and gaps will be filled.
Then, both simulation wil be coupled and validated using satellite altimetry data and tidal gauge data

(II) ESTIMATION THE BENEFIT OF THE FUTURE SWOT/AIRSWOT MISSION FOR MID-LATITUDE RIVER HYDROLOGY

As soon as the modelling will be validated, we will use a SWOT simulator to compute virtual SWOT-like observations. Then, benefits of the future SWOT/AirSWOT mission for mid-latitude river hydrology will be evaluated using an Observing System Simulation Experiments (OSSE) methodology (see figure below).



From Biancamaria (2009) and Lion (2012)

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LION Christine, 2012, Simulation des données SWOT haute résolution et applications à l'étude de l'estuaire de l'Amazone, Doctorat de l'Université de Toulouse III Paul Sabatier