Geophysical Research Abstracts
Vol. 21, EGU2019-10377, 2019
EGU General Assembly 2019

Retrieving baseflow of large rivers from space with the future SWOT mission

Nicolas Flipo (1), Fulvia Baratelli (1), Agnès Rivière (1), and Sylvain Biancamaria (2)

(1) Geosciences Department, MINES ParisTech, PSL University, Fontainebleau, France (nicolas.flipo@mines-paristech.fr), (2) LEGOS, Université de Toulouse, CNES, CNRS, IRD, UPS, 14 avenue Edouard Belin, Toulouse, France

The quantification of aquifer contribution to river discharge is of primary importance to evaluate the impact of climatic and anthropogenic stresses on the availability of water resources. Several baseflow estimation methods require river discharge measurements, which can be difficult to obtain at high spatio-temporal resolution for large basins. The SWOT satellite mission will provide water level values from which discharge estimations will be derived for large rivers ($>$ 50 - 100 m wide) even in ungauged basins with a maximum frequency of 21 days.

We develop a methodology to estimate baseflow over a whole mission lifetime. To this aim, an algorithm based on hydrograph separation using the Chapman's filter was developed to automatically estimate the baseflow in a river network at regional scale ($>$ 10 000 km^2). The algorithm was applied to the Seine River basin (75 000 km^2, France) using the discharge time series simulated at daily time step by the coupled hydrological-hydrogeological model CaWaQS to obtain the reference baseflow estimations. The same algorithm is then forced with discharge time series sampled at SWOT observation frequency. The average baseflow is estimated with good accuracy for all the reaches which are observed at least once per cycle (relative bias less than 8 %). The time evolution of baseflow is also rather well retrieved, with a Nash-Sutcliffe coefficient above 0.7 for 96 % of the network length (Baratelli et al., 2018). Based on former estimations of uncertainties on discharges that will be estimate by the mission, it appears that baseflow estimates are always slightly lower than those on discharge. This work provides new potential for the hydrological community to better close the water cycle using forthcoming spaceborne data.

Reference : Baratelli, F., Flipo, N., Rivière, A., Biancamaria, S. (2018) Retrieving river baseflow from SWOT spaceborne mission, Remote Sensing of Environment, 218, 44-54. doi:10.1016/j.rse.2018.09.013