



SWOT data assimilation for reservoir operations in the upper Niger river basin

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Our objective is to evaluate the potential for swath altimetry (SWOT) data to improve reservoir operations in the upper Niger river basin where two reservoirs are (or will be) used to sustain water demand, mainly for irrigation. We coupled the LISFLOOD-FP hydrodynamics model to the VIC hydrology model to compute the "true" state of the system which we used with a SWOT simulator to provide synthetic water levels and surface extent for both the Niger River channel and the two reservoirs. The simulated states were obtained by running the models with perturbed inputs (meteorological forcings to the VIC model, and water level in the two reservoirs). We integrated a reservoir rule model with the river hydrodynamics and hydrology models in order to define dam releases for each reservoir depending on available water in the river reach and downstream water demand. We then assimilated in situ and SWOT data into the coupled models to correct for model and forcing errors. We considered four scenarios: no assimilation, assimilation of in situ data only, assimilation of SWOT data only, and assimilation of both data sources. We computed performance of each scenario from the total volume of released water and the ability of the system to satisfy water demand.