Geophysical Research Abstracts
Vol. 21, EGU2019-10372, 2019
EGU General Assembly 2019

To what extent does the spatial resolution of water balance models impact the calibration and assimilation results using GRACE data?

Maike Schumacher (1) and Ehsan Forootan (1,2)

(1) Institute of Physics and Meteorology, University of Hohenheim, Stuttgart, Germany (maike.schumacher@uni-hohenheim.de), (2) School of Earth and Ocean Sciences, Cardiff University, Cardiff, UK

During the last decade, several studies have assimilated changes of total water storage obtained from the Gravity Recovery And Climate Experiment (GRACE) satellite mission into global water balance and land surface models. Besides obvious benefits for representing the total water column, individual water storage components, and even water fluxes, such as river runoff, still major challenges arise in selecting an optimal strategy to integrate the satellite data into models. Investigations have shown the impact of GRACE data processing on the assimilation results, e.g., its spatial resolution and the temporal disaggregation of monthly observations into daily time steps of the model, as well as the influence of the choice of various sequential data assimilation methods, such as the Ensemble Kalman filter / smoother and their extensions. So far, the sensitivity of data assimilation results with respect to changes of the model set-up have not been considered.

In this study, we use an improved calibration and data assimilation (C/DA) approach to combine GRACE data with the W3RA water balance model. In particular, we study how the spatial resolution of the model impacts the results by changing the grid size from 1° to 0.125°. To validate the performance of the C/DA runs, altimetry measurements over large rivers, such as the Niger and Nile, as well as remotely sensed soil moisture data are used. In addition, we assess the conversion and changes in uncertainty of the calibrated parameters to identify whether GRACE is able to constrain these empirical model parameters, as well as to quantify the sensitivity with respect to the model's spatial resolution.