



Continental water storage variations in Africa

Jean-Paul Boy (1,2), Claudia Carabajal (3), Scott Luthcke (1), David Rowlands (1), Frank Lemoine (1), and Terence Sabaka (1)

(1) NASA GSFC, Planetary Geodynamics Laboratory, Greenbelt, USA., (2) EOST-IPGS (UMR 7516 CNRS-UdS), Strasbourg, France., (3) Sigma Space Corporation / NASA GSFC, Greenbelt, USA.

We investigate temporal and spatial variations of continental water storage in Africa as recovered by the GRACE (Gravity Recovery and Climate Experiment) mission. Mass variations are directly inverted from only KBRR (K-band range rate) data using a mascon approach. We compare our solutions to classical spherical harmonic solutions and also to different global hydrology models, and regional models in the African monsoon area (thanks to the ALMIP project).

We compare mass estimates of major Africa lakes and reservoirs to volume estimates from laser (ICESat) and radar altimetry. We investigate the improvement of our mass retrievals when hydrology (GLDAS/Noah model) is forward modeled, compared to the more classical approach when continental water storages variations are not taken into when processing GRACE data.

We solve the water mass balance equations using different precipitation datasets from remote sensing techniques, as well as ground rain gauge stations, using fresh water fluxes (precipitation minus evaporation) from various atmospheric models (reanalysis and operational). As a result, our runoff are compared to river flux measurements.

In addition to the comparison with the ALMIP models, we also pay a special attention to the Lake Chad and Niger river basins, where ground gravity variations are repetitively measured as part of the GHYRAF project in order to investigate seasonal water storage variations at small and larger spatial scales.