Geophysical Research Abstracts
Vol. 19, EGU2017-13068, 2017
EGU General Assembly 2017

Modeling surface water storage from space altimetry, remote sensing and gravity

Jean-Paul Boy (1), Bryant Loomis (2,3), and Scott Luthcke (3)

(1) University of Strasbourg, EOST/IPGS, Strasbourg, France., (2) Stinger Ghaffarian Technologies, Inc. (SGT), Greenbelt, MD, USA., (3) NASA GSFC, Greenbelt, MD, USA.

Since its launch in 2002, the GRACE (Gravity Recovery And Climate Experiment) is recording Earth gravity field variations with unprecedented temporal and spatial resolutions, mainly due to global circulation of surface geophysical fluids. Continental water storage variations estimated with GRACE are classically compared to global hydrology models such as GLDAS (Global Land Data Assimilation System) or MERRA (Modern Era-Retrospective Analysis) hydrology models. However most of these models do not take into account both the groundwater and the surface water (lakes and rivers) components of the hydrological cycle.
We derive surface water storage in several large river basins, characterized by various climates, using a simple routing scheme, forced by runoff outputs of GLDAS and MERRA-land hydrology models. We adjust the flow velocity, i.e. the only free parameter in our modeling by fitting the modeled equivalent water height to the observed water elevation from radar altimetry measurements. The conversion of the observed geometric heights into the modeled equivalent water heights requires the knowledge of the variations of the river widths, which can be derived from MODIS observations. We validate river models by comparing the estimated discharge to independent in-situ measurements.
We finally add to the soil-moisture and snow components of the GLDAS and MERRA-land models our estimates of surface water variations and show that they are in better agreement with GRACE. We also compare these estimates to WGHM, which includes both groundwater and surface components.