Geophysical Research Abstracts
Vol. 17, EGU2015-9424, 2015
EGU General Assembly 2015

Estimation of surface water variations from space gravity, altimetry and remote sensing

Jean-Paul Boy
University of Strasbourg, EOST/IPGS, Strasbourg, France (jeanpaul.boy@unistra.fr)

Since its launch in 2002, the GRACE (Gravity Recovery And Climate Experiment) mission is recording the variations of the Earth's gravity field at unprecedented temporal (classically at 10 day to monthly samples) and spatial (a few hundreds of kilometers) resolutions, mainly due to the 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) land. 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 of several large rivers, 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 (Moderate Resolution Imaging Spectroradiometer) observations. We validate our 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 (WaterGap Hydrology Model), which includes both groundwater and surface components.