Geophysical Research Abstracts
Vol. 14, EGU2012-7163, 2012
EGU General Assembly 2012

Water mass change in the Amazon basin estimated by multi-temporal SAR data, GRACE gravimetry and water level observations

S. Spiridonova (1), F. Seitz (1), K. Hedman (1), and F. Meyer (2)

(1) Earth Oriented Space Science and Technology (ESPACE), TU München, Munich, Germany, (2) University of Alaska Fairbanks (UAF), Section Earth and Planetary Remote Sensing, Fairbanks, USA.

The 2007 IPCC assessment report identified the land hydrology as one of the most uncertain components of the global water cycle. Variations of continental water masses occur in several compartments (e.g. surface and soil water, snow/ice, and groundwater). Mass variations and related changes of surface water exten-sions are being observed by contemporary space and in-situ observation systems such as GRACE gravim-etry, altimetry, optical/infrared sensors, SAR/InSAR, and in-situ river gauges.

In this session we will present a regional multi-sensor study in the Amazon basin. The study focuses on the quantification of variations of water mass and water surface extent caused by extreme flood and drought situations that were frequent during the last decade. PALSAR data of two extreme events was selected; once when the Amazon River was flooded (March/April 2009) and once when the region suffered from a se-vere drought (October/November 2009). The advantage of using PALSAR is that it operates in L-Band and has the possibility to penetrate through the vegetation which is essential in the Amazon basin with its dense vegetation. Time series of water level variations were obtained from two in-situ gauges at Manacapuru and Obidos as well as from Envisat satellite altimetry. Total water storage change in the whole region was given by GRACE gravimetry.

First, the variation of water mass is computed numerically using GRACE. Second the water level varia-tions obtained from the two river gauges are analyzed with respect to observation of Envisat. Third the surface water extent is estimated by extracting water masks from PALSAR image data. The water mass change is obtained by intersecting the water masks with a medium resolution digital elevation model (SRTM). More specifically, water heights along the boundary of the river body were extracted from the DEM and processed for error reduction. Then, pixel heights within the river contour were interpolated with a Delaunay triangula-tion. Multiplying the differences in heights between high and low water periods by the area of the DEM reso-lution cell and summing them up over the river area provided an estimate of the total volume change.

In the end, the presentation will give an assessment of the spatio-temporal consistency of the different ob-servation systems by comparing the spatial patterns of water variability in the data sets with respect to their temporal development and existing phase lags. Based on the level of consistency we will provide an outlook on the applicability of measurements of water levels and surface water extent for an independent assess-ment of water mass variations.