Geophysical Research Abstracts
Vol. 12, EGU2010-8981, 2010
EGU General Assembly 2010

Water balance estimation for large scale basins from regional atmospheric moisture budgets and comparison to GRACE

Benjamin Fersch and Harald Kunstmann

Karlsruhe Institute of Technology, Institute for Meteorology and Climate Research, Garmisch-Partenkirchen, Germany (fersch@kit.edu)

Besides energy fluxes and temperature properties, atmospheric downscaling models also describe the vertical water fluxes and exchange processes between soil and atmosphere. The analysis of long term impacts of land use and climate variations with hydrometeorological models requires a proper description of the energy and water interplay.

In our study, we investigate how well the mesoscale Weather Research and Forecasting modeling system WRF (WRF-ARW) is able to reproduce the 2003-2006 water balance of continental scale river catchments and basins without discharge, based on the analysis of atmospheric moisture budgets. The divergence of the vertically integrated moisture flux is used as a proxy for precipitation minus evapotranspiration (P-E). Therefore, at basins where discharge measurements are available or outflow equals zero, the water budget can be determined also for the basin storage change. Global boundary conditions from ECMWF ERA-INTERIM and the NCAR/NCEP Reanalysis are used for the driving of WRF. Water budgets are analyzed for the river basins of Amazon, Yenisei, and Lena, and also for the Sahara and the central arid region of Australia.

The results show that for cold and winterly conditions, WRF reproduces the basin water budget quite well. For warm and moist conditions, net water input (P-E) is mostly overestimated. Different model driving with ECMWF and NCEP boundary conditions has small effects for the Siberian tundra. The Amazonian, Saharan and Australian domains show stronger deviances. The evaluation of the derived storage changes with their global counterparts and with the *Gravity Recovery And Climate Experiment* GRACE suggests that for moist and warm environments, the regional atmospheric model has substantial problems in describing the vertical water fluxes, whereas for cold conditions downscaling is likely to decrease overall uncertainty.