Geophysical Research Abstracts
Vol. 12, EGU2010-5370, 2010
EGU General Assembly 2010

Evaluation of different precipitation products for hydrological prediction in mountainous areas

Wouter Buytaert and Louisa Peaver
Imperial College London, London, United Kingdom (w.buytaert@imperial.ac.uk)

Hydrological modelling and prediction in mountainous areas is seriously hindered by the high spatial variability of precipitation. This is particularly true in the Andes, a mountain range that is characterised by extreme precipitation gradients, and a lack of a dense rain gauge network. Incomplete characterisation of precipitation can result in serious errors in the water balance, and failure to capture extreme events.
In this study we compare the ability of three precipitation products to reproduce the discharge regime of mesoscale basins in Ecuador and Chile. The study basins are part of the Paute river in Ecuador, and the Baker river in Chilean Patagonia. Both basins are crucial for their respective country's hydropower production. The Paute river hosts the largest hydropower plant of Ecuador. In the Baker river, the largest hydropower project of Chile is currently being designed. Three types of precipitation products are evaluated for their ability to represent the spatial variability of precipitation in the context of hydrological modelling. The traditional network of rain gauges is compared to the PERSIANN dataset and ECMWF Interim reanalysis data. PERSIANN (Precipitation Estimation from Remotely Sensed Information using Artificial Neural Networks) is a precipitation product derived from a number of satellite images, and interpolated with artificial neural networks. The ECMWF reanalysis data also incorporate available satellite products, but use them to force a complex meteorological model consisting of parameterized microphysical processes.
The three rainfall products are used to drive a conceptual hydrological model designed for each of the basins. The water balance of the models are then analysed for consistency with observed discharge. It is shown that both the PERSIANN and ECMWF Interim data exhibit large biases that may jeopardize their use without any field validation. However, both products can be used to interpolate the scarce rain gauges, thus improving the predictions. The results are more promising in the larger Baker river basin. In the Paute basin, local variability is so high that none of the satellite products can capture it satisfactorily.