Modelling ENSO effects on the water balance and freshwater transport for the Pacific coast of Peru and Northern Chile

J. García (1)(2), A. Güntner (1), C. Távara (1)(2), P. Tume (3), J. Reyes (2), B. Merz (1)

(1) GeoForschungsZentrum Potsdam (GFZ), Germany, (2) Institute of Hydraulics, Hydrology and Sanitary Engineering, University of Piura, Piura, Peru, (3) Facultad de Ingeniería, Universidad Católica de la Santísima Concepción, Concepción, Chile

One of the main objectives of the integrated project CENSOR (Climate Variability and El Nino Southern Oscillation: Implications for natural coastal resources and mangement) is to enhance the interdisciplinary understanding of the coastal ecosystem of the Humboldt Current System offshore Peru and Chile. In particular, predictive tools to assess El Nino Southern Oscillation (ENSO) induced environmental changes on resources availability are to be developed to support local communities. Within this context, it is the goal of our study to quantify the continental water balance and to assess freshwater transport to the coastal ecosystem at a large spatial scale. The study area comprises all coastal watersheds of Peru and Northern Chile that drain into the Pacific Ocean (350 000 km2). Large parts of that area are severely hit by ENSO-induced climate variability in terms of droughts and floods. The large-scale hydrological model WASA has been set up for the study area. The parameterization approach using local data sets if available is presented and compared to global data sets in cases where no detailed information was available. Simulation results of freshwater runoff from the continental area are analyzed with emphasis on ENSO-related variability. The model performance is evaluated against observed river discharge and discussed relative to uncertainties of input data, in particular precipitation. A more detailed analysis is performed for the Piura basin in Northern Peru where denser monitoring networks were available.