SecaVista – a web application for operational drought forecasts in Ceará, NE-Brazil

Klaus Vormoor, Sebastian Voss, Aline Murawski, José Miguel Delgado, and Till Francke
University of Potsdam, Institute for Earth- and Environmental Science, Potsdam, Germany (kvormoor@uni-potsdam.de)

Although Brazil is generally known as one of the most water-rich countries in the world, there are large regional differences regarding water supply. As to that, the semiarid Northeast Brazil is regularly as recently facing serious water scarcity problems due to seasonal drought events. In addition to the climatological conditions, water management strategies regarding the operation of strategic water reservoirs influence the water availability in this region. To improve the efficiency of these water management strategies, reliable seasonal drought forecasts are required.

In collaboration with FUNCEME (Ceará′s research foundation for meteorology and hydrology), we have developed a fully automatically operational drought forecast system for the state of Ceará, NE-Brazil. To that end, an ensemble of the ECHAM4.6 atmospheric circulation model with 20 ensemble members and a forecast lead time of 1-6 months is statistically downscaled and bias-corrected with reference to the state's meteorological station network using Empirical Quantile Mapping. Subsequently, a set of informative meteorological and hydrological drought indices (i.e. the Standardized Precipitation Index (SPI_12month) as well as regional water storages in reservoirs) are estimated from the downscaled forecasts. These monthly updated forecasts are finally visualized in a publically accessible web application: SecaVista (www.seca-vista.geo.uni-potsdam.de).

The choices of models and indices are based on a systematical evaluation of six hydro-meteorological forecasts products: (i) two atmospheric model ensembles; (ii) three downscaling methods combined with the model ensemble in hindcast mode; (iii) five meteorological and hydrological drought indices with varying temporal aggregation estimated for all of the six downscaled forecast products. The web application is implemented using the R-Studio package shiny, allowing the interactive display of maps and charts.