The Latin American and Caribbean Flood and Drought Monitor

Colby Fisher[1], Nathaniel Chaney[1], Justin Sheffield[1], Eric F. Wood[1]

(1) *Department of Civil and Environmental Engineering, Princeton University , Princeton, NJ, 08544, USA, e-mail: justin@princeton.edu*

Abstract

Monitoring and forecasting extreme hydrological events, such as floods and droughts, are crucial for reduction of impacts and building resilience in vulnerable populations, and are an important component of water and agricultural management. We describe the development and use of an experimental continental scale system for providing monitoring and early warning of floods and droughts for Latin America and the Caribbean (LAC). The system is based on a hydrological modelling framework using the VIC land surface model, coupled to a grid-to-grid streamflow routing model, and is implemented for all LAC land areas at 0.25-degree spatial resolution. The model is forced in near real-time by a merged satellite (TRMM Multi-satellite Precipitation Analysis; TMPA), weather analysis (Global Forecast System; GFS) and observational (gauges) dataset of precipitation and temperature, that is updated daily. Outputs from the system include modelled evapotranspiration, runoff, soil moisture and streamflow. Drought indices are calculated for soil moisture and streamflow based on a long-term climatology derived from an historic simulation (1948-2008) forced by observed meteorological data. Short-term (7-day) and seasonal (6-months) hydrological forecasts using VIC are provided for flood and drought prediction, respectively. The short-term forecasts are driven by GFS 7-day precipitation forecasts and the seasonal forecasts are driven by Climate Forecasts System (CFS) monthly precipitation and temperature, all downscaled and bias corrected to daily, 0.25-deg resolution. The system can be accessed via an intuitive web interface (http://stream.princeton.edu/LAFDM/WEBPAGE/) and the data can be displayed and downloaded back to 1950. We show analysis of the performance of the hydrological monitoring against observed streamflow measurements and large-scale estimates of evapotranspiration and water storage from satellite remote sensing. The short-term and seasonal forecasts are evaluated for a series of hindcasts in terms of the skill in representing flood and drought events. We discuss the potential for operational usage in decision-making and disaster management.