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The upgraded, high-resolution Latin American Flood and Drought Monitor (LAFDM) for improved risk management

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Floods and droughts are among the most devastating natural hazards in Latin America. Floods in Peru in early 2017, for example, caused 113 deaths and destroyed 115,000 homes, while droughts in northeastern Brazil during 2010−2015 caused US$6 billion in losses in the agricultural sector. In this talk, we introduce the newly upgraded Latin American Flood and Drought Monitor (LAFDM), an operational system with a high 0.05° (∼5 km) resolution based on the VIC hydrological model intended to provide advance warning of impending floods and droughts. The system provides daily, freely accessible nowcasts and forecast ensembles for several key hydrological variables, including soil moisture, evaporation, runoff, and streamflow. The meteorological forcing is derived by merging a wide range of station, satellite, and atmospheric model data in an effort to obtain the best possible predictions across the entire continent. The precipitation forcing is taken from the gauge-, satellite-, and model-based MSWEP-NRT product (0.1°) for the nowcasts and the model-based NCEP-GEFS product (1°), probability matched to MSWEP-NRT, for the forecast ensembles. The air temperature and wind speed forcings are taken from the model-based ERA-Interim (0.75°), GDAS-Anl (0.25°), and JRA-55 (0.56°) products for the nowcasts and NCEP-GEFS for the forecast ensembles. To obtain temporally consistent, high-resolution air temperature and wind speed forcings, each product is downscaled to 0.05° and bias corrected using the station-based, topographically-adjusted WorldClim climatic dataset (1 km). Additional bias corrections are applied to the air temperature forecast ensembles based on near real-time station observations from the GHCN-D and GSOD databases. Predictions from the upgraded LAFDM were compared to those from a baseline system forced using the original uncorrected NCEP-GEFS product and evaluated using a large dataset of streamflow and soil moisture observations. The predictions from the new system exhibit more realistic spatial patterns and better match the observations. The LAFDM predictions are accessible via http://stream.princeton.edu.