A Drought Cyberinfrastructure System for Improving Water Resource Management and Policy Making

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Development of reliable monitoring and prediction indices and tools are fundamental to drought preparedness, management, and response decision making. This presentation provides an overview of the Global Integrated Drought Monitoring and Prediction System (GIDMaPS) which offers near real-time drought information using both remote sensing observations and model simulations. Designed as a cyberinfrastructure system, GIDMaPS provides drought information based on a wide range of model simulations and satellite observations from different space agencies. Numerous indices have been developed for drought monitoring based on various indicator variables (e.g., precipitation, soil moisture, water storage). Defining droughts based on a single variable (e.g., precipitation, soil moisture or runoff) may not be sufficient for reliable risk assessment and decision making. GIDMaPS provides drought information based on multiple indices including Standardized Precipitation Index (SPI), Standardized Soil Moisture Index (SSI) and the Multivariate Standardized Drought Index (MSDI) which combines SPI and SSI probabilistically. In other words, MSDI incorporates the meteorological and agricultural drought conditions for overall characterization of droughts, and better management and distribution of water resources among and across different users. The seasonal prediction component of GIDMaPS is based on a persistence model which requires historical data and near-past observations. The seasonal drought prediction component is designed to provide drought information for water resource management, and short-term decision making. In this presentation, both monitoring and prediction components of GIDMaPS will be discussed, and the results from several major droughts including the 2013 Namibia, 2012-2013 United States, 2011-2012 Horn of Africa, and 2010 Amazon Droughts will be presented. The presentation will highlight how this drought cyberinfrastructure system can be used to improve water resource management in California. Furthermore, the presentation provides an overview of the information farmers need for better decision making and how GIDMaPS can be used to improve decision making and reducing drought impacts.

Further Reading

Hao Z., AghaKouchak A., Nakhjiri N., Farahmand A., 2014, Global Integrated Drought Monitoring and Prediction System, Scientific Data, 1:140001, 1-10, doi: 10.1038/sdata.2014.1.

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AghaKouchak A., 2014, A Baseline Probabilistic Drought Forecasting Framework Using Standardized Soil Moisture Index: Application to the 2012 United States Drought, Hydrology and Earth System Sciences, 18, 2485-2492, doi: 10.5194/hess-18-2485-2014.