Geophysical Research Abstracts
Vol. 21, EGU2019-9600, 2019
EGU General Assembly 2019

Supporting food and water insecurity early warning in Africa through a recently developed seasonal scale multimodel hydrologic forecasting system

Shraddhanand Shukla (1), Kristi R. Arsenault (2), Abheera Hazra (3), Amy McNally (3), Augusto Getirana (3), Sujay Kumar (4), Christa Peters-Lidard (4), Randal Koster (4), Ben Zaitchik (5), Laura Harrison (1), Tamuka Magadzire (6), Alkhalil Adoum (6), Gideon Galu (6), and Jim Verdin (7)

(1) University of California, Santa Barbara, Department of Geography, Santa Barbara, United States (shrad@geog.ucsb.edu), (2) SAIC, Inc., USA, (3) University of Maryland, Maryland, USA, (4) NASA-GSFC, Maryland, USA,, (5) John Hopkins University, Baltimore, Maryland, USA, (6) Famine Early Warning Systems Network, USA, (7) United States Agency for International Development, Washington D.C., USA

A seamless and effective early warning system is critical for mitigating the most adverse impacts of water and food insecurity in Africa. The U.S. Agency for International Development (USAID) supported Famine Early Warning Systems Network (FEWS NET) is tasked with providing early warning and analysis on acute food and water insecurity to help government decision-makers and relief agencies plan for and respond to resulting humanitarian crises. This presentation describes a recently developed multimodel based seasonal scale hydrologic forecasting system, which has been operationally supporting the early warning efforts of FEWS NET since August 2018. Since then, this system has helped identify flood risk potential in parts of Eastern and Western Africa, and development and progression of drought conditions in Southern Africa. Both of these types of extremes contribute to food and water insecurity.

At the core of this system is NASA's Land Information System (LIS) (a hydrologic modeling framework), which supports seasonal scale monitoring and forecasts of runoff and soil moisture by combining satellite and reanalysis based atmospheric forcings datasets and dynamical climate forecasts. Specifically, the LIS-based seasonal scale hydrologic forecasting system incorporates NASA/GMAO's Catchment and the Noah Multi-Physics (Noah-MP) land surface models (LSMs). It is driven by NASA/GMAO's Modern-Era Retrospective analysis for Research and Applications, version 2 (MERRA-2), and the UCSB Climate Hazards Group InfraRed Precipitation with Station (CHIRPS) rainfall dataset to provide a long historic record for monitoring (1982-present) of hydrologic variables. Currently, the seasonal scale hydrological forecasts are generated by using NASA's Goddard Earth Observing System Model, version 5 (GEOS-5).

Long-term availability of monitoring and forecasts of hydrologic variables allows for historical validation of this dataset against independent hydrologic observations and reported crop yields (up to the extent they are available). Validation results thus far have demonstrated agreement of hydrologic monitoring simulations with independent satellite based observations in Eastern Africa and the value of this system in supporting food insecurity early warning in Southern Africa.

This presentation will first describe the development of this system, followed by its validation for drought early warning and subsequently the process of stakeholder engagement and operational application of the products derived from this system by the FEWS NET.