Geophysical Research Abstracts
Vol. 15, EGU2013-6356, 2013
EGU General Assembly 2013

A prototype Global Drought Information System based on multiple land surface models

Bart Nijssen (1), Shrad Shukla (1,2), Chi-Yu Lin (1), and Dennis Lettenmaier (1)

(1) Department of Civil and Environmental Engineering, University of Washington, Seattle, WA, USA, (2) Climate Hazards Group, University of California Santa Barbara, Santa Barbara, CA, USA

Droughts are pervasive natural hazards, which cause large economic losses and human suffering. While the absolute magnitude of these losses is greatest in the developed world, the relative impact is much higher in the developing world. Nonetheless, our ability to monitor and predict the development and occurrence of droughts at a global scale in near real-time is limited. This ability is of particular importance in estimating regional crop production and thus current and future prices of agricultural commodities, as well as the implementation of emergency measures in areas where the effects of drought threaten lives and livelihoods. We describe the implementation of a multi-model drought monitoring system, which provides near real-time estimates of soil moisture conditions for the global land areas between 50S and 50N with a latency of about one day. The system is an extension of similar systems developed by both the University of Washington and the National Centers for Environmental Prediction for use in the U.S. Drought Monitor. Global application of the protocols used in the U.S. systems poses new challenges, particularly with respect to the generation of meteorological forcings with which to drive the land surface models used in such a system. The global system we describe uses satellite-based precipitation (as contrasted with gridded station data in the U.S. systems) as well as temperature estimates based on global weather model analysis fields to track the evolution of soil moisture in near real-time at a spatial resolution of 0.5 degree using multiple land surface models. By comparing the modeled, near real-time soil moisture values with the results from long-term retrospective simulations, the model estimates can be placed in historic context (as soil moisture percentiles) and used to monitor the development of droughts around the world. We evaluate the performance of our system for historic droughts, and compare with other drought analyses and analytical data.