Geophysical Research Abstracts
Vol. 13, EGU2011-9205, 2011
EGU General Assembly 2011

Group on Earth Observation (GEO) Global Drought Monitor

William Pozzi (1), Douglas Cripe (2), Richard Heim (3), Michael J. Brewer (4), Justin Sheffield (5), Stefan Niemeyer (6), Benjamin Lloyd-Hughes (6), Leliana Nunez (7), Blair Trewin (8), Wolfgang Wagner (9), and the W. Pozzi Team

(1) GEO AIP Water and Drought Working Group, Washington, United States (will.pozzi@gmail.com), (2) GEO Secretariat Science Officer for Water, (3) USA National Oceanic and Atmospheric Administration (NOAA), (4) USA National Integrated Drought Information System (NIDIS), (5) Princeton University, (6) University College London, (7) Argentina Servicio Meteorologic Nacional (SMN), Buenos Aires, (8) Australia Bureau of Meteorology National Climate Centre, Melbourne, (9) Technical University Wien

Given current concerns with the increasing frequency and magnitude of droughts in many regions of the world, especially in the light of expected climate change, drought monitoring and dissemination of early warning information in a timely fashion is a critical concern. The European Union experienced intense drought and heat waves in 2003, Argentina in 2008/2009, southeast Australia in 2009, and the Russia Federation in 2010, while, at the same time, the Intergovernmental Panel on Climate Change (IPCC) climate projections for the 21st century suggest an increased frequency of severe droughts in continental USA and Mexico, Mediterranean Basin, parts of northern China, Southern Africa, Australia, and parts of South America.

Droughts and famine have been linked to one another in history: droughts can potentially lower agricultural production beyond the coping capacity of vulnerable populations. Current agricultural monitoring efforts, such as the European Union (EU) Monitoring of Agricultural Resources with Remote Sensing (MARS Food-Sec), the USA Department of Agriculture (USDA) Foreign Agricultural Service, and the Famine Early Warning System (FEWS NET) include gridded crop water balance models for estimating the impact of drought upon agricultural production, such as the traditional Food and Agricultural Organization (FAO) Water Requirements Satisfaction Index (WRSI). However, recent science advances now provide the capability to modernize this methodology. Advances in Land Surface Modeling and distributed hydrologic modeling, as in more sophisticated representation of soil water process, including linkage of groundwater with surface water, is just one way in which new technologies could potentially upgrade these older techniques. At the same time, new technologies also include high resolution (by this is meant 1 kilometer) satellite-derived soil moisture datasets, and the global drought monitor community of practice provides the capability to compare these soil moisture products (in non-forest, agricultural, pastureland, and grassland settings) with soil moisture estimated from land surface models and in situ networks. Thirdly, additional advances in Information Technology (IT) infrastructure and informatics methodologies, combined with all of these scientific advances, have now created the opportunity to develop more up-to-date, comprehensive, and accessible drought monitoring information to support drought- sensitive decision making . In view of these new opportunities, an initiative was launched through the Group on Earth Observations (GEO) Secretariat and through GEO Architectural Implementation Pilot (AIP) to set up a Global Drought Monitor, which has involved the contribution of multiple parties all across the globe.

The Global Drought Monitor (portal) is made interoperable with the Global Earth Observation System of Systems (GEOSS) by setting up Open Geospatial Consortium (OGC) Web Mapping Services (WMS) and other web services to exchange drought maps (and other information) among the North American Drought Monitor (which provides coverage for North America, including Canada, USA, and Mexico), the European Drought Observatory (which provides coverage for the European Union), and the Princeton University African Drought Monitor (which provides African continental coverage). The Republic of Argentina and the Commonwealth of Australia are also being integrated into the system. The priority areas for the upcoming year are to make interoperable the coverage over two continental areas: Africa and, secondly, Central and South America coverage, within the Global Drought Monitor. One project is to compare drought coverage and methodologies through intercomparison between the Princeton African Drought Monitor and the implementation of the EF Drought and Early Warning System for Africa (DEWFORA (Werner et al 2010). The scarce land-based rain gauge grid and coarse-scale satellite-based precipitation data mergers are ill-suited for drought monitoring, so that other drought indicators based upon water budget components, besides precipitation will be examined in intercomparison. Plans are also underway for eventual inclusion of East Asian coverage, as well as the WMO Drought Management Center for Central Asia, and remaining areas.

The University College London Global Drought Monitor already provides coarse resolution global coverage within the Global Drought Monitor, but the GEO Global Drought Monitor "bottom up" system is intended to increase the spatial resolution of drought episode detection, while offering a "drill down" system from global to continental to regional and national coverage.

The GEO Global Drought Monitor is a loosely-couped system of: 1) drought indicators; 2) drought climatologies; 3)drought observing system; 4) water usage observing system; 5) internet-based and web-based services making interoperability and exchange of maps and data possible; 6) standardization among the system; and 7) user network to verify nowcasts and forecasts.