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International Drought Workshop Series

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MEETING SUMMARIES

INTERNATIONAL DROUGHT WORKSHOP SERIES

BY MICHAEL J. BREWER AND RICHARD R. HEIM JR.

Drought is a part of the natural climatic cycle, albeit one of the costliest natural hazards. Its annual economic impact in the United States has been estimated at \$6–\$8 billion (U.S. dollars), with global estimates in the hundreds of billions of dollars. Drought is an insidious natural hazard and like all climate phenomena, it does not respect international borders.

Recognizing the importance of international drought monitoring efforts, the Group on Earth Observations (GEO) met in 2007 to determine steps necessary to implement a Global Drought Early Warning System (GDEWS) as part of the Global Earth Observation System of Systems (GEOSS). However, with the financial stresses and instability that soon followed, little was accomplished.

In spring 2010, a series of workshops was held to increase international collaboration on drought issues and to begin laying the groundwork for global drought monitoring that would support a future GDEWS. The National Oceanic and Atmospheric Administration (NOAA)'s National Climatic Data Center (NCDC) hosted¹ the events. The remainder of this article summarizes the workshop series. Detailed information about each workshop is available online

NORTH AMERICAN DROUGHT MONITOR FORUM AND GLOBAL DROUGHT ASSESSMENT WORKSHOP

WHAT: Three international drought workshops were held consecutively to facilitate collaboration on international drought monitoring and services with the goal of laying the groundwork for a Global Drought Early Warning System.

WHEN: 20–23 April 2010

WHERE: Asheville, North Carolina

(www.drought.gov/portal/server.pt/community/drought.gov/202/2010_nadm_workshop).

THE NORTH AMERICAN DROUGHT MONITOR (NADM) FORUM. The first workshop was a biannual meeting of the authors of the NADM. The NADM is a cooperative effort between experts in the United States, Canada, and Mexico. Each month, a coordinated drought depiction is developed for the three countries. Authorship of the NADM rotates between experts in NOAA, USDA, NDMC, AAFC, and SMN (refer to footnote 1).

At this workshop, NADM authors and partners discussed administrative issues, time lines, new

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tools, and constraints. A number of issues arose this year. First, reflecting concern over the timeliness of production of the NADM map and narrative, member countries agreed to move the release date of the product from the sixteenth to the tenth of each month, making the product more relevant. This necessitated agreements to expedite the processing of monthly data to support the earlier release date.

A second issue involved a proposal by the Mexican government to increase the frequency of its national drought depiction from monthly to weekly, which would then match the weekly U.S. Drought Monitor. It was further proposed that if this is accomplished, that the NADM consider moving from monthly to weekly issuance. This will require Canadian government support for the development of a weekly version of the new Canadian Drought Monitor (described below), as well as the time and resources in each country to pull together another operational product.

A number of new tools were introduced at the forum. Of note is the new Canadian Drought Monitor. This monthly product uses a nearly identical portrayal of drought as the Canadian portion of the NADM, but it is released specifically for Canada. It is not yet being made available to the public.

The NIDIS U.S. Drought Portal includes new dissemination mechanisms for products that support the generation of the NADM. New Web mapping services have been developed to distribute the information that Canada, Mexico, and the United States integrate to aid in the production of the NADM. These new Web services will be housed in the U.S. Drought Portal in a North American-specific site. The new tools will increase both the accuracy in the creation of the NADM, by allowing the overlaying of information, and the utility of the data, by providing it in more accessible and useful formats.

THE GDAW. The second day of the NADM forum focused on providing an overview of the NADM process for other international participants who do not currently have a continent-wide, internationally agreed-upon depiction of drought. Following this process overview, the NADM workshop segued into the Global Drought Assessment Workshop (GDAW), which was planned to partially reinvigorate previous work² toward GDEWS and determine next steps that are possible without new resources. To open this workshop, international participants were invited to

provide input on drought monitoring and assessment activities in their countries.

One point mentioned repeatedly during the discussion was that drought impact monitoring, a key component of drought monitoring, is receiving little attention. In the United States, NDMC operates the Drought Impact Reporter (DIR), a tool to allow users to input and describe a drought impact they are experiencing. It also supplies summary information gleaned from news sources on U.S. drought. Additionally, several U.S. states are working to enhance their statewide collection of drought impact information. It was recognized that starting an activity similar to DIR on an international scale is a major undertaking that would require substantial new resources.

A major component of the GDAW was a session in which recommendations to the WMO were discussed and agreed upon. At the Inter-Regional Workshop on Indices and Early Warning Systems for Drought in December 2009, the WMO agreed to recommend that the National Hydrological and Hydrometeorological Services around the world adopt the standardized precipitation index (SPI) as a universal measure of meteorological drought. However, details of the SPI, such as computation procedures, base periods, and time scales for the index, were not specified during the December workshop. Spirited discussion at the GDAW resulted in a recommendation to calculate the SPI at the 1-, 2-, 3-, and 6-month time scales for depicting meteorological drought. In addition, recommendations for SPI computations took two paths. Path 1 assumes that the index will be used to compare relative conditions around the world. To do this, computations should be based on a 30-yr base period where available (preferably 1981–2010). Fewer years will be permissible in locations without 30 yr of data. Further, SPI computations should utilize the incomplete gamma probability distribution function (PDF). This will ensure that comparisons around the world can be made.

If, however, it is the intent of the WMO to show absolute intensity of drought at specific locations worldwide, then SPI computations should take path 2. The base period should be station dependent; each station should be computed with its entire period of record as a base. A common PDF should not be mandated. The best-fitting PDF should be determined for each location or station and should be used in the computations. This path will ensure

² Previous work includes the Expert Group Meeting on Early Warning Systems for Drought Preparedness and Drought Management held in Lisbon, Portugal, in September 2000, and the Inter-Regional Workshop on Indices and Early Warning Systems for Drought held in Lincoln, Nebraska, in December 2009.

that accurate location-specific drought intensity is depicted.

The final component of the GDAW was determining whether to establish a Global Drought Monitoring Web portal (GDMwp) as a clearinghouse for global drought information. The consensus of the group was that this would be highly beneficial. Especially enthusiastic were those involved in the Famine Early Warning System (FEWS), who see this as a source of information should their program expand outside of Africa. It was recognized that neither the WMO nor GEO has the resources to provide such a program. Therefore, the managers of the NIDIS U.S. Drought Portal agreed to develop a prototype GDMwp.

The GDMwp will provide a number of different depictions of drought on a global scale, developed using data from WMO World Data Centers. Products will include the SPI at various time scales, and possibly precipitation, Palmer drought indices, and a normalized difference vegetation index, or vegetation health depictions. The GDMwp will also serve as a launching point to continental-scale drought depictions, where not only an international assessment, such as the NADM, could reside but also indicators used to develop the assessment. The initial portal prototype (www.drought.gov/portal/server.pt/community/global_drought) was made available in November 2010.

U.S.–CANADIAN GEO BI-LATERAL TECHNICAL WORKSHOP. Following the GDAW, USGEO and CGEO met to discuss bilateral

activities and agreements related to drought. Five programs (two drought studies and three test beds) were established in 2009 to look at different aspects of drought in the United States and Canada. The first is a crosscutting study to develop an inventory of all drought indicators used by the two countries and their applicability to specific parts and climate zones of those countries.

The second drought study is looking at the surface water supply index (SWSI) and the expansion of its computation outside of the U.S. western mountains. The three test beds include improving moisture extremes monitoring in the prairie regions of the continent, determining water quantity and quality issues in the Great Lakes region and their impact on the area's economy, and better understanding the dynamics of rain and snow hydrology in the Rocky Mountains.

Each of these activities leveraged the workshop to develop work plans for the coming years. The projects are expected to take a few years to complete and will result in closer international coordination on drought issues and a better understanding of drought across the United States and Canada.

CONCLUSIONS. The series of drought workshops held in the United States in April 2010 helped pave the way for increased international collaboration on drought and will lead to improved tools to measure drought and an improved mechanism to distribute drought information. Commitment is needed by countries wishing to participate in a GDEWS to ensure a level of success in the coming years.