JP2.10 OVERVIEW AND UPDATE OF THE NORTH AMERICA DROUGHT MONITOR AND NORTH AMERICA CLIMATE EXTREMES MONITORING SYSTEM

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1. INTRODUCTION

Drought can occur in any part of the world, and its impact can be devastating. Consequently, drought monitoring has become an integral part of drought planning, preparedness, and mitigation efforts in the United States at the national, regional, and local levels (Lawrimore et al., 2002). The U.S. Drought Monitor (USDM) was created in 1999 to track and display the magnitude and spatial extent of drought and its impacts across the nation, and it has been extremely successful in communicating the state of U.S. drought on a weekly basis (Svoboda et al., 2002; Lawrimore et al., 2002). This success, and the recognition that an ongoing comprehensive and integrated drought assessment was needed across North America, led to a commitment between Canada, Mexico, and the United States to build a continent-scale program on the model of the USDM. This new first-of-its-kind drought monitoring program is part of a broader effort to improve the monitoring and assessment of climate extremes across the continent through a cooperative effort that was established in 2001 between the three countries (Lawrimore et al., 2002).

This paper will provide an update on the status of the monthly North America Drought Monitor (NADM) and review the procedure involved in its preparation. The progress toward implementing a broader North America Climate Extremes Monitoring (NACEM) program will also be reviewed.

2. NADM INDICATOR DATA

The United States, Mexico, and Canada each have active climate and drought monitoring programs with a variety of indices and indicators utilized, some of which are unique to each country. The NADM examines moisture conditions across the continent based on a suite of tools that are common to all three countries. This "toolbox" includes such indicators as the satellite-based Vegetation Health Index (VHI) as well as several in situ-based indicators.

Monthly mean temperature and total precipitation data for several hundred stations across the continent form the basis for the in situ indicators. For the United States, a mix of station and climate division data have been used, but the divisional data are being replaced by station data with the development of the Integrated Near Real-Time (INRT) daily station data base.

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Several indicators are computed from the temperature and precipitation data, including the Standardized Precipitation Index (SPI) and percent of long-term average precipitation (PCTPCP) (Figs. 1 and 2). Palmer drought indices are also computed from these data for the three countries, but they are being evaluated for their suitability in some areas to determine if useful information can be extracted for arid, humid, and cold climate regions. The years 1951-2001 are used as a common standardizing or normalizing period for all stations in all three countries for these indices to facilitate spatial consistency.

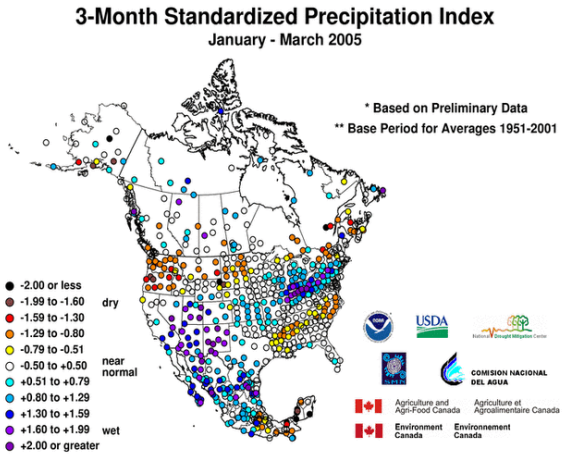

Fig. 1. Dot plot of 3-month SPI for United States, Canada, and Mexico, January-March 2005**.**

3. PROCEDURE FOR PREPARING THE NADM

NADM authorship rotates amongst the participating agencies and organizations. Within the United States the participants include the National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center and Climate Prediction Center, the U.S. Department of Agriculture, and the National Drought Mitigation Center at the University of Nebraska-Lincoln. In Canada and Mexico, the participants include Agriculture and Agrifood Canada (AAFC), the Meteorological Service of Canada (MSC), and the National Meteorological Service of Mexico [Servicio Meteorologico Nacional (SMN)].

Each month the NADM author examines the national indicators of each country and the continental-scale indicators (SPI, PCTPCP, VHI, and others as available) and prepares a first draft of the NADM map using ArcGIS software. The ArcGIS shapefiles from the USDM for the week closest to the end of the month are

used for the drought depiction in the United States, and the continental-scale indicators provide guidance for drawing the depiction across international boundaries. The draft NADM map is reviewed by the participants and other consultants, which include NOAA's Regional Climate Centers, other federal agencies, state and provincial climate offices, and universities. The author also coordinates the preparation of a narrative which is reviewed by the participants. The SPI and PCTPCP indicator maps, and the final versions in English of the NADM map (Fig. 3) and narrative, are put online at the following web page:

http://www.ncdc.noaa.gov/oa/climate/monitoring/drought/nadm/index.html

The international participants provide translations of the narrative. French and Spanish versions of the NADM map and narrative are also placed online.

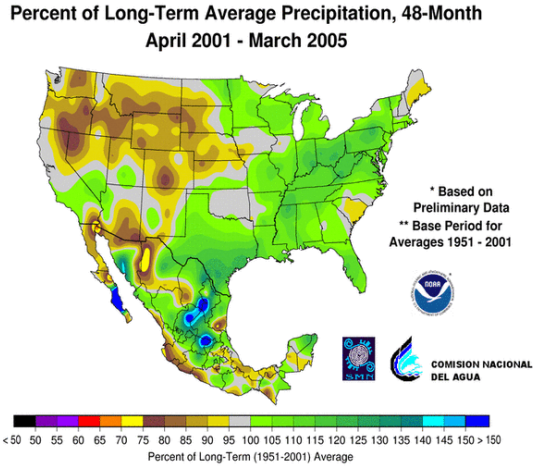

Fig. 2. Contour plot of 48-month percent of long-term average precipitation for the United States and Mexico, April 2001-March 2005.

4. MONITORING OTHER CLIMATE EXTREMES

In addition to drought, the NADM indicator tools provide for the monitoring of monthly precipitation and temperature extremes. With the development of the INRT data base containing operational station data from all three countries, indicators based on daily data can be computed. These include degree day statistics; daily and multiple-day temperature and precipitation extremes; number of days with temperature, precipitation, snowfall, and snow depth beyond various thresholds; runs of (consecutive days with) temperature, precipitation, and snowfall beyond various thresholds; and a North America Climate Extremes Index patterned after the U.S. Climate Extremes Index (Karl et al., 1996). As the INRT data base is populated and these new indicators become available, maps and time series graphics can be easily prepared and put online, enabling the participants to prepare operational assessments of climate extremes on a continental scale to be used as decision-making tools by managers in all three countries.

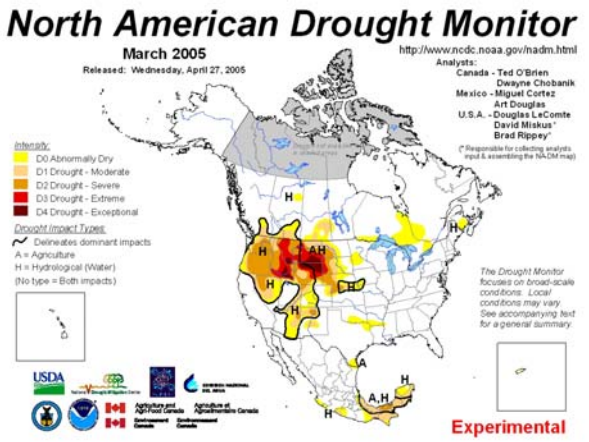

Fig. 3. March 2005 North America Drought Monitor map.

5. REFERENCES

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