8.9 DROUGHT AND IMPACT DISCONNECT: THE MIDWEST DROUGHT OF 1999-2000

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1. INTRODUCTION

Drought conditions developed in the Midwest during the 1999 growing season. At its worst, severe drought encompassed the entire Corn Belt from Indiana to Nebraska, as determined by the U.S. Drought Monitor. However, by the time it was over, there were minimal direct impacts in the Midwestern states and the Corn Belt, given the magnitude and duration of the drought. This paper will examine the climatological evolution of the drought, the primary impacts that resulted, and the key role that timing played in both minimizing the impacts and causing difficulties in the assessment of drought status.

2. CLIMATOLOGICAL OVERVIEW

Between 1 July 1999 and 30 April 2000, a substantial precipitation deficit occurred in the Midwest (Figure 1). Most of the central Midwest, including the Corn Belt, was 150 to 250 mm below normal for the period, while southern Missouri was more than 300 mm below normal. Even before the widespread drought in the Midwest began, much of Ohio and eastern Kentucky were quite dry due to their proximity to the East Coast, which had a severe drought during 1998 in response to La Niña conditions. The rainfall tapered off in most of the Midwest in early July, and soil moisture available to plants started to decline (Figure 2). Since most of the Midwest and almost the entire Corn Belt started the growing season with excellent soil moisture reserves, most areas made it through the critical silking and doughing stages without corn yields being curtailed. Crop district 4 in central Illinois received just enough growing season rain to always have plant available water above zero. However, some less fortunate areas, such as the northeastern Missouri district 3 and southern Illinois district 9 (Figure 2), did not receive sufficient mid- to late-season precipitation to maintain needed levels of plant available water, and their corn yields were reduced.

The evolution of the season to drier conditions in the fall was actually beneficial for a rapid harvest of the productive areas of the Midwest. The dryness in the Midwest continued through the fall, deepening the soil moisture deficit and increasing concern about the lack of fallow season soil moisture recharge. This is illustrated by the state of Missouri pentad (5-day) precipitation anomalies continuing in negative territory through the end of November (Figure 3a). By the end of November, a state-wide 230 mm precipitation deficit had accumulated (Figure 3b). The five-month period from July to November was the second driest on record in Missouri and Indiana, the third driest in Illinois, and the fourth driest in Kentucky.

Following a winter marked by normal precipitation in most of the Midwest, dry meteorological conditions returned to the region in the spring. Missouri and Iowa were especially dry, receiving less than 60% of normal precipitation during March and April. While the Ohio Valley did receive some much needed precipitation during the spring, the core of the Corn Belt from Nebraska through Indiana was rated as being in severe drought by the U.S. Drought Monitor, and all available climate forecasts from the Climate Prediction Center indicated that the drought was likely to continue. Farmers in the Corn Belt planted crops early to allow for germination while there was still moisture in the soil.

After 9 months of drought, normal precipitation totals resumed during May. This was a surprising turn of events given the expectation that drought would likely persist, as noted in the U.S. Drought Outlook. The short term aspect of the drought was ended by a much wetter than normal June, when Iowa, Missouri, Illinois, and Indiana all received more than 150% of normal precipitation state-wide. While the long-term hydrological drought lingered in some areas, the topsoil moisture levels in the central and eastern Corn Belt returned to near normal, ending the agricultural drought.

3. IMPACTS

This was one of the most spatially extensive, longest, most intense droughts that can be imagined in the Midwest without resulting in severe and widespread impacts. In 1999, some areas of Missouri, southern Illinois, and Kentucky experienced considerably reduced yields for corn, and some municipalities in Illinois and Missouri were forced to impose water use restrictions. However, national grain production was not significantly impacted, prices remained low, and there was little impact beyond the directly affected farmers.

In 2000, some areas of the western Corn Belt in western Iowa and Nebraska were affected by lingering dryness, but, again, not enough to affect national production levels for grains. The greatest impacts, documented by Sonka and Changnon (2001), were related to distortions of the grain markets by the expectation of drought. Farmers and commodity traders did not sell grain in the spring of 2000, anticipating higher prices due to projected drought conditions. These higher prices never materialized. While the drought was lengthy and deep, its seasonal timing resulted in minimal direct impacts and, perhaps, overestimation of its potential.

4. ACKNOWLEDGMENTS

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5. REFERENCE

Sonka, S.T., and S. A. Changnon, 2001: Midwestern Impacts of the 2000 Drought Forecast. Final Report, UCAR Award Number S01-31363. Ag Education & Consulting, Savoy, IL. 97 pp.

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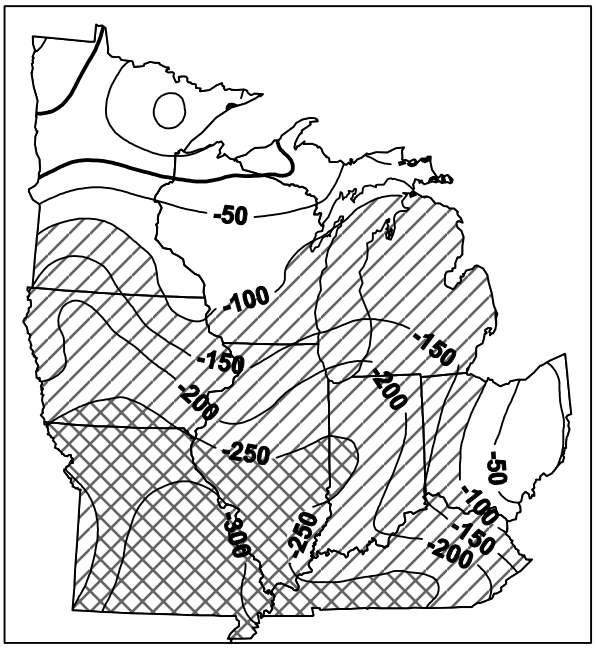


Figure 1. Total precipitation deficit (mm) in the Midwest for the period 1 July 1999 to 30 April 2000.

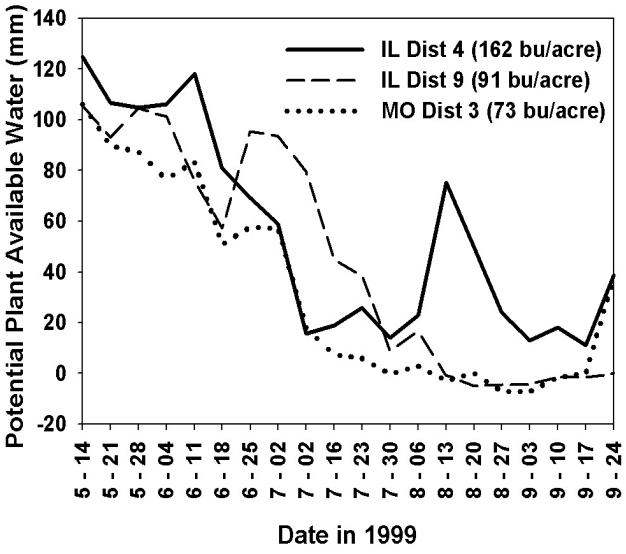
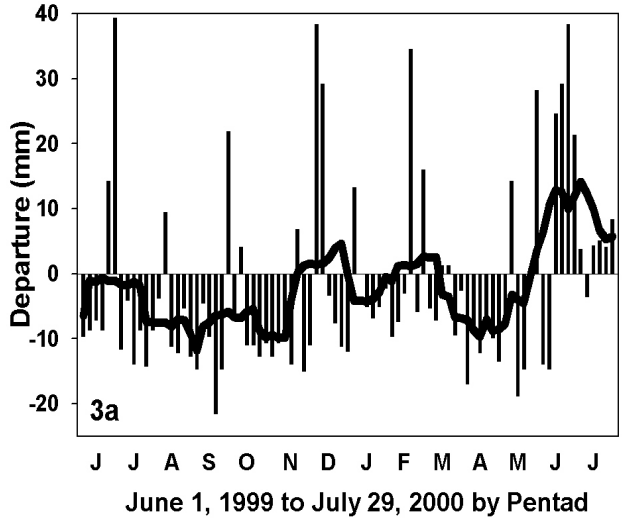


Figure 2. Modeled potential plant available water (mm) in the top 63.5 cm of soil in three Midwest crop reporting districts during the 1999 growing season. The district names and the corn yield in each district are noted in the figure legend. The model is a custom version of CERES MAIZE operated at the Midwestern Regional Climate Center.



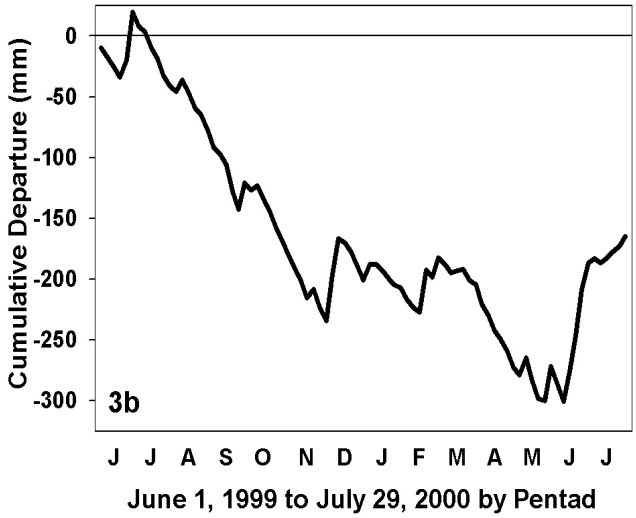


Figure 3. State of Missouri precipitation record for the period 1 June 1999 to 29 July 2000: a) precipitation departure from normal (mm) by pentad (5-day period); b) cumulative precipitation departure from normal (mm) by pentad from 1 June 1999 onward.