

Paul Roundy
Atmospheric and Environmental Sciences

Sponsor: National Oceanic and Atmospheric Administration

Dates: September 1, 2014 to August 31, 2017

Anticipated Amount: \$225,000

**Precursor Conditions to Onset and Breakdown of Agricultural
Drought over the United States Corn Belt Region**

The proposed work targets the NOAA competition “Modeling, Analysis, Predictions, and Projections (MAPP), Competition 5: Research to Advance Understanding, Monitoring, and Prediction of Drought. The proposed work would fulfill both points 2) advancing the development of a national drought monitoring and Prediction system and objective 1) understanding the predictability of past droughts. The proposed work will generate a ~60 year record to identify both the onset and termination dates or pentads of intraseasonal and longer period agricultural drought events in the United States Midwest Corn Belt Region (CBR) based on an index of anomalous crop maturation reconstructed from temperature and rainfall data as well as on the NOAA crop moisture index (CMI). Time lag composites and time extended empirical orthogonal function analysis applied to these events will show the average pathway as well as other leading pathways to transition toward or away from drought conditions. These pathways will be analyzed to reveal evolving precursor patterns of drought onset or termination. Then, the predictability of these different types of drought transition events will be assessed in the climate forecast system (CFS) V2 and in the global ensemble forecasting system (GEFS) reforecast datasets, with skill benchmarked against each other, against a statistical approach based on identification of precursor patterns, and against climatology. The statistical algorithms will ultimately predict anticipated fractions of full corn crop given model forecasts and the observation or prediction of precursor patterns of drought onset or termination.

The proposed work would broaden NOAA’s drought monitoring and prediction systems by developing critical crop-specific algorithms for evaluation and prediction of intraseasonal drought development and termination events that conveniently associate directly with agricultural and economic outcomes of such events. The proposed research would advance understanding, monitoring, and prediction of drought and would provide information about the precursor patterns to drought transition along with an online real time prediction system for the probabilities of such transitions.

Results will fulfill NOAA's Next Generation Strategic Plan by 1) improving our scientific understanding of drought and its impacts, 2) developing algorithms to track and predict drought onset or termination events in ways that might help agricultural decision makers and commodity markets, 3) making drought prediction services more directly applicable to public needs, including in agriculture, and 4) increasing public awareness of the weather and climate patterns that tend to lead to development or decline of drought events and the state of the art in predicting development or termination of drought