Downscaling Seasonal Climate Forecasts for Agricultural or Hydrologic Applications

Assessment of Utility of CPC Seasonal Forecasts
(at forecast scales: large areas and 3-month periods)

Areas with stronger color have higher utility.

A. What is this research project?

Variations in weather from month to month or year to year are critically important in agriculture and water resource management. As an example, droughts lasting more than a few months are a particularly expensive hazard, sometimes with prolonged and pervasive fiscal, environmental, and ecological impacts. If our decision support tools could be made climate-sensitive, incorporating skillful seasonal forecasts of precipitation or air temperature out to a year ahead, losses could be minimized and opportunities maximized. This project is part of an over-arching effort to transform freely available official NOAA seasonal climate forecasts into decision support information.

B. What problem does it address?

NOAA has been offering seasonal climate forecasts for more than a decade, but the forecasts are offered for very large areas and three month periods. Crop and hydrologic models operate at daily scales for specific locations or watersheds. This mismatch between space and time scales makes it impossible to use the forecasts directly in decision support. A bridging method has been developed to address this problem. The first step is to downscale the seasonal climate forecasts to the location of area of interest; the second is to downscale them in time, from three months to single months so they can be used to drive a weather generator (see companion poster by Jurgen Garbrecht).

## C. How is the project different from or how does it enhance other projects?

This project is unique in both subject and approach, and enhances other decision support projects by offering the possibility of incorporating seasonal climate forecast information. As part of this effort, the NOAA seasonal climate forecasts were evaluated for skill on a regional, seasonal, and situational basis, producing information that is still not offered with the forecasts.

D. What are the potential benefits of partnering with ARS on this research?

Our team has conducted analyses of forecast skill, has developed the necessary methods, has access to the climatological data required, and experience with the downscaling techniques.

E. Who are the potential customers?

Everyone who desires to develop climate-sensitive decision support in a region where the NOAA seasonal climate forecasts have demonstrated predictive skill.
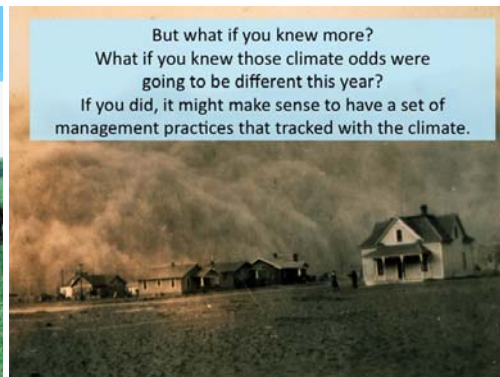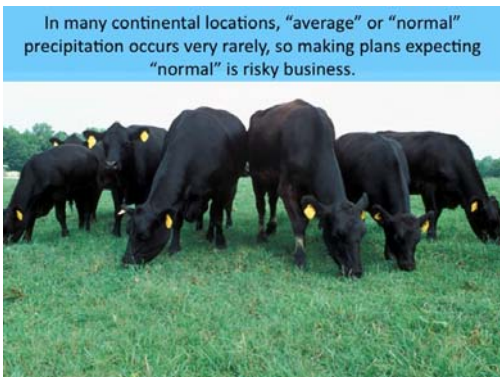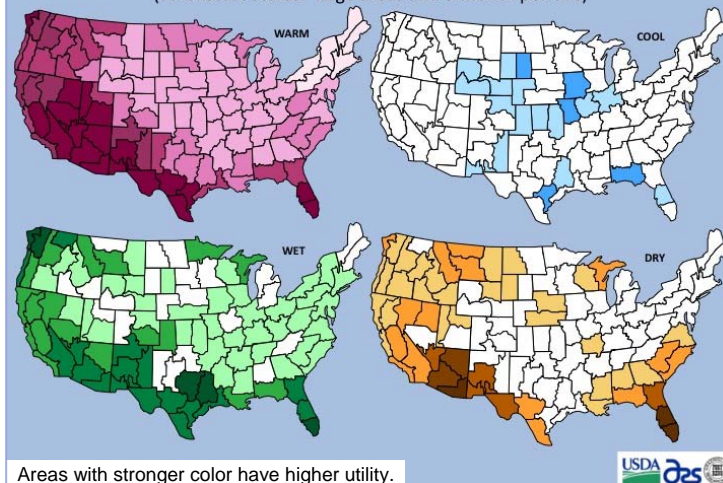
Stage of Development

This approach to downscaling seasonal climate forecasts has been developed and reported at meetings and in journal articles. To date, the method has been applied in two very different applications to evaluate possible utility for hydrologic and agricultural decision support in Oklahoma: forecasting monthly runoff for a small watershed, and forecasting grain and beef production in a wheat grazing model.

Moving Forward

This method for downscaling seasonal climate forecasts needs to be applied and evaluated for specific agricultural or hydrologic applications and locations. The skill of the seasonal climate forecasts varies with region, season, and the state of the oceans (for example, whether an El Niño event is occurring). This is especially true for precipitation forecasts, so each possible application of climate-informed decision support needs to be examined separately. Anyone interested in exploring the possible use of seasonal climate forecasts as part of a decision support tool is encouraged to review the associated papers and to contact the authors.

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In many continental locations, "average" or "normal" precipitation occurs very rarely, so making plans expecting "normal" is risky business.

But what if you knew more? What if you knew those climate odds were going to be different this year? If you did, it might make sense to have a set of management practices that tracked with the climate.

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