Improving Seasonal Climate Forecasts For Winter Wheat Farmers in the South-Central US

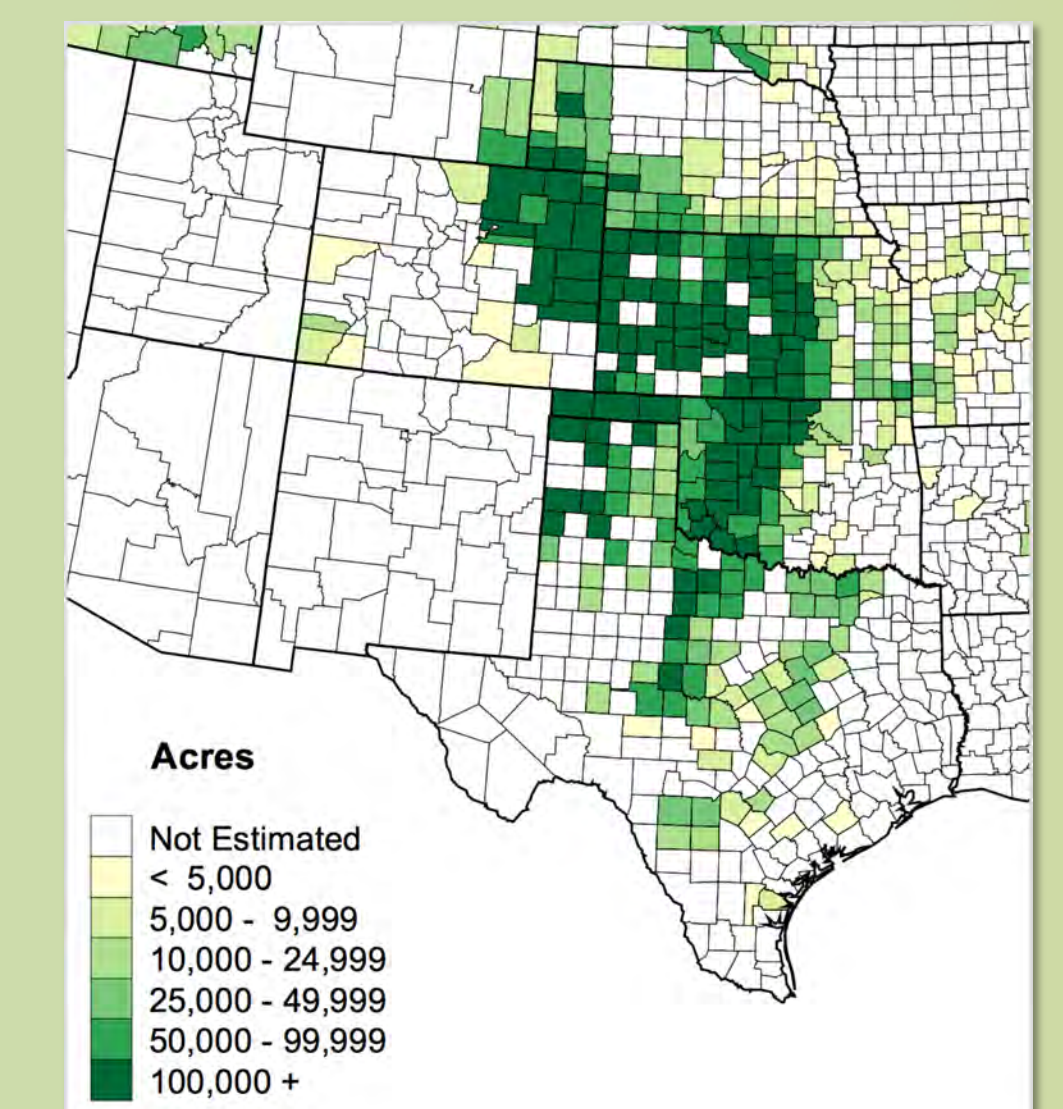## PROPOSED DISSERTATION RESEARCH

Toni Klemm, Renee A. McPherson (Ph.D.) | University of Oklahoma, South Central Climate Science Center

What is my research about?

Floods, droughts, and other climate calamities can cause severe crop losses that have serious socio-economic impacts and threaten global food security. Tailored seasonal climate forecasts can help farmers change management practices, such as planting density, crop type and variety, or harvesting time. They can reduce crop losses by adapting to unfavorable conditions or increase yields by taking advantage of favorable conditions. Farmers have long been requesting more useful forecasts, and in light of ever-improving climate models and forecasts, tailored decision aids seem closer than ever before.

My research focuses on the forecast needs of winter wheat farmers in the south-central US and assesses existing seasonal climate information for its ability to provide tailored decision aids. Over the next 6 months, I will design, conduct, and analyzing online surveys with extension agents in Texas, Oklahoma, Kansas, and Colorado. Following up the surveys, I will carry out a statistical comparison of historical weather data using hindcasts (that is, forecasts for past time periods), which will help quantify the error and accuracy of the forecast.

What are the benefits of my research?

1. For Agriculture and Related Sectors

Tailored seasonal climate forecasts can help winter wheat producers with choosing crop variety, planning planting and harvest dates, becoming aware of unseasonal frost or drought, and improving overall strategic decision-making and mitigation of unseasonal climate. This can increase efficiency of agricultural production and lower financial burdens for crop producers, crop insurers, and consumers. Ultimately, more reliable agricultural production can improve nation- and worldwide food security.

2. For Forecasters and The Research Community

Forecasters will gain insights into how winter wheat producers operate and how forecasts can be adjusted to better serve their needs. It also helps climate researchers understand crop-specific decision-making. Climate modelers can learn about regional climate model uncertainty which can feed back into future model improvements.

Planted winter wheat in the South Central US in 2014. Source: USDA NASS

What are my research methods?

1. Online Survey

Online surveys with corporate extension agents will help identify:
(1) The most important decisions winter wheat farmers need to make
(2) The climate-related threats that go along with these decisions
(3) Weather and climate information that can help assess and mitigate these threats

2. Statistical Evaluation

Forecasts need to be evaluated before they can be used for a given region. To do this, hindcasts are compared against existing observations. Metrics like Anomaly Correlation (AC) or Root Mean Square Error (RMSE) can help determine the difference between observations and forecasts and how both measures are related.

What are seasonal climate forecasts?

Seasonal climate forecasts cover the next 1 to 12 months, i.e., seasonal conditions. They help bridge the gap between weather forecasts and multi-year climate forecasts and are created using short-term and long-term factors, like ocean currents and the state of El Niño. Seasonal forecasts are used for strategic decision-making in the energy sector, in tourism management, water management, and the agricultural industry, among others.

ABOUT TONI KLEMM

Toni Klemm is a Ph.D. candidate at the University of Oklahoma and the South Central Climate Science Center in Norman, Oklahoma. He holds a Masters in Geography with minors in Meteorology and Cartography from Dresden University of Technology in Germany. He is currently in the 4th year of his Ph.D. and expects to graduate in summer of 2017.

405-371-5273 | toni@ou.edu
Twitter: @ToniKlemm
Blog: www.eccforum.org

Contact & Thesis Information:

Photo: Mareen Wegener, DWD Germany