

OKLAHOMA

# EPSCoR UPDATE

Promoting Innovative Research

OK NSF Established Program to Stimulate Competitive Research | August 2017

## Statewide Soil Moisture Mapping System for Oklahoma

Many agricultural, ecological, meteorological, and hydrological processes are influenced by soil moisture. One of goals of the current Oklahoma NSF EPSCoR project is to develop a method for soil moisture monitoring across Oklahoma. Soil moisture data is a key factor for appropriate land management and effective use of available water.



Led by EPSCoR researcher, Dr. Tyson Ochsner of Oklahoma State University (OSU) this project aimed to develop a system for spatially continuous soil moisture

estimates throughout the state to inform agricultural and natural resource management decisions.

Previously, measurements from the Oklahoma Mesonet provided soil moisture information, but only for approximately 100 monitoring stations across the state. Soil moisture conditions between the monitoring stations were unknown because differences in rainfall amounts, soil properties, and other factors cause soil moisture to vary dramatically from place to place. However, with the current EPSCoR project, Ochsner's

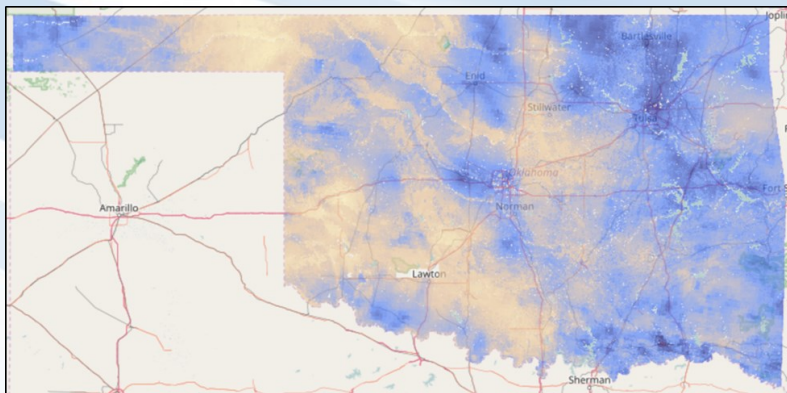
research team was able to enhance soil moisture estimates to provide statewide coverage by incorporating information from digital soil maps and radar-based precipitation data from the National Weather Service.

Ochsner's team used a special mobile instrument called a cosmic-ray neutron rover to provide ground-truthing data for large-scale soil moisture mapping. "The rover detects soil moisture within about 650 feet of the instrument and up to two feet deep in the soil, and it can continuously measure from a moving vehicle," Ochsner said.

In collaboration with the OSU High Performance Computing Center led by Dr. Dana Brunson, Ochsner's team created a unique high resolution mapping system for Oklahoma. "This system takes daily soil moisture observations from the Oklahoma Mesonet and radar precipitation estimates from the National Weather Service and combines those data with detailed soil maps to reveal previously undetectable meso-scale

patterns in soil moisture," Ochsner said. Users are able to view soil moisture data through an interactive website via <http://soilmoisture.okstate.edu/>.

Soil moisture data obtained by this project will be utilized by another EPSCoR researcher, Dr. Phil Alderman (OSU), to develop a forage forecasting framework for grazing management decisions. This will provide a forecast



**Patterns of soil moisture across Oklahoma with one-half mile resolution on August 10, 2017, for the 2-inch soil**

of the amount of forage production to expect for the upcoming season given current soil moisture and rainfall projections.

*Funding of this project was provided by the National Science Foundation Grant OIA-1301789 through Oklahoma NSF EPSCoR.*

