# Effects of Evapotranspiration on the Longitudinal Dryline Position in the Southern Great Plains

#### Introduction

The dryline, a transition zone that separates dry air from moist air, is an important meteorological phenomenon in the Great Plains of the United States (Fujita 1958). Modeling has determined that landatmosphere interactions affect boundary layer processes including the dryline (Shaw 1995; Ziegler 1995; Grasso 1999). This work focuses on how observed evapotranspiration (soil moisture and transpiration) affects the climatological positioning of the dryline.

## **Data and Methods**



- Area of research (AOR) includes Oklahoma, the Texas Panhandle, and Eastern New Mexico,
- Dryline is defined by specific humidity gradient > 3  $g k g^{-1} (100 km)^{-1}$
- Drylines are defined at 0000 UTC on spring days (April-June) from 2006-2015
- Drylines are found each day using the Oklahoma Mesonet, ASOS, and SAO stations
- Volumetric soil moisture data from Oklahoma Mesonet and West Texas Mesonet
- Pearson's product-moment correlation (R) coefficient is used to determine whether a relationship exists between the longitude of the dryline and soil moisture.

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- There is strong negative correlation between





• There is moderate negative correlation between the dryline longitude and total volumetric water content of soil

### Conclusions

- There is a relationship between volumetric soil moisture content and the dryline positioning in the Southern Great Plains, which suggests evapotranspiration affects dryline positioning
- As the volumetric soil water content increases, the longitude of the dryline decreases (moves westward). Thus, drylines tend to be further west in high evapotranspiration years.
- There is also a relationship between the weighted mean center of soil moisture within the AOR and the total volumetric soil moisture content. As mean soil moisture content increases, the weighted mean center of soil moisture (longitude) moves westward.
- There is a positive relationship between the longitude of the dryline and the specific humidity gradient of the dryline, which suggests that the strength of the dryline is stronger toward the east.
- There was also a decrease in specific humidity gradient over spring season, which is likely due to increased agriculture land use in Western Oklahoma and the Texas Panhandle, lessening the moisture gradient.