**Introduction**

A gridded product of daily soil moisture at 250-meter spatial resolution was created by integrating in situ soil moisture from the Kansas Mesonet and a simple soil water storage model as part of my research. The model represented temporal soil moisture dynamics using the following equation:

Where  represent the soil water storage in the rootzone at day t, is a recursive parameter representing the fraction of remaining water storage after the daily storage loss due to the different processes of the water dynamics in soil. *SLL* is the lowest limit the soil can reach after it is completely dry, and *SUL* is the maximum amount of water the soil can store, , represent the previous state of soil water storage, finally represent the precipitation events. In the current model is implemented as a function of vapor pressure deficit (VPD).

**Significance of the study**As shown in Figure 1, there is a correlation between VPD and , however the proposed equation is no accounting for all the possible values that are not being represented by the linear regression. Using a Bayesian approach for this problem can lead to more accurate and reliable predictions or inferences, by incorporating prior knowledge, and will allow to quantify the uncertainty.

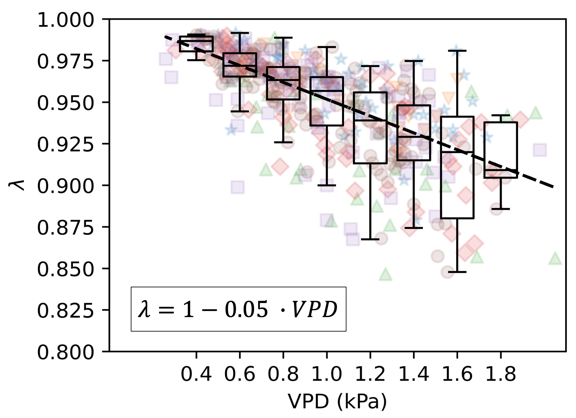


Figure 1. λ as a function of VPD.

**Methodology**

This research will involve defining the prior distributions for the model parameters and constructing the Bayesian hierarchical model. The posterior distribution of the model parameters is going to be fitted using Markov Chain Monte Carlo (MCMC) to data from the Kansas Mesonet available until 2022, newer data will be used for model inferences and validation tests.

**Data Dissemination**

The findings of this research will be published as part of my research in a poster at the 2023 ASA-CSA-SSSA annual meeting and a scientific article in the Vadoze Zone Journal. Moreover, the outcomes of this research will be used to develop a Mesoscale Soil Moisture Monitoring tool as one of the Rainfed Agriculture Innovation Network project objectives.