

Request #: 591 - Other - Thesis

Intercomparison of Methodologies for the Estimation of Evapotranspiration Rates in Utah Agricultural Fields

Laura Christiansen [A02225130] - Masters Student (w/Dr. Alfonso Torres)

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Background

This project has been designed to analyze existing methods for estimating crop water use in order to direct water management practices around Utah. Data collected from soil moisture sensors have been used to estimate the water use (evapotranspiration (ET) rates) of the crops over the selected time frame (summer of 2021). The goal of the project is to determine which methods out of the 8 methods used are most reliable for this estimation.

Sample

Soil moisture data was collected using soil moisture sensors. Sensors were installed in 3 locations in 3 center pivots, for a total of 9 sensor locations. Data from two of the center pivots cover June - August 2021, and the third center pivot covers April - October 2021.

Hypothesis

The goal of the project is to determine which are the most reliable methods for estimating crop water use in an agricultural setting. This will be done by estimating water use through the use of 8 methods (6 calculations, 1 online platform, 1 eddy covariance tower). The results of each method will be compared against the other methods to determine if there are any significant differences between the methods.

Progress

Daily ET rates have been estimated from soil moisture data using 6 calculation methods. The daily results from each method have been cleaned and gap filled based on assumptions about the patterns of crop water use. The online platform and the eddy covariance tower provide data per month, rather than daily, so the gap-filled daily data has been summed to get weekly and monthly ET values. The data from each location within a center pivot has been averaged to get an estimate of the overall ET rate for each center pivot.

Request

I would like assistance in determining which tests to run on my data to best compare the methods to each other. The big question I have is how the gap-filling that I have done will impact the results of the statistical analysis. The gap-filling has forced a correlation in some of the methods, and I am not sure how to account for this in the statistical analysis.

Timeline

A final report that will include all of my results will be written in the spring, to be submitted by June 1, 2022. Two draft reports will be submitted in early March and mid-April. It would be beneficial to have as much as possible completed by the first draft report submission in March, but adjustments or further analysis can be added in the subsequent reports.