The Evaluation of Nasa ECOSTRESS Water Use Efficiency Estimates on Southern Oregon Vineyards

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Introduction

Southern Oregon is experiencing increasing droughts and agriculture needs more tools to prepare for the changing climate. ECOSTRESS is a device that remotely estimates water use efficiency of the earth's plant canopies. We are evaluating the accuracy of ECOSTRESS in Vineyards using data from samples collected on the ground at specific sites.

Materials and methods – Satellite Data

- Collected data from MODIS to develop script to process ECOSTRESS data (ECOSTRESS data processing error [1])
- Used python in Jupyter Notebook to read and visualize datasets from NASA
- Used irrigation data from 2019 water meters in Vineyards around Southern Oregon

Materials and methods – Ground Data

- Using Google earth, we selected vineyards and drew hectares where I would collect grapes and leaves from the vines
- We sampled along 2 rows in each hectare and from 10 vines in each row
- The grapes were juiced and frozen while the leaves were powdered and frozen
- The juice and powder will be tested in the OSU stable Isotope lab for carbon C-13

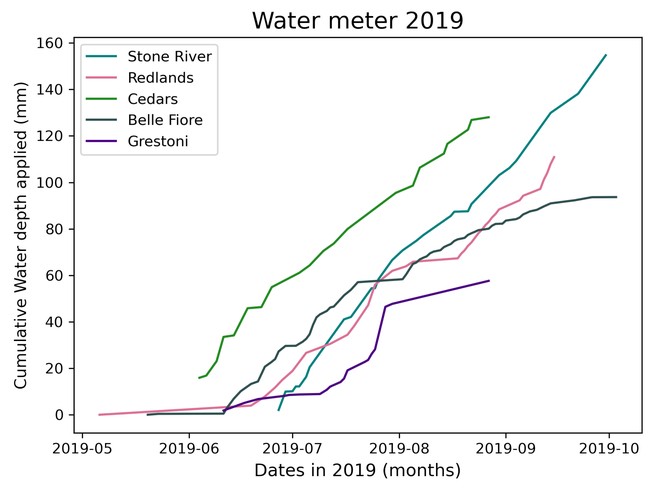


Figure 1. Graph of five vineyards with cumulative on ground data of the depth of applied water in millimeters from April to October

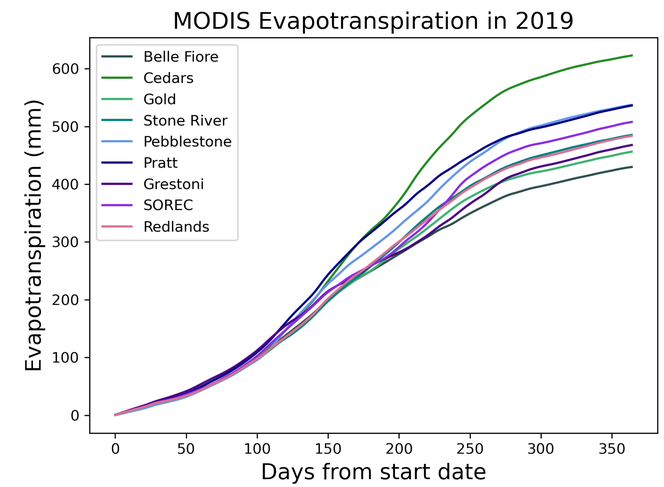


Figure 2. Graph of nine vineyards with cumulative remote MODIS data of Evapotranspiration in millimeters from December 2018 to December 2019

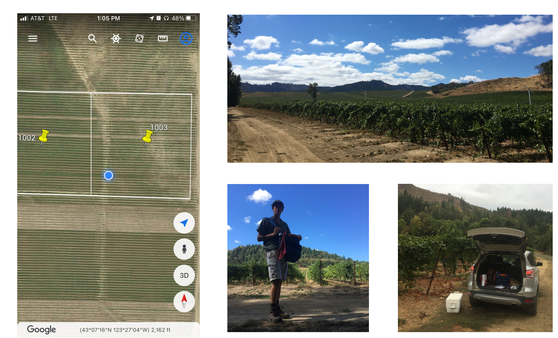
Results

Developed methodology for comparing satellite ET data to on ground data

- Statistical Analysis has not been done yet. The graphs are not easily comparable. However subtle differences give insight

Collected on ground data

- 51 samples of juice
- 51 samples of grape leaf powder
- No ground data from grape or leaf samples have been produced yet…



In Clockwise rotation:
Photo 1. Brockway Vineyards in September
Photo 2. Photo of SOREC vehicle with sampling equipment at Strickland Canyon Vineyard
Photo 3. Collen at Brockway Vineyards near Roseburg with sampling bag
Photo 4. Screenshot of quadrat in Brockway Vineyards on Google earth

Conclusions

NASA satellite data can be downloaded, read, and visualized using simple python code.

Ground data can be collected in precise location using Google Earth.

Future Work

We need to test the grapes and leaves for the carbon-13 isotope proven to be directly correlated to water use efficiency[1]

We need to develop the code visualizing the satellite data to add statistical analysis to the script

We need to obtain ECOSTRESS water stress estimates from NASA

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Citations

[2] Brillante, L., Marta-nez-La1, Yu, R., & Kurtural, S. K. (2020). Carbon Isotope Discrimination of Grape Musts Is a Reliable Tool for Zoning and the Physiological Ground-Truthing of Sensor Maps in Precision Viticulture. Frontiers in Environmental Science, 8. https://doi.org/10.3389/fenvs.2020.561477

[1] Hook, S.J. & Hulley, G.C. (2016). Level-2 Cloud Detection ATBD. Jet Propulsion Laboratory. D- 94644.