**UC Davis Plant Sciences - Drone Data in Agricultural Research**

**Facilitators Training Outline 3/22/2019**

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***PES 1137 (GIS lab)***

8:30 **Introduction**

8:45 **Setup and start processing**

* Multispectral indices with Pix4D (start SOP)

*Processing Multispectral Images in Pix4D for Agricultural Research SOP w/ Colusa 1/28/19 images for example*

9:15 **Mission Planning (getting good data to work with)**

* [*https://www.airmap.com/*](https://www.airmap.com/)
* [*https://www.esrl.noaa.gov/gmd/grad/solcalc/*](https://www.esrl.noaa.gov/gmd/grad/solcalc/)
* [*https://www.sserc.org.uk/wp-content/uploads/2012/04/Resource-2\_2-Measuring-Cloud-Cover.pdf*](https://www.sserc.org.uk/wp-content/uploads/2012/04/Resource-2_2-Measuring-Cloud-Cover.pdf)

10:00 **Image Processing**

* Taking images off the drone / organizing flight data
  + *Bring and show SD cards*
* Online tools for processing
  + Not recommended for large projects (most of these projects are)
  + Can do RGB images relatively easily
* Multispectral indices with Pix4D
  + Quality report
  + Creating different indices (post processing and saving)

11:00 **Data Visualization – QGIS**

*Multispectral Data Visualization in QGIS SOP w/ Colusa\_1l28l19\_index\_gndvi as example data*

* Example of N rich strips test strips (can use this to transition into data extraction)

12:00 **Lunch Break**

1:00 **Data Extraction – QGIS**

**This is often the bottleneck ….**

*Multispectral Data Extraction in QGIS SOP w/ Davis\_4l10l18 images as example*

* Manual Data Extraction
  + Create a shapefile manually
  + Zonal Statistics
  + Export to CSV
* High Throughput Data Extraction single time point
  + Automatically create shapefile for large trials
  + Edit shapefile
  + Merge shapefiles
  + Zonal Statistics
  + Export to CSV
* High Throughput Extraction Multiple time points
  + Georeferencing

4:00 **Data Analysis**

* **Data visualization in QGIS**
* Moving quantitative data into analyzable format
  + Opening in Excel from DBF
  + Opening in R (from DBF or CSV)
    - Merging with other data
* Basics of analyzing drone data
  + Relative measurements
  + Plotting data
  + Different indices and their uses (Taylor Becker)