

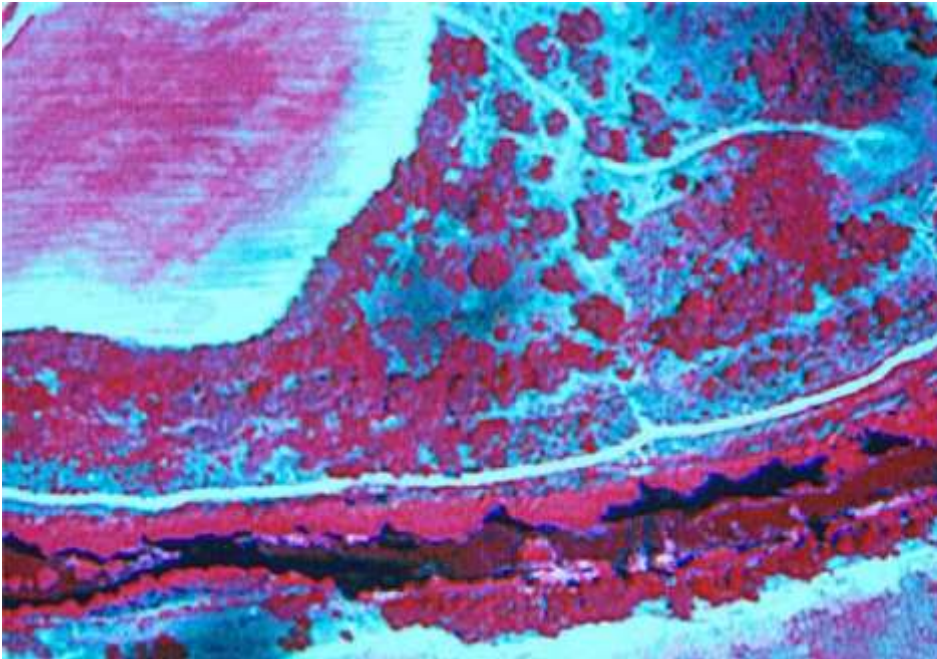
Mapping and estimating invasive plant chemical traits in the Sacramento-San Joaquin River Delta using hyperspectral UAS imagery

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Outline

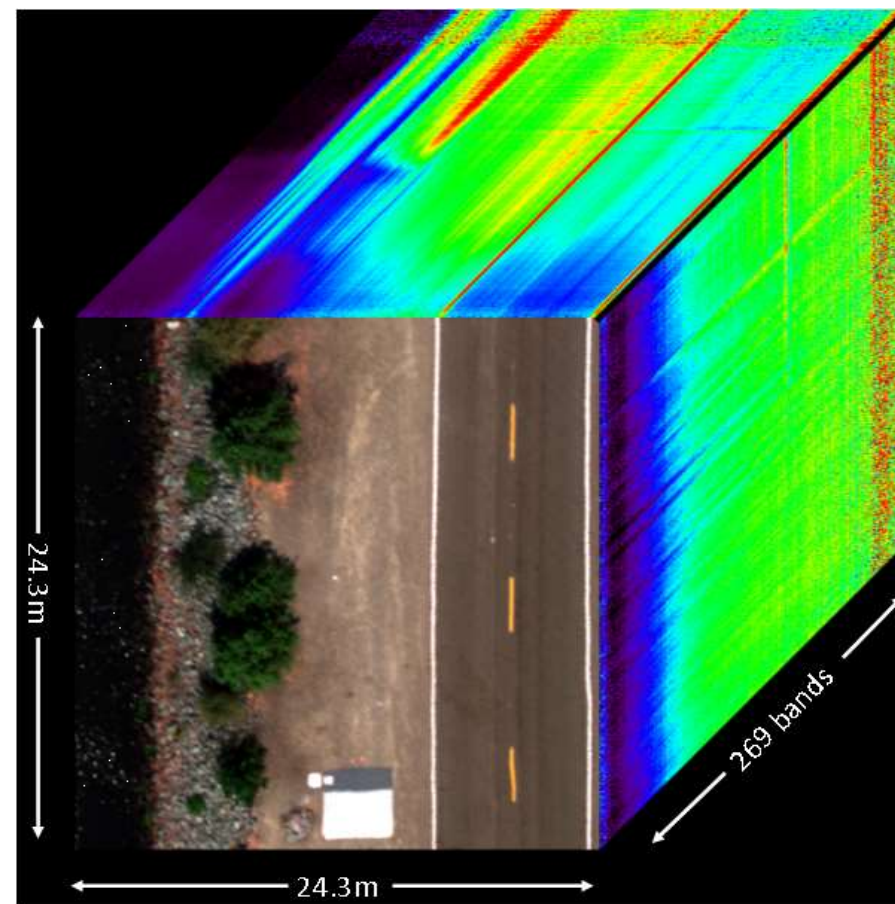
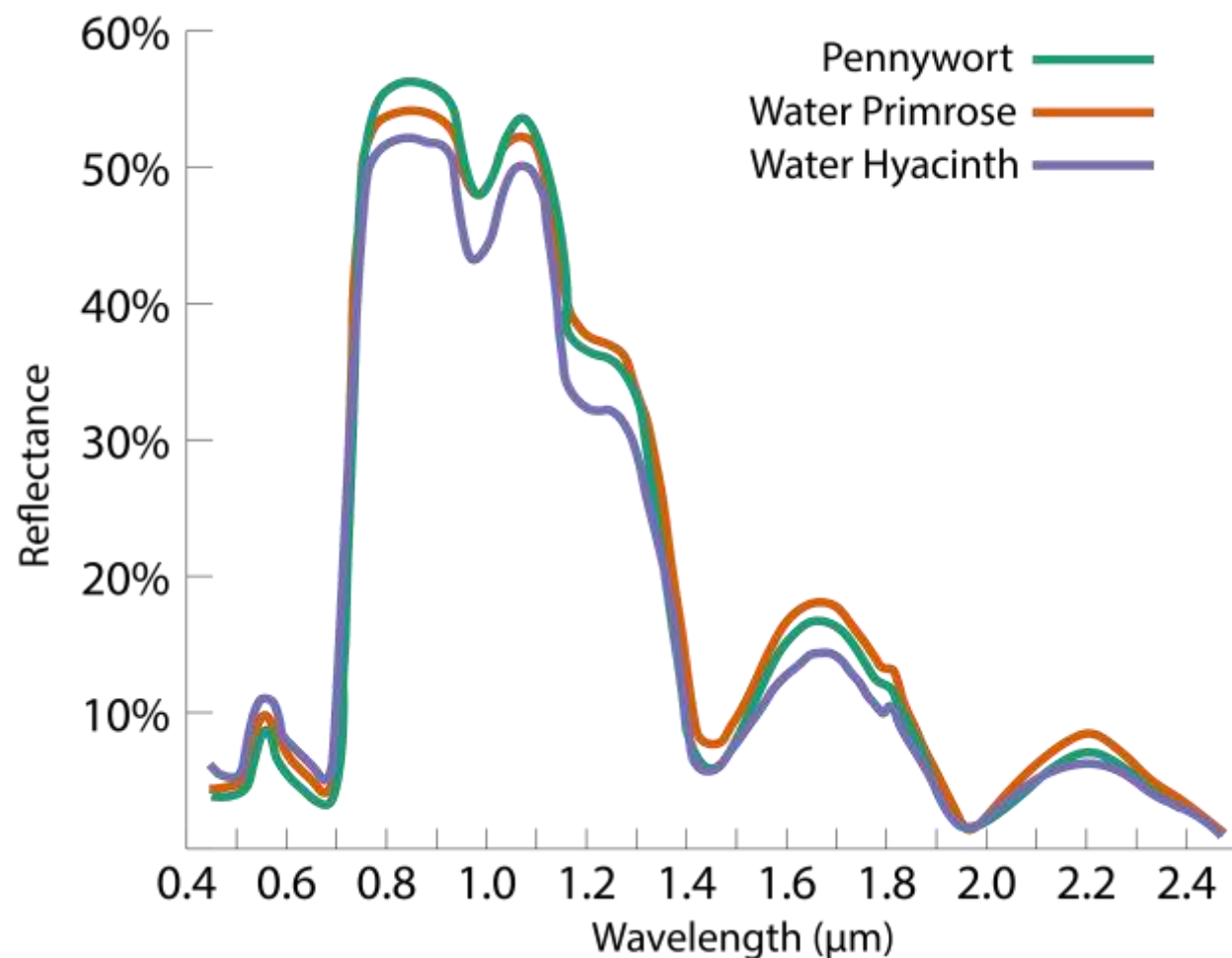
- Introduction
 - Remote sensing and invasive species
 - Using hyperspectral data
- Methods
 - Collecting UAS Imagery
 - *In situ* field validation
- Results
 - Classification
- Conclusions

History



AQUATIC PLANT MONITORING - Lake Livingston, Texas; east end of Jungle area, showing old river channel at right. Area to right of channel is land; area to left is water covered by water hyacinth and duckweed. (Black and white reduction of color infrared transparency).

Using Hyperspectral Imagery



Hyperspectral image cube sample

UAS: a new platform for targeted applications



Headwall Nano-Hyperspec

- VIS-SWIR (400-1000nm)
- 269 bands
- 2.2kg



DJI Matrice 600P with Headwall Nano-Hyperspec

- Flight time: ~20 mins @

Study Area and Species

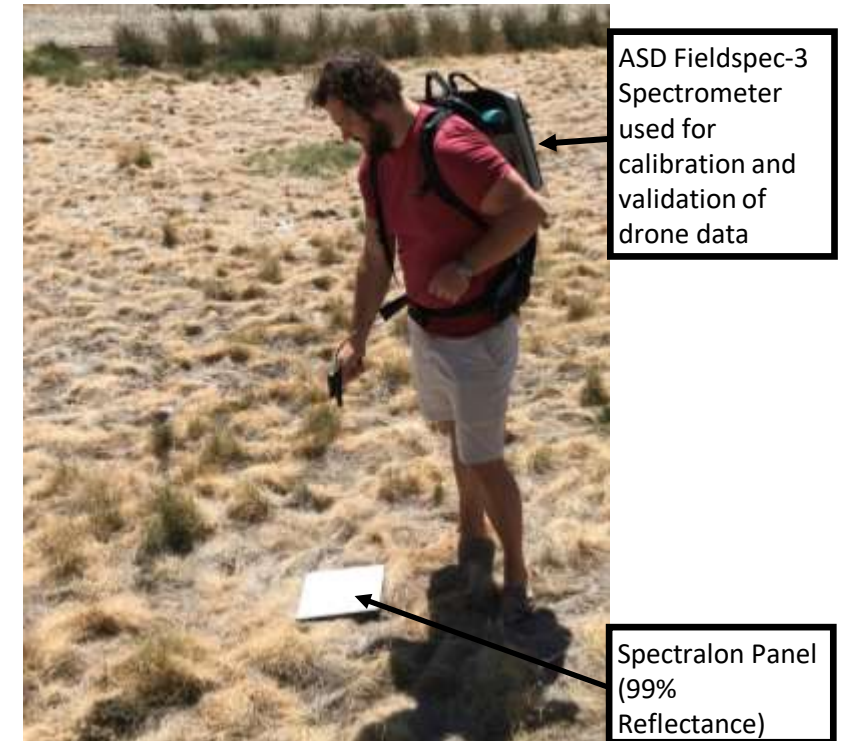
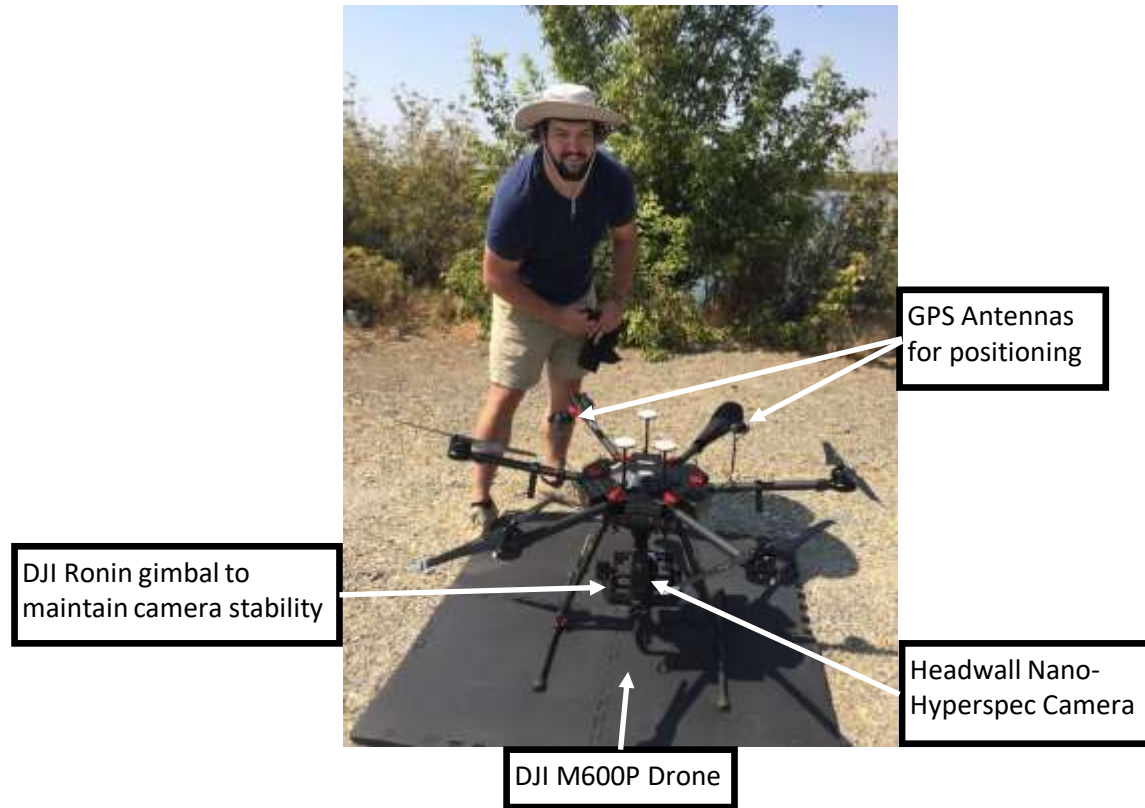


Water hyacinth (*Eichhornia crassipes*)

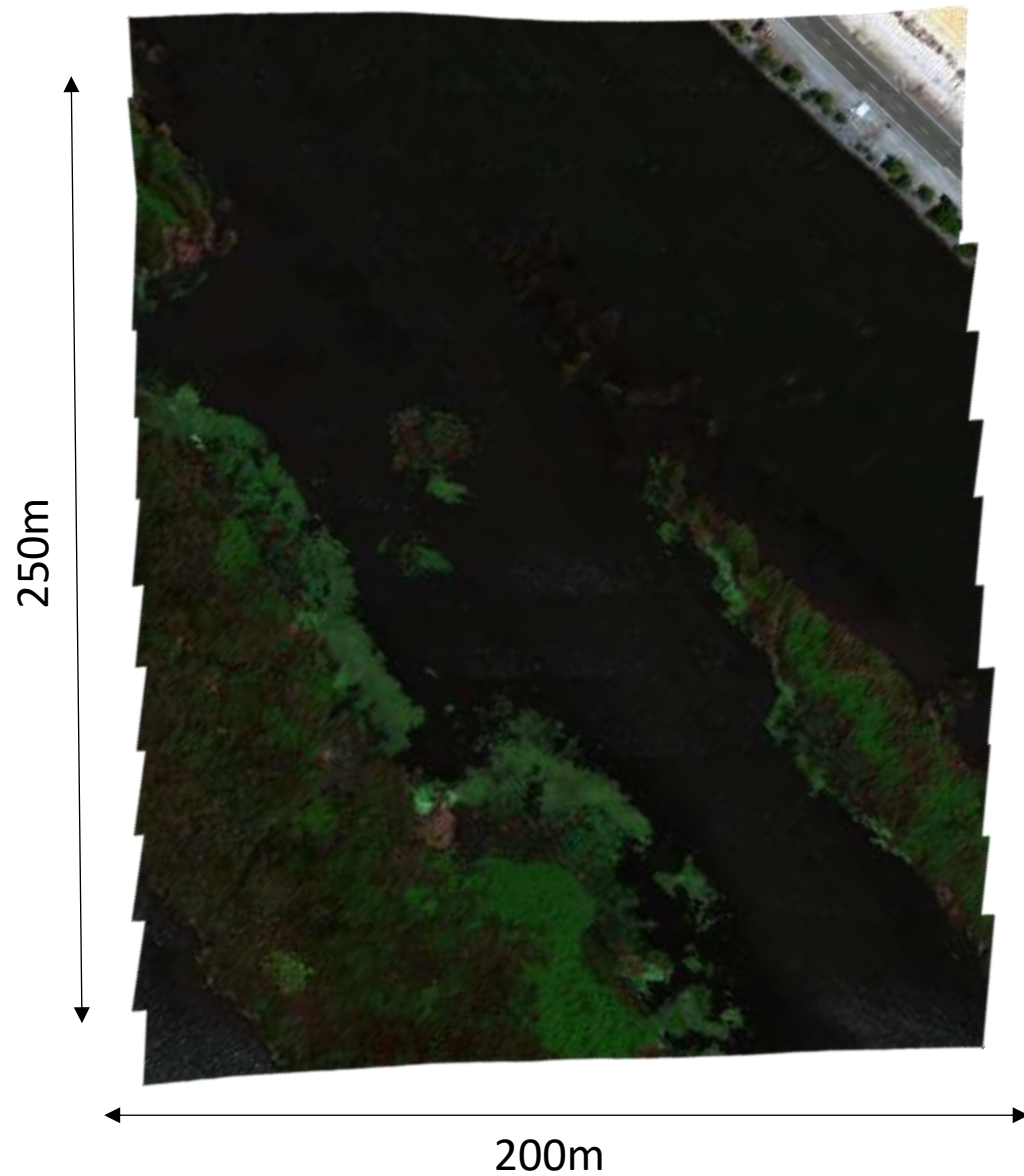


Water primrose (*Ludwigia* spp.)

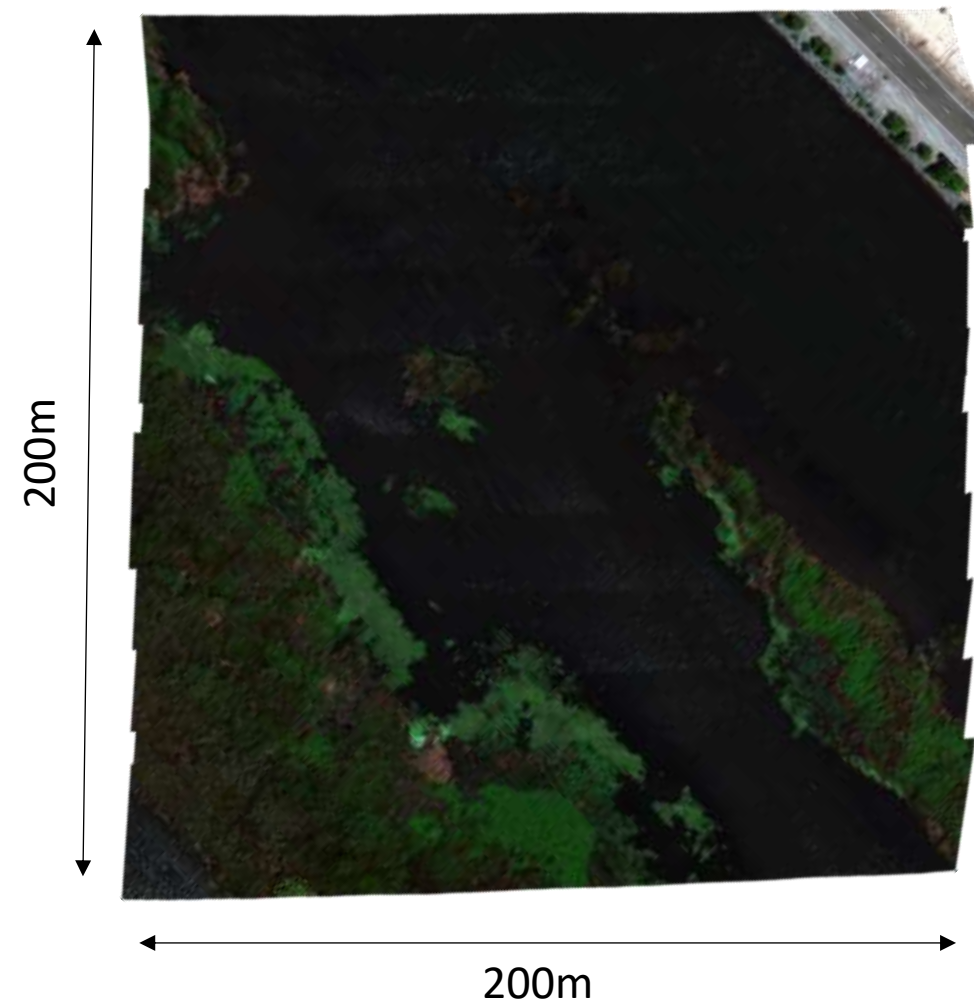
UAV Data Acquisition



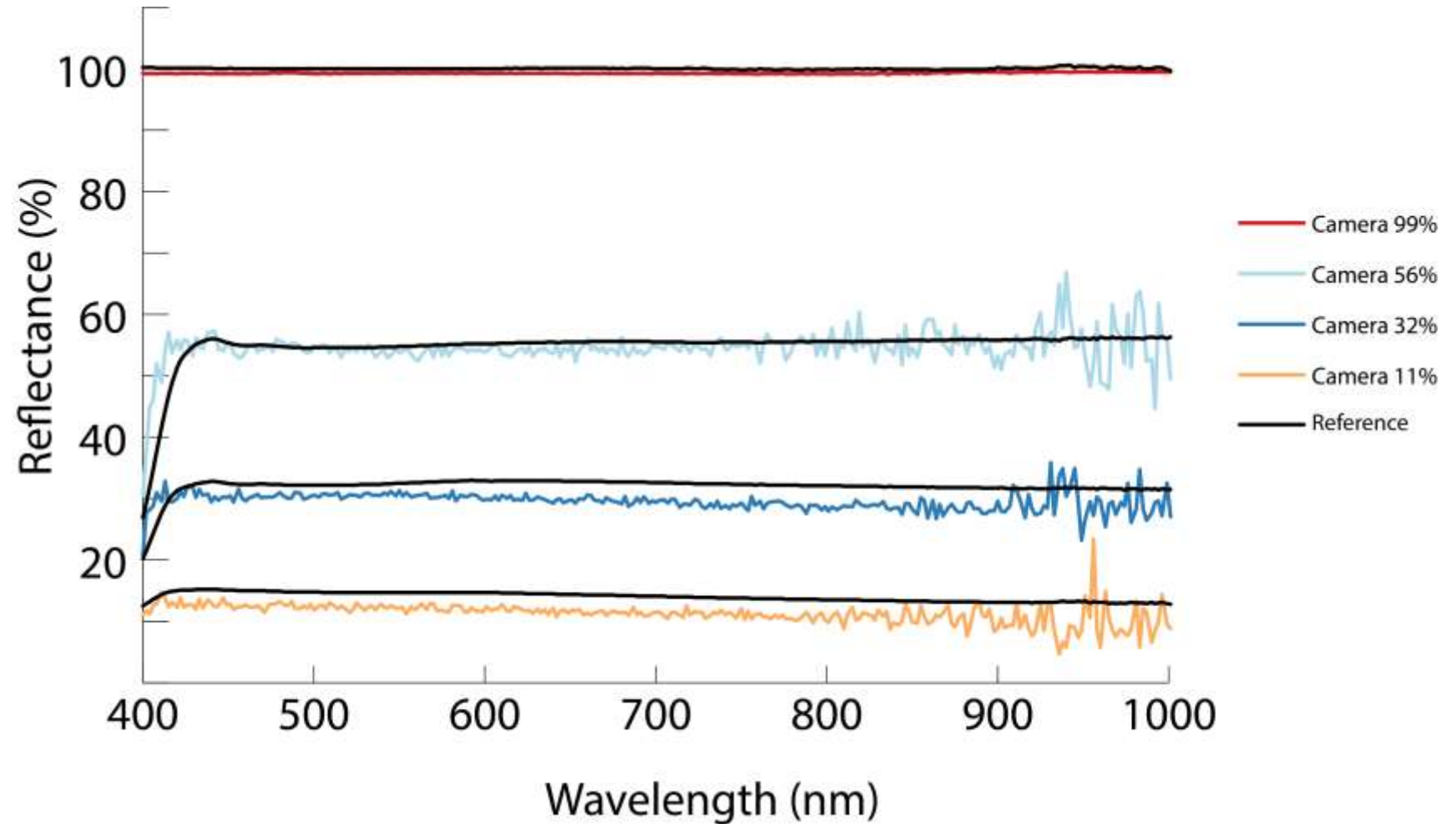
Southeast flight – Toward Sun



Northwest flight – Away from Sun



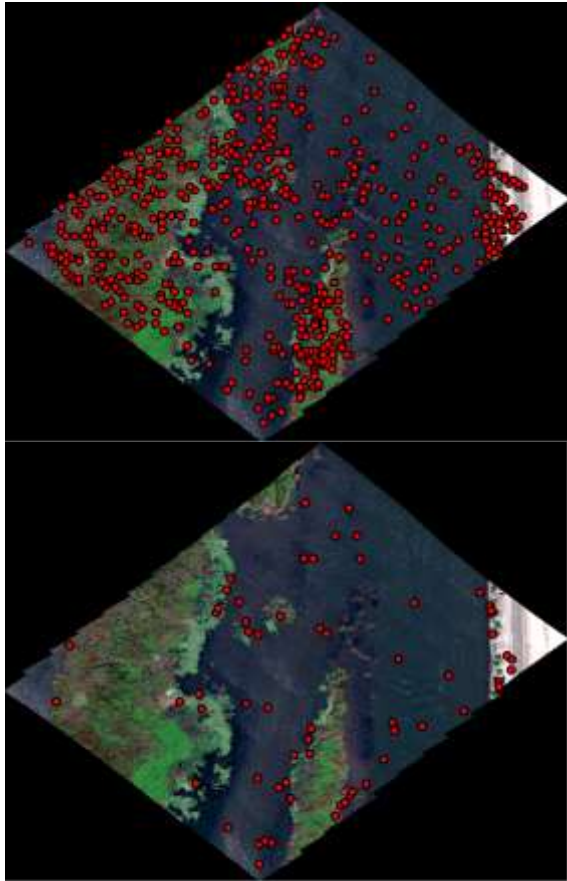
Radiometric Calibration



Orthorectification

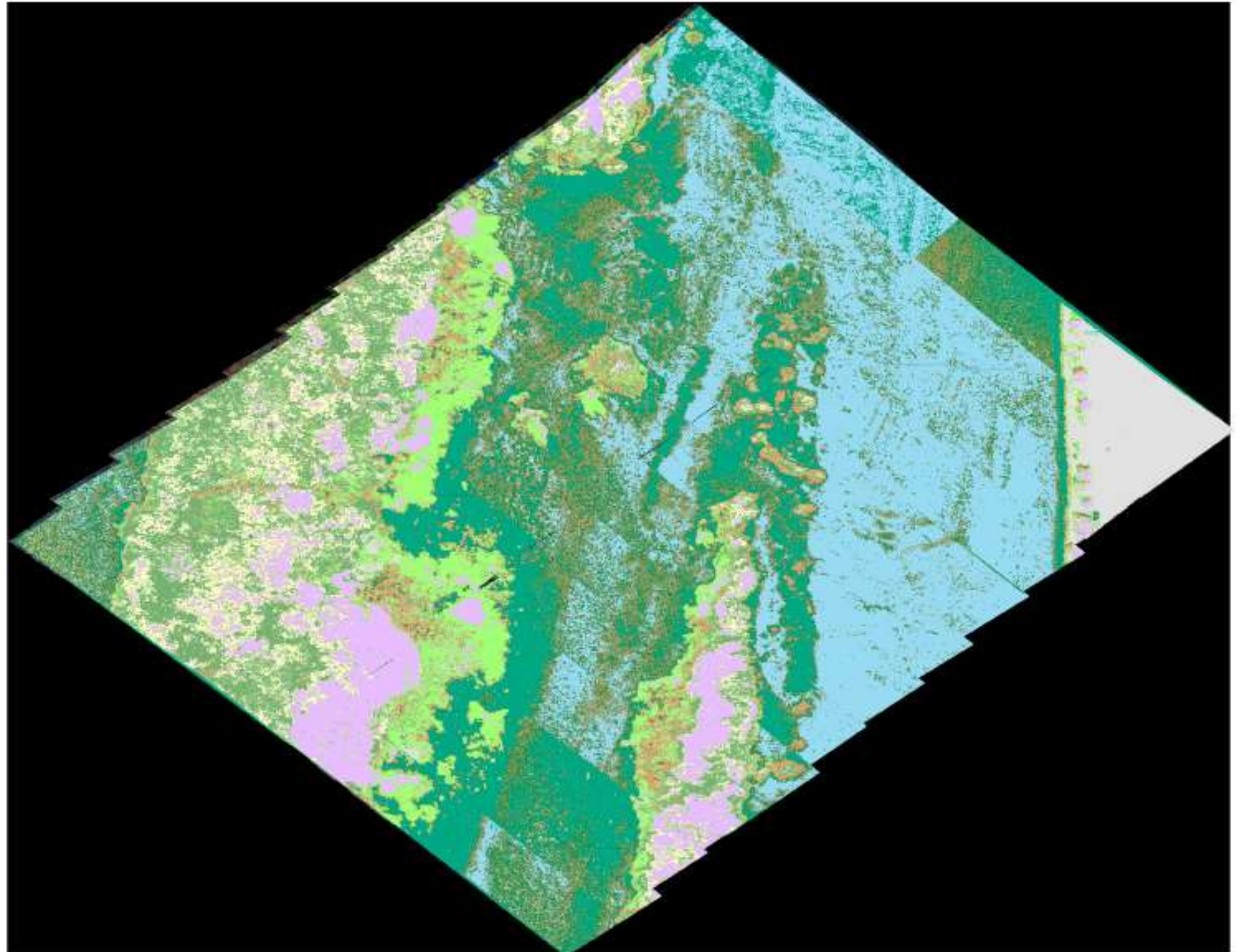


Field Data Collection

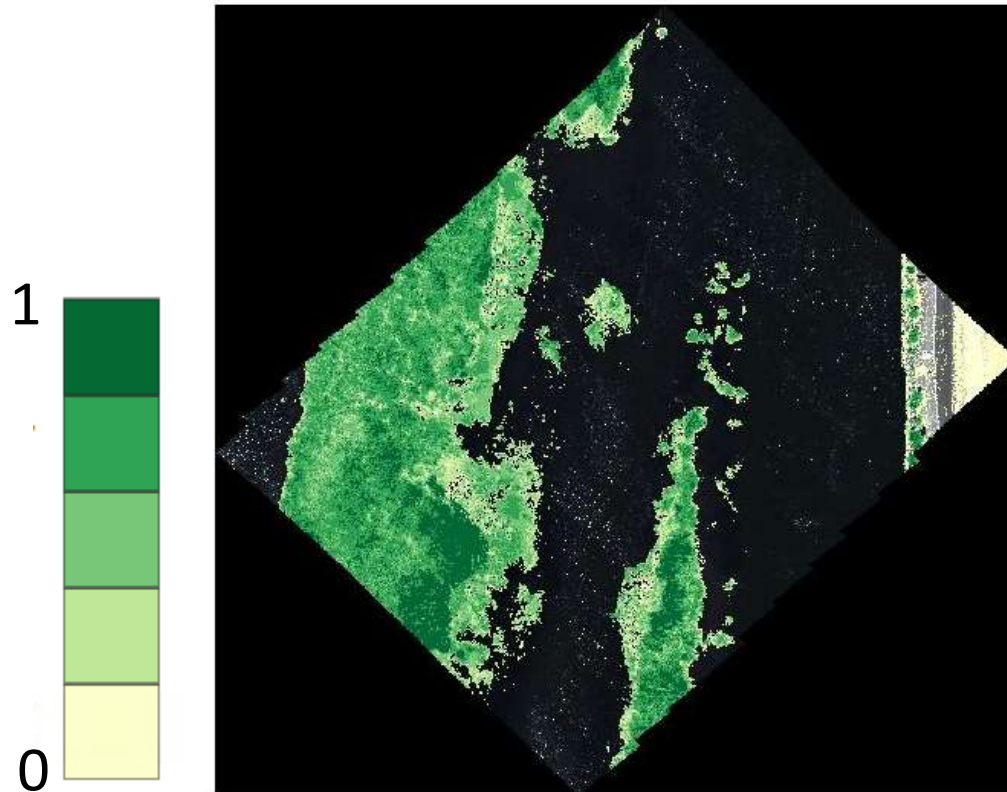


Results

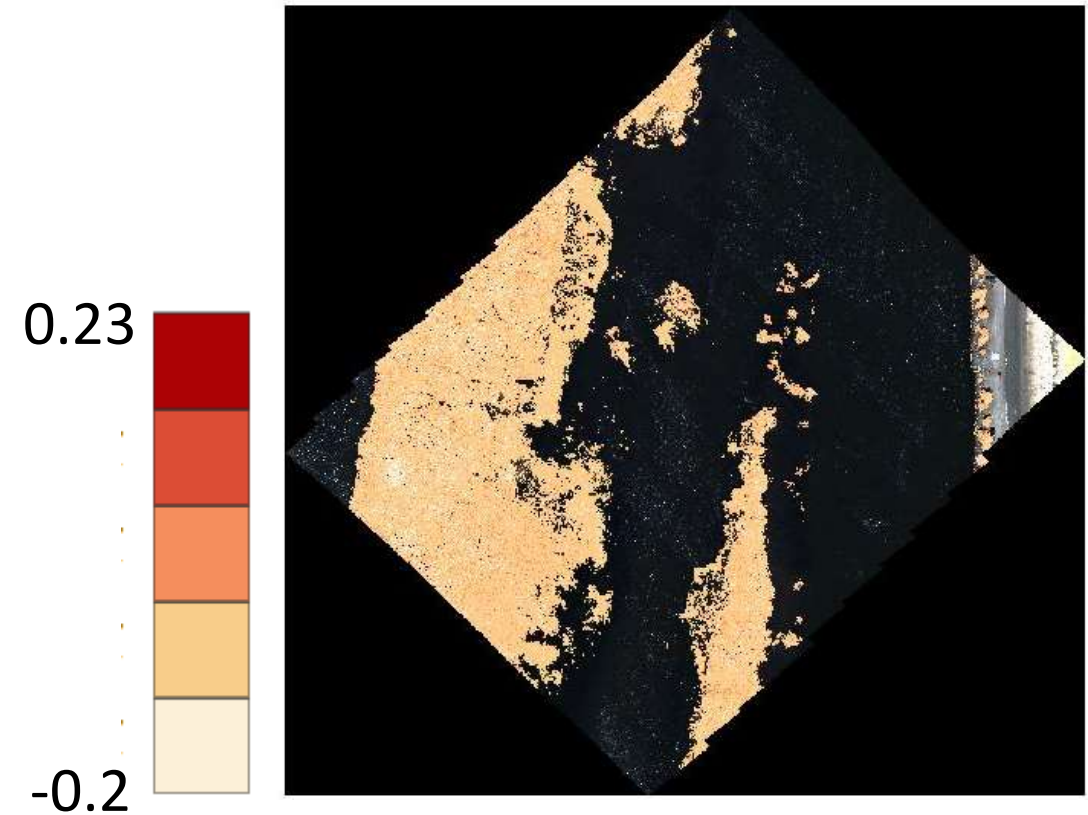
Random Forest:
Overall Error rate:
28.77%



Vegetation Condition



NDVI



PRI

Conclusions and Future Work



- Improve orthorectification
- Improve radiometric calibration
- Collect more field data

Advice from someone who's been in the weeds

- Your drone will probably crash at some point, get insurance.
- Streamline field collection plans



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