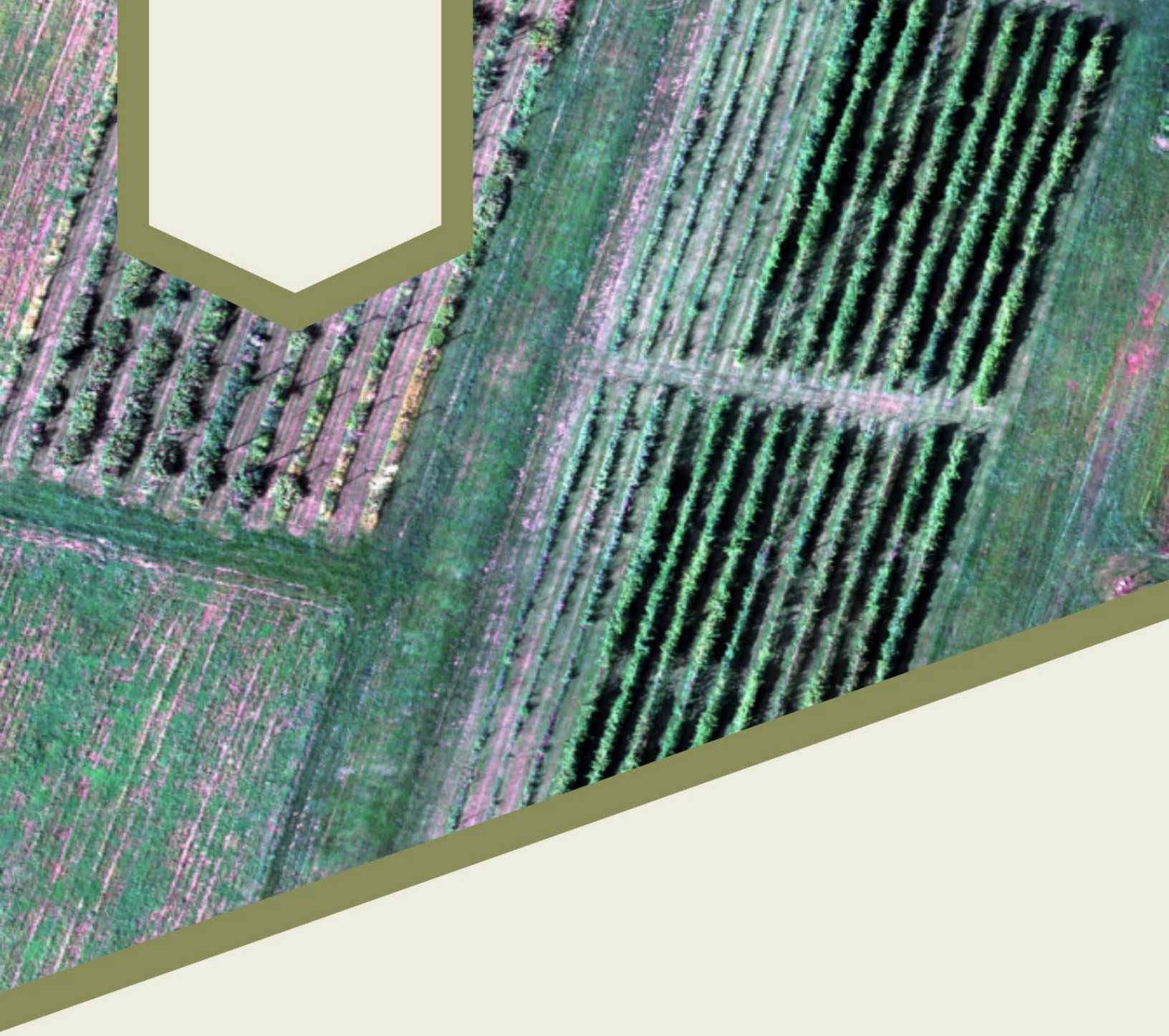

Exploring the Building Blocks of Precision Agriculture: Height Comparison, Crop Classification, and NDVI Variance at Scale Using Drone Imagery at the Connecticut Agricultural Experiment Station

Written by Skye Hellenkamp, Violet Low-Beinart, and Sophie Roberts

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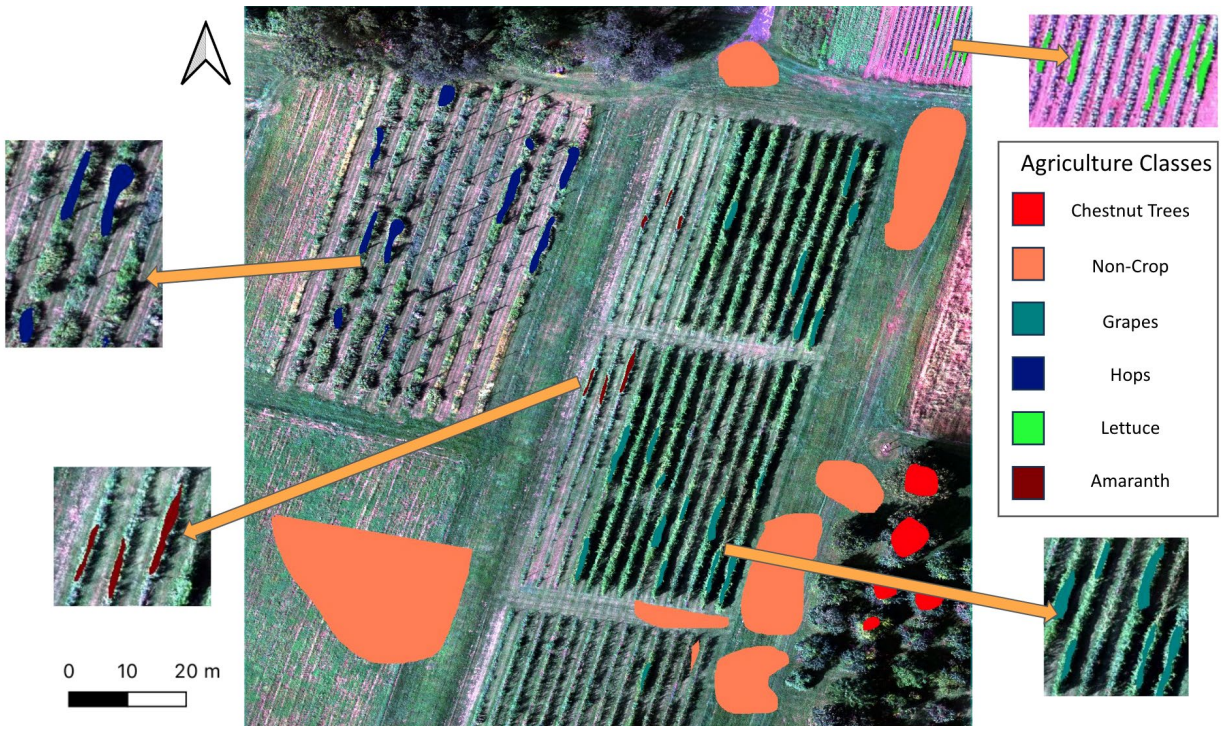
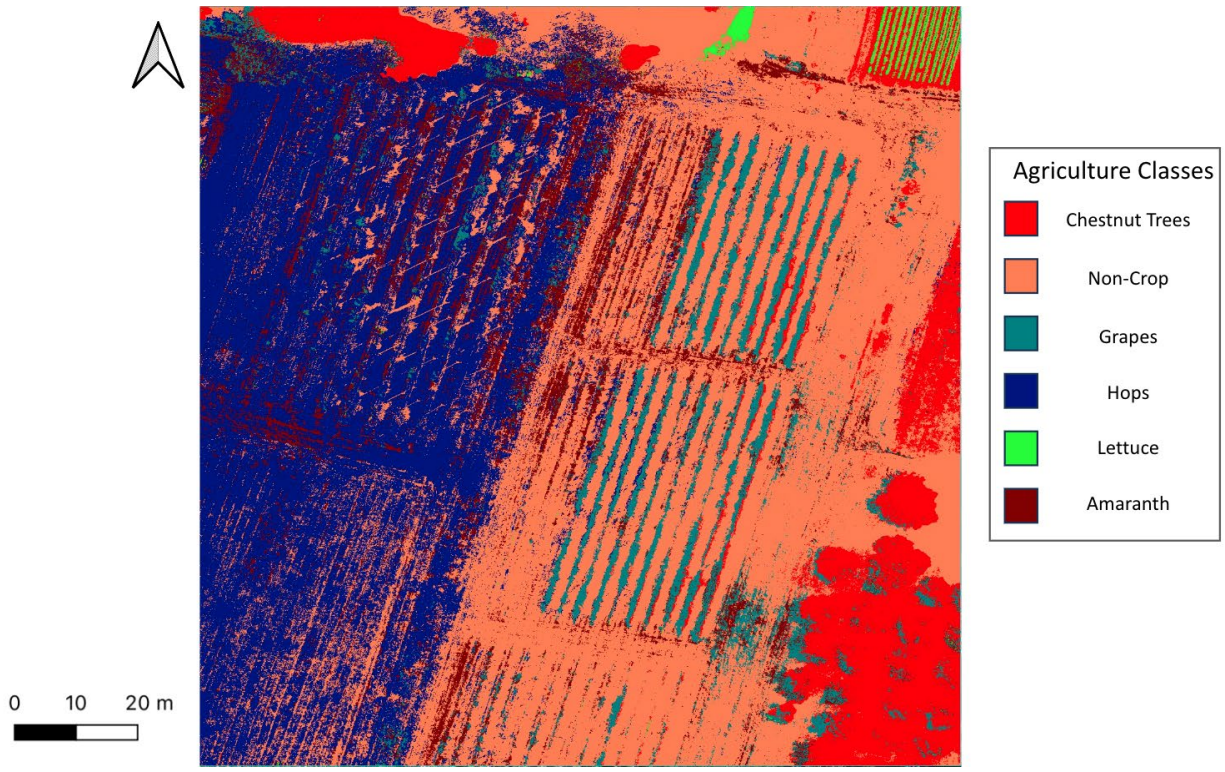
Abstract

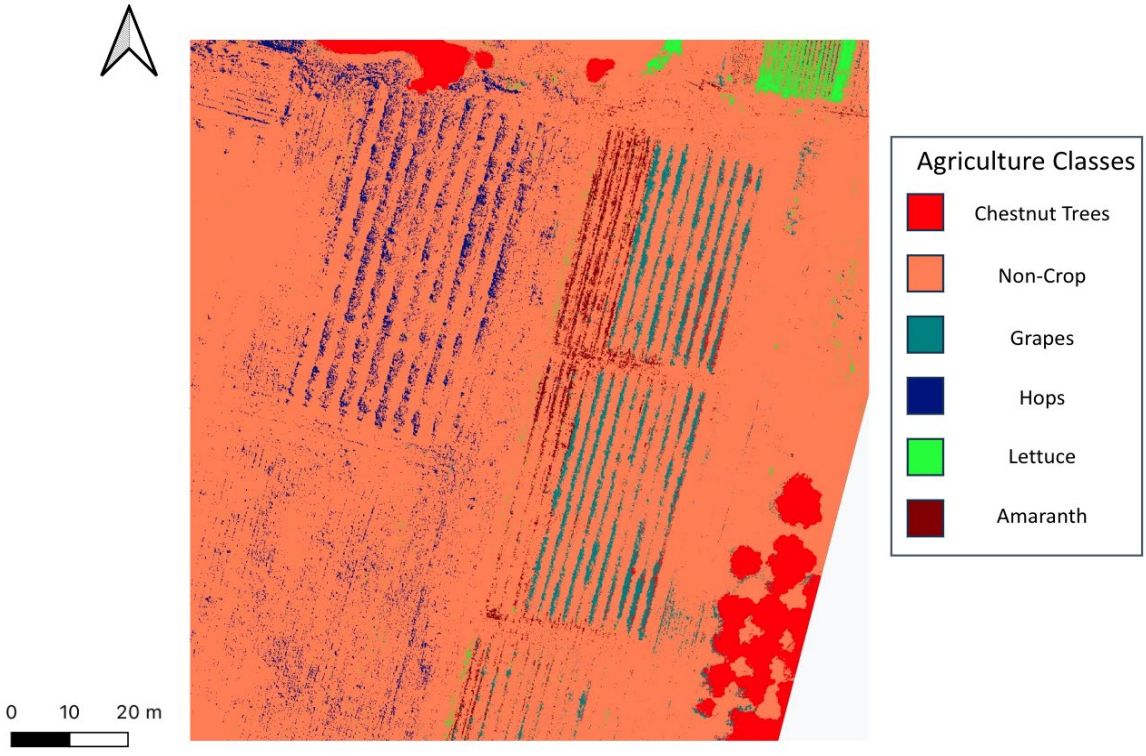
This study delves into the multifaceted applications of Unmanned Aerial Vehicles (UAVs) in precision agriculture, focusing on crop classification, tree height measurement, and vegetation indices. Employing a DJI Phantom 4 multispectral drone at the Connecticut Agricultural Experiment Station, the research highlights the superiority of the Google Earth Engine Random Forest algorithm in crop classification over ENVI. While Agisoft excels in providing superior 3D visual representation, Reality Capture stands out for delivering more accurate tree height measurements on average. Additionally, the low correlation between NDVI values from UAV and satellite imagery emphasizes the importance of opting for original UAV imagery in precision agriculture applications. Overall, the study underscores the potential of UAVs to provide valuable insights for farm management, presenting implications for making informed decisions regarding technology and data usage in precision agriculture.



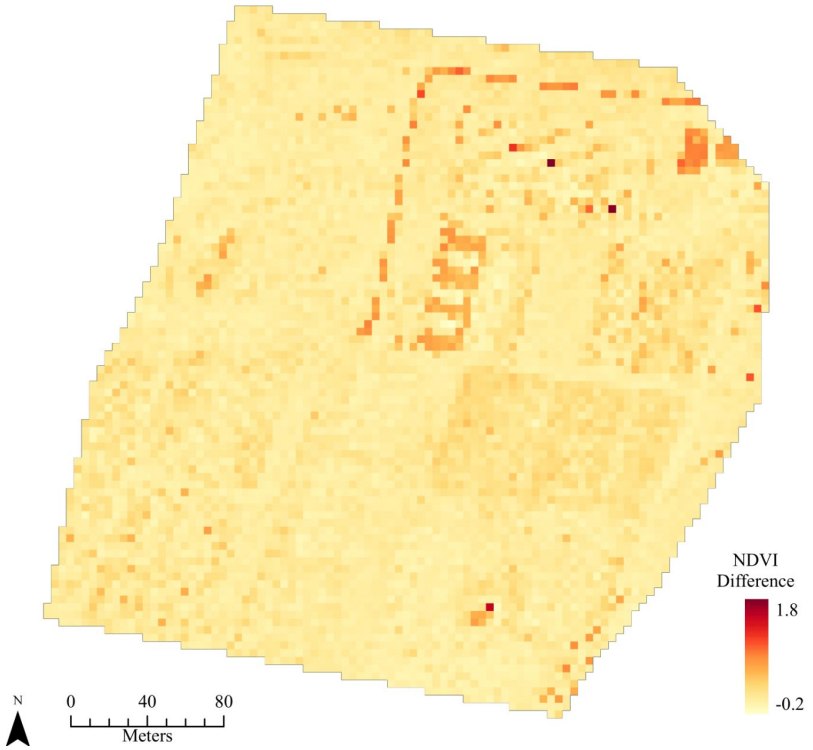
Regions of interest over the classification area.



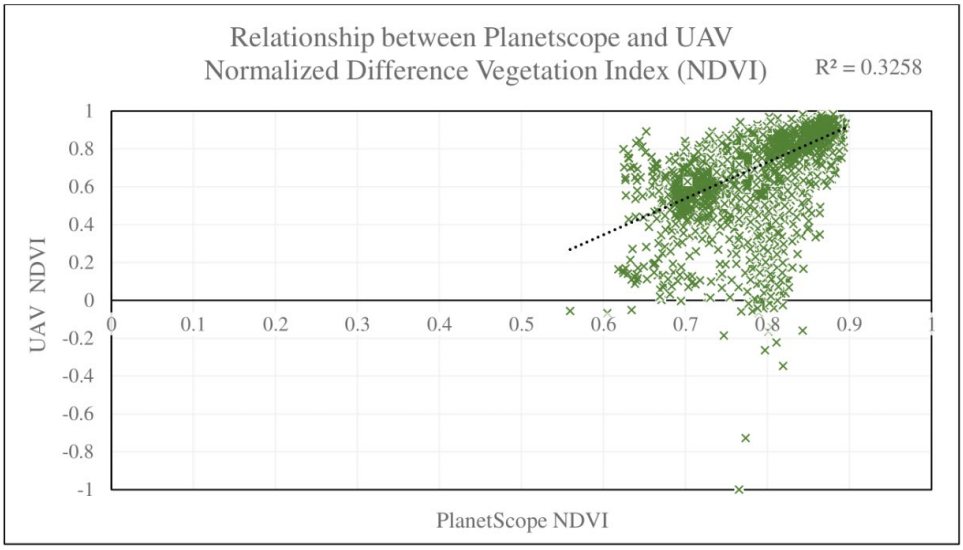
ENVI classification using Mahalanobis Distance algorithm.



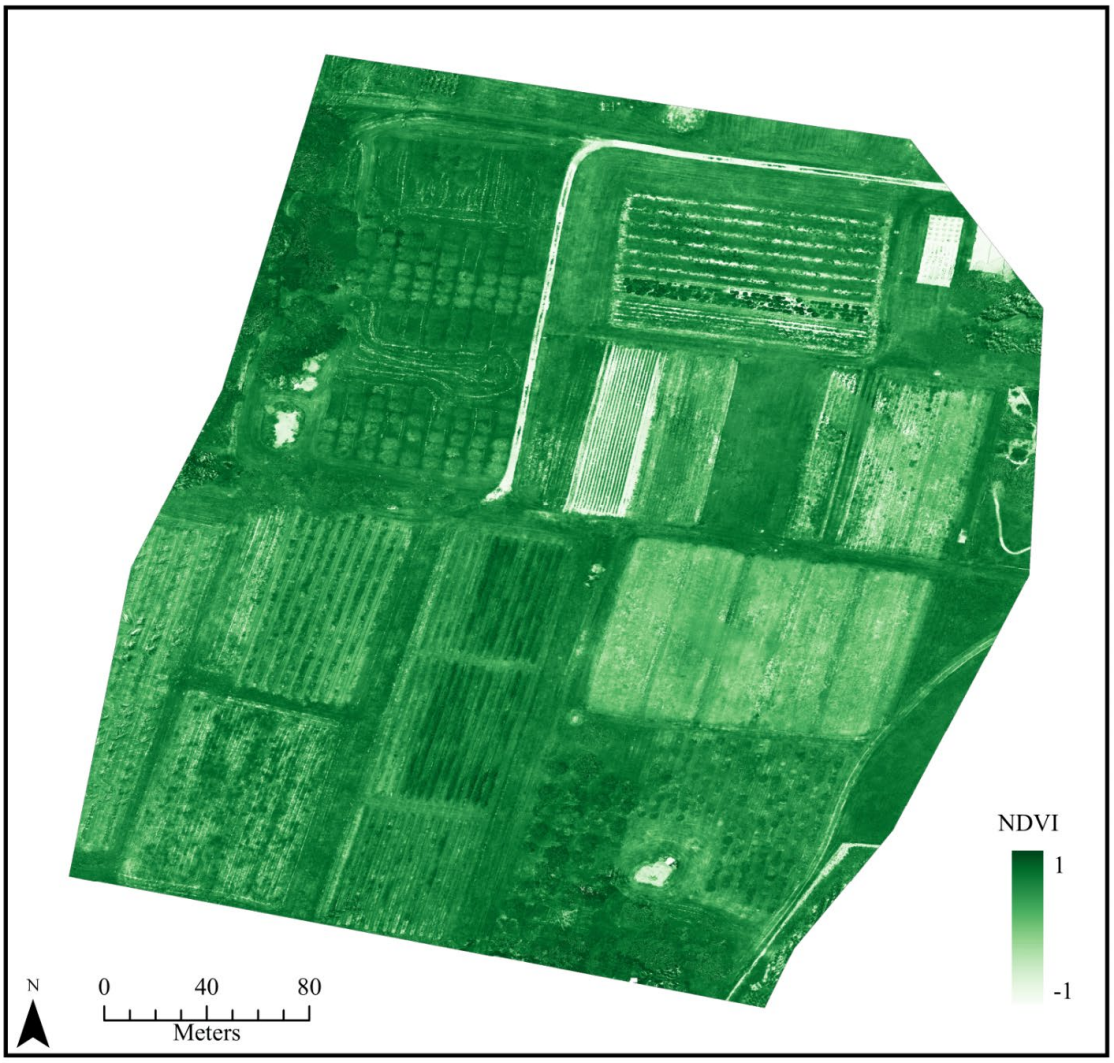
Google Earth Engine Classification using Random Forest algorithm.



A change detection map between the calculated NDVI of the resampled UAV orthomosaic and the PlanetScope satellite image.



Scatterplot showing the relationship between NDVI values obtained from the resampled UAV image and the PlanetScope image.



Calculated NDVI on the original UAV orthomosaic, at 3.2 centimeter resolution.