Geophysical Research Abstracts
Vol. 17, EGU2015-7082, 2015
EGU General Assembly 2015

UAV based tree height estimation in apple orchards: potential of multiple approaches

Abraham Mejia-Aguilar, Enrico Tomelleri, Andrea Vilardi, and Marc Zebisch
Institute for Applied Remote Sensing, EURAC, Bozen, Italy (remote.sensing@eurac.edu)

Canopy height, as part of vegetation structure, is ecologically important for ecological studies on biomass, matter flows or meteorology. Measuring the growth of canopy can be undertaken by the use multiple remote sensing techniques. In this study, we firstly use data generated from an Unmanned Aerial Vehicles (UAV) with a simultaneous consumer-grade RGB and modified IR cameras, configured in nadir and multi-angle views to generate 3D models for Digital Surface Model (DSM) and Digital Terrain Models (DTM) in order to estimate tree height in apple orchards in South Tyrol, Italy. We evaluate the use of Ground Control Points (GCP) to minimize the error in scale and orientation. Then, we validate and compare the results of our primary data collection with data generated by geolocated field measurements over several selected tree species. Additionally, we compare DSM and DTM obtained from a recent 1-meter resolution LIDAR campaign (Light Detection and Ranging). The main purpose of this study is to contrast multiple estimation approaches and evaluate their utility for the estimation of canopy height, highlighting the use of UAV systems as a fast, reliable and non-expensive technique especially for small scale applications. The study is conducted in a homogenous tree canopy consisting of apple orchards located in Caldaro -South Tyrol, Italy. We end with proposing a potential low-cost and inexpensive application combining models for DSM from the UAV with DTM obtained from LIDAR for applications that should be updated frequently.