Geophysical Research Abstracts
Vol. 21, EGU2019-12158, 2019
EGU General Assembly 2019

A UAV-RTK-Lidar System measurements of wave energy dissipation in a sandy beach and algal reef area

Cheng-Yang Yeh and Zhi-Cheng Huang
Institute of Hydrological and Oceanic Sciences, National Central University, Taoyuan, Taiwan (sunnyourfriend@gmail.com)

Unmanned Aerial Vehicles (UAVs) have been widely used as an imagery mapping tools for coastal applications. However, the usage of Light Detection and Ranging (Lidar) on UAVs is limited by the drawback of the low payload on UAVs. A lightweight, low cost and compact UAV-RTK-Lidar system developed by Huang (2018) was used for the measurements of wave energy dissipation. The system is an assembly of a multirotor UAV, a robotic Lidar, an altitude and heading reference system (AHRS), and a real-time kinematic (RTK) Global Navigation Satellite System (GNSS). The root-mean-square error (RMSE) of the system was approximately 5cm compared with the ground truth value. Here we present remote measurements of wave energy by using the UAV-RTK-Lidar system on a sandy beach and algal reef area. Digital Surface Model (DSM) of sandy and algal reef area were obtained by the system to determine the elevation of bottom bed. Water level spectrum and wave characteristic group velocity were computed by the transformed ranging data to quantify wave energy dissipation based on two energy fluxes from different locations of cross-shore distance in one flight. We conducted eight flights separated by hours in the field experiment. The effect from bottom roughness of sandy area and algal reef area was discussed and compared. Continuous wave data were simultaneously recorded by Acoustic Doppler Velocimeter (ADV) and Acoustic Doppler Current Profilers (ADCPs), which were all deployed on the in-situ sea bottom bed. Results from remote and in-situ measurements were performed and discussed, giving us the potential of using this UAV-RTK-Lidar system to remotely quantify wave energy dissipation in the coastal region.