



## **A portable UAV LIDAR system for coastal topographic surveys and sea surface measurements**

Zhi-Cheng Huang (1), Philip L.-F. Liu (2), Kuo-Hsin Tseng (3), and Sunny Yeh (4)

(1) National Central University, Graduate Institute of Hydrological and Oceanic Sciences, Taoyuan County, Taiwan (zchuang@ncu.edu.tw), (2) Cornell Univ, Sch Civil & Environm Engn, Ithaca, NY 14853 USA, (3) Center for Space and Remote Sensing Research, National Central University, (4) National Central University, Department of Earth Science

A light-weight UAV system for coastal topography and coastal sea surface measurements is developed. This system is based on techniques of a multicopter UAV, a light detection and ranging (LIDAR), an inertial measurement unit, and a real-time kinematic global navigation satellite system (RTK-GNSS). The synchronization and data recording are achieved using Labview. This system can be operated in a very low attitude flight within a range of 10m that can provide very high resolution of point cloud data. The performance of this system has been tested and calibrated with known targets. The vertical root-mean-square error is less than about 10 cm, depending on the flight height. Applications of the system, including coastal topographic surveys, tidal elevation measurement, wave measurements, and bottom roughness measurements are presented and discussed. The tide and wave measurements are compared with in-situ measurements using pressure sensors. The results of comparison suggest that this system is a useful tool to measure the sea surface elevation and topography. The challenges of applying this system are also discussed.