



## **Using unmanned aircraft system (UAS) for monitoring seasonal changes of dune and barrier island in the southwestern coast of Taiwan**

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Reduction in area and volume of the landward-migrating barrier islands along the southwestern coast of Taiwan becomes an important coastal management issue recently. In order to understand the seasonal changes of the barrier island “Dingtoue”, which is 1.3 km in length and 25.5 ha in area in the southwestern coast of Taiwan, this study use unmanned aircraft system (UAS) to take the images of the barrier island on the 26th of March and the 17th of November in 2018. We used Agisoft PhotoScan software to convert and orthorectify the images and generate the Digital Elevation Model (DEM) of the barrier island. The DEM of difference (DoD) is analyzed by ArcGIS to evaluate the changes in area, position and sand body’s volume of the Dingtoue barrier island. Estimated accuracy of horizontal and vertical coordinates of ground control points is  $\pm 0.04$  and  $\pm 0.04$  m, respectively. Cell size of the DEM is  $0.08 \times 0.08$  m.

The DEM generated from the UAS survey in March was taken as the reference surface for areal and volumetric changes comparison. Results show that the area of the barrier island in March and in November is 260928.74 sq.m and 249416.86 sq.m, respectively. The area of the barrier island is reduced 11511.88 sq.m. Moreover, sediment accumulation volume of the barrier island is 57735.11 cu.m, and the sediment erosion volume is 51578.37 cu.m. Therefore, the overall volume of the barrier island increased 6156.74 cu.m in 8 months. In addition, beach and dune on the barrier island are influenced by different surface processes. The northern part of the beach was drowned but the south part was accumulated. So the area of the beach was increased from March to November in 2018 and the beach migrated southward. In contrast, erosion occurred in the southern part of the dune but accumulation occurred in the north part of the dune. Therefore, the dune was narrowed and moved landward. We consider that different processes may attribute to the changes of beach and dune in different direction. Waves and longshore currents are the dominant processes for the beach, but summer monsoon southwestern wind for the dune.