



## **Estimating rates of coastal cliff erosion in a small island using terrestrial laser scanning and RPAS-based SfM-MVS photogrammetry**

Yuichi S. Hayakawa (1) and Hiroyuki Obanawa (2)

(1) The University of Tokyo, Center for Spatial Information Science, Kashiwa, Japan (hayakawa@csis.u-tokyo.ac.jp), (2) VisionTech Inc.

Rapid erosion of coastal cliffs has been historically observed to be more than 1 m/y in the outer Boso Peninsula area, eastern Japan. However, due to the modern work of coastal protection, the erosion rates of the coastal cliffs have significantly decreased. This caused coastal erosion in the nearby sand beach, to which sands had been supplied from the formerly eroded rocky coast. In order to assess the relationships between erosion and protection in both rocky and sandy coasts, quantitative evaluation of erosion rates by natural processes would be necessary. The Suzume-jima Island, a small coastal island in the outer Boso Peninsula area, is an ideal site, which is located outside of the coastal protection and natural processes of erosion can still be observed. Here we carried out multiple measurements of the entire shape of the island using remotely piloted aerial system (RPAS) and structure-from-motion multi-view stereo (SfM-MVS) photogrammetry. Terrestrial laser scanning is also performed for the accuracy assessment. The high-frequency (3 times a year) and high-resolution (cm) measurements of the small island for 3 years revealed spatially variable rockfalls and wave erosion, whose volume of mass has been quantitatively revealed from the 3-D point cloud obtained. The relatively short-term measurements are also compared with the long-term 2-D topographic changes in the island by aerial photographs for 50 years.