

# A possibility of the identification of bottom sediment in shallow-water area using ALOS-3 image from a point of view for the environmental monitoring and protection in coastal areas

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As a successor to the wide swath and high spatial resolution optical mission of the ALOS, which was launched in 2006, the development of ALOS-3 has been underway for the launch in 2020. ALOS-3 has the observation width of 70km(nadir) same as ALOS and the advanced sensor WISH (wide-swath and high-resolution optical imager). The observation performance of WISH is higher than PRISM and AVNIR-2 onboard ALOS. The ground spatial resolutions are 0.8 m (panchromatic) and 3.2 m (multi-color bands), and the number of quantization bits was 8 bits in ALOS, increasing to 11 bits. In particular, ALOS-3's multi-bands are 6 wavelengths, whereas it was 4 bands of AVNIR-2, in addition to these 4 bands, a total of 6 bands plus 2 bands of Coastal and Red edge. The main purpose of the ALOS-3 mission is to contribute to disaster prevention and mitigation, and the understanding of the damage situation after a disaster occurs and to the development and renewal of high-precision geospatial information. It is also expected to use various observational functions for environmental monitoring of coastal areas and to use and research for environmental conservation in vegetation areas. In this study, we report on the possibility of classification of sediment in shallow sea area using satellite images which are simulated to ALOS-3 observation performance from the viewpoint of conservation of coastal environment. The area of study was a coral reef in the Yaeyama islands of Okinawa Prefecture, including Ishigaki Island, where water quality was relatively stable in coastal shallow waters. The satellite images as ALOS-3 simulation are Digital Globe Worldview (WV), close to ALOS-3's observation performance. The WV data (ortho-rectified) is used to resize the WISH equivalent to 0.8 m (panchromatic) and 3.2 m (multi-color) for our analysis. The results of the analysis by ALOS/AVNIR-2 near the season of WV's observing date/time are also shown as a comparison. In the sediment identification of shallow sea area by satellite remote sensing, the effect of the water depth (tide level) difference is a problem, and a depth correction algorithm has been proposed as one of the methods to reduce the influence. This algorithm is based on the basic principle (Lyzenga, 1978) in which the logarithm of the pixel value (digital number) in the two wavelength bands in the same bottom quality is constant slope not involved in the depth, the index of the bottom quality was removed information of the depth it is intended to calculate.

The results of analysis using Coastal and Red Edge which are the features of ALOS-3 sensor are also reported. Our results showed that it can be distinguished more in detail than AVNIR-2(10m) so far. ALOS-3 data is expected to be used as a coastal environmental monitoring tool.

Keywords: ALOS-3, WISH, ALOS, Bottom Index, Coral Reef