Coastal erosion and land loss detection using multi-temporal ALOS/ALOS-2 data in Sittaung Estuaries, Myanmar

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The Myanmar government is faced with the risk of coastal erosion as one of the urgent issues in land use planning and coastal management in order to reduce economic losses, i.e., relocation of residents due to land loss. To evaluate the impact of coastal erosion and sedimentation in the estuary of the Sittaung River around the Gulf of Martaban in Myanmar, we conducted a preliminary investigation focusing on short-term coastal change detection using satellite optical and synthetic aperture radar (SAR) sensors. The selected study site is located 200 km east from Yangon city around the estuary of the Sittaung River, 420 km long, with a basin area of approximately 35000 km^2.

We employed ALOS (12.5m spatial resolution) and ALOS-2 (25m spatial resolution, copyright 2017, JAXA) and Landsat-8 (30m spatial resolution, copyright 2017, NASA-USGS) data to detect accurate coastal lines during the dry season between December and February considering insensitive weather conditions such as tidal effect, cloud, wind and strong wave during the similar snapshot period.

As a result of delineating by the interpretation and classification, spatially the maximum erosion rate of 2017 coastal line change (2 km/year) was faster in contrast to the average rate of 1 km/year for the period between 2007 and 2017. The maximum distance of erosion was about 2 km (west to east) along the 30 km shoreline (north to south) in the representative eroded areas in the selected western part of the Sittaung esturary.

In addition, the resultant coastal change line was also verified by ground truth and field survey data using a small unmanned aerial vehicle (sUAV: Quadcopter with a flight control system, ©DJI Technology Co. Ltd., China) for comprehensive validation, i.e., a natural coastal line with 2-3 meter coastal bank.

For accurate coastal mapping based on evidence data, we will develop an automated algorithm for coastal change detection, in particular for ALOS-detected erosion and sediment. This feasibility study will continually investigate the characteristics of short-term and long-term changes with the relationship between hydrological parameters such as precipitation, river discharge, wave, and tidal effect. Also, this study will contribute to setting boundary condition options and validating a prediction model for coastal erosion changes.

Keywords: Coastal change, Coastal risk management, ALOS/ALOS-2

