

Long-term Change Detection of the Coastal Zone in Bangladesh Using Multiple Satellite Data

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The Bangladesh floodplain covers approximately 80% of the country which is formed by the deposition of alluvium by the network of the Ganges-Brahmaputra-Meghna Rivers.

Bangladesh has a subtropical monsoon climate characterized by rainy and dry seasons. In particular, floods occur frequently in the rainy season causing erosion and deposition due to intense rainfall and unexpected river discharge. The people living in the riverine and lowland areas are substantially affected by flood and storm surge. Satellite remote sensing is crucial to the understanding of natural disasters in coastal areas of Bangladesh because earth observation data can detect long-term coastal changes at the large scale. The objective of this study is to detect and clarify the relationship between the long-term coastline changes and hydrological events using time series data from multiple satellites between 1993 and 2016.

First, geometric corrections were performed for different types of satellite data including JERS-1 SAR and ALOS PALSAR. Next, the coastline was traced into polylines on each image in order to convert to GIS data in ArcMap (ESRI). Erosion and sedimentation were extracted from the changes of the coastline.

Correlations between erosion, sedimentation, precipitation and water level were analyzed to understand the mechanism of the coastal changes.

Preliminary results showed that erosion and sedimentation occurred simultaneously in the Ganges Estuary area between 1993 and 2016. We found that precipitation and water levels both contributed significantly to the changes of erosion and sedimentation in the study area. Strong erosion and sedimentation processes have been occurring continuously along the coastal area for over 14 years. At the same time, sandbar repeated appearing and disappearing by deposition and erosion in the middle of the channel in a short period of time.