



Delineation of typhoon-induced shoreline changes in Taiwan

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Taiwan, an island country located at the southwestern Pacific Ocean, has a coast line of 1,355 km long. And only 55% proportion of the coast line remains natural. The maximum daily accumulated rainfall over 1000 mm brought by the typhoon Mindulle in 2004 generated huge disaster, including a broad flood-prone area and a sick sedimentation, in the littoral zones of the low-latitude part of Taiwan. The event resulted in the official definition of the coastal area, which is a 9 km wide belt area surrounding Taiwan island and is composed of one third land area and two third sea area. And human constructions are restricted in the proposed coast area to prevent or reduce the possible disaster in the future.

Not only the sea level rising induced by the global climate warming may seriously affect the littoral zones, but also the extreme climate accompanying with the global climate warming, such as typhoons and storms, can heavily disturb the coastal environment in Taiwan. In the storm area, the wave and the storm surge may induce the coast erosion. But even being outside the storm area, the coastal environment is still regularly influenced by the sediment transportation triggered by the storm in the Cainozoic zones in the central part of Taiwan. Therefore, the continuous and regular monitoring of shoreline changes is essential for the disaster management in Taiwan.

The two dimensional Morlet wavelet analysis is used to detect edges on synthetic aperture radar (SAR) images. And a block tracing algorithm and an active contour model are integrated for the final shorelines auto-delineation in the study. The SAR image that is climate unaffected and is free of visible light can provide reliable information. The Morlet wavelet function has the smallest window size and is directional. Therefore, the Morlet wavelet function is more flexible and efficient in extracting specific information from image signals. The shoreline changes induced by the typhoon Mindulle were studied. The outcome that is well coincided with the result of a field survey can be obtained in a more efficient way.

Keywords: shoreline, auto-delineation, wavelet analysis, SAR