

Movement of boulders by tsunamis or typhoon waves in the Lanyu Island, Taiwan.

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The eastern Taiwan region is convergent plate boundary where the collision of Philippine Sea plate and Eurasian plate is ongoing. Occurrence of M 7.5 earthquakes are estimated from the distribution of the sea floor active faults. Seismic potential for interplate earthquakes in the western Ryukyu Trench is M 8.5 (Lin et al., 2012). Few damages by historical tsunamis were reported in the old documents in Taiwan, whereas folklore about tsunami damage remains in the east part of Taiwan and Lanyu Island, southeast of Taiwan. Large boulders, which consist of fragments of coral reef and are moved by inundation of tsunamis or storm waves, are distributed on the shore of Lanyu Island.

We surveyed the distribution of boulders in the shore of Lanyu Island, and investigated whether the boulders are moved by tsunami or typhoon wave. The survey was carried out from August 31th to September 4th of 2012. Just before the survey, the typhoon 14 (TEMBIN) approached the island and caused severe damages to the infrastructure of the island. We surveyed the distribution of boulders in the western coast of the Island. The maximum run-up heights of the storm wave were 11 m in the western coast of the Island. Although the boulders whose diameters were within 2.0 m were not moved by the storm waves, the boulders whose diameters were over 2.0 m were transported by the typhoon wave. This suggests that the boulders whose diameters are over 2.0 m would be transported by the storm wave whose maximum heights were over 11 m.

The boulders are distributed in the north and east coast of the Lanyu Island. The maximum size of boulder is 6.4m x 6.1m x 2.9m. We calculated the minimum inundation depth that can transport the boulder using the formula by Kennedy et al. (2007). The calculated minimum depths by tsunami and storm waves are 3.4 m and 12.9m, respectively. The coral reef-lagoon topography does not develop along the Lanyu Island, and the distribution of the boulders is limited within 100 m from shore and within the heights of 10 m. this area corresponds to the storm area. The boulders in the Lanyu Island would not have been transported by the tsunamis but have been moved by the storm waves.

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