

Evaluation of natural break water of coral reefs affected by typhoons in the near future

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Tropical cyclones are one of the most extreme natural catastrophic events over the world and devastate coastal areas affected by floods and coastal erosions. Ryukyu Islands in the northwest Pacific is especially prone to many typhoons every year (Emanuel et al. 2008 Bull Amer Meteor Soc). However, the region is moderately protected from storm surge and wave during typhoons because coral reefs play a role in natural break water. For the last several decades, coral cover and species diversity on coral reef have shown dramatic declines in the region, influenced by global and local stresses (e.g., Hongo and Yamano 2013 PLoS ONE). According to the numerical modeling of global warming at the end of 21 st century, moreover, the mean intensity of tropical cyclones will probably increase significantly in the near future (Meehl et al. 2007 IPCC 4th Report). It is thus of some interest to understand the impact of tropical cyclones on the coastal areas in the region and the evaluation of coral reefs as natural break water.

To calculate a hydraulic force on a natural break water, we measured 9 transects using the echo sounder system (HFD-1000; Hongo et al. 2013 The Quat Res) on from the coast to the reef crest at Ishigaki Island in Ryukyu Islands during November 2013. To evaluate a contribution to reef formation by corals, moreover, we observed species abundance (cover) of tabular corals at the island. We shows that a change of role in natural break water of coral reefs in the island from present to end of 21 st century. Furthermore, we suggest necessary information of corals (e.g., cover and species) for maintenance of natural break water in the near future. The information are like to be one of basic criterion for determination of species in terms of direct transplantation of juvenile or adult corals, if the coral reefs will decline in the near future.

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