



Modeling of low-frequency wave motions on an atoll island during typhoon events

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Low-lying coral reef islands in the South China Sea are often subjected to coastal overwash and flooding during typhoon events. Low-frequency infragravity waves (0.004 – 0.04 Hz) and very low frequency motions (0.001 – 0.004 Hz) have found to be dominant on reefs in high tides and storm conditions. However, typhoon-induced low frequency waves on reef islands are not fully understand. In the present study, a Boussinesq wave model is applied to investigate nearshore wave characteristics around Dongsha Island, the largest atoll island in the South China Sea. Model simulations with high-resolution grids and an extensive spatial coverage allow to examine detailed wave hydrodynamics. Model result shows that wave transformation on the reef flat is greatly influenced by reef bathymetry. Wave refraction on reef flat result in wave focusing on the southern coast. In addition, model results displays highly spatial variability of infragravity waves and very low frequency waves on the reef platform. While high-frequency sea and swell are significant the windward side, low-frequency waves are considerable both at the windward and leeward of the island due to wave diffraction. Nearshore low-frequency wave motions provide critical indicators of the stability of the island beach.