

Extraction of tsunami response functions at small islands by averaging four tsunami spectra

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Tsunami power spectra obtained from the tide gauge records of four Pacific tsunamis, 1952 Kamchatka, 1960 Chile, 1964 Alaska and 2011 Tohoku, were used to extract response function of small islands. The extractions were applied to three small islands, Wake, Johnston and Midway, being located in north-west Pacific. Response function is defined as logarithm of spectral component averaged to the four tsunamis. It was derived for Wake, Johnston and Midway. The power spectra showed wavy ramp function in a log-log expression. The corner frequency is approximated to be 0.1 cycle/min (10 min in period) for Wake and Midway, and 0.032 cycle/min (30 min in period) for Johnston. Difference spectra defined as difference of the averaged spectrum to each tsunami spectrum were obtained to each tsunami. The difference spectra, being approximated as that of tsunami incident to the tide station, were compared with tsunami power spectra obtained at open ocean (DART21413) in the 2011 Tohoku tsunami and at Japanese coast (Ishinomaki, Sendai, Soma, Onahama and Ooarai) in the 2016 Off-Fukushima tsunami on Nov. 21, 2016. The difference spectrum of 2011 Tohoku tsunami at Wake is shown with tsunami spectrum and average spectrum in Fig. 1. At the same time spectrum of DART 21413 by NOAA is shown in the same figure. DART 21413 (30.55N, 152.13E) is located near the source and in the direction of N132E. On the other hand tide station of Wake is distant from the source and has an azimuth of N126E. Both the points have an almost same azimuth angle. The fact that main peaks in difference spectrum reproduce those of DART spectrum supports the response function. A part of tide gauge data is cited from webcites of NOAA and JMA. Author acknowledges the citation to NOAA and JMA.

Keywords: response function, island, tsunami spectra

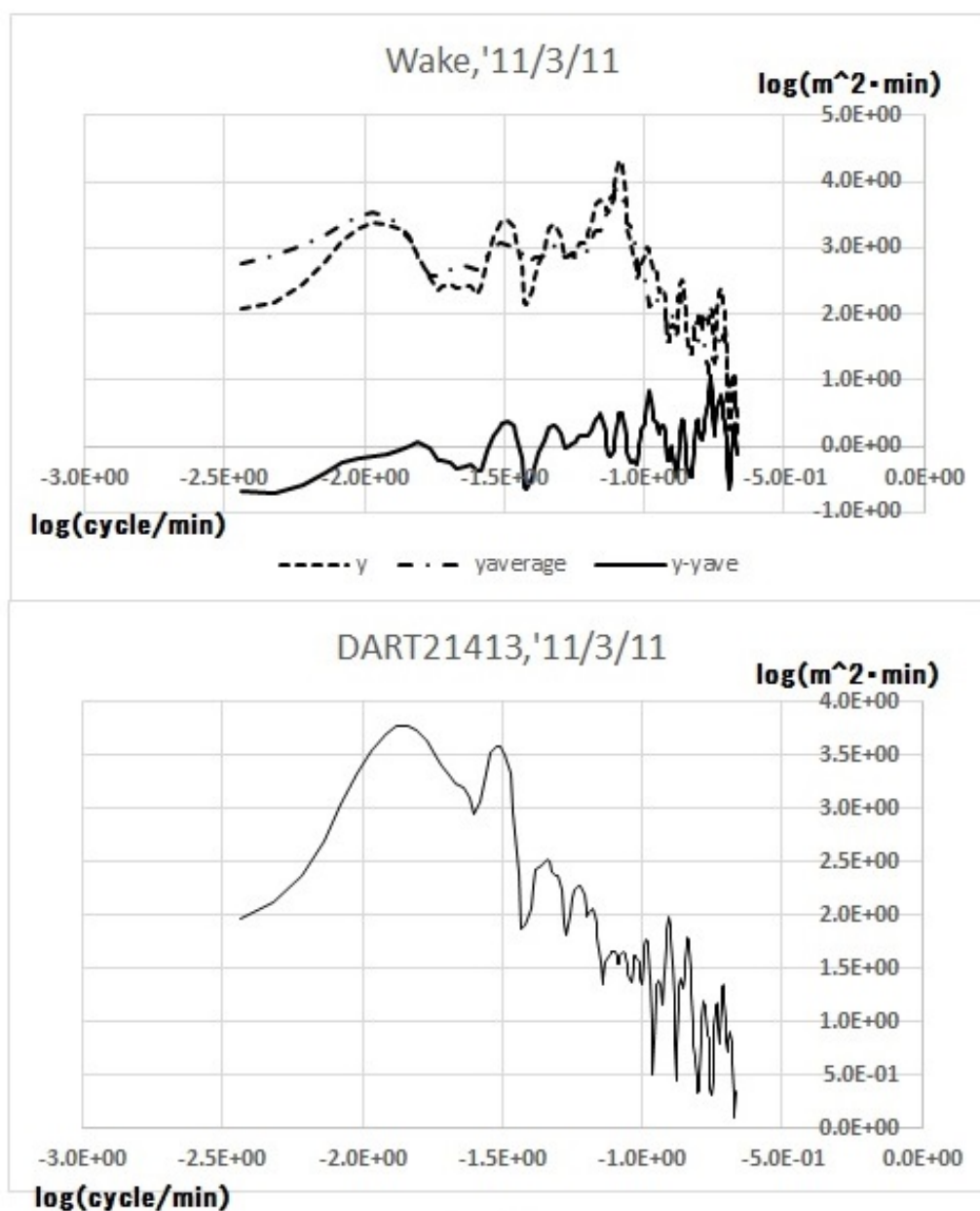


Fig.1