

Observation of azimuth dependence in dominant periods of the 2011 Tohoku Earthquake Tsunami

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Tide gage records of the 2011 Tohoku Earthquake Tsunami observed at tide stations around the Pacific Ocean were decomposed into the spectra. The records of twelve tide stations including Japanese two, Hanasaki and Chichijima, were downloaded from Internet sites, and after reducing the tidal level the spectra were calculated for time duration of 6 hours including the arrival time with time interval of 1 minute. From the energy density spectra dominant period was defined as a period of the maximum value. At the same time spectra of sea level oscillation at quiet sea condition observed at the same tide stations were calculated for time variation of 6 hours before the arrival to detect dominant periods based on the local topography.

As the result it proved that the tsunami brought a change of dominant period larger than 5 minutes in seven cases from those of the quiet sea condition. Generally, the displacement was generated toward an azimuth dependence predicted from the theory (Yamashita and Sato,1974), which is based on the assumption of constant sea depth. In the theory a reverse fault with low dip angle and the length of 450 km, the width of 200 km was assumed, and the spectra were estimated at the distance of 2000km. The theory predicts a variation of the dominant period for azimuth relative to the strike direction. Dominant periods of the tsunami and the seiche are shown in Figure 1 with a predicted curve of 6000m in sea depth. Thus, it is concluded that observed dominant periods showed an azimuth dependence characteristic to the radiation of faulting source.

Keywords: azimuth dependence, 2011 Tohoku Earthquake Tsunami, dominant period, tide gage records

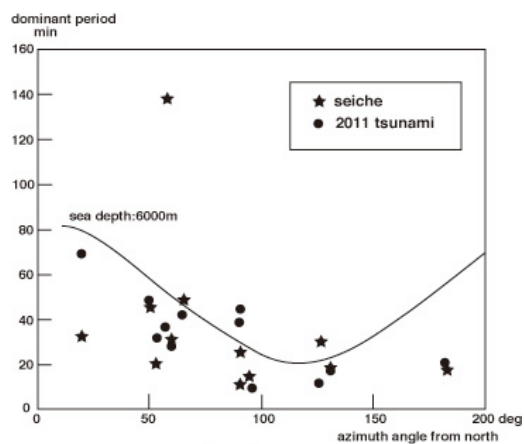


Figure 1