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気象庁父島地磁気観測点で捉えられた２０１１年東北日本太平洋沖地震による津波電磁気シグナル
Magnetic signals from 2011 Tohoku earthquake tsunami observed at Chichijima magnetic station of JMA

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Magnetic fields generated by tsunami from 2011 Tohoku earthquake are observed at the magnetic station on Chichijima, 1200 km south of the epicenter. Vertical component of the magnetic field show a periodic signal with periods of about 20 minutes, lasting more than several hours. The signal starts at 6:55 UTC and the amplitude of the first wave is 1.5 nT. Sea level change recorded at the tide station on Chichijima indicates that the arrival time of the tsunami was 7:15 UTC and the amplitude of the first wave is about 1m. The sea level change is also periodic. The 20 minutes delay of the first arrival of tsunami compared to the magnetic signal can be attributed to shallow water depths around Chichijima, whereas the magnetic change reflects water flows in a wide area around the island. By using the formula by Tyler (2005), the ratio of the magnetic change to the sea level change indicates that the average water depth responsible for the magnetic field is about 1500 m.

Although the dynamo effect of ocean flow is well known and the effects by tidal flow have been frequently observed, observation of the tsunami-induced magnetic field had to be waited until very recently. Seafloor measurement of the induced magnetic field from 2006 and 2007 Kuril island earthquakes were first recorded by the seafloor electro-magnetic observatory (SFEMS) located at North-West Pacific (Toh et al., 2011), and the seafloor geophysical network in the French-Polynesia observed the magnetic fields generated by tsunami from 2010 Chilian earthquake (Hamano et. al, 2011). As for land measurement, magnetic signal from the above Chilean tsunami was detected by the magnetic observatory on Easter island (Manoj and Maus, 2011). Accumulation of these data sets of tsunami-induced magnetic field is very important not only for understanding electromagnetic induction effect of tsunami, but also for monitoring the tsunami propagation and for designing next-generation tsunami-warning systems.

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