2011年東北地方太平洋沖地震 (M 9.0) 近傍の海底電磁力計によって観測された津波による磁場変動

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Geomagnetic variation induced by the great tsunami of the 2011 off the Pacific coast of Tohoku earthquake near the focal area

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We detected an electromagnetic signal induced by the tsunami of the March 11 Tohoku earthquake (M9.0) from the record of an ocean bottom electrometer deployed at 39-03.5’N, 144-48.5’E (seaside of the Japan Trench). The OBEM was deployed by the R/V ”””Kairei””” in Novermber 2010 for a project aiming to image the electrical resistivity distribution across the NE Japan arc (See Ichihara et al., poster presentation in this meeting). . After the earthquake occurred, the OBEM was recovered by R/V ”””Natsushima””” in May 2011. The recovered OBEM successfully recorded three components of geomagnetic time series for six months except for the electric field data after one month from the start. In the magnetic field, a sharp pulse-like anomaly was recognized soon after the earthquake. The anomaly in the horizontal magnetic field shows a unipolar waveform with the amplitudes of 13 and -5 nT in the north and east directions, respectively. The anomaly in the vertical magnetic field precedes that of the horizontal field and shows a bipolar waveform. These features are well explained by the theoretical tsunami induced waveform based on Sanford (1971). In addition, the waveform in the horizontal components, which is expected to be proportional to the sea level change by tsunami, is similar to the sea level data of cabled ocean floor pressure gage that show sharp pulse-like sea level change (e.g. Maeda et al., 2011). Therefore, we conclude that these magnetic anomalies were induced by the particle motion of conductive seawater by the tsunami propagation. Based on these geomagnetic data and observatories for sea level changes settled in the landside of the Japan Trench, we will discuss about the generation of the tsunami.