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2011年東北地方太平洋沖地震の震源域直上における海底圧力観測 In-situ observation of ocean-bottom pressure in the source region of the 2011 off the Pacific coast of Tohoku Earthquake

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The 2011 off the Pacific coast of Tohoku Earthquake of March 11, 2011 killed more than 25,000 people living near the coast off Tohoku Japan. The earthquake generated a tremendous tsunami; the tsunami height near the coast reached over 10 m. The highest impulsive crest of the tsunami was generated near the trench [Hayashi et al., 2011]. Tsunami generation by an earthquake in a subduction zone is generally modeled by water surface displacement identical to the vertical deformation of ocean bottom, especially inner trench slope near a trench due to the earthquake. Here we show an uplift of five meters near the toe of the inner slope along the Japan Trench; the uplift is caused by the M9.1 event. The pressure gauge also recorded an uplift of 20 mm accompanied with the M7.3 foreshock of March 9, 2011, which is well consistent with the calculated uplift from the model reconstructed by landward GPS data. The pressure gauge could record continuous data for a year with a logging interval of 30 s. The sensors were recovered by a pop-up system after the mainshock. After the earthquake, large disturbance appear it may be caused surrounding environmental change by ground shaking. The distinct negative offsets clearly appear the between before and after the foreshock and the mainshock. The negative pressure changes represent uplift of the observation point. The calculated pressure change reached 2 and 500 hPa (20 and 5000 mm), respectively. The pressure gauge was located near the source area of the impulsive tsunami accompanied with the mainshock. We successfully obtained the in-situ pressure change that is accompanied with the megathrust event and related to the tsunami generation.

キーワード: 海底地殻変動, 海底圧力

Keywords: seafloor geodecy, ocean bottom pressure