

Trapped sediment in Ocean Bottom Seismometers - The 2011 Tohoku-Oki Earthquake and earthquake-induced turbidite

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We recovered 17 ocean bottom seismometers (OBSs) after the 2011 Tohoku-Oki Earthquake (Mw=9.0), and collected sediment samples from the OBSs, off Miyagi region. All these OBSs had deployed before the earthquake in order to observe seismic activities, and recovered during five cruises conducted from March to December, 2011. Particularly, three OBSs have recovered just after the occurrence of the earthquake, during R/V Kairei (JAMSTEC) KR11-05 Leg2 cruise, (14 - 31 Mar., 2011). All 17 OBSs were filled with greenish dark-gray soft sediments. We analyzed grain-size and benthic foraminifers of 14 OBS-fill sediment samples, and also analyzed multi-narrow beam echo sounder (SeaBeam 2112) data collected during KR11-05 Leg2, KR11-E03, and KR11-E05 cruises of R/V Kairei, to delineate bathymetry in detail. These sediment samples are composed of clay to coarse-sand, and the grain-size of the sediment decreases from the continental shelf to trench (Arai et al., 2011). Miura et al. (2011) interpreted these sediments were derived as turbidite induced by submarine landslide; however, our analyses of SeaBeam bathymetric data do not show distinct scars of landslides on the continental shelf to mid-slope terrace, off Miyagi. Moreover, the shallowest OBS (depth=299m) on the gentle slope (less than 2-degree) was filled with sediments. Arai et al. (2011) proposed that large tsunamis eroded continental shelf and induced the turbidity currents, on the basis of grain-size analysis of the OBS-fill sediments and sediment samples by Shinkai 6500 and Deep-Tow of R/V Yokosuka. Such OBS-fill sediments have not recovered previous long-term (several months ? one year) observations by same type of OBSs, for example, around the Nankai Trough. Additionally, OBSs on the landward slope of Japan Trench deployed after the 2011 Tohoku-Oki Earthquake were not filled with sediments. On the basis of these observations and analyses, we infer these OBS-fill sediments are derived by large scale turbidity currents, from the shallow part of continental shelf, off Miyagi. Probably these OBSs trapped these wide-spread turbidites induced by 2011 Tohoku-Oki Earthquake and tsunamis.

<References>

Arai et al. (2011) 2011 Annual Meeting of the Sedimentological Society of Japan, Abstract, P34.

Miura et al. (2011) 118th Annual Meeting of the Geological Society of Japan, Abstract, R12-P4.

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