

Dynamics and sedimentary processes of the turbidity current generated by the 2011 Tohoku Oki Tsunami

NARUSE, Hajime^{1*}, ARAI, Kazuno², MIURA, Ryo³, KAWAMURA, Kiichiro⁴, ITO, Yoshihiro⁵, HINO, Ryota⁵, INAZU, Daisuke⁵, YOKOKAWA, Miwa⁶, IZUMI, Norihiro⁷, MURAYAMA, Masafumi⁸, KANAMATSU, Toshiya⁹

¹Kyoto University, Graduate School of Science, ²Chiba University, ³Nippon Marine Enterprises, Ltd., ⁴Yamaguchi University, ⁵Tohoku University, ⁶Osaka Institute of Technology, ⁷Hokkaido University, ⁸Kochi University, ⁹JAMSTEC

On the basis of the sea-floor sediment cores, records in ocean bottom seismometer and ocean bottom pressure observation, it was suggested that large-scale tsunamis influence deep-sea floor by generating turbidity currents. Tohoku Oki Earthquake (Mw 9.0) and subsequent large tsunami occurred at March 11 2011. Eastern Japan such as Sanriku Coast was severely damaged by the inundation of the tsunami. Coasts and levees were largely eroded by the tsunami waves. On the other hand, we revealed that the broad region of sea-floor from the shelf to the trench slope was covered by the muddy event deposit. OBP and OBS record suggests that the event deposit was transported by a turbidity current generated from the suspended sediment cloud caused by the tsunami wave. The current reached the OBP site that locates 70 km off Sanriku Coast 3 hours after the earthquake, and it was sustained at least 2.5 hours. The head velocity was approximately 5.5 m/s, and the sediment concentration was tentatively estimated as 0.9 ? 2.6 vol.%. The turbidite ranges from 0.3 cm to 15 cm in thickness, and consists of clay to coarse sands. This study reports on the distribution and the detailed characteristics of the turbidite, and estimates the morphodynamics of the tsunami-generated turbidity current.

Keywords: tsunami, turbidite, turbidity current, morphodynamics