Origin of submarine event deposits by the 2011 Tohoku earthquake and tsunami: from benthic foraminiferal assemblages

Kazuko Usami1, Ken Ikehara1, Robert Jenkins2, Juichiro Ashi3

1Geological Survey of Japan, AIST, 2Kanazawa University, 3Atmosphere and Ocean Research Institute, University of Tokyo

Tsunami by the 2011 off the Pacific Coast of Tohoku Earthquake brought significant damage along the northeastern Japan coast. We conducted a marine survey cruise (KT-11-17) to clarify the influence of earthquake/tsunami to sea bottom environments, off Sanriku, northeastern Japan, July-August, 2011. As the results, we found the 2011 earthquake- and/or tsunami-induced turbidites at 13 sites from outer shelf to trench slope off Sanriku. At two sites from slope (893 m and 1446 m in water depth), the turbidites have sharp erosional bases, and upward-fining graded structures started from very fine sand-coarse silt.

The surface layer of the turbidite mud at the shallower site (893 m) includes the major foraminiferal species in the outer shelf (Uvigerinella glabra and Elphidium clavatum). The possibility of inflow from outer shelf to the site by earthquake- and/or tsunami-induced turbidity currents is inferred from the benthic foraminiferal assemblages. The Basal sands of the turbidite at the deeper site (1446 m) include abundant Takayanagia delicata; and the turbidite mud include abundant Stainforthia apertura. Both species are reported by previous studies on living benthic foraminifera off Sendai as dominant species in water depth 550 m - 900 m. It is suggested that the sediment was transported from several-hundred meters shallower water depth than the site.

Keywords: event deposit, earthquake, tsunami, turbidite, marine sediment, foraminifera