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Offshore active fault of the Nagaoka-heiya-seien fault zone revealed by high-resolution seismic profiles

Takahiko INOUE^{1*}, Fumitoshi Murakami¹, Yukinobu Okamura², Atsuko Amano¹, Ken Ikehara¹

¹GSJ, AIST, ²AFERC, AIST

National Institute of Advanced Industrial Science and Technology (AIST) carried out a high-resolution multi-channel seismic survey using Boomer and a 12 channel streamer cable (developed by AIST) in the coastal shallow sea area, in order to clarify distribution and activity of faults in coastal area off northern Niigata. And the 40 meters length boring cores were obtained at 25 meters in depth on seismic survey lines. We report that the deformations along the active faults are found in the northern offshore area of the Nagaoka-heiya-seien fault zone in the study area. The most remarkable reflection surface in the seismic profiles is erosional surface at the Last Glacial Maximum (LGM). This reflection surface is recognized by the boundary between the muddy sediment and the sandy sediment in the boring core. Holocene sediments cover the erosion surface that is distributed under the shelf and the sediments thin toward offshore.

The Kakuda-Yahiko fault in the northern part of Nagaoka-heiya-seien fault zone is west-dipping reverse fault with the high slip rate along the western margin of the Niigata Plain. In seismic profiles across the fault, the flexures like deformation in the Holocene sediments continue in the N-S direction along the syncline axis shown Okamura et al. (1995) for more than 25 kilometers. The vertical offset of the flexures on the LGM erosion surface is larger than those on the reflections in the sediments covering the erosion surface and the offset decrease upward. This growing deformation indicates that fault recurrence is several times in the last 10000 years and we inferred the mean vertical-slip rate that is estimated around 2~3 m/kyr based on these profiles and core samples.

Keywords: Offshore active faults, high-resolution seismic profiles, Nagaoka-heiya-seien fault zone, coastal zone, fault activities