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Deformation structure around the Sagami Knoll and Manazuru Knoll observed by seismic reflection data

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Great earthquakes (e.g., the 1923 Great Kanto earthquake, the 1703 Genroku earthquake) have frequently occurred in the Sagami Trough, including Sagami Bay, causing very strong vibrations, large tsunamis, and serious damage around the Kanto and Tokai areas. In January 2010, we conducted a multi-channel seismic reflection (MCS) survey in Sagami Bay using the *R/V Kairei* of the Japan Agency for Marine-Earth Science and Technology. The survey lines were set according to the drilling sites proposed for the IODP (Integrated Ocean Drilling Program) expedition of the Kanto Asperity Project.

The following results were obtained from seismic reflection data. The Manazuru Knoll was formed as an asymmetrical anticline and its height difference is smaller towards the east. The Manazuru Knoll forms a Z-shaped bend toward the south near its eastern end, with its easternmost point located at the bottom of the Sagami Knoll. The offset distance of the strike of the Z-shaped fold is approximately 7 km. According to the results of seafloor geodetic observation in Sagami Bay (Saito et al., 2008), Sagami Bay has been moving to the northwest at a speed of 4.1 cm/year. From the results of seafloor geodetic observations and the offset distance of the Manazuru Knoll, the formation of the L-shaped bend has taken approximately 0.17 Ma. Furthermore, the growth of a reverse fault that is related to the formation of the Manazuru Knoll is clearly confirmed on the west and south sides of the knoll. This reverse fault formed when the Manazuru Knoll was forming by the relative motion of the Philippine Sea Plate to the north. When the relative motion of the Philippine Sea Plate shifted northwest, strike-slip plate motion occurred near the survey area resulting in the Z-shaped bend of the Manazuru Knoll. Moreover, the knoll on the west side of plate boundary is thought to have moved to the northwest. Subsequently, the Sagami Knoll is assumed to have accreted to the easternmost part of the Manazuru Knoll. This may explain the differences in the geological ages of the north and south regions of the Sagami Knoll obtained from dating of calcareous nanofossils (Kanie et al., 1999). Inside the Sagami Knoll we identified a clear reflector inclined toward the northeast from the western margin of the knoll. The inclination angle of this reflector becomes high toward the north. Compared with the results of the two-ship seismic reflection survey in the Sagami Trough (Sato et al., 2010), this reflector is believed to be part of a splay fault from the plate boundary, which is the extension of the Kozu-Matsuda fault. The reflector from the Philippine Sea Plate, which is estimated to be just below the knoll, returns a very weak seismic signal and the location indicated that it deepens gradually toward the north.

Keywords: Sagami Knoll, Seismic reflection survey, Manazuru Knoll, Sagami Bay, Kanto Asperity