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Fault distribution and shallow structure around the Boso escarpment in the Sagami Trough

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Around the Boso Peninsula, central Japan, the Philippine Sea (PHS) plate is subducting beneath the Honshu Island along the Sagami Trough and the Pacific Plate is subducting beneath the PHS plate and the Honshu Island along the Japan Trench. The area offshore Boso Peninsula has very complicated geological histories by the influence of highly oblique convergence of the PHS plate and collision of the Izu-Bonin Arc since 15Ma. The geologic body of this region is composed of accretionary complex, some part of which is exposed in the Miura and the southern Boso Peninsulas. The geologic body of the offshore Boso Peninsula is also considered as the accretionary complex. Moreover, this area is accompanied with the seismogenic zone in which the great earthquakes such as the 1703 Genroku and 1923 Taisho Kanto earthquakes repeatedly occurred. Additionally, the tsunami and crustal movements also occurred together with earthquakes in this area. In the case of the 1703 Genroku earthquake, it is indicated that the tsunami height at the eastside coast of the Boso Peninsula was a maximum of about 10 m. From this result, it is thought that the earthquake fault of the Genroku event exists around the Boso escarpment. However, the fault distributions around the Boso escarpment have not been yet well understood.

The objective of this study is to elucidate the shallow structure and fault distribution around the Boso escarpment in the Sagami Trough using various kinds of data sets as the swath bathymetric map, IZANAGI side-scan imagery, Multi-Channel Seismic (MCS) reflection profiles, and Single-Channel Seismic (SCS) reflection profiles. These data sets were acquired by JAMSTEC, Japan Coast Guard and ORI, Univ. Tokyo, respectively.

Around the Boso escarpment, geomorhological lineaments were recognized in swath bathymetric map and side-scan sonar imagery. These lineaments are interpreted to be continuous fault scarp morphologies. These lineaments are distributed in the form of the en echelon arrangement in the W-E or WNW-SSE directions. MCS profiles of the area offshore Boso Peninsula provided very clear images of the upper boundary of PHS plate (UPHS) and the forearc area of the Honshu arc composed of the accretionary complex. Landward dipping faults were recognized in the accretionary prism between the Boso and the Katsuura canyons. These faults are distributed along the Sagami Trough and interpreted as splay faults branched from UPHS (Kimura et al., 2009). A number of the splay faults were reached near the seafloor around the top of the Boso escarpment. The seafloor configuration around one of the splay faults clearly indicates that this fault deformed the seafloor recently. The sedimentary basin located above a splay fault shows some evidences of crustal movement: landward tilted reflectors, unconformity with onlap by uplifting and deformations of the shallow part of the basin sediment and the seafloor. These results suggest that the sedimentary basin have been affected by repeatedly faulting. Additionally, faults beneath the sedimentary basin are active.

Keywords: Kanto earthquake, Active fault