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Second report on the Deep Seismic Profiling "Northern Mino Transect(NORM)2009" in the NW part of Central Japan

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Beneath the northern Mino district, north-western part of central Japan, configuration of the subducting Philippine Sea Plate (PHS), concentration of active faults and the biggest hinge in the mega kink structure of the Mino belt are considered to be strongly related. In order to reveal the whole crustal structure and the geometry of the upper surface of the Philippine Sea Plate (PHS), the Deep Seismic Profiling, "Northern Mino Transect 2009" (NORM) was carried out there from September 30 to October 20 in 2009.

We set a 90km-long survey line which was divided into two segments, western part having E-W trend and eastern part having SW-NE trend. The seismic line intersected at high angle with the two major active faults, i. e. Yanagase and Neodani faults. Receivers were arranged with an approximately 50m intervals. 8 dynamite shots and 2 Vibroseis shots were used as powerful sources.

After applying a conventional reflection method, a distinctive deep reflective zone was recognized from the western to the eastern ends of the seismic line. As it occurs at two way travel time (TWT) 8 - 11s in the west segment, and at TWT 9 - 12s in the east segment. Further, intermittent reflections can be seen at 2s later than the reflective zone.

To clarify the cause of these reflections, we compared the feature of the NORM profile with those of the other profiles which were obtained in the Kinki district, central Japan; one is the 1989 Fujihashi-Kamigori(FK) profile and another is Shingu-Maizuru(SM) profile.

FK seismic line was located in the northern part of Lake Biwa with E-W trend. Total length of survey line was about 210km and its receiver interval was approximately 1.6km. It had four dynamite shots. In FK profile, we found a reflective zone around approximately TWT 9-11s and the reflective zone continued toward the west. Since the western end of our NORM line was overlapped with the eastern end of FK line, this reflective zone is considered to be the western extension of our distinctive reflective zone. The reflective zone seen in FK profile can be also traced in SM profile which intersects with FK profile. In the previous study, this reflective zone was interpreted as lower crustal lamination because its depths and reflection pattern. Thus distinctive reflections were interpreted as lower crustal lamination which was widely found in areas of Inner Zone because of the continuity.

Intermittent reflections were seen beneath the distinctive reflection zone, but the amplitudes of these phases were quite small. The candidate reflectors of these reflections are the top boundary of the PHS plate or the plate Moho. Although we have no information to judge which candidate is valid to explain the reflections, if these reflections were waves in association with the PHS plate, it means that the very thin mantle wedge is sandwiched between the Moho of the land plate and the top boundary of the PHS plate.

Keywords: Philippine Sea Plate, Neodani fault, seismic reflection survey, lower crust, Mino belt