

The crustal structure beneath northern Mino region, central Japan revealed by seismic reflection survey

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The Nobi earthquake, the largest inland earthquake in Japan, occurred in 1891 in northern Mino district, central Japan. In that region, most active faults run nearly parallel to the NW-SE trending hinge of megakink structure of the Mino belt (Kano et al., 1990). It is remarkable that the upper surface of the subducting Philippine Sea Plate (PSP) also shows a NW-SE trending broad anticlinal form whose axial zone is deeply situated almost below the hinge of the megakink. However we don't have sufficient information about seismic structure of whole crust and the uppermost mantle beneath this region to discuss influence of subducting plate on surface deformation.

To elucidate the seismic structure, a seismic reflection survey was carried out in October in 2009 (Komada et al., 2010). The survey line intersected at high angle with Neodani faults zone. We applied the seismic reflection method to the shot records of this survey and got seismic profiles of whole crust and the uppermost mantle.

We found reflectors having 2 s duration around 10 s two way travel time (TWT) in the seismic profiles. These waves occurred at TWT 9 - 11 s in the southwestern part of the study area, and at TWT 10 - 12 sec in the northeastern part. Applying depth conversion, the reflectors are located in the depth of 28 - 37km in the southwestern part, and of 32 - 39km in the northeastern part. We can clearly see that the depth of the reflection waves in the southwestern side of the Neodani fault zone are shallower than that in the northeastern side. Further the depth varies just beneath the Neodani fault zone. These feature correspond with the result of velocity analysis in the study area (Emoto et al., 2012).

Those reflection waves are interpreted as a lower crustal lamination by comparing with the result of previous seismic profiles. The geometry of laminated lower crust is consistent with the trend of the displacement on Nodani Fault Zone of Nobi earthquake. The fact might show that the difference of the reflectors depths between the southwestern and the northeastern side is caused by fault displacement and it might reach the whole crust. In southwestern part of study area, the depth of top boundary of the Philippine Sea plate (PSP) was estimated from travel time tomography in the previous studies. Its depth is equivalent in the lower limit of the lower crustal lamination. Then it might show that the crust of the land plate contacts on the subducting PHP beneath the northern Mino district.

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