Improvement in image of the Philippine Sea slab beneath the northern Izu-Tanzawa Collision Zone by fan-shooting reflection method

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Beneath the northern Izu-Tanzawa collision zone, the shape of subducting Philippine Sea slab was not clear, because seismic activity is extremely low. But the seismic survey (Daidaitoku2005) presented firstly the prominent image of the slab subducting down to 40km in depth and gives at last a clear solution that the subducting slab really exists although it is aseismic (Sato et al., 2006). Since all strong shots of Daidaitoku2005 were recorded along the other seismic survey (Itoshizu2005) (Ikeda et al.,2006) almost perpendicular to that of Daidaitoku2005, CMPs were distributed widely between the two lines as fan shooting data. Thus the three-dimensional image of the slab is obtained with the fan shooting reflection method, which gently dips northwestward down to about 45 km deep(Kikuchi et al.,2006). In this presentation we introduce the improvement in the image of the slab with high accuracy processing method for the fan shooting data.

Despite the fan shooting data distributed over the three dimensions, but the data density is not enough to be applied on the conventional three-dimension seismic reflection processing. Therefore Kikuchi et al.(2006) used the wide-angle reflection method for the fan shooting data as follows. At first they processed to NMO collection every shot points based on single-fold reflection method. Next they picked out reflection points related to the upper surface of the Philippine Sea slab every the section. The extracted three-dimensional data were converted from time to depth and corrected by three-dimensional Dip Move-Out correction and three-dimensional migration calculated from a quadric fitting. Thus they got true reflection points of the upper surface of the Philippine Sea slab from the picking data.

We introduce an application of the conventional three-dimensional seismic reflection method to fan shooting data. However, the fan shooting data distribution is too sparse to be difficult to apply as it is. Therefore we use as same method extracting reflection points as Kikuchi et al.(2006), and convert wave from the data The converted wave is applied with three-dimensional Dip Move-Out correction and three-dimensional migration. As a result, we can get the image of the true reflection points as the envelope of the data distribution. Thus the image of the upper surface of the Philippine Sea slab is obtained, which gently dips northwestward down from 20 to 40 km deep.

In other words there is a different in three-dimensional DMO correction and three-dimensional migration process by the space-time integral calculation on the wave data and the geometric calculation on the picking data. The result of this study shows improved image than the Kikuchi et al.(2006) in detail. Through these comparisons, we discuss about the availability of the fan shooting reflection survey and introduce the images of the Philippine Sea slab provided by two different processing.