

Reflection traveltimes mapping method for imaging lithospheric scale reflectors.

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Wide angle seismic experiments data have been usually analyzed using conventional traveltimes analysis methods; solving an observation equation of traveltimes by the trials and errors or the inverse approach. Although these conventional methods using first arrivals are useful to determine average P-wave velocities, it is difficult to determine the geometry of interfaces, such as a plate boundary. To determine the interface geometry well, reflection traveltimes are required as well as first arrivals.

However, to use reflection traveltimes in the conventional traveltimes analysis method, accurate velocity structures are required in advance, because reflection phase identifications are indispensable. This is a crucial problem especially in the horizontally heterogeneous structures, such as the subduction zone.

Recently, both of quality and quantity of seismic surveys using Ocean Bottom Seismometers (OBSs) have been improved. Then, we have

developed a new method to image lithospheric scale reflectors by mapping directly reflection traveltimes onto the velocity structure. This new method is based on the same principle of the diffraction stacking method. A reflection point of each reflection traveltimes is plotted as a diffraction contour not as a single point, but the true reflection point will be strongly imaged after stacking many diffraction contours of reflection traveltimes. Since a diffraction

contour of a reflection traveltimes doesn't depend so much on the velocity structure than a reflection point, this new method is more stable to image reflectors than the conventional traveltimes analysis method. Moreover, as reflection phases from the same point observed at different observatories will be mapped onto the same point, it is easy to group reflection phases. The grouping information will help to identify the reflection phases.

In this presentation, we will show the effectivity and credibility of this new method by using numerical experiments and practical experiment data in the Japan Trench region.