

## Horst-graben structure subducting beneath the Izu-Ogasawara trench from Multi-channel seismic data

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In the east of the Izu-Ogasawara trench near the Boso triple junction, two earthquake swarms occurred in 2005. A relation between the seismicity and the crustal structure has not been clear yet. The National research Institute for Earth science and Disaster prevention (NIED) deployed a Multi-channel reflection survey crossing the Izu-Ogasawara trench in 1991. The purpose of this study is to obtain a clear cross section across the Izu-Ogasawara trench by re-analysis of the Multi-channel data. From the result, we reveal the relation of swarm and structure and understand characteristics of this subduction system.

The survey specification is shown as follows. The survey line had a length of 170.8 km and crossed the Izu-Ogasawara trench in the ENE-WSE direction. The source was an airgun with a volume of 3,560 cubic inch. The airgun was fired in 106.64m interval. The total number was 1,626. The receiver was a multi-channel streamer with 150 channels whose intervals were 26.66 m. Data was recorded for 20 seconds with a sampling interval of 4 msec.

In our re-analysis process, we have performed dense velocity analysis (2km interval) and Dip MoveOut (DMO), correcting for the effects of dip, in addition to conventional processes. After migration and depth conversion process, we obtained a final cross section.

The characters of the seismic cross section are shows as follows. Horst-graben structure has well developed on the surface of the Pacific plate. The vertical steps between horst and graben gradually become larger toward the trench. Particular, an abrupt increase occurs at the inflection point of the plate. Such horst-graben structure is observed to subduct beneath the thick trench fills. In contrast, oceanic sediments are formed regularly and layered horizontally beyond 80km apart eastward from the trench. In the west of the trench, a slope of the Philippine Sea plate shows a steeper dip than one of the Pacific plate, suggesting that slope failures occurred and filled the trench with thick sediments. Accretionary prism has not well developed on the Philippine Sea plate.

Next, earthquake swarms as described above are projected to the seismic section. The hypocenters concentrate near the inflection point of the plate. Most of mechanisms of these earthquake swarms indicate normal fault types with E-W or NE-SW tension axes. The mechanisms correspond with normal faults constituting horst-graben structure, which suggests that earthquake swarms would be caused by activation of the normal faults; the horst-graben structure is just growing in the seismic swarm area.

Absent accretionary prism would indicate superiority of the tectonic erosion process to accretionary process in the Izu-Ogasawara trench. If curvature of the Pacific plate involves the development of horst-graben structure, it may decide the balance between tectonic erosion and accretionary process.