Location of a scatterer deduced from ocean bottom seismograph experiment

Yoshio Murai [1], Satoshi Akiyama [2], Tadashi Yamashina [3], Asako Kuwano [4], Hideki Shimamura [1]

[1] Institute of Seismology and Volcanology, Hokkaido Univ., [2] Inst.Seismology and Volcanology,Sci.,Hokkaido Univ., [3] Inst. Seismology and Volcanology, Sci., Hokkaido Univ., [4] ISV, Hokkaido Univ.

http://shimpc.sci.hokudai.ac.jp/murai.html

In 1998, we conducted an ocean bottom seismograph experiment in the Sea of Japan northwest off Shakotan Peninsula, Hokkaido. Bearing in mind the principle of reciprocity, we determined directions and magnitudes of slowness vectors of incoming waves across the shot array of airguns by using the semblance analysis. We can detect a coherent wave train after the direct water wave and the reflection phase. This result indicates that the wave train comes from the local scatterer located 5.7 km southwest of the seismograph and 6.2 km in depth beneath the sea bottom. The scatterer may be a fault beneath the sea bottom. It may be possible to obtain realistic crustal structure by analyzing scattered waves in addition to seismic refraction profiling.

In 1998, we conducted an ocean bottom seismograph (OBS) experiment in the Sea of Japan northwest off Shakotan Peninsula, Hokkaido. Bearing in mind the principle of reciprocity, the seismograms caused by a shot array of airguns at the sea surface and recorded at a single OBS station are identical to the time series that would be recorded by an array of receivers at the shot locations if an airgun shot were fired at the location of the OBS. The array system consists of 10 airgun shots and dimension is about 600m. We determined directions and magnitudes of slowness vectors of incoming waves across the shot array of airguns by using the semblance analysis. We can detect a coherent wave train after the direct water wave and the phase reflected at a discontinuity beneath the sea bottom. This result indicates that the wave train comes from the local scatterer located 5.7 km southwest of the OBS and 6.2 km in depth beneath the sea bottom. The scatterer may be a fault beneath the sea bottom. It may be possible to obtain realistic crustal structure by analyzing scattered waves in addition to seismic refraction profiling.

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