

STT071-10

Room: 201A

Time: May 27 11:30-11:45

Recent advances in onshore-offshore seismic survey in Japan

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The deep geometry of active faults and crustal structure in the marine-land transition zones are the key issues for evaluating the risk of destructive earthquakes and improving the reliability of predicted strong ground motion.

Deploying Ocean Bottom Cable (OBC) system is one and only way to accomplish complete connection of land seismic line and marine seismic line. OBC system is also suitable for deep seismic profiling across transition zone, because stationary array of receiver stations can collect signals from all the land seismic energy sources at the same receiver points and low noise environment at sea floor make it possible to detect very low level signals from source points faraway from the coast line. In the last few years, dual-sensor-OBC systems using MEMS (Micro Electronics Mechanical System) accelerometers have become available, and we can obtain sea floor 4C data in dense array at economically acceptable costs.

In the inshore area around Japan, it is virtually impossible to tow long streamer cable because of heavy traffic and high fisher activity. Two-vessel seismic exploration is practically the only solution to large-aperture reflection data acquisition for deep seismic profiling in the inshore area. In the two-vessel seismic exploration, land seismic stations can record multiple shots during the sequence of various offset acquisition patterns on the same survey line, and consequently high quality wide angle reflection data can be accomplished by stacking those shot records.

In this presentation, we will demonstrate the effectiveness of above mentioned seismic acquisition techniques, showing field data obtained by recently conducted surveys in Japan.

Keywords: reflection seismic survey, marine-land transition zone, two-vessel seismic exploration, Ocean Bottom Cable, refraction seismic survey