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海底地震計記録を用いた Po-to-s 変換波の抽出
Extraction of Po-to-s converted waves from OBS records

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Po/So wave has been frequently observed by ocean bottom seismometers (OBSs) at frequencies higher than 2 Hz with long wave duration, e.g., a few hundred seconds. These waves are primarily generated by earthquakes within subducting slabs, and propagate along the mantle in the oceanic plate for long distances due to scattering effects. With propagating within the mantle, a part of Po and So wave energies goes upward through the oceanic crust and sediment from the mantle, and are observed at the seafloor. This implies that P-to-s and S-to-p converted waves should be generated at the Moho and basement below the observation sites in the case that the impedance contrast at the boundaries is large. Here, in order to extract such P-to-s (Pos) converted phases from Po coda waves, we deconvolved records in the vertical component from ones in the radial component for Po coda portion, i.e., receiver function (RF). If such converted waves are extracted, it would greatly contribute to understand in details seismic structure for oceanic crust and sediments.

We used records of earthquakes during 2010-2014 with magnitudes greater than 5.5 and epicentral distances less than 30^o, which were observed at 18 broadband OBSs deployed by NOMan project. We selected Po records with good S/N, and hand-picked their arrival times. For deconvolution, the time window was set to be -2 ~ 25 s from the arrival time of Po wave. The used frequency was 2-5 Hz. As a result, we totally collected 1063 traces from 233 events.

RF traces showed clear Ps converted phases from the basement and Moho. In addition, they showed PwPs from the basement and Moho. Here, PwP is the first water reverberation, and PwPs is P-to-s reflected wave from interfaces below the seafloor. At the seafloor, upgoing P wave incidence mainly generates upgoing transmitted P wave and less downgoing reflected P wave. As a result, P-to-s converted waves associated with PwP are often emerged in the RF traces in the seafloor observation.

Since the location of OBSs deployed by NOMan project is good for collecting earthquakes from the Aleutian, Kuril, Japan, Izu-Ogasawara, and Mariana trenches, the back azimuth coverage of Po wave is excellent. Also, since higher frequency components are enough in Po coda waves, RF traces showed clear converted phases, which enable us to investigate seismic structure of oceanic crust and sediment in details.