

SCG059-09

Room:105

Time:May 26 14:15-14:30

Receiver function for ocean bottom seismograms

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We introduce a receiver function which is appropriate for ocean bottom seismograms to image the seismic structures below the stations. It is an application of the receiver function proposed by Takenaka and Murakoshi (2010, AGU) for deep borehole records, which is an extension of "S-wavevector receiver function" (SWV-RF), originally introduced for ground surface records by Reading et al. (2003, GRL). Standard receiver function obtained by deconvolving a horizontal record with the vertical record of a teleseismic P wave and its coda, includes the contribution of the sea surface (free surface). The sea surface reflection phases mask the original signals from the subsurface interfaces. The free surface contribution is contained much larger in the down-going components of the seismic wavefields than the up-going ones. The SWV-RF uses only the up-going components, which is defined as the deconvolution of the up-going S-wave component with the up-going P-wave one. In this study we propose a method for extracting up-going P and S waves from the observed seismograms at the ocean bottom stations to calculate the SWV-RFs for borehole and ocean bottom stations based on the structure models from the top to the receiver level. If we have a structure model below the receiver level, we can also calculate the SWV-RFs at any levels (virtual receivers) below the ocean floor. In the presentation we apply this method to synthetic waveform data for a 3D trench-junction model to illustrate the effectiveness of the SWV-RF.

Keywords: receiver function, ocean bottom station, teleseismic body wave