Rayleigh admittanceを用いた１次元S波速度構造インバージョン
The one dimensional S-wave velocity structure inversion using Rayleigh admittance

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A cabled seafloor network with 20 stations (DONET: Dense Oceanfloor Network System for Earthquake and Tsunamis) has been constructed on the accretionary prism at the Nankai subduction zone of Japan between March 2010 and August 2011, which means that the observation period became more than 4 years. Each station contains broadband seismometers and absolute and differential pressure gauges. In this study, we estimated the Rayleigh admittance at the seafloor for each station, i.e., an amplitude transfer function from pressure to displacement in the frequency band of microseisms, particularly for the fundamental Rayleigh mode of 0.1–0.2 Hz. The pattern of the transfer function depends on the S-wave velocity structure at the sediment beneath stations (Ruan et al., 2014, JGR). Therefore, we estimate one-dimensional S-wave velocity structure beneath each station, and investigate lateral variation of the accretionary prism in the Nankai subduction zone.
We used the Rayleigh wave records of earthquakes with magnitude greater than 6.5 and within an epicentral distance of 30º. At each station, the velocity seismogram was converted to the displacement seismogram by removing the instrument response. The pressure record observed by the differential pressure gauge was used in this study because of a high resolution of the pressure observation. In the frequency domain, we estimated the amplitude transfer functions of displacement/pressure for each event, smoothed it using a Parzen window with a frequency band of 0.01 Hz, and stacked them over all of the used events. For inversion, we employed a simulated annealing technique to estimate one-dimensional S-wave velocity structure, in which the predicted admittance was calculated through a software of DISPER80 (Saito, 1988).
Because we used a broad frequency range (0.03–0.15 Hz), the velocity structure down to 10–20 km depths could be estimated. In particular, at depths from the seafloor to 5 km, the error of the estimated velocity was small compared with those at deeper depths. At some sites, it seems that the obtained S-wave velocity structure shows a low velocity layer within the accretionary prism. In the presentation, we will show other characteristics of the obtained velocity structures.

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