Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

SSS27-P02 Room:Poster Time:April 29 18:15-19:30

Frequency domain calculation of the seismic wavefield propagating along an ocean trench, with a constant Q attenuation

MITSUHASHI, Yuta[1*] ; FURUMURA, Mitsuko[2] ; MATSU'URA, Ritsuko S.[2] ; SHOJI, Masahiro[1]

[1]KKE, [2]ADEP

For shallow interplate earthquakes, large long-period later phases are frequently observed at long distance. Simulations using the finite difference, which we have performed, revealed an important effect of seawater on those later phases (e.g. Furumura et al., 2011).

However, attenuation $\exp(-\pi ft/Q)$ in the finite difference calculation is set to $\exp(-\pi ft/(Q_o f/f_o))$, meaning $Q/f=Q_o/f_o$ is set as a constant, where f_o is a target frequency of the calculation purpose, and Q_o is its corresponding attenuation factor, so it causes some problems especially for waves propagating for a long distance.

Then we calculated waves propagating in a 2.5D structure in the frequency domain with FEM to realize Q as a constant instead of Q/f, for both cases with and without seawater. We could confirm the important effect of seawater on later phases as well as the finite difference calculations. Calculated later phases have relative large amplitude for frequencies lower than f_o in the Q-constant model compared with the Q/f-constant model. It indicates necessity of estimation of difference between realistic Q and modeled one, when we use the finite difference method. In addition, the results reveal large later phases in the case with seawater, which are rarely seen in the calculated waveforms without seawater. It implies overestimation of magnitude of ocean earthquakes obtained from analysis of waves propagating through a long distance along and across an ocean trench, such as the 1911 off Kikai Island earthquake and the 1933 off Sanriku earthquake observed in Honshu.