Comparison of Seismic Waveforms Calculated by a Spherical 2.5-D Finite-difference Method with Observed Data

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Seismic waveform modeling with a realistic Earth model including lateral heterogeneity greatly contributes to our insight into nature of seismic waves and the Earth's inner structure. Since full 3-D computations of global seismic wavefields are impracticable on current architectures, considering a compromise between realism and computational efficiency, the best choice is 2.5-D approach which solves 3-D seismic wavefields on a 2-D cross section of the spherical Earth model assuming axisymmetry of global structure around an axis through a seismic source. However, conventional spherical 2.5-D approach contained serious drawbacks that structures and seismic sources used for the computations are forced to be axisymmetric.

We had, therefore, extended the traditional 2.5-D approach for arbitrary asymmetric structures and moment-tensor sources, developing numerical schemes with the finite-difference method (FDM) [1,2,3]. Our FDM scheme had also incorporated the anelastic attenuation for the first time for spherical 2.5-D FDM computation in seismology, and the Earth's centre.

This time we apply our scheme to analyze seismograph observed especially on Antarctica, which is ideally located for observations of deep Earth structures such as the inner core due to its weak seismicity, wide extent, and novelty of the data. Approved projects of the IPY 2007-2008 such as the POLENET and AGAP/GAMSEIS had installed broad-band seismographs on intra-Antarctic region providing unique observational results exploiting the vantage points of the Antarctic. We compare the observed and synthetic seismograms calculated for several heterogeneous Earth models as a preliminary work for further investigation.

Keywords: Seismology; global modeling; finite-difference method; Antarctica

References

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