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# Global seismic Wave Field Effects of geodynamically derived 3-D Mantle Structures

**B. Schuberth** (1), A. Piazzoni (1,2), H. Igel (1), H.-P. Bunge (1) and G. Steinle-Neumann (2)

(1) Dept. for Earth and Environmental Sciences, Ludwig-Maximilians-University Munich, Germany (bernhard@geophysik.uni-muenchen.de), (2) Bayerisches Geoinstitut, University Bayreuth, Germany

When discussing seismological reference models of Earth‘s interior it is important to consider geodynamical constraints which provide estimates on magnitude and power of lateral mantle heterogeneity. To explore this avenue, we have built a 3-D mantle velocity model derived from a combination of geodynamic mantle circulation simulations and thermodynamically self-consistent mineral physics modeling. The purpose of this approach is to obtain seismic velocity models independently from seismological observations. Additionally, one can test the effects of varying input parameters on the seismic wave field. We have calculated seismic velocities using temperature fields from a geodynamic simulation and assuming a certain mantle composition (e.g. pyrolite). Our mineralogic modeling algorithm computes the stable phases at each depth (i.e. pressure) and temperature by system Gibbs free energy minimization. Through the same equations of state (EOS) that model the Gibbs free energy of phases, we compute elastic moduli and density. For this we built a mineral physics database based on calorimetric experiments (enthalphy and entropy of formation, heat capacity) and equation of state parameters.

In our study we focus primarily on amplitude effects of 3-D mantle structure on the seismic wave field. 3-D wave fields are simulated using numerical wave propagation techniques for the whole globe (SPECFEM3D, Komatitsch and Tromp, 2002a,b) for different velocity models of the mantle. Effects of the geodynamic mantle model on the spatial distribution of amplitudes and its frequency dependence are compared to those obtained with tomographic models.