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Towards a Global Upper Mantle Attenuation Model

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Global anelastic tomography is crucial for addressing the nature of heterogeneity in the Earth's interior. The intrinsic attenuation manifests itself through dispersion and amplitude decay. These are contaminated by elastic effects such as (de)focusing and scattering. Therefore, mapping anelasticity accurately requires separation of elastic effects from the anelastic ones. To achieve this, a possible approach is to try and first predict elastic effects through the computation of seismic waveforms in a high resolution 3D elastic model, which can now be achieved accurately using numerical wavefield computations.

Building upon the recent construction of such a whole mantle elastic and radially anisotropic shear velocity model (SEMUCB_WM1, French and Romanowicz, 2014), which will be used as starting model, our goal is to develop a higher resolution 3D attenuation model of the upper mantle based on full waveform inversion. As in the development of SEMUCB_WM1, forward modeling will be performed using the spectral element method, while the inverse problem will be treated approximately, using normal mode asymptotics. Both fundamental and overtone time domain long period waveforms (T>60s) will be used from a dataset of over 200 events observed at several hundred stations globally. Here we present preliminary results of synthetic tests, exploring different iterative inversion strategies.