



Surface Wave Synthetic Seismograms in a 3D Model of the Mid-Mediterranean Region

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The Euro-Mediterranean area is a region with complex tectonic history where we can expect strong lateral heterogeneities. The best model obtained for this region from surface wave analysis is the one recently published by Marone et al. (2004). They used higher modes of surface waves as well as the fundamental mode and obtained a model of the upper-mantle under the Mediterranean region which shows variations in S-wave velocity of up to 20% at a scale of about 500 km. They explained about 50% of their data. Considering that they have selected data which are not too complex, we think that this best model can still be improved. In particular, it would be important to try to explain a larger part of the data at short periods in order to improve the lateral resolution of the model.

So large heterogeneities may cause multipathing and mode coupling, two phenomena which are not taken into account in classical tomographic studies. They complicate the wavetrains and lead us to discard an important part of the surface wave data. In order to evaluate the complexity we can expect in the waveforms for a realistic model of the Euro-Mediterranean region, and in the view of preparing new tomographic methods, we generate synthetic seismograms in the model of Marone.

We use a multiple scattering method for surface waves in 3D structures which takes into account mode coupling and multipathing. We focus on about 2000 km long wavepaths from Greece, with high seismicity, to Switzerland and Southern Germany, with high density of seismological stations. These paths follow a very low velocity region under the Adriatic Sea, favoring multipathing and large amplitudes. The degree of complexity of the surface wave propagation in this region, that we can expect from the roughness of the present tomographic models, will be presented.