



Imaging the diffuse boundary between the Aegean and the Anatolian plates : new constraints from surface wave tomography using SIMBAAD experiment data

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Installed in the spring of 2007, the SIMBAAD experiment (Seismic Imaging of the Mantle Beneath the Aegean-Anatolian Domain) is a dense temporary broad band network (33 stations) completing the coverage of permanent stations (94) in Greece and Western Turkey. Its main aim is to provide a high resolution (100km) 3D S-velocity model beneath the area. Previous studies do not have sufficient resolution to answer key questions related to mantle-crust structure and dynamics and in particular the geometry of the lithospheric structure between the Hellenic Arc and eastern Anatolia. SIMBAAD provides high quality data that will significantly improve the quality of the tomographic images. In this study, 210 events of magnitude ≥ 6 are analyzed over the total 127 broad band (cut-off period ≥ 90 s) stations which have an approximate interstation spacing of 80km in the western and central part of the study area [20-34°E; 35-42°N] and 200 km further east [34-40°E]. We use fundamental mode Rayleigh wave travel-time tomography to obtain phase velocity maps of the region. The development of a new strategy to apply time-frequency filtering in an automatic way is necessary to encompass the amount of data and retrieve the fundamental mode Rayleigh waves. The time-delay inversion method include paraxial ray tracing and allows incoming wave-fronts to be non-planar. One of the key aspects of the SIMBAAD experiment is to image with good resolution the diffuse boundary between the Aegean and Anatolian plates in Western Turkey. Synthetic tests demonstrate our ability to retrieve narrow velocity structures (<100km) mimicking an hypothetical slab geometry in Western Anatolia. Moreover the phase velocity can be retrieved with an uncertainty lower than 1%.