Geophysical Research Abstracts
Vol. 21, EGU2019-10365, 2019
EGU General Assembly 2019

A new P-wave tomographic model of the Aegean-Anatolia Domain and its implications for small scale dynamics

Hayrullah Karabulut (1), Doğan Aksarı (1), Ali Değer Özbakır (1,2), and Anne Paul (3)

(1) Bogazici University, Kandilli Observatory and Earthquake Research Institute, Geophysics, Istanbul, Turkey (kara@boun.edu.tr), (2) Department of Earth Sciences, Universiteit Utrecht, Utrecht, the Netherlands, (3) Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, IRD, IFSTTAR, ISTerre, F-38000 Grenoble, France

The geometry and segmentation of the Hellenic and Cyprus slabs in the eastern Mediterranean beneath Aegean-Anatolia domain has been the focus of many geodynamic studies. Although the slab geometry has been improved with the recent advances of the seismic instrumentation there is still ambiguity on the details of the segmentation. We present a new high-resolution tomographic model using P-wave data from 860 broadband seismic stations, both from permanent networks and temporary experiments. This model provides an improved image of the slab structure in the Aegean-Anatolia domain. Furthermore we combine seismicity, earthquake focal mechanisms and shear wave splitting data with the tomographic model, in order to investigate the links between slab deformation and related physical processes.

The results document the discontinuities of subducting slabs from Hellenic to Cyprus subduction zones. The slab tears are clearly identified in Kefalonia, Pliny-Strabo, Antalya Bay and Cyprus at shallower depths while slab break-off are also observed in various locations. The Hellenic and Cyprus subduction fronts are separated by a tear from the west of Cyprus in the south to the Antalya Bay to the north. The continuation of Pliny-Strabo tear zone beneath Anatolia plate also marks the lateral termination of the subduction rollback. The apex of the tear zones lies within the Isparta Angle. The apparent similarities between the topography within the Isparta angle and underlying slab segmentation in the mantle indicates the surface deformation is strongly related to the underlying mantle structure. Moreover, significant deviation of fast-splitting directions of SKS phases from regional orientations in the vicinity of the tear zone beneath the Antalya Bay support the dominant role of mantle flow around the tears.