Geophysical Research Abstracts
Vol. 19, EGU2017-14473, 2017
EGU General Assembly 2017

Upper mantle anisotropy in western Iran: observations from quasi-Love surface wave scattering

Amir Sadeghi-Bagherabadi (1,2,3), Lucia Margheriti (3), Abdelkrim Aoudia (2), Farhad Sobouti (1), Francesco Pio Lucente (3), and Paola Baccheschi (3)

(1) Department of Earth Sciences, Institute for Advanced Studies in Basic Sciences (IASBS), Zanjan, Iran (asadeghi@iasbs.ac.ir), (2) Earth System Physics Section, Abdus Salam International Centre for Theoretical Physics, Trieste, Italy, (3) Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy

The Iranian plateau is made up of different tectonic and structural provinces such as the Zagros and Alborz orogenic belts, the Sanandaj-Sirjan and Urumieh-Dokhtar magmatic arcs, and the active subduction zone of Makran. We use data from a temporary seismic network in western Iran. The network was deployed in 2013 and 2014 and consisted of 63 broadband seismometers installed along three parallel profiles that crossed the Zagros Mountains, central Iran and the Alborz Mountains. Diverse patterns of upper mantle anisotropy in these regions are revealed by recent studies on shear wave splitting of core-refracted phases.
Observation of quasi-Love surface waves is a proxy for the lateral gradients of anisotropy. We quantitatively analyzed the relative presence or absence of coupled Love and Rayleigh waves recorded by the temporary seismic stations. The records were filtered between 70 s and 200 s which are sensitive to structures deeper than 100 km. Assuming a horizontal anisotropic symmetry axis, Love to Rayleigh scattering is expected to be maximized when the incoming surface wave direction is at a 45 orientation to the fast anisotropy axis. The presence of quasi-Love is predicted by the geometric relation between the fast axis as inferred from shear wave splitting measurements, and the surface wave back-azimuths. Our coherent observations of SKS measurements and Love-to-Rayleigh scattering suggest a deep origin of anisotropy and allow us to argue for the existence of an upper mantle anisotropic structure with laterally-variable horizontal symmetry axis. The anisotropic pattern so found puts new constraints on the geodynamic models of the Iranian region of Arabia-Eurasia collision zone.