Geophysical Research Abstracts
Vol. 19, EGU2017-7144, 2017
EGU General Assembly 2017

Imaging the Ionian Sea subducting slab panels and faults to control present day motion in the Hellenic-Aegean region

Maria Sachpazi
NATIONAL OBSERVATORY OF ATHENS, ATHENS, Greece (m.sachp@noa.gr)

The Hellenic-Mediterranean subduction system characterized by its fast overriding upper plate, fast trench retreat and its most rapidly extending Corinth Rift has been the target of several conceptual models on slab dynamics and lithosphere extension. Using teleseismic waves conversions on a dense 2-D seismic array –installed in the frame of Thales Was Right project- from Crete to the North Aegean coast through central Greece, a high-resolution imaging of the Hellenic slab and the overlying Aegean plate lithospheric mantle has been acquired. The subducting slab top appears segmented into panels 30- 50km wide by SW-NE along dip faults to at least 100km depth. Intermediate-depth Mw>6 earthquakes are located on those faults which implies that they are seismically active at 70 km depth. Smaller magnitude earthquakes of the upper Benioff zone commonly related to dehydration processes of the descending slab, are also resolved to be clustered along these faults. These faults are likely inherited structures of the oceanic lithosphere and sites of preferred hydration. Their revealed relation with this specific seismicity provides high-resolution insight validating dehydration embrittlement. RF imaging on 4 OBS sites has allowed to resolve the depth and geometry of the updip offshore part of the slab, the thrust interplate boundary. The observations support a trenchward continuation of the slab faults and correlation with the similarly segmented thrusting contact of the Mediterranean Ridge accretionary wedge over the upper plate. The slab faults may control the location and size of major historical megathrust earthquakes a hypothesis that has been strengthened by the study of the Mw 6.8 14.02.2008 earthquake, the first large instrumental interplate earthquake offshore SW Peloponnesus.
New high-resolution imaging resolves the Aegean plate lithospheric mantle and shows the presence of a significant heterogeneity on top of the presently subducting slab, never imaged before. It can be considered as a marker of the deformation of the upper plate related to the active slab segmentation and helps in understanding the slab retreat vs Aegean upper plate trenchward migration and extension processes.
Future work aims at a better understanding of the control of the along-dip faults on the mechanical coupling of the two plates and on the upper plate seismic faulting.