

Interface and in-slab fragments along the Cyprean arc: a look at final stage of a subduction process

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The scope of this review study is to understand the lateral and depth variations of seismicity along the Cyprean Arc and outline the borders of an interface and in-slab region along the Cyprean arc. In this respect; 1) the geodynamic evolution of the Bitlis-Hellenic subduction zone is examined, 2) the tomographic images of the subducting African slab are utilized 3) correlation between the tomograms and the seismic activity is done 4) differential motions between Cyprus and Anatolia derived from the nearby GPS stations is investigated 5) results from wide-angle seismic reflection data along a profile crossing Cyprus island and extending from Eratosthenes Seamount to Central Anatolia is correlated 6) gravite data profiles crossing the western, central and eastern parts of the Cyprus arc are used to trace the interface boundaries and 7) receiver functions derived from the CSS broadband seismic station deployed on the island are used to constrain the depth of the interface.

The seismic activity is not uniform along the subducting African plate. It terminates at 130-140 km depth along the western flank of the Cyprean arc. However, the seismogenic depth is getting shallower from west to east along the arc. In the central part of the Cyprean arc the seismic activity terminates at about 70 km and the region to the north along the slab no seismic activity is observed. Such a feature in seismicity along with the tomographic images suggest slab steepening, breakoff and slab tear. Westward tear propagation along the Cyprean arc suggested by the geodynamic models might be a causative for the systematic decrease in the depth of seismicity. Both CMT solutions and seismicity provide evidences on NE subduction in the western flank of the Cyprean arc, but no seismic evidences of subduction is present in the central and eastern part of the arc. Constraints from hypocenters, CMT depth, receiver functions, gravity data, wide-angle reflection data, and tomographic images are applied to plot the boundaries of the interfaces and in-slab portion of the slab. The following characteristic features are determined;

1. Break off between the interfaces in the central and western parts of the Cyprean arc
2. No evidences for an interface and in-slab in the eastern part of the arc
3. Interface exist in the central part of the arc
4. No in-slab in the central part of the Cyprean arc
5. Interface and in-slab exist in the western part of the Cyprean arc

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