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# From tectonic accretion to gravitational collapse of the Aegean crustal wedge in response to slab roll-back at the boundary between the converging African and European plates

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We present a tectonic reconstruction of the Aegean domain that addresses the evolution of topography, crustal wedge deformation and thermal evolution and leads to an assessment of the interplay between plate dynamics and surface processes on the evolution of the crust located at the boundary between the converging African and European plates.

The central Aegean domain is characterized by the exhumation of metamorphic rocks juxtaposed to Oligocene to Upper Pliocene sedimentary basins along low-angle detachments. The metamorphic rocks comprise a Mesozoic sequence of metasedimentary rocks overlain by a weakly metamorphosed ophiolitic mélange. In contrast, the Mesozoic metasedimentary sequence is affected by a metamorphism grading from blue schist to amphibolite facies with the genesis of migmatites exposed in the core of structural domes. Inherited Mesozoic and Paleozoic cores of zircons from the migmatites are rimmed by metamorphic overgrowths dated respectively at ca. 50 Ma and ca. 15 Ma. Ar-Ar and Rb-Sr ages decrease from ca. 45 Ma in the blue schists to ca. 7 Ma in the migmatites. The sedimentary basins are filled mainly by coarse siliciclastic deposits that record progressive exhumation of the metamorphic units. Sedimentologic features suggest (1) Oligocene shallow marine to continental deposits, (2) early Miocene subsidence with deep marine turibidites, and (3) continental deposits in mid Miocene to Pliocene times.

These data indicate that the evolution of the central Aegean domain is characterized by (1) Eocene burial and subsequent exhumation of the Mesozoic metasedimentary rocks under a low geothermal gradient; (2) increase in the geothermal gradient and development of migmatitic domes and low-angle detachments in Miocene times coeval with surface subsidence; (3) Mio-Pliocene final exhumation of the metamorphic rocks associated to surface uplift.

This reconstruction suggests a model for the thermal-mechanical evolution of the Aegean crustal wedge that includes, (1) tectonic accretion associated to subduction and extrusion of crustal slices facilitated by slab roll-back, (2) thinning of the crustal wedge coeval with its thermal maturation and (3) final uplift and gravitational collapse in response to asthenospheric upwelling above the retreating slab.