



## Cenozoic denudation of the Menderes Massif and its geodynamic framework: slab tear or not?

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Despite having experienced similar rates of convergence during the Alpine Orogeny, the Hellenides and Anatolides display fundamental differences in crust and mantle structure across a region that broadly coincides with the Aegean coastline of the Anatolian peninsula. The Menderes Massif experienced early Miocene tectonic denudation and surface uplift in the footwall of a north-directed extensional detachment system, followed by late Miocene to recent fragmentation by E-W and NW-SE trending graben systems, resulting in one of Earth's largest metamorphic core complexes. Based on the interpretation of geological and geophysical data we propose that the tectonic denudation of the Menderes Massif was caused by late Oligocene/early Miocene lithosphere scale transtension along the boundary of the Adriatic and Anatolian lithospheric domains, when rollback of the Aegean slab affected the Aegean-Menderes section of the Tethyan Orogen. In addition to previously hypothesized crustal discontinuities, gravity data, earthquake locations and seismic velocity anomalies highlight a north-south oriented boundary in the upper mantle between a fast slab below the Aegean and a slow asthenospheric region below western Turkey. As an alternative to the common interpretation of this discontinuity representing the western edge of a slab tear, we propose that the change in lithospheric structure is the result of how different lithosphere domains responded to roll-back: relatively slow removal of lithospheric mantle below western Anatolia versus trench retreat in the rapidly extending Aegean Sea region. Our findings highlight the significance of lateral variations in subduction-collision systems for the formation of continental plateaux and metamorphic core complexes.