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Map-view restoration of the Aegean back-arc

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The Aegean back-arc in Greece and Western Turkey is one of the best-studied continental extensional provinces. In this paper, we provide the first, detailed kinematic restoration of the Aegean back-arc back to 35 Ma. The Aegean region consists of stacked upper crustal slices (nappes) that reflect a complex paleogeography. These were decoupled from the subducting African-Adriatic lithospheric slab. Especially since ∼25 Ma, extensional detachments cut the nappe stack and exhumed metamorphosed portions of the nappes in metamorphic core complexes. We reconstruct up to 400 km of arc-perpendicular (NE-SW) extension in two stages: from 25-15 Ma, the Aegean forearc rotated clockwise around poles in NW Greece, accommodated along extensional detachments in the north and a transfer fault SE of the Menderes massif. The majority of extension occurred after 15 Ma (up to 290 km) by opposite rotations of the western and eastern parts of the arc. Simultaneously, the Aegean region underwent up to 650 km of post-25 Ma arc-parallel extension leading to dramatic crustal thinning on Crete. Our alternative detachment configuration proposes that the Mid-Cycladic Lineament represents a detachment that accommodated arc-parallel extension in the central Aegean region. Finally, we demonstrate that the Sakarya zone and Cretaceous ophiolites of Turkey cannot be traced (far) into the Aegean region, and are likely bounded by a pre-35 Ma N-S fault zone. This fault became reactivated since 25 Ma as an extensional detachment located west of Lesbos island. The paleogeographic units south of the İzmir-Ankara-Sava suture, however, can be correlated from Greece to Turkey.