



Quantitative analysis of the influence of subduction roll-back and Anatolian extrusion on Neogene west-Aegean rotations

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In the Aegean region, northward subduction since the Late Jurassic-Early Cretaceous has resulted in an originally NW-SE to E-W striking stack of nappes. These have been deformed into the Aegean arc since the late Eocene. The formation of the arc was associated with large-scale block-rotation, exhumation of metamorphic core complexes and the westward translation of Anatolia. Paleomagnetic investigation shows a regionally consistent 50° clockwise rotation of the western Aegean region, from northern Albania to the Peloponnesos since 15 Ma. The amount of rotation decreases in the back-arc domain, and is approximately 20° in the Rhodope of northern Greece and southern Bulgaria. Two scenarios exist that may explain the formation of the Aegean arc and the associated rotations: roll-back of the subducted slab, leading to opposite rotations on either side of the arc, and \sim N-S extension in the middle, or alternatively, clockwise rotation in western Greece due to the westward translation of Anatolia. To quantitatively test these scenarios, the amount of rotation, extension and Anatolian translation is estimated and dated by synthesizing available information from the structural, volcanic, sedimentary and metamorphic history of the region, and the geophysical imaging through GPS and seismic tomographic techniques. The onset of roll-back, determined from the onset of core complex exhumation and the southward migration of the volcanic arc, occurred around 35 Ma, and the vast majority of the extension related to roll-back occurred prior to 15 Ma. It can therefore not explain the rotations of the western Aegean region. The onset of westward motion of Anatolia is estimated to occur around 13 Ma, and is therefore a valid candidate. However, the amount of N-S Aegean extension and Anatolian translation is in no way in agreement with the amount of rotation. It is concluded that the west Aegean rotations did occur in response to westward translation, but on a much larger scale, likely including the Moe-

sian platform and (part of) the Black Sea region, and was restricted to the present-day system as late as the Pliocene.