

The Coupling of Back-arc Extension, Extrusion and Subduction Dynamics in the Eastern Mediterranean

Fabio A. Capitanio

Monash University, School of Earth, Atmosphere and Environment, Clayton, Australia (fabio.capitanio@monash.edu)

Extension in the Aegean Sea and lateral Anatolian extrusion are contrasting and seemingly unrelated examples of continental tectonics in the Eastern Mediterranean. It is acknowledged that these must reconcile with the dynamics of Tethys closure and following continental collision along the convergent margin, however the underlying mechanisms have been difficult to pinpoint, thus far. Three-dimensional numerical modelling of the dynamics of subduction and coupling with the mantle and upper plates allows probing the evolution of similar areas, supporting inferences on the ultimate causes for the continental tectonics. I will present models that reproduce the force balance of subducting slabs' buoyancy, mantle flow and upper plate interiors, and emphasise the role of perturbations in the force balance that may have followed slab breakoff, collision and trench land-locking reconstructed during the oceanic closure in the Eastern Mediterranean. These perturbations lead to a range of different margin motions and strain regimes in the upper plate, from rollback and back-arc spreading, to indentation and extrusion along the collisional margin. Different spatial and temporal fingerprints are illustrated for these processes, and while the trench rollback and back-arc spreading are rather stable features, extrusion is transient. When these regimes overlap, rapid and complex rearrangements of the tectonics in the upper plate are the result. The remarkable similarity between the models' and the Eastern Mediterranean tectonic regimes and geophysical observable allows proposing viable driving mechanisms and support inferences on the Miocene-to-Pliocene evolution of this puzzling area.