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The Central Anatolian Plateau: relative timing of uplift and magmatism

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A blanket of Late Miocene ($\geq$8 Ma) marine sediments covering large parts of the central Anatolia plateau (Turkey) is currently exposed at an elevation of more than 1 km. Together with the finding of a carbonate complex at a similar elevation in the Mut basin (southern Turkey), these observations suggest that the central Anatolia plateau region has risen over 1 km since the Late Miocene ($\geq$8 Ma). For the east Anatolian plateau region, various authors have attributed similar observations to delamination of the lithospheric mantle. Here, retreat of the Bitlis slab is thought to have been the main driver of the uplift. Results from high-resolution seismic tomography indicate that the Bitlis slab is laterally continuous below the east and central Anatolian plateau regions. We therefore hypothesize that one single mantle delamination event is responsible for the uplift of central and east Anatolian plateau. Our thermal-flexural models show that delamination of the lithospheric mantle can account for the present day elevation of the central Anatolia plateau.

Widespread Miocene volcanic activity due to the lithospheric delamination is observed throughout central Anatolia. In the Galatean volcanic province (northern Turkey), for example, the youngest period of volcanic activity started $\sim$10Ma. A similar age is found for the onset of Miocene volcanic activity in the Cappadocia volcanic province (central Anatolia). With the youngest marine sediments having an age of $\sim$8 Ma and possible $\sim$5Ma in central Anatolia, there appears to be a gap (> 2Myr) between the onset of widespread volcanic activity (i.e. delamination of the lithospheric mantle) and uplift of the central Anatolian plateau. We propose that the sinking of the delaminated lithospheric mantle is responsible for the apparent lag between delamination of the lithospheric mantle and uplift. In this scenario, the lithospheric mantle in central Anatolia separates from the crust about 15-10Ma causing a wide spread Miocene volcanic activity. The positive buoyancy and hence uplift due to the removal of the lithospheric mantle (negative buoyancy) is initially compensated the by slab suction. As the lithospheric mantle sinks deeper, the slab suction decreases. With the positive buoyancy remaining unchanged, it becomes dominant resulting in uplift of the central Anatolia plateau to its present day elevation.

To test whether slab suction can explain the apparent 2 Myr lag between delamination and uplift of central Anatolia we use a 2D coupled mechanical thermal model. Using this model, we aim to quantify the magnitude, temporal and spatial evolution of subsidence caused by the sinking of a delaminated lithospheric mantle. Model results are subsequently applied to the central Anatolian plateau. Subsequently, our model results are discussed in the context of the uplift of the central Anatolian plateau with potential inferences of other plateau regions.