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TITLE: A possible cause of the Miocene uplift and volcanism in the central Anatolian plateau

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AUTHORS (FIRST NAME, LAST NAME): Jeroen Bartol[1], Rob M A Govers[1], Marinus J R Wortel[1]

INSTITUTIONS (ALL): 1. Utrecht University, Utrecht, Netherlands.

Title of Team:

ABSTRACT BODY: During the middle and late Miocene (13-5Ma) several seemingly unrelated events occurred in central Anatolia, Turkey; (1) a new epoch of widespread volcanic activity with a mantle signature, (2) sudden uplift and disruption of a Oligocene-lower Miocene palaeo drainage system in the Western Taurus (southwest Turkey) and (3) a regional regression across southern Turkey (Antalya, Adana, Mut) coeval with volcanic activity. These observations suggest an uplift (>1000 meters) of the central Anatolian plateau by a mechanism which also triggered widespread volcanic activity. In eastern Anatolia, similar events are attributed to delamination of the lithospheric mantle [e.g. Keskin et al., 2003]. Results from tomography [W.Spakman, pers. com]) suggest that the (deeper) Bitlis slab was laterally continuous below the eastern and central Anatolian plateau. We therefore propose that the scenario developed for eastern Anatolian plateau also applies to the central Anatolian plateau. In this scenario, delamination started along the Izmir–Ankara-Erzincan suture zone and was possibly induced by remnants of a northern Neotethys slab or continental collision between Arabia and Eurasia. As the lithospheric mantle separated from the crust it sank into the asthenosphere and was replaced by hot mantle material.

If true, delamination is expected to have had a thermal and isostatic imprint. Using a three-dimensional thermal-flexural model and taking changes of the effective elastic thickness due to thermal perturbation into account, we aim to quantify the possible imprints in the geological record of the central and eastern Anatolian plateau.

Our model results show that delamination of the lithospheric mantle can explain the present day elevation (1500 m) of the central Anatolian plateau. For the eastern Anatolian plateau, however, delamination of the lithospheric mantle alone can only explain half (1000 m) of the present day elevation. Thickening of the eastern Anatolia crust by 1-5 km (β=1.1), could explain the remaining uplift and is consistent with field observations of crustal shortening. The initial uplift is followed by a gradual thermal subsidence, which continues today with a rate around 0.5 cm/kyr. Rivers in eastern Anatolia, like the Euphrates, can potentially be used to verify the timing, rate and magnitude of uplift and the rate of subsidence due to the large uplift and uplift gradients predicted in this area. For the present day surface heat flow, our model predicts a maximum of 85 mW/m2 in the central Anatolian plateau while a maximum of only 75 mW/m2 is predicted for the eastern Anatolian plateau. This is, to a very first order, in agreement with the observed surface heat flow. Based on the model results, we expect to see a clear crustal signature within the erupted volcanic products in central Anatolian were our model predicts significant crustal melting. In eastern Anatolia, crustal melting is substantially less and consequently we expect to see less influence of the crust in the erupted volcanic products.

KEYWORDS: [8138] TECTONOPHYSICS / Lithospheric flexure, [8178] TECTONOPHYSICS / Tectonics and magmatism.