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Neogene foreland basin evolution in SE Anatolia and the evolution of the eastern Tethys gateway through Turkey

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Several scenarios have been proposed to explain a global climate shift during the Middle Miocene indicated by isotope records at 13.8 Ma. These include atmospheric CO_2 drawdown, long-term orbital forcing, eustatic sea level lowering associated with the build-up of the East Antarctic ice sheets, and the closure of the eastern Tethyan gateway. However, the latter event has not yet been dated accurately nor has such a "former" gateway between the Indian Ocean and the Mediterranean Sea been localized. The most likely region of the Tethys gateway lies in the collision zone between the Arabian plate and Eurasian plate including southern Turkey, where the Bitlis suture zone in southern Turkey and the Zagros suture zone in Iran have been interpreted as the main loci of Neogene shortening. We investigate three Neogene basins in southeastern Anatolia, Turkey.

The Muş and Elazı ğ Tertiary basin are located north of the Bitlis suture zone in southeastern Anatolia, and a third basin near Kahraman Maraş lies near the triple junction of the African, Arabian, and Anatolian plates in southeastern Turkey. All three basins show flysch-like deposits with alternating clay and sandstone (turbidite) layers. According to the Turkish geological map, the Muş basin consists of Oligocene marine sediments with Lower Miocene limestones on top, separated by a hiatus from Miocene lavas. The same map suggests that the Elazı ğ basin is filled with Eocene limestones, overlain by Miocene volcanics. Assemblages of macrofossils, including echinoderms, gastropods, oysters and molluscs, collected in (reefal) limestones at the top part of

both the Muş and Elazı ğ Tertiary basin show that these two basins must have become shallow marine in the Chattian/Aquitanian (Upper Oligocene/Lower Miocene), which is in contrast with the local geological map for the Elazı ğ Tertiary basin. This, in combination with the overlying Miocene lavas, indicates that both basins were most likely closed during the Lower Miocene.

In the Kahraman Maraş basin, the stratigraphy consists of Eocene limestones, separated by allegedly Oligocene continental red beds and lavas from lower Miocene limestones which grade into middle to upper Miocene marine sediments, which are separated from overlying by Pre-Neogene basement by a thrust. In contrast to the two basins north of the Bitlis suture zone, the Kahraman Maraş basin remained open marine in the early Miocene and probably continuously did so until the late Miocene.

If we can confirm these data with biostratigraphy and paleobathymetry, it is most likely this foredeep basin remained marine and relatively deep up into the late Miocene, and may have served as a connection of the Tethys to the East. We therefore envisage to biostratigraphically re-date all three basins and, in combination with paleobathymetry data, to allow us to study the evolution of every basin in terms of shallowing and deepening trends throughout the Neogene time. Consequently, we anticipate concluding the potential of each basin to have served as connection to the eastern oceans and, more importantly, to date the closure of these basins which will evidently give an indication of the evolution of the eastern Tethys gateway and the regional eastern Anatolia tectonic history within the context of the collision between Arabia and Eurasia.