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Deformation History of the Haymana Basin: Structural Records of Closure-Collision and Subsequent Convergence (Indentation) Events at the North-Central Neotethys (Central Anatolia, Turkey)

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Gondwana- (Tauride Platfrom and Kırşehir Block) and Eurasia (Pontides) - derived continental blocks bound the Haymana basin, in the south and north, respectively. Boundaries between these blocks are signed by İzmir-Ankara-Erzincan and debatable Intra-Tauride Suture zones which are straddled by the Haymana Basin in the region. In this regard, deformation recorded in the upper Cretaceous to middle Eocene deposits of the basin is mainly controlled by the relative movements of these blocks. Therefore, understanding the structural evolution of the Haymana Basin in a spatio-temporal concept is crucial to shed some light on some debatable issues such as ; (1) timing of late stage subduction histories of various branches of Neotethys and subsequent collision events, (2) effects of post-collisional tectonic activity in the Haymana region.

Fault kinematic analyses (based on 623 fault-slip data from 73 stations) indicate that the basin was subjected to initially N–S to NNE-SSW extension until middle Paleocene and then N–S- to NNE-SSW- directed continuous compression and coeval E-W to ESE-WNW extension up to middle Miocene. These different deformation phases correspond to the fore-arc (closure) and foreland (collision and further convergence) stages of the basin. Additionally, fold analyses (based on 1017 bedding attitudes) and structural mapping studies show that development of folds and major faults are coeval and they can be explained by principle stress orientations of the second deformation phase.

The Haymana basin is, based on the trends of E-W- and WNW-ESE- directed structures at the south-eastern and the north-western parts of the basin, respectively, divided into two structural segments. The balanced cross-sections also indicate $\sim$4% and $\sim$25% shortening at the north-western and south-eastern segments, respectively. The differences in amounts of shortenings are explained by reduce in effectiveness zone of basin-bounding thrust faults towards west. On the other hand, the boundary of the segments is defined as an intra-basinal strike-slip system which is thought to be developed together with late stage activities of the basin bounding thrust (or reverse) faults (Dereköy and İnler faults) in response to the north-westward movement of the northern segment of the Kırşehir block.

It is proposed that the Haymana basin was initially evolved under the influences of subduction related extensional setting until middle Paleocene, and latterly foreland settings in front of a south-vergent fold and thrust belt developed during collision and post-collisional convergence until middle Miocene. Additionally, the north-westward movement and indentation of the Kırşehir Block caused structural segmentation and rotation events in the basin.