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Lithospheric convective removal related post-collisional middle Eocene magmatism along the Izmir-Ankara-Erzincan suture zone (NE Turkey).

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Obliteration of the Mesozoic Neo-Tethyan Ocean and succeeding collision of the micro plates along the northern part of Turkey lead the development of the İzmir-Ankara-Erzincan suture zone (IAESZ). The suturing and collision stages terminate with the amalgamation of the three different crustal blocks (Pontides, Central Anatolian Crystalline Complex and Anatolide-Tauride Block) in the Paleocene-Early Eocene period. After the collisional stage; a new phase of extension and magmatism concomitantly developed at the both sides and as well as along the IAESZ during the Middle Eocene period. However, the origin, mechanism and driving force of the post-collisional magmatism is still enigmatic. To understand and better constrain the syn-to post collisional evolutionary stages, we have carried out volcano-stratigraphy and geochemistry based study on the middle Eocene magmatic associations along a transect (∼100 km) from Pontides to the Central Anatolian Crystalline Complex (CACC) at the NE part of the Turkey.

Middle Eocene magmatic activity in the region has been represented by calc-alkaline, alkaline, shoshonitic volcanic and granitic rocks together with scarce gabbroic intrusions. We particularly focused on middle Eocene volcano-sedimentary successions (MEVSS) to constrain the tectono-magmatic evolution of the abovementioned transect. The volcano-sedimentary succsessions are coevally developed and cover the crustal blocks (Pontides and CACC) and the IAESZ with a region wide unconformity. We have differentiated three lava series (V1-V2-V3) and their sub-groups (V1a-V1b; V2a-V2b) in MEVSS. Generally, all lava series have middle-K to shoshonitic composition with distinct subduction characteristics. V1 series is marked by presence of hydrous phenocrysts such as amphibole+biotite. V1a sub-group constitute the first volcanic product and characterized by the high Mg# (42-69); alkaline basaltic andesite, and hawaiites. V1b sub-group is represented by calc-alkaline, low Mg# (24-57) andesite and dacites. V2 series made up of the olivine+pyroxene rich anhydrous lavas. V2a sub-group displays calc-alkaline/mildly alkaline character, moderate Mg# (33-54) and represented by basaltic andesites. Furthermore, V2b sub-group has mildly alkaline/alkaline in character and represented by more Mg# rich (40-62) basalt and trachy-basalt lavas. Final products, V3 series, cut the older units and made up of high-K - shoshonitic trachyte and trachy-andesites.

The V1a sub-group, showing the alkali nature and high Mg#, is probably derived from the partial melting of a hydrous spinel lherzolitic source with minor garnet and amphibole while the V1b sub-group is a fractionated (FC) derivative of them. The V2 series are mixed products of varying amounts of magma sources similar to V1b type with a high Mg#, deep-seated magma source and their fractionated assemblages. The V3 series developed independently from the other series in shallow magma chambers, displaying the large amounts of crustal assimilation and constitutes the final product of the Middle Eocene volcanism.

The data presented above shown that volcanic units; (i) are rich in potassium, (ii) have subduction-related signatures, (iii) display fluctuant alkalinity and Mg# during the course of volcanism, (iv) coevally developed on both amalgamated continental blocks after the cessation of subduction. These characteristics imply that, lithospheric convective removal related processes can be the most plausible driving mechanism of the middle Eocene magmatism.