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# Deducing the magma chamber processes of middle Eocene volcanics, Sivas and Tokat regions; NE Turkey: Insights from clinopyroxene chemistry

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Middle Eocene Tokat and Sivas volcanic successions occur within the İzmir-Ankara-Erzincan suture zone. Different models are suggested for the development of the middle Eocene volcanism such as post-collisional, delamination and slab-breakoff models as well as the arc magmatism. In both areas, volcanic units cover all the basement units with a regional disconformity and comprise lavas spanning a compositional range from mainly basalt-basaltic andesite to a lesser amount trachyte. Here, we report mineral chemistry of different basaltic lavas through transect from northern continent (Tokat region, Pontides) to southern continent (Sivas region, Kırşehir block) to deduce the characteristics of the magma chamber processes which are active during the middle Eocene.

Basaltic lavas include olivine bearing basalts (Ol-basalt: $\pm$ olivine + clinopyroxene + plagioclase); amphibole bearing basaltic andesite (Amp-basaltic andesite: amphibole + clinopyroxene + plagioclase $\pm$ biotite) and pyroxene bearing basaltic andesite (Px-basaltic andesite: clinopyroxene + plagioclase). Microlitic, glomeroporphyric and pilotaxitic texture are common. Clinopyroxene phenocrystals (macro $\geq$ 750 $\mu$m and micro $\leq$300 $\mu$m) are common in all three lava series which are investigated by transecting core to rim compositional profiles.

They are generally augite and diopside; euhedral to subhedral in shape with oscillatory, normal and reverse zoning patterns. Also, all clinopyroxene phenocrystals are marked by moderately high Mg# (for Ol-basalt: 67-91; avg. 80; Amp-basaltic andesite: 76-83, avg: 80; Px –basaltic andesite 68-95, avg: 81). In Ol-basalt, clinopyroxene phenocrystals show normal zonation (high Mg# cores and low Mg# rims). In Amp-basaltic andesite, clinopyroxenes are generally homogenous in composition with minor variation of Mg# towards the rims. On the contrary, in Px-basaltic andesite, clinopyroxene macro phenocrystals show reverse zonation with the core with low Mg# and the rims with higher. Also, within the same unit, there are clinopyroxene micro phenocrystals compositionally resembling the rims of the macro phenocrystals.

Barometric calculations from clinopyroxene phenocrystals display large range of crystallization pressure for the Ol-basalt (2-9 kbar; average $\sim$4 kbar) and Amp-basaltic andesite (2-5 kbar; average $\sim$4 kbar). Besides, in Px-basaltic andesite macro phenocrystals have high crystallization pressure in the cores (6.5-8 kbar) and low pressures at the rims (3-6.5 kbar). Similarly, micro phenocrystals also show the similar pressure ranges as macro phenocrystal rims.

Regarding the data presented above, clinopyroxene phenocrystals from Ol- and Amp-basalts generally show normal zonation which can be explained by time depended fractionation of magma. Besides, in Px-basaltic andesites, macro phenocrystal cores might be inherited from antecrysts crystallized at the deeper level of the same system. Reverse zonation and high Mg# and lower pressure crystallization of macro phenocrystal rims and micro phenocrystals indicate that injection and/or mixing of primitive magma within the host magma chamber. Differences in crystallization pressures and chemical compositions from the same volcanic sequence show the existence of different conduit levels or magma reservoirs.