New insights for the mantle source components of the most primitive recent basaltic rocks from central and western Anatolia: Evidences for the involvement of pyroxenite and the peridotite source domains

Biltan Kurkcuoglu and Tekin Yurur
Hacettepe University, Dept. of Geological Engineering, 06800 Ankara, Turkey (biltan@hacettepe.edu.tr)

Basaltic activities developed extensively in central and western Anatolia since middle–Miocene to quaternary time, the most primitive lavas are situated at the eastern end of central Anatolia, (southern Sivas) and the most recent ones are situated in central (basaltic cinder cones at south of Hasandağ) and also in western Anatolia (Kula region). Among those primitive recent lavas, mantle sources that are responsible for the generation of basaltic rocks is still a matter of debate.

Previous studies suggested that spinel peridotite source is the dominant source component for many of the basaltic rocks which are situated in several different locations in central Anatolia, including, Erciyes and Hasandağ stratovolcanoes, Erkilet, Develidağ, Karapınar vents and Salanda fissure eruptions while Sivas fissure basalts in the east, Gediz and Kula basalts in the west, were derived mostly from the garnet peridotite sources, but, the specific incompatible element ratios and the melting model based on Rare Earth Elements obviously indicate that these basaltic rocks could not be solely generated from the garnet-spinel transition zone, instead another mantle source component need to be involved in the generation of the basaltic rocks.

\( \text{Tb/Yb(N)} \) and \( \text{Zn/Fe} \) ratios provide significant values in order to constraint for the magmas generated from the asthenosphere. \( \text{Tb/Yb(N)} \) ratio seperates garnet–spinel transition [1] and \( \text{Zn/Fe} \) ratio displays separation between the peridotite-derived \( (\text{Zn/Fe} < 12, [2,3]) \) and pyroxenite-derived \( (13-20 [2,3]) \) melts. \( \text{Zn/Fe} \), as well as the \( \text{Tb/Yb(N)} \) ratios and the melting model display that single spinel source component is not solely responsible for the generation of the basaltic rocks, pyroxenite source domain should also be involved in during the genesis of these rocks as well, besides, the contributions from both of the mantle source domains also explain the depleted magma nature that is observed in some of recent basaltic rocks (e.g. Salanda and Hasandağ volcanic systems) which is different from the dominated alkaline character, generally observed as the final products of central Anatolian magmatism.

1. Wang et al., 2002, J. Geophys. Res. vol:107, ECV 5 1-21


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