Genesis of mafic-intermediate lavas at Hasandag stratovolcano, Central Anatolia

H. GALL[1*], B. KURKCUOGLU[2], B. HANAN[3], K. SAYIT[4] AND T. FURMAN[1]

[1]The Pennsylvania State University, University Park PA USA (*correspondance: hdg5028@psu.edu, furman@psu.edu)
[2]Hacettepe University, Ankara, Turkey (biltan@hacettepe.edu.tr)
[3]San Diego State University, San Diego CA USA (bhanan@mail.sdsu.edu)
[4]Middle East Technical University, Ankara, Turkey (kaansayit@hotmail.com)

We present new geochemical data on lavas from Hasandag stratovolcano in the transtensional Tozgölü Fault Zone, Central Turkey. Samples comprise mildly alkaline basalts and basaltic andesites through andesites. Major element variations indicate abundant parental basalts with a narrow compositional range (9-10 wt. % MgO) suggesting frequent, small and near-homogenous melting events. Incompatible trace element abundances are enriched over ocean island basalt in large ion lithophile elements Ba, Th, U and K, and depleted in high field strength elements Nb, Zr, Ta and Ti, suggesting a mantle source modified by slab derived fluids and melts. Sr-Nd-Pb-Hf isotopic data further constrain the source domain of the Hasandag lavas. Hasandag mafic lavas plot above the mantle array in ε_{Hf}-ε_{Nd} space with lowest values approaching those of continental lithosphere. Pb-Pb isotopic plots define a steep array almost perpendicular to the NHRL, suggesting multi-stage mixing between ocean sediment, melts of Anatolian lithosphere (represented by Cretaceous ultra-potassic lavas) and a shared mantle component within the isotopic range of C. Trace element and isotopic data support changes in Hasandag geochemical signatures over time. Oldest volcanic products (~7-1 Ma) are characterized by higher Ba/La (15-21) and Ba/Nb (46-65) than rejuvenated <~0.15 Ma basalts (Ba/La 10-16, Ba/Nb 16-40); Ba/Th values overlap, but are highly variable over time (40-135). Sr-Nd isotopic values are higher in older lavas (~0.7050) than in younger products (0.7041-0.7046) (Deniel et al. 1998, Alici Sen et al. 2004, this study). We also explore the origin of the erupted andesites in a non-arc environment. Major element trends indicate a strong role for fractional crystallization, although abundant textural features in hand sample show evidence for magma mingling and mixing that will be investigated in detail with geochemical analysis.