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Petrologic evaluation of Late Miocene Mecitli granitoid in Eastern Anatolian region, Turkey

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Eastern Anatolian is a High Plateau which occurred as a result of continent-continent collision between Arabian and Eurasian plates in the Middle Miocene. Following the collision, volcanism observed along the region initiated 15 Ma ago. Most of the studies about the Eastern Anatolian magmatism were concerned with the petrology of collision related volcanics, however, granitic intrusions within the East Anatolia Acceretionary Complex (EAAC) have not been investigated in detail. The present study aims to construct geochemical and magmatic evolution of the Mecitli granitoid (north of Lake Van) within the EAAC.

Mecitli granitoids located in the northeast of Lake Van covers an area about 80 km2 and is one of the most important igneous intrusions that observed in limited areas within EAAC and shaped slab. Our new Ar/Ar data indicate that Mecitli granitoid is aged 23 Ma and occurred in Miocene in contrast to known Cretaceous age. The Mecitli granitoid cutting serpantinites and schists is covered by youngest volcanic rocks.

MELTS modeling suggest that magmas of the Mecitli granitoid were exposed to fractional crystallization under a crustal pressure of 3-4 kbar with H_2O content between 1-1.5 %. EC-AFC model calculation revealed that Mafic Microgranular enclaves(MME) and granites includes to 2% and 6 % crustal assimilation rates, respectively. MORB and primitive mantle normalized pattern and Sr, Nd, Pb isotopic composition as well as trace-REE element compositions of the mafic microgrannular enclav imply that they could have been derived from a mixture between lower crust and lithospheric mantle source that had previously been enriched by a distinct subduction component.

The partial melting model calculations obtained by using the REEs suggest that source (SC) that can produce MMEs and granites in this part of the region could have been produced by melting of a bulk mixing between lower crust and upper mantle source with 33 % partial melting degree. To examine the relative contributions of these two components, I produced the MORB-normalised multi elements patterns of trace element values of the most primitive MME and compared them with the patterns of the trace element concentrations obtained from modeled melting curves. Results of MORB-normalised petrological model indicate that a mantle source that may be a mixing the 89 % SC with 11 % sediment melt might be the source composition of the melts that produced the MMEs and granites.