



## **Cu-Mo and Fe Enrichments in the Karacaali Magmatic Complex, Central Anatolia, Turkey: Evidence for metal partitioning during magma mixing/mingling processes**

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The Karacaali Magmatic Complex (KMC) is located in the northwest part of the Central Anatolia, Turkey. The complex consists of Upper Cretaceous (67±13 Ma and 73.1±2.2Ma) volcanic and plutonic rocks. Volcanic rocks include basalt and rhyolite. Plutonic rocks range in composition from gabbro, through quartz-monzonite and porphyry quartz monzonite to fine-grained granite and porphyry leucogranite. The contacts between the porphyry quartz monzonite and gabbro are transitional and display a large variation in chemical composition (quartz monzonite, granodiorite, monzodiorite and gabbro). Acidic and basic dykes cut the plutonic rocks. Monzonite and porphyry quartz monzonite contain dioritic and quartz dioritic mafic microgranular enclaves (MME). KMC is calc-alkaline to mildly alkaline transitional and has both I-type and S-type characteristics. The KMC shows geological, petrographic and geochemical evidences of mingling and mixing between mafic and felsic magmas. The mixing/mingling textures of felsic and mafic magmas are mainly observed within the mingling zone between the rhyolite and basalt and represented by individual small enclaves and enclave swarms. The other important mixing/mingling evidences observed in the KMC are biotite and acicular apatite inclusions in the feldspars of the monzonitic rocks rich in MME, quartz with poikilitic textures in MME and microbasaltic inclusions in the porphyry leucogranite and rhyolite, element concentration of feldspars phenocrysts (anorthite content and Ba) of monzonitic rocks rich in MME. The KMC hosts Fe and Cu-Mo enrichments. Fe enrichments are basically hosted by basalts and observed as magnetite+actinolite+carbonate veins, vesicle fillings and ma-

trix in basaltic rocks. Magnetite+actinolite veins are rarely seen in monzonitic rocks. Cu and Mo enrichments are related to N-S oriented vertical quartz scalcite veins in granitic rocks. The main ore minerals of the Cu-Mo enrichments are chalcopyrite, molybdenite and pyrite. Sphalerite, galena and pyrrhotite are also observed. Cu, Mo and Fe<sub>2</sub>O<sub>3</sub> contents of the acidic and basic rocks of the complex reveal that magma mixing/mingling processes played a major role of the metal enrichment in the KMC. The average metal content of the granitic, monzonitic and gabbroic rocks are respectively [Cu (ppm): 15.6; 37.5; 33, Mo (ppm): 4; 1.78; 0.7, Fe<sub>2</sub>O<sub>3</sub> (%): 1.25; 5.73; 9.80]. According to geological, petrographical and geochemical investigations, the main source of the metals are basaltic and felsic magmas, and the injection of mafic magma into the felsic magma chamber is one of the main factors controlling Fe and Cu-Mo enrichments in KMC.