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Thermal, chemical and isotopic homogenization of syn−extensional I-type plutons and mafic microgranular enclaves

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Magma mixing and mingling processes are common phenomenon in the evolution of granitoid magmas. This study deals with examination of mineral chemical, geochemical and isotopic characteristics of enclaves and enclosing syn-extensional granite bodies in western Turkey to make an attempt to solve problems regarding their origin. Mafic microgranular enclaves have granodiorite, quartz monzonite, monzonite and monzodiorite compositions, are subalkaline/calc-alkaline and high-K in character and display typical mixing/mingling textures. Mafic enclaves have partially overlapping geochemical characteristics onto their host rocks in terms of mobile elements and their isotopes while distinct immobile element patterns occur within host rocks and enclaves. Contrasting geochemistry of enclaves is mainly defined by their low SiO_2 and high MgO, Mg# and high $Fe2O_3$ contents. Chondrite-normalized spidergrams of enclaves also reveal two contrasting patterns. One is relatively enriched in rare earth element content and the other is slightly enriched and displays relatively flat pattern. 87Sr/86Sr and 143Nd/144Nd contents of enclaves imply considerable amount of crustal input. Crustally derived felsic magma coeval with mafic magma have been chemically, thermally and mechanically exchanged with each other and resulting homogenization led to compositional and isotopic equilibration of mafic and felsic magmas. Fractional crystallization, mixing and the following crustal contamination were responsible for the final composition of syn-extensional granitoids. Such processes appear to have been widely occurred in continental extensional regime that caused melting and mixing of crustal and mantle sources at MOHO depth.