Origin of enclaves in syn-extensional Eğrigöz and Koyunoba granitoids, Western Turkey: geochemical and Sr-Nd-Pb isotopic variations

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Eocene to Miocene magmatism includes large amounts of southward younging and overlapping I-type granitoid belts in western Turkey. Some of the Miocene granitoids are closely associated with metamorphic core complexes and are commonly characterized by variably-sized, fine grained, ellipsoidal and elongated enclaves. These enclaves were formerly omitted in explaining the petrogenesis of syn-extensional granitoids. Therefore, this study aims to better understand the magma source characteristics and the degree of magma formation and solidification processes, leading to the development of enclaves within the syn-extensional granitoids using whole-rock geochemistry, mineral chemistry and Sr-Nd-Pb isotope data. While Eğrigöz and Koyunoba granitoids are commonly massive, locally foliated and granite and granodiorite in composition, their enclaves are monzodioritic. Equigranular and porphyritic texture are common. Enclaves and their host contain quartz + K-feldspar + plagioclase + biotite + hornblende + clinopyroxene + allanite + apatite + zircon. The mineralogical assemblage of host rocks reflects a similarity to those of their enclaves. These rocks have metaluminous to peraluminous, calc-alkaline and I-type nature. Sr, Nd and Pb isotopic values of these enclaves and their hosts commonly display similar variations with the overlapping values and they are difficult to be explained by fractional crystallization processes alone. Magma mixing/mingling processes coupled with thermal, mechanic and chemical exchange played important role in the genesis of these granitoids. These mixed magmas might have been formed at the mantle and lower crust boundary that became unstable by upwelling of asthenosphere as heat source. Asthenosphere upwelling appears to be generated by roll-back of the subducted Aegean lithosphere, which also led to the migration of melting and hybridization processes of mantle and lower crustal sources.