Geochemistry of the Pınarbaşı granite (Gediz-Kutahya-Western Anatolia)

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The western Anatolian magmatic province is defined by a large number of Late Cenozoic post-collisional granitic plutons (e.g. Kozak, Eybek, Çataldağ, Alacam, Koyunoba, Egrigoz and Baklan plutons). In the Gediz area, the magmatic activity started with the intrusion of the Pınarbaşı Granite and coeval volcanic association. The Pınarbaşı Granite, described here for the first time is a small granitic intrusion which occurs a NW–SE trending magmatic belt along the northern border of the Menderes Massif. The Pınarbaşı granite shows similarities in their internal structures, petrological and geochemical characteristics to other granitic plutons.

The Pınarbaşı granite, based on modal and geochemical classification, is composed of granite, granodiorite and quartz monzonite composition. These rocks are made up by plagioclase, K-feldspar, quartz, biotite and hornblende, with accessory apatite, sphene, zircon, magnetite and muscovite. The SiO_2 content of these rocks range from 59.5 to 67.8 wt% with an alumina saturation index of Shand [molar $Al_2O_3/(CaO + Na_2O + K_2O)$] ~ 1.1. It have high K_2O (3.55-4.21 wt.%) and Rb (105.5-118.6 ppm) compositions and low contents of MgO (0.89-1.71 wt.%), Co (27.2-90.1 ppm) and Ni (14, 7-41, 5 ppm). The Pınarbaşı granite is sub-alkaline character, high-K, calc-alkaline series and displays features of I-type granites.

The rocks show enrichment in LILE and LREE relative to HFSE. Tectonic discrimination diagrams of Pınarbaşı granite suggest probably belong to post-collisional granotoid (Post-COLG). Their chondrite normalized REE patterns are fractionated and have small negative Eu anomalies (Eu/Eu* = 0.69–0.82) with the depletion of Nb, Ti. Geochemical characteristics of the Pınarbaşı granite indicate that they could have derived from the magmas of the lithospheric mantle origin.

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Origin of sulfides and pyroxenites in the Hawaiian mantle: Insights from PGE and Re-Os isotopes

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PGE concentrations in the Hawaiian garnet pyroxenite xenoliths are significantly depleted relative to mantle peridotites with strong PGE fractionations ($Pd_{(n)}/Ir_{(n)}$ ~2-21; $Re_{(n)}/Os_{(n)}$ 20-728, n=chondrite normalized). Sulfides in these pyroxenites have Fe-Ni MSS compositions and high $Pd_{(n)}/Ir_{(n)}$~1-35 ratios. Mass balance calculations show that the sulfides are the major repository of PGEs in the pyroxenites and are best explained as immiscible liquids separated from a melt similar to the Honolulu Volcanics rejuvenated stage lavas. We note that neither the sulfides nor bulk rock pyroxenites have the required Pt/Re ratio that, upon 'ageing', can account for the enriched ^{186}Os-^{187}Os isotope signature observed in some Hawaiian picrites and komatiites.

The pyroxenites have subchondritic to suprachondritic $^{187}Os/^{188}Os$ ratios (0.123-0.164) that correlate with bulk rock major and trace elements: the most radiogenic samples have the highest Al_2O_3, REE, Pd/Ir and lowest Ni, Cr and Mg# contents. However, bulk rock $^{187}Os/^{188}Os$ ratios do not correlate with the Hf-Nd-Sr isotope compositions of clinopyroxene [1], nor with bulk rock Re/Os or 1/Os ratios. This observation does not support an origin of these $^{187}Os/^{188}Os$ ratios from mixtures of melts from different sources or having resulted from *in situ* ^{187}Os ingrowth.

We interpret the major element, trace element, Os isotope and PGE correlations as the result of a fractionation of magma at depth. We envision a primary mantle melt from a depleted mantle source with unradiogenic Os, Sr and radiogenic Nd and Hf isotopes that crystallizes the most isotopically depleted samples with high PGE, Ni and Cr and low incompatible element concentrations. With progressive fractional crystallization and sulfide separation (~0.4%), the residual melt becomes increasingly PGE poor (e.g. Os – 0.02 ppb, Ir-0.04 ppb) and incompatible element enriched. The very low Os contents in these later pyroxenites makes them susceptible to post melting metasomatic overprint, perhaps by fluids or melts related to the HV lavas with very radiogenic $^{187}Os/^{188}Os$ ratios [2].

[1] Bizimis *et al.* (2005) *GCA* **69**, 2629–2646. [2] Lassiter *et al.* (2000) *EPSL* **178**, 269–284.