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Title: GEOLOGY AND GEOCHEMISTRY OF JURASSIC PLUTONIC ROCKS, BABOQUIVARI MOUNTAINS, SOUTH-CENTRAL ARIZONA

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Abstract: The Jurassic magmatic arc segment extending across southwest North America, from southern California to southern Arizona and northern Sonora, includes igneous rocks ranging from ultramafic hornblendite to high-silica leucogranite and rhyolite, from calcalkaline to mildly alkaline, and from metaluminous to weakly peraluminous. Among the granitic rocks, two distinctive types dominate, occurring together in numerous mountain ranges: hornblende-biotite granodiorite and biotite leucogranite. These characteristic rocks of the plutonic levels of the Jurassic arc are particularly well preserved and well exposed around Kitt Peak, in the Baboquivari Mountains, southern Arizona.

Middle to Late Jurassic calcalkaline plutonic rocks in the Baboquivari Mountains constitute the Kitt Peak Plutonic Suite (KPPS), which comprises three major units: Aguirre Peak Quartz Diorite (APQD; >165 Ma, <170 Ma, U-Pb), ranging from olivine hornblendite to leucodiorite; Kitt Peak Granodiorite (KPGD; 165 Ma, U-Pb), titanite-bearing hornblende-biotite granodiorite and monzogranite, with large alkali feldspar phenocrysts; and Pavo Kug Granite (PKG; 159 Ma, U-Pb), equigranular biotite leucogranite, characterized by conspicuously greasy-gray quartz. APQD forms heterogeneous pipe-like intrusions or small stocks of hornblendite, appinite, or various dioritic rocks; KPGD and PKG form more uniform plutonic masses.

Binary variation diagrams, chondrite-normalized REE spectra, and primitive-mantle, normalized incompatible element patterns indicate that APQD and KPGD are consanguineous. The most primitive appinite and diorite probably approximate the parental magma for the APQD, KPGD series. More evolved rocks of this series evidently formed by some combination of fractional crystallization and assimilation of crustal material. The PKG (about 6 m.y. younger than the KPGD) appears to have a less direct petrogenetic relation to the APQD and KPGD than these two do to one another.

We have examined the behavior in the KPPS of numerous trace elements (determined by ICP-MS), mainly by plotting their concentration against indices of igneous evolution, of which FeO*+CaO generally yields the most coherent trends. Four types of behavior can be distinguished. (1) Rb, K, Th, U, and W are strictly incompatible, increasing monotonically through the sequence from hornblendite to leucogranite. (2) Sc, V, Cr, Co, Ni, and Cu are consistently compatible, decreasing monotonically with igneous evolution. (3) Cs, Ba, P, Ti, Zr, Hf, Sn, LREE, MREE (including Eu), Zn, and Ga are incompatible in the earlier stages of evolution, reach maximum concentrations in intermediate rocks, and then become compatible at more evolved (more silicic) compositions. That is, these element display concave-downward trends when plotted (as ordinate) against FeO*+CaO. (4) Pb, Nb, Mo, HREE, Sb, and Bi increase from ultramafic through mafic to intermediate compositions, then remain semiconstant in intermediate through silicic rocks.