

Geochemical Evidence for 1.9-1.8 Ga Continental Arc Magmatism in the Arequipa Massif, Southwestern Peru

[Loewy, S. L.](#); [Bahlburg, H.](#)

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The anomalous Arequipa Massif, along the coast of southwestern Peru, is part of an exotic terrane (The Arequipa- Antofalla Basement) that was likely emplaced along the margin of Amazonia at ca. 1 Ga. As such, it may be a tectonic tracer left behind by the craton that collided with Amazonia during the ca. 1 Ga Sunsas Orogeny. Correlation of the massif with its "parent craton" could constrain the position of Amazonia within the Mesoproterozoic supercontinent Rodinia. Better characterization of the "pre-1 Ga" tectonic evolution of the Arequipa Massif is necessary to evaluate potential parent cratons. Previous geochronologic work has constrained the timing of Paleoproterozoic events. Bimodal magmatism occurred between 2.02-1.82 Ga. This granite and gabbro was metamorphosed between 1.82 and 1.79 Ga. The resulting gneisses were intruded by granite at ca. 1.79 Ga. The entire sequence was metamorphosed ca. 1 Ga, generating a planar fabric in the younger granite. Based on these ages, there are numerous potential parent cratons, including Amazonia, Sao Francisco/Congo Craton, Kalahari, Laurentia, and Baltica (although previous Pb isotopic work refuted potential correlation with Laurentia). New elemental analyses from the same samples now provide better characterization of the tectonic environment in which these rocks formed. Samples include three granitic gneisses, two metagabbroic amphibolites, and three foliated megacrystic granites. The six granitic rocks have calc-alkaline compositions and the two mafic rocks are alkaline-rich. Among the granitic samples, comparison of Ta/Yb vs Th/Yb is consistent with formation in an "active continental margin" and comparison of Th-Hf/3-Ta (for all samples), Rb vs. Y+Nb, Ta vs. Nb suggest formation by volcanic arc magmatism. Although the rocks have been metamorphosed, multiple geochemical indicators are consistent with formation during continental arc magmatism.

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