

Age, geochemistry and emplacement of the Pascuales plutons in western Ecuador and their geodynamic implications

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The Late Cretaceous subduction related M-type Pascuales granitoides were emplaced by subduction process along the Piñón intra-oceanic arc formed in the Farallón Plate prior to the docking of the Pallatanga and Piñón terranes. U/Pb in zircons ages ranges between 98 and 86 Ma for these magnesian-rich calc-alkaline rocks and occasionally contain large sedimentary xenoliths of lithology similar to the Cayo Formation incorporated during magma ascension and often are cut by basaltic dykes. Most of the stocks and dykes are granodiorite, mainly calc-alkaline, metaluminous and magnesian with a strong subduction signature and significant percentage of high fluid derived melts that is somewhat enriched with respect to the primitive mantle as the outcome of more fertile magmas contamination that ensured a pyroxene residual melt. While the slab fluid input is backed by a prominent Nb negative anomaly, and slight La (Ta, was not analyzed), Zr and Ti, the fertile magma contamination is recorded in the gentle slope with slighter LREE enrichment than in HREE in the chondrite spidergram and the majority of the samples show negative Lu anomaly. Although the bulk of the stocks and dykes are characterized by strong negative Lu anomaly, Yb < 1.4 ppm, Sr < 145.9 ppm, Y < 13 ppm, La/Yb < 6, Eu < 0.7, and Y < 13. However, the San Francisco stock is characterized by Sr = 257.7 ppm, Y = 59.17 ppm, and Eu = 4.14 ppm, suggesting a different magma batch typified by deeper source and slight fractional crystallization of amphiboles with marked accumulation of plagioclases. The U/Pb age and geochemistry of the Pascuales granitoides as well as the presence of sedimentary xenoliths mentioned, suggest that this intrusive event was linked to the Piñón Formation and Chongón Group magmatism. Indeed, this Upper Cretaceous magmatism took place in a subduction-related intra-oceanic arc (Piñón Arc) prior to the final docking and collision of the Piñón Terrane in the Late Danian.

In the Western Cordillera the only intrusive of the mesozoic documented so far, is the 85.5 Ma U/Pb zircon Pujili monzonite that was incorporated and preserved in a collisional melange along a sheared zone of the same name during the collision of the Pallatanga Terrane (Vallejo, 2007). Although this intrusive has a well-defined subduction signature documented by the negative Nb anomaly, steep slope and enrichment in the LHREE and MREE, and the almost flat pattern in the HREE indicate garnet as a residual melt. However, the low Mg (0.21 ppm), Eu (0.206 ppm), Y (2.673ppm), and high Sr (303.984 ppm), Sm/Yb Y (5.682028), and La/Yb Y (47.0553) ratios strongly suggest an adakite-like derived from melting of the basaltic portion of oceanic crust subducted beneath oceanic arcs where unusual conditions lower the solidus of and older slab (Condie, 2005).