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**Title:** ADAKITIC ROCKS OF ECUADOR AND THEIR POTENTIAL TO FORM PORPHYRY-STYLE DEPOSITS

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**Abstract:** Recently there has been a growing interest in the association of adakitic magmatic rocks with porphyry-type deposits in magmatic arcs worldwide. However, the actual role of adakitic magmatism in the genesis of porphyry-type deposits remains unclear because precise temporal relationships between the adakitic rocks and mineralization are missing and much debate exists on whether adakitic rocks are slab melts or mantle-derived magmas that evolved at the base of the lower crust.

In Ecuador, porphyry-style mineralization occurs in association with Miocene normal calc-alkaline magmatism and sharply decreases until disappearance with the onset of adakitic magmatism since ca. 5 My ago. Here we present new Pb, Sr and Nd isotope data, combined with major, trace and rare earth element (REE) geochemistry of more than 80 magmatic rocks from 6 recent (<2 My old) and active volcanoes of Ecuador (Pilavo, Pululagua, Pichincha, Ilalo, Chacana, Sumaco), with no associated mineralized systems. Each volcanic center displays geochemical evolutionary trends characterized by increasing Sr/Y, Na and Al (i.e., more adakitic character) with silica, suggesting that plagioclase was not a stable phase during the evolution of the magmas. Correlations between radiogenic isotopes (Pb, Sr, Nd) and various evolutionary indices indicate that magmas evolved also by assimilating lithologies characterized by slightly different isotopic compositions. Middle and heavy REE depletions imply amphibole and some garnet fractionation in the source of these rocks. The occurrence of frequent cumulitic gabbroic and granulitic xenoliths, combined with the above geochemical data, indicate that the increasing adakitic character with evolution of the Ecuadorian magmatic rocks most likely results from ponding of mantle-derived magmas at the base of or within the lower continental crust (the crust being at least 40 km thick in Ecuador), and subsequent fractionation outside the stability field of plagioclase and partial assimilation of lower crust lithologies. We suggest that the switch from normal calc-alkaline to adakitic magmatism, occurred at least 5 My ago, is related to a well documented increase in compression started at the end of Miocene and probably associated with the Carnegie Ridge subduction. The increased compression constrains mantle-derived melts to evolve at depth before they can eventually rise as overpressured magmas that erupt violently, as documented by the explosive activity of the Quaternary Ecuadorian volcanoes. Under these conditions no shallow level, long-lived and large magmatic chambers can develop, which are instrumental to the formation of porphyry-type deposits. Additionally, the

occurrence of abundant chalcopyrite blebs in minerals of lower crustal cumulitic gabbroic xenoliths hosted by lavas of the Pichincha volcano, suggests that chalcophile metals might be lost by fractional crystallization during the evolution of the magmas at depth.