

Recent and frequent eruption of crystal-poor rhyolites in a compressive tectonic regime

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The Andes are best known for the production of andesitic volcanic products. Nonetheless, there are notable exceptions of rhyolitic production observed from the NVZ to the SVZ. Here we focus on volcanic centers situated along the Andean crest in central Ecuador which are host to major rhyolitic production within a notable compressive tectonic regime. All centers are situated upon or near the crest or eastward of the principal cordillera, the main arc of andesitic magmatism. Large calderas, eg. Chacana and Chalupas, whose ages range from 2.5 Ma to .2 Ma and which have each erupted volumes exceeding 100 km³ for single events are included. A dozen other smaller siliceous centers are under study. These 12 eruptive centers have crystal-poor rhyolites, whose ages range from only 2,000 yBP to older than 1.4 M yBP. We recognize that these centers are associated with fault convergences that may have facilitated ascent of rhyolitic magma. Their repose periods are shorter than for the large calderas, such that eruption periodicity occurs on timescales of a few thousand to tens of thousands of years. We suggest that the crystal-poor content of these magmas is a result of the separation of melt from crystal mushes at the top of larger siliceous magma bodies. The limited volumes of erupted rhyolitic material and the apparent frequency of these eruptions may be related to the dominant compressive tectonic regime in Ecuador where rhyolites are hosted. Perhaps the actual compressive regime limits abundant heat transfer and stirring of a large siliceous batch, voluminous eruptions? To the contrary, small slugs of siliceous magma upwelling along faults, such as at Cosanga or Pisayambo, have resulted in frequent eruptions. Both areas are favored by cross-cutting of a major transpressive fault family, namely the NE-SW trending Chingual-Cosanga-Pallatanga-Puna fault.