

## Transition from calc-alkalic to adakitic magmatism at Cayambe volcano, Ecuador: Insights into slab melts and mantle wedge interactions

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### Abstract

In volcanic arcs, two main types of magmatism are recognized: (1) widespread calc-alkalic magmatism, generated by hydrous partial melting of a metasomatized mantle wedge, and (2) less common adakitic volcanism produced by subducted-slab melting. The Cayambe volcanic complex in Ecuador shows a progressive temporal change from an older calc-alkalic volcano (Viejo Cayambe) to a younger adakitic edifice (Nevado Cayambe). This evolution may be related to the unusual geodynamic setting of the Ecuadorian Andes, controlled mainly by the subduction of the Nazca plate, including the Carnegie Ridge thickened oceanic crust. The Viejo Cayambe magmas appear to be generated from a mantle-wedge source, slightly metasomatized by slab-derived melts. Conversely, the Nevado Cayambe magmas imply either stronger and more advanced interactions between slab melts and mantle peridotite, or that adakitic magma could reach the surface due to higher degrees of slab melting. Fractional crystallization, assimilation, and mixing processes also contributed to lava diversity. We propose that the magmatic evolution of the Cayambe volcanic complex is due to increasing efficiency of interaction between slab melts and the mantle wedge, because of higher degrees of slab melting in response to the subduction of the Carnegie Ridge.

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