When Earth Erupts: The Formation of Continental Crust in the Central Mexican Volcanic Belt (MVB)

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This study addresses the formation of continental crust. The Mexican convergent margin where the Cocos Oceanic Plate subducts under the N. American Plate, is a distinct region where andesitic arc composite volcanoes produce high silica magmas. We are especially interested in analyzing andesitic and dacitic volcanic rocks because they are a proxy for understanding how the continental crust was once formed because of their similar composition. Although continental crust petrogenesis, remains unclear, there are several hypotheses on its formation. A conventional model states that high silica rocks initially begin as basaltic magma in the mantle. Upon melting and during ascent the silica increases within the crust by two processes: **fractional crystallization** (loss of mineral phases), and **crustal assimilation** (mixing of basaltic magma with ambient silicic crust to form an intermediate andesitic composition). The goal of this study is to test a new model for the genesis of andesitic arc magmas. The new model states that arc andesites form consequent to infiltration of a silicic slab component in a peridotite mantle, that then transforms to a pyroxenite. Partial melting of the pyroxenite creates a broad range of high Mg# basaltic to dacitic melts. Ultimately, our results imply that high-silica rocks originate from silicic slab components within the mantle with negligible contamination in the overlying crust.