MAGMA GENESIS, CRUSTAL STRUCTURE AND PLATE INTERACTION IN THE EARLY TRANSMEXICAN VOLCANIC BELT

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The Transmexican Volcanic Belt (TMVB) is a volcanic arc that started its activity in the middle to late Miocene (~16 Ma) as a result of a counterclockwise migration of volcanism from the Oligocene, NW-SE trending Sierra Madre Occidental rhyolitic province, to the present E-W trending TMVB. Several lines of evidence indicate that volcanic migration occurred when the present Middle American Trench (MAT) was already active. We studied the Neogene phase of the TMVB in order to recognize the role of crustal structure in magma genesis, and to develop a model of plate interactions for its inception. Volcanism of the early TMVB consists of basaltic plateaus in the western-central sector, and andesitic-dacitic stratovolcanoes in the central and eastern sectors. Magmatism in the easternmost part of the belt, near the Gulf of Mexico, is depicted by calc-alkaline granitoids and andesitic volcaniclastics. Major and trace element data of selected late Miocene volcanic fields along the arc unequivocally indicate a magmatic arc origin. Furthermore, our data indicate that variations in composition (arc-cratonic), age (Cretaceous-Precambrian) and structure (thickened crust) of the basement underneath the arc, significantly influenced the degree of mantle melting, ascent, differentiation paths and emplacement conditions. Subduction related magmatism associated with the early TMVB reached ~500 km from the trench, suggesting a very shallow angle of subduction for that period. A shallow angle could be related to major plate reorganizations in the Pacific at ~25 Ma that promoted a significant increase in the convergence rate along the MAT at about 20 Ma.