

ORIGIN OF THE GIANT VOLCANOES IN THE TRANSMEXICAN VOLCANIC BELT

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The ~E-W trending Transmexican Volcanic Belt crosses Mexico from the Pacific to the Atlantic Oceans and has been active since middle Miocene. Many of the giant volcanoes in this arc show a ~N-S alignment which defines volcanic chains including at least three major polygenetic volcanoes. In contrast, monogenetic volcanoes are parallel to the main normal fault system and to the general orientation of the arc. We documented several areas in which the alignments of polygenetic and monogenetic volcanoes are almost orthogonal and a giant volcano is synchronous with monogenetic volcanoes. Many alignments of polygenetic volcanoes are located on crustal blocks boundaries. The strain rate of each alignment depends on its orientation with respect to the strain field. Since the volcanic arc is ~15° oblique to the trench, the maximum extensional strain axis is expected to approach any of these orientations: 1. perpendicular to the arc, 2. perpendicular to the trench or, 3. parallel to the convergence direction. In any case, transverse polygenetic alignments represent directions of low strain rate. The deformation seems accommodated by strain partitioning along zones with different directions and released both by faults and by magmatic addition to the crust. We concluded that polygenetic volcanism resulted from shallow magma trapping in fault zone with low strain rate. It is easy to visualise that in a high strain rate zone magma continues its ascent until surface, whereas when it reaches a low strain rate zone, its ascent is inhibited