



The Tenango Fault: active intra-arc transtensive deformation in the central Trans-Mexican Volcanic Belt

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The Trans-Mexican Volcanic Belt is an east-west active volcanic arc related to subduction along the NW-SE Middle American Trench and characterized by seismicity and Holocene synvolcanic arc-parallel faulting. Major intra-arc faults within the central part of the volcanic belt were described by previous authors. The Tenango Fault, trending east-west and bounding the intra-arc Lerma Basin, was considered one of the most important faults and characterised only by Holocene normal movements. The Tenango Fault shows a clear morphological trace more than 50-60 km long, cuts in the middle the Nevado de Toluca volcano edifice, and is composed of some segments and a narrow graben. Several morphostructural and field evidences indicate activity of this fault at least in the last 50,000 years, particularly in the Holocene. The strike and geometry of the fault segments from satellite and aerial photos suggest a predominant transtensive left-lateral kinematics. Field work focused on Holocene fault movements, including trenching the fault trace, reveals displacement of volcanoclastic deposits and lava bodies as long as man made infrastructures. The structural stations analyzed confirm a predominant left lateral strike-slip motion with an associated extensional component of the Tenango fault; the minimum estimated slip rate is about 0.2 mm/year. Relationships between volcanism along the Tenango Fault and its kinematics demonstrate the influence of the regional tectonic on the evolution of a continental volcanic arc. Particularly, the Tenango Fault controls the emplacement of the fissural lava flows of the monogenetic Chichinautzin volcanic field and the growth and destabilization of the recent summit dacitic domes of the Nevado de Toluca volcano. Moreover, the

movements of the Tenango Fault cause an important seismic hazard in the intra-arc Lerma Basin, where several towns, including Toluca city with more than 1 million of inhabitants, are located; the basin is filled by lacustrine and unconsolidated volcaniclastic deposits.