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Active tectonics and volcanic activity in El Salvador (Central America)

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El Salvador is located on the western part of the Caribbean plate, close to its boundaries with the North American and Cocos plates. To the north, the contact between the Caribbean and North America plates occurs along the complex Polochic-Motagua fault system, which runs some 100 km far from the north-western border of El Salvador. The western active margin, marked by the Middle America Trench, is related to subduction of the Cocos plate beneath the North American and Caribbean plates. Subduction -oblique to the plate boundary- produced a prominent magmatic arc, the modern Central American Arc, associated with several coast-parallel active volcanoes. El Salvador is characterized by a Neogene volcanic basement, which is overlain by the youngest volcanism, including 18 active volcanoes. No significant temporal gap exists between the erupted products at least during the Plio-Quaternary. The erupted products constitute a typical calc-alkaline association ranging in composition from basalts to rhyolites.

Geodetic and structural studies suggest that the oblique convergence is partitioned between trench-orthogonal compression and strike-slip deformation parallel to the volcanic arc. This latter component is accommodated by development of a major dextral transcurrent fault system, the El Salvador Fault Zone (ESFZ). This fault system is laterally discontinuous, being subdivided in different major *en-echelon* segments which interact forming pull-apart structures. These fault segments focus the volcanic activity, as testified by localization of the volcanic front along the three major E-W en-echelon segments. Notably, between the dextral ESFZ and the sinistral Motagua fault system, a series of N-S trending grabens testifies an intraplate deformation of the Caribbean plate related to an active E-W extensional stress field.

More detailed geological, structural and petrological investigations were carried out in two key areas, namely the Berlin and Ahuachapan geothermal areas, located in eastern and western El Salvador, respectively.

In the Berlin area the active deformation is controlled by the regional transcurrent stress-field resulting in the development of systems of right-lateral E-W-trending strike-slip faults and associated secondary Riedel and tensional shears. Conversely, the structural setting of the Ahuachapan area is more complex being characterized by different fault systems possibly reflecting an interaction among the ESFZ-dominated stress field, the sinistral Motagua transform fault, and the active E-W extension responsible for the intraplate deformation of the Caribbean plate.

Volcanic activity in these two areas retains different characters: a marked geochemical and isotopic homogeneity is found in Berlin, pointing out to the presence of a single magmatic system giving rise to a single volcanic edifice. By contrast, Ahuachapan rocks show higher heterogeneity with significant variations either in Sr isotope or in trace element distribution: this area is characterized by multiple volcanic centers, fed by different magma batches that reach the surface without reciprocal interactions in shallow reservoirs, as testified by the relative abundance of basaltic products.

Thus, the characters of volcanic products in Berlin and Ahuachapan reflect their different tectonic setting and point to an increase of the structural complexity approaching the margin between the North American and Caribbean plates.