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Structural model of the basement and its link with the volcanic activity of the Mocho-Choshuenco Volcanic Complex, Southern Andes, Chile

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Mocho-Choshuenco Volcanic Complex (MCVC) is one of the most hazardous volcanoes in Chile's Southern Volcanic Zone (SVZ), and is located at 40°S 72°W in Los Ríos Region, Chile. Here, the SVZ coexists with the margin-parallel Liquiñe-Ofqui Fault Zone (LOFZ) and with NW-striking Andean Transverse Faults (ATF). The LOFZ is 1200 km-long intra-arc strike-slip fault system located between 38°-46°S, and partially controls the occurrence, spatial distribution and geometry of major stratovolcanoes. Deformation-induced fault-fracture networks have been regarded as efficient pathways through which magma is transported, stored and eventually erupted at the Earth's surface, reason for which the Chilean Andes provides one of the best natural laboratories in the world to assess the link between tectonics and volcanism. In this study, we provide new structural, kinematic and dynamic insights, which would condition the formation and evolution of the MCVC.

Structural field data was collected and analyzed from regional and local scales. The strain analysis shows homogeneous deformation, with NE-trending shortening and NW-trending extension. The stress field analysis at a regional scale indicates a strike-slip dominated transpressional regime with N46°E-trending σ1 and N42°W-trending σ3, which is consistent with the actual oblique convergence. Deformation driven by this oblique convergence is partially partitioned, where the margin-parallel component originates the dextral strike-slip in LOFZ. Preexisting NW-striking faults are reactivated under the regional stress field, facilitating hydrothermal fluid flow and magma migration, associated with volcanoes, dikes and minor eruptive centers present in the study area. As a final result, we propose a simplified, three-dimensional model for the MCVC's basement, contributing to the understanding of the system and the way in which the different factors interact.