

Seismicity in a Transpressional Volcanic Arc: The Liquine-Ofqui Fault System in the Puyuhuapi Area, Southern Andes, Chile (44 degrees S)

Por: [Perez-Estay, N](#) (Perez-Estay, Nicolas)^{1,1}; [Yanez, G](#) (Yanez, Gonzalo)^{1,2}; [Crempien, J](#) (Crempien, Jorge)^{1,2}; [Roquer, T](#) (Roquer, Tomas)^{1,2}; [Cembrano, J](#) (Cembrano, Jose)^{1,2}; [Valdenegro, P](#) (Valdenegro, Pablo)¹; [Aravena, D](#) (Aravena, Diego)¹; [Arancibia, G](#) (Arancibia, Gloria)^{1,2}; [Morata, D](#) (Morata, Diego)^{1,3}

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Abstract

Understanding the relationship between crustal faults and volcanic activity in transpressional environments is a main goal in geosciences and could help to understand geothermal resources and evaluate geological hazards. In the Andean Southern Volcanic Zone (SVZ), Chile, recorded seismicity is scarce, and few studies have evaluated the relationship between volcanic activity and crustal faults from seismic observations. Thus, in this study, we deployed a seismic network for almost 1 year to understand the brittle deformation of the upper crust within the Puyuhuapi area, located at similar to 44 degrees S in the SVZ. We analyzed the location and kinematics of seismicity together with previously published field structural geological data. Considering these results, we developed an integrative tectonic model for the area and discussed which faults facilitate magma transport through the crust. Our results indicate the existence of two NNE-oriented seismogenic dextral to dextral-reverse regional faults that generate a duplex in a continental-scale fault setting. Inside the duplex, we observed normal to strike-slip normal focal mechanisms which recurrently have NE trending nodal planes. At a regional scale, a strike-slip tectonic environment has a N60 degrees E/18 degrees shortening direction and a N151 degrees E/03 degrees extension direction. We conclude that stratovolcanoes are located inside the duplex in a local transtensional environment where NE oriented normal faulting may occur. These faults facilitate magma transport since they represent the preferential orientation for dilatational fractures. Conversely, in local transpressional environments such as the Puyuhuapi fault (NNE oriented dextral to dextral-reverse kinematics), only minor eruptive centers of small volume are emplaced, suggesting a less productive magma transportation process.

Palabras clave

KeyWords Plus:[EARTHQUAKE LOCATION ALGORITHM](#); [TECTONIC EVOLUTION](#); [PATAGONIAN ANDES](#); [FOCAL MECHANISMS](#); [AYSEN FJORD](#); [ZONE](#); [STRESS](#); [SLIP](#); [DEFORMATION](#); [INSIGHTS](#)

Información del autor

Dirección para petición de copias:

Universidad de Chile Univ Chile, Andean Geothermal Ctr Excellence CEGA FONDAP, Santiago, Chile.

Dirección correspondiente: Perez-Estay, N (autor correspondiente)

+ Univ Chile, Andean Geothermal Ctr Excellence CEGA FONDAP, Santiago, Chile.

Direcciones:

+ [1] Univ Chile, Andean Geothermal Ctr Excellence CEGA FONDAP, Santiago, Chile

+ [2] Pontificia Univ Catolica Chile, Dept Ingn Estruct & Geotecnia, Santiago, Chile

+ [3] Univ Chile, Dept Geol, FCFM, Santiago, Chile

Direcciones de correo electrónico:nnperez@uc.cl

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