Geochemistry of geothermal fluids in the active Liquiñe-Ofqui Fault System (Southern Andes Volcanic Zone, Chile).

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The nature of the interplay between tectonics and the chemical composition and circulation of geothermal fluids is a major question in active continental margins (Cox, 2010; Rowland and Simmons, 2012). The intra-arc, strike-slip Liquiñe-Ofqui Fault System (LOFS) in the Southern Andes Volcanic Zone (SAVZ) of Chile offers a unique opportunity to address this question because of evident changes in tectonic style related with changes in geochemical signature of volcanic products (Lopez Escobar, 1995; Lara et al., 2006). Two main volcano–tectonic features have been recognized by Cembrano and Lara (2009): 1) kinematically coupled systems directly related to the current dextral transpressional tectonic regime, including NE–trending volcanic alignments of stratovolcanoes and monogenetic cones of primitive, basaltic compositions; 2) kinematically uncoupled systems, including NW–trending of stratovolcanoes associated with ancient reverse faults of the volcanic arc basement. Within this context, one lesser known but relevant aspect of the evolution of geothermal systems associated to the LOFZ is the relation between these volcano–tectonic features and fluid geochemistry.

This study focus on the chemical and isotopic composition of gases and waters in selected volcanoes in the SAVZ. The NE–trending volcanic alignment Callaqui–Copahue is investigated at the northern termination of the LOFS, where the spatial distribution of the hydrothermal discharges is controlled by a NW–trending faults (Nakanishi et al., 1995). South of this area, two additional systems are studied: the Tolhuaca volcano, whose geothermal system seems to be related to an active NW–trending fault, and the NE–trending systems that control the active Lonquimay volcano.

Previous works in Copahue volcano shows a variability in He concentration between the two, NW and NE, structural lineation that control the geothermal system (Agusto 2011). We are using He, O, H and N isotopes able to provide insights about fluid sources, gas–water–rock interactions and their relation with the volcano–tectonic structures, mentioned above.