

Abstract

The processes leading to the formation of large volumes of silicic volcanic rocks is not fully understood, yet such eruptions are relatively common and can be of substantial danger for surrounding populations. The present study focuses on the geology and geochemistry of a silicic volcanic dome close to the town of El Chaltén in Patagonia, Argentina. It was formed during the breakup of Gondwana during the Jurassic and is part of one of the world's largest silicic igneous provinces, the Chon Aike Province.

Following fieldwork observations, a whole rock major and trace element analysis is conducted to determine whether an evolution of the magmatic system can be recognised throughout the dome. An oxygen isotope study is carried out to constrain the origin of magmas. Whole rock and bulk quartz analysis were performed by CO₂-laser fluorination. They show high oxygen isotope values (respectively 10‰ and 12‰), which cannot be achieved by fractional crystallisation of a basaltic parental melt, suggesting assimilation of continental crust in the production of the studied rhyolites.

Moreover, LA-ICP-MS U/Pb studies on zircons from the volcanic dome, reveal the presence of old inherited cores that could be of crustal origin. Jurassic zircons that crystallized during the formation of the dome, reveal that the structure is slightly younger than what has been reported for the formation of the El Quemado Complex. It is believed that volcanism associated to the breakup of Gondwana is extended until the end of the Jurassic in this area. Further investigations conducted on quartz phenocrysts and the study of CL imaging reveals that they have a complex growth history. Changes in CL intensity are believed to reflect variations in Ti content. The observation of numerous resorption textures are indicative of quartz crystal residence in an ever evolving crystalline mush prior to eruption. Ti-diffusion profiles along the boundary forming the last rim overgrowth of quartz crystals reveals very short time-scales, suggesting that eruption took place relatively fast after the onset of crystallization.

Keywords: *SLIP, Chon Aike Province, rhyolitic dome, $\delta^{18}O$, LA-ICP-MS zircon dating, Ti-in quartz diffusion*