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Textural and compositional analysis of plagioclase as a clue for precursors in the unexpected 2015 Calbuco volcano eruption

Andrés Oyarzún¹

¹Universidad de Concepción

Calbuco Volcano, turbulent convection, disequilibrium textures, electron microprobe, BSE image

Calbuco Volcano eruption (April 2015) was not preceded by an evident unrest period as usually occurs for such an erupted volumes. That poses a major problem in terms of volcano hazards assessment and risk mitigation therefore providing motivation for the study of factors that control eruptions with too short run-up times. Several studies have concluded that the texture and chemical zoning in plagioclase can be a useful tool to track dynamics and kinetics of magmatic processes due to the high sensitivity to changes in physical and chemical conditions. In this study, the analysis of textures with optical microscopy will be complemented by BSE image analysis and compositional zonation of major and trace elements by electron microprobe. As a preliminary result, two textural populations were observed in terms of, and presence of glomerocrysts. These crystals have also different types of zoning, disequilibrium textures as coarse sieve in the center of the some of them show patchy zoning, reabsorption surfaces and synneusis, which taken together could be interpreted evidence of magma mingling or turbulent convection being the latter better supported. Complementary studies are aimed to find more evidence in favor of the turbulent convection and degassing (reversely zoned crystals, resorption surfaces and wide ranges of mineral compositions, crystals that have very different thermal histories), which could be generated by rapid heating at the base and cooling from above of the magma chamber, prior to the eruption.