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Petrogenesis of Cinder Cones on Villarrica Volcano, Southern Chile

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Introduction

The goal of this project is to determine the compositional heterogeneity of lavas erupted along a fissure system at Villarrica Volcano. Variations in geochemistry (major and trace elements) are used to evaluate the role of fractional crystallization down the fissure system.

• 12 samples were collected from Villarrica:
  1. 10 samples along a NE-SW trending cinder cone fissure system noted by the red line on the map.
  2. 2 tephra from the 2015 eruption (9a and 9b)

Examining the composition along the fissure will allow us to determine if the fissure samples are related to each other and the 2015 tephra.

Research Questions

• Are lavas from the entire fissure system compositionally similar?
• Are lavas from a single cinder cone compositionally similar?
• Can differences be explained by fractional crystallization?

Methods

• 12 samples collected from Villarrica in March 2015
• 3 samples collected from cone 1 to evaluate heterogeneity
• Processed by crushing, sieving, cleaning, and picking
• Weighed and dissolved samples for analyses
• Measured major and trace elements by solution ICP-MS

Compositions vs. Longitude

• Lava compositions are heterogeneous
• No consistent variation with longitude
• Slight variation in lavas collected from cinder cone 1, suggesting crystallization during eruption

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References

² Sack, 1995) to model fractional crystallization.