

# **Petrology of Volcanic Rocks from Bequia and Soufrière, St. Vincent**

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## **Abstract**

Volcanism is a persistent feature of the Lesser Antilles island arc spanning as far as Saba to the north and Grenada to the south. The geochemical compositions of the igneous rocks produced along this arc axis vary within a close spatial context. Attempts have been made in the past to segment the arc based on eruptive compositions, but this has only proved to oversimplify the geochemical patterns actually occurring geographically. These variations are especially highlighted when looking at the southern third of the arc: St. Vincent to Grenada. Although these islands are only 140 km apart, Grenada and the Grenadines show greater similarities than with St. Vincent. In fact, recent research has highlighted a petrological and geochemical boundary between Grenada and St. Vincent, but its position in the Grenadines has not yet been determined. This study uses petrographical and geochemical data from lavas of Bequia and La Soufrière, St. Vincent to compare the crystallization history of each magmatic system and to help constrain the geochemical transition in the southern third of the arc.

Lavas from each locality were compared using three complimentary methods: qualitative observation of mineral textures under the petrological microscope, quantitative analysis of phenocryst compositions using Electron Probe Micro-Analysis and quantitative analysis of plagioclase textures using Crystal Size Distribution (CSD) theory. Evidence so far suggests that both localities did not have a simple crystallization history. These porphyritic lavas contained mineral assemblages dominated by mafic phases including clinopyroxene, Ti-magnetite, plagioclase and orthopyroxene for Soufrière, with the addition and exclusion of olivine and spinel respectively for Bequia. Both systems exhibited similar disequilibrium textures with phenocrysts showing evidence of compositional zoning, resorption and exsolution. CSD results indicated the presence of two plagioclase populations in both localities. This study awaits the inclusion of whole rock geochemical data to assist with this comparison.