Magmatic evolution of the Santa Barbara G trachyte, Terceira, Azores

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Terceira, one of nine islands that comprise the Azores archipelago, is composed of four stratovolcanoes. Santa Barbara volcano, located at the island's western end, is the youngest and most historically active. Previous volcano-stratigraphic studies have described the Santa Barbara deposits in detail [1, 2] but little is known about the geochemical compositions or the petrogenetic processes and timescales that produced these deposits. Santa Barbara G (SB-G), a sequence of pumiceous airfall deposits and associated domes and lava flows, represents one of the most recent eruptions of Santa Barbara, loosely constrained at ~2 ka, [1, 2]. Our research aims to constrain the pre-eruptive processes that produced the SB-G deposit. Major and trace element compositions were obtained from trachytic pumices, one obsidian and two lavas from associated domes. SB-G is characterized by decreasing Fe_2O_3, MnO, Na_2O, K_2O, Al_2O_3, Sr and Ba with decreasing TiO_2, controlled primarily by fractionation of sanidine and lesser Fe-Ti oxides. The lower units of the deposit are the most evolved, with samples becoming less evolved up-section. A compositional gap between the least evolved pumices and a lava sample from an associated dome, that is significantly less evolved, suggests that eruption of the SB-G trachytes may have been triggered by injection of a less evolved melt into a more evolved, compositionally zoned magma chamber. Sr-Nd-Pd isotopic analyses and U-series disequilibria in glass and mineral separates will further help elucidate the processes and timescales operating in the SB-G magmatic system.

[1] Self (1976) *J. of the Geological Society of London* **132**, 645–666. [2] Calvert *et al*. (2006) *J. of Volcanology & Geothermal Research* **156**, 103–115.

Microbial community structure and geochemistry of the New Albany Shale (Illinois Basin) and its potential to produce biogenic methane

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Methanogens in organic-rich coalbeds and shales generate significant amounts of methane, but little is known about the microbial community structure that enables this generation to occur. The Upper Devonian New Albany Shale (NAS) (Illinois Basin) is an emerging gas play that shows similarities to the economically productive Antrim Shale (Michigan Basin). Previous research has established geochemical proxies for microbial gas production, and has shown that many midcontinent shales and coalbeds contain biogenic methane. For example, biogenic methane in the Antrim is indicated by high $\delta^{13}C$ values for carbon dioxide and dissolved inorganic carbon, as well as high alkalinity and high carbon dioxide concentrations. The geochemistry of the NAS contains many of the same markers for biogenic methane as the Antrim, although differences occur. To assess the microbial community of the NAS and its contribution to methane production, we built 16S clone libraries of archaea and bacteria from 10 NAS wells selected due to variations in geochemistry, such as chloride and dissolved inorganic carbon concentrations. When combined with extensive geochemical and microbial data from biogenic methane plays in other basins, our results can further identify the environmental factors affecting the community structure of subsurface methanogens.