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In-situ Sr isotopic investigations of feldspar phenocrysts from the Teide-Pico Viejo stratovolcanic complex, Tenerife (Canary Islands)

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As part of the ongoing EU-funded ERUPT (European Research on Understanding Processes and Timescales in magma systems) project, we have engaged in a detailed petrologic and geochemical study of samples from the Teide-Pico Viejo stratovolcanic complex, Tenerife (Canary Islands). Located within Las Cañadas caldera, the Teide-Pico Viejo complex represents a large component of the most recent (0.18 Ma – present) volcanic activity on Tenerife. Therefore, through in-depth investigation of eruptive products from the Teide-Pico Viejo complex we hope to gain a better understanding of the current state of the Tenerife magmatic system. The study includes both whole-rock isotopic (Sr-Nd-Hf-Pb) analyses and in-situ microsampling of individual feldspar phenocrysts for $^{87}Sr/^{86}Sr$ analysis. Previous work and our own initial examination of individual feldspar phenocrysts via electron microprobe analysis have revealed the presence of considerable core-to-rim variations in major and trace element contents. Likewise, preliminary results of $^{87}Sr/^{86}Sr$ microanalysis of the same feldspar phenocrysts indicate relatively small (but still detectable) accompanying variations in $^{87}Sr/^{86}Sr$ from $\sim$ 0.7031-0.7032. The most significant shifts in $^{87}Sr/^{86}Sr$ within individual feldspar phenocrysts often correspond with obvious textural boundaries (e.g., resorption surfaces). In addition, petrographic observations of some Teide-Pico Viejo lavas suggest a sequential process by which large complexly zoned feldspar megacrysts are formed. This process appears to involve initial amalgamation of individual elongate feldspar phenocrysts into large clusters followed by subsequent crystallization of a rim that entirely surrounds each cluster. These early results suggest a complex crystallization history for at least some feldspar phenocrysts indicative of an open and dynamic magmatic system beneath the Teide-Pico Viejo complex.