

[EE] Evening Poster | S (Solid Earth Sciences) | S-VC Volcanology

[S-VC39]Pre-eruptive magmatic processes: petrologic analyses, experimental simulations and dynamics modeling

convener: Michihiko Nakamura (Division of Earth and Planetary Materials Science, Department of Earth Science, Graduate School of Science, Tohoku University), Akihiko Tomiya (Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology), Shanaka L de Silva (共同), Fidel Costa (Earth Observatory of Singapore, Nanyang Technological University)

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Processes leading to volcanic eruptions are central and yet still enigmatic issues in volcanology. Recent advances in understanding thermo-mechanical and open-system behavior of magma reservoirs and mineral zoning stratigraphy allow us to take a step forward to reveal the complex incubation processes during volcanic dormancy and following magma chamber tapping. This session aims at putting together recent knowledge on magmatic processes including 1) magma chamber evolution through magma reintrusion, crystallization-induced volatile exsolution, magma mixing and gas fluxing, 2) externally-driven eruption trigger mechanisms, and 3) conduit processes and controls on eruption styles such as outgassing, dehydration-induced crystallization, fragmentation and rheological transition of ascending magmas. We welcome contributions based on petrological, mineralogical and geochemical analyses of pyroclasts and volcanic gasses, experimental simulations of magma reservoir conditions and conduit flow dynamics, and numerical modeling to integrate the elementary processes.

[SVC39-P01] Insights into the petrogenesis of Taupo Volcanic Zone basalts from U-series isotope analysis of whole rocks, groundmasses, and minerals

★ Invited Papers

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Keywords: Uranium-series isotopes, Pre-eruptive crystal uptake, Rapid magma ascent

The Taupo Volcanic Zone (TVZ) is a back-arc continental rift zone within the North Island of New Zealand, and extends from White Island in the Bay of Plenty southwards to the Tongariro Volcanic Centre. Extension rates vary from $>12 \text{ mm yr}^{-1}$ in the North to $<7 \text{ mm yr}^{-1}$ within the Tongariro graben in the south. The central TVZ is characterized by high magma production rates ($> 10,000 \text{ km}^3$ since c. 2 Ma), with 95% erupted as rhyolites and less than 1% as basalts. However, mafic magmas are thought to be the heat source for the extensive crustal melting that produces felsic eruptives, and thus the rates and processes of mafic magma production are critical in our understanding of all magmatism within the TVZ. We have sampled 9 Late Pleistocene to Holocene basaltic eruption products from Rotokawau in the North to Ohakune in the South, and have separated groundmass, olivine, pyroxene, and plagioclase, for U-series (^{238}U - ^{234}U - ^{232}Th - ^{230}Th) isotope work, targeting the timescales of crystallisation and how these may or may not vary with extension rates within the TVZ. Preliminary U-series data provides some insights into the complex petrogenetic processes operating in the genesis of these basaltic magmas, indicating the uptake of hydrothermally altered crystal cargo in ^{234}U - ^{238}U disequilibrium into ascending basaltic arc melts prior to their eruption. Ultimately, our work will provide important insights into the timescales of mafic melt ascent from mantle source to surface within the TVZ.