[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, Nanynag Technological University)
Thu. May 24, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
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 exolution, 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-P11]Magmatic conditions prior to the 2000 eruption of Usu volcano, Japan

Satoka Ohnishi[1], *Akihiko Tomiya[1] (1.National Institute of Advanced Industrial Science and Technology)

Usu volcano is one of the most active volcanoes in Japan, which is in the Shikotsu-Toya National Park, Hokkaido. There have been eight recorded eruptions since $_{AD}$ 1663 at a relatively short time interval (ca. 30-50 y). We here focus on the most recent $_{AD}$ 2000 eruption to understand the present conditions of the Usu magma-feeding system, which is important to prepare for the next eruption. The $_{AD}$ 2000 eruption started with a phreatomagmatic (small phreatoplinian) eruption, producing dacitic pumice (Us-2000pm; Tomiya et al., 2001), followed by many small phreatic explosions. Petrographical studies (Tomiya and Miyagi, 2002; Tomiya and Takahashi, 2005) and melting experiments under high pressure and temperature conditions (Tomiya, 2002; Suzuki et al., 2007) of the $_{AD}$ 2000 volcanic products (Us-2000pm) have been performed. However, petrological constraints are still limited.
In this study, we measured the trace element concentration in plagioclase of the $_{AD}$ 2000 volcanic products to reveal the change in magmatic conditions (e.g., temperature, pressure, melt composition) prior to the eruption, using LA-ICP-MS (Laser Ablation Inductively Coupled Plasma Mass Spectrometry) at the GSJ-Lab (New Wave Research NWR213 + Agilent 7700x) with the method by Yamasaki et al. (2015). We found that the Mg, Ti, Fe contents and Sr content in plagioclase were increased and decreased, respectively, from $_{AD}$ 1663 to 2000 eruption, which were consistent with our SIMS (Secondary Ion Mass Spectrometry) analyses for plagioclase in the former products (e.g., $_{AD}$ 1977, $_{AD}$ 1943-45; Tomiya et al., 1998). We consider that the change was caused by mixing of mafic components.
We are also conducting melting experiments of Us-2000pm to estimate the pressure and temperature of the pre-eruptive magmatic conditions, using an internally heated pressure vessel at GSJ (HARM-200; Tomiya and Miyagi, 2001). At 147 MPa and 950°C, we observed only magnetite and apatite in the experimental product. On the other hand, magnetite, apatite and plagioclase (An=58±5) were

formed at 98 MPa, 940°C. Considering that Us-2000pm contains plagioclase (An56-60), orthopyroxene, and magnetite (±apatite) (Tomiya and Miyagi, 2002), the magmatic conditions may be close to 98 MPa and 940°C, but slightly lower temperature.
We will discuss the petrological understanding of Usu volcano, combining these results and previous studies.