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ABSTRACTS

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Amphibole record of the ongoing dome-forming eruption of Young Shiveluch volcano (Kamchatka)

Young Shiveluch is the most productive, highly explosive and hazardous andesitic volcano on the Kamchatka peninsula. The present phase of Shiveluch volcanic activity started in 1964 with an edifice collapse and subsequent strong Plinian eruption. Lava dome have been growing in the 1964 crater since 1980 and producing block-and-ash and more rare pumice flows, lahar and ash falls. Since 2001 five strong explosive eruptions (May 2001 and May 2004, February and September 2005 and in October 2010) accompanied the lava dome growth and produced large 20-25 km long pyroclastic flows. In 2007, 2008, 2009, 2013 and 2016, moderate explosions also occurred and formed small-volume 6 to 12 km long pyroclastic flows.

The most recent erupted products of Young Shiveluch are amphibole-bearing andesites of narrow compositional range of whole rocks ($\text{SiO}_2=60-64$ wt. %) and matrix glasses ($\text{SiO}_2=74-80$ wt. %). The rocks exhibit, however, a large textural heterogeneity and multiple crystal populations. Here we present the results of study focused on the composition of amphibole from andesites of the 1964 Plinian eruption, dome-building eruption with slow (in 1980-81 and 1993-95) and high discharge rates (2001-current time). The goal of the study was to decode a complex zoning of amphibole crystals to reconstruct the most recent evolution of the volcano plumbing system.

The dataset comprises ~1000 amphibole analyzes of high-resolution core-to-rim profiles across crystals with point spacings ranging between 10–15 μm . The amphiboles have variable compositions, ranging from low-Al Mg-hornblende to high-Al pargasitic and magnesiohastingsitic amphiboles on the scale of the entire dataset as well as within single rock samples or even within single crystal. The data were interpreted using petrographic information and geo- and thermobarometric models. The P-T estimates from three different models (Holland, Blundy, 1994; Ridolfi et al., 2010; Putirka, 2016) provide mostly comparable results but show some discrepancies in the case of hybrid rocks. Our data reflect P-T-fO₂ variability in the Young Shiveluch plumbing system and provide insight into mixing and convective processes in shallow magma chamber. This work was supported by the Russian Foundation for Basic Research (grant # 15-05-06640)

References:

- Holland, Blundy, 1994. *Contrib Mineral Petrol*, 116: 433-447;
- Ridolfi et al., 2010. *Contrib Mineral Petrol*, 160. P: 45-66.;
- Putirka, 2016. *American Mineralogist*, 101 (4):841-858.