Dynamics of the magmatic reservoir leading to the 2010-2013 eruption of Kizimen volcano in Kamchatka (Russia)

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My PhD is focused on the dynamics of magmas of two volcanoes in Kamchtaka (Russia): Bezymianny and Kizimen and on correlating disrupting events prior to eruptions with monitoring signals. These volcanoes have been chosen because their eruptions have been well monitored by the Institute of seismology and volcanology of Petropavlovsk, as the 2019 eruption of Bezymianny or the 2010-2013 eruption of Kizimen, on which this study is focused on. We begin our work with the eruption of Kizimen. This eruption is the first historical magmatic eruption of Kizimen; it produced 0.4 km^3 DRE of magma with the extrusion of a lava dome and its evolution to a lava dome flow. Numerous block- and ash-pyroclastic density currents were produced. A model proposed by Auer et al. (2018) for this eruption suggests that an injection of basaltic magma in a dacitic reservoir occurred at depth in 1963 associated to a seismic crisis. Then, after a long period of dormancy, a phase of unrest begun in April 2009 characterized by 1.5 years of seismicity before the eruption. A rapid mingling of the magma components in the reservoir is at the origin of the eruption that began on November 2010 ejecting a not well mixed magma attested by the abundance of banded andesites and dacites. Dominant phenocryst phases include plagioclase, amphibole, orthopyroxene, Fe–Ti oxides (and trace amounts of olivine, quartz and apatite). A 3-week fieldtrip has been done during the summer 2019 on Kizimen and Bezymianny volcanoes to collect the samples: dacites, silica-rich andesites and mingled samples emitted during this eruption. A petrological and mineralogical study of the samples is presented. Then, the methods used to decipher the architecture and mobility of the magmas in the plumbing system will be presented; orthopyroxenes and plagioclase crystals will be studied by combining a crystal system analysis with timescales estimation of disrupting events prior to eruptions, using Fe-Mg interdiffusion modeling. These results will be correlated with the monitoring data. For this, I'll benefit of the experience that I have acquired during my master thesis on four Plinian eruptions (18-9 ky BP) of a central volcano in Dominica.

Auer et al., 2018. Bull Volcanol. 80/33, https://doi.org/10.1007/s00445-018-1199-z

Key words: Volcanology, petrology