V51A-4726 The Sub-Crustal Magma Chamber Existence and Magma Ascent Rate for Klyuchevskoy Volcano (Kamchatka): Constrains from Ni Zonation in Olivine Phenocrysts

Back to: Maxim Gavrilenko

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Klyuchevskoy volcano is the highest active volcano in Europe and Asia (~4800 m). Morphologically it is a classic stratovolcano, but its edifice consists entirely of mafic rocks (up to 55% of SiO_2). The absence of andesites and dacites suggests that Klyuchevskoy does not have a crustal magma chamber. This is supported by seismological studies, the results of which have shown that stable crustal structures (magma bodies) are not found. However, [2] petrological barometry, indicates the existence of a magma chamber near the base of the crust beneath Klyuchevskoy at pressures of 5 – 9 kbar, (~ 18-33 km). In later studies, [1] and [4] proposed a model of decompression crystallization during continuous magma ascent in the conduit (from 50-60 km depth to the surface), which explains the genesis of the whole variety of Klyuchevskoy mafic rocks without the magma chamber requirement. The most recent detailed seismological studies combined with petrological barometry [3] suggest the existence of a sub-crustal volume (magma chamber) beneath Klyuchevskoy volcano (25-35 km depths) where processes of magma accumulation most likely occur.
In this study we attempt to confirm the presence of a sub-crustal magma chamber using Ni zonation in primitive olivines, which may preserve information about mixing between distinct primitive melts in the magma chamber. Moreover, olivine Ni diffusion rates could help to estimate the rate of magma ascent (from the 35 km depths to the surface) beneath Klyuchevskoy using the approach of [5]. Ni concentration in olivines were measured by the electron microprobe high-precision technique (20kV, 300 nA) developed in [6].
[1] Ariskin et al. (1995) Petrology, 3(5): p.449-472.
[2] Kersting & Arculus (1994) J. of Petrology, 35(1): p.1-41.
[3] Levin et al. (2014) Geology, (in print).
[4] Ozerov et al. (1997) Petrology, 1997. 5(6): p. 550-569.
[5] Ruprecht & Plank, (2013) Nature, 500(7460): p.68-72.
[6] Sobolev et al. (2007) Science, 316(5823): p.412-417.

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