

Variability in late-stage interactions between the Cenozoic volcanic host-rock and the mantle xenoliths from the Złotoryja Volcanic Field (Sudetes, SW Poland)

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Interactions between basaltic host-rock and its peridotitic xenoliths in the studied area occurred during different stages of magma genesis (Puziewicz et al. 2011). We present observations focused on late-stage interactions, related to xenoliths ascent and magma stops in small crustal magma chambers.

The studied outcrops (Wołek Hill, Muchowskie Hills and Wilcza Mt) are located ca. 100 km SW from Wrocław, and belong to Złotoryja Volcanic Field. The magma ascent-rates were calculated using two independent methods: xenoliths size distribution analysis (Spera, 1984) and diffusion profiles in olivines on the edges of the xenoliths (Costa et. al 2008).

The xenoliths from Wołek Hill don't show any evidence of long-time interference with the host-rock – the magma ascent was calculated for an average of 15 days. Nevertheless, four types of interactions were recognized: 1) small veins cross-cutting the xenoliths, composed of melt and secondary minerals (Cpx, sulfides and apatites), 2) decreasing Mg content in rock-forming minerals – with no visible diffusion rims, 3) changes in mineralogical and chemical composition inside the melt-pockets 4) carbonates- and glass-filled veins cross-cutting both: the host-rock and xenoliths.

At the Muchowskie Hills the time of magma ascent was calculated for an average of 50 days. Except the diffusion rims in olivines, interactions are related to important magmatic intrusions into the xenoliths, evidenced by: 1) Cpx intergrowths in Opx, 2) Cpx rims around Opx and 3) the presence of magnetite in the melt pockets.

Situation at the Wilcza Mt is not clear. The time of magma ascent ranges from 1 up to 20 days. The xenoliths are surrounded by secondary, up to 1 mm Cpx crystals, and exhibit lower MgO content in all rock-forming minerals, compared to the other lithospheric mantle rocks. Additionally, information from the fluid inclusions suggests possible stops of the magma within the crust (Ladenberger et al. 2009). On the other hand, decreasing MgO content may be related to the Fe–metasomatism (Puziewicz et al. 2011) or overlapping of both processes.

The differences in mineralogical and chemical changes between xenoliths from the studied outcrops are related to the time of host-rock and xenolith interactions which in turn are determined by the geological history of the individual volcanic body.

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