

Syn-rift alkaline magmatism in the Outer Western Carpathians: timing, duration and rates of magma differentiation

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Alkaline lamprophyres in the Outer Western Carpathians at the Czech-Polish border form a suite of melano- to mesocratic dykes and sills commonly known as teschenites or teschenite association rocks (TAR). They show HIMU affinity and their emplacement is commonly related to Early Cretaceous rifting [1, 2, 3].

In this study we focus on further constraints of TAR petrogenesis utilising Sr, Nd and Hf isotopes. Additionally, we aim at constraining rates of magma differentiation applying high precision Lu-Hf apatite dating as well as U-Pb sphene geochronology.

All analysed samples, regardless of the degree of magma differentiation, show very narrow range of $\epsilon\text{Nd}(\text{CHUR})$ variation (from +5.0 to +5.7) which is supported by $\epsilon\text{Hf}(\text{CHUR})$ values ranging from +7.9 to 10.2. These suggest little crustal contamination as and rather homogenous mantle derived magma.

Previous geochronological studies based on Ar-Ar kaersutite dating of lamprophyres from the Polish side suggest that more evolved lamprophyres were emplaced c. 2 Ma later than more primitive magma [4]. However, age precision achieved in the latter study does not allow to fully resolve the age difference. We applied Lu-Hf dating of apatite that is commonly present in nearly all lamprophyre types. Strong Lu/Hf fractionation by this mineral makes it suitable for high precision geochronology. Our preliminary 121.34 ± 0.66 Ma age obtained for the mesocratic teschenite is in a very good agreement with previously published 122 ± 1.5 Ma Ar-Ar date. The achieved precision allows to fully resolve potential time difference in emplacement of evolved to various degree teschenites and determine rates of magma differentiation.

[1] Hohenegger (1861), Gotha, 1-50 [2] Tschermak (1866), *Sitzber. Akad. Wiss. Wien*, **53** (1-5), 260-287 [3] Dostal & Owen (1998), *Geol. Rundsch.* **87**, 67-77 [4] Lucińska-Anckiewicz *et al.* (2009), *Geol. Carpath.* **53**, 1, 45-52