



## **Magma mixing, crustal contamination, contamination before chemical analysis or complex history? The case study from the Wołek Hill, SW Poland**

Monika Nowak

Adam Mickiewicz University, Institute of Geology, Poznan, Poland (mnap@amu.edu.pl)

Wołek Hill is one of the smallest exposures from ca. 300 occurrences of Cenozoic volcanic rocks from SW Poland. The outcrop is located about 100 km SW from Wrocław and belongs to the Złotoryja Volcanic Field, which is one of the largest volcanic fields in the Polish part of the Central European Volcanic Province (Ladenberger et al. 2006).

The volcanic body, which is about 20 m wide, cross-cuts older Permian volcanic rocks (trachyandesites and rhyolites) and is well exposed in an old abandoned quarry. The occurrence was studied in detail because of great amount of mantle and crustal xenoliths brought to the surface by magma. Wołek Hill is one of the two occurrences in SW Poland where amphibole crystals were recognized as results of modal metasomatism in lithospheric mantle (Nowak et al. 2012). The volcanic rock from Wołek Hill represents complex history, difficult to explain by simple model.

The rock was classified as basanite (Nowak, 2012). Its texture is porphyritic to glomeroporphyritic, olivine (Ol) and clinopyroxene (Cpx) occurs as phenocrysts, Cpx is also the dominant phase in the groundmass. Wołek Hill basanite differs from other exposures in Złotoryja Volcanic Field by presence of xenocrysts of Ol and Cpx from mantle rocks and also quartz (Qtz) and feldspars (Feld) xenocrysts from crustal rocks. Those xenocrysts with additional carbonate veins, probably related with post-volcanic processes, were a great difficulty during rock preparation for whole-rock and isotopic analyses.

The complex history of Wołek Hill basanite is visible in its chemical content (slight increase of SiO<sub>2</sub>, positive Pb anomaly, <sup>87</sup>Sr/<sup>86</sup>Sr and <sup>143</sup>Nd/<sup>144</sup>Nd values), but also in its petrography (e.g. by three types of olivine phenocrysts Fo<sub>82-91</sub> with differences in zonation patterns reflecting Fo content; the most abundant are phenocrysts with normal zoning, but also crystals with opposite zoning and oscillatory zoning were recognised).

According to available data from the basanite and previous studies in mantle xenoliths three different scenarios for Wołek Hill could be proposed: 1) the basanite represents one portion of magma, ascent with great speed to the surface 2) the basanite represents two portions of magma mixed on MOHO level 3) the basanite was partly contaminated by crustal rocks. The selected model determines further considerations about magma genesis.

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References:

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