# LEAD ISOTOPE EVOLUTION OF THE UPPER MANTLE BENEATH THE BOHEMIAN MASSIF

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The Pb isotope composition of the upper mantle beneath the Bohemian Massif is heterogeneous, largely due to the subduction of regionally contrasting material during the Variscan orogeny. Post-Variscan mafic and ultramafic rocks sample this mantle, which allows to map this mantle heterogenity on a regional scale, but also at depth and through time, as these mantle-derived rocks formed at different depth and at different time. The main focus of the study is on the Cretaceous to Quaternary volcanic and subvolcanic rocks of the Ohře/Eger Rift.

The studied volcanic suites are situated along the Ohře/Eger Rift zone, i.e., from SW to NE the late-rift Western Bohemian Quaternary volcanoes of Komorní Hůrka and Železná Hůrka, the syn-rift Tertiary volcanic complexes of the České Středohoří Mts., and the Ralská Pahorkatina Mts., as well as the pre-rift Cretaceous ultramafic lamprophyric intrusions located in the Ploučnice River Basin. The volcanic rocks sampled in the České Středohoří Volcanic Complex (CSVC) and in the Ralská Pahorkatina Volcanic Complex (RPVC) consist mainly of basanites, tephrites, phonolites, nephelinites, trachybasalts or trachyandesites (~37–59 wt.% $SiO_2$). The studied alkaline intrusions from the CSVC comprise of camptonites, monchiquites (~43–48 wt.% $SiO_2$), bostonites and gauteites (~53 wt.% $SiO_2$), whereas the subvolcanic rocks from the Ploučnice River Basin are composed primarily of Cretaceous polzenites, alnöites and melilite-bearing rocks (~31–40 wt.% $SiO_2$); there are also rare Cenozoic alkaline lamprophyres of camptonite to monchiquite composition (~39–45 wt.% $SiO_2$). Similarly to the pre-rift ultramafic rocks, the late-rift Quaternary volcanites from the western Bohemia are melilite-bearing as well (~38–42 wt.% $SiO_2$).

All determined rock types show their Pb isotope composition roughly following the northern hemisphere reference line (NHRL) of Hart [1] with only moderate deviation towards high-radiogenic Pb. The isotope ratio of $^{208}Pb/^{204}Pb$ and $^{206}Pb/^{204}Pb$ displays a high variability of the volcanic rocks which can be explained by mixing of two Pb mantle-derived components. The Cretaceous ultramafic lamprophyres and associated rocks from the RPVC represent a high-radiogenic end member with $^{206}Pb/^{204}Pb$ ratio up to 20, while the Quaternary melilitites, Tertiary alkaline lamprophyres and associated intrusive rocks originated in mantle dominated by less radiogenic $^{206}Pb/^{204}Pb$ ratio not exceeding 19.4.

Beside the predominant trend of the presence of radiogenic Pb, the second trend towards the custal end-member with elevated $^{207}Pb/^{204}Pb$ is also obvious. An involvement of this crustal component is slightly increasing from the RPVC towards CSVC. In a wider regional context, the composition of studied rocks is similar to volcanic rocks from the German part of the Bohemian Massif [2]. However, the presence of the crustal component with elevated $^{207}Pb/^{204}Pb$ is not so considerable compared to the Tertiary volcanic rocks from the Western Bohemia [3] and from the Lower Silesian Basin in Poland [4].

The investigated rocks folow the same Pb isotope orogenic grow curve as Variscan mantle-derived rocks from the Bohemian Massif [5, 6] which recorded the isotope signature of the collision between Laurussia, Gondwana and associated terranes. This Pb isotope record have persisted in the upper mantle since the Palaeozoic and is still reflected in the isotope composition of the both Mesozoic (initial mafic melts with high-radiogenic Pb component) and Cenozoic (high volume rift-related melts with diluted high-radiogenic Pb component) mantle-derived rocks.

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