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Wehrlit formation in the upper mantle beneath the Northern Pannonian Basin (Nógrád-Gömör Volcanic Field)

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Poster

The Nógrád-Gömör Volcanic Field is situated in the northern part of the Pannonian Basin, where Plio-Pleistocene alkaline basalts brought upper mantle xenoliths to the surface. We collected great number of ultramafic xenoliths from the central part of the region, Medves-plateau (Eresztvény, Magyarbánya) and Bábi-hill (Fülekrátka, Fülekkovácsi, Terbeléd), and detailed petrographic studies were carried out. As a result, beside the dominating lherzolite xenoliths, large number of wehrlite xenoliths also appeared, in which the modal proportion of clinopyroxene was increased in contrast to the descending amount of orthopyroxene. These wehrlite xenoliths show highly unique texture, which is characterized by irregularly shaped olivine grains hosted in clinopyroxene and vermicular spinel inclusions in clinopyroxenes.

Ten wehrlite xenoliths and six representative lherzolite xenoliths have been selected from the central part of the region based on petrography. Based on the major elements of rock forming minerals, Fe and Mn enrichment in olivines, Ti, Al and Fe enrichment in clinopyroxenes, and Fe and Ti enrichment in spinels can be observed compared to the representative lherzolite xenoliths. In the studied wehrlite xenoliths silicate melt and fluid inclusions, and sulfide minerals are also abundant. The mineralogy of the multi-phase sulfides is in agreement with those usually found in the upper mantle with domination of pyrrhotite, pentlandite and chalcopyrite. However, bulk composition of the sulfides slightly differs from the ones found in lherzolite xenoliths.

Based on detailed petrography and geochemistry of rock forming constituents and sulfide minerals, wehrlite xenoliths are products of a process called stealth mantle metasomatism where new minerals, in this case clinopyroxene formed in the system. This metasomatism is supposed to be caused by a mafic melt agent with high MgO/FeO ratio, which differs from the host alkaline basalt.

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