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Petrology of metabasic and peridotitic rocks of the Songshugou ophiolite, Qinling orogen, China

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The Proterozoic Songshugou ophiolite outcrops as a rootless nappe which was emplaced into the southern margin of the Qinling Group. It consists mainly of amphibolite facies metamafic and -ultramafic rocks. Trace element geochemistry and isotope composition show that the mafic rocks are mainly E-MORB and T-MORB metabasalts (Dong et al., 2008b).

Within the ophiolite sequence, ultramafic rocks consist mainly of peridotites and serpentinites. Particularly, extremely fresh dunites and harzburgites, are found which do not display a conspicuous metamorphic overprint. The low CaO (<0.39 wt.%) and $Al2O_3$ (<0.51 wt.%) as well as high MgO (41–48 wt.%) contents classify them as depleted non-fertile mantle rocks. Chromite is found as disseminated phase but can sometimes form massive chromite bands. The platinumgroup mineral Laurite (RuS2) could be identified as inclusion in chromites. Usually part of Ru is substituted by Os and Ir.

The metamafic rocks consist of garnet, amphibole, symplectitic pyroxenes, ilmenite, apatite, ±zoisite, ±sphene and show a strong metamorphic overprint. Garnet contains numerous inclusions in the core but are nearly inclusion free at the rim. The cores have sometimes snowball textures indicating initially syndeformative growth. Pure albite and prehnite were found in the central parts of the garnets. In the outer portions, pargasitic amphibole, rutile and rarely glaukophane were found. The symplectitic pyroxenes are of diopsidic composition which enclose prehnite and not albite, as common in retrograde eclogitic rocks. Different stages of garnet breakdown to plagioclase and amphibole, from thin plagioclase rims surrounding the garnets to plagioclase rich pseudomorphs, can be observed in different samples.

Based on the glaukophane inclusions and symplectitic pyroxenes a high pressure metamorphic event can be concluded. The garnet breakdown to plagioclase and the symplectites clearly indicate a rapid exhumation phase. The age of the metamorphic event is unclear but probably related to the closure of the Shangdan ocean during the early Paleozoic.

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Dong, Y.P., Zhou, M.F., Zhang, G.W., Zhou, D.W., Liu, L., Zhang, Q., 2008. The Grenvillian Songshugou ophiolite in the Qinling Mountains, Central China: implications for the tectonic evolution of the Qinling orogenic belt. Journal of Asian Earth Science 32 (5–6), 325–335.