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SERPENTINIZATION OF THE GYÓD ULTRAMAFIC BODY – A LOW TEMPERATURE PARTIAL HYDRATATION STORY

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Ultramafic bodies in South Transdanubia have long been known through aerial geophysical measurements as well as sporadic boring activity. For many reasons the most intensely studied serpentinite body is located in the realm of the Görcsöny metamorphic complex in the vicinity of the small village, Gyód.

The Gyód Serpentinite Formation extends over 5–7 km with a WNW–ESE strike and can be traced down to about 700 metres below Pannonian sediments. It most probably has a tectonic contact with the surrounding basement, which consists of high grade metamorphic rocks. The aim of this study is to sketch the post-magmatic evolution of the ultramafic rocks by petrological as well as geochemical examination of this rock mass.

Macroscopic as well as microscopic observations suggest a basically three-step post-magmatic evolution. The last deformation event had a strong effect on certain segments of the body, where relic orthopyroxene grains are sheared, while the serpentine mineral rich parts of the rock samples indicate plastic deformation. The other main type of serpentinite is a non-foliated rock. The two types occur alternately downwards. Micro-textural observations suggest a pervasive carbonatization prior to the late deformation.

Based on the dominating ultramafic phases, the serpentinite can be divided into two distinct domains. The significant part of the rock exhibits a well-developed mesh structure. Mesh center is formed probably of brucite. Mesh rim is chrysotile, while the central parting unit is marked by magnetite grains mimicking an igneous texture of an olivin bearing rock with equigranular grain contact. Ortopyroxene dominated parts of the serpentinite appear separately, and contain talc and chlorite as significant secondary phases with only a low amount of serpentine.

Application of the isocon method for differently altered sample pairs shows that the serpentinization of the one-time ultramafic rocks was close to isochemical for most major and trace elements. Important exceptions are Ti and Sr with decreasing and Cr with increasing concentration with the rate of the alteration. Immobile element distributions as well as classical discrimination methods show in good agreement with the mineralogical composition that the precursor of the Gyód serpentinite should have been harzburgite.

Independent thermobarometric modelling (Domino–Theriak) of the olivine and pyroxene rich domains of the rock, respectively, suggests that the characteristic metamorphic parageneses in both cases are stable at LT (< 250 °C) in the presence of a low f_{CO_2} fluid. The observed mineral sequences could form due to intensive hydratation without significant change in p or T.

In contrast to the previous models we conclude that the Gyód serpentinite body formed during a single LT hydratation event. No subsequent MT overprint was needed to grow talc and chlorite as it was suggested earlier.