



## **Multiphase tectonics in the Eastern Moldanubian realm, insights from metamorphic, petrological and structural observations (Austria)**

H. Zeitlhofer, K. Petrakakis, and Ch. Iglseder

Department of Geodynamics and Sedimentology, Universität Wien, Althanstraße 14, 1090 Wien, Austria

The Austrian part of the Moldanubian Zone has been divided into three lithological units: the Monotonous Series, Variegated Series and Gföhl Unit. These have different lithostratigraphies, metamorphic grades and evolutions. The Monotonous Series shows HT-LP metamorphism whilst the Variegated Series and the Gföhl Unit suffered HT-HP metamorphism. The present study was concentrated in the Amstettener-Bergland and Strudengau parts of the Moldanubian Zone within Austria. Contrary to the usual lithostratigraphic setting within the Moldanubian zone, the Variegated Series is missing and the Gföhl Unit lies directly on the Monotonous Series. This work focuses on a comparison of the rocks with the other Moldanubian rocks and documents their structural and metamorphic evolution. The structural record shows that there are two different lineations in this area; SSE-NNW trending lineations have generally been observed within the gneisses and amphibolites of the Gföhl Unit, as well as within the western part of the Monotonous Series. In contrast, NNE-SSW trending lineations have been observed in mylonitic gneisses (the so-called felsic granulites) and ultramafic rocks of the Gföhl Unit. Furthermore, low-temperature ultramylonites south of Viehtrift show a top-to-WSW shear-sense, with well-formed sinistral delta and sigma clasts showing high  $\lambda$ -values. Currently, the significance of these cold ultramylonitic rocks is not clear. The Gföhl Unit comprises HT-HP metamorphic ortho- and paragneisses, amphibolites, metabasites, ultramafic rocks and mylonitic gneisses (granulites). Microprobe profiles of garnets from the mylonitic gneisses show a HT homogenisation event. During cooling, the garnet close to their rims were enriched in Fe ( $X_{Mg,core} = 0.35$ ;  $X_{Mg,rim} = 0.19$ ). Homogenisation has also been observed within amphibolite garnets ( $X_{Mg,core} = 0.22$ ;  $X_{Mg,rim} = 0.19$ ). The ultramafic rocks in the Gföhl Unit show an olivine-rich (magmatic) harzburgitic protolith with an amphibolite facies overprint bearing an Ol (metamorphic) + Tr + Atg paragenesis. There is also much of evidence for a subsequent thermal overprint, most probably related with the adjacent extensive plutonism of the area. Essentially, tremolite and tremolite+cummingtonite grew in amphibolites and some metabasites, respectively. Notably, in other parts of the Moldanubian Zone, amphibolites commonly did not form Ca- and Al-pore amphibols. Studies of the occurring Monotonous Series rocks have shown that there is a metamorphic heterogeneity in the gneisses. Gneisses in the west of the Gföhl Unit show HT-LP metamorphism in contrast to those in the east that show a HT-HP overprint comparable to those of the Variegated Series. So it currently remains unclear, if these latter gneisses do really belong to the Monotonous Series.