

THE ULTRAMAFIC COMPLEX OF NAUDERS (LOWER ENGADINE WINDOW, EASTERN ALPS, AUSTRIA)

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Ultramafic complexes of Mesozoic age are widespread within the Penninic Windows of the Eastern Alps. Most of them are related to ophiolitic fragments representing former Penninic oceanic crust. All of these mantle fragments are highly serpentized and show in the Eastern Alps harzburgitic composition. Only few exceptions are composed of rather undepleted lherzolitic rocks. They occur in the zone of Matrei (a tectonic zone between Penninic and Austroalpine nappes) south of the Tauern window, and in the north in the Lower Austroalpine Reckner complex. An additional lherzolite complex occurs close to Nauders at the southern margin of the Lower Engadine Window.

The ultramafic complex SW Nauders is located between pumpellyite-bearing greenschists and sediments to the north, both related to the North Penninic zone of Pfunds, and granitic to gabbroic rocks of the Middle Penninic Tasna nappe to the south. The ultramafic body of Nauders is situated in a middle Penninic position as is demonstrated by recent geological mapping (BERTLE, 2004). Locally, small gabbroic intrusions and synfoliation layers with commonly pyroxenitic composition and more rarely with preserved volcanic texture are connected to the lherzolites. The coarse-grained lherzolite of Nauders carries a well-preserved magmatic assemblage of olivine ($F_{0.90}$), clinopyroxene ($X_{Mg} = 0.90$ to 0.91 , with up to 2 wt% Na_2O and 6–7 wt% Al_2O_3), orthopyroxene (En 0.89–0.90, with 0.4–0.6 wt% CaO and 4–5 wt% Al_2O_3) and a green spinel (with a Cr# = 0.065 and a $X_{Mg} = 0.796$). This assemblage is partly replaced by pure diopside (rimming clinopyroxene), minor amphibole (Na- and Ti-rich pargasite), serpentine and carbonate as well as brown spinel. Na concentra-

tions are considerably higher (up to 0.23 wt% Na_2O) than in all other Penninic lherzolitic complexes. Chondrite-normalized REE patterns of the ultramafic rock of Nauders are rather flat with slightly depleted LREE (MELCHER *et al.*, 2002), similar to other lherzolitic samples of the Mesozoic units.

Small gabbroic bodies and rare cross-cutting basaltic dikes are associated with the ultramafic rocks. Based on their less mobile trace element (HFSE) geochemistry, they more likely represent within-plate magmas than typical mid-ocean ridge basalts.

Based on the differences in preservation and geological setting, and in the geochemical composition of associated mafic rocks the ultramafic complex of Nauders might better correspond to tectonic setting such as, e.g. the Valmalenco complex (MÜNTENER *et al.*, 2000, MANATSCHAL *et al.*, 2006), which is currently interpreted as a fragment of a pre-oceanic subcontinental mantle of the Briançonnais microplate, emplaced and denudated during late Jurassic to early Cretaceous time (BERTLE, 2004).

References

- BERTLE, R. (2004): PhD thesis, University of Vienna.
 MANATSCHAL, G., MÜNTENER, O., PÉRON-PINVODIC, G., JAMMES, S. & MOHN, G. (2006): Excursion guide IODP-Workshop 2006.
 MELCHER, F., MEISEL, T., PUHL, J. & KOLLER, F. (2002): *Lithos*, 65: 69–112.
 MÜNTENER, O., HERMANN, J. & TROMMSDORFF, V. (2000): *Journal of Petrology*, 41: 175–200.