PERMIAN BASIC MAGMATISM, UPPER EOCENE AND LOWER OLIGO-CENE METAMORPHISM IN THE FURGG ZONE (WESTERN ALPS)

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The Furgg zone (Western Alps) separates the Monte Rosa nappe from the Bernhard and Zermatt nappes. It consists mainly of a schist-, leucocratic gneiss-, quartzite- and metacarbonate-matrix containing boudins of amphibolitised eclogites. Controversial views exist on the nature, origin and extent of the Furgg zone (cf. Dal Piaz, 2001). We dated by SHRIMP (GSC, Ottawa) magmatic and metamorphic zircon domains of a metabasite in the area of Stockknubel (north of the western part of the Monte Rosa nappe). This metabasite is a strongly retrogressed eclogite occurring in form of a boudin, ca. 1 m long, within leucocratic schists. Based on cathodoluminescence (CL)-imaging, zircons from this rock consist of large oscillatory zoned (magmatic) domains surrounded by metamorphic (recrystallisation) rims, bright in CL, with ghost oscillatory zoning. Bright CL-domains are irregularly dispersed also inside the magmatic domains, due to fluid circulation along fractures during metamorphism(s). Eight spot analyses on the magmatic domains yield a Permian weighted mean age at 269 ± 3 Ma (95% c.l.), corresponding to the crystallisation time of the gabbroic protolith of this metabasite. This age is in agreement with a ca. 272 Ma age reported for the crystallisation of an orthogneiss at Mattmark (farther east in the Furgg zone; Liati et al., 2001), as well as for Monte Rosa granites. The new Permian protolith age of the metabasic rock in Stockknubel, together with a 510 ± 5 Ma age reported for an eclogite boudin from the eastern part of the Furgg zone, is in agreement with the 'mélange hypothesis' for the origin of the Furgg zone (e.g. Froitzheim, 2001). 11 spot analyses on metamorphic domains indicate a strong influence of the Lepontine event at 31.5 ± 1.0 Ma (weighted mean of 8 analyses), accompanied by influx of high amounts of fluids. Of great interest are metamorphic rim analyses at ca. 38-39 Ma, together
with a series of data scattering between this and the ca. 31.5 Ma age. The Eocene data can best be explained with a first Alpine metamorphism (eclogite-facies) in the Furgg zone. They support the assumption that the Furgg mélange was formed and metamorphosed during subduction of the Valais ocean at 38-39 Ma. This is later than subduction and HP-metamorphism of the Piemont-Ligurian domain (44-45 Ma) and earlier than subduction of the European continental margin (ca. 35 Ma), as well as Lepontine overprinting under amphibolite facies conditions 31-32 Ma ago.