Different types of rock alteration, namely K–metasomatism, silicification, chloritization, carbonatization, ev. tourmalinization and biotitization, are widespread in these deposits. Also a presence of numerous iron deposits of Lahn–Dill type documents the Devonian submarine hydrothermal and exhalative activity. Convective geothermal systems accompanying crustal extension in the Devonian comparable to modern systems at spreading centres are assumed to have existed in this region.

GEOCHEMICAL EXAMINATIONS OF MOLDANUBIAN AMPHIBOLITES FROM THE WALDVIERTEL (AUSTRIA)

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According to Tollmann (1985), Fuchs (1986) and Weber & Duyster (1990) three units can be distinguished in the Moldanubikum: the Ostrong–unit, including the "Monotone Serie" with its cordierite–gneisses, a few orthogneisses and calcsilicate–schists. The Drosendorf–unit, seperated from the Ostrong–unit by a narrow granulitic layer consists of orthogneisses at the bottom and of the "Bunte Serie"– a succession of paragneisses, amphibolites, quarzites, calcsilicate–schists and graphite bearing marbles in its upper parts. The Gföhl unit finally is marked by the Gföhl Gneiss, granulites, ultramafitites, amphibolites and anorthosites. There are two main amphibolitic bodies. The first, east of the Gföhl Gneiss is named Rehberg amphibolite, the second west of it is named Buschandlwand layer. At the base of the Gföhl Gneiss there are amphibolites north of the Danube as well as south in the Dunkelstein Forest.

Careful fieldwork indicates that in some amphibolite bodies, despite their medium– to highgrade metamorphism, relicts of old magmatic textures are recognizable. An interlayering of coarse–grained and fine grained amphibolites can be easily interpreted as former gabbros cut by basaltic dikes. This texture, together with the occurrence of ultramafitites and basaltic–andesitic–rhyolitic volcanics on top argues for an ophiolitic origin of the Rehberg amphibolite. The composition of the mafic rocks is characterized by a slight enrichment of elements such as K, Rb, Ba, Th, and a relative depletion of Ta, P, Zr, Y etc. This distribution suggests an island arc origin for the Rehberg amphibolite, but intern relations are, due to the fact that the analyses show tholeiitic as well as calcalkalic tendencies, probably more complex.

The Buschandlwand amphibolites show cleavent relations, but the amphibolites located in the Weitental and the Dunkelstein Forest show unequivocaly within plate signatures.

MOR basalts as described by Steyrer & Finger (1993) from the Raabs–Meisling unit (probably equivalents to the Rehberg amphibolites) could not be proved. The Rehberg amphibolite seems to be a relict of an ancient island arc or marginal basin above a subduction zone. It is clearly distinguishable from most of the other amphibolites and quite well comparable to the Letovice amphibolite situated north of the Moravian Svratka window (Jelínek et al. 1984).

DATING OF THE SILVRETTA OLDER ORTHOGNEISS INTRUSION: U–PB–ZIRCON DATA INDICATE CADOMIAN MAGMATISM IN THE UPPER AUSTROALPINE REALM

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The crystallisation age of the **main intrusive suite** in the upper austroalpine Silvretta Nappe (Flüelagranitic association) is assumed to be **Ordovician** (Rb/Sr whole rock isochron, 450±2 Ma). Together with the Simano Augengneiss and the Berisal gneiss in the penninic region of the Alps (Köppel et al.,1980), the suite appears to be part of the Central and SW–European tectonomagmatic event of Heinisch and Schmidt (1982), which took place in Ordovician to Silurian time. The other inmportant intrusive series in the Silvretta nappe consist of older, mainly calc–alkaline (Flisch, 1989), basic to intermediate and granitic rocks known as **older orthogneisses** (Grauert 1969). The crystallization age of the older orthogneisses was previously only roughly estimated to be Precambrian (approx. 600

to 900 Ma) by Rb/Sr whole rock reference lines (Maggetti and Flisch,1991).

U/Pb data of zircons, as well as of single zircon stepwise heating results ($^{207}Pb/^{206}Pb$ dating by single zircon evaporation technique, Kober, 1986) suggest a **latest Precambrian to Cambrian intrusion** age for the protoliths of these orthogneisses, since:

A) population U/Pb zircon dating of an **alkaline granite gneiss**, Val Lavinuoz (Müller, 1989) yields a Cambrian preliminary upper intercept age of 525.5±15 Ma. The Carboniferous lower intercept age of 293±50 Ma is explained to date the Variscan upper amphibolite grade regional metamorphism (Flisch, 1989).

B) The Kober $^{207}Pb/^{206}Pb$ single zircon dating yields also a Cambrian age with a well defined plateau at 533.5±5.5 Ma (**quartz diorite gneiss**, God Praschitsch / Zernez, Grauert, 1969).

C) Zircons of a **tonalite gneiss**, Val Lavinuoz, give preliminary ages of 560±16 and 570±18Ma.

Zircon typologies (Pupin,1980) accord to:

- **for A)** P5 (525 Ma)
- **for B)** S3 (based at present on < 10 zircon crystal measurements) (533 Ma)
- **for C)** S9 (560–570 Ma)

The magmatic morphology of zircons is indicative to interpret the data as intrusive ages.

Whole rock initial Sr isotope ratios vary from "depleted mantle" to slightly higher values:

- **for A)** $^{87}Sr/^{86}Sr_i$ = 0.702 approx. 525 Ma
- **for B)** $^{87}Sr/^{86}Sr_i$ = 0.70442 533 Ma
- **for C)** $^{87}Sr/^{86}Sr_i$ = 0.70352 / 0.70350 560–570 Ma

Geodynamic evolution: Igneous rocks of a subduction–related (inferred calk–alkaline differentiation sequence, VAG after Pearce et al., 1984, I–type after Chappel & White, 1974) setting with ages of approx. 560/570 to 533 Ma represent the main part of the older orthogneisses. Besides, there exist very rarely preserved post–orogenic alkaline granites (**A**). The rock types and ages are in excellent agreement with the results of recent comprehensive U/Pb dating studies in the Cadomian terrane of SW Spain (Ochsner et al.,1993).

Very similar ages were also found in orthogneisses of the adjacent upper austroalpine **Oetztal nappe**: Gabbros with 530 – 516 Ma Sm/Nd mineral isochrons (Miller and Thöni, in prep.); orthogneisses showing 530 – 490 Ma for U/Pb zircon (Klötzli and Bernhard, in prep.). In the **Bohemian Massif**, an age of 585 Ma (van Breernen et al.,1982) also points towards a Cadomian time. And in the Central South Carpathians, Grünenfelder et al. (1983) found a well defined U/Pb age of 610±30 Ma for two Kfeldspar–rich granites.

Gebauer et al. (1988) determined Ion Probe–600 Ma–detrital zircon ages in paragneisses in the Moldanubian Basement and the French Central Massif. These authors already postulated a "pervasive Pan–African orogenic cycle" in central Europe.

The term "Cadomian" is used here only in a chronological context, for indicating processes which took place outside of known Cadomian terranes (e.g. Spain, N Armorican Massif). However, a causal link is very well possible.

The accuracy of the $^{207}Pb/^{206}Pb$ single zircon evaporation dating technique has been validated in several comparative studies (Roddick, J.C., 1991)

Errors are 2 sigma std errors of the mean, except for the evaporation technique 2 sigma std deviation (=95% conf. limit).

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