based on their original geodynamic setting and further tectonometamorphic evolution, belong to two essential types: (1) material of the subducted lithospheric plate of the Meliata-Hallstatt ocean and (2) material of the overriding lithospheric plate immediately above subducting oceanic plate. The first type is represented by metamorphosed basaltic rocks with BABB to N-MORB affinity (Groups 1 and 2) occurring in the association with carbonates, rarely pelitic schists and also radiolarites. All these rocks are probably Mesozoic in age. The latter type is represented by metamorphosed calc-alkaline basalts (Group 3) interlayered by pelitic metasediments containing originally variable amounts of organic matter and pyroclastic component. The age of this formation is probably Early Palaeozoic (Faryad and Henjes-Kunst 1997 - $^{40}Ar/^{39}Ar$ dating on phengite). Polymetamorphosed amphibolite associated with phyllonitised gneisses (Group 5) and banded metamorphosed calc-alkaline volcanoclastics interlayered with banded carbonates (Group 4) belong probably to the same type.

References

MELLO J. et al. 1997. *Explanation notes to the geological map of the Slovenský kras Mts.* 1 : 50 000. (In Slovak with English resume). Vyd. Dyonýza Štúra, 256 pp. Bratislava.

FARYAD S.W. and HENJES-KUNST F. 1997. Petrological and K-Ar and ^{40}Ar-^{39}Ar age constraints for the tectonothermal evolution of the high-pressure Meliata unit, western Carpathians (Slovakia). *Tectonophysics*, 280, 141-146.

Sr–Nd Isotopic Composition of Granites from the Northern Part of the Moldanubian Pluton and its Significance for Genetic Classifications

Vojtěch JANOUŠEK[1] and Dobroslav MATĚJKA[2]

[1] *Czech Geological Survey, Klárov 3, 118 21 Prague 1, Czech Republic*
[2] *Institute of Geochemistry, Charles University, Albertov 6, 128 43 Prague 2, Czech Republic*

In order to characterise sources and processes that could have been involved in genesis of peraluminous granites in the northern part of the Moldanubian Pluton (MP) a combined study of whole-rock major- and trace-element geochemistry and Sr–Nd isotopic composition was undertaken. As precise geochronological information on individual rock types is still scarce, a muscovite Ar–Ar age of 328 Ma (Scharbert et al. 1997) was chosen to age-correct all isotopic ratios. The granites are classified using a scheme published by Matějka (1997 and references therein); undistinguished fine-grained granites between Čeřínek and Landštejn bodies are termed Eisgarn s.l.

The new Sr isotopic ratios (Tab. 1) tie in with those published previously (Scharbert and Veselá 1990) and thus all the available data were treated as a single data set. Taken together, they are very variable ($^{87}Sr/^{86}Sr_i$ = 0.7049–0.7144), spanning a wide compositional range from little modified, mantle or lower crustal rocks to mature metasedimentary lithologies such as Moldanubian paragneisses. The most primitive is the Pavlov granite (0.7049–0.7051, n = 2), followed by Boršov (0.7067–0.7075, n = 6), one analysis of the Světlá type (0.7075: Kam. Lhota) and Čeřínek granite (0.7090–0.7100, n = 3). Eisgarn s.l. from Horní Cerekev (Scharbert and Veselá 1990) yielded an initial ratio of 0.7108 — identical to Eisgarn granite analysed by Liew et al. 1989. Comparable composition shows majority of Lipnice type (0.7092–0.7111, n = 3) and one Světlá granite (0.7110: D. Březinka). The Sr-isotopic ratios from the Bílý kámen granite are extremely variable (0.7051–0.7120, n = 10). The most evolved strontium contains typical Eisgarn s.l. (0.7122–0.7143, n = 7).

On the other hand, the obtained initial Nd-isotopic compositions (so far not determined in this part of the MP) are all evolved and more or less uniform (ε^{i}_{Nd} = -5.6 to -7.9; Tab. 1). High two-stage Nd model ages indicate a negligible (if any) role for depleted-mantle derived magmas and a long crustal history of the protolith (T^{DM}_{Nd}= 1.48–1.66 Ga). The most primitive is Lipnice (-5.6), followed by Světlá (-6.2), Pavlov (-6.5), Boršov (-7.1 to -7.3), Stvořidla (-7.2) and Čeřínek types (-7.9). Austrian Eisgarn has ε = -7.5 (Liew et al. 1989).

	Locality (type*)	$^{87}Sr/^{86}Sr_i$ †	$^{143}Nd/^{144}Nd_i$ †	ε^{i}_{Nd} †	T^{DM}_{Nd} ‡
Ce-1	Boršov (B)	0.70672	0.511850	-7.1	1.60
Ce-2	Boršov (B)	0.70746	0.511842	-7.3	1.62
Ce-3	Čeřínek (Č)	0.70974	0.511811	-7.9	1.66
Me-1	D. Město (L)	0.70921	0.511928	-5.6	1.48
Me-2	D. Město (L)	0.71108	–	–	–
Me-3	D. Březinka (Sv)	0.71099	0.511896	-6.2	1.53
Me-5	Pavlov (P)	0.70493	0.511883	-6.5	1.55
Me-6	Kam. Lhota (Sv)	0.70754	–	–	–
Me-7	Stvořidla (St)	–	0.511847	-7.2	1.61

* *Rock types (Matějka, 1997):* B: Boršov, Č: Čeřínek, L: Lipnice, Sv: Světlá, P: Pavlov, St: Stvořidla
† isotopic ratios age-corrected to 328 Ma
‡ two-stage Nd model ages (Ga; Liew and Hofmann 1988)

Tab. 1. Sr–Nd isotopic data for granites from northern MP.

The relatively primitive Sr-isotopic composition of the Pavlov and Boršov granites rules out their genesis by partial melting of ordinary Moldanubian metasediments and may point to a lower crustal source with low time-integrated Rb/Sr ratio. On the other hand, Sr–Nd isotopic signature of both the Lipnice and Světlá types, and, in particular, Eisgarn s.l., is compatible with their derivation from a metasedimentary source isotopically similar to the Moldanubian paragneisses.

The variability of Sr-isotopic data from Bílý kámen and their alignment in the 1/Sr vs. $^{87}Sr/^{86}Sr_i$ diagram can be attributed to interaction of strontium from two sources, one primitive, isotopically similar to Pavlov, and one evolved, close to typical Eisgarn s.l. The most plausible interpretation invokes a progressive contamination of a Pavlov-like magma by local metasedimentary material (or melt derived from such a source), with higher degree of contamination in Sr-poor members of the Bílý kámen intrusion. A similar process (assimilation and fractional crystallisation: AFC) could have been also responsible for generation of the Boršov type and even of the fractionated Čeřínek granite, as documented by observed Sr–Nd isotopic variation.

References

LIEW T. C. and HOFMANN A. W. 1988. Precambrian crustal components, plutonic associations, plate environment of the Hercynian Fold Belt of Central Europe: indications from a Nd and Sr isotopic study. *Contributions to Mineralogy and Petrolology*, 98, 129–138.

LIEW T. C., FINGER F. and HÖCK V. 1989. The Moldanubian granitoid plutons in Austria: chemical and isotopic studies bearing on their environmental setting. *Chemical Geology*, 76, 41–55.

MATĚJKA D. 1997. Chemismus hlavních typů granitů v severní části moldanubického plutonu. *Zprávy o geologických výzkumech v roce 1996*, 47–48.

SCHARBERT S. and VESELÁ M. 1990. Rb–Sr systematics of intrusive rocks from the Moldanubicum around Jihlava. In MINAŘÍKOVÁ D. and LOBITZER H. (ed.): *Thirty years of geological cooperation between Austria and Czechoslovakia*, 262–271. ÚÚG, Praha.

SCHARBERT S., BREITER K. and FRANK W. 1997. The cooling history of the southern Bohemian Massif. *Journal of the Czech Geological Society*, 42, 24.

Ductile Strain Partitioning VS Viscosity Partitioning in Transpression Zones (Obliquely Convergent Orogens)

Josef JEŽEK[1], Karel SCHULMANN[1] and Alan Bruce THOMPSON[2]

[1] *Faculty of Science, Praha, Czech Republic*
[2] *ETH Zuerich, Switzerland*

This contribution deals with two contrasting types of partitioning of deformation that are called here ductile strain partitioning and viscosity partitioning. The first model of ductile strain partitioning considers the transpression domain of convergent orogens to be split into a zone of prevailing pure shear (PSZ) and a zone dominated by simple shear (SSZ). For ductile strain partitioning, a given large proportion of the instantaneous shortening of the transpression domain is accumulated in PSZ and similarly instantaneous lateral motion is prescribed to act mainly in SSZ. In the second model, the viscosity ratio of high viscosity zone (HVZ) to low viscosity zone (LVZ) defines the partitioning of the instantaneous shortening and of the lateral motion between the zones. In both models we can evaluate components of the velocity gradient tensor (the rates of pure shear and simple shear) and compute strain patterns and other characteristics.

We assume that the ductile strain partitioning may appear due to a pre-deformational structure of the transpression domain and to the imposed (side and bottom) boundary conditions. We compare our model to that of partitioning of displacement of Tikoff and Teyssier (1994) who demonstrated that for an angle of convergence > 20° the lineation is vertical across the whole transpressional domain. This is also valid for displacement partitioning in their work. In contrast to their model, the ductile strain partitioning allows us to obtain the degree of horizontal stretching for any angle of convergence. It is possible to construct regions of vertical fabrics of a relatively low finite strain intensity, limited by narrow zones of simple shear with horizontal stretching and high finite strain intensities. The other consequence of the model is the fact that on the erosional surface originally deeper rocks will be observed in PSZ rather than in SSZ.

In the viscosity partitioning model the transpression domain is split into zones of low viscosity and high viscosity. The viscosity contrast may appear due to different rheology and/or temperature. The type of deformation is equal in both LVZ and HVZ. They differ only in strain rate and consequently in accumulated finite strain. Therefore, for small convergence angles (strongly oblique convergence) the competent zones (HVZ) will accumulate strain slowly - and will maintain horizontal stretching for longer periods than in weaker zones. Incompetent areas (LVZ) will accumulate strain more rapidly and consequently, if the angle of convergence < 20°, the switch of lineation to the vertical direction will occur earlier. LVZ will exhibit higher elevation rates than rheologically stronger HVZ. The direct consequence on the erosional surface is the occurrence of originally deeper rocks in zones of more intense strain and with horizontal stretching.

Thermally induced incompetent zones will behave in the same way as LVZ. The viscosity partitioning will be strongly dependent on thermal contrast which also generates viscosity contrast. Basically this partitioning will be less evident than vertical lithological variations. In this model, hotter and originally deeper rocks will be exhumed in zones of higher ductile strain where, in the case of oblique convergence, vertical stretching will appear first. Colder domains will maintain horizontal stretching for longer duration; lower strain intensities and vertical elevation will be less important.