Our studies are focused to test two elementary hypotheses of leucosome origin - the stress controlled viscous fluid segregation or strain dependent subsolidus segregation. In order to solve this problem we have used 1) statistical grain frequency methods (KRETZ, 1969; FLINN, 1969; MCLELLAN, 1982), 2) petrochemical analytical and mineral chemistry study an 3) micro fabric analysis. The result of our investigation is compared with the physical model to test gravitational stability of the rock if the viscous fluid segregation hypothesis is taken into account.

The results of micro fabric analysis (3) indicate solid state HT non coaxial deformation to be responsible for the stromatititc geometry of RCM. This hypothesis is in good accord with a physical model, that does not allow the latter hypothesis supposing evolution of stromatitic layering due to segregation from melt.
The results of grain frequency analysis are equivocal. It is explained by release of Qz during dealkalisation of K-Fsp.

TECTONIC EVOLUTION OF THE SOUTHEASTERN BOHEMIAN MASSIF: EVIDENCE FROM NEW $^{40}Ar/^{39}Ar$ MINERAL AGES

DALLMEYER, R.D.[1], FRITZ, H.[2], NEUBAUER[3], F. & URBAN, M.[4]

[1] Dept. of Geology, Univ.Georgia, Athens (USA), GA 30 602
[2] Dept. of Geology and Paleontology, Univ. Graz, Austria
[3] Dept. of Geology and Paleontology, Univ. Salzburg, Austria
[4] Dept. of Geology, Charles Univ., 128 43 Praha 2, Czech Rep.

The eastern margin of the Bohemian Massif consolidated during continental collision within an overall transpressive regime. Available geochronological data (DALLMEYER et al., 1992; FRANK et al.1990) suggest late Variscan age of nappe stacking within the Moldanubian and the Moravian nappe complexes. Within the Moravo-Silesian foreland, however, Proterozoic ages have been reported by SCHARBERT & BATIK (1980). Structural characteristics indicate a clockwise displacement path with NNE-directed HT motion during emplacement of hot Moldanubian units onto cool Moravian foreland, followed by orogen-perpendicular LT displacements (FRITZ & NEUBAUER, 1993).

New $^{40}Ar/^{39}Ar$ mineral ages have been elaborated from (1) an W-E section across the Svratka dome which include samples from the Svratka crystalline complex (Moldanubian hangingwall), samples from the Moravian nappe complex (intermediate nappe complex) and samples from the Svratka window (footwall) where imbricated basement units are exposed. (2) A second set of samples has been taken in a NE-SW section, parallel to the direction of HT nappe transport to reveal thermal influence during thrust propagation.

$^{40}Ar/^{39}Ar$ plateau ages for six muscovite concentrates and an amphibole concentrate (Fig. 1) within the Moldanubian and Moravian nappe complexes gave very homogeneous ages between 331.6 ± 3 Ma (2) and 325.1 ± 0.4 (1) Ma without any systematic variation. All other ages are indicated in Fig. 1.

These data are very sharply contrasted by data from the Thaya and Brno composite batholiths and the Deblin Fm., the host rocks of the Brno batholith. (Fig. 1). Both, muscovite and amphibole concentrates from the Svratka window, only a few meters below the major thrust plane, gave purely Cadomian ages with 565.3 ± 0.8 Ma (8) for pegmatitic muscovite and ages between 575.6 ± 2.2 Ma (11) and 596.1 ± 2.1 Ma (13) for amphibole. Muscovite concentrates from samples in a NE-SW section indicate increasing influence of the Variscan thermal event towards SW as indicated by isotopic exchange in low temperature increments (Fig. 1).

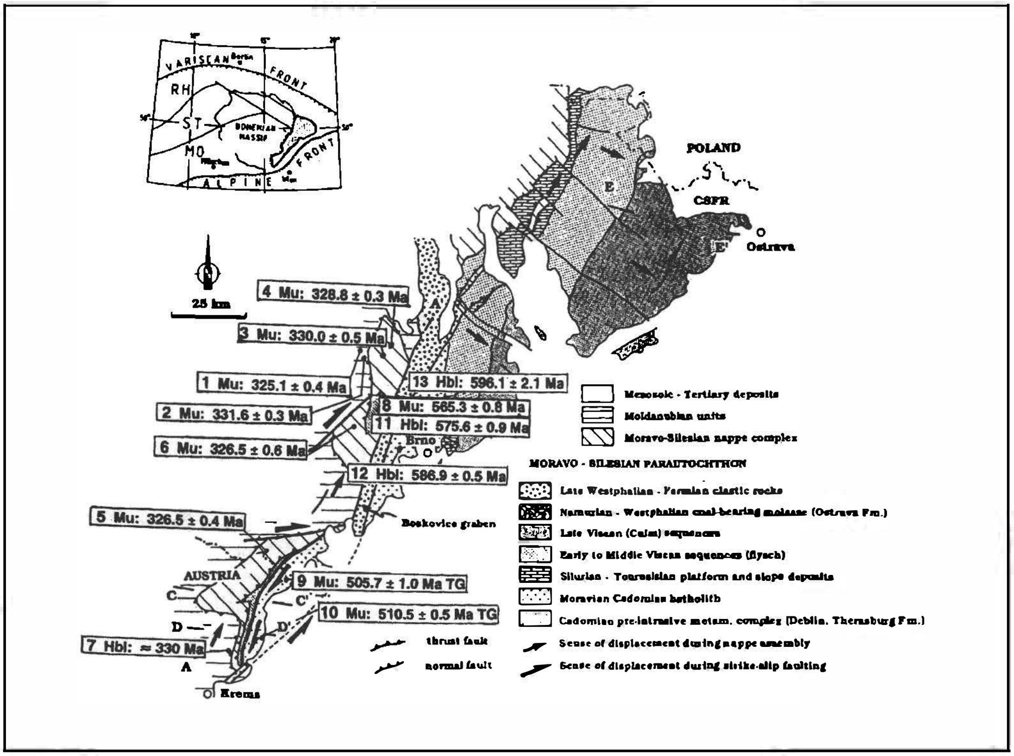

Fig. 1: Simplified geological map of the southeastern Bohemian Massif with apparent $^{40}Ar/^{39}Ar$ mineral ages. Mu = muscovite; Hbl = hornblende; TG = total-gas age; other ages are plateau ages.

We interpret (1) the late Proterozoic ages as cooling of the Thaya and Brno batholiths from c. 500 °C to c. 350 °C between appr. 596 Ma to 565 Ma. (2) Systematic increasing Variscan thermal influence towards the south is interpreted to result from thrust propagation with root zone of the Variscan nappe assembly to the south. (3) Lack of Variscan thermal overprint beneath the major thrust is explained by rapid uplift associated with formation of ramp anticlines during foreward nappe propagation. HT nappe assembly initiated in deep crustal levels in a thick-skinned tectonic style but subsequent uplift and exhumation of deep-crustal nappes changed the rheological behavior. Subsequently formed thrusts within the foreland progressively developed under LT conditions and thin-skinned tectonic style.

DALLMEYER, R.D., NEUBAUER, F., HÖCK, V. (1992): Tectonophysics, 210, 135 - 153.
FRANK, W., SCHARBERT, S., THÖNI, M., POPP, F., HAMMER, S. (1990): Österr. Beitr. Meteor. Geophysik, 3, 185 - 228.
FRITZ, H., NEUBAUER, F. (1993): Geol. Rundsch. 82, 556 - 565.
SCHARBERT, S., BATIK, P. (1980): Verh. Geol. B.-A., 385 - 405.

$^{40}Ar/^{39}Ar$ MINERAL AGE CONTROL OF PRE-VARISCAN AND VARISCAN TECTONIC PROCESSES: THE ALPINE-CARPATHIAN BELT VERSUS THE BOHEMIAN MASSIF

DALLMEYER, R.D.[1], NEUBAUER, F.[2] & FRITZ, H.[3]

[1] Dept. of Geology, University of Georgia, Athens/GA 30 602, USA
[2] Dept. of Geology and Paleontology, University, Hellbrunner Str. 34, A-5020 Salzburg, Austria
[3] Dept. of Geology and Paleontology, University, Heinrichstr. 26, A-8010 Graz, Austria

$^{40}Ar/^{39}Ar$ mineral ages of muscovites and amphibole have been prepared from the southeastern Bohemian Massif (BM), and from basement units along a cross-section through all major Austroalpine units at the eastern margins of the Eastern Alps (EA), from the Western Carpathians (WC), and from a cross-section through the Southern Carpathians (SC). This contribution provides an overview on 'age' provinces and timing of pre-Variscan and Variscan tectonic processes based on these data. Preservation of Cadomian mineral ages within calc-alkaline magmatic suites within the Moravian unit (BM) and the Danubian basement (SC) display the importance of Cadomian subduction-related processes within the pre-Variscan basement which partly escaped Variscan tectonothermal overprint. Furthermore, consistent Cadomian ages of detrital muscovite within Ordovician sandstones argues for a similarly-aged Cadomian basement in the hinterland of the EA units.

Variscan tectonic processes cover a major time span between c. 420 and 280 Ma. Within the southeastern Bohemian Massif amphibole and muscovite $^{40}Ar/^{39}Ar$ indicate regionally consistent, rapid cooling from c. 500 to c. 350 °C between ca. 335 and 325 Ma. These ages relate to final emplacement of hot Modanubian tectonic units over the relatively cool Moravian units and final A-subduction of cold continental material.