morphic „Telekesoldal nappe" thrust over the Bódva nappe. In the D_5 phase, characterized by NW-SE compression, SE verging reverse faults and fault-propagation folds were formed (Fig. 1.). The alternating dip values measured on the rocks of Bódva series and those of TO Fm. are probably the reason of a late folding phase (F_4), characterized by open folds with long wavelength. The semi-vertical dipping of the Late Triassic basinal limestones can be formed by movements along SE verging fault-propagation folds (F_5). The ongoing NW-SE compression resulted in SE verging thrusts. Among them, an uncertain unit of Gutenstein Dolomite, Steinalm Limestone and Early Triassic marl thrust upon the Bódva Unit. During this thrust the ramp fault might have not reach the surface, but connected to roof thrust of duplexes. The juxtaposition of Aggtelek Unit and Bódva Unit can be related to this phase, but it is more likely to be an older structure. Younger transpressive strike-slip and normal fault movements (D_6–D_7), connected to Darnó Zone, juxtaposed the Mezosoic formations of Rudabánya Hills and the Paleozoic rocks of Uppony and Szendrő Hills. Parts of these movements are Tertiary in age, indicated by the involved Szuhogy Conglomerate and Pannonian sediments (Szentpétery 1997). This model can be extended to the major part of Rudabánya Hills, because it has a great similarity to the previous investigations made in other part of the Rudabánya Hills (Fodor and Koroknai 2000, Kövér et al 2005)

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Multiple Magmatic Fabrics in Episodically Emplaced Granites in Transtensional Setting: Tectonic Model Based on AMS Study and Numerical Modeling

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The three successive sigmoidal sheet-like granite intrusions (Thannenkirch, Brézouard, Bilstein granites – BBT Complex) in the Central Vosges Mts. (France) separates medium to high grade (~700 to 800 °C, >9 kbar) gneiss and granulites to the north from low-pressure (~700 °C, ~4 kbar) anatectic migmatites to the south. The entirely compressional fabrics in the northern gneiss contrast with the pervasive extensional deformation in the south. This different structural record reflects the latest deformation event in the south while the relics of first compressional steep foliations are preserved in both regions. In addition, the entirely discordant northern contacts of BBTC with respect to the host rock foliations contrast with the southern intrusion margins that show fabrics perfectly coherent with the host rock. The BBTC intrusions show systematic transition from the dominant magmatic fabric in their northern and central parts to the MT subsolidus deformation terminating in LT mylonites in the south. The latter fabrics are developed in conjunction with E-W trending foliation and subhorizontal stretching lineation. The progressive decrease of deformation temperature is confirmed by quartz c-axis fabric patterns that suggest transition from the activity of prism <a> slip system towards the rhomb <a+c> and the basal <a> slip systems. AMS study reveals bimodal fabric pattern with the central-northern margins showing NW-SE trending foliations and lineations, low intensity (P parameter) and the southern parts with steep E-W trending magnetic foliation, horizontal lineation and high intensity (P parameter). The AMS within the central and northern parts is consistent with the AMS fabrics in southern migmatites. Telescoped ^{40}Ar-^{39}Ar cooling and U-Pb crystallization ages (~328–325 Ma) of BBTC and migmatites in the south proved that the exhumation occurred during a short period of time and that the intrusions of granitoids were coeval with the ductile thinning of southern domain. In contrast, the granulites to the north show cooling path related to compressional exhumation (~335–330 Ma) followed by reheating (~325 Ma) during intrusion of northern granite sheet (Thannenkirch pluton) of the BBTC. Based on our structural study, we suggest that the preexisting E-W trending compressive fabrics structurally controlled the distribution and the emplacement of the granitic magmas. The SSW-NNE extensional traction operated along steep mechanical anisotropy at high angles which generated oblique transtensional regime. The internal fabric within individual plutons is therefore interpreted in terms of partitioning of transtensional deformation, with pure shear dominated area in their northern and central parts and wrench dominated domains along their southern margins. To asses realistically the obtained AMS pattern we compare two numerical models of AMS fabrics in transtension with respect to originally isotropic and pre-deformational intrusion-related fabrics. It is the latter model which returns more realistical fabric data. The asymmetrical microstructural and geochronology patterns are further discussed using thermal 1D modeling which indicates the sequences of individual intrusion from north to south and their mutual thermal interferences leading to successive reheating of southern margins of northerly intrusions that can accommodate prolongated viscous deformation compared to granite northern regions that are cooled down almost instantaneously.

Caledonian Orogeny in Southeast Asia: Questions and Problems

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Avalonia probably started to drift from Gondwana and move towards Baltica in the late Tremadocian and was in a drift stage by the Llanvirnian (McKerrow *et al*. 1991, Torsvik *et al*. 1996, Golonka 2002). Between Gondwana, Baltica, Avalonia and Laurentia, a large longitudinal oceanic unit, known as the Rheic Ocean (McKerrow *et al*. 1991, Golonka 2002) was formed. Traditionally the continent of Avalonia consists of northwestern and possibly southern Poland, and their foredeep, terranes in northern Germany, the Ardennes of Belgium and northern France, England, Wales, southeastern Ireland, the Avalon Peninsula of eastern Newfoundland, much of Nova Scotia, southern New Brunswick and some coastal parts of New England. The Brunovistulicum terrane, some accreted terranes in the basement of East Carpathians parts of the Scythian platform, parts of Kazakhstan and Southern Mongolia terrane could constitute the eastern extension of the Avalonia (Paul *et al*. 2003a, b). The Turkmen (Zonenshain *et al*. 1990) and Solonker (Sengör and Natalin, 1996) oceans in Asia could constitute the eastern parts of this Rheic Ocean. Relationship of eastern peri-Gondwana terranes and Avalonia plates remain unknown and speculative. On presented maps the South China and Southeast Asia plates remain attached to Gondwana according to the previously published global paleoreconstructions (Golonka 2002). The alternative reconstructions (Paul et al. 2003a, b) suggest the possibility of extension of Rheic toward the easternmost part of Gondwana. It is not impossible that South China and Indochina plates were rifted from Gondwana in Ordovician. The uplift and volcanic rocks (Fig. 9) support such a possibility. According to Shouxin and Yongyi (1991) the Ordovician conformably overlies the Cambrian over most of the South China plate. The northern part of the plate (Yangzi Platform was covered with carbonates and mixed carbonate/clastic facies. The southern part of the plate is partially uplifted and partially covered by deep water synorogenic clastic deposits – more than 4000 m of weakly metamorphosed flysch, sandstones and graptolitic shales. Similar rocks formed on the margins of Indochina plate. They are known as Pa Ham formation (Ordovician-Silurian).

Late Siluruian was the time of the major development of the Caledonian orogeny and final closure of the Iapetus. The collision between Baltica and Greenland continued, marked by nappes in Norway and Greenland. After the complete closure of the Iapetus Ocean, the continents of Baltic, Avalonia, and Laurentia formed the continent of Laurussia (P. Ziegler 1989). It is quite possible, that at that time several microplates rifted away from the Gondwana margin to arrive at Laurussia and Kazakhstan at the Devonian-Permian time (Golonka 2002). The exact time and the nature of rifting of these terranes and their relationship to Southeast Asia and Chinese plates remain speculative. Accor-