affected by ductile deformation represented by a combination of simple shear (responsible for overthrust movements) and lateral shortening (mostly bedding-parallel), probably associated with creation and motion of the thrust sheets driven by a push from the rear side. However, the deformation was too weak to give rise to the cleavage.

The Variscan thrust sheets of the Rheno-Hercynian Zone of the E Bohemian Massif, cropping out in the Drahanska vrchovina Hills and the Nizky Jesenik Mts., show very variable magnetic fabrics and deformation fabric elements. In the easternmost areas of both outcrops, the achimetamorphism, ductile deformation and degree of AMS are in general weak; the magnetic fabric is oblate, the magnetic foliation is either parallel to the bedding or tends to create a partial girdle in its poles. The strata create buckle folds of long wavelength whose magnetic fabric can be unfolded geometrically. In the central areas of both outcrops, spaced cleavage and relatively tight buckle folds can be found. Magnetic foliation is still mostly parallel to the bedding, but the magnetic lineation is re-oriented into parallelism to the cleavage/bedding intersection lines. The magnetic fabric of the most folds can be unfolded only partially. In the western areas of the Nizky Jesenik Mts., cleavage folds and very well developed slaty cleavage occur. The degree of AMS is high, the magnetic foliation is parallel to the slaty cleavage and the magnetic lineation is parallel to the cleavage/bedding intersection lines. The magnetic fabric in the folds is homogeneous, the folds cannot be unfolded at all. In places, the slaty cleavage is transposed into the metamorphic schistosity.

Coaxial Magnetic Fabrics in the Basement Rocks of the Western Carpathians: a Remnant of the Variscan Structure within the Alpine Edifice

František HROUDA[1], Milan KOHÚT[2] and Dagmar GREGOROVÁ[3]

[1] AGICO Ltd., Brno, Czech Republic
[2] Dionýz Štur State Institute of Geology, Bratislava, Slovak Republic
[3] Geophysical Institute, Slovak Academy of Sciences, Bratislava, Slovak Republic

Anisotropy of magnetic susceptibility (AMS) is one of the most powerful techniques for investigation of the rock fabric. Modern instruments for its measurement are very sensitive and accurate so that even weakly magnetic and very weakly anisotropic rocks can be measured with sufficient precision despite these rocks may look massive and/or isotropic at the first view. The magnetic fabric of granitic bodies is traditionally interpreted in terms of magma flow, because it primarily originates during the process of emplacement of these rocks into the upper layers of the Earth's crust. However, granitic rocks can be after their intrusion affected by tectonic deformations giving rise to deformational magnetic fabrics superimposed on the primary magnetic fabrics, which is frequent case of the Central Western Carpathians (CWC). The Western Carpathians mountain range creates direct eastern continuation of the Eastern Alps and their present edifice is Alpine in age. The basement components together with Mesozoic cover and nappe complexes were juxtaposed through north-directed thrusting during the Upper Cretaceous. The Hercynian basement within the Alpine-Carpathian orogenic belt was disrupted and sliced into blocks, which were incorporated into the Alpine (nappe and/or terrane) complexes and subsequently variously tilted and uplifted during the Alpine collisional tectonics. This polyorogenic history makes the reconstruction of Hercynian structures rather difficult, but provides excellent exposure of various levels of the Hercynian crust. The Hercynian granitoid rocks occur in all three superunits of the CWC (the Tatricum, Veporicum and Gemericum) in various positions. In the Tatricum, these rocks with surrounding metamorphites (amphibolites, orthogneisses and paragneisses) constitute the backbones of the so-called Core Mountains – horst structures that were finally exhumed during the Alpine orogeny in the Eocene-Miocene period. A large composite granodiorite-tonalite massif, strongly affected by the Alpine tectonics, dominates the Veporicum, and a large hidden granitoid body, penetrating the overlying Early Palaeozoic rocks in the form of apophyses, is observed in the Gemericum. In some Core Mountains of the Western Carpathians, the magnetic fabrics show similar patterns in metamorphic, granitic and covering sedimentary rocks within each Core Mountains, but different orientations between the Core Mountains (Hrouda et al. 2002a, Gregorová et al. 2004). This magnetic fabric is regarded as resulting from ductile deformation associated with regional metamorphism operating during Alpine Upper Cretaceous collision comprising formation and motion of the Central Western Carpathian nappes. During these processes, granites were softened secondarily and could easily undergo ductile deformation.

However, the above magnetic fabric relationship is not valid in all Core Mountains. In some of them, the magnetic fabrics in crystalline rocks are in general non-coaxial with those in cover sediments thus indicating weak or even no effect of the Alpine ductile deformation. As the coaxial magnetic fabrics occur in the centrally located Veporic Superunit of the Central Western Carpathians where the basement was strongly re-activated during collisional burial in a collisional wedge, while the non-coaxial magnetic fabrics occur at the outer margins of the Central Western Carpathians, the magnetic fabric method offers itself as an indicator of the extent of the occurrence of the collisional burial (Hrouda et al. 2002b).

In all Core Mountains, regardless whether the magnetic fabrics in crystalline rocks are coaxial with those in cover sedimentary rocks, the magnetic fabrics in granitic rocks, which are mostly Carboniferous in age, are coaxial with the magnetic fabrics in metamorphic rocks, which are in general older than Carboniferous. This coaxiality is interpreted as resulting from Variscan ductile deformations that operated evidently before Triassic (sometimes before Upper Permian) when started the sedimentation in Palaeo-Tethys. The Variscan ductile deformation took evidently place in relatively deep parts of the crust (thick-skinned tectonics), what suggest pressure conditions of granite emplacements and/or metamorphism of the host metamorphic rocks (400–600 MPa), while the Alpine deformations are rather superficial (thin-skinned tectonics).

Even though the magnetic fabrics of crystalline rocks are oriented in different ways in individual Core Mountains, the degree of AMS and the magnetic fabric shapes are relatively homogeneous in all Core Mountains. Consequently, it is very unlikely that the stress and strain fields controlling the formation of the magnetic fabric had more or less the same magnitudes in all the Core Mountains, but different orientations of the principal directions in each Core Mountains. It seems to be more probable that the orientation of the magnetic fabric was rather homogeneous originally and only later, probably in Neogene, during splitting the superunits into smaller blocks, tilting and rigid body rotations of smaller segments took place and the magnetic fabric was differentiated in orientation as observed today.

References

GREGOROVÁ D., HROUDA F. and KOHÚT M., 2004. The Magnetic Fabric of the Veľká Fatra Mts. Part Two: Emplacement Mode of the Hercynian Granitic Pluton and its Relation to the Alpine Sedimentary Rocks, Based on AMS Study. *Geolines*, 17: 35-36.

HROUDA F., PLAŠIENKA D. and GREGOROVÁ D., 2002a. Assumed Neogene deformation in the Central Western Carpathians as inferred from magnetic anisotropy investigations. *EGS Stephan Mueller Spec. Publ. Series*, Vol. 1, 195-211.

HROUDA F., PUTIŠ M. and MADARÁS J., 2002b. The Alpine overprints of the magnetic fabrics in the basement and cover rocks of the Veporic Unit (Western Carpathians, Slovakia). *Tectonophysics*, 359: 271-288.

Unusual Subduction Mechanism Recorded in Blueschist Clasts from Cretaceous Exotic Conglomerates of the Klape and Manín Units (Pieniny Klippen Belt, Western Carpathians) as Inferred from Geochemical Study

Peter IVAN[1], Rastislav DEMKO[2] and Milan SÝKORA[3]

[1] Comenius University, Department of Geochemistry, Mlynská dolina G, 842 15 Bratislava, Slovak Republic
[2] Slovak Geological Survey, Kynceľovská 10, 974 01 Banská Bystrica, Slovak Republic
[3] Comenius University, Department of Geology and Paleontology, Mlynská dolina G, 842 15 Bratislava, Slovak Republic

Comprehensive geological study of exotic conglomerates seems to be important tool for the reconstruction of geological structure and tectonic history of crustal segments completely eroded away during the evolution of orogenic belts. Very interesting results can be obtained if volcanic rocks or blueschists occur among clasts. They can be undergone geochemical study to provide additional information to elucidate of the plate tectonic history of removed crustal segments. Possibilities of such study are demonstrated on the example of the Cretaceous exotic conglomerates from the Pieniny Klippen Belt.

The Pieniny Klippen Belt (PKB) is a term for a narrow thrust system between the outer and central Western Carpathians. Western part of the PKB is generally divided into three units: (1) Czorsztyn-Pieniny, (2) Klape and (3) Manín Unit. Huge wild flysh complexes together with thick prisms of Albian exotic conglomerates are most characteristic feature of the Klape Unit whereas similar conglomerates in the Manín Unit form thin layers only associated with flysh of higher (Cenomanian to Turonian) stratigraphic level. Carbonaceous or clastic sediments belong to the most widespread exotic clasts, but igneous and metamorphic rocks also occur in lesser amount. Most of these rocks are unmetamorphosed (carbonates) or they experienced low-grade metamorphic alteration only (volcanic rocks). Occurrences of blueschists are restricted on a small area in the vicinity of the town Považská Bystrica (Klape Unit) or Hradná village (Manín Unit; Fig. 1 – black squares). Although total content of blueschist clasts in conglomerates do not exceed 1%, variegated petrographic types have been found here. Three groups of blueschists can be discerned based on their starting rocks of (1) sedimentary, (2) metamorphic and (3) volcanic origin. Deep-sea laminated pelagic shales and cherts were sedimentary precursors of the first group. Amphibolites and rarely also gneisses oveprinted by blueschist metamorphism represent the second group of blueschists. Amphibolites contain green Ca-amphibole (magnesiohornblende) relics rimmed by pale violet or blue