an alluvial environment. They comprise up to 2000 m thick succession of continental clastic deposits, mostly of a coal-bearing character.

The early Namurian Wałbrych Formation consist of quartz conglomerates and arenites interpreted to represent an upper delta-plain association which evolved into a meandering alluvial plain associations (Němec 1984). N-directed palaeocurrent indicators showing a distinct fan-like arrangement were related to a northward propagation of the alluvial-deltaic system. The Wałbrzych formation is approximately 300 m thick and contains some 30 coal seams.

The Biały Kamień Formation represents up to 400 m thick Upper Namurian to Lower Westphalian (Gothan and Gropp 1933) series of coarse-grained barren deposits. Sedimentation was dominated by in-channel processes. A braided style of the channel pattern evolved upwards into a meandering channel system of the upper delta fan. Palaeocurrent indicators, in vicinities of Wałbrzych, point to NNW-directed transport of clastic material, derived from E and S frames of the Intra-Sudetic Basin.

The Biały Kamień Formation grades upwards into fine-clastics of the acl Formation (Westphal A-C) which contain numerous coal seams. This is up to 900 m thick sequence of sediments representing diverse in-channel and overbank subfacies of the extensive alluvial plain. The palaeocurrent indicators suggest a N and NW-directed transport of clastic material from the S and SE margins of the basin, parallel to the inclination of the palaeoslope. Low-lying areas of the basin remained out of the active paths of sediment distribution. They accumulated only fine-clastics supplied during periodic floods. Such environmental conditions resulted in a permanent plant colonisation and a high-rate of peat-forming accumulation.

The acl Formation is overlain conformably by the monotonous succession of the Glinik Formation (Westphal D - Stephan). The latter represents a 600 m thick sequence of transitional character between coal-bearing Namurian to Westphalian successions and barren Stephanian and Lower Permian sediments. The Glinik Formation consists of pink to yellow sandstones and fine conglomerates interlayered with red mudstones. They represent deposits of braided-type channels and overbank areas.

The Late Stephanian sedimentation in the Intra-Sudetic Basin produced up to 400 m thick, fining upwards sequence of the Ludwikowice Formation. This sedimentary succession comprises mostly red-coloured sandstones and conglomerates deposited in alluvial-fluvial settings. Coarse- to medium grained sediments grade upwards into mudstones and claystones including thin intercalations of bituminous limestones. This uppermost portion of the Ludwikowice Formation is referred to sedimentation in a lacustrine environment.

The Autunian sediments of the Intra-Sudetic Basin are similar in many respects to the underlying Ludwikowice Formation. They comprise two successive megacyclothems: the Krajanów and Słupiec Formations which collectively attain up to 900 m in thickness. Both fining upwards sequences comprise clastic deposits of alluvial fan, fluvial and lacustrine environments. Sedimentation developed in NW-SE elongated palaeovalleys which were fed by axial NW-sloping fluvial systems and transverse, marginal alluvial fans.

An intense tectonic activity during the Saxonian led to the significant uplift of the S and SE frames of the Intra-Sudetic Basin and resulted in a high-relief morphology. Elevated margins of the basin were subjected to effective erosion. Sedimentation took place in elongated valleys bounded by fault-related steep slopes. The valley floors were occupied by fluvial plains dominated by accumulation in braided-type channels. The axial fluvial belts were effectively fed in coarse-clastic material by transverse, mass-flow-dominated alluvial fans. The Saxonian period of sedimentation in the Intra-Sudetic Basin was recorded in a form of 100 to 400 m thick sequence of the Radków Formation which consists of red-coloured, coarse-clastic conglomerates.

References

DATHE E. 1892. Geologische Beschreibung der Umgebung von Salzbrunn. *Abh. König. Preuss. Geol. Landesanst., Neue Folge*, 13, 1-157.

DZIEDZIC K. and TEISSEYRE A. K. 1990. The Hercynian mollase and younger deposits in the Intra-Sudetic Basin, SW Poland. *N. Jb. Geol. Paleont. Abh.*, 197, 285-305.

GOTHAN W. and GROPP W. 1933. Paläobotanisch - stratigraphische Untersuchungen im niederschlesischen Karbon. *Z. Berg. Hütt. u. Salinenw*, 81, 88-96.

NEMEC W. 1984. Wałbrzych beds (Lower Namurian) in the Wałbrzych Basin: an alluvial sedimentation in coal-basin. *Geol. Sudetica*, 19 (2), 7-73.

TEISSEYRE A. K. 1968. The Lower Carboniferous of the Intra-Sudetic Basin; Sedimentary petrology and basin analysis. *Geol. Sudetica*, 4, 221-298.

TEISSEYRE A. K. 1975. Sedimentology and Paleogeography of the Kulm alluvial fans in the western Intra-Sudetic Basin (Central Sudetes, SW Poland). *Geol. Sudetica*, 9(2), 7-135.

ŻAKOWA H. 1963. Stratygrafia karbonu dolnego w Sudetach. *Kwart. Geol.*, 7(1), 73-94.

The Cathodoluminiscence Study of the Metasomatic Mineralization from the Uranium Deposit Rožná

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The uranium deposit of Rožná occurs in the Variegated group of the Strážek Moldanubian, 10 km southeast from the city of Nové Město na Moravě. Three main types of uranium mineralisation are mined in this deposit:

- vein type
- mineralised tectonic zones
- metasomatic type

The source of uranium is traced in neighbouring paragneisses (Hájek and Uhlík 1987). The remobilisation and concentration of uranium is according to both authors connected with melting of the crustal rocks and with following hydrothermal processes.

The granites which were found in deeper parts of the Rožná mine, together with the metasomatic type of mineralisation, are objects of this study.

Granites

The granites are light coloured, fine to medium grained rocks. The contact to surrounding gneisses is often transitional. A several meter thick zone of migmatites is developed on the contact between both rocks. However, some contacts between the gneiss and the granite are sharp and discordant. A mineral composition of the granite is very simple - plagioclase, K-feldspar, quartz, garnet and very rare biotite. Plagioclase is zoned if observed using cathodoluminiscence microscopy. The grain cores exhibit a yellow luminescence, the rims are bright blue. K-feldspar exhibits even oscillatory zoning in dark blue colours. Quartz is not luminescent. Described styles of zoning constitute a magmatic fabric.

Feldspars from the surrounding gneisses are, on the other hand, mostly homogenous and unzoned. The zoning of both feldspars, together with observed discordant contacts, show that the granites are actually magmatic rocks, crystallising from a magma.

Metasomatites

Metasomatites are in fact strongly altered - albitised- red coloured gneiss. Feldspars from this rock types are mostly very weekly luminescent. The reason for this feature is a high content of very fine dispersed hematite which quenches the luminescence, together with a strong sericitisation of the plagioclase. Irregular grains of carbonate are an important component of the metasomatites. Carbonate appears in several generations. The older one exhibit a dull, dark red luminescence. The younger generations are marked by a bright yellow to orange luminescence. The study of relations between the carbonates and other mineral phases shows that the carbonatisation was the latest alteration. The rocks were affected, just before the carbonatisation, by sericitisation together with albitisation and heamatitisation. The estimated sequence of alteration shows that the rock was affected by at least two different fluid generations. The first alteration - sericitisation - was caused by hydrous fluids. The CO_2 rich fluids are responsible for the second one.

The anatectic granites may represent a potential source of the fluids. When compared to the gneisses, the granites are extremely depleted in water. The water content in the gneiss's fluctuate between 3.9 and 1 %. The granites contain max. 0.6 % of water. The fluids release during melting of deeper parts of the crust caused probably alterations in the hangingwall.

Ar-Ar Thermochronology in Transpressive Zones: from Numerical Modelling towards Natural Examples

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Ar-Ar hornblende thermochronology shows that two NE-SW trending belts with contrasting structural pattern in the Variscan basement of the Western Carpathians present also contrasting cooling ages: 1) mica schists domains presenting Variscan prograde Barrovian assemblages are strongly retrogressed along narrow steep transpressive greenschist facies zones. These zones of intense deformation exhibit exclusively Cretaceous cooling ages (ca. 80 to 90 Ma). They are surrounded by 2) regions composed of high grade gneisses and migmatites with flat, mainly extensional fabrics and Lower Carboniferous cooling ages (ca. 360 to 340 Ma). Occasionally, lozenge-shaped domains of retrogressed gneisses are present in steep shear zones, which exhibit stepped Ar-Ar spectra yielding mixed ages (from ca. 90 to 170 Ma).

Regions with Variscan plateau cooling ages are interpreted as domains exhumed from mid-crustal (T > 500°C) to upper crustal levels during the Variscan orogeny. In contrast, the domains with Alpine hornblende and muscovite plateau ages followed the same trajectory during the Alpine Cretaceous convergence. Using the numerical model of Lister (1996, Mac Argon program package) the domains with stepped spectra are interpreted as regions which were located in levels close to the 500°C isotherm for periods longer than 150 Ma. This lateral pattern of cooling ages can be viewed in terms of differential vertical tectonic exhumation of the thermally zoned pre-Mesozoic basement.

This thermochronological and structural pattern is interpreted as a result of the Alpine transpressive tectonics affecting the continental crust with a thermal profile stabilised from the end of the Variscan orogeny to the Cretaceous times. This continental crust had a layered structure with high-grade gneisses in the hanging wall and mica schist in the foot wall that originated during the Variscan thrusting. The Alpine convergence developed steep transpressive zones with strongly partitioned deformation and rheologically weakest micaschists were extruded along pure shear dominated vertical zones to supracrustal levels.

This geological situation was modelled using 2D thermomechanical - rheological modelling coupled with numerical thermochronological calculations. This kinematical forward modelling allows us to quantify lateral and vertical displacements as well as the time factor necessary for interpretation of geochronological studies of successive metamorphic episodes.

References

LISTER G. S. 1996. Modelling argon diffusion using the Mac Argon Program. *Geol. Soc. Aust. Abstracts*, 41, 151.

THOMPSON A. B., SCHULMANN K. and JEŽEK J. 1997. Extrusion tectonics and elevation of lower crustal metamorphic rocks. *Geology*, 25, 491-494.