invisible except for margins of the intrusion were magmatic and subsolidus fabrics were measured. The rest of the pluton had to be explored by means anisotropy of magnetic susceptibility (AMS). Magnetic susceptibility of the granodiorite containing magnetite is by two orders higher than in the granite where carriers of magnetisation are presented by ilmenite, haematite, pyrrhotite and biotite. Magnetic foliations along the periphery of the intrusion are fairly concentric, yet the core zone displays only foliations with a regular NE-SW trend and a steep plunge. Magnetic lineations plunge at shallow angles in the periphery whilst in the central zone they are steep. The geometry of AMS fabric implies that the erosion was deep enough to remove the apex of the pluton where conventionally presumed flat-lying magmatic foliations may have been preserved. Moreover, we have found no evidence the magma was indeed flowing subhorizontally in the superficial part of the intrusion.

The strike-slip shear zone at the eastern margin of the pluton cross-cuts both the Tis granite and the Čistá granodiorite and runs parallel to their contact. One deformational event produced different mylonite structures in these rocks, depending on their former mineral composition and igneous fabric. In a profile across the shear zone, the strain intensity increases from magmatic fabrics up to ultramylonite. In the highest-strain zone, the Tis granite shows a development of structures characterised by interconnected weak layers whereas for the Čistá granodiorite a structure composed of ultramylonitic matrix and rounded fragments of plagioclase is typical. We interpret the transition from the magmatic fabric to solid-state mylonitic foliation as a result of the syntectonic granodioritic intrusion combined with continuing activity of the transtensional sinistral shear zone after the emplacement had ceased. Quartz microfabrics determined in samples with a different strain intensity also support syntectonic cooling of the intrusion as is indicated by transition from prism [c] activity to prism [a] glide.

We assume that the transtensional regime in this area was decisive for the emplacement of the Čistá granodiorite. The source of magma could have a linear configuration, as indicated by elongation of the stock parallel to the major shear zone. The width of the stock is supposed to grow as the sinistral transtensional motion of the shear zone went on. The ascent and emplacement of the Čistá granodiorite controlled by this shear zone match with the extension evidenced by kink bands in the Proterozoic rocks west of the intrusion.

Sliding Reaction Sil + Bt + Qtz ⇋ Crd + Kfs + H_2O and Polymetamorphism of Moldanubian Paragneisses Associated with Multiple Shearing Deformations

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The reaction given in the title (Hoffer 1976, Spear and Cheney 1989) tends to be accompanied by several other reactions involving Bt, Sil, Crd, Ms, Kfs, Pl, H_2O and melt, located in neighbouring parts of the amphibolite facies PT field.

Sillimanite-biotite gneisses and cordierite-biotite gneisses represent the most widespread rocks in the Moldanubian Zone. They tend to occur separately in more or less clearly defined regional domains (e.g., Zelenka 1926). In some cases, the two rock types may occur as interlayered bands on scale of metres (Krupička 1968). Elsewhere, in various subareas, either of the two rock types may pass into migmatites which may exhibit a variety of histories: 1) cordierite migmatites around late-Variscan plutons, 2) migmatites with foliated/recrystallised mobilisates, showing a polymetamorphic history.

Major-element analyses indicate that the two types of gneisses tend to show closely similar or comparable composition (Suk 1964, Krupička 1968). With exclusively prograde metamorphic history in mind, Krupička (1968) suggested that examples of intimately interlayered Sil-Bt and Crd-Bt gneisses, such as in the section near Havlíčkův Brod, violate fundamental principles of the phase rule, since both rock types were exposed to the same PT conditions across the small domain of < 100 m. An alternative evolution history, including reactivation of certain structural layers of former Crd-Bt gneiss by shear deformation and minor influx of water-bearing fluid under amphibolite facies conditions (and, possibly, a slight change in PT conditions?) allows interpretation of locally interlayered Sil-Bt gneisses in Crd-Bt gneisses in terms of the reaction Crd + Kfs + H_2O ⇋ Sil + Bt + Qtz. Consequently, the small-scale interlayering of gneisses showing contrasting mineral assemblages poses no problem in context of validity of the phase rule. The example is introduced to visualise the inertia, with which the "prograde-metamorphism-only" concept is ingrained in geological community.

The lecture will present examples of microscopic-scale textures and structural relations and outcrop-scale structural relations pointing to shear deformation repeatedly superimposed on early-stage paragneiss (Vrána 1979).

Pressure solution and fabric reorientation, materialised mainly through efficient recrystallisation of micas and quartz, are important mechanisms. Microscopic-scale structural relations indicate that the reaction Sil + Bt + Qtz ⇋ Crd + Kfs + H_2O (and some related reactions) took place repeatedly as a sliding reaction over certain domains reactivated by deformation and influx of fluids. The structural relations include examples of Sil+Bt+Grt pseudomorphs after Crd. The resulting situation corresponds to population of paragneiss domains with unlike metamorphic evolution histories, including potential differences in the PT (fluid) conditions of the last recrystallization.

As thermobarometry studies of gneisses will proliferate through international efforts (e.g., Owen and Dostál 1996) and activity of local petrologists, it appears as critical that the information should be tied to local (and regional) structural sequence and a possible polymetamorphic history. Without this specific information the PT estimates may be difficult to interpret or may result in artefact PT histories on regional scale.

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The Correlation Between Radioactivity and Mineral Composition: an Example from Alkali Feldspar Syenites; Gföhl Unit, Moldanubian Zone

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Two small, up to 100 m long, bodies of alkali feldspar syenites crop out in the Oslava valley, north-west of the town of Náměšť nad Oslavou (western Moravia). The syenite intrudes into the Moldanubian biotite-bearing migmatites of the Gföhl unit. Both bodies are separated from a neighbouring large magmatic body, which is represented by durbachites of the Třebíč massif, by a several-hundred-meter-thick zone with amphibole-biotite-bearing gneisses and biotite bearing migmatites.

A high radioactivity of the alkali feldspar syenites was for the first time mentioned by Weiss (1974). Zircon and titanite are according to Weiss (1974) the most important radioactive minerals.

The rock consists of K-feldspar (77 - 92 %), amphibole (2 -17 %), quartz (1,5 - 9 %) and altered plagioclase (0,5 - 3%). Based on these data, the rocks can be classified as alkali-feldspar quartz syenite or alkali feldspar syenite. Zircon (0,5 - 5 %), titanite, biotite and apatite are minor phases. As the mineral composition shows, the rock is not homogenous. The coarse-grain syenite grades into fine-grain leucocratic alkali feldspar syenite in the centre of the body.

The leucocratic fine grain syenite display the highest radioactivity of the studied samples which correlates with the highest estimated concentration of Th (up to 961 ppm) and U (370 ppm). The Th concentration reaches in the coarse grain syenite only 44 - 98 ppm, the uranium concentration is even lower (10 -40 ppm). U and Th are bound predominantly in zircon as inclusions of uranothorite and its metamictised products. The zircon concentration increases up to 10 times; from 0,5 % in the common, coarse grain syenite to 5 % in the leucocratic syenite. The Th concentration increases in the same rate (from 44 - 98 to 322 - 961 ppm). The uranium follows more or less this dependence (10 - 40 - common syenite vs. 140 - 370 ppm - leucocratic syenite). Thus the radioactivity displays a direct dependence on the zircon concentration.

The Th/U ratio in the individual sample shows a large scale variation between 1.9 - 6.4. This variation is caused mostly by a fluctuation in the U concentration. EMP analyses of uranothorite, which is the most important U mineral in the rock, and its metamictised products show that the uranium concentration decreases strongly during metamictisation. The thorium concentration is, on the other hand, more stable. The variation of Th/U ratio is therefore more likely a secondary feature, originating during metamictisation, than a primary sign of the rock.