Lithostratigraphy and Tectonomagmatic Evolution of the Železný Brod Crystalline Unit: Some Constraints for the Palaeotectonic Development of the W Sudetes (NE Bohemian Massif)

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The Železný Brod crystalline unit (ZBCU) is situated on the SW margin of the Krkonoše-Jizera crystalline unit (KJCU) (Report 1994). The latter represents a large-scale megaanticlinorial zone intruded in the core by the late Variscan Krkonoše-Jizera granite pluton.

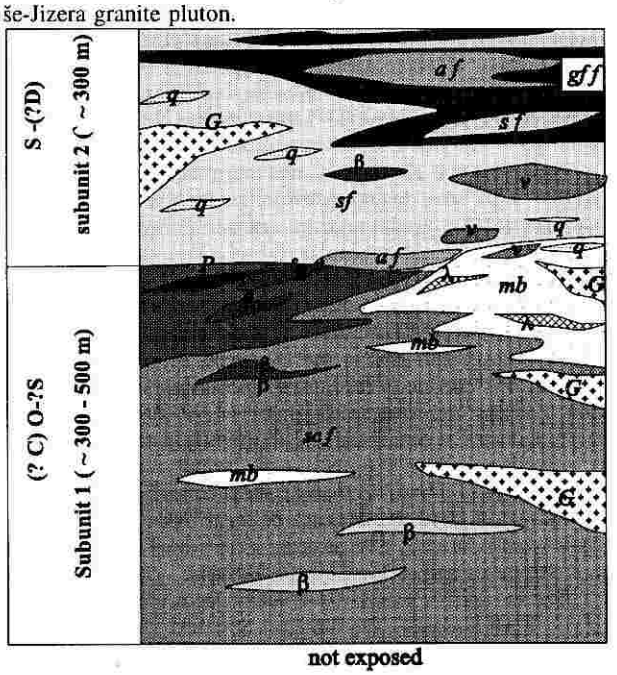

Fig. 1. *Generalized lithostratigraphic scheme of the Železný Brod Crystalline Unit:* Subunit I: *sc f* - sericite -chlorite phyllite rich in tuffitic admixture, *b* - metadiabase, *G* - mylonitized and phyllonitized porphyroclastic orthogneiss, *mb* - metabasites of the Železný Brod Volcanic Complex undistinqushed (pilllow lavas, tuffs, tuffites), *l* - metakeratophyre, porphyroid of the ZBVC, *P* - picritic metagabbro to picrite (±serpentinized), *d* - metagabbro, *v* - limestone, *q* - quartzite with volcanogenic admixture (chloritoid, stilpnomelane bearing). Subunit 2: *s f* - sericite phyllite, *q* - quartzite, *v* - limestone, *a f* - albite phyllite, *G*- mylonitized and phyllonitized porphyroclastic orthogneiss), *gf f* - graphite phyllite with metachert intercalations.

The KJCU is identified with a suspected terrane distinguished in the W Sudetic mosaic by Cymerman and Piasecki (1994). The terrane mosaic juxtaposition is interpreted as a result of (early?) Variscan (Maluski and Patočka 1997) collision of peri-Gondwanan microplates (E Avalonia, Armorica, Perunica?) with Baltica and subsequent late Variscan large-scale shear movements on the TESZ along the Fennosarmatia SW margin.

The ZBCU is a representative of the low- to medium-grade metamorphosed volcano-sedimentary complexes distributed along the S a E margins of the KJCU. The ages of the complexes and timing of tectonothermal events have been disputed at length (e.g. Kodym and Svoboda 1948; Máška 1964; Chaloupský et al. 1989; Chlupáč 1993).

A new geological mapping (at a scale 1:10.000), and complementary studies on the tectonics and metamorphism of the ZBCU provided a basis of a new lithostratigraphy of the unit, taking into account also new palaeontological data (Chlupáč 1997, this vol.), and substantially changing the "multiorogenic" concept of Chaloupský et al. 1989. The principal results are shown in the lithostratigraphic scheme and geological map (Fig. 1, Fig. 2).

The ZBCU was a continuous volcano-sedimentary basinal sequence accumulated in an intracontinental rift setting since the Cambrian/Ordovician to the Silurian (Devonian?) (Fajst et al. this vol.). An identical tectonic setting is documented also by the Early Palaeozoic metavolcanic suites of the E Krkonoše Mts. (e.g. Bendl and Patočka 1995; Kryza et al. 1995) and the Kaczawa Mts. (Furnes et al. 1994). The rift may have been developed during the Early Palaeozoic extension of the Cadomian basement of Lusatia and KJCU.

The sequence is divided into two subunits:

1. The lower subunit bottom part comprises finely laminated sericite-chlorite phyllites and scarce black slates; in the upper part of the subunit typical roofing slates occur, yielding rather diversified deep-water ichnofossil assemblage of the Ordovician age (Chlupáč 1997). These rocks laterally pass into X00 m thick bimodal metavolcanic suite (Fajst et al. this vol.) dominated by metabasites (subaquatic lavas, tuffs and tuffites); felsic metavolcanics are minor. The metavolcanics are associated with (subvolcanic?) metadiabases and metagabbros. The suite, previously called the Železný Brod volcanic complex (e.g. Fediuk 1962), has not been dated precisely yet, but the age of roofing slates (Chlupáč 1997) and relations to conformably overlying subunit indicate the Ordovician-?Early Silurian age (cf. Chaloupský et al. 1989; Chlupáč 1993).
2. The upper subunit, showing gradual transition from the lower one (Kachlík 1997), consist of dark sericite-graphite phyllites (with metacherts), albite phyllites, quartzites, dolomitic marbles and rare diabase sills. The metabasites are successively waning out. The marble bodies occur in two stratigraphic levels in the ZBCU. The small bodies of well bedded marbles appear on the top of the metavolcanic suite, and pass into the base of the upper subunit. The large bodies of massive pure dolomitic marbles occur within sericite phyllites of higher levels. Quartzites are frequent in the bottom part of the upper subunit; close to the base they show an assemblage chloritoid+paragonite±stilpnomelane. The quartzite mineral and lithic compo-

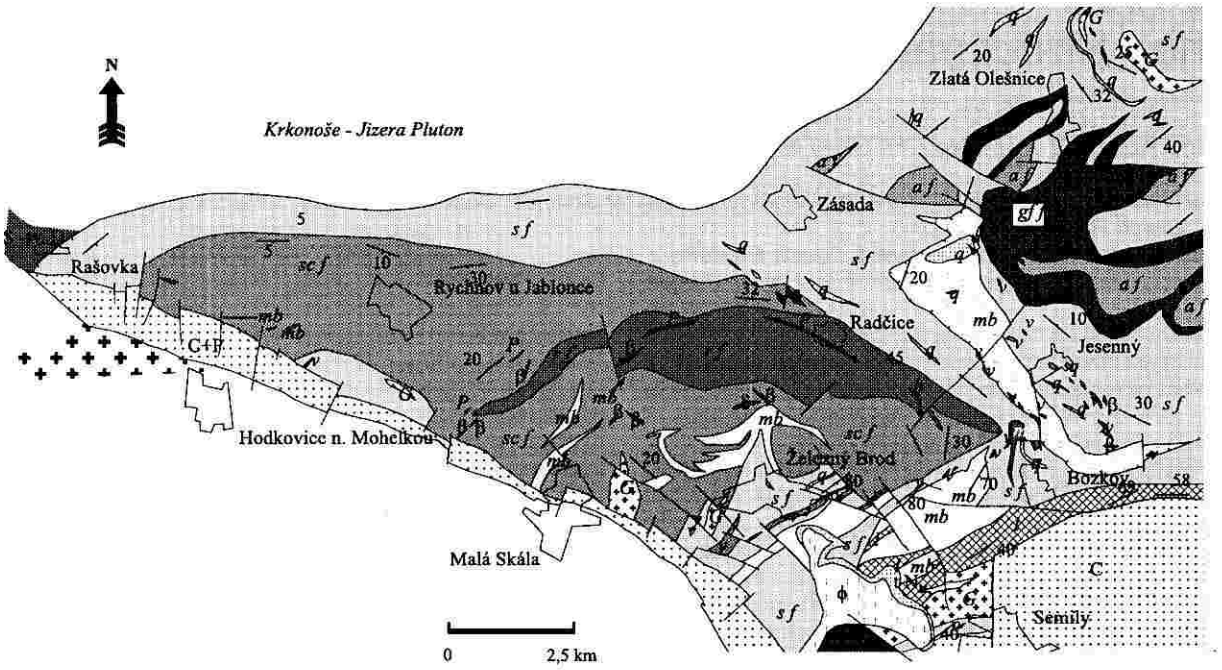

Fig. 2. Železný Brod Crystalline Unit - see Fig. 1 for explanations, C - Late Carboniferous sediments of the Krkonoše Piedmont Basin, C+P - sediments and metavolcanics of the Mnichovo Hradiště Basin, t NM - terrace gravels, *f* - Pliocene olivine basalts.

nents - grains of blue quartz as well as granitoid and hornfels clasts - suggest that the Panafrican Lusatian basement was a provenance. Fossils in the graphite phyllites associated with marbles indicate the Silurian and/or Devonian age of the upper subunit (Chlupáč, this vol.).

A key problem in understanding the ZBCU tectonomagmatic development is an interpretation of the small (usually sill-like) bodies of strongly sheared (mylonitised to phyllonitised) and subsequently folded porphyritic metagranitoids penetrating both subunits; some were originally described as metaarkoses and conglomerates of Early Palaeozoic age (e.g. Chaloupský et al. 1989). There are two possible ways of the interpretation:

(a) The deformed metagranitoids represent an older (Cadomian) basement elements incorporated into the Early Palaeozoic volcano-sedimentary sequence due to the Variscan tectonics.

(b) They intruded into the ZBCU during the Cambrian/Ordovician-Silurian(-Devonian?) period; their origin and emplacement were related to the above described intracontinental rift development. Subsequently they experienced intense Variscan deformation under the greenschist facies PT conditions.

As the metagranitoids sporadically contain randomly arranged and sharp-edged xenoliths of the host rocks (in orientation independent of the younger mylonite foliation), and as the albite porphyroblast growth was observed in metasediments near the metagranitoid bodies, the second interpretation seems to be more probable in spite of sparse radiometric data on the metagranitoids (Kröner et al. 1994) limited possibly to the Cambrian/Ordovician (ca. 500 Ma) early phase of the rift evolution.

In conclusion, an anorogenic granitoid magmatism (±bimodal volcanism) associated with continental lithosphere extension and rifting in the Cambrian/Ordovician(-Devonian?) period is suggested in the W part of the W Sudetes. The intricate space relationships between the Krkonoše orthogneiss and its metasedimentary mantle (lithologically equivalent to the ZBCU) may be explained this way (cf. Máška 1964, Grandmontagne 1993, Kachlík 1996).

For the references cited see the Excursion guide on p. 79 of this GEOLINES volume.