Correlation of Lithological Markers within the Moravian-Silesian Culm

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There are many reasons for seeking and defining distinct lithological horizons in relatively monotonous Lower Carboniferous Culm basin-fill in Moravia and Silesia. The present geometry of the basin-fill is bow-shaped trending SW-NE in the south and SE-NW in the north (Fig. 1). In the central part the continuity of Culm units of the Drahany and Nízký Jeseník subbasins is interrupted. The discontinuity is controlled by the Elbe lineament with the displacement along the lineament being marked by some distinct lithohorizons. Some authors considered the two parts of the basin as primarily separated, sourced from the west

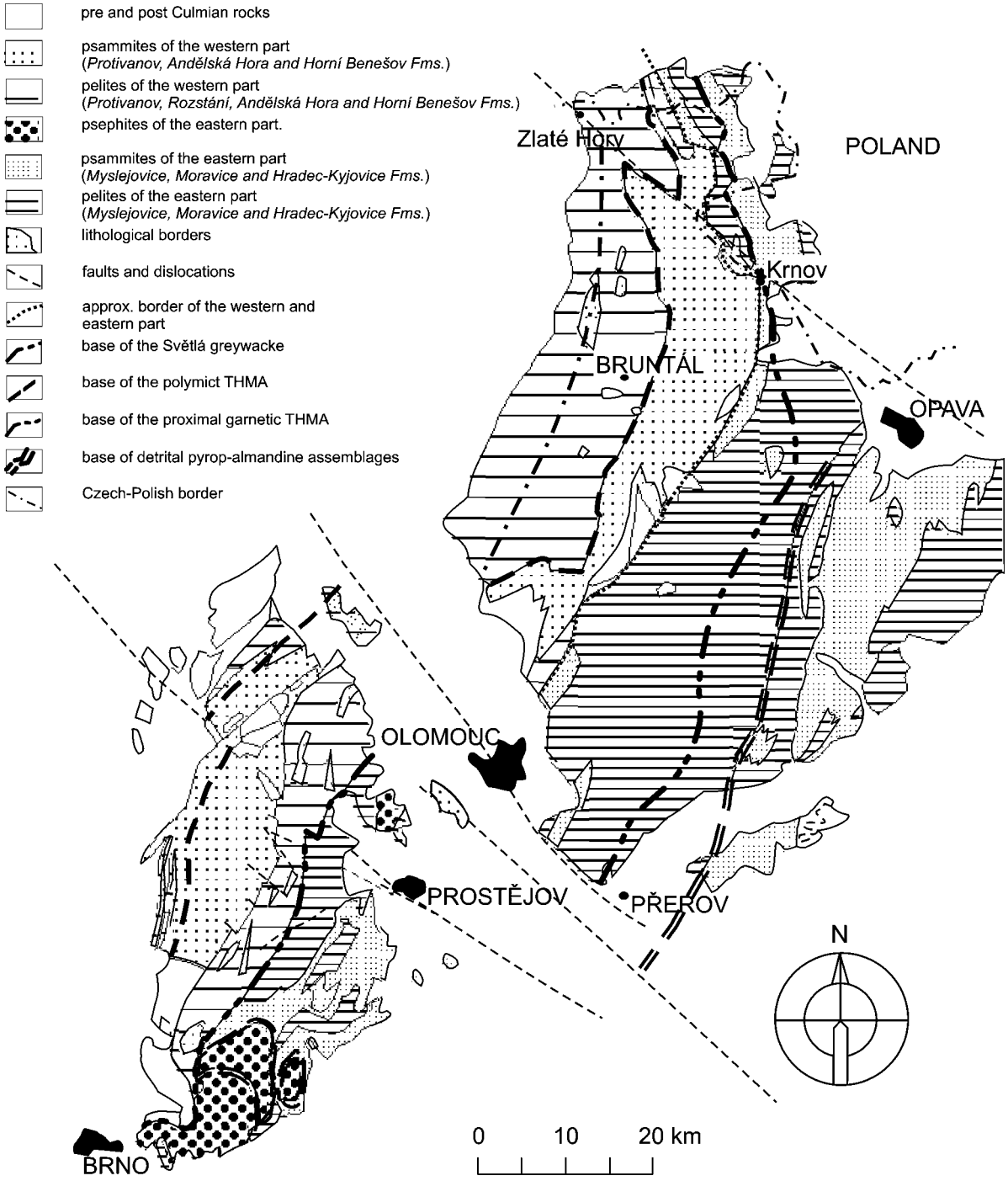

Fig. 1. Distribution of main lithotypes in the Moravian-Silesian Culm with lines of distinct lithological markers (more details in the text).

(Zapletal 1926, Dvořák 1977). Other geologists interpreted the basin as an axial turbidity system fed exclusively from south (Kumpera and Martinec 1995 or Hartley and Otava 1999 in press).

Biostratigraphic correlations within the Lower Carboniferous are possible only in the eastern part of the basin and are relatively difficult because of sporadic fauna-containing sites. Lithological correlations were done using several methods and various rock types. The comparison of pebble composition revealed generally low or no correlation between the southern and northern (Drahany and Jeseník) parts. Even the parallelisation within the Drahany and Jeseník parts is complicated due to the discontinuous development of psephites and lateral variations in their composition.

The most promising seems to be the psammitic (greywacke) lithology of the basin fill. There exist many hundreds or even first thousands of thin-sections from the Lower Caboniferous of the Drahany and Jeseníky Culm, but unfortunately they were not statistically evaluated as a whole yet.

The pattern of distinct lithological horizons or markers presented in the map is based on important changes in the translucent heavy mineral assemblages (THMA) of greywackes and on changes within the assemblage of detrital garnets in greywackes. The changes are controlled both by tectonic and provenance influences. The continuous character of lithomarkers proves the original unity of the Moravian-Silesian Culm basin. Gradual increase in the number of samples and in the density of sampling gives precision to the lines of markers and eventually brings new markers.

The state of art shown on the map below brings the following main lithomarkers from west to east (from underlying to overlying rocks) :

1 - the base of the Světlá Greywacke (specific THMA with hornblende, epidote, without garnet). It is discontinuous in the southern part of the Nízký Jeseník Culm, present in the lower part of the structural borehole Dětřichov 1, continuous in the Vrbno area, missing or not detected north of the Zlaté Hory-Krnov line. This assemblage probably has no equivalent in the Drahany Culm.

2 - the base of the polymict THMA is continuous throughout the whole basin, i.e. Drahany and Jeseníky parts. The line reflects 5 km NW horizontal displacement (probably partly caused by different erosional levels) of the Bouzov Subbasin along the Nectava Fault. The SE displacement of the Nízký Jeseník Subbasin as reflected by this marker is about 10 km. The Zlaté Hory-Krnov line displaces the northern block by about 5 km southeasterly.

3 - the base of the proximal garnet THMA shows a more prominent displacement between the Drahany and Nízký Jeseník Culm but no displacement along the Zlaté Hory – Krnov line.

4 - the onset of massive influx of pyrope-almandine detrital garnets. In spite of low number of samples it evidences the original material continuity of the Luleč Conglomerate member of the Myslejovice Fm. of the Drahany Culm and the upper part of the Moravice and Hradec-Kyjovice Fms.

Conclusions

Lithological markers evidence the material continuity of main turbidity complexes across the Elbe lineament dividing the two subbasins of the Moravian-Silesian Culm Basin. Marker lines document the tectonic displacement of the Culm units by 5 to 20 km along transversal lineaments and faults.

References

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