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Žďárky-Pstrążna Dome: Dextral Strike-Slip Fault-Related Structure at the Eastern Termination of the Pořiči-Hronov Fault Zone (Sudetes, Góry Stołowe Mts.)

Jurand WOJEWODA

Instytut Nauk Geologicznych, Uniwersytet Wrocławski, Pl. Maksa Borna 9, 50-204 Wrocław, e-mail: *juwo@ing.uni.wroc.pl*

Location and geological framework

The precisely mapped area of the **Žďárky-Pstrążna** vicinity constitutes an integral part of the Intra-Sudetic Synclinorium unit. It is interesting for several reasons. Firstly, because since the 19th century small, though easily accessible coal seams have been excavated and the village of Pstrążna have become a miners' settlement. Secondly, this area is situated at the border of two prominent structural units – the Kudowa Granitoid Massif

and Kudowa Trough – as well as at the termination of the major dislocation zone – the Pořiči-Hronov Fault Zone (Fig. 1). The mapping field was limited by the following geographical coordinates: the northern border – **50°28'58"**; southern border – **50°27'38"**; western border – **16°14' 33"** and the eastern border – **16°16'33"**. In the **Žďárky-Pstrążna** area the structural boundaries between the crystalline and sedimentary rocks and between Carboniferous and Cretaceous rocks are of particular significance. In the nearby – in the vicinity of Žďarek – these boundaries have been directly documented in mine drifts and they commonly are of reverse fault type. Alike phenomena, although not precise both in description and interpretation, were identified in the vicinity of Pstrążna, where in one of the drifts (*Wilhelminen Schacht*) tectonic boundary of Carboniferous had been described, and where reverse stratigraphical sequence had been (probably?) documented (e.g. Flegel 1905, Petrascheck 1904, Weithofer 1897). In places, without any justification, the boundary between the Carboniferous and the Cretaceous was interpreted as an overthrust (Gierwielaniec & Radwański 1955), which in consequence became a „basis" for some of the structural models of the Middle Sudetes (Cymerman 2004).

Žďárky-Pstrążna Dome

Two distinct structural elevations are distinguishable in the area of Pstrążna – the **Pstrążna Elevation** (**PE**) and the **Kudowa Elevation** (**KE**). They are separated by a dislocation zone consisting of numerous normal or reverse faults. An immanent feature of this zone is structural disintegration and common occurrence of structures indicating dextral dislocation with significant horizontal component of the movement. The most characteristic phenomenon is shear slaty cleavage, which so far was often misinterpreted as bedding in sedimentary rocks. The **Žďarek - Jakubowice Fault Zone** (**Ž-JFZ**) constitutes the eastern extension of the Pořiči-Hronov dislocation. On the opposite side relative to **Ž-JFZ** the elevations are assisted by tectonic depressions – the **Kudowa Depression** (**KD**) in the west and the **Karłów-Batorów Depression** (**K-BD**) in the east. The Pstrążna and Kudowa granite Elevations, despite distinct differences, depict some structural similarity. Their boundaries neighbouring with **Ž-JFZ** are of fault type and steeply inclined, while the opposite boundaries dip more gently and the sedimentary covers form fault-forced folds. Also the shape outline of both elevations relative **Ž-JFZ** is

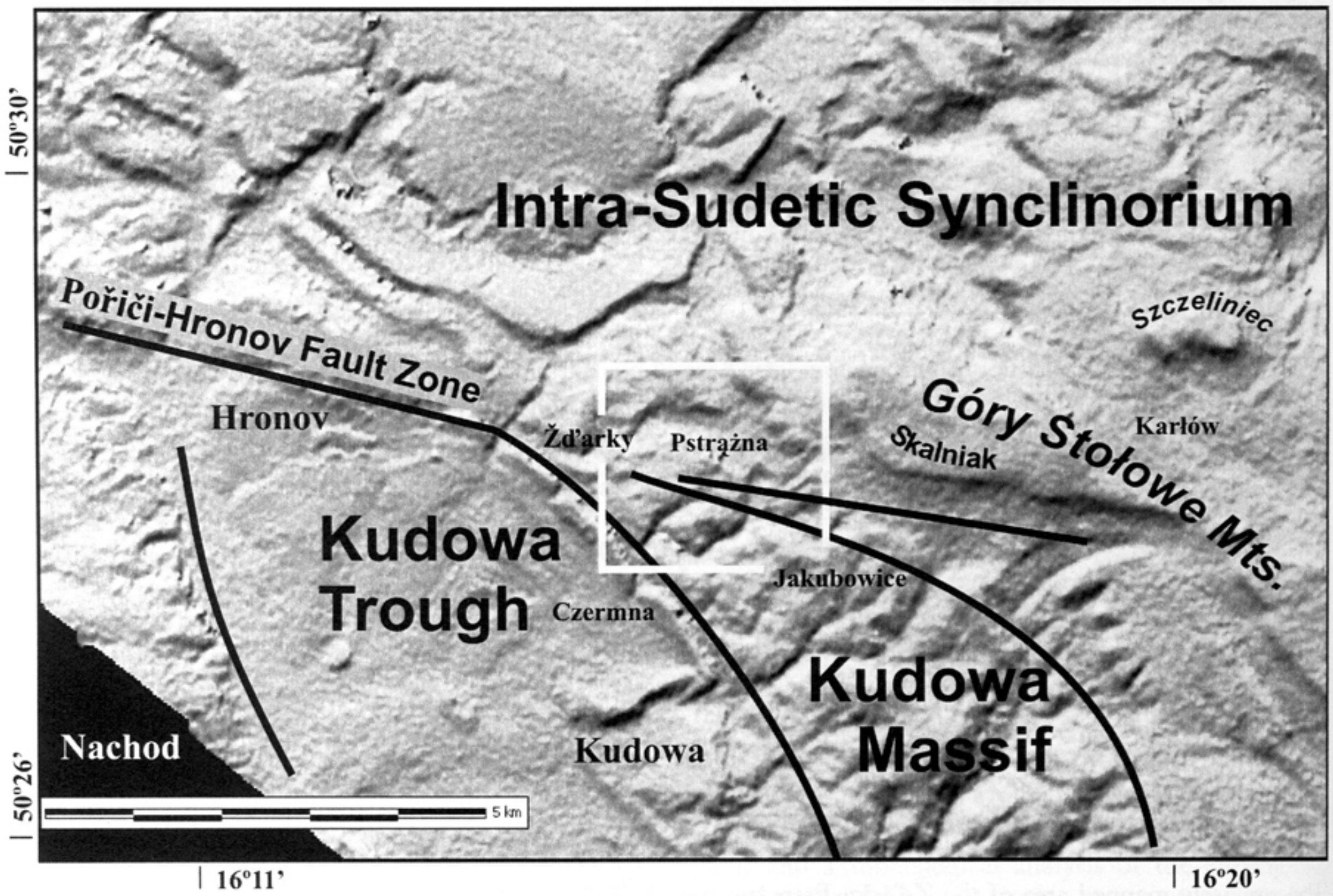

Fig. 1 Location scheme of the **Žďárky-Pstrążna area (white rectangle) on the background of main regional structures**

similar. Considering the altitude of the basement in the depressions (from about -100 to 50 m a.s.l. respectively), relative vertical amplitude of the displacement along **Ž-JFZ** exceeds 600 m. Horizontal displacement along **Ž-JFZ** is difficult to assess. While the dextral displacement seems certain, its amplitude is difficult to be determined. Based on the offset of the Carboniferous and the Cretaceous contacts along the faults trending 310°–130° and considering possible fold shortening in the elevation areas, this component can be assessed most certainly as 100 m according to the Carboniferous outcrops.

Palaeogeographic evolution

The morphological uprising (inversion) of the **Žďárky-Pstrążna** area had to begun in the Westfalian C and D, as the Žacleř Beds contain redeposited material of metamorphic rock soils (*Krinsdorfer Gneisskonglomerat*, *sensu* Dathe & Petrascheck 1913) and the Hronov Quartz Conglomerate (Němejc 1958). In the Stephanian and the Autunian the rate of denudation increased, which is indicated by the unconformity surface at the contact with the Westphalian, poorly sorted deposits and distinctly lower accumulation potential of the area (relatively low thickness and numerous erosional surfaces in the deposits of the Svatoňovice Beds). A new palaeotopografic pattern concerns the Saxonian deposits, which unconformably overlie both the Carboniferous formations and the crystalline basement. Deformation of those deposits are of local character and they relate to the zones of local troughs and tectonically formed basins (August & Wojewoda 2005). In the Late Cenomanian, during and after the transgression, the whole area of the Kudowa Elevation (and perhaps the whole area of the modern Góry Orlickie Mts. as well), including the Carboniferous and the Permian, constituted a morphological elevation – probably the denudation relics of the structural elevation from the time of the Stephanian-Autunian, partly destroyed between the Saxonian and the Early Cretaceous (Don & Wojewoda 2005).

Tectonic evolution

Therefore, the name of the „Pstrążna Elevation" refers first of all to the style of deformation of the Cretaceous formations. And these depict an inclination outwards of the Carboniferous outcrops, forming, thus, a structural dome – brachyanticline. This structure had developed in the post-Cretaceous, and its development only slightly modified the older structural pattern of monoclinal setting of the Carboniferous formations (north-western dips of beds in the western part of the Carboniferous outcrops). It is not clear when exactly the **Pstrążna Elevation** had developed. It is separated by **Ž-JFZ** to the south from the Kudowa Depression. The Kudowa Depression is in turn open to the south, where since the Miocene alluvial sediments from the eroded Kudowa Elevation have accumulated. And although it can not be strightforwardly proved, just the Neogene seems to be the period of the tectonic troughs of Kudowa and Žernov (the **Nachod Basin** *sensu* Wojewoda (2007), this volume) initial development. The brachyanticlinal pattern of the Pstrążna dome, due to the lack of cartographical evidence of formerly supposed „thrusts", must meet another explanation than a simple regional compression. Moreover, the author does not find proofs which could exclude the possibility of complementary and even synchronous development of the following structures: **the Pstrążna Elevation, the Kudowa Elevation, Karłów-Batorów Depression, the Kudowa Depression and the Žďarek-Jakubowicce Fault Zone**. Their mutual arrangement, their outline and subordinary structural features (faults, shear zones) indicate that they all could develop as conjugated structures over a regional strike-slip discontinuity. The features imaged on a structural model (Fig. 2), as well as those described above in the paper, allow, in the author's opinion, to assent the Pstrążna Elevation and the Žďarek-Jakubowicce Fault Zone as features originated over and within the strike-slip zone, and the tectonic depressions of Kudowa and Karłów-Batorów as a pull-apart basins conjugated with the zone. According to the author, the development of the structures has started in the Miocene and persists until present.

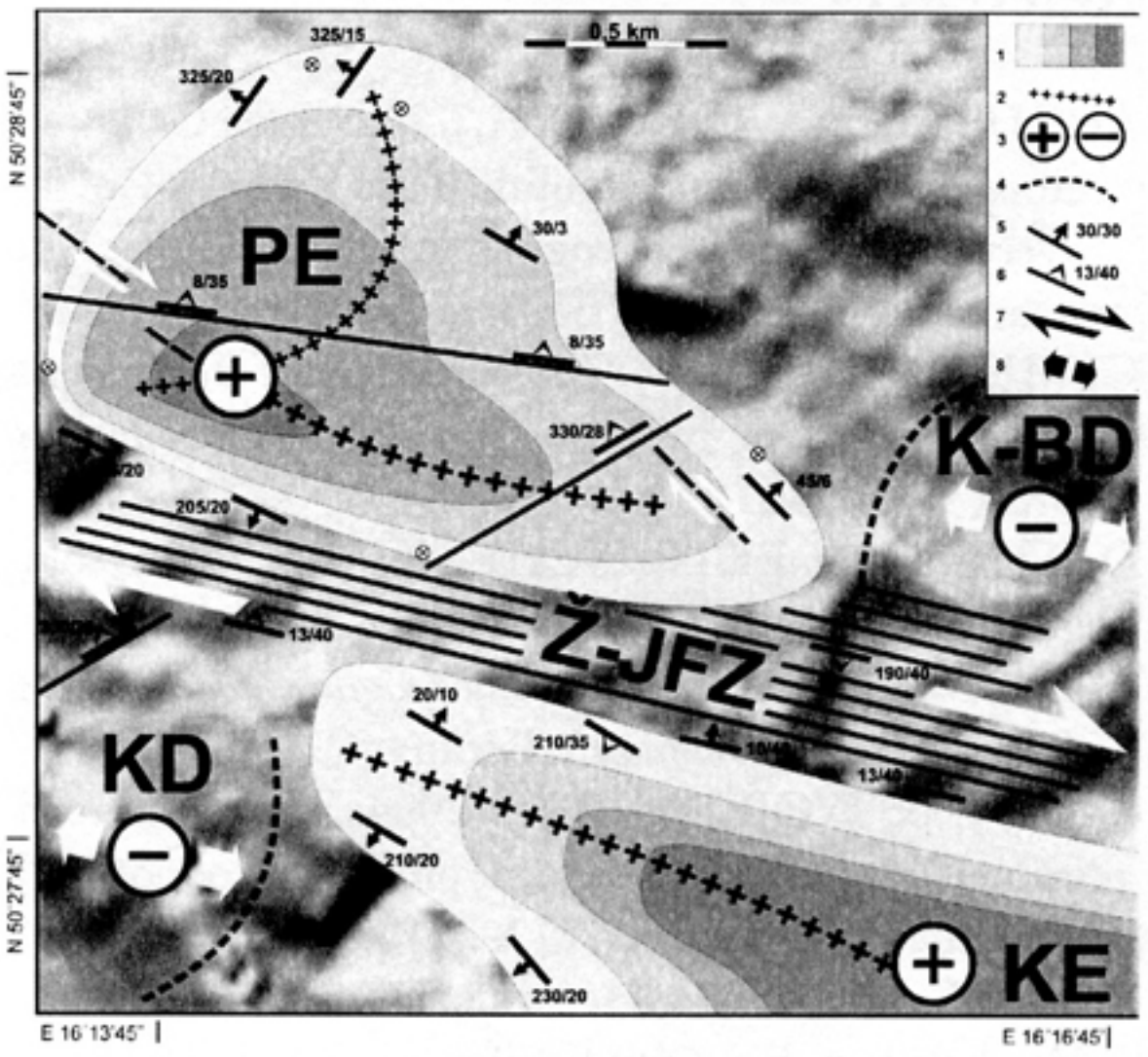

Fig. 2 Structural model of the area of Pstrążna (image at a level of about 600 m a.s.l.)
1 – 25 m contour intervals of the elevation surface; 2 – axis of elevation; 3 – central points of the elevations and depressions; 4 – presumable normal listric faults; 5 – unconformities; 6 – fault planes; 7 presumable shear directions; 8 – presumable extensional zones; PE – Pstrążna Elevation; KE – Kudowa Elevation; K-BD – Karłów-Batorów Depression; KD – Kudowa Depression; Ž-JFZ – Žďarek-Jakubowice Fault Zone.

References

AUGUST, C. & WOJEWODA, J. 2005. Late Carboniferous weathering and regolith at the Kudowa Trough, West Sudetes: palaeogeographic, palaeoclimatic and structural implications. *Geologia Sudetica 36*, 53–66.

CYMERMAN, Z. 2004. Tectonic Map of the Sudetes and Fore-Sudetic Block, 1 : 200 000. *Państwowy Inst. Geol.*, Warszawa.

DATHE, E. & PETRASCHECK, W. 1913. Geologische Übersichtkarte des Niederschlesich-Böhmischen Beckens, 1 : 100 000. *Königlichen Preußischen Geologischen Landesanstalt*. Berlin.

DON, J. & WOJEWODA, J. 2004: Tektonika rowu górnej Nysy Kłodzkiej - sporne problemy – odpowiedź. *Przegląd Geologiczny 53*, 212–221.

FLEGEL, K. 1904. Heuscheuer und Adersbach-Weckelsdorf. Eine Studie über die obere Kreide im böhmisch-schlesichen Gebirge. *Jahres-Bericht Schlesichen der Gesellschaft für vaterländische Cultur 82*, 114–144.

GIERWIELANIEC, J. & RADWAŃSKI, S. 1955. Szczegółowa mapa geologiczna Sudetów – arkusz Jeleniów. *Instytut Geologiczny – Wydawnictwa Geologiczne*, Warszawa 1955.

NĚMEJC, R. 1958. Biostratigrafická studie v karbonu českého křídla vnitrosudetské pánve. *Rozpravy Československe Akademie Ved 68 (6)*. Praha.

PETRASCHECK, W. 1904. Zur neuesten Literatur über das böhmisch-schlesische Grenzgebiet. Jahrbuch *Keiserlich-Königlichen Geologischen Reichsanstalt 54*, 511–540.

WEITHOFER, K. A. 1897. Der Schatzlar-Schwadowitzer Muldenflügel des niederschlesisch-böhmischen Steinkohlen beckens. *Jahrbuch Keiserlich-Königlichen Geologischen Reichsanstalt 47*, 455–478.