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THE LUBLINIEC FRACTURE ZONE: BOUNDARY OF THE UPPER SILESIAN AND MAŁOPOLSKA MASSIFS, SOUTHERN POLAND

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Abstract: The Paleozoic complexes at the northern margin of the Upper Silesian Coal Basin (USCB) subcrop under thin cover of Mesozoic rocks. They have been pierced by many boreholes. Nevertheless, their geologic structure is not fully understood. Integration of geological, geophysical and cartographic data including teledetection allowed to make a complex structural analysis. A discontinuous structure of E–W trend has been localised in the Paleozoic and basement strata and referred to as the Lubliniec Fracture Zone. It is marked by an en echelon pattern of geophysical lineaments (gaps and displacements).The latter have been formed due to complex wrench movements of crustal blocks bordering this zone.

The position of the Lubliniec Fracture Zone suggests the following structural connections: 1) it makes a boundary between the crustal blocks – the Małopolska and Upper Silesian massifs; 2) it possibly links the Odra lineament in the west with the Kraków lineament in the east; 3) a watershed runs along this deep fault zone between Odra and Warta river basins, which points to longlasting tectonic activity and neotectonic processes.

Abstrakt: Przedmiotem opracowania są utwory paleozoiczne występujące w północnym obrzeżeniu Górnośląskiego Zagłębia Węglowego i leżące płytko pod mezozoikiem. Zostały one nawiercone znaczną ilością wierceń, ale ich struktura jest ciągle niejasna. Wykorzystanie danych geologicznych, geofizycznych oraz różnorodnych opracowań i metod kartograficznych, włącznie z teledetekcją, pozwoliły na przeprowadzenie kompleksowej analizy strukturalnej. W jej wyniku zlokalizowano w paleozoiku i głębszym podłożu subrównoleżnikową strukturę nieciągłą, nazwaną tu rozłamem lublinieckim. Został on stwierdzony na podstawie zmiany układu kulisowych lineamentów geofizycznych (przerw i przesunięć), pomiędzy Lublińcem a Myszkowem, które mogą obrazować efekt tektonicznych, różnokierunkowych ruchów odbywających się na granicy dwóch bloków.

Pozycja rozłamu lublinieckiego pozwala sugerować następujące związki geotektoniczne: 1) stanowi on granicę między blokami w głębszym podłożu – jest granicą pomiędzy masywem małopolskim i masywem górnośląskim; 2) łączy się z lineamentem Odry na zachodzie i Krakowa na wschodzie; 3) wzdłuż linii rozłamu przebiega dział wodny I rzędu pomiędzy Odrą i Wartą, co wskazuje na długotrwale utrzymującą się aktywność tektoniczną w tej strefie i procesy neotektoniczne.

Key words: fracture zone, geophysical lineaments, neotectonics, the Upper Silesian Massifs, the Małopolska Massifs, South Poland.

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INTRODUCTION

Rocks of different Paleozoic stages form a subcropped northern margin of the Upper Silesian Coal Basin (USCB) and continue further SE into the Kraków–Myszków zone. North of Tarnowskie Góry they occur relatively shallow under Triassic deposits (Fig. 1). Morphology of the top of Paleozoic sequence controlled sedimentation of Permian and lower Triassic deposits in this region (Morawska, 1985, 1993). Interpretations of tectonic structure of the Paleozoic complexes are controversial (Deczkowski, 1977; Bukowy, 1994). This paper reinterprets available geological, geophysical and cartographic data. In pre-Permian basement a major fault structure was recognized and referred to as the Lubliniec Fracture Zone (lineament) LFZ (Fig. 5), marked by seismic activity and more intensive neotectonic processes.

TOP OF THE VARISCAN COMPLEX

Paleozoic rocks subcropping between Tarnowskie Góry, Lubliniec and Myszków appear at a morphologically diversified paleosurface, overlain by horizontal Triassic strata. This surface is generally inclined northward to the depth exceeding 1000 m. It rises southward and culminates in the E–W oriented Brudzowice anticline, whose Devonian fragments are actually exposed at the surface. The Brudzo-

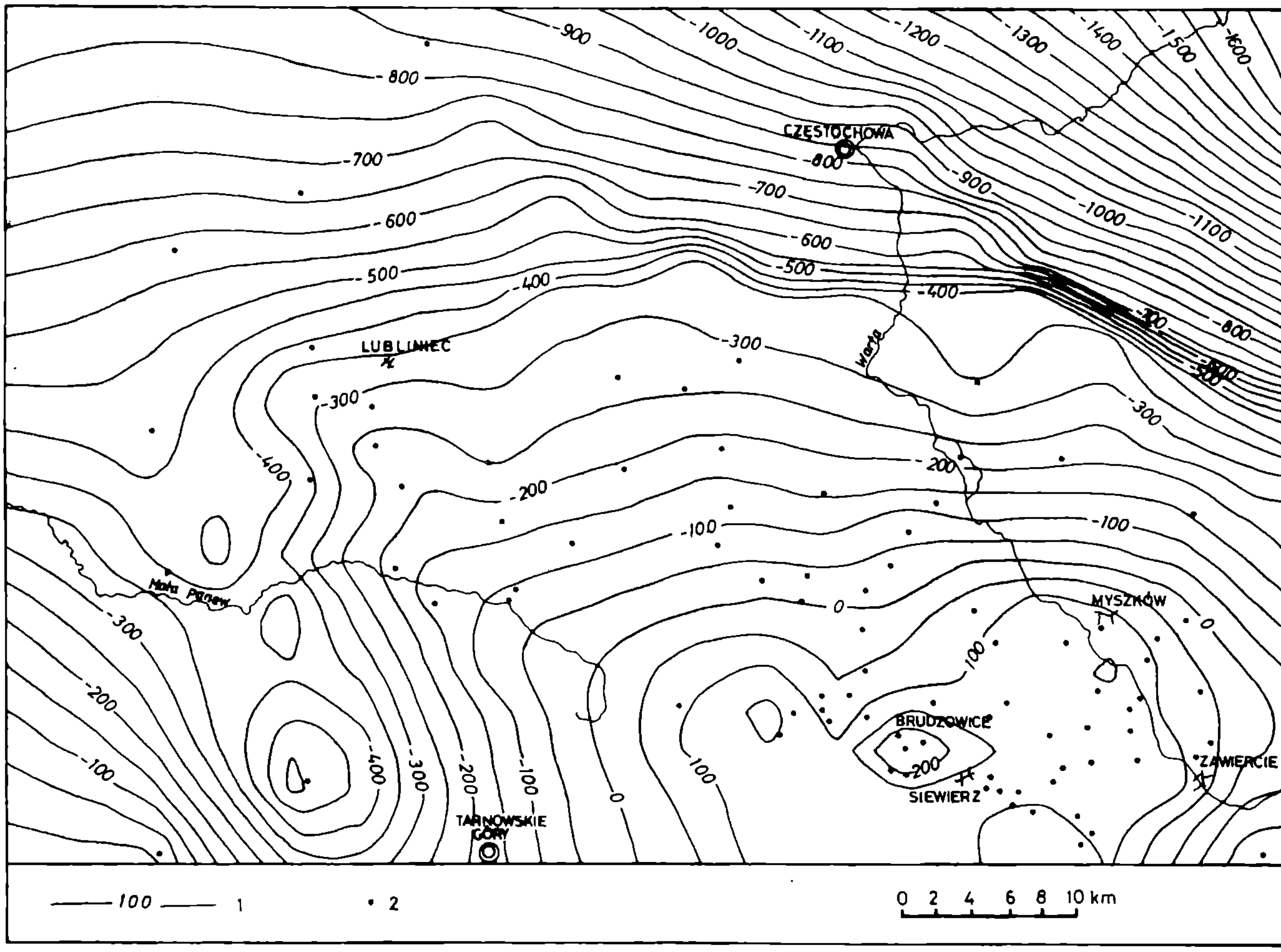

Fig. 1. Structural map of the top of the Paleozoic series. *1* – contour lines of the top of the Paleozoic complex; *2* – boreholes

wice anticline has southern limb steeper (35–40°) than northern one (10–40°) and it is cut by several transversal and longitudinal faults (Śliwiński, 1964).

More detailed studies of E and NE margin of the USCB, initiated in the 60-ies to explore the zinc-lead deposits, gradually extended to northern margin too. Numerous boreholes were drilled but only some were deeper than 500 m and penetrated Paleozoic basement beneath Triassic strata. Over 100 archive well logs (1975–1992) collected in the State Geological Institute were studied by the present author and these data allow to revise stratigraphic assignments of the Paleozoic rocks and reinterpret their tectonic structure.

At the pre-Triassic paleosurface Ordovician through Lower Carboniferous and Permian rocks are exposed, all poor in fossils. The Ordovician was evidenced recently (Gładysz *et al.*, 1990) by acritarchs in shaly-arenaceous deposits occurring below the Devonian in borehole BM-152 situated at the western part of the Brudzowice anticline. The Silurian was found in several boreholes near Lubliniec to rest directly under Triassic rocks. In borehole Lubliniec IG 1 (Fig. 2) Silurian age of rocks was determined on the ground of lithological similarity with paleontologically documented Silurian rocks at the NE border of the USCB (Bukowy, 1977). More often Triassic deposits are underlain by Devonian rocks which lie relatively shallow in the Brudzowice–Siewierz–Zawiercie zone. The Devonian rocks were also found in several boreholes in NE and N part of this zone and in the Lubliniec area, where they surround the Silurian outcrops pointing to anticlinal structures. In borehole Solarnia IG 1 (Fig. 2) the most complete Devonian section was drilled. Predominantly quartzitic lower Devonian is followed here by almost exclusively carbonatic middle and upper Devonian. The central part of this region is built by lower Carboniferous – Namurian A strata. The most complete Lower Carboniferous section comes from borehole Kalety IG 1 (Fig. 2), where in its drilled, 1403 m thick portion two parts have been distinguished within the Culm sequence. The lower part is considered autochtoneous, whereas the upper is overthrust during the formation of Variscan externides. Igneous rocks, mostly porphyries, often found in boreholes, are, most probably, of early Carboniferous or younger age as it follows from their cross-cutting relations to the host rocks.

Permian rocks occur in tectonic grabens at the peripheries of the discussed region (Kiersnowski, 1991). In this part of the USCB the Permian graben of E–W strike developed on southern slope of the Brudzowice anticline (Fig. 2). Further to the west it bends northword (Tworóg graben) and to the east it deflects southward (Sławków graben).

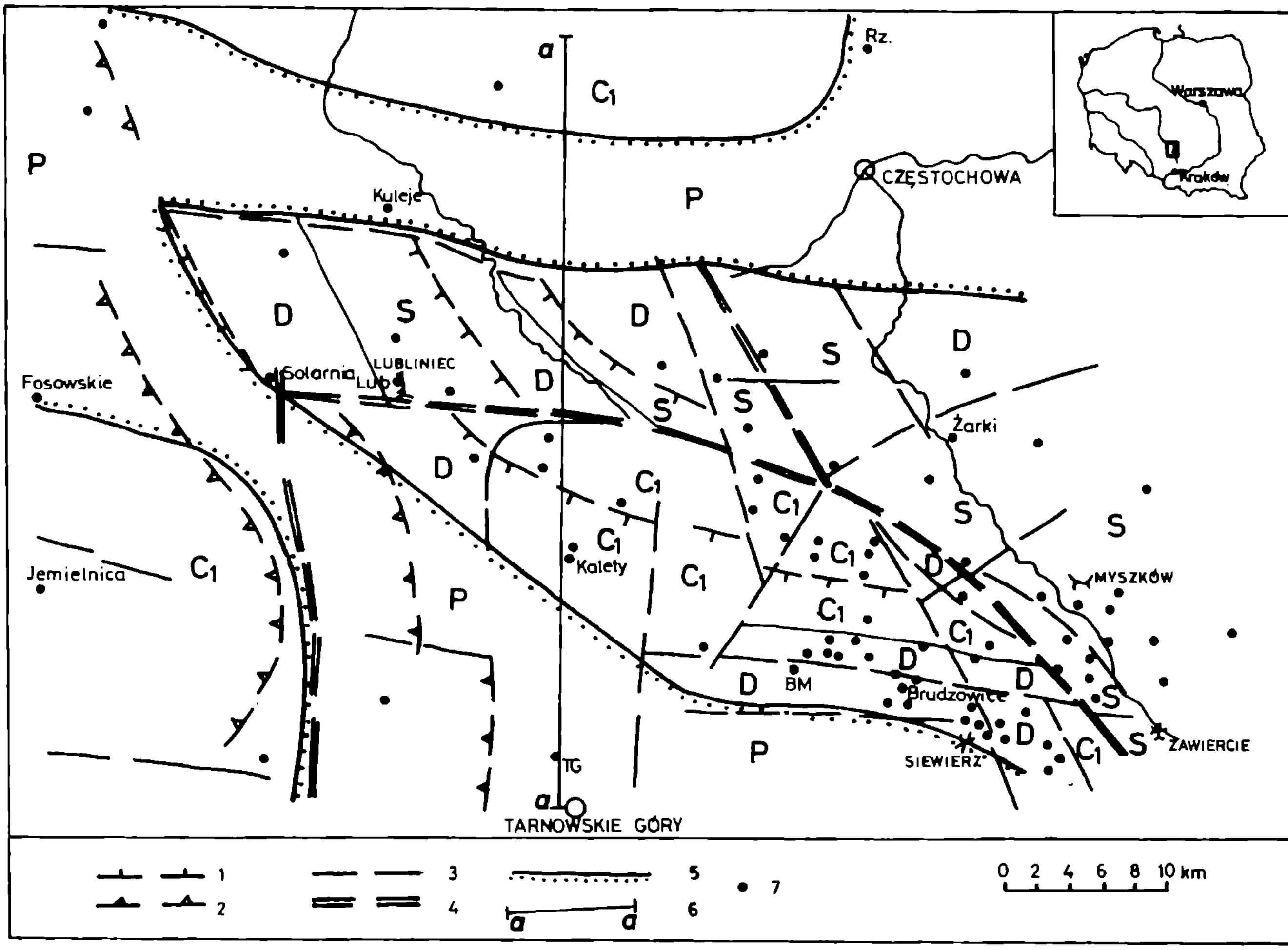

Fig. 2. Geologic sketch map of the top of the Paleozoic series based on the interpretation of gravimetric and satellite lineaments (after Fig. 4). *1* – thrusts; *2* – Culm overthrusts; *3* – faults; *4* – deep fractures; *5* – extent of Permian deposits; *6* – cross-section line (see Fig. 3); *7* – important boreholes: Rz – Rzeki IG1, Kul – Kuleje IG1, Solar – Solarnia IG1, Lub – Lubliniec IG1, Kal – Kalety IG1, BM – BM 152; S – Silurian; D – Devonian; C_1 – lower Carboniferous; P – Permian

EARLIER INTERPRETATIONS

The subcrop pattern of Paleozoic rocks at the pre-Triassic erosional surface is difficult to interpret, yet interplay of fold and fault tectonics is obvious. Based on data from NE border of the USCB Bukowy (1974) developed a model of NW-trending Paleozoic fold structures for the Lubliniec–Kraków region. North of the USCB he claimed to determine on eastward vergence of the folds. From west to east these are: Siewierz anticline, Woźniki syncline, Mrzygłód anticline and Krzepice syncline which is flanked on the east by the elevated Pilica block. Their continuation to NW was traced by Trzepierczyński (1987). The model is still being developed and modified by Bukowy (1994).

Another structural model of Paleozoic complex in this region was proposed by Deczkowski (1977), who envisaged the presence of a W–E oriented ridge between Lubliniec and Żarki (Fig. 2), with lower Paleozoic rocks in the axial zone and Devonian rocks on its margins.The ridge, cut by transversal faults, limited early Permian-Mesozoic sedimentation to the south and represented the source area for sediments of that age deposited in its forefield. Adjacent from the south is the Kalety syncline filled with Carboniferous deposits and yet further S, the Brudzowice anticline and the Tarnowskie Góry graben filled with Permian. Deczkowski's (1977) model of Variscan structures in the area north of the USCB was also adopted by authors of "Tectonic Map of Poland during the Variscan Time" (Pożaryski *et al.*, 1992).

INTERPRETATION OF NEW STRUCTURAL DATA

The structural models of the Paleozoic complex should be verified in the light of new published and unpublished data. In the years 1985–1990 complex gravimetric survey was carried out in the Upper Silesian region, northern border of the USCB inclusive, by the Enterprise for Geophysical Researches, Warsaw (Bachnacki *et al.*, 1990). On the maps of residual anomalies caused by the pre-Permian basement, the most distinct is a nearly W-trending oriented positive anomaly consistent with the Brudzowice anticline, and negative anomalies related to the E–W oriented Tarnowskie Góry graben and the N–S oriented Tworóg graben, filled

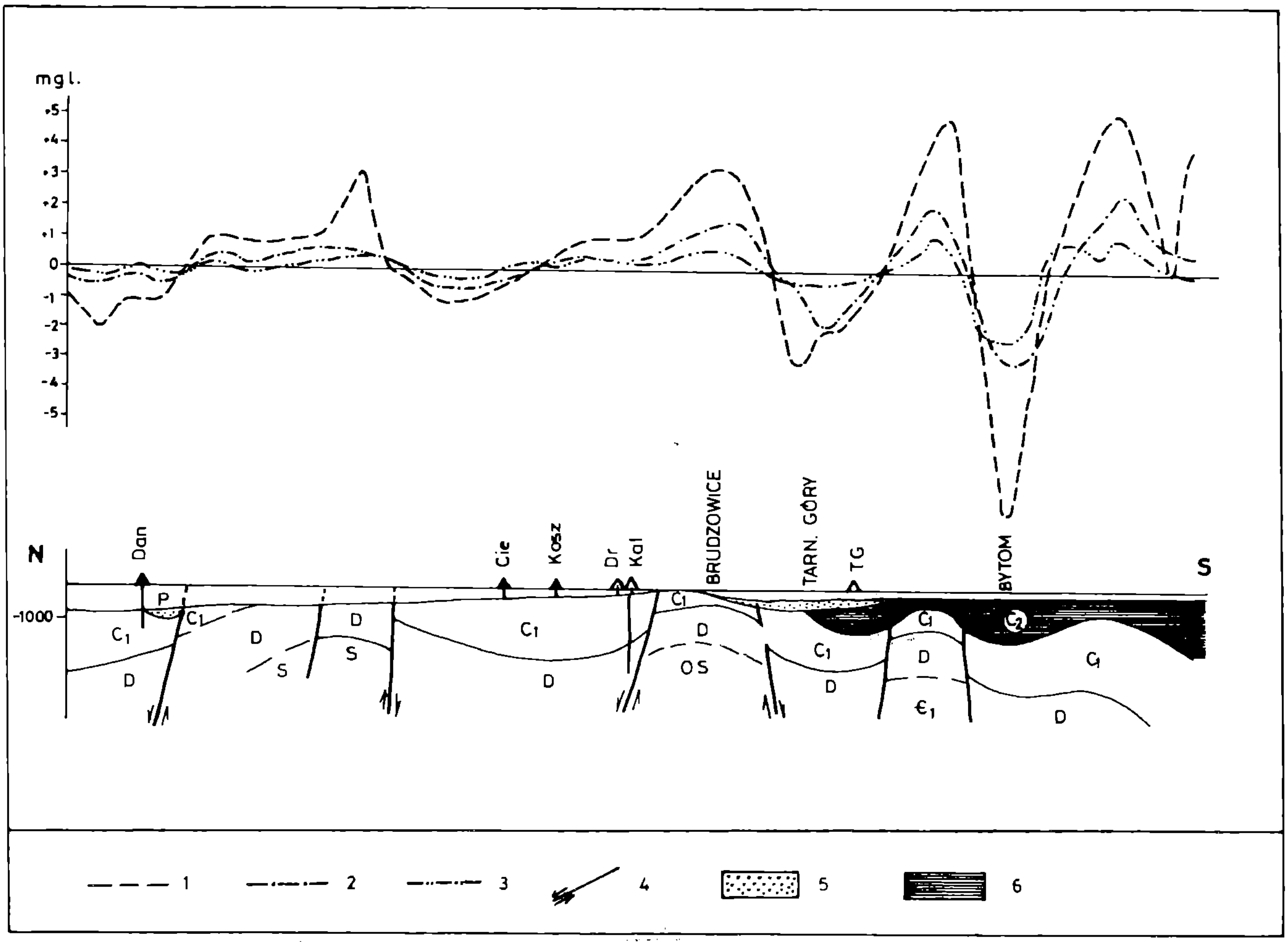

Fig. 3. Geological-geophysical cross-section along the Kalety meridian. Outlines of residual gravimetric anomalies: *1* – after Saxov for R1=1.5 km, R2=3 km; *2* – after Griffin for R=5 km; *3* – after Griffin for R=2.8 km; *4* – dislocations; *5* – Permian deposits; *6* – coal-bearing Upper Carboniferous in the Upper Silesian Coal Basin

with Rotliegendes rocks. Further to the south, between the Tarnowskie Góry graben and Bytom depression, there is another positive anomaly caused by a fault-controlled elevation of Devonian rocks, which continues further east under Meso-Cenozoic sequence (Kaziuk, 1978). Subparallel belts of the positive and negative anomalies and zones of high density gradients occur further south, under the whole USCB.

Gravimetric pattern of the area north of the Brudzowice anticline is less legible and residual anomalies are diffuse and difficult to interpret on contour maps. Consequently, variations of the anomal values were analyzed along the N–S profile, passing through the Kalety IG 1 borehole and correlated with its geological version (Fig. 3). South of the Brudzowice anticline, positive and negative anomalies are steep and narrow, which indicates the presence of either a fault with large throw of the Tarnowskie Góry Fracture Zone (TGFZ – Fig. 5) or tight upright folds. The positive anomaly related to the Brudzowice anticline is broader and has smaller values. North of the anticline negative anomalies match the increasing thickness of less dense Carboniferous sediments. Yet further to the north there is a positive anomaly, similar in shape and value to that of Brudzowice, caused by shallower position of Devonian rocks in the Lubliniec ridge zone. On the northern side of the ridge this anomaly probably abuts against a fault and thus comes across it into a contact with another negative anomaly pertaining to the Carboniferous–Permian graben, situated in the ridge forefield. Faults in this area seem to have smaller throws than those observed south of Brudzowice.

The interpretation of spatial distribution of gravity anomalies integrated with that of satellite lineaments was carried out using method worked out by Doktór *et al.* (1987). It allows to obtain a highly objective pattern of lineaments and in particular their trends over fairly large areas. A complex correlation analysis was carried out (Graniczny, 1994) using remote sensing, gravimetric, magnetic, seismic and topographic data and informations on the distribution of ore deposits to determine linear structural elements in the study region.

The discussed area represents a small fragment of maps prepared by applying the above method (Graniczny & Doktór, 1993). The map of correlation of remote sensing and geophysical data (Fig. 4) shows the system of gravimetric lineaments related to deeper structural elements and satellite lineaments actually observed at the surface. These line-

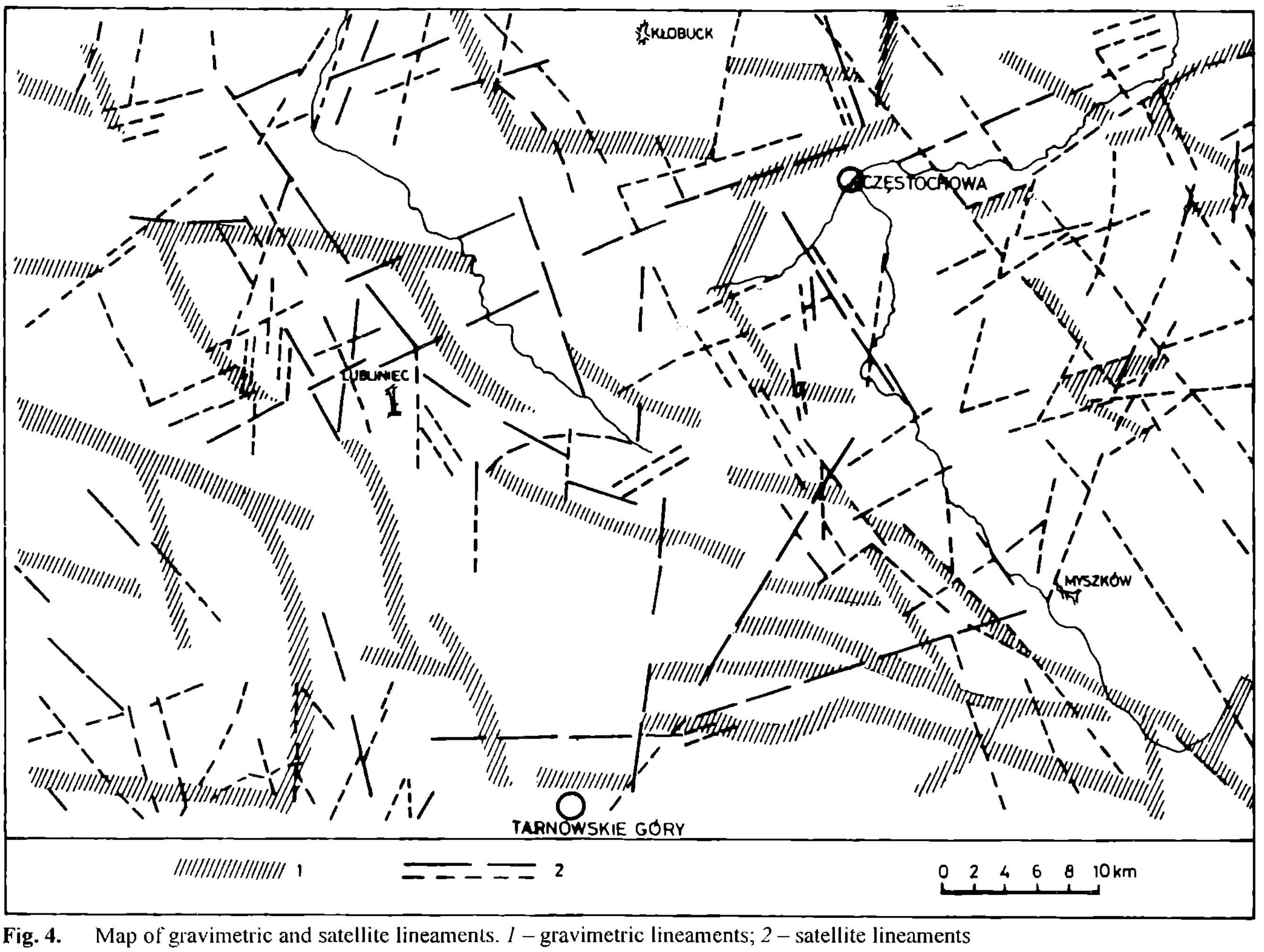

Fig. 4. Map of gravimetric and satellite lineaments. *1* – gravimetric lineaments; *2* – satellite lineaments

aments form an interesting spatial system which has been interpreted by integrating geological data. Very distinct is the Brudzowice anticline situated in southern part of the area in question. To the west of Tarnowskie Góry, there occurs a set of several N-trending gravimetric lineaments. They are consistent with the front of Culm overthrusts and with the Tworóg graben developed as a foredeep filled with Rotliegendes deposits. This set of gravimetric features continues southward, being linked with the Gliwice folds and yet further south with the Orlovo overthrust in western part of the USCB. According to Bogacz & Krokowski (1981) and Kuzak (1992, 1994), in the USCB basement there is a dextral wrench fault controlling geometry of thrusting in the western part of the coal basin. It is likely that this important structure continues northward to the Lubliniec ridge. At the intersection of these two major crustal elements the Lubliniec block has developed, with particularly intense tectonism indicated by shallow occurrences of lower Paleozoic complex and close spacing of satellite lineaments.

A series of short, en echelon arranged and mutually displaced gravimetric lineaments occur in the Lubliniec–Myszków area (Fig. 4). Their presence is vital for interpretating geological structure of this area. The morphological Lubliniec ridge (Deczkowski, 1977) embraces a transversal set of four short gravimetric lineaments. Two of them, striking in the NW–SE direction (azimuth 155°) form together with the E–W oriented features the frame of the Lubliniec block (ridge). Further south of this ridge another set of lineaments deflect easterly and shows the WNW–ESE strikes (azimuth 110°). To the south of Lubliniec, there is an intervening, W–E oriented narrow belt between the two sets, extremely distinct by the lack of continuity of gravimetric features (Fig. 4). The gravimetric lineaments apparently terminating at northern and southern boundaries of this belt, are likely sinistrally displaced along the belt and they seemingly meet there an important structural boundary that is nowhere crossed by them. Such a pattern of gravimetric lineaments in the Lubliniec–Myszków area (provided they are structurally significant lines) seems to indicate the presence of a deep-seated wrench fault in the basement referred to as the Lubliniec Fracture Zone (LFZ). Its presence is corroborated by linear occurrences of igneous rocks found in boreholes. The LFZ is cut by satellite lineaments of NW–SE and N–S strikes.

In the eastern part of the area in question, in zone parallel with the upper course of the Warta river, satellite and gravimetric lineaments are closely spaced along the NW–SE direction. The close spacing of the lineaments unquestionably evidences an increased tectonic activity along this direction. The Rzeszotary–Zawiercie Suture (RZS – Fig. 5)

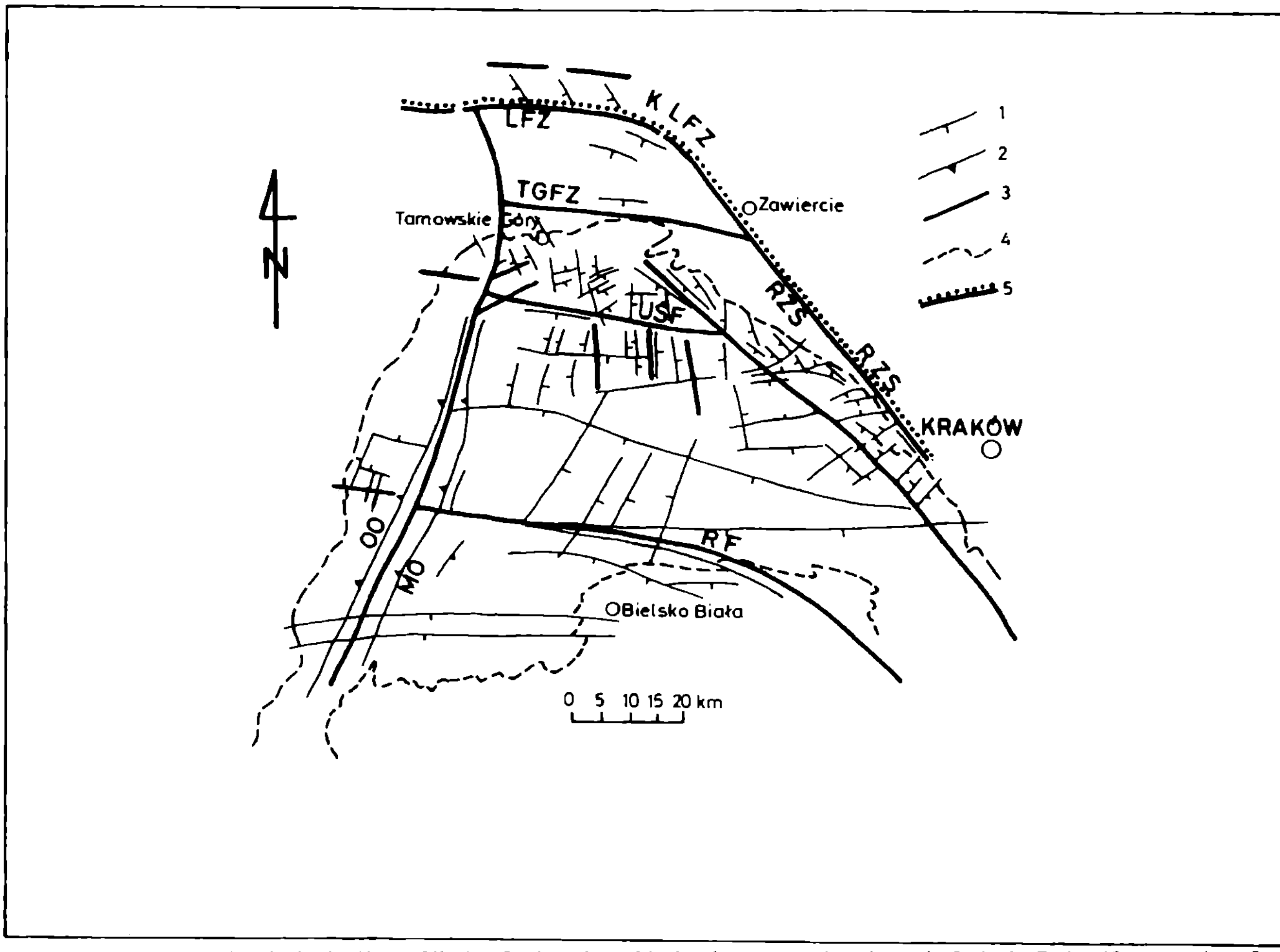

Fig. 5. Distribution of faults in the Upper Silesian Coal Basin and its border zone against the main faults in Carboniferous rocks (after Herbich, 1981 and Harańczyk, 1994 – supplemented). *1* – faults; *2* – overthrust: OO – the Orlova overthrust, MO – the Michałkowice overthrust; *3* – faults in Carboniferous rocks: LFZ – the Lubliniec Fracture Zone, TGFZ – the Tarnowskie Góry fault zone, USF – the Upper Silesian fault, RF – the Ruptawa fault, RZS – the Rzeszotary–Zawiercie suture, KLFZ – the Kraków–Lubliniec Fracture Zone; *4* – limit of the Upper Silesian Coal Basin

designed by Harańczyk (1994) as a boundary between the Małopolska Massif and a hypothetic exotic terrane of Cracovides is parallel with that zone.

TECTOGENETIC CONNECTIONS

The LFZ is distinctly connected with the Upper Silesian Coal Basin and its western and eastern borders (Fig. 5). Tectogenesis of the Kraków–Myszków zone, based on mesotectonic studies (Bogacz, 1977), is connected with a crustal scale fault separating the Małopolska and Upper Silesian Massifs of complex evolution (Żaba, 1994, 1995, 1996). Successive sinistral and dextral movements on this fault gave rise to en echelon arranged deformational structures within the Devonian–Carboniferous cover (Kotas, 1982; Brochwicz-Lewiński *et al.*, 1983). Structural analysis of the Triassic sequence has also confirmed the presence of a set of characteristically en echelon disposed open folds, with WNW-trending axes, cut by a set of N-trending, en echelon arranged faults (Górecka, 1993).

Detailed analysis of the lower Paleozoic sediments in the Kraków–Lubliniec area allowed Buła (1994) to determine the course of a master wrench fault and identify the boundary between the Małopolska and Upper Silesian Massifs on the basis of different character of early Palaeozoic sedimentation on its either side (Buła & Jachowicz, 1996). In general, west of the boundary wrench fault the Mesozoic cover is underlain by folded Devonian and Lower Carboniferous strata, whilst east of it (Kraków–Myszków sector) mostly lower Paleozoic sequence occurs. In Buła's (1994) and Buła and Jachowicz's (1996) opinion, the boundary fault bends westerly to the west of Myszków (S of Lubliniec). Thus the bending is consistent with the Lubliniec Fracture Zone recognized by the present author. Since the latter displays characteristics of a deep-seated fault similar to those of the Kraków–Myszków Zone it is reasonable to integrate the two features into the Kraków–Lubliniec Zone as it has already been speculated. Some speculations also suppose to connect the Odra Fault Zone (lineament) with the Kraków–Myszków Zone (Kotas, 1985), or with a hypothetical Silesian–Lubusian fault (Oberc, 1993, 1994).

On the other hand, at the northern border of the USCB tectonic processes similar to those at the Lubliniec– Mysz-

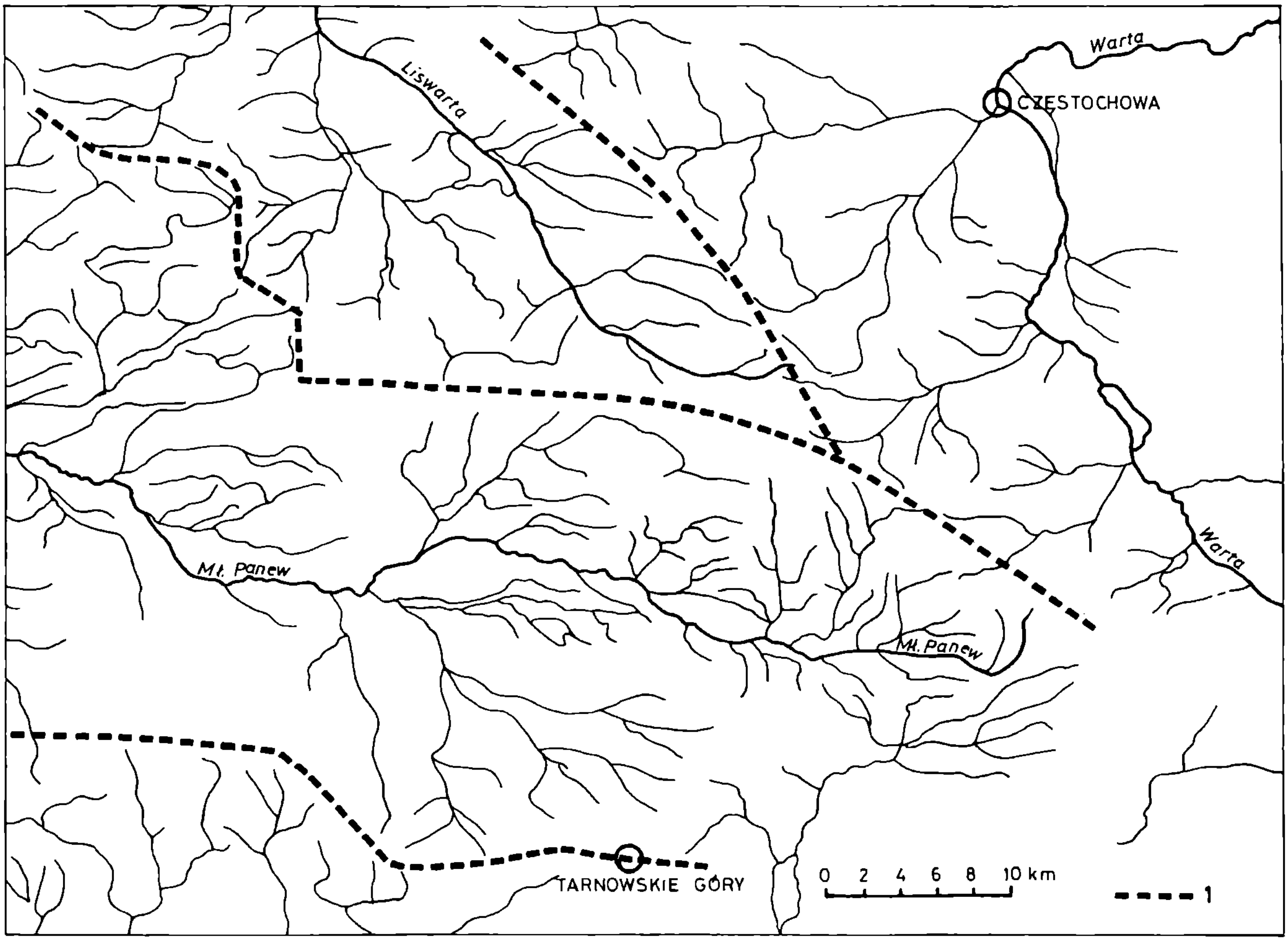

Fig. 6. Map of river drainage pattern. *1* – lines of watershed

ków area were also taking place along the Upper Silesian Fault (USF) recognized by Hebrich (1980, 1981) in the basement of the main anticline. This structure corresponds to the boundary between complexes II and III distinguished by Kotas (1982) in the Precambrian basement of the Upper Silesian Massif. The main anticline consists of several gently sloping domes with en echelon distributed axes. In Herbich's (1980, 1981) opinion, they were formed due to sinistral wrench displacements within the pre-Carboniferous basement along the deep-seated fault of WNW–ESE strike. Its presence is also evidenced by abrupt terminations of faults approaching it from north and south. The gravimetric profile (Fig. 3) also points to a large fault of considerable throw (TGFZ – Fig. 5) at the border of the Permian Tarnowskie Góry graben, situated between the Tarnowskie Góry and Bytom blocks (Kotas, 1985). These two mentioned deep faults, occurring in the basement of the Upper Silesian massif are likely secondary features (Kotas, 1982, 1985) compared with the LFZ, which most likely represents boundary between the Upper Silesian and Malopolska Massifs.

NEOTECTONIC PROCESSES

Results of structural analysis are supplemented by interpretaion of evolution of recent drainage pattern to compare results of paleo- and neo-tectonic processes and evaluate ranks of the observed fault zones. Strikingly the Lubliniec Fracture Zone situated at the watershed between Liswarta and Mała Panew river basins, which also is the first order watershed separating drainage basins of the Odra and Warta rivers (Fig. 6). It continues further SE to Zawiercie area and within the Lubliniec block deflects northwestward. Zone of closely spaced lineaments, parallel with the upper Warta course, overlaps the first order watershed between Liswarta and Warta rivers. This overlapping of the present watershed boundaries and tectonic lines of Paleozoic basement suggests still active tectonic processes in the Lubliniec Fracture Zone, which is characteristic of deep-seated faults (Dadlez & Jaroszewski, 1994).

CONCLUSIONS

The presented results, achieved by using several complementary methods, allowed to formulate some important conclusions on geologic evolution of the Paleozoic complex of the Lubliniec–Myszków area, which bear also on future studies. These include searching for further westerly continuation of the Kraków–Lubliniec Zone in the Paleozoic basement under thick sedimentary Permo–Mesozoic cover and for boundary between the Małopolska and Upper Silesian Massifs (Żelaźniewicz & Cwojdziński, 1995).Taking into account the above regional considerations, particular attention should be paid to detailed study of the Moravo–Silesian branch of Variscan externides, subcropped further west and north, and probably overlying a continuation of the Kraków–Lubliniec Fracture Zone (KLFZ – Fig. 5). Culm deposits, because of considerable thickness and lack of borehole data, have not been studied yet from this viewpoint. However, the experience resulting from the presented study indicates, that the results of complex structural-cartographic investigations by applying numerous methods can be helpful in solving complicated regional problems, particularly because the long-lived tectonic lines have been active till now and thus reflected by neotectonic processes.

1. The Lubliniec Fracture Zone is a continuation of the Kraków–Myszków Zone (Buła, 1994, Buła & Jachowicz, 1996). They form jointly the Kraków–Lubliniec Fracture Zone (KLFZ), which separates the Upper Silesian and Małopolska Massifs. During the Variscan orogeny dextral strike-slip displacements of the two massifs took place along these zones (Żaba, 1994, 1995, 1996). Among others they led to folding and thrusting of Culm sediments in the Moravo–Silesian zone and in the western part of the USCB.

2. To the north of the LFZ, lower Paleozoic and Devonian–Carboniferous complexes form a E-striking ridge (rise) due to transpression across this fracture zone. At the margin of the Małopolska massif a tendency to form elevations is noted. The Lubliniec ridge (Deczkowski, 1977) consists of block elements which can be the fragments of fold structures of NW strike, cut and thrown down by E–W oriented faults. In Trzepierczyński's (1987) and Bukowy's (1984, 1994) opinions, these structures dip under the front of Culm overthrusts.

3. As prompted by gravimetric lineaments, on southern side of the LFZ, a lower Paleozoic structure of WNW–ESE strike is likely buried under the Kalety syncline filled with lower Carboniferous rocks.

4. The W-trending faults, occurring in the basement of the USCB: Tarnowskie Góry, Upper Silesian and Ruptawa and the N-trending fault under western part of USCB: Orlova and Michalkowice, seem to be of secondary importance as compared with the Kraków–Lubliniec Fracture Zone (Fig. 5).

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Streszczenie

STREFA ROZŁAMU LUBLIŃCA: GRANICA MASYWÓW GÓRNOŚLĄSKIEGO I MAŁOPOLSKIEGO

Anna Morawska

Celem opracowania było stwierdzenie, na podstawie analizy strukturalnej utworów paleozoicznych występujących w północnym obrzeżeniu Górnośląskiego Zagłębia Węglowego, iż łącząc się dalej z utworami paleozoicznymi obrzeżającymi zagłębie na południowym wschodzie, stanowią razem strefę rozłamową Kraków–Lubliniec (KLFZ), o podobnym stylu budowy. Na północy strop utworów paleozoicznych, leżąc stosunkowo płytko pod utworami środkowego triasu, zapada ku północy i podnosi ku południowi, odsłaniając się na powierzchni w strefie osiowej grzbietu Brudzowic (Fig. 1). Stwierdzone licznymi otworami, utwory ordowiku, syluru, dewonu oraz dolnego karbonu jak również skały magmowe (porfiry), tworzą mozaikę występującą w otoczeniu utworów permu (Fig. 2). Skomlikowana tektonika tego obszaru powoduje rozbieżności w interpretacji stylu budowy. Przyjmowany styl blokowy (Deczkowski, 1977; Pożaryski *et al.*, 1992) kształtuje system rowów i grzbietów o kierunku zbliżonym do równoleżnikowego, natomiast fałdowy (Bukowy, 1974, 1994) zakłada istnienie nasunięć o NW kierunku rozciągłości i wschodniej wergencji.

W opracowaniu wykorzystano poza danymi geologicznymi i geofizycznymi (Fig. 3), różnorodne materiały kartograficzne oraz interpretację zdjęć satelitarnych. Interesujących danych dostarczyły mapy korelacji danych teledetekcyjno-geofizycznych, opracowane według specjalnej metodyki (Graniczny & Doktór, 1993). Przedstawiają one układ lineamentów grawimetrycznych, związanych z głębszymi elementami strukturalnymi i satelitarnych, obserwowanych dziś na powierzchni (Fig. 4). Ich interpretacja, w powiązaniu z danymi geologicznymi, pozwoliła stwierdzić obecność wgłębnej dyslokacji, nazwanej rozłamem Lublińca (LFZ– Fig. 6). Przejawem jej obecności jest obserwowany kulisowy układ lineamentów grawimetrycznych o zbliżonym do NW-SE kierunku rozciągłości, które pomiędzy Lublińcem i Myszkowem są wyraźnie poprzerywane i wzajemnie przesunięte na linii o kierunku równoleżnikowym. Jest to wynik deformacji utworów paleozoicznych wywołany, jak się wydaje, lewoskrętnym kierunkiem przesunięć sąsiadujących, wzdłuż rozłamu LFZ, bloków podłoża (Żaba, 1995, 1996). Należą one wg. Buły (1994) do dwóch różnych masywów: górnośląskiego i małopolskiego, a ich kontakt w dalszym, Myszków–Kraków, odcinku tej strefy rozwiniętej ponad suturą (Harańczyk 1994) Rzeszotary–Zawiercie (RZS), powoduje analogiczne deformacje utworów paleozoicznych (Bogacz, 1977). Ku zachodowi łączy się prawdopodobnie z lineamentem Odry (Oberc, 1993). Dyslokacje występujące w podłożu Masywu Górnośląskiego, zarówno o kierunku W–E takie jak: Tarnowskich Gór (TGFZ), górnośląska (USF) czy ruptawska (RF), jak i południkowym obecne pod nasunięciami orlowskim (OO) i michałkowickim(MO), wydają się być drugorzędnymi w stosunku do rozłamu Kraków–Lubliniec (KLFZ – Fig. 6).

Dopełnieniem analizy strukturalnej jest interpretacja sieci rzecznej (Fig. 5), ktorej rozkład może być często przejawem procesów neotektonicznych. W omawianym rejonie, wzdłuż stwierdzonego rozłamu Lublińca przebiega dział wód I rzędu: pomiędzy rzekami Wartą i Odrą, a wzdłuż sutury Rzeszotary–Zawiercie – dział wód II rzędu: pomiędzy Liswartą i Wartą. Jest to dowód na silną, utrzymującą się do dziś aktywność tektoniczną tych nieciągłości, która jest charakterystyczna dla dużych, wgłębnych rozłamów (Dadlez & Jaroszewski, 1994).