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IDENTIFICATION OF THE FLUVIAL-CHANNEL TRACTS BASED ON THICKNESS ANALYSIS: ZABRZE BEDS (NAMURIAN B) IN THE MAIN ANTICLINE AND BYTOM–DĄBROWA TROUGH OF UPPER SILESIA COAL BASIN, POLAND

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Abstract: The studied area of ca. 500 km^2 lies within the Main Anticline and the Bytom–Dąbrowa Trough of the Upper Silesia Coal Basin. During the deposition of the fluvial Zabrze Beds, this area was subject to differential subsidence which resulted in gradual eastward thinning of this unit from ca. 250 m near Zabrze to ca. 4 m near Sosnowiec. Maps of net sandstone and coal contents in two stratigraphical intervals selected within the Zabrze Beds point to the presence of four channel tracts. The main tract is parallel to the NE–SW trending axis of maximum subsidence, and the other three are perpendicular to it. During deposition of the Zabrze Beds the main, NE–SW trending channel tract has shifted westward.

Key words: fluvial sedimentology, sandbody geometry, fluvial-channel tracts, Upper Carboniferous, Upper Silesia Coal Basin

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INTRODUCTION

The reduction of drilling activity in the USCB prompts to a better use of rich data files accumulated so far for sedimentologic and stratigraphic purposes. The area of the Main Anticline and the Bytom–Dąbrowa Trough provides such an opportunity, especially for the Anticlinal Beds, lying at shallow depths in this area. Taking into account the large number of boreholes which penetrated these beds, the author attempted to use archived data on lithology and thickness for the analysis of the areal distribution of sandstones and phytogenic sediments and variations in their thickness.

STRATIGRAPHIC SETTING AND SEDIMENTOLOGICAL BACKGROUND

The Zabrze Beds (Stopa, 1957), known also as the Siodłowe Beds (Namurian B) form the lower part of the informal lithostratigraphic unit called the Upper Silesia Sandstone Series (Fig. 1). The boundaries of this and other lithostratigraphic units in the Upper Silesia Coal Basin (USCB) are placed at coal seams. In order to facilitate correlation and to unify nomenclature of the coal seams they were given three-digits numbers, increasing downsection (Doktorowicz-Hrebnicki & Bocheński, 1945). The first digit identifies a major lithostratigraphic unit, so "5" stands for the Zabrze Beds. The base of the unit is placed on the sole of seam 510 and the top at the top of seam 501, except where seam 501 is lacking and the top of the unit is accepted at the base of a thick sandstone package lying above the youngest coal seam identified in the Zabrze Beds (Kotas & Malczyk, 1972). The thickness of the Zabrze Beds varies from ca. 250 m near Zabrze to about 4 m near Sosnowiec, where the Zabrze Beds consist of one thick coal seam.

The Zabrze Beds belong to the higher part of the coal-bearing succession of the USCB, composed entirely of continental deposits (Kotas & Malczyk, 1972). The Upper Silesia Sandstone Series, the lower part of which are the Zabrze Beds, is generally interpreted as alluvial plain deposits (Doktor & Gradziński, 2000). The schematic descriptions of borehole sections, on which this paper is based, permit only a general sedimentological interpretation of the studied deposits.

The sequences represented by thick packages of channel sandstones may be interpreted as fluvial channel deposits (cf. Doktor & Gradziński, 1985; Fielding & Webb, 1996; Gersib& McCabe, 1981; Miall, 1996).

The sequences that occur between the channel sand-

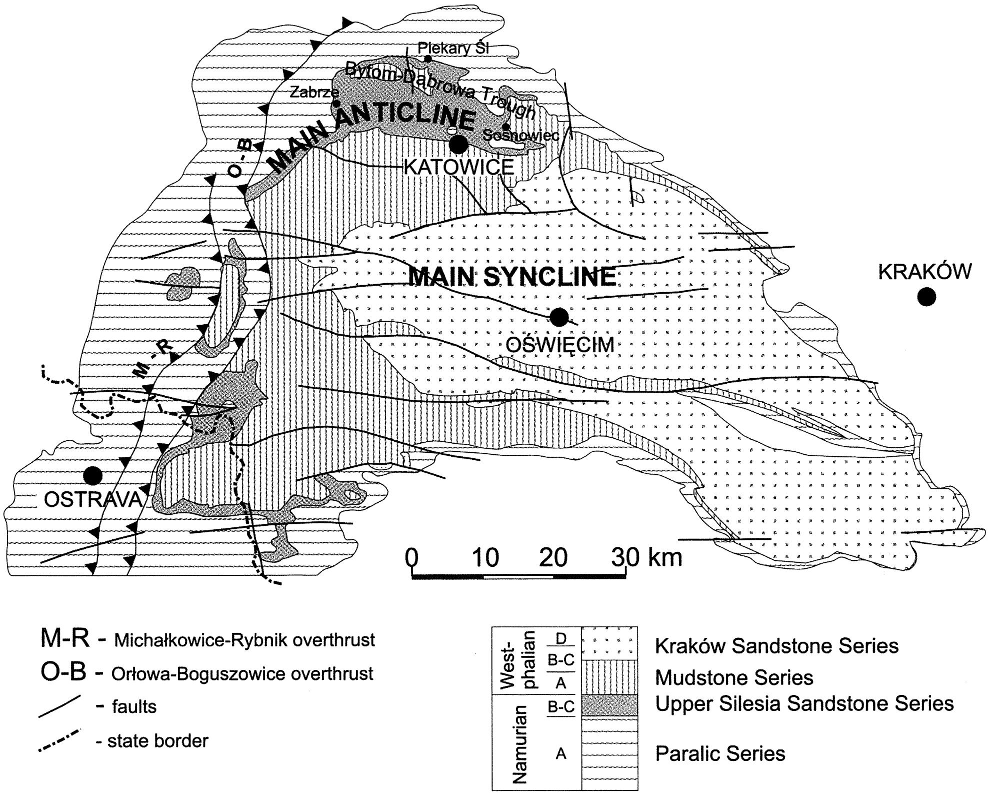


Fig. 1. Geological map of the Upper Silesia Coal Basin (after Kotas, 1994 – simplified)

stone packages, composed mainly of fine-grained sediments and subordinate thinner (>5m) sandstone packages and coal seams are considered as interchannel deposits. The modest thickness of the mentioned sandstone packages and their position within the sequences of interchannel deposits suggest that they are channel and crevasse splays deposits, commonly reported from modern (cf. Farrell, 1987; Smith *et al.*, 1989) and fossil alluvial plains (cf. Doktor & Gradziński, 1985; Ethridge *et al.*, 1981; Fielding & Webb, 1996; Galloway, 1981). It is very likely that the thicker sandstone packages represent deposits of proximal crevasse splays, and the thinner ones were laid down in the distal parts of crevasse splays (cf. Smith *et al.*, 1989; Fielding & Webb, 1996). The fine-grained sediments are floodplain deposits (cf. Farrell, 1987; Jorgensen & Fielding, 1996; Halfar *et al.*, 1998). The coal seams are interpreted as deposits of peatbogs in the interchannel areas of the alluvial plain (cf. Doktor & Gradziński, 1985; Flores & McCabe, 1981; Halfar *et al.*, 1998).

STUDY AREA AND DATABASE

Thickness of the Zabrze Beds was analysed in the area of ca. 500 km^2 between Zabrze, Piekary Śląskie, Sosnowiec, Katowice and Ruda Śląska. The area includes major part of the Main Anticline and the Bytom–Dąbrowa Trough (Fig. 1). Geological cross-sections and maps of quantitative parameters showing sandstone and coal frequency were drawn using data from ca. 600 borehole logs from 22 mines active in this area since the end of 18th century. The author used data from geological archives of these mines, and his experience gained during logging well cores from the Zabrze Beds in the Rybnik area (SW part of the USCB) was helpful in palaeonevironmental interpretations. The distance between adjacent boreholes is usually within 1–1.5 km (Fig. 2), enough for a reasonable detailed control of thickness variations of the clastic and phytogenic sediments. The mine fields are conterminous and in many cases connected underground with tunnels. Lithological data from boreholes are confirmed by underground mine workings, though they usually lack descriptions of textures and sedimentary structures.

AIM AND METHODS OF STUDY

The main aim of the analysis of thickness variation in the Zabrze Beds was to locate the depocentres of clastic and phytogenic sediments and their migration.

The wedge-shaped lithosome of the Zabrze Beds was divided into the lower and upper intervals for the purpose of this study. The boundary has been placed at the top of seam 504, which is recognisable practically over all the studied area, from Zabrze to Katowice. Near Katowice the seam merges with seam 501, and east of Katowice it merges with seam 510 (Fig. 3).

Maps of interval thickness, total thickness of sandstone and coal, percentage of sandstone and coal and average thickness of sandstone packages and coal seams and of the number of coal seams (Figs 6–9). The maps have been constructed using Surfer software, version 7.0, to interpolate values by krigging, with the following parameters: eight

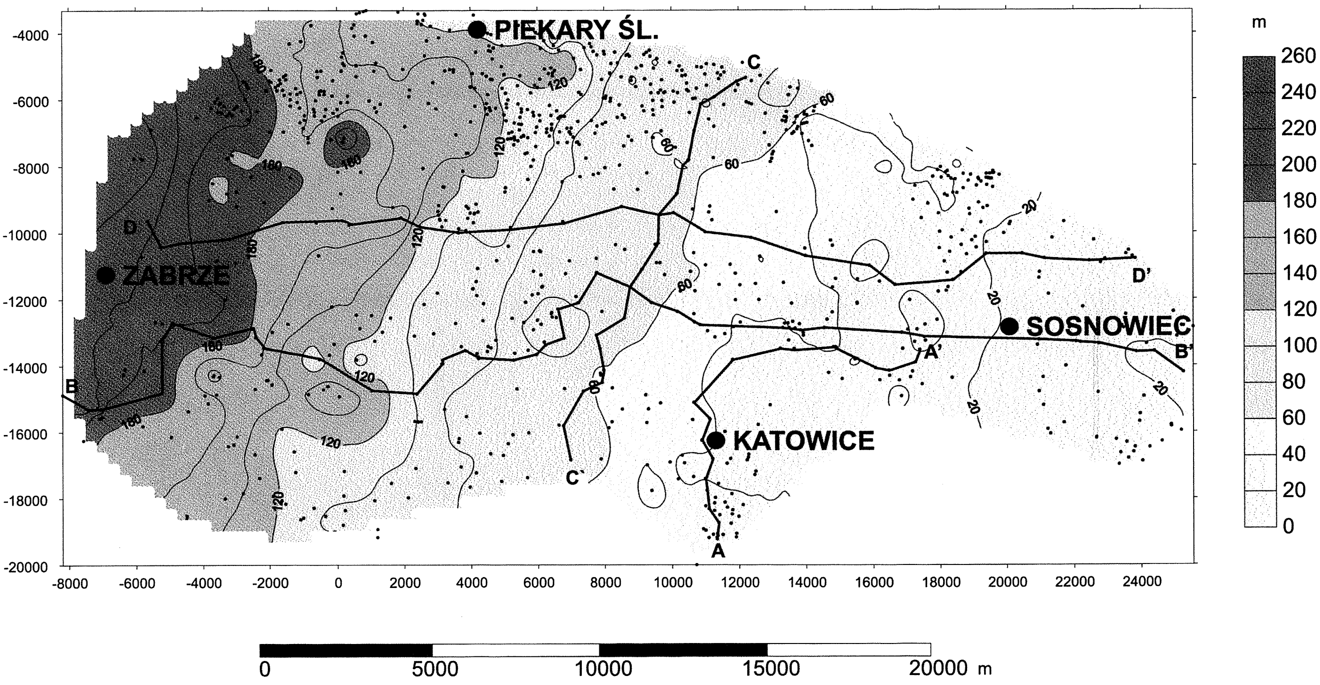


Fig. 2. Map of the total thickness of the Zabrze Beds, distribution of the control points and locations of the stratigraphic cross-sections

searching sectors, maximum of eight data points in each sector; at least three data points in each sector. The accepted method of interpolation gave the most credible results of all methods tested.

It should be noted that the eastern part of the studied sequence has been not divided into intervals. There is only one coal seam there (510) within which the bulk of clastic and phytogenic sediments of the Zabrze Beds pinches out. The thickness of this coal seam has been accepted as the equivalent of the thickness of both intervals in this part of the studied area. The small thickness of seam 510 (less than 4 m) is probably due to fluvial channel erosion. This is indicated, among others, by the presence of thick sandstone lithosomes directly over the seam and by the proximity of areas where the thickness of this seam attains 24 m (Kotas & Malczyk, 1972).

RESULTS

Channel belts

Geological cross-sections, drawn along the line of the greatest change in the thickness of the Zabrze Beds and perpendicular to this line (Figs 4 and 5), indicate that the channel sediments of this unit formed two basic types of sandstone bodies. Characteristic for the initial phase of channel sediments deposition were narrow sandstone bodies, usually transformed later into extensive sheets by fluvial channel migration. The distinction of the two types is based on the width/thickness ratio. The bodies with the ratio values lower than 15 are called ribbon-like sandstone bodies, and those for which the value is greater than 15 are called sheet-like bodies (Friend, 1983). Thick (> 20 m) accumulations of sandstones consist of a stacked channel bodies in which individual elements are separated by erosional surfaces or conglomerate intercalations (Fig. 4A). The multichannel nature of the thick sandstone packages was interpreted basing on the presence of repetitive fining upwards sequences in the borehole sections. The variable thickness of the channel sediments correlated between neighbouring boreholes permitted interpretation of the positions of horizons separating deposits of individual channels in those boreholes for which detailed grain size characteristics of the sandstone deposits were not available. This indicates a relatively long period of stabilisation of the channel belt. Because of the lack of surface exposures of the Zabrze Beds, the erosional surfaces of wide lateral extent are difficult to locate. Fluvial channels that entered peat bogs modified their top surfaces. This is now reflected in zones of reduced thickness of coal seams (see Kędzior, 2000 and Mirkowski, 1999) or in complete removal of the phytogenic material (Fig. 4A, B).

Information contained in the well described borehole sections, regarding the presence of thin interbeds, root traces or sideritic nodules, allows one to accept that the sandstone packages thicker than 5 m, intercalated within the fine-grained deposits and coal seams, were laid down on proximal floodplain. On the other hand, the lack of sandstone deposits suggests deposition on a distal floodplain (Fig. 6).

Interval I (bottom of Zabrze Beds – top of seam 504)

The thickness of this interval decreases eastward from ca. 190 m to ca. 4 m (together with interval II) near Sosnowiec. Depocenter is located north of Zabrze (Fig. 7A). The maps showing the distribution values of total thickness of the sandstones (Fig. 7B), sandstone content (Fig. 7C) and

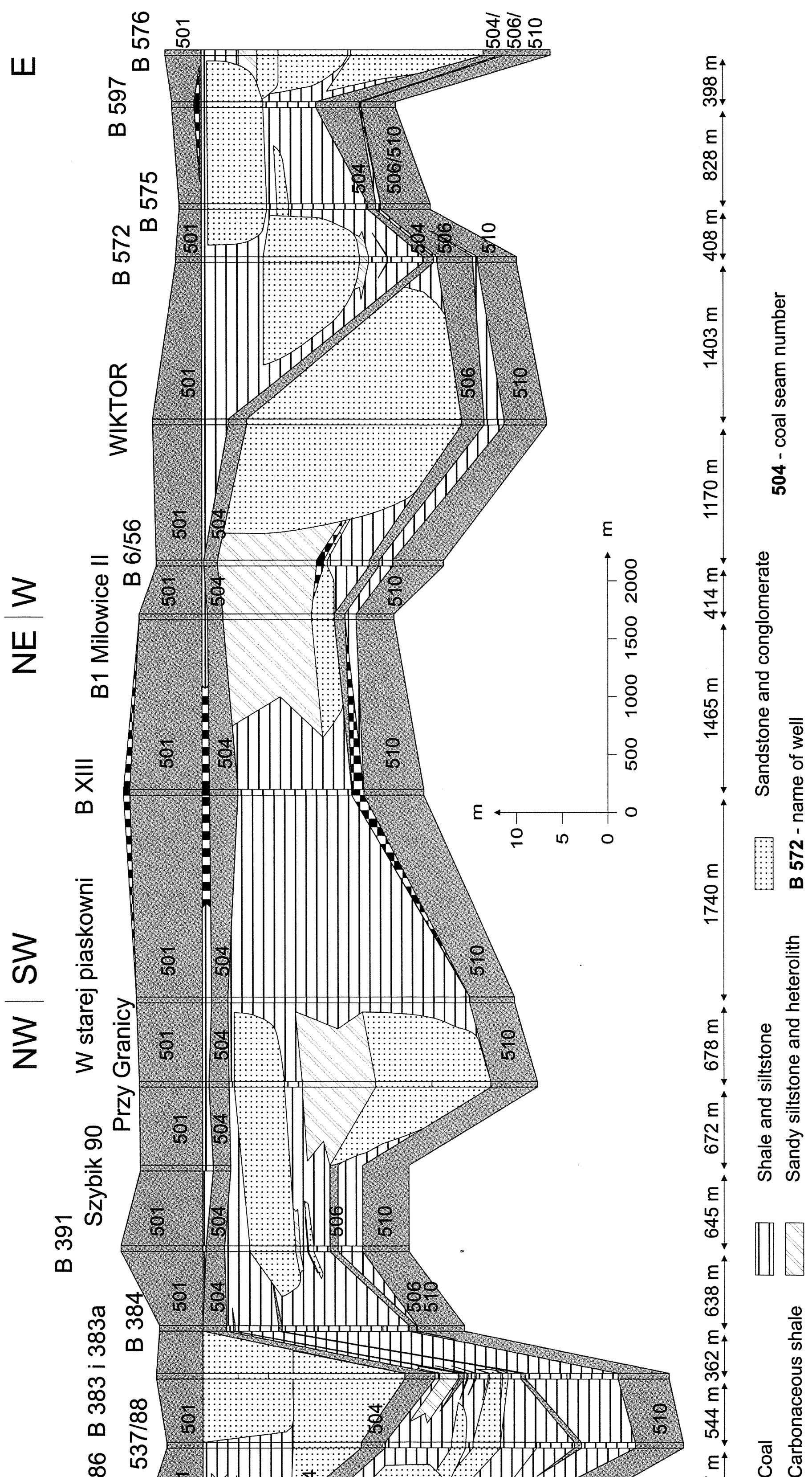


Fig. 3. Correlation of the coal seams and clastic sediments along line of cross-section A-A'

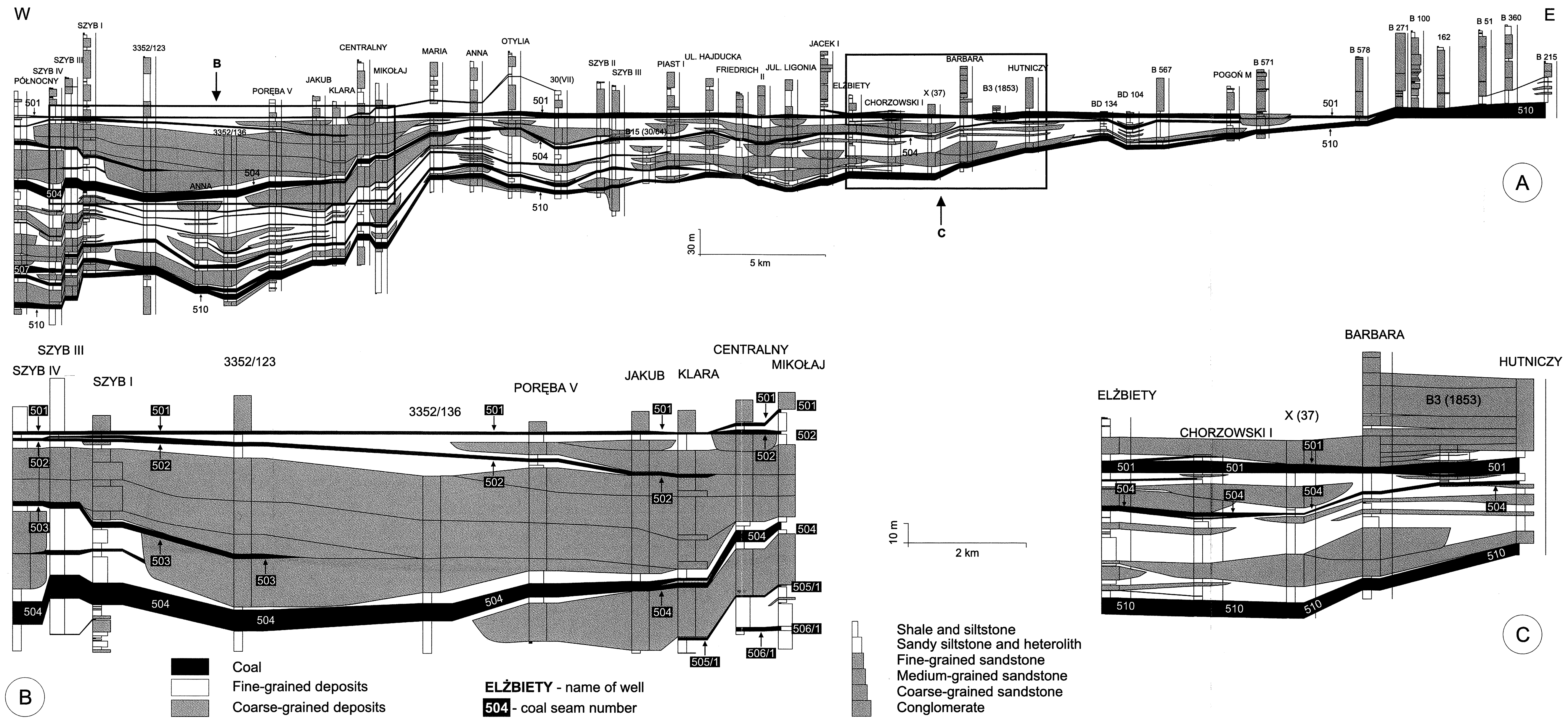


Fig. 4. Geological cross-section B-B' showing the geometry and distribution of sandstone bodies and coal seams paralled to stratigraphic dip in the Zabrze Beds

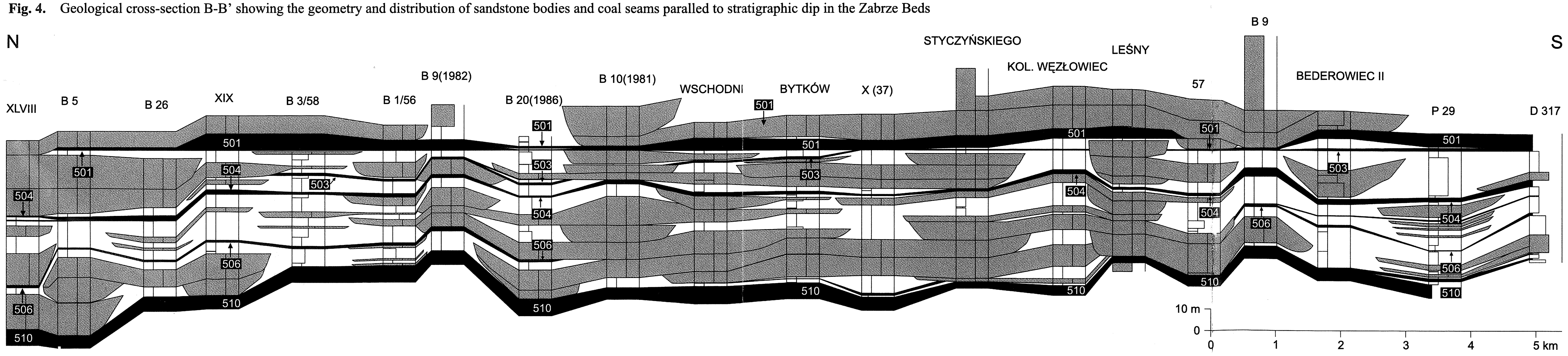
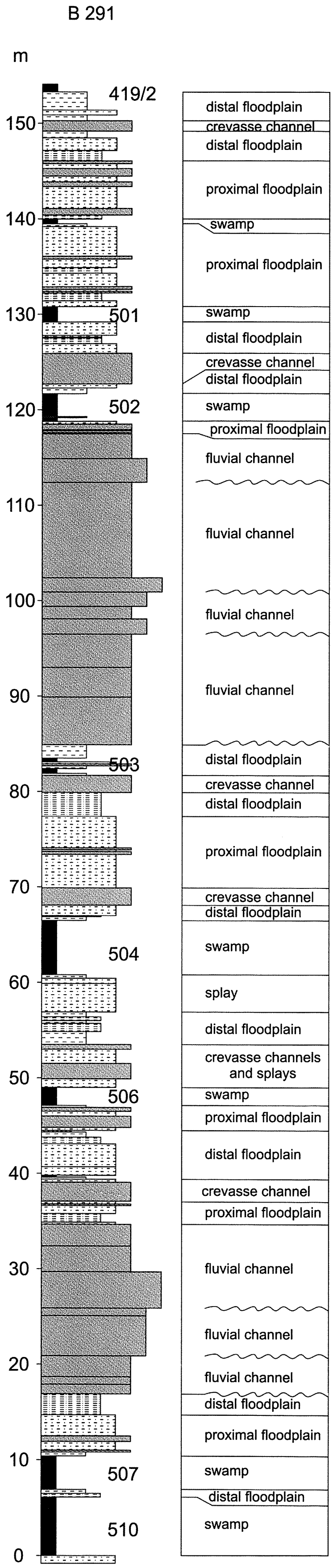


Fig. 5. Geological cross-section C-C' showing the geometry and distribution of sandstone bodies and coal seams paralled to stratigraphic strike in the Zabrze Beds



mean thickness of of the sandstone bodies (Fig. 7D) reveal the presence of four areas with elevated values of these parameters. This indicates the presence of channel tracts that acted with various intensity. Three of them form parallel belts extending NE–SW, the middle one being the most distinct. The fourth tract is related to the area of maximum thickness of interval I, but its position at the margin of the study area does not permit to determine precisely its course. It seems, however, that the southern part of this tract is perpendicular to the other three.

The distribution of values of total thickness of coal (Fig. 8A), coal content (Fig. 8B) and mean thickness of the coal seams (Fig. 8C) indicates areas with best conditions for peat-bog formation. These areas are marked by high proportion of coal, often in thin seams (Fig. 8D). This indicates frequent initiation of peat bogs and their rapid cessation due to their proximity to active fluvial channels. The greatest amounts of peat accumulated in two clearly marked areas (Fig. 8A and 8B). The western area, with numerous coal seams whose average thickness is 4 m, is related to the zone of maximum thickness of interval I. The eastern area is characterised by continuous growth of peat-forming vegetation. There is one thick coal seam in this area, free of clastic intercalations.

An analysis of the distribution of parameters describing the content and proportion of sandstones and coal in the interval reveals a few separate areas (Figs 7 and 8). The western one features a high content of both sandstone and coal. Thick sandstone packages are present in this area (average thickness >12 m), while the average thickness of the coal seams is 2–3 m. This relatively low value reflects the presence of numerous thin and discontinuous coal seams. The other four of the distinguished areas are narrow zones. They extend NE–SW, occur alternately and differ in the content of sandstone and coal. The first of these zones is marked by the presence of moderately thick (up to 8 m) sandstone packages, with less than 20% of coarse-grained sediments. Coal seams in this zone are relatively thick, locally above 5 m of average thickness. The next area to the east displays increased proportion of sandstones (above 30%). The sandstone packages exceed 12 m in thickness, whereas the average thickness of coal seams decreases; in only a few places it exceeds 3 m. The next area to the east shows again a reduced proportion of sand fraction (less than 20%) and includes coal seams whose average thickness exceeds 4 m. The last area is the most distinctive one. The values of all

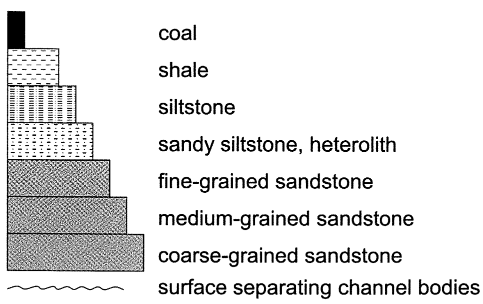


Fig. 6. Interpretation of depositional environments of Zabrze Beds based on lithological features

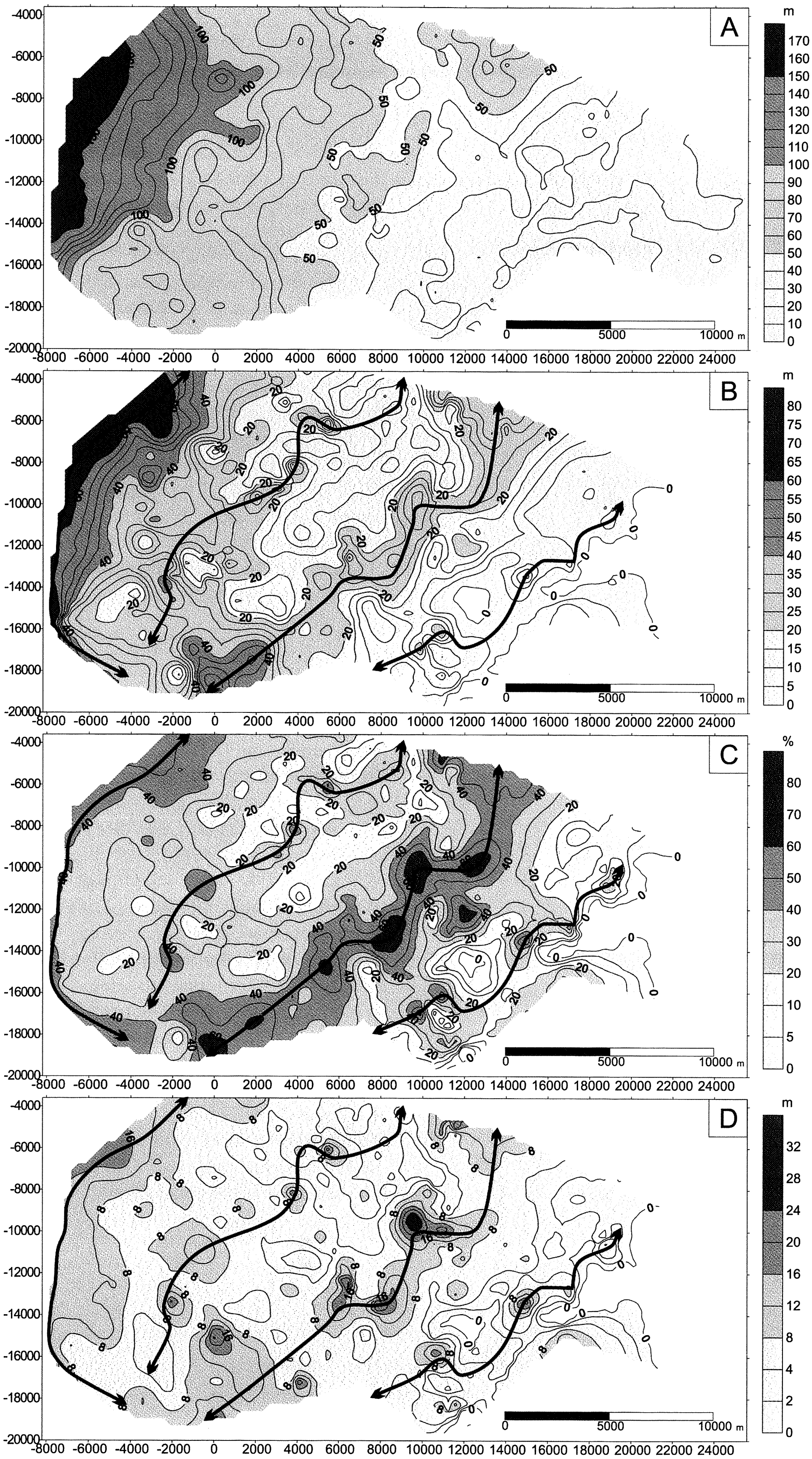


Fig. 7. Thickness of interval I, content and proportion of sandstones in this interval. **A** – thickness of the interval I; **B** – total thickness of the sandstones; **C** – sandstone content in %; **D** – mean thickness of the sandstone bodies. Thick lines showing extend of fluvial-channel tracts

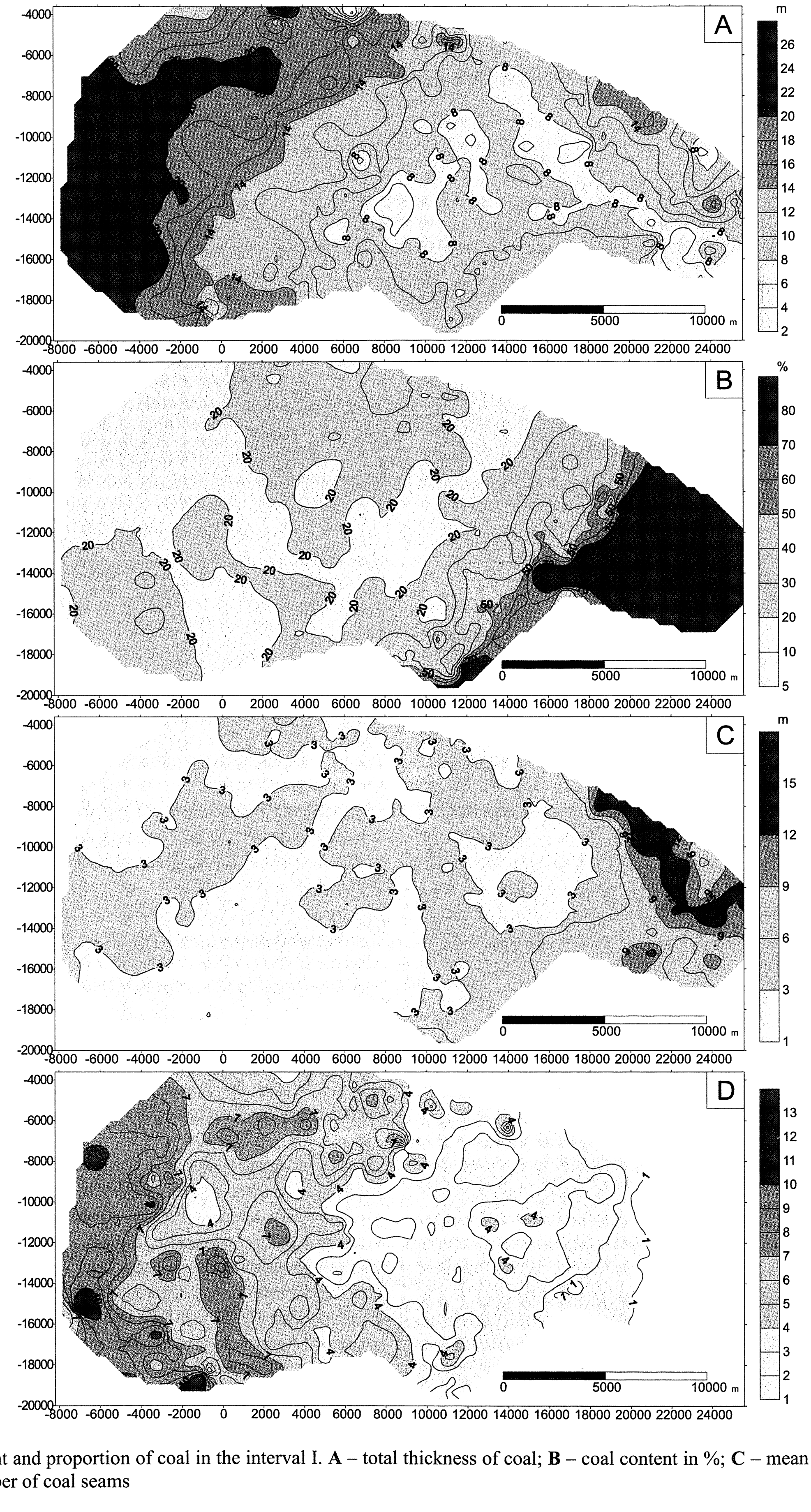


Fig. 8. Content and proportion of coal in the interval I. **A** – total thickness of coal; **B** – coal content in %; **C** – mean thickness of coal seams; **D** – number of coal seams

parameters which describe the proportion of sandstones (up to 80%) are elevated, the average thickness of the sandstone packages exceeds 40 m. The coal percentage does not exceed 10%; coal seams are up to 4 m thick. The area situated farthest to the east has one coal seam free of clastic intercalations. The south-east area was omitted in the thickness analysis because of the insufficient amount of data for its detailed characteristics. The high values of mean thickness of the sandstone bodies in this area are related to the activity of rivers depositing coarse-grained sediments in the peat bog areas. Fluvial erosion resulted in local removal of peat (Mirkowski, 1999). The NE–SW arrangement of this channel zone is analogous as that of the other channel tracts.

Interval II (top of seam 504 – top of Zabrze Beds)

The maximum thickness of interval II is ca. 135 m near Zabrze and it decreases eastward to ca. 4 m near Sosnowiec (Fig. 9A). The main zone of maximum thickness trends N–S but there is also a narrow zone of greater values almost perpendicular to it. This narrow zone is built almost exclusively of coarse-grained material, forming packages up to 75 m thick (Fig. 9B–D). Besides it, three other areas are discernible which display elevated values of total thickness of sandstones (Fig. 9B), sandstone content (Fig. 9C) and mean thickness of the sandstone bodies (Fig. 9D). Two of them lie to the east and are parallel to it. The third, diagonal to the others, is related to the zone of maximum thickness of interval II.

The main difference between the intervals I and II is in the position of the main channel belt, the one responsible for the deposition of the greatest amount of coarse-grained sediments. The channel belt in the central part, best marked in the first interval, was still active but deposition of sandy sediments was much less intensive, and the main channel zone in the upper part of the Zabrze Beds has shifted westward. All zones with high values of content and percentage of sandstones in this interval are separated by areas that were more favourable for peat accumulation.

An analysis of the maps of the content and percentage of coal (Fig. 10), reveals three main areas of maximum deposition of phytogenic material. A western area, related to the depocenter, a less distinct central area and an area of continuous growth of peat bogs in the east.

The values of parameters describing the content and percentage of coal in this interval (Fig. 9 and 10) reveal several areas of different sedimentation. The area situated in the northeast displays a low (less than 25%) content of sandstones in packages whose average thickness does not exceed 10 m and the presence of relatively thin (1–2 m) and numerous coal seams. The area next to the south has very thick sandstone packages with average thickness attaining 70–75 m. It continues to the northeast as a elongated zone ca. 5 km wide. It is bounded to the east by an area of increased content of coal (up to 40%), which occurs in seams with average thickness in excess of 4 m. The content of coarse-grained material is lower, below 25%. A next area to the east displays increased content of sandstones, arranged similarly as the main channel tract in interval I. Farther eastward, it passes to an area in which greater amounts of phytogenic material were accumulated. Coal seams whose average thickness exceeds 8 m are present here and the coal percentage in the section attains 80%. The sandstone packages are thin (less than 5 m) or absent and clastic material is represented almost exclusively by fine-grained sediments. The area situated in the eastern extreme of the studied part of the Upper Silesia Coal Basin displays almost uninterrupted accumulation of peat, which gave rise to a single coal seam over 18 m thick. Similarly as in the lower part of the Zabrze Beds, the southeastern extremity of the studied area was omitted because of the lack of sufficient data.

Time frame of Zabrze Beds deposition

The Zabrze Beds form a wedge of sediments delimited by two coal seams, 510 at the bottom and 501 at the top. The seams merge near Katowice and Sosnowiec into one seam – 510. One possible interpretation is that the time of peat bog growth in this area equals the time of deposition of the whole package of the Zabrze Beds in the area of their greatest thickness. When trying to determine the duration of deposition of the Zabrze Beds, the maximum thickness of the combined seams 510 and 501 – 18.1 m – has been accepted. In order to calculate the original thickness of the peat bog a value of 11 m of peat thickness was accepted as the amount necessary for the formation of 1 m of coal thickness (Ryer & Langer, 1980). The original thickness of the peat bog that gave rise to seam 510 could thus be about 200 m. During the Carboniferous the area of Upper Silesia Coal Basin was located in tropical latitudes (Calder & Gibling, 1994). Accepting the rate of growth of modern tropical peat bogs of ca. 4 mm per year (Rahmani & Flores, 1984), some 50 000 years would be required for the deposition of a 200 m thick Carboniferous peat bog. This is only a rough estimate as the published estimates of the ratio of the thickness of peat to the thickness of coal formed from it vary between 3:1 (Kosanke *et al.*, 1958) to as much as 30–40:1 (see Ryer & Langer, 1980). Thus, the duration of the period of the peat accumulation that is represented by seam 510 may vary from 13,500 to 180,000 years.

An important element in any attempt at determining the duration of deposition of the Zabrze Beds is the interpretation of the nature of coal seam bifurcation. Earlier authors (e.g. Kotas, 1995; Kotas & Malczyk, 1964, 1972) have taken for granted that seam 510 splits westward, first in two seams – 510 and 501, and farther westward into so-called bundles of seams. An alternative interpretation seems, however, equally plausible, one that the coal seams in the Zabrze Beds are onlapping older strata in the eastward direction. This would mean that the younger the seam, the farther is its eastward termination (Fig. 11). It is thus possible that successive peat bogs exceeded their areas and encroached the older ones, so that in some places two generations of peat bogs may directly overlie one another. This process can explain the step-like increases in coal seam thickness in the zones of their coalescence. Eastwards of this zone there extends seam 510, which is, in fact, a stack of successively younger seams, each offlapping the precending one farther to the east. In this interpretation the Zabrze Beds are not included within one laterally splitting coal

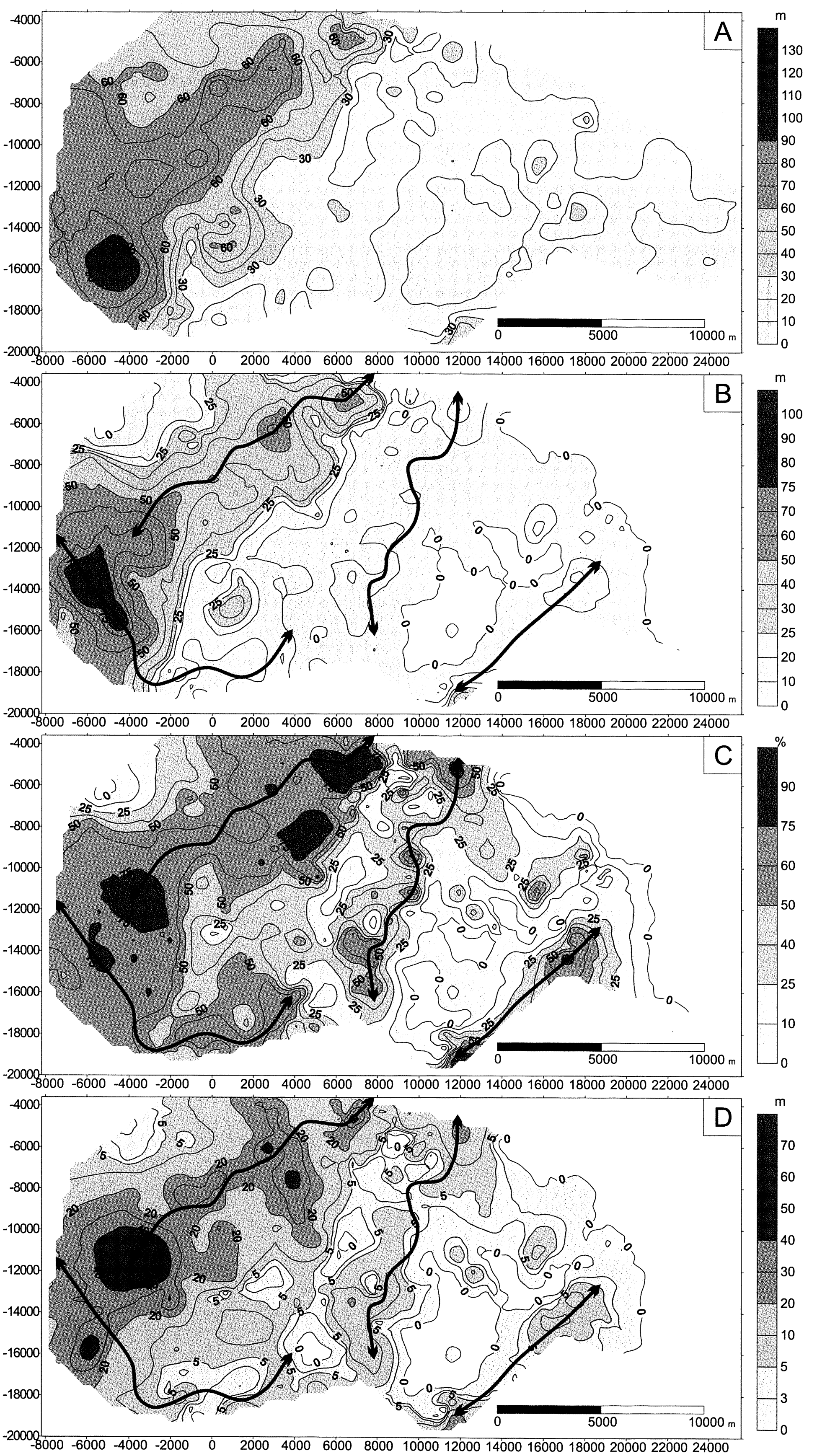


Fig. 9. Thickness of interval II, content and proportion of sandstones in this interval. **A** – thickness of interval II; **B** – total thickness of sandstones; **C** – sandstones content in %; **D** – mean thickness of sandstone bodies. Thick lines showing extend of fluvial-channel tracts

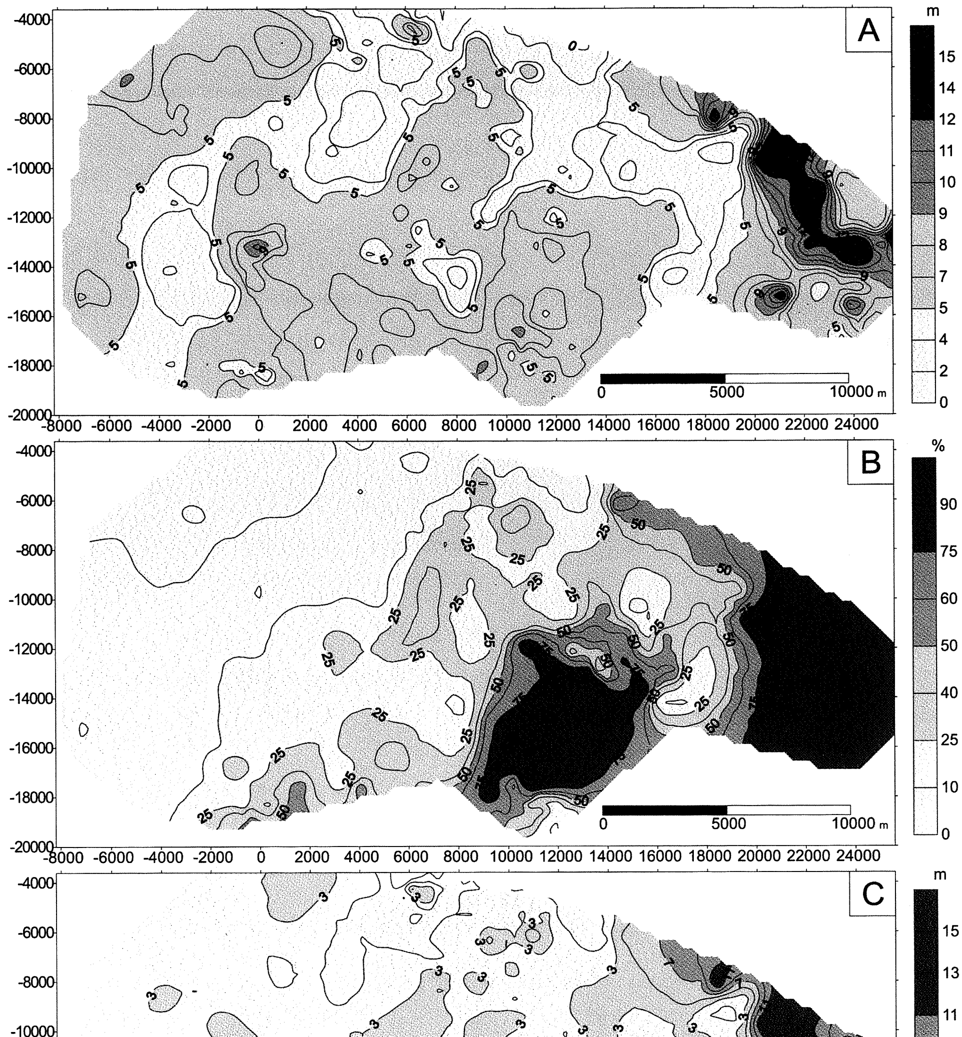


Fig. 10. Content and proportion of coal in interval II. **A** – total thickness of coal; **B** – coal content in %; **C** – mean thickness of coal seams; **D** – Number of coal seams

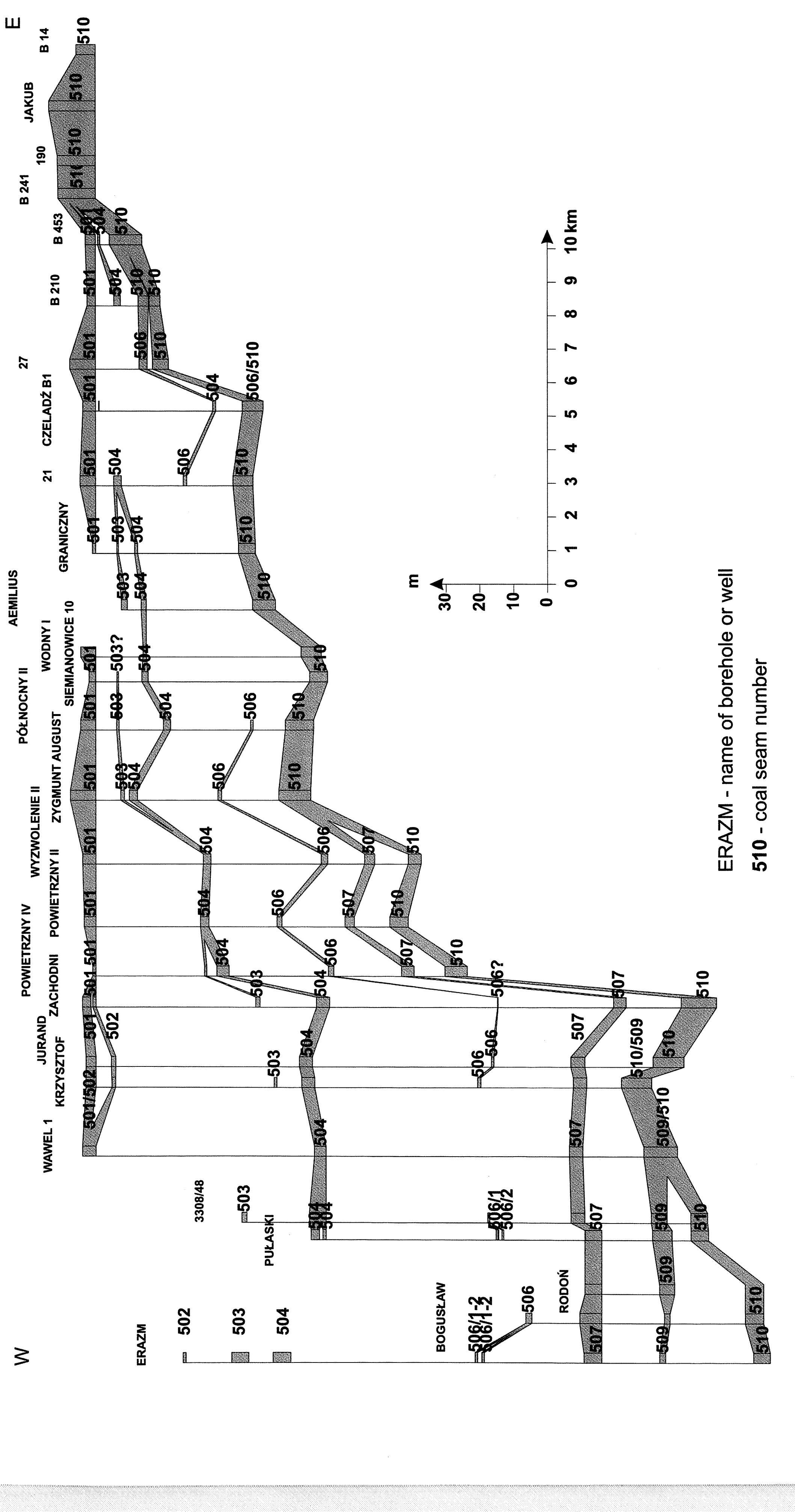


Fig. 11. Correlation of the coal seams along line D-D'

seam. The suggested duration of 13,500–180,000 years would then be the minimum time for deposition of the Zabrze Beds.

CONCLUSIONS

The eastward decrease in the thickness of the Zabrze Beds, from ca. 250 m to ca. 4 m over the distance of ca. 30 km points to a marked differential subsidence. The mapped distribution of the total thickness of sandstones, percentage of sandstones and the average thickness of sandstone beds in both intervals suggests the presence of four channel tracts. The main channel belt follows the N–S striking zone of maximum subsidence. The other tracts are ribbons trending SW–NE and may be related either to old faults in the basement, reactivated during the flexural bending of the basin floor or to increased compaction of peat under the load of sand supplied to the peat bog area by the channel tracts, allowing for the continuing accumulation of sandy sediment. The main channel tract has shifted westward with time. The most favourable areas for the accumulation of phytogenic material were the western area, where the rate of subsidence was greatest and large amount of clastic sediments accumulated besides the large amounts of coal, and the eastern area, where growth of peat-forming vegetation was not disturbed by influxes of clastic sediments into the peat bog area.

The channel deposits occur as ribbon-like bodies, transformed by migration into sheet-like bodies of complex structure with amalgamated accumulations of channel sediments. The rivers that supplied sand to the peat bog areas modified the top surfaces of peat by partial or complete removal of phytogenic material.

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Streszczenie

TRAKTY KORYT RZECZNYCH W WARSTWACH ZABRSKICH (NAMUR B) NA PODSTAWIE ANALIZY MIĄŻSZOŚCI W REJONIE SIODŁA GŁÓWNEGO I NIECKI BYTOMSKO-DĄBROWSKIEJ GÓRNOŚLĄSKIEGO ZAGŁĘBIA WĘGLOWEGO, POLSKA

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Górnośląska seria piaskowcowa a zatem i zapowiadające ją warstwy zabrskie (Stopa, 1957), zwane również siodłowymi, są pierwszym kompleksem w górnośląskiej sukcesji węglowej, w którym brak jest wkładek morskich. Warstwy zabrskie stanowią dolną część nieformalnej jednostki litostratygraficznej nazywanej górnośląską serią piaskowcową (Fig. 1). Granicę spągową warstw zabrskich postawiono na spągu pokładu 510, natomiast strop tych warstw stawiany jest w stropie pokładu 501. Wyjątkiem są obszary gdzie brak pokładu 501, tam strop warstw zabrskich stawiany jest w spągu grubego kompleksu piaskowców występującego powyżej najmłodszego zidentyfikowanego pokładu warstw zabrskich (Kotas & Malczyk, 1972). Miąższość tych warstw zmienia się w kierunku wschodnim od około 250 m w rejonie Zabrza do lokalnie około 4 m w rejonie Sosnowca, gdzie warstwy zabrskie reprezentowane są przez jeden miąższy pokład węgla.

Analizę miąższości warstw zabrskich wykonano na obszarze około 500 km^2 między Zabrzem, Piekarami Śląskimi, Sosnowcem, Katowicami i Rudą Śląską. Obszar ten obejmuje przeważającą część siodła głównego oraz nieckę bytomsko-dąbrowską (Fig. 1). Do analizy miąższości wykorzystano dane pochodzące z około 600 profili otworów wiertniczych (Fig. 2) z 22 kopalń prowadzących intensywną eksploatację węgla od końca XVIII w na wyżej wspomnianym terenie. Obszary górnicze tych kopalń sąsiadują ze sobą i nierzadko połączone są podziemnymi przekopami.

Zasadniczym celem analizy miąższości warstw zabrskich była lokalizacja depocentrów osadów klastycznych i fitogenicznych oraz zmian ich położenia w czasie.

Dla potrzeb nininiejszej analizy warstwy zabrskie, mające formę zwężającego się w kierunku wschodnim klina podzielono na część dolną i górną. Granicę między tymi częściami postawiono w stropie pokładu 504, który jest identyfikowany praktycznie na całym analizowanym obszarze od Zabrza po Katowice. Dla obu interwałów wykonano mapy wartości parametrów obrazujące miąższość interwałów, całkowitą miąższość piaskowców i węgla, procentowy udział piaskowców i węgla oraz średnią miąższość kompleksów piaskowcowych i pokładów węgla a także ilości pokładów węgla (Fig. 7–10).

Na podstawie wykonanych przekrojów geologicznych wzdłuż linii wyznaczającej kierunek największych zmian miąższości warstw zabrskich jak i prostopadle do niej stwierdzono (Fig. 4 i 5), że osady korytowe tych warstw tworzyły dwa zasadnicze typy ciał piaskowcowych. W początkowej fazie rozwoju stref korytowych powstawały wąskie ciała piaskowcowe, które w wyniku migracji koryt rzecznych przekształcane zwykle były w ciała piaskowcowe o charakterze pokrywowym. Nagromadzenia piaskowców o znacznych miąższościach (powyżej 20 m) złożone są z wielu amalgamowanych ciał korytowych, w których poszczególne elementy rozdzielone są bądź powierzchniami erozyjnymi, bądź wkładkami zlepieńców (Fig. 4A). Wskazuje to na stosunkowo długi okres stabilizacji strefy korytowej. Koryta rzeczne wkraczające na torfowiska modyfikowały ich powierzchnie stropowe, co na przekrojach geologicznych wraża się redukcją miąższości pokładu węgla albo całkowitym usunięciem materiału fitogenicznego (Fig. 4A, B).

Miąższość interwału I zmniejsza się w kierunku wschodnim od około 190 m do około 4 m w rejonie Sosnowca. Depocentrum zlokalizowane jest na północ od Zabrza (Fig. 7A). Analiza map rozkładu parametrów opisujących zawartość i udział piaskowców i węgla pozwala wyznaczyć kilka obszarów różniących się odmiennym rozwojem (Fig. 7 i 8). Zachodni charakteryzuje się wysokim udziałem zarówno piaskowców jak i węgla. Następne cztery obszary spośród tu wyróżnianych w kierunku wschodnim mają postać wąskich stref o charakterze pasów. Mają one przebieg NE–SW, występują przemiennie a różnią między sobą zawartością piaskowców i węgla. Obszar położony najdalej w kierunku wschodnim cechuje obecność jednego pokładu węgla bez przerostów osadów klastycznych.

Maksymalna miąższość interwału II wynosi około 135 m w rejonie Zabrza i zmniejsza się w kierunku wschodnim do około 4 m w okolicach Sosnowca (Fig. 9A). Główna strefa maksymalnych miąższości ma przebieg N–S jedocześnie wyraźnie zaznacza się wąska strefa dużych miąższości niemal prostopadła do niej. Ta wąska strefa zbudowana jest niemal wyłącznie z materiału gruboziarnistego, tworzącego kompleksy o miąższości sięgającej nawet do 75 m (Fig. 9B, C, D). Analiza map rozkładu parametrów opisujących udział i zawartość piaskowców i węgla pozwala wyróżnić kilka obszarów różniących się charakterem sedymentacji (Fig. 9 i 10). Obszar znajdujący się północnym zachodzie cechuje się niską zawartością piaskowców oraz obecnością dość cienkich i licznych pokładów węgla. Na południe od niego położony jest obszar charakteryzujący się występowaniem bardzo grubych kompleksów piaskowcowych. Kontynuuje się on w kierunku północno wschodnim w formie pasa o szerokości około 5 km. Ograniczony jest on od wschodu obszarem o zwiększonym udziale węgla, który występuje w grubych pokładach i mniejszym udziale materiału gruboziarnistego. Dalej ku wschodowi znajduje się obszar ze zwiększoną zawartością piaskowców. W kierunku wschodnim przechodzi w obszar, w którym występują grube pokłady węgla a kompleksy piaskowcowe są cienkie lub ich brak. Obszar położony we wschodniej części charakteryzuje się obecnością jednego, grubego pokładu węgla o miąższości przekraczającej 18 m. Podobnie jak w przypadku interwału I warstw zabrskich przy omawianiu poszczególnych stref pominięty został obszar znajdujący się w

południowo wschodnim krańcu ze względu na niedostateczną ilość danych niezbędnych do przeprowadzenia dokładniejszej charakterystyki.

Zasadniczą cechą różniącą obydwie części warstw zabrskich jest położenie głównego traktu korytowego odpowiedzialnego za depozycję największych ilości materiału gruboziarnistego. Strefa korytowa znajdująca się w centralnej części i najwyraźniej zaznaczająca się w pierwszym interwale, była nadal aktywna lecz sedymentacja osadów piaszczystych odbywała się na znacznie mniejszą skalę a główna strefa korytowa w górnej części warstw zabrskich została przesunięta w kierunku zachodnim.

Pokłady graniczne warstw zabrskich łączą się ze sobą w okolicach Katowic–Sosnowca tworząc jeden pokład 510. Można zatem przyjąć, że czas wzrastania torfowiska w tym rejonie jest równy czasowi depozycji całego pakietu warstw zabrskich w rejonie ich największej miąższości. Maksymalna zaobserwowana miąższość w zgromadzonych przez autora otworach wiertniczych połączonego pokładu 510 i 501 i wynosząca 18,1 m. Do odtworzenia pierwotnej miąższości torfowiska przyjęto, że 1 metr węgla powstał z około 11 m torfu. Wiadomo, że Górnośląskie Zagłębie Węglowe w karbonie znajdowało się w tropikalnych szerokościach geograficznych. Przyjmując tempo wzrostu współczesnych torfowisk w obszarach tropikalnych wynoszące około 4 mm na rok, to karbońskie torfowisko o miąższości 200 m powstało w ciągu około 13,5–180 tys. lat.

Obserwowany skokowy wzrost miąższości pokładów węgla w strefach ich łączenia (Fig. 11) wskazuje na nakładanie się kolejnych pokładów. Zatem pokład identyfikowany jako 510 w istocie jest generacją coraz młodszych pokładów sięgających coraz dalej w kierunku wschodnim. W tak ujętej interpretacji układu pokładów węgla warstwy zabrskie nie są zawarte wewnątrz jednego ulegającego rozszczepianiu pokładu. Wówczas sugerowany przedział 13,5–180 tys. lat stanowi minimalny czas tworzenia kompleksu nazywanego warstwami zabrskimi.