MODELLING OF THE DUBŇANY LIGNITE SEAM BASE IN THE MORAVIAN CENTRAL DEPRESSION (THE CZECH PART OF THE VIENNA BASIN)

PROSTOROVÉ MODELOVÁNÍ BÁZE DUBŇANSKÉ SLOJE V MORAVSKÉ ÚSTŘEDNÍ PROHLUBNI (ČESKÁ ČÁST VÍDEŇSKÉ PÁNVE)

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Abstract

This paper deals with the methodology of modelling the Dubňany lignite seam base and its tectonic failure. Tectonic pattern of the Vienna Basin has been subject of many studies. Opinions on its origin have been developing. Coal seams in the South Moravian Lignite Coalfield were modelled under the project of the example modern evaluation of the coal deposit. Designed software with application of modern mathematical, statistical and geostatistical methods and SURFER program were used for coal seam modelling. Input data were taken from detailed mining, deposit and well exploration carried out for more than 50 years.

Abstrakt

Příspěvek je věnován metodice digitálního modelování báze dubňanské lignitové sloje a jejího tektonického porušení. Tektonická stavba vídeňské pánve je předmětem mnoha studií a názory na její genezi se stále vyvíjejí. Podrobné modelování slojí jihomoravského lignitového revíru bylo provedeno v rámci vzorového komplexního hodnocení uhelného ložiska v prostředí programu SURFER a pomocí účelově sestaveného programového systému s využitím moderních matematických, statistických a geostatistických metod. Vstupní data tvořily údaje o sloji a jejím okolí získané v minulosti během více než padesátiletého podrobného důlního, ložiskového a vrtného průzkumu.

Key words: coal seam, lignite, 3D-modelling, pull-apart basin, Czech part of the Vienna Basin

1 INTRODUCTION

At present, digital models of deposit characteristics form an inseparable part of the modern methods of coal deposit evaluation. In the years 2003–2005, an interactive program system was developed within a grant project at the Faculty of Mining and Geology of the VŠB-TU of Ostrava for the application of advanced methods of evaluation of coal deposits and their parts under complex geological conditions. This system has been modified and applied for a sample modelling and evaluation of coal deposits in the South Moravian Lignite Coalfield (SMLC).

The deposit model accuracy depends on the density and accuracy of the input data. Tectonic pattern of the deposit is one of the input data layers. Unfortunately, to this day there is no unanimously accepted opinion on the tectonic pattern of the Vienna Basin, of which the South Moravian Lignite Coalfield is a part. In recent years, geologists' views of the structural development in the whole area have developed considerably (Čekan et al. 1990; Fodor 1995; Jiříček 2002; Kováč et al. 1993; Kováč, Plašienka 2003; etc.). There are different opinions not only on the structural development of the studied area, but also on the exact location of the particular faults. Recent opinions are involved in newer maps of the entire Vienna Basin (e.g., Kováč, Plašienka 2003; Kováč, Hók 1993), which are, nevertheless, general. They only record important faults located roughly and are unsuitable for compiling a detailed deposit model.

The tectonic map of the Dubňany and Kyjov seam bases in the SMLC is presented in Fig. 1 (Honěk et al. 2001). The map was recorded on the basis of map outputs from particular explorations projects in the SMLC during about 50 years. Accurate data on the structural pattern exist in the mining areas only. The structural-tectonic mine maps record positions and characteristics of the individual tectonic faults. Unfortunately, these maps do not cover the entire SMLC.

2 GEOLOGICAL SETTING

The Vienna Basin (VB) is a Neogene structure spreading across the territories of the Czech Republic, Slovakia and Austria. It is made of a 150-km-long and 50-to-60-km-wide irregular rhomboidal depression extending in the NE-SW direction. There are two structural levels in the VB. The lowest level is formed of folded rocks of Alpine orogeny. On this highly distorted base, a Neogene basin filling rests, made of marine, brackish and freshwater sediments of the Eggenburgian to Pliocene age. The Neogene formations are distorted by fault tectonics only (Jiříček 2002). The maximum thickness of the Neogene deposits in the central part of the VB is 5,500m. The study area, the SMLC, is located in the south-eastern part of the Czech Republic and in the central part of the Vienna Basin. There are minable lignite seams of Pannonian age occurring in the SMLC.

The origin and development of the VB have not yet been cleared up unambiguously. Originally, the VB was considered to be an intermountain depression formed by lateral expansion in the period of Neogene sedimentation. That was accepted until the mid-twentieth century when many authors (Janoschek 1942; Buday 1960; Mahel 1961) raised a presumption that the faults in the Vienna Basin arose as a result of tension forces at the back of the sliding orogeny, where they compensated the compression at the folding front. In 1967, Buday et al. drew a conclusion that, after loading of south-eastern slopes of the Bohemian Massif by Alpine nappes, the old deep faults were restored and copied through into the Vienna Basin structure. The basin originated at the crossing of the longitudinal NE-SW and transverse NW-SE faults. This alternative was also supported by the geophysical findings by Beránek et al. (1977) that the so-called autonomous block can be located in the Vienna Basin basement. With view to the exceptional thickness of its sediments, flysch in particular, the block induces a distinctive negative gravity anomaly. It is separated by the Lednice deep zone in the east and by the peri-Pieniny lineament in the west from the areas of high positive gravity anomaly. Both deep failures in the NE-SW direction are crossed by faults in the perpendicular direction, which should delimit the Nesvačily and Vranovice troughs on the SE slopes of the Bohemian Massif (Němec 1973). Pícha et al. (1971) connected this version with the aulacogene of both troughs; while Čech (1984) ascribed rather a pseudoaulacogene form to them.

According to new ideas based on the plate tectonics theory, the basin developed as the piggy-back basin from Eggenburgian to lower Badenian, and as the pull-apart basin from the middle Badenian. The Eggenburgian opening of depocenters was according to Kováč and Plašienka (2003) controlled by dextral faults in the ENE-WSW direction as well as by normal faults in the NW-SE direction. The north-southern sinistral faults and reverse faults in the NE-SW direction participated in the structural pattern. For the area of interest, subduction-collision processes were very important in the Karpatian, owing to which a distinctive shear zone formed in the NE-SW direction. According to Kováč and Plašienka (2003), the pull-apart Vienna Basin opened in this area. This phase of development was characterized by a north-southern compressive component of the paleostress field. In this period, the sinistral faults along the Malé Karpaty block and the front of the Magura nappes were crucial in the VB development (Fodor 1995). According to Wessely (1988), en echelon fault pattern of the main faults and depocentres in the basin as well as their curved course bear witness to strike-slip tectonics. Jiříček (2002), however, explains en echelon fault pattern of the main faults and their local curvature by a gradual north-south opening of the Vienna Basin along the Steinberg and the opposite Lanžhot-Hrušky faults during the lower to middle Badenian. In the Middle Miocene, the main role in the depression opening was played by the normal faults in the direction of NNW-SSE to NW-SE (Kováč, Hók 1993). The compression in the NE-SW direction is documented by the paleostress analysis by Nemčok et al. (1989). Kováč and Hók (1993) do not decline activations of the sinistral faults in the N-S and NNE-SSW direction, as well as the activation of the dextral faults in the ENE-WSW direction.

The pull-apart Vienna Basin comprises a system of horsts and troughs separated by distinctive faults with considerable movement amplitude (Kováč, Plašienka 2003). Marine sedimentation was gradually replaced by continental sedimentation accompanied by decrease in salinity of the environment. In the zones B and F according to Papp’s Pannonian classification (1951), extensive swamps formed on the flat ground, from which lignite seams arose (the Kyjov, Dubňany, and other seams in the coal series in the Dubňany Seam roof). The Pannonian sediments with lignite seams occur at the very end of the complex sedimentary development of the VB.

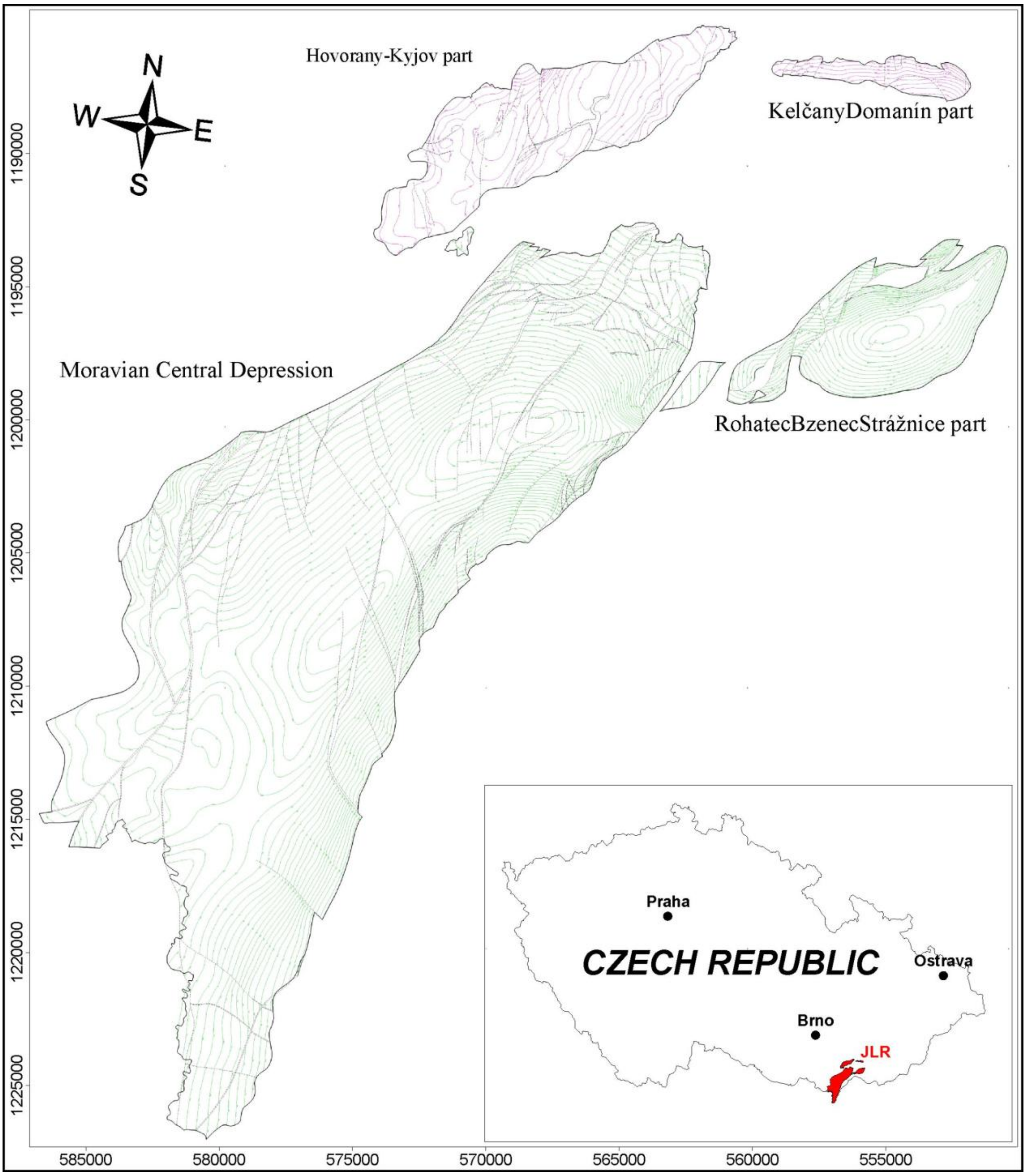

Fig. 1 The South Moravian Lignite Coalfield and the tectonic pattern of the Dubňany and Kyjov seams (Honěk et al. 2001).

The Kyjov Seam (upper part of the B-zone) occurs in the SMLC in two separate parts (Fig. 1). The larger Hovorany-Kyjov part, 15km long and up to 4km wide, extends in the ENE-WSW direction. The smaller Kelčany–Domanín part is 7km long and 1km wide, extending in the W-E direction. Likewise, the Dubňany Seam (lower part of the F-zone) occurs in two separate areas in the SMLC. The largest part of the SMLC, due to both area and lignite reserves, is the Moravian Central Depression (MCD), 40km long and 8–15km wide. The Rohatec–Bzenec–Strážnice part is 12km long and 5.5km wide.

The seam limitation of the MCD is mostly tectonic, by the Steinberg and Schrattenberg fault systems in the NW and Lužice-Lanžhot fault system in the SE, partly by outcrops covered with the Quaternary sediments. Some of the associated faults of both systems are antithetic and form partial fault troughs. The Steinberg fault zone is tectonically disrupted considerably; the central part of the MCD is slightly tectonically affected. The MCD is a fault trough with asymmetrical synclinal seam deposition and with the syncline axis shifted to the eastern edge. There are partial depressions and elevations along the axis. The maximum depth of the seam base is 315m (–120m above sea level). The seam dip is lower in the western part of the MCD (1–3° south-eastwards); in the eastern part, the seam dip amounts to 3 to 5° north-westwards (Honěk et al. 2001).

In the northern part of the MCD, the seam is uniform, without significant partings. In the central part of MCD, the seam features three significant partings dividing the seam into four individual coal beds. Thus the seam is divided into seven genetic horizons. Westwards and southwards, the partings become considerable, the inorganic proportion rises in the seam, the seam thickness increases, but its quality declines. The geological thickness of the Dubňany Seam is between 4–5m in the northern part of the MCD. From the central part of the MCD the geological thickness increases up to 12 to 13m southwards and westwards by splitting the seam into benches. However, most of the "seam" is made up of transition rocks or rocks without coal admixture; the economic seam thickness decreases under 2m (Honěk et al. 2001). In the northern and eastern parts of the MCD, the seam was extracted in a series of mines. Today, lignite is only mined in the last active mine in the SMLC – the Mír Mine in Mikulčice. The mined out area represents only a small part of the total original seam area in the MCD.

3 DATA APPLIED

The data on the coal and the surrounding rock mass structure were obtained from the active mines and particularly from the deposit well exploration which was carried out in several stages in different time intervals. More than 3000 wells drilled during the second half of the 20th century were used for drawing the digital model reflecting the structural-tectonic pattern of the deposit.

3.1 The first stage of the lignite deposit exploration

There is almost no information about the initial exploration in the 19th and early 20th centuries. At that time, exploration activities were only performed to the most necessary extent. More systematic exploration was started in the 1930s and 1940s by the Baťa firm in Zlín. The exploration was aimed at ensuring lignite reserves of the future Tomáš and Jan mines.

An extensive basic deposit exploration of the entire SMLC began in 1952. The exploration started in the surroundings of the mined areas. Then it continued during 1955-1960 in the whole Rohatec–Bzenec–Strážnice part and in the perspective regions in the central part of the MCD. In the southern part of the MCD, a preliminary survey was performed up to the Austrian border. The well network density was 250x500m in the mining areas and their vicinity, sporadically 250x250m, up to 2000x2000m in the prospect areas.

A prevailing part of the boreholes were drilled with the counterflush (CF) drilling rigs with reverse circulation elevating rock and coal fragments through hollow drill stems. Drilling speed was the advantage of the continual CF-drilling; its disadvantage was small rock and coal fragments up to 1.5 to 2.5cm or even the insufficient gain of rock from sand horizons, which did not enable to draw an entirely reliable lithological seam log. The amount and characteristic of the lignite drill cuttings depended on the petrographic coal type and the type of the boring crown.

According to the size and density of the coal and rock fragments, the fragments elevated by circulation were partly separated by gravity. Thus the correct positioning of the seam boundaries with the base and roof as well as of the parting boundaries became problematic. Furthermore, the partings were not analysed in the first stages of the SMLC exploration.

Rocks elevated by means of flush drill set and discharge hose in the CF-rigs were retained on a screen. As the clay fragments increased in volume when passing the drill set, the samples were reduced. No reduction was done with the seam samples.

The CF-system drilling necessitated a permanent presence of a geologist at the rig. Drilling results were highly influenced by the quality of his work. Experience with archive data processing shows that the credibility of old data from various exploration projects and periods is much diversified. There are substantial differences in the individual geologists' work.

The core drilling with Craelius (CR) rigs was introduced later. The seam core was slit longitudinally; one part was sent to the laboratory, the other remained in the documentation.

The coal drill cuttings from the CF-wells contained admixed rock fragments. At first, the samples were sent to laboratories untreated, and the analyses results were substantially distorted. Therefore, a thorough separation of rock fragments from lignite samples was introduced later. Also, the delayed sample processing influenced the analyses results negatively. This had an especially high impact on the determination of water content and of the net calorific value.

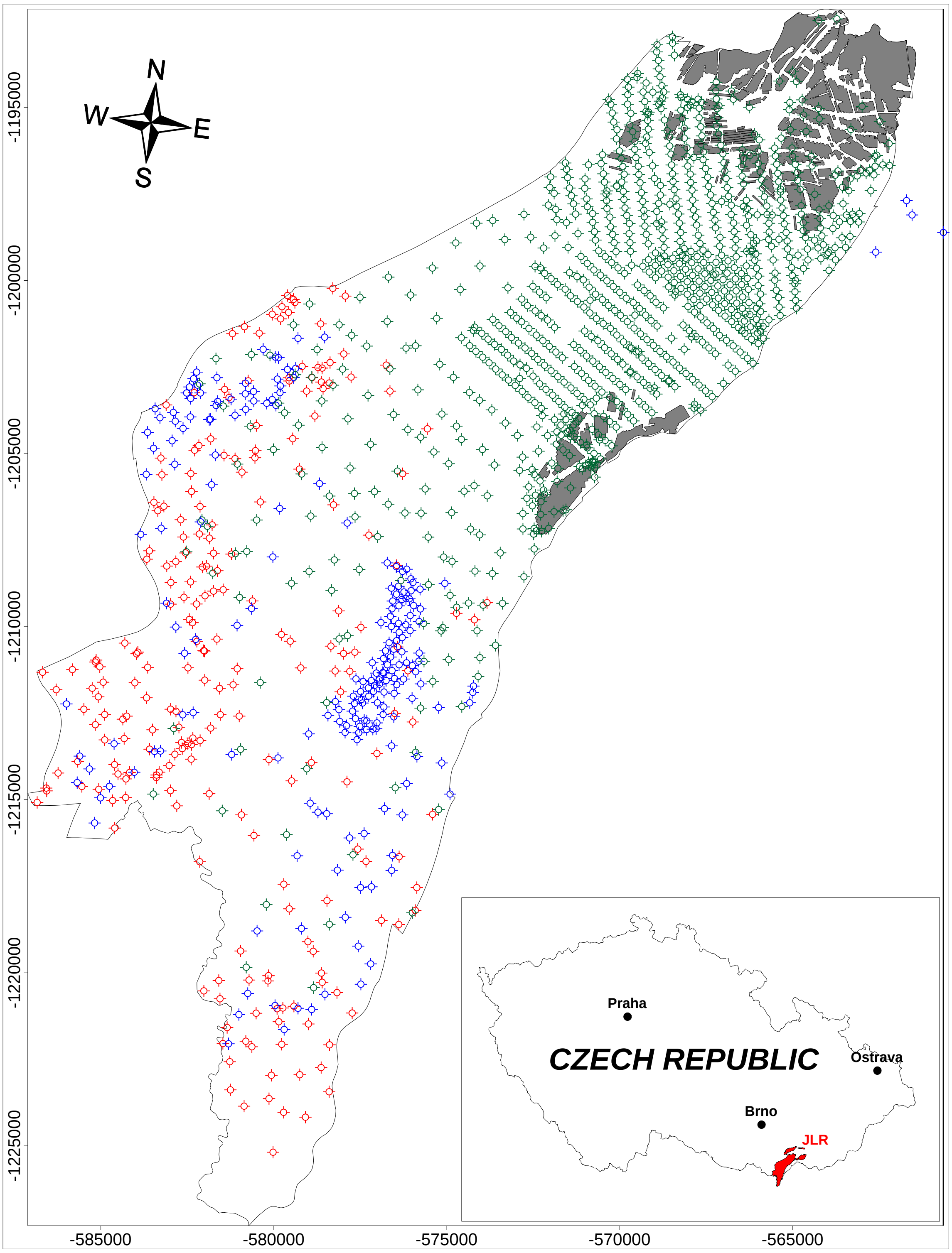

Fig. 1 The Moravian Central Depression with wells classified according to the exploration stages.

Legend: grey polygon – mined out; dark-green wells – lignite deposit wells from the seventies and eighties; light-green wells – lignite deposit wells from the fifties; blue wells – other wells from oil exploration (Krejčí et al. 1975); red wells – other wells from oil exploration (other archive sources).

In the oldest wells of the main exploration stage in the SMLC (wells from 1952-1954), the samples were either not taken from the Dubňany and Kyjov seams at all, or only mixes from coal horizons were analysed, usually up to one sample. However, not always all the coal horizons were mixed in the sample; some top or bottom horizons may have been excluded from the sample. No samples were taken from partings.

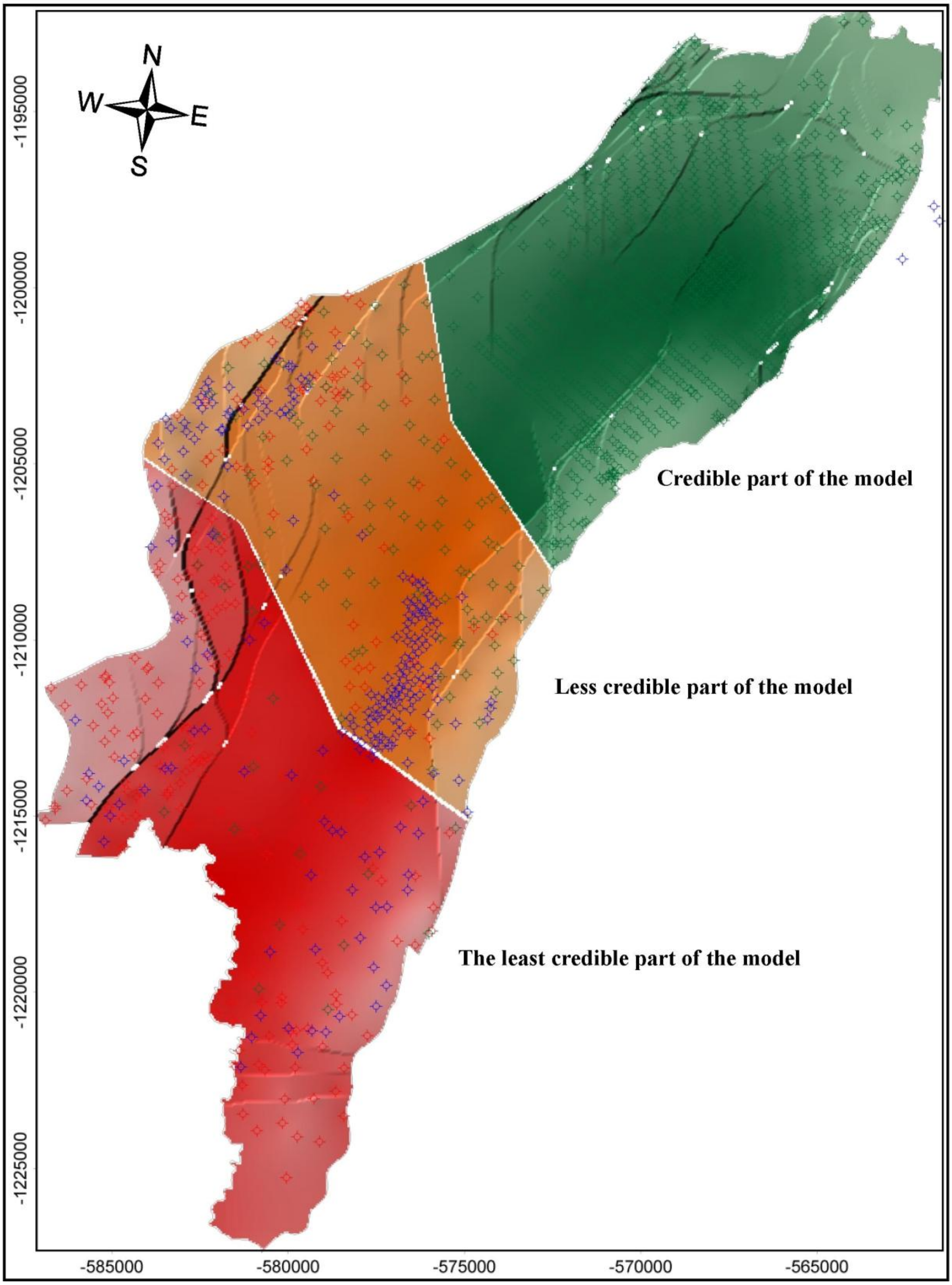

Fig. 3 Drills and the Dubňany Seam model in the Moravian Central Depression classified according to credibility.

Later on, mixes from coal horizons in one or more samples and parting mixes (usually in one sample) were analysed separately. At that, not all coal horizons or partings were included in the mix, but only selected parts of the seam. At the late fifties, the individual coal horizons and partings, or mixes of petrographically similar coal horizons or partings, started to be analysed.

Roof seams were analysed in different way. At first, no samples for the analysis were taken from roof seams; later on, one sample was taken if the roof seam thickness was at least 40cm.

3.2 The second stage of the lignite deposit exploration

The second main stage of the deposit and hydrogeological exploration in the SMLC took place in the 1970s and 1980s. Most of the deposit wells were drilled within the Hodonín - Břeclav exploration project in the central and southern part of the MCD and during the Hodonín-I field exploration in the eastern part of the MCD before the Mír Mine construction. Further, other exploration activities were performed in the SMLC, including hydrogeological ones, for example, in the Hovorany-Kyjov area.

Information of much higher quality was provided by new core wells and wells measured by geophysical logging. The deposit and hydrogeological exploration differs from that of the fifties in the technical and methodical aspects, particularly in the more detailed lithological logging and sampling. In the seams, samples were separately taken from all important coal horizons and partings for analysing purposes. The range of characteristics analysed was extended substantially. In addition to chemical parameters, information was obtained also on the physical-mechanical properties of lignite and the surrounding rocks. Geophysical logging was done in every well. All these data made it possible to draw a much more detailed and accurate image of the development of the coal and associated rocks in the well place.

3.3 Other boreholes

Data from other exploration were included in the Dubňany Seam modelling because of lack of lignite deposit boreholes in the southernmost parts of the MCD. Most of them were shallow boreholes of various purposes drilled with CF-rigs during oil exploration. They were used in spite of lower credibility when compared to the lignite deposit wells.

The data were divided into two groups. The first group consists of wells drilled from the pre-war period to the seventies. Data on coal from these wells were compiled in the report by Krejčí (1975).

The second group involves wells acquired from various archival sources. The file was compiled during the complex study of the SMLC (Honěk et al. 2001). Unfortunately, the origin and correctness of these data cannot be verified.

3.4 Data credibility

The first step to design a digital model of the seam base of the MCD was data verification. According to credibility, the wells were assorted in three files. The different input data accuracy as well as density and irregularity in spacing played a key role in sorting out the data.

The first group of the most reliable data consists of the lignite deposit wells drilled within the survey activities in the 1950s to 1980s. In the second file of the less credible data, oil survey wells prevail. The third group of the least credible wells consists from data obtained from other archive sources. The seam model in the MCD was divided into three parts according to data reliability and distribution. The credibility of the model decreases from the north to the south (Fig. 3).

4 METHODICAL PROCEDURE

The accuracy of digital models depends on the input data accuracy, their distribution and density, and type of the interpolation algorithm used. The individual modelling procedures aim at creating a model depicting the real body surface as accurately as possible. Thereby, an infinite number of points are necessary, which, on the other hand, require an infinite data capacity (Krcho 1990). Many interpolation methods of digital models are often argued in literature (Abramowitz, Stegun 1972; Franke 1982; Journel, Huijbregts 1978). There is, however, no universal interpolation algorithm suitable for all digital models.

Modelling of the Dubňany Seam base in the Moravian Central Depression was performed in the Surfer software environment, Version 8.01. All the digital models were created with the grid cell size of 20 metres. The most suitable interpolation method was selected by the “Cross Validation method” (Staněk 1999). The method of ordinary kriging with the exponential variogram model was evaluated as the most suitable method. Because of impossibility to involve faults in the calculation when using this method, the minimum curvature method was selected as gridding method, although it featured a little larger mistake.

In the first stage of modelling the seam base, an atectonic model was created and analysed by selected morphotectonic analyses, e.g. slope analysis, first and second directional derivatives, contour analysis and shaded relief model analysis. To be able to interpret the morpholineaments (possible faults), the created outputs were exaggerated vertically. The modelled seam is very flat and the morphotectonic features are not distinct enough in the non-exaggerated model. The morpholineament interpretation procedure was taken over from Jelínek’s study from 2004. The morphotectonic analysis resulted in morpholineaments indicating the existence and characteristics of possible tectonic faults. The result was compared with the gravimetric map of Bouger anomalies and the individual geologists' opinions (Čekan et al. 1990; Fodor 1995; Jiříček 2002; Kováč et al. 1993; Kováč, Plašienka 2003; etc.).

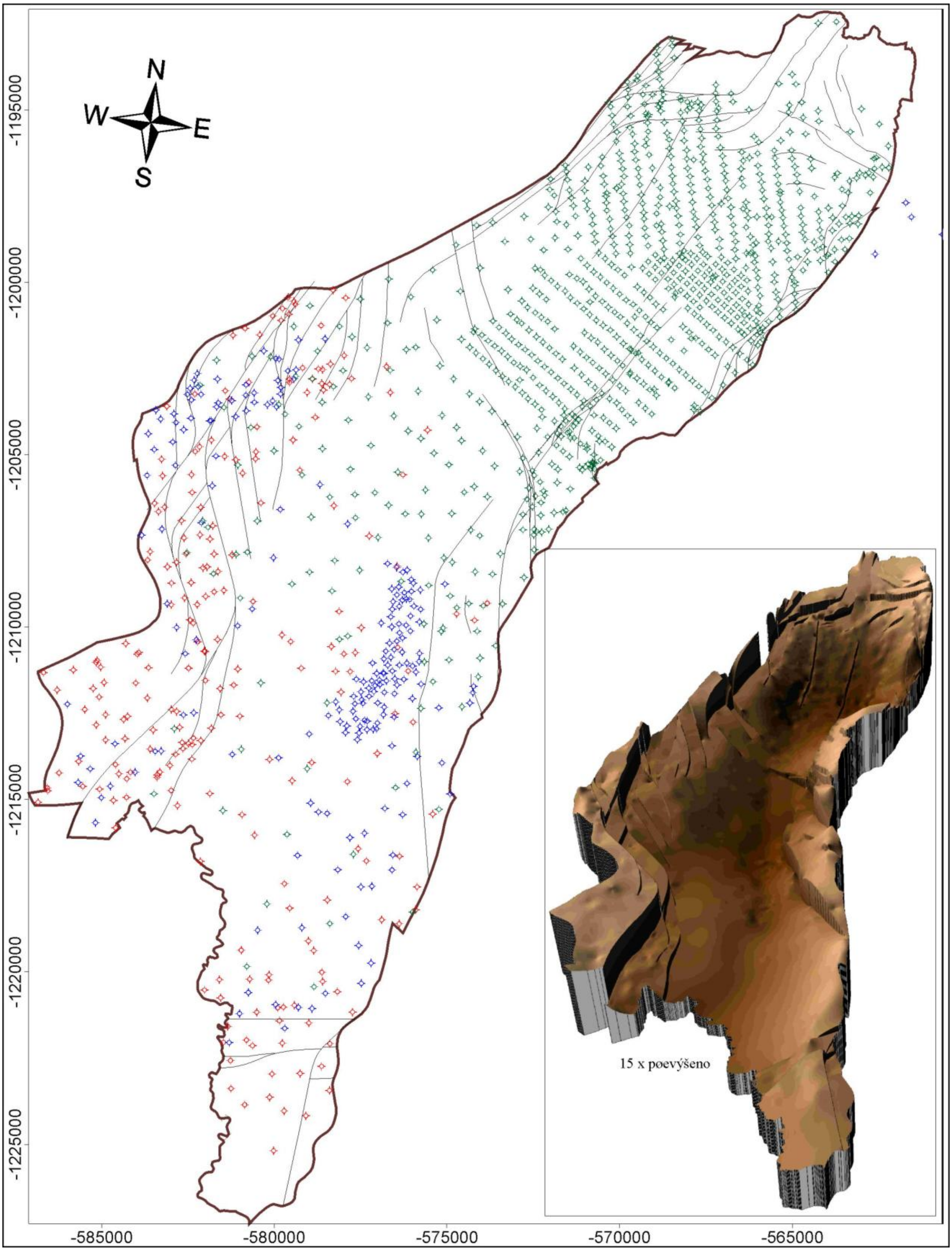

Fig. 4 Redesigned tectonic scheme of the Dubňany Seam in the Moravian Central Depression with wells classified according to credibility. 3-D view of the seam base model in the bottom right corner (vertical exaggeration 15x).

In the second stage of modelling the seam base, the obtained idea of the tectonic failure of the seam base was introduced in the model calculation as faults. The faults were modelled vertically for simplification, since the horizontal displacements by the faults were found minimum by mining activities. The model created started to resemble the idea of tectonic pattern in rough outline. Unfortunately, some of blocks were modelled in unsuitable position. Therefore, a process of improving the model began. It was necessary to proceed section by section and compare the seam base height parameters among the surrounding wells. The procedure was very elaborate. Inaccuracies in the seam base determination between two close wells were revealed. A well which belonged to a group of lower data credibility was disqualified from further processing. The idea about the course of the individual faults was corrected by this procedure. This new tectonic plan was subsequently included in the new seam base model calculation in the form of faults.

The acquired model was displayed in 3D-preview, from which significant tectonic failures were obvious. However, interconnections of the faults or their splittings were not quite clear. Again, detailed reprocessing began by comparing the height values of the seam base, and a corrected idea of the tectonic pattern was being created. In addition, the faults were classified by the significance of their influence in the model. The faults were classified in three categories by the normal throw. The first class was made of fault sections with the normal throw above 30m; the second category consisted of fault sections with the throw of 5 to 30m; and the third fault group was less than 5m. By the procedure described, the weight of importance was determined for the individual fault sections.

Remodelling the seam base, drawing, reassessing positions of the partial tectonic blocks and correcting the individual fault positions were repeated until most of the tectonic blocks and fault positions conformed to our ideas. Gradually, smaller and smaller partial blocks were arising, still not showing an entirely suitable position. The reason was the low number of input data points in the block area (one to two wells). Therefore, the final stage included the usage of auxiliary points at the block edges, which helped to model and create an overall idea of the seam base surface.

5 DISCUSSION

The described methodical procedure of coal base modelling with respect to the tectonic pattern is a very elaborate iterative process. Necessity of including data from old wells made the process more difficult. Different approach at modelling of the faulted coal seam applied Vizi (2008) employing geostatistical methods and using special software.

The Dubňany Seam and its tectonic pattern were modelled on the basis of approximately 3000 well data and, partially, of mining documentation. The fault positions are determined precisely in the northern part of the MCD where there was a dense network of credible wells with accurately defined base depth, and for which mine maps are available, particularly of those the normal throw of which exceeds 20 metres. The existence and position of faults with lower normal throw may be argued. The tectonic map features a lower degree of precision in the central and southern parts of the area, where deposit wells were only available in a loose network and thus the less accurate wells of oil exploration had to be included. Overall, we can say that the accuracy of our idea is certainly higher than that of the general opinions on the entire Vienna Basin.

The individual faults cannot be localised precisely on basis of the general opinions on the Vienna Basin development. Most of the maps are of a large scale and can be compared with the created tectonic map only with difficulty. The course and characteristic of significant faults, like the Steinberg fault or Lužice faults, conforms to the general ideas of most geologists. However, there is a fault disturbing the Lužice faults in the northern direction. This fault is very distinctive; it is a belt of approximately 150-metre width, recorded by several credible wells. This fault genesis remains a question.

6 CONCLUSIONS

The digital modelling of the seam base including the tectonic pattern is the first step at creating the coal deposit model, which is groundwork of the modern deposit evaluation. Modelling of the faulted seam base on the basis of drill exploration data is a very elaborate process. To facilitate the process, tools such as morphotectonic analysis for tracing the faults or Cross Validation method for selection of optimal gridding method can be employed. Paying high attention to modelling the seam base and its tectonic pattern is desirable, since the seam geometry and the faults form computation block boundaries and influence the estimation of coal reserves.

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RESUMÉ

Podrobné digitální modely strukturních ložiskových charakteristik jsou nedílnou součástí moderního způsobu hodnocení ložisek. V rámci projektu věnovaného vzorovému komplexnímu hodnocení ložisek uhlí v oblasti jihomoravského lignitového revíru bylo řešeno modelování morfologie a tektonického porušení sloje. Článek prezentuje metodiku tvorby modelu báze sloje na vybraném příkladu - dubňanské sloji v moravské ústřední prohlubni.

Přesnost vytvořeného modelu ložiska závisí na hustotě a přesnosti vstupních dat a použité interpolační metodě. Významným prvkem ovlivňujícím morfologii i rozložení vnitřních ložiskových atributů modelu je strukturně tektonický plán ložiska. Bohužel na strukturně tektonickou stavbu vídeňské pánve není do dnešní doby zcela ujednocený názor. Během posledních let se pohled geologů na strukturní vývoj celé zájmové oblasti značně vyvíjel. Modernější názory na vývoj oblasti jsou zahrnuty v mapách vídeňské pánve (např. Kováč, Plašienka 2003; Kováč, Hók 1993; Strauss et al. 2006), které jsou ovšem příliš zevrubné. Zachycují pouze významné zlomy, navíc jen přibližně lokalizované. Jako podklad pro sestavení podrobného modelu ložiska jsou proto nevhodné. Detailní tektonická situace v jihomoravském lignitovém revíru byla zachycena ve strukturní mapě báze kyjovské a dubňanské sloje (obr. 1), která vznikla kompilací a následným doplněním řady dílčích ložiskových map sestavených během dlouhodobého ložiskového průzkumu.

Modelování báze dubňanské sloje v příkladové moravské ústřední prohlubni bylo provedeno v softwarovém prostředí Surfer verze 8.01 a pomocí specielně vytvořeného programového systému. Velikost buňky gridu činila 20 metrů. Výběr nejvhodnější interpolační metody byl proveden „bumerangovou metodou" (Staněk 1999). Jako nejvhodnější interpolační metoda byla tímto způsobem stanovena metoda krigování s použitím exponenciálního modelu variogramu. Protože použití této metody by nedovolilo začlenit do výpočtu modelu tektonické poruchy, byla pro interpolaci zvolena metoda minimální křivosti, která sice vykazovala o něco větší chybu, ale vložení zlomů dovoluje.

V první fázi modelování báze sloje byl vytvořen atektonický model, který byl podroben vybraným morfotektonickým analýzám. Především se jednalo o sklonitostní analýzu, první a druhou směrovou derivaci, analýzu výškových hladin a analýzu stínového modelu. Pro možnost interpretace morfolineamentů (možných tektonických poruch) bylo nezbytné vytvořené výstupy dostatečně převýšit. Modelovaná sloj je velmi plochá a zjištěné nerovnosti nejsou v nepřevýšeném modelu dostatečně zřetelné. Postup interpretace morfolineamentů byl převzat ze studie Jelínka z roku 2004. Výsledkem morfotektonické analýzy byly morfolineamenty, které naznačovaly existenci a charakter průběhu případných tektonických poruch. Tento výsledek byl srovnán s gravimetrickou mapou bugerových anomálií a s jednotlivými studovanými představami geologů (Čekan et al. 1990; Fodor 1995; Jiříček 2002; Kováč et al. 1993; Kováč, Plašienka 2003; atd.).

Získaná představa tektonického porušení báze modelované sloje byla zanesena do výpočtu modelu báze sloje v programu SURFER formou zlomů (faults). Zlomy byly modelovány pro jednoduchost jako vertikální. Z ložiskového pohledu se nejedná o nedostatek, protože horizontální přemístění na zlomech bylo důlní činností zjištěno jako minimální. Vytvořený model se v hrubých rysech podobal představě o tektonické stavbě. Bohužel místy byly vymodelovány tektonické kry v nevhodných pozicích. Proto následoval proces zpřesňování modelu. Bylo nezbytné postupovat úsek po úseku a porovnávat výškové parametry báze sloje mezi blízkými vrty. Jednalo se o velmi pracný postup, který odhalil nepřesnosti v určení báze sloje mezi dvěma blízkými vrty. Vrt patřící do skupiny s nižší věrohodností byl v takovém případě z dalšího zpracování vyřazen. Zvlášť byly označeny a posouzeny vrty, kterými prochází tektonická porucha. Zmíněným postupem byla opravena představa o průběhu jednotlivých tektonických poruch. Upravený strukturní plán byl následně opět vložen formou zlomů do nového výpočtu modelu báze sloje.

Popsaný postup se opakoval do chvíle, než většina tektonických ker a pozic zlomů odpovídala naší představě. Postupnými úpravami zlomů vznikaly v modelu menší a menší dílčí kry, které stále nevykazovaly zcela vhodnou pozici. Důvodem byl nízký počet vstupních bodů v oblasti kry (jeden až dva vrty). Proto se v konečné fázi přistoupilo k použití pomocných bodů na okrajích ker, které pomohly upřesnit pozici ker v souladu s představou o tektonické stavbě ložiska.

Výsledná strukturně tektonická mapa báze dubňanské sloje se opírá o interpretaci údajů z přibližně 3000 vrtů a částečně také o důlní dokumentaci. V severní části, kde byla hustá síť věrohodných vrtů s přesně určenou hloubkou báze a kde jsou k dispozici strukturní důlní mapy, je pozice dislokací přesně určena. Nižší míra přesnosti strukturní mapy je ve střední a jižní části oblasti, kde byly k dispozici ložiskové vrty na lignit jen v řídké síti a bylo tedy nutné je doplnit dostupnými vrty z jiných průzkumných akcí. Nevýhodu těchto doplňujících vrtů byla snížená přesnost údajů o dubňanské sloji. Celkově můžeme říci, že přesnost naší představy je jistě vyšší než v případě obecných úvah zabývajících se celou vídeňskou pánví.