ELEMENTS OF THE GEOLOGIC STRUCTURE OF THE BELASITSA-OGRAZHDEN BLOCK ACCORDING TO GEOPHYSICAL DATA

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SUMMARY

In the territory of Bulgaria, to the Belasitsa-Ograzhden block as a part of the Serbian-Macedonian block, are related parts of the Belasitsa Mountains, the Ograzhden Mountains and the Malashevska Planina Mountains. The block is limited to the east by the Strouma fault system, to the north and northeast - by the Kadiytsa-Breznitsa fault zone, to the south - by the Middle-Mesta fault zone which controls the south edge of the Belasitsa horst in Greece. To the west the block continues in Macedonia, where it is bounded by the Sasa-Toranitsa fault zone.

A negative background characterizes the observed gravitational field of the territory under study. The Belasitsa-Ograzhden block is bounded by two very well pronounced gravity transitions. It is limited to the east by the Strouma gravity transition, tracing the western edge of the Strouma rift structure. This transition is striking S35°E and has a stable horizontal gradient of 8-10 mGal/km along its entire length of about 30 km. The block northern border is the Breznitsa gravity transition B-B, that is almost perpendicular to the Strouma one.

The studied area gravitational field is characterised by a regional trend positive to the south, starting from the Breznitsa gravity transition towards the two opened to Greece anomalies. The presented field distribution rose-diagram (excluding the areas of the Strouma and the Breznitsa gravity transitions) shows three dominant directions : a subequatorial one, one striking N(45°-60°)E and one striking S35°E. These three directions correlate well with the concept of development of longitudinal and transverse fault deformations along the rift structures periphery.

The local field characteristics are analyzed according to the residual fields derived from the regional transforms and according to the variation anomalies compiled from the center-point and ring method of Griffin using a circle of radius R = 5 km.

The observed geomagnetic field of the studied territory is characterised by negative background values within the limits of -100 and -150 nT. On this background two anomalies can be separateded. A pronounced positive anomaly is very obvious in the northern part. A negative anomaly is present in the southwestern part of the map. It has an intensity of about -300 nT, and remains opened to the south. The subequatorial direction (90-110°) is predominating on the presented rose-diagram. The two other directions observed are one striking roughly S45°E and one striking roughly N45°E.

The compound analysis and systematization of the studied geophysical fields and other characteristics is the reason for some basic conclusions. The Strouma gravity transition is pronounced without ambiguity in all regional and local gravitational fields. The transition characteristics in the regional maps, which are reflecting the depth interval 3-10 km, are showing that it dips west. In the local fields maps, this gradient zone is tracing the Ograzhden fault limiting the Strouma fault zone to the west The fault-block tectonics have predominant influence in the depth interval 3-10 km. The Lebnitsa, the Southern-Ograzhden, the Podgoritsa, the Kolarovo and the Petrich gravity transitions are forming the block division of the studied territory. The Northern-Igralishte and the Klyuch negative anomalies are mapping relatively deep granitoid plutons. The geophysical fields main characteristics in the depth interval down to about 3 km are mapping the near-surface disposition of plutons, reflected by the Northern-Igralishte, the Igralishte, the Nikoudin and the Klyuch negative anomalies. The areas having increased thickness of the metamorphites are separated by positive anomalies. The Stroumeshnitsa graben and especially the areas having increased thickness of the decompressed sedimentary rocks that are filling it are mapped very well by negative anomalies. In the studied near-surface interval, gradient transitions are tracing faults of two main systems - the Lebnitsa system and the Stroumeshnitsa one. The analysis of the main elements of the geologic-geophysical structure in the Belasitsa-Ograzhden block has been developing under the direct influence of the rift processes in the regional Strouma rift system. In the Bulgarian territory the Belasitsa-Ograzhden block has been developing under the direct influence of the rift system. In these processes and their performance are reflected mainly in fault deformations transverse and oblique to the Strouma rift system, which are successfully mapped by well-pronounced gravity

INTRODUCTION

In the territory of Bulgaria, to the Belasitsa-Ograzhden block as a part of the Serbian-Macedonian block, are related parts of the Belasitsa Mountains, the Ograzhden Mountains and the Malashevska Planina Mountains (Boyadzhiev, 1971; Ignatovski, 1968; Ignatovski, 1969a; Ignatovski, 1969b; Zagorchev, 1970a; Zagorchev, 1970b; Zagorchev and Dinkova, 1991; Zagorchev, 1992).

The block is limited to the east by the Strouma fault system, to the north and northeast - by the Kadiytsa-Breznitsa fault zone (the Breznitsa fault or the Gradeshnitsa fault), to the south - by the Middle-Mesta fault zone which controls the

south edge of the Belasitsa horst in Greece. To the west the block continues in Macedonia, where it is bounded by the Sasa-Toranitsa fault zone.

The Belasitsa-Ograzhden block is composed mainly by the Archaic structural complex. The Caledonian-Hercynian intrusive complex has a relatively small participation. During the Upper-Alpine stage, in the Stroumeshnitsa graben and the Strouma graben, respectively in the southern and eastern block flanks, the Neogene-Quaternary substage is superimposed.

The Archaic structural complex builds almost entirely the situated in the Bulgarian territory parts of of the Belasitsa

Mountains, the Ograzhden Mountains and the Malashevska Planina Mountains. It is presented by the Archaic metamorphic complex, that is divided into three suites composed mainly by gneisses, granite-gneisses, shales and amphibolites.

The Ograzhden-Malashevski anticlinorium and the Belasitsa horst are well pronounced in the Precambrian structural plan.

The Ograzhden-Malashevski anticlinorium has a monoclinal character. It consists of rocks of the Archaic metamorphic complex, among which are intruded the Igralishte pluton and many other smaller granitoid apophyses.

The Belasitsa horst is also a monoclinal block, built by rocks of the Archaic metamorphic complex. Among them are intruded metamorphosed granitoids. The development of stock-wise apophyses of granites of the Southern-Bulgarian type, as well as the presence of small bodies of granitoids of the Pirin type are observed in the northwestern portion of the horst.

The Caledonian-Hercynian intrusive complex is composed by the Southern-Bulgarian granites and the relatively younger Pirin granitoids. The Southern-Bulgarian granites are building the Igralishte pluton and many smaller apophysic bodies situated along the northern border of the Belasitsa horst. The Pirin granites are building some small stock-wise bodies in the northern slope of the Belasitsa Mountains.

Neogene-Quaternary sediments are presenting the Alpine structural stage and fill entirely the Stroumeshnitsa graben and the Strouma graben. They consist of Pliocene deposits (of molasse character) which have a thickness of over 1000 m in the Strouma basin, of Pliocene volcanics (trachyandesites, andesite and dacite vein-bodies, tuffs), and of Quaternary eluvial, alluvial, proluvial and hybrid sediments.

The fault structures in the Belasitsa-Ogralden block are presented by the Lebnitsa fault zone, which has a predominant direction of 330° and by one relatively smaller cross-fault zone having direction of 90-100°, which has the Petrich fault and the Stroumeshnitsa fault as typical members.

The Lebnitsa fault zone is a direct continuation of the southern branch of the Sasso-Toranitsa deep-seated fault zone. Many volcanic bodies and zones of big hydrothermal changes, situated along the northeast flank of the Igralishte pluton, are connected to it.

Between the Ograzhden-Malashevski anticlinorium and the Belasitsa horst is situated the Stroumeshnitsa graben, which is formed during the Upper-Alpine stage and consists of Pliocene-Quaternary sediments.

The performed studies, presented in this report, include a detailed analysis of the gravitational field and its transforms and of the magnetic field, aimed mainly towards determination of the density and magnetic inequalities distribution in the surveyed territory.

The basic rock types building the geological section of the Belasitsa-Ograzhden block are well differentiated with respect to their density (Dobrev , *et al.*, 1989).

The different types of gneisses, which are widely spread in the studied region, have increased density. By the relatively lowest density are characterized the granitizated gneisses (2,62-2,65 g/cm³), the density of the biotite-gneisses is higher (2,66-2,68 g/cm³), and the highest density have the amphibolite-gneisses (2,69-2,81 g/cm³). The granitoids are characterized by relatively low density having values within the limits of 2,58-2,66 g/cm³. The density of the sedimentary rocks building the graben structures is decreased - 2,35-2,53 g/cm³.

The outcropped gneisses, granitoids and sedimentary rocks are non-magnetic. The magnetic susceptibility of the Pliocene volcanics, presented mainly by trachyandesites and veinbodies composed of andesite, is increased and has values up to $n.10^{-3}$ SI.

CHARACTERISTICS OF THE GRAVITATIONAL FIELD AND ITS RELATIONSHIP TO THE GEOLOGIC STRUCTURE

A negative background (Fig.1) characterizes the observed gravitational field of the territory under study.

The studied Belasitsa-Ograzhden block is bounded by two very well pronounced gravity transitions.

It is limited to the east by the Strouma gravity transition A-A, tracing the western edge of the Strouma rift structure. This transition is striking S35°E and has a stable horizontal gradient of 8-10 mGal/km along its entire length of about 30 km. The northern border of the Belasitsa-Ograzhden block is the Breznitsa gravity transition B-B, that is almost perpendicular to the Strouma one.

The studied area gravitational field is characterised by a regional trend positive to the south, starting from the Breznitsa gravity transition towards the two opened to Greece anomalies. The presented field distribution rose-diagram (excluding the areas of the Strouma and the Breznitsa gravity transitions) shows three dominant directions : a subequatorial one, one striking N(45°-60°)E and one striking S35°E (Fig.1). These three directions correlate well with the concept of development of longitudinal and transverse fault deformations along the rift structures periphery.

The gravitational field regional characteristics are analyzed according to the upward continuations at height H = 3 km and H = 10 km, and according to the average values for circle radius R = 15 km.

The regional fields are reflecting the predominant influence of the depth interval under about 10 km (the upward continuation at height H=10 km), under about 7 km (the average values for circle radius R = 15 km), and under about 3 km (the upward continuation at height H = 3 km).

The regional gravity background of the Belasitsa-Ograzhden block in the Bulgarian territory is expressed by a negative gravitational field that includes the peripheral parts of the gravity transitions limiting the Rila-Western Rhodope megablock.



Figure 1. Compound scheme of the observed gravitational field distribution with included elements of the regional fields and a rose-diagram of the field isolines orientation.
1 – field distribution zoning – the arrow shows the direction of increase in the negative intensity;
2 – axes of regional gravity transitions:
A-A - Strouma regional gravity transition mapped at the following depths starting form east to west respectively: under about 10 km, under about 5 km under about 3 km;

B-B – Breznitsa regional gravity transition

The compound regional scheme for the studied block is illustrated in Fig.1. The eastern border is the Strouma gravity transition A-A, that is tracing the Strouma fault zone. This regional gravity transition has a length of about 30 km and stands out boldly on all regional field maps. According to the field of average values for circle radius R = 15 km, it is characterized by a horizontal gradient of 2 mGal/km and a width of about 6 km. The analysis of the transition behavior in regional maps, reflecting depth interval 3-10 km, shows that it dips west about 70-80°.

The northern border of the Belasitsa-Ograzhden block is the Breznitsa gravity transition B-B, that is almost perpendicular to the Strouma one.

The studied area regional gravitational field is characterised by an increase in the gravitational force to the south of the Breznitsa gravity transition. This is a reflection of the depth decrease towards the regional density boundary – the Moho discontinuity.

The local field distortions are due to the structural-tectonic non-uniformity of the studied block.

The local field characteristics are analyzed according to the residual fields derived from the regional transforms and according to the variation anomalies compiled from the centerpoint and ring method of Griffin using a circle of radius R = 5 km.

The residual anomalies derived from the upward continuation at height H = 10 km (Fig.2) show, on a negative background, the distribution of the differentiated with respect to their density media to a depth of about 10 km.

The Strouma A-A, and the Breznitsa B-B gravity transitions are mapping without ambiguity the deep-seated fault zones. The field values are increasing to the south with about 22 mGal. Many relative anomalies can be isolated on this background.

The positive anomaly 1 is situated in the central part of the area. It is opened to the west and is mapping rocks having increased density. In the southeastern portion of the studied territory is separated the positive anomaly 2 that remains opened to the south. The positive anomalies 1 and 2 are situated along an axis that is almost parallel to the Strouma gravity transition. Southwest of these anomaly zones, two smaller positive anomalies 3 and 4 are formed.

In the most western part of the area, the Klyuch negative anomaly 5 is located. It remains opened to the west and to the southwest, and most probably is related to the intrusion of granites having relatively lowered density among the gneisses.

Local gravity transitions are mapping the fault tectonics characteristics.

In the northern part of the area, the gravity transition a-a is tracing the Brezhani fault. Next to Levounovo, northwest of the Strouma regional gravity transition A-A, is formed a gravity transition of a lower order b-b. It reaches Sedelets, and is tracing the Lebnitsa fault.

The Southern-Ograzhden gravity transition c-c is striking N80°E and is separating the central anomaly 1 from the southern ones 2, 3 and 4. This transition, compared to the Strouma one, is of a lower order, and is mapping a fault almost transverse to the rift. It divides the Belasitsa-Ograzhden block into two parts – a northern and a southern one.

The Petrich gravity transition f-f is tracing a fault separating the two southern positive zones. Gravity transitions of the lowest for the studied depths order – d-d and e-e – are detailing the internal faulting of the southwestern block into two parts – positive anomalies 3 and 4.

The compound analysis of the residual field distribution derived from the upward continuation at height H = 10 km indicates that, in the depth interval down to about 10 km, the faults and the separation of the Belasitsa-Ograzhden block are connected to the processes in the Strouma rift structure. The transverse faults of Lebnitsa b-b and Southern-Ograzhden c-c, and the oblique one of Petrich f-f, are forming the main internal-block faulting of the studied territory.





2 - relative field anomalies:
2a - positive;
2b - negative;
3 - axes of gravity transitions:
3a - regional;
3b - local

The residual field derived from the upward continuation at height H = 3 km is illustrated in Fig.3. It reflects the density distribution in the depth interval down to about 3 km.

The Strouma gravity transition A-A is mapped very well, and is moved about 2,0-2,5 km to the west, in comparison with the residual field derived from the upward continuation at height H = 10 km. In this map, the transition is tracing the western border of the Strouma fault zone – the Ograzhden fault (Zagorchev, 1992).

The Breznitsa gravity transition B-B has no distinct presence, but only distorts the field distribution. This fact shows that at small depths the fault mapped by this transition has a weaker performance as density non-uniformity.

The well-pronounced Lebnitsa gravity transition b-b is very obvious in the map. The Southern-Ograzhden gravity transition c-c is also confidently traced. It isolates a wellexpressed negative anomaly 6. Most probably, this anomaly maps a granite core.



Figure 3. Scheme of the residual gravitational field distribution, derived from the upward continuation at height H = 3 km 1 – field isolines (negative); 2 – relative field anomalies: 2a - positive; 2b - negative; 3 – axes of local gravity transitions

In the southern block, the density distribution at the studied depths down to about 3 km is quite modified. A common positive zone, which has two maximums -7 and 8, is formed.

To the south it is limited by the Stroumeshnitsa gravity transition e-e. This transition is mapping well a fault situated at a depth of about 3-4 km.

In the most southwestern part of the territory, the Klyuch negative anomaly 5 is broader and larger at these shallower depths.

Some extra information about the density distribution in the near-surface geologic section can be obtained from the map of the variation anomalies compiled from the center-point and ring method of Griffin using a circle of radius R = 5 km (Fig.4).



Figure 4. Scheme of the gravitational field variation anomalies distribution, compiled from the center-point and ring method of Griffin using a circle of radius R = 5 km 1 – field isolines mapping the variation anomalies; 2 – field anomalies: 2a - positive; 2b - negative; 3 – axes of local gravity transitions

This transform is reflecting the predominant influence of the density-geologic section at a depth of about (0,6-0,7).R, i.e. down to 3-4 km. But it is suppressing in a higher degree the regional background in comparison with the upward continuations residual field. Like this, the influence of the near-surface density distribution is increased.

Well-pronounced anomalies are present on the variation anomaly scheme.

The zero-line on the map is limiting the Belasitsa-Ograzhden block to the west. This line is tracing the Strouma (Ograzhden) gravity transition.

The vast Ograzhden-Malashevska Planina zone 17 has negative field values and remains opened to the west. It is mapping near-surface formations having lowered density.

The negative, almost isometric, local anomaly 6 is well pronounced in this map as well. South of it is situated the Igralishte negative anomaly 13, and to the west – the Nikoudin negative anomaly 12. They are mapping the Igralishte and the Nikoudin plutons respectively (Ignatovski, 1969a; Ignatovski, 1969b).

In the eastern portion of the area, on a negative background, can be separated the positive anomalies 9 and 16 – to the east, and 10 and 11 – to the west. These anomalies are reflecting the presence of metamorphites having a bigger thickness.

It can be summarized, that in this map, the anomalies in the eastern and central part of the studied territory are creating an alternation of zones having increased and decreased density, and orientation close to the one of the Strouma gravity transition.

The pronounced Stroumeshnitsa negative anomaly 15 is very obvious in the southern part of the area. It has two local minimums – a western and an eastern one. This anomaly is mapping very well the Stroumeshnitsa graben.

A positive anomaly 14, which is striking SE-NW, is located in the southeastern part of the studied territory and is connected with the gneisses increased thickness.

Several local gradient transitions can be isolated in the analyzed map. In the northern part, the Lebnitsa b-b and the Tsaparevo b'-b' gravity transitions are most pronounced. They are striking S45°E and are tracing faults of the Lebnitsa system. To the south, the gradient zones e-e, e'-e' and e"-e" are reflecting faults of the Stroumeshnitsa system.

The compound analysis of the regional gravitational fields (Fig.1) and the local transforms (Fig.2, Fig.3 and Fig.4) shows that they are differentiating very well the geologic section of the Belasitsa-Ograzhden block with respect to its density characteristics.

CHARACTERISTICS OF THE GEOMAGNETIC FIELD

The observed geomagnetic field of the studied territory (Fig.5) is characterised by negative background values within the limits of -100 and -150 nT. On this background two anomalies can be separateded.

A pronounced positive anomaly 1m is very obvious in the northern part. Its position is correlating well to the Breznitsa

fault zone B-B (Fig.1). Most probably along this zone are intruded rocks having increased magnetic susceptibility.

A negative anomaly 2m is present in the southwestern part of the map. It has an intensity of about -300 nT, and remains opened to the south. This anomaly correlates well to the Klyuch negative anomaly 5, pronounced in the local gravity transforms schemes (Fig.2 and Fig.3). It is mapping intruded granites having relatively lower magnetic susceptibility in comparison with the Neogene volcanics of the Stroumeshnishki graben.

The subequatorial direction (90-110°) is predominating on the presented rose-diagram (Fig.5). The two other directions observed are one striking roughly S45°E and one striking roughly N45°E.



Figure 5. Compound scheme of the observed magnetic field distribution with included elements of the regional fields and a rose-diagram of the field isolines orientation.
1 – field distribution zoning – the arrow shows the direction of increase in the negative intensity;
2 – field anomalies: 2a - positive;

2b - negative

MAIN ELEMENTS OF THE GEOLOGIC-GEOPHYSICAL STRUCTURE OF THE BELASITSA-OGRAZHDEN BLOCK

The compound systematization of the studied geophysical fields basic characteristics shows a complex interrelation between the deep fault-block tectonics of the BelasitsaOgrazhden block and the near-surface distribution of rocks having different density. This fact is justifying the development of two compound schemes of the geologic-geophysical structure of the studied territory.

In Fig.6 is illustrated the scheme reflecting the main elements of the fault-block tectonics, dominating in the depth interval 3-10 km, and in Fig.7 - the scheme reflecting the main elements of the near-surface geologic-geophysical section, predominating down to a depth of about 3 km.

The analysis of the geophysical fields in the studied part of the Serbian-Macedonian massif shows generally a good correlation between the established anomalies and transitions and the main geologic structures described in the region.



Figure 6. Compound scheme reflecting the main elements of the Belasitsa-Ograzhden fault-block tectonics, dominating in the depth interval 3-10 km

1 –structures mapped by geophysical anomalies:

- 1a positive gravity anomalies;
- 1b negative gravity anomalies;
- 1c positive gravity anomaly;
- 2 gravity transitions tracing fault structures:
- 2a regional gravity transitions expressed down to 15 km and more;
- 2b gravity transitions expressed in the depth interval 3-10 km

The Strouma gravity transition A-A is tracing the deepseated Strouma fault zone. It is limiting the Belasitsa-Ograzhden block to the east.

At relatively shallower depths the Strouma gravity transition is mapping the Ograzhden fault (Zagorchev, 1992), as a western border of the Strouma fault zone. The transition is striking S30°E. The interpretation data are showing that at bigger depths it displaces to the west. This fact confirms the concept of rotation in the Strouma zone faults during the Pont-Pliocene (Zagorchev, 1992).

The Breznitsa gravity transition B-B is tracing a deep-seated fault and is bounding the Belasitsa-Ograzhden block to the north. Most probably along the fault were intruded rocks having increased magnetic susceptibility. They are mapped by a very well pronounced positive magnetic anomaly.

The Lebnitsa gravity transition b-b is striking approximately N60°W and is traced very well from the village of Sedelets to its intersection with the Strouma gravity transition near the village of Levounovo. It is mapping the Lebnitsa fault zone (Boyadzhiev, 1971) – a continuation of the Sasa-Toranitsa fault zone second southern branch (striking approximately N30°W).

The Southern-Ograzhden gravity transition c-c is transverse to the Strouma fault zone and is tracing a fault that separates the central block 1 from the southern ones.

In the most southern part of the territory are situated the Kolarovo d-d and the Petrich f-f gravity transitions. They are tracing the Kolarovo and the Petrich faults respectively (Ignatovski, 1968) and are dividing the Belasitsa block structure reflected by two positive anomalies - 2 and 3.

The Northern-Igralishte and the Klyuch negative anomalies 5 and 6 are mapping granite plutons, intruded among metamorphites.

The Podgoritsa gravity transition e-e is mapping the Podgoritsa fault (Ignatovski, 1968; Zagorchev, 1992) and is separating a block structure having two local highs 7 and 8.

In the scheme, reflecting the main elements of the nearsurface geologic-geophysical section predominating down to a depth of about 3 km (Fig.7), the studied territory is differentiated very well with respect to the density.

The positive zones 9, 10, 11, 14 and 16 are separating the areas where are dominating gneisses having bigger thickness and relatively higher density.

The Igralishte negative anomaly 13, the Nikoudin one 12 and the negative anomaly 6, caused by a deeper structure, are mapping granitoid plutons having relatively low density.

The Stroumeshnitsa negative anomaly 15 is tracing the biggest thicknesses of the decompressed sedimentary rocks that fill the Stroumeshnitsa graben.

The gradient transitions are mapping faults of two main systems – the Lebnitsa system, situated in the northern part of the area and striking S45°E, and the Stroumeshnitsa one, situated in the southern part and striking N45°E.

Analyzing together the two compound schemes one can see that in the depth interval 3-10 km are predominating the faultblock tectonics main elements, while the near-surface distribution of rocks having different petrography and respectively density characteristics is predominating in the depth interval down to about 3 km.



Figure 7. Compound scheme reflecting the main elements of the Belasitsa-Ograzhden near-surface geologic-geophysical section predominating down to a depth of about 3 km 1 –structures mapped by geophysical anomalies:

- 1a positive gravity anomalies;
- 1b negative gravity anomalies;

2 – gravity transitions tracing fault structures:

2a – regional gravity transitions expressed down to 15 km and more;

2b – gravity transitions expressed in the depth interval 3-10 km

CONCLUSIONS

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The data of the Belasitsa-Ograzhden block geophysical fields analysis and interpretation are confirming and enriching the knowledge of the geologic-geophysical structure in this territory. The compound analysis of the gravitational fields (Fig.1, Fig.2, Fig.3 and Fig.4), the magnetic field (Fig.5) and the developed two compound schemes (Fig.6 and Fig.7) is the reason for the following conclusions:

• The Strouma gravity transition is pronounced without ambiguity in all regional and local gravitational fields. The transition characteristics in the regional maps, which are reflecting the depth interval 3-10 km, are showing that it dips west about 65-80°. In the local fields maps, this gradient zone is tracing the Ograzhden fault limiting the Strouma fault zone to the west (Zagorchev, 1992). It strikes N35°W and dips west about 70-80°.

• The fault-block tectonics have predominant influence in the depth interval 3-10 km. The Lebnitsa, the Southern-Ograzhden, the Podgoritsa, the Kolarovo and the Petrich gravity transitions are forming the block division of the studied territory. The Northern-Igralishte and the Klyuch negative anomalies are mapping relatively deep granitoid plutons.

• The geophysical fields main characteristics in the depth interval down to about 3 km are mapping the near-surface disposition of plutons, reflected by the Northern-Igralishte, the Igralishte, the Nikoudin and the Klyuch negative anomalies. The areas having increased thickness of the metamorphites are separated by positive anomalies. The Stroumeshnitsa graben and especially the areas having increased thickness of the decompressed sedimentary rocks that are filling it are mapped very well by negative anomalies. In the studied nearsurface interval, gradient transitions are tracing faults of two main systems - the Lebnitsa system and the Stroumeshnitsa one.

• The analysis of the main elements of the geologicgeophysical structure in the Belasitsa-Ograzhden block is showing that the studied block has been developing under the direct influence of the rift processes in the regional Strouma rift structure. These processes and their performance are reflected mainly in fault deformations transverse and oblique to the Strouma rift system.

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