

## QUATERNARY RELIEF BUILDING IN THE EAST STARA PLANINA MOUNTAIN RANGE

**Abstract:** The Eastern Stara Planina Mountains Range is prolonged from west to east between the Pass of Vratnik and Black Sea coast at a distance from 155 km. It is limited to north from the Eastern Fore Balkan Mountain Range and the Golyama Kamchiya River valley. The southern boundary is marked by Sliven, Straldzha, Karnobat and Aytos Kettles and Kableskovo Hill. This part of the Stara Planina Mountain Range System is composed by the middle and low high more or less longitudinal oriented Kotel, Varbitsa, Kamciya, Emine, Sliven, Stidov, Grebenetsm Terziyski, Karnobat and Aytos mountain massifs. They are crossed in WSW-ENE direction from the large Luda Kamchiya River valley.

The geological-tectonic basement of the mentioned area is compounded by different Phanerozoic (predominantly Mesozoic and Paleogene) rocks of the Late Alpine (Pre Upper Oligocene) Stara Planina and Sliven Allochthon Complexes, Upper Oligocene-Lower Pleistocene and Quaternary continental deposits. The Upper Oligocene-Lower Pleistocene time was characterized by a similar paleogeographic setting. It was finished with the rising of the large Post Early Pleistocene Orthoplain. The beginning of its destruction (before 990 000 y) has marked the beginning of the Quaternary mountain building in the region.

The mentioned area corresponds with the eastern part of the Stara Planina Morphostructural zone. It was up to now divide on the Western Stara Planina, Middle Stara Planina and Eastern Stara Planina morphostructural area. The realized investigation has given arguments for the following divide:

The morphogenesis in the Udvoymator and Maritime morphostructural area has the following peculiarities: 1/ The contemporary relief has a mosaic pattern. It includes fragments from the four Quaternary morphostructural generations in this territory. 2/ The Quaternary morphogenesis was completely controlled from the listric tectonics. The last one is the most important very specific morphodynamic factor of the endogen processes near the earth superficial. The listric faulting has formed the dome-like morphostructures – the most important contemporary morphounits in the Eastern Stara Planina Mountains Range. 3/ The primary Quaternary mosaic pattern of the Udvoymator and Maritime morphostructural area is an effect of the more deep destruction of the crust. It determined the irregular contours of the dome-like morphostructures. 4/ The orographic peculiarities of the mountain ridges are limited by the dome-like morphostructures.

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### Keywords:

Morphotectonic, morphostructures, listric tectonics, platetectonic.

**I**n this article are examined some new conceptions (opinions) regarding Quaternary geodynamic of Eastern Stara Planina Mountains from point of view of platetectonic.

As whole the alpine relief of Bulgarian continental microplate is result from intercontinental impact between Gondwana and Eurasia microplates and between Bulgarian and Misian microplates (Stara Planina Range) [1]. In the area of Sliven and Kotel Mountains contemporary rising movements are with highest value (+ 1.5 to + 2.0 mm er year) for all Eastern Stara planina Moutains.

This research has aim to make contemporary attempt for creation model of Neogene-Quaternary paleographic and geodynamic characteristics of Eastern Stara Planina Mountains. It has proceeded from the presumption that Middle Pleistocene – Holocene morphogenesis in Bulgaria has been done in continental environment in conditions of tender deformations and with the decisive role of listric tectonic in forming of regional block, mountain, kettle and other morphostructures.

On the land surface endogenous forces have interacted with exogenous ones. In this meaning in this research has taken in consideration the role of the main exogenous processes and their influence in forming the contemporary pattern of the morphostructures.

It has propounded new interpretation of the genesis and the essence of the river – valley network and the kettle morphostructures in the region.

For starting point of the implemented research was took morphostructural analysis. It is examined the influence of contemporary endogenic processes onto the land i.e. the creation (morphogenesis) and consequent changes (morphoevolution) of land forms under the influence of surface crust the youngest and contemporary geotectonic processes.

In result of implemented regional morphometric, morphostructural researches and the analysis of paleographic Neogene – contemporary evolution in Eastern Stara Planina range was rejected dominant more then 100 years conception for unified geomorphological Eastern Stara Planina Mountains. It is cut diagonally by well marked valley of Luda Kamchya river. Its gorges (between Daskotna and Asparuhovo villages) and Potamishka river (its right feeder) divide Eastern Stara Planina Mountains (conceptual till now like unified) in two independent Post Early Holocene morphostructural: to West Udvoymator (consist Vratnik, Kipilovo, Rish, Vartbitza, Veselinovo, Razboi, Gradetz, Podvis, Sliven, Stidovo, Grebenetz and Terzievo morphostructural regions) and to East Maritime (consist Asparuhovo, Kamchya, Rudnik, Golish, Solnik, Belen, Kozidhene, Emine, Obzor, Karnobat, Aitos and nevestino morphostructural regions).

The contemporary hilly and mountain relief of Stara Planina Mountains chain system eastern from Vratnik pass is result of post - alpine (Post Early Oligocene) morphogenic processes. They had done after the almost fully erosion cover up the relics of the last morphostructural plan. From it have preserved area area detached solids. Consequently the beginning of Neogene – contemporary morphogenesis in these places is connected with widespread planar of former Late alpine relief. Each morphogenesis originate in one -type for widespread areas natural environment. It is obligatory precondition for origin of new relief.

During the long geo- historical interval Late Pleistocene – Early Pleistocene the land of Eastern Stara Planina Mountains as and almost all eastern part of Balkan Peninsula have distinguished with marked savanna and savanna -like plane relief checkered with separated or group of remnant hills – solids [2] etc. In the erosion processes of savanna take part widespread in this environment interweave rivers with variable flow, continuously alteration of the apron, meandered stream and wide range of depositing alluvial deposits. The originated in these conditions continental denudation and partially accumulative wide alluvial plain have to be considered in morphostructural researches as Orthoplain. The forming and the very long existence of this type landscapes are due to the continued several million years ( in the interval Upper Oligocene – Early Pleistocene) undisturbed supremacy of exogenous processes .

In the area of Eastern Stara Planina Mountains during forenamed period consequently have formed several super positioned Orthoplains. The last one has originated completely at the end of Early Pleistocene. Post Early Pleistocene Orthoplain as and the other Orthoplains have had morphological character of widespread alluvial plain. And it was base of development of Quaternary mountain - forming processes.

The changes in morphotectonic regime which have begun at the end or after Early Pleistocene obviously were connected with endogenous processes mosaic faulting and block displacement in the deeper parts of the crust. The effects of this deep crust destruction

gradually have led to forming the first dome -like and mountain morphostructures under the activity of surface listric tectonic.

The new created positive land forms have destructed more and more the Orthoplain surface.

The originated from them hilly and low mountain relief has begun fast to reduce the range of savanna -like paleographic environment. The first new originated (Post Pleistocene) positive land forms have fallen under the active influence of exogenous processes. This has led to their partially destruct (erosion) and their consequent conversion from dome -like to concentric morphostructures. Nowadays their trucks mark the early stage of fast raised endogenous morphogenesis.

The next morphogenic stage is characterized with more intensively and large – scale forming of positive (dome – like and mountain) morphostructures. The surface spreading of this new morphostructural generation has done on behalf to reducing the range of Post Early Pleistocene relics. Gradually the new formed positive morphostructures has got territorial superiority.

And the relics of Orthoplain have differentiated onto the the bottoms of kettle morphostructures , morphostructural corridors and related with them morphostructural thresholds as and river- valley morphostructures . The last ones save nowadays their dome-like or mountain character, because the speed of their rising exceed the intensity of exogenous destructive processes. All this have led to consequent but fast replacement of savanna plain regime with this one of the hilly and low mountain areas.

In course of Middle Pleistocene – Holocene mountain – origination process has continued land surface reducing and internal destruction of Orthoplain relics. In the bottoms of kettle morphostructures around centers of maximum contemporary rising have originated sinmorphogenic elevations- inceptions of the new positive forms.

The negative morphostructures are the oldest Quaternary land forms in researched regions. This oldest morphostructural generation don't belong to in the range of the younger mountain morphostructures but it is includes in contemporary Quaternary morphostructural block mosaic of East Stara Planina Mountains. The territorial range of the fragments of Orthoplain has decreased (till its full disappearing) on behalf of increased new positive dome-like and mountain structures.

Separated very small Orthoplain relics have preserved by erosion as cover surfaces (or parts of them) of some listric prisms in the range of dome -like morphostructures.

Within East Stara Planina Mountains the older relics from Post Early Pleistocene Orthoplain are Luda Kamchya complex morphostructural corridor , Kotel, Jeravna, Beronovo, Ljuliakovo, Sungulare, Hadjiiska kettle morphostructures. Kotel, Manolich, Trunak, Marash, morphostructural corridors, Medven, Esen, Duskotna, Mochurishte morphostructural thresholds,

Neikovo, Ichera, Elena, Kriva, Fundakliska, Perperedere, Dvoinik, Kukudere, Iraklii river-valley morphostructures.

In the kettle bottoms have formed and are still forming Holocene contemporary sinmorphogenic elevations (Katunica, Dubovik, Vezenkovo, Esen, Zavet, Listetz, Orizare and Tunkovo).

In this meaning the space of geographical separated East Stara Planina Mountains is morphotectonic mosaic from fragments of several different generations.

Within Udvoymator and Maritime morphostructural area are represented wide spectrum of various negative and positive morphostructures. They are united in several morphostructural generations. Their traces have formed complicit mosaic of land forms which modeling contemporary relief at these places.

## MORPHOSTRUCTURAL GENERATIONS IN EASTERN STARA PLANINA MOUNTAINS RANGE

### POST EARLY PLEISTOCENE ORTHOPLAIN

Origin time – end of Early Pleistocene.

Essence – large alluvial savanna – like plain.

Beginning of destruction and displacement – after the Early Pleistocene, parallel with the starting of the Quaternary mountain originating processes.

Contemporary relics – block displaced bottoms of the kettle morphostructures, morphostructural passages, river valley morphostructures, morphostructural thresholds, fragments of villa frangian accumulative plains on the top of some listric prisms.

### POST EARLY PLEISTOCENE CONCENTRIC MORPHOSTRUCTURES

Origin time – after the end of Early Pleistocene – beginning of Late Pleistocene.

Essence – relics from early generation of dome-like morphostructures, transformed, trough very active erosion, in concentric morphostructures.

Beginning of destruction – simultaneously with the creating of the primary dome-like morphostructures under the influence of the very active erosion processes.

Contemporary relics – traces of concentric morphostructures.

### MIDDLE PLEISTOCENE – HOLOCENE DOME-LIKE MORPHOSTRUCTURES

Origin time – From Middle Pleistocene till today.

Essence - numerous dome-like morphostructures.

Beginning of destruction – very fast, non stop origin and vertical and lateral (at the ortoplain relics expense) creasing of the dome-like morphostructures prevent the activity of the destructive exogenous processes.

Contemporary relicts – The dome-like morphostructiures (with the older negative and concentric morphostructures) are building the contemporary mountain relief.

### HOLOCENE CENTERS OF CONTEMPORARY ELEVATION

Origin time – Holocene today.

Essence - synmorphogene uplifting on the bottoms of the kettle morphostructures.

Beginning of destruction – very active contemporary uplifting of this embryonic dome-like morphostructures prevent the activity of the destructive exogenous processes.

Contemporary relicts – positive relief forms on the bottom of the kettles.

## CONCLUSION

The contemporary development of the relief has begun with destructing of Post Early Pleistocene Orthoplain (990 000 years ago). Then have started the rising of dome -like and mountain morphostructures of the contemporary mountain massifs in the country – included Eastern Stara Planina Mountains.

The relics from more destructed Orthoplain nowadays model the bottoms, the kettle morphostructures, of morphostructural corridors and river -valley morphostructures. They mark periphery zones around the rising dome -like and mountain Middle Pleistocene morphostructural regions and their consisted morphostructures .

As older passive element the relics of Orthoplain are more surface reduced depend of intensity and speed of the raising of formed dome-like morphostructures . That's why these relics are located in the periphery of the morphostructural regions. The fact that these relics are represented very frequently within Maritime morphostructural area is because of its later formed dome- like and mountain morphostructures .The Orthoplain relics have very important role for differentiating of separated morphostructural regions eastern from Vratnik pass.

The presence of widespread sinmorphogenic elevations in the bottoms of kettle morphostructures in the range of Udvoymator and Maritime morphostructural areas shows continuously destroying of these last relics from Orthoplain.

Very important role for modeling of Neogene and contemporary relief in Eastern Stara Planina Mountains have the regional defile network from one side and the effects of listric tectonic from other side.

From Quaternary till nowadays the listric tectonic in combination with steep sunk faults set the specific characteristics of the land forms in the researched region. This influence is represented with set of step – shaped in altitude listric prisms.

The indented relief in our country and already proved [1] very fast riding of contemporary Bulgarian mountains (in the last 990 000 years) unambiguous show that the relief in Eastern part of Balkan Peninsula exactly Eastern Stara Planina Mountains is dominated by the endogenous processes.

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