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PREHISTORIC ROCK SANCTUARY WITH ARCH NEAR THE VILLAGE OF KOVACHEVITSA, BULGARIA: SPATIAL ORIENTATION AND SOLAR PROJECTIONS

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ABSTRACT

Study of spatial - temporal organization of the sanctuary interior of rock - cut monument with rock arch is presented in this work. The sanctuary is located in the Western Rhodopes, village of Kovachevitsa, Garmen Municipality and it is archaeologically dated back to the Eneolithic. The monument is about 20 meters long and it is part of a large rock ridge. The topographical, landscape and microrelief features of this monument are described and the excellent view of the ancient observer to the sky and local horizon is noted. An analysis is made of the structural elements of the sanctuary and possible observational purposes. Astronomical azimuths of the base lines connecting the arch opening and the other elements of the sanctuary are determined. It has been found that sunrise during the summer solstice can be observed from the observational platform through the arch opening. Chronological boundaries of existence of the rock-cut monument are determined. They refer to the era of the late Eneolithic - III - II millenium BC.

KEYWORDS: Rock sanctuary, rock arches, solar projections, extreme rises of the sun.

1. INTRODUCTION

The study of the spatial organization of the rock-cut monuments (rock sanctuaries) and the presence of linear and circular structures gives serious evidence of solar orientations, natural relief and architecture in antiquity associated with the cult of the sun. Therefore, rock-cut monuments are subject of

separate and independent archaeoastronomical investigation. The study is based on our knowledge about the place of astronomy in the culture of the ancient archaic societies lived in Bulgarian lands, and the recording, analysis and interpretation of their morphometric modifications (Potemkina *et al.*, 2006).



Figure 1. Rock arch on the territory of the megalithic sanctuary "Tsarevi porti" (Royal gates) near the village of Kovachevitsa, Garmen Municipality

Longtime research has shown that the earliest era in the history of astronomy in Bulgarian lands is associated with observations on the horizon and fixing points of the horizon from one observational point (rises and sets of the sun, moon, stars, planets). Later, special constructions are used for observations of culminations of the sun and the light projections.

On the other hand, in ancient astronomy, structure of morphological elements, height and depth of the horizon, symmetry, fractal, isomorphism and others are parameters that affect us in the perception of relief and generate subjective perceptions of its relationship with the sky, celestial objects and phenomena. The totality of natural objects and natural conditions is a valuable spatial resource used by ancient astronomers and priests (Stoiev *et al.*, 2013).

In later times, natural rock alignments were replaced by artificial building constructions, which are now called dolmens. The dolmens are more complex structures - fixed plate (roof) above the ground with

supporting elements. It turns out that the morphology of the later dated objects clarifies somewhat morphometric characteristics of the earlier sites. We see some similarities (which illustrate the cultural continuity, tradition) as well as some differences (expression of cultural development and technological evolution). The comparison allows us to draw the following conclusions:

First: The studied rock arches show that besides from the direction of the sun's extreme sunrises and sunsets, the creators of these sacred objects were also attracted from the directions of sunrise and sunset on random days of the year. Probably, they have coincided with important days of the cult calendar of the ancient societies. All these directions were sought in both the design and realization of the monuments from the so called epoch of dolmen building.

Second: The earlier megalithic culture, relying on natural forms and elements additionally incorpo-

rated in them, at the end of the 1st millennium BC has been replaced by a new megalithic culture with completely artificially created monuments. Sacred, religious and ideological content of the later structures (reflected in the orientation and ritual practices) has been maintained in the new historical era. The basic principle-orientation in compliance mostly with the Sun God at its extreme rises and sets and

occasionally with sunrise and sunset on the equinoxes remained the same in the new era with an addition-orientation towards the highest daily position of the sun during different seasons. This proves in one more way the continuity of evolution in the general and special cultural life of the society of ancient Thrace.



Figure 2. Main structural elements of the rock sanctuary "Tsarevi porti"

Third: The evolution of rock arches is caused not only by improving orientation construction technique, but also by the development of theological doctrines. The most significant religious ideas, practices, customs (expressed in and through orientation) are emphasized. Temple architecture of the sacred monuments is simplified and the astronomically significant directions are further accented with additional rock-cut shapes. Sun worship has undergone major development towards simplification. This process is a demonstration of the parallel processes of territorial, economic and political consolidation among the Late Eneolithic and Thracian tribes. The common observational practice in the investigated natural monuments (rock arches) is associated with probable prognostic features of the rock complexes

connected with the daily and annual solar cycle (Maglova et al., 2010).

Rhodope Mountains emerged as a specific cultural area in the Chalcolithic and Bronze Age - contact zone between the Carpathians and the Aegean. From the period of early Eneolith (Karanovo V), in the Rhodopes so far have not found traces of permanent population. Since the second half of the Eneolith begins the expansion of the peoples of the Thracian lowland to peripheral areas. There are large changes in the lands of the central Balkans in the Late Eneolith. It is established tribal unity on huge territory lasted about 400 years - the culture Kodzhadermen-Gumelnitsa-Karanovo VI. Rhodopes fall in the southern periphery of this tribal confederation stretching north across the Danube river.



Figure 3. Groove for outpouring of sacred fluids (libations) on the upper part of the rock arch "Tsarevi porti"

This archaeological culture possessed dual nature of their governance bodies - social and religious. New types of objects - a craft-production centers, rock sanctuaries and probably some gold mines - are organized and acted to the end of that epoch to service the needs of the new social formation.

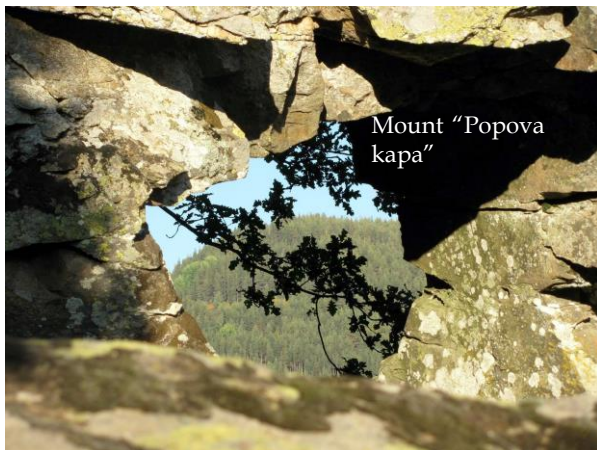


Figure 4. Main opening of the rock arch "Tsarevi porti" for sun projections viewed from the stone-altar

Such objects are found only in the southeastern part of the mountain, while the southwest part, along the Mesta river, remains less populated and without particularly large settlements. Rather, it remains territory reserved for religious centers associated with major cults of the Great Mother - Goddess and God - Sun (Raduncheva A., 2003).

2. DESCRIPTION OF THE ROCK SANCTUARY "TSAREVI PORTI"

The discovery of the rock arch "Tsarevi porti" in the land of the village of Kovachevitsa, Garmen municipality (Figure 1) was a result of research of the National complex scientific expedition "Thracian sanctuaries from the Western Rhodopes, Pirin and Rila" from 2002 to 2006 (Gotcev and Markov 2005), organized by South-West University "Neofit Rilski"

- Blagoevgrad, National Archaeological Institute with Muzeum, Bulgarian Academy of Sciences, Sofia and Plovdiv Regional ethnographic Museum.



Figure 5. Sacrificial altars of the sanctuary "Tsarevi porti"

In 2009, within the frames of the fieldwork during the complex expedition, detailed archaeoastronomical research on spatial-temporal organization of the sanctuary interior of the rock-cut monument is made of specialists from the Space Research and Technology Institute, Bulgarian Academy of Sciences, Stara Zagora Department.



Figure 6. The stone-altar, standing on the line of the main astronomical azimuth of the sanctuary

The part of the Rila-Rhodope massif, where the rock arch is located consists of system of structures composed of igneous rocks (granite, gneiss, schist, marble and others), shaped at the end of the Early Cretaceous. In the early Paleogene the rock massif was subjected to stretching and faulting, which leads to the formation of depressions filled with sedimentary and volcanogenic rocks. It is characterized by a complex tectonic structure.

The rock arch "Tsarevi porti" is formed in gneiss rocks. Geological research in the area of the village of Kovachevitsa, shows that wind and water erosion is unlikely as physical-chemical factor in the formation and development of rock arches in gneiss.

Lithological studies of the rock massif show that the physical processes of weathering and selective weathering led to the formation of the arch. Process of formation of the arch is seriously affected by disturbance of masses in the bedrock because of geomorphological change of the slope as a whole. The reason for this is cutting of the relief in the line of the river valley (Katskov and Marinova, 1992).

The rock sanctuary near the village of Kovachevitsa, Garmen Municipality is located in the composition of a large rock group with a length of 20-25 meters, oriented in a natural way, almost in the plane of the meridian. There is an excellent view of the sky and horizon. After the analysis of the structural elements of the monument the essential observational purposes who have placed ancient observers are determined. The geometric center of the observational lines connecting extreme points of sunrises with the characteristic relief of the rock arch were studied in the process of archaeoastronomical research. Survey of the rock arch has been done with an accuracy of $\pm 5''$ and the geographic coordinates have been determined using GPS receiver ($\varphi = 41^\circ 42' 05,5''$, $\lambda = 23^\circ 48' 55,4''$, $h = 1147$ m).

3. ARCHAEOASTRONOMICAL RESEARCH

Choice of the specific rock group with a particular orientation is deliberate. All astronomical hypotheses about the described sacred territory are associated with the lintel of the arch. Projection of the light opening is connected with additional elements of the rock sanctuary, located close to the main axis of the monument (grooves, altars) (Maglova et al., 2010).

The rock arch is cut high in the mountains, in a natural rock. To the south, there is a large ground with hewn in the bedrock altar. During the summer solstice the sun rises over the opposite peak named Popova kapa and the sunlight goes through the arch and illuminates the altar (Figures 2, 3, 4, 5 and 6).

It became clear that cult activities are concentrated in two main centers respectively in position "above" and "below", similarly to the great part of the investigated megalithic sanctuaries in the region (Markov et al., 2008).

In structural and semantic terms, these are positions related to space, and the underworld. "Outpouring" of sacred fluids through the rock-cut grooves and rock arches in the rock pools gives a reason to believe that this is evidence of ritual bath as part of an ancient ritual during the summer solstice.

This ritual could be found in the ritual practice of many Indo-European peoples. Moreover, probably during the summer solstice "Feast of manhood Sun" was a popular practice in some of the largest megalithic temples in the Western Rhodopes.

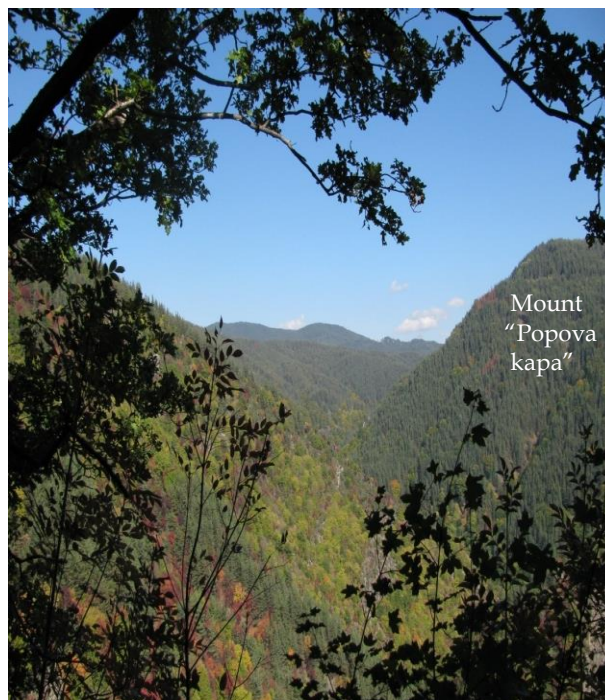


Figure 7. The limb of the northeastern horizon seen through the opening of the arch of the sanctuary "Tsarevi porti"

Calculations show that during the summer solstice, when the sunlight passes through the opening along the axis of the facility, the outer lower edge of the lintel of the arch is projected exactly on the sacrificial altar, separate rocks and rock groups around the facility (Figures 7 and 8). This is connected with building of a system of markers and observational points along the line of sight from the place of observation to astronomically significant point on the horizon (sunrise over Mount Popova kapa at summer solstice) (Stoiev and Maglova, 2002).

4. RESULTS AND DISCUSSION

Most probably, the basic geometric elements of the arch are connected with cosmogonic view of the ancient Eneolithic communities that have considered the celestial sphere in direct relation with different spatial orientations of the rock arches relative geographical directions.

This can be interpreted as reconciling the needs of economic and social life, which is found in the cult of the Great Mother Goddess. Her worship originated during the Paleolithic, where She appeared as a self-sufficient for the movement of the World cycle.

For the primitive religious consciousness Earth is taken for granted: its scope, its hardness, its diverse topography and vegetation are living and active cosmic unity (Markov, 2007).

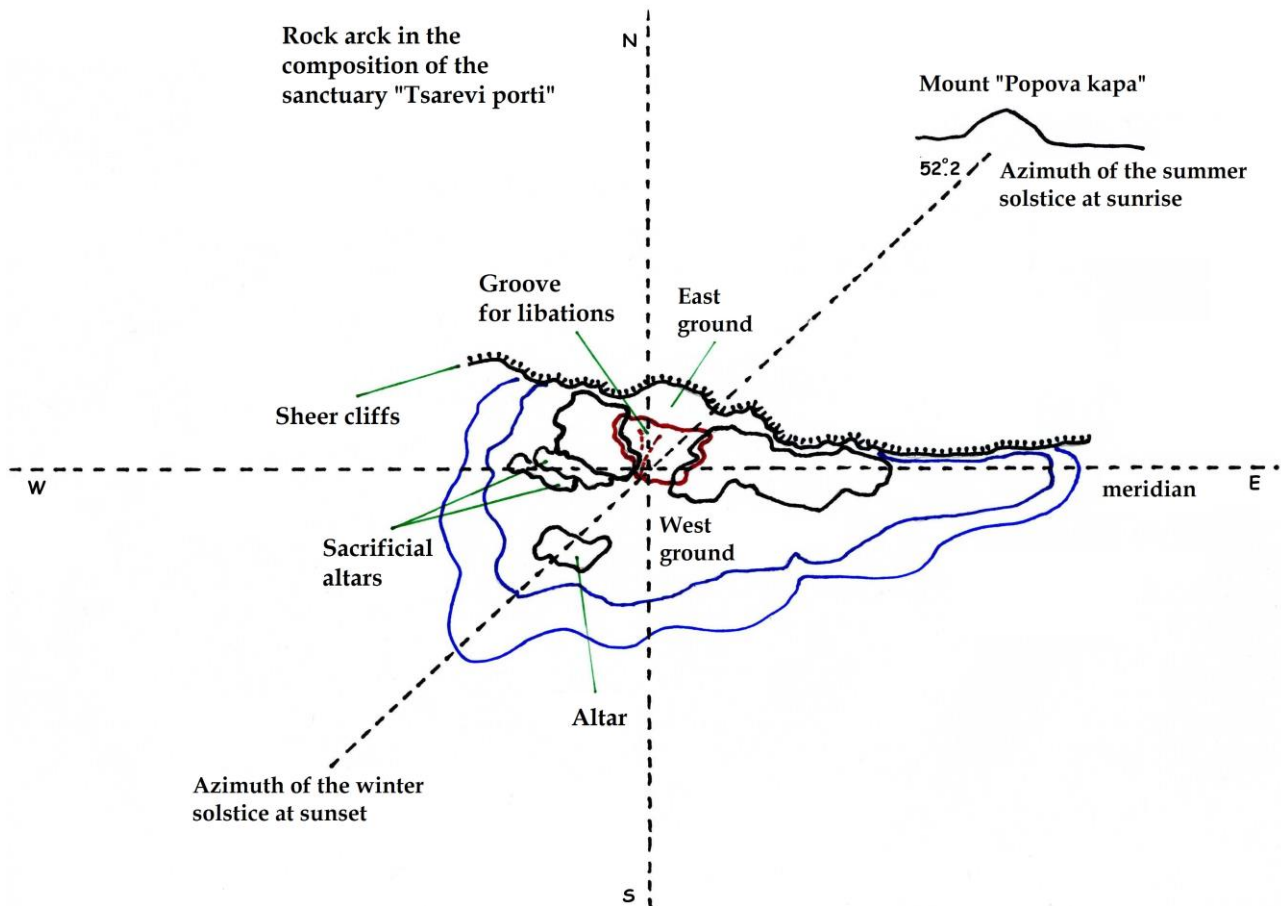


Figure 8. Orientation of the main structural elements and astronomical azimuths within the rock arch "Tsarevi porti"

5. CONCLUSIONS

The investigated megalithic monument-rock arch "Tsarevi gates" near the village of Kovachevitsa, Garmen Municipality is oriented along the axis connecting the light opening with extreme sunrise in the east horizon line that matches the characteristic peak "Popova kapa". Eastern orientation, geometry and ratios between the different functional elements of the sanctuary show that it has been deliberately constructed and continuously exploited for maintenance of solar calendar.

Archaeoastronomical hypothesis about the rock arch "Tsarevi porti" is connected with direct observations of the sunrise during the summer solstice, and solar projection, produced by the passage of sunlight through the rock hole that falls

on exactly corresponding to its size entrance marker (rock altar).

The problems of more general observational practice in the space of this and other already investigated megalithic monuments, as well as probable prognostic capabilities of rock complexes associated with daily and annual solar cycle will be subject to additional archaeoastronomical research. This also applies to the modeling of spatial-temporal organization of the sanctuary from the Bronze Age to the Chalcolithic included in the value system of the society of that time and their transmission in later epochs until today. An important test for the credibility of archaeoastronomical hypothesis of this study related to the calendar projections in the axis of the facility is the attempt to implement it in the later Thracian cult architecture.

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