

**Session title: ASTRONOMICAL ASPECTS OF  
ARCHAEOLOGICAL CULTURES**

**Organizers:** Saša Čaval, Institute of Anthropological and Spatial Studies,  
Scientific Research Centre of the Slovenian Academy of Sciences  
and Arts, Slovenia

**Discussant:** Martina Knavs, Institute of Josef Stefan, Slovenia

**Time:** Thursday morning

**Room:**

**Session abstract:**

Astronomy is an inseparable part of ancient cultures. Archaeoastronomical surveys in different countries vary according to the period researchers are most interested in or have the most information of. The aim of the session is to get closer to the notion of what was perceived as important in the sky or on the horizon but in connection with the celestial bodies. One of the major interests is also the significance that was ascribed to it in ancient cultures and in societies, explored by archaeology. The complex relationship between astronomy and other aspects of a culture's life, such as politics and economy, makes astronomical part extremely interesting and revealing. The interdisciplinarity of the subject logically employs modification of anthropological and ethnological approaches in the least. A culture's astronomical concepts interact mostly with religious ideas; people strived to adjust their activities with natural cycles or with especial events in the natural world (on the sky or in connection of the sky with the horizons). Archaeoastronomical research supported by a theoretical erudition can assist in elucidation of such interactions.

**Paper abstracts:**

**THE MOON PREHISTORICAL CALENDAR**

Ronaldo Rogério de Freitas Mourão, Brazilian Institute of History and Geography,  
Academy of Philosophy, Brasil

One of the questions raised is the one about the doubt if the first men had the required ability to use the celestial bodies on their tempo-spatial orientation, as has been seen in several specimens of animals. In fact, some bird specimens are, mysteriously, genuine masters on the celestial orientation.

On its biological sense, the orientation is naturally a necessary aspect to all living creature. On man, however, the stimulus and/or the instinct of orientation seem to have had little development. His abilities to navigate in long distances, on the contrary to what happened to the birds, fishes and maritime mammals had been very limited. The human migrations seem to be had more restricted themselves to nature geographic distances and obstacles. On the other hand, the modern man, opposite of

the primitive man, needs a compass to guide him and in long distances, even of a sextant or of an star almanac to find his route.

There are vestiges that the primitive societies used the Sun, the Moon, constellations, and even sometimes, a very shining star, like Sirius, Regulus, etc., or even opened starrng agglomerated, like the Pleiades, as an element of guidance and/or of time score. Some stars and planets, the same way as the Pleiades among the Brazilian Indians, constituted authentic seasonal marking references.

## **SOUTH INDIAN MEGALITHS AND ASTRONOMY**

Kudupudi Pulla Rao, Department of History, University of Hyderabad, India

South India is dotted by numerous megalithic sites. Contrariwise as in Europe, in India intensive studies on astronomical characteristics of the megalithic monuments were not carried out yet, with the exception of present author. The studies at Mudumal and other sites in Andhra Pradesh have given interesting results suggesting astronomical features of these monuments. Mudumal (16°23' N 77°26' E), located in the State of Andhra Pradesh, is a remarkable megalithic site with more than 800 menhirs arranged in different formations and rows. The central area of the complex has a concentration of about 80 menhirs, which are forming alignments and avenues. A study of the complex on the days of solar significance revealed that on the days of solstice four rows are aligned to the Sun. The complex also has several stone circles distributed in three clusters. On the southwestern area of this complex is a vertically planted stone with 30 cup-marks on top that make the depiction of Ursa Mjor constellation. Overall, it appears that this megalithic complex served as an astronomical observatory, both in the daytime as well as in the night.

The paper also discusses the chronological aspects of the megalithic sites, ethnographic data and the observations made at the site.

## **ASTRONOMICALLY ORIENTED MEGALITHIC MONUMENTS IN CILENTO AND BASILICATA (ITALY)**

V. F. Polcaro, INAF/IASF-Rome, Italy

M. Mucciarelli, University of Basilicata, Potenza, Italy

A. Polcaro, University of Rome "Sapienza", Italy

D. Ienna, University of Rome "Sapienza"/ARA, Rome, Italy

The "Preta 'ru Mulacchio" is a monument, sited on Monte Stella (Cilento) and dated to an epoch presently unknown but possibly preceding the Greek colonization of Cilento. It is composed by three rocks formed for natural reasons from a single block of arsenide in its upper part and of a rough conglomerate in the lower one. Two galleries (thereafter F and G) were formed between the three rocks. However, it is easy to see that the "Preta" was deeply modified by human intervention. We performed measurements of the astronomical alignments in the "Preta 'ru Mulacchio megalithic complex on various occasions between 2003 and 2006, by using a bearing compass. The measurements were later corrected for the magnetic declination, derived by astronomical measurements performed on 18th August 2006. Within the measurement precision ( $\pm 1$  deg), the galleries are oriented to the meridian and to

the sunset of the winter solstice respectively. Obviously, the G gallery points, in the contrary direction, to the summer solstice sunrise. On the base of these measurements, we conclude that the “Preta” was aligned towards the winter solstice. The main reasons for this orientation could be ceremonial, probably connected with fertility rites. Other megalithic monuments in vicinity, to date scarcely studied but most probably astronomically oriented, could be attributed to the same culture.

## **ASTRONOMICAL ASPECTS OF TASMOLA ARCHAEOLOGICAL CULTURE OF CENTRAL KAZAKSTAN**

Nyissanbay Bekbassar, Almaty Astronomical Society, Kazakhstan

Interpretation of over-burial or off-kurgan constructions of Eurasian steppe zone nomads is traditionally restricted by the researchers only by the statement of cult actions had been taken during burials or commemoration of a died. Focus on the presence of the astronomical orientation in the designs of one of the types of Tasmola Archaeological Culture's sites of Central Kazakstan - kurgans with ridges (with “moustaches”) allow us to interpret them as a horizon solar calendar.

Direct observations over the Sun on such sites allow dividing the year into four or eight periods that, probably, had not only nomadic cattle breeding but also a sacral meaning.

According to the data, from written source such as antique Greek authors and ancient Chinese chronicles, a tradition of holding of ritual celebrations, accompanied by the sacrifices and associated with worship of the sacred mountains, sky and gods, originated from Skiff, Hun and ancient Turk time.

We suppose that cardinal dates of solar calendar, such as equinox and summer solstice, as well as cross quarter days (natural and climate beginnings of seasons) are attractors that form sacral designated dates.

## **ASTRONOMICAL ORIENTATION IN ANCIENT DACIAN RECTANGULAR SANCTUARIES OF ROMANIA**

Florin Stanescu, Faculty of Sciences, Romania

The Dacian (Daces), mentioned with this name by the Latin writers, or Getics (Getes), how the ancient Greek writers named them, formed the north branch of the Thracians. Sarmizegetusa-Regia, the former capital city of the Dacians' kingdom, is situated in the South Carpatian Mountains. The Roman Emperor Trajan conquered the Dacian kingdom at the beginning of the 2<sup>nd</sup> century AD. After this victory, Dacia was transformed in a Roman province “Dacia Felix”.

In the sacred precinct of Sarmizegetusa-Regia, 11 round and rectangular sanctuaries were discovered. The archaeological discoveries have proved that these sanctuaries are not a unique case in the cultic and spiritual life of the Dacians. Sanctuaries are also present at other sites in the ancient Dacian kingdom. Great part of these cult buildings has certain astronomical orientations and we used 2 methods to determine solstitial or north - south orientations of the rectangular sanctuaries:

- a) Antiquity method type (the direction of the shadow of the gnomon at the crossing of the sun above the meridian of the place)
- b) Moderns methods (theodolite type TK4), applied at the celestial plans configuration from the epoch of the sanctuaries constructions  $\varepsilon = 23^{\circ}40'$ .

The existence of astronomical orientation of different types of sanctuaries in the differently places in the country demonstrates the purpose of this orientation, in the plans of the ancient builders. This is a typical conclusion of archaeoastronomy - the deduction of knowledge and astronomical methods from archaeological vestiges, therefore from pieces - unwritten sources.

## **ASTRONOMICAL ORIENTATION OF FOUR MUSTACHED KURGANS IN AKSU, CENTRAL KAZAKHSTAN**

Nyissanbay Bekbassar, Almaty Astronomical Society, Kazakhstan

Among a great variety of archeological sites of nomads of Eurasia Steppe a major interest for archaeoastronomy constitute so-called off-kurgan constructions: stone sculptures (menhir with a pictures of elk, balbals, stellas), kereeksurs, kurgans with ridges.

During more than ten years the author of this work has been carrying out researches of astronomical, mainly calendar aspects of kurgans with ridges (kurgans with “mustache”, KM or Mustached Barrow). Area of spreading out covers the territory of Kazakhstan, mainly central, north and east regions, as well as the territory of Russia that borders with Kazakhstan. There exist problems of dating, purpose and semantics, as well as belonging of these monuments to some archeological culture. This is associated with a lack of certain system in their study.

This work is devoted to the detailed analyze of the results of continuing archaeoastronomical research of 4 mustached kurgans located 140 km to the north from a new capital of Kazakhstan along on the bank the of small river named Aksu.

## **ARCHAEOASTRONOMICAL THEORIES FROM “MINOR” MONUMENTS VIEWPOINT: A STUDY CASE ON SARDINIAN “NURAGHE”**

Dimitriadis George, DiSA-Anthropological Sciences, University of Genoa, Italy  
Pasztor Emilia, Museum of Matriçia, Hungary

Sardinia is the biggest isle located in the middle of Mediterranean Sea. From ancient times it was an attractive geographical area for metal need societies. Indeed, during the Bronze Age the inland societies developed a particular megalithic architectural culture called “Nuragic” thanks to a strong connection to Mycenaean trade world. “Nuraghe” dropout by the suffice “nur” traduced in stone accumulation and in the local idiom indicate any kind of cylindrical stonewall structures.

Archaeological and architectonical investigations demonstrate that “nuraghe” could be more complex than a simple tower. Huge dimension “nuraghe” in central Sardinia in time became pole of social aggregation formed real urban complex. Archaeologists propose different theories in order to describe the high dissemination of such structures around the isle without a concordance solution.

Last years archaeoastronomers add new perspectives on monuments reading accumulating new questions to the open one. The critical point from an archaeoastronomical view is how combine minor “nuraghe” with the most important one and how we can link archaeological material with astronomical. From a statistical analysis jump out a crucial bottleneck between population intensity and high percent of megalithic structures fitness in the same geographical area. Can archaeoastronomy help us clear:

- The functionality of minor “nuraghe” in loco and in network
- If such structures are astronomically significant or not
- How could astronomy fit with archaeological and ethnological evidences?
- Can we combine astronomy and landscape studies?

We aim to propose work in progress an organic and methodological research protocol based on a preliminary analysis of minor “nuraghe”.

## **ASTRONOMICAL ORIENTATIONS DURING THE ROMANESQUE PERIOD IN SLOVENIA**

Saša Čaval, Scientific Research Centre of the Slovenian Academy of Sciences and Arts, Slovenia

This paper summarises the most pertinent results of recent research on the astronomical orientation of churches during the Romanesque period (11<sup>th</sup>-13<sup>th</sup> centuries) in Slovenia. Over the span of three centuries, the elementary network of Christian parishes, established during the period of the Christianisation within the region (6<sup>th</sup>-9<sup>th</sup> centuries), was widely extended and subdivided. The economic prosperity and socio-cultural significance of this religion in the Romanesque period is clearly evidenced in the large number of new churches, for both parochial and succursal function. The majority of them were located on sites with previous pagan significance. Employing a multidisciplinary methodology reliant on standard measurements with a theodolite as well as astronomical reference, orientations were measured and calculated for some 190 churches across the whole country. These data were then used to determine their possible astronomical referents, principally the corresponding sunrise and sunset dates. A review of previous research, using a variety of hypothetical standpoints from similar studies in other countries, provides strong support for the results of this study. The research has clarified several aspects of medieval astronomical knowledge and its use in the design of ecclesiastical architecture, particularly the importance of certain calendrical dates, targeted by the churches' alignments.