Ways of observing calendar phenomena by ancient inhabitants of the Southern Urals

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Abstract: A unique initiative of the members of the Chelyabinsk Branch of the Russian Geographical Society (RGS CHO) is the long-term archaeoastronomical research of the author of this article, with the support of Doctor of Historical Sciences, Professor A.D. Tairov, Candidate of Philosophical Sciences A.I. Matsyna, local historian F.E. Zhizhilev, commercial director of the Variator Laboratory A.V. Kuzmina, members of the youth club of RGS CHO: a schoolboy Maxim Larin and CHVVAKUSH cadets. The purpose of these studies is to identify ways of conducting calendar observations by ancient people on the territory of the Southern Urals, according to astronomical dates of solstices and equinoxes. The methods of conducting calendar observations reveal the thinking ability of ancient people, manifested in certain conditions of the landscape and at a certain historical time.

Keywords: Southern Urals, ancient calendar, solstices, equinoxes.

1.Introduction

This fits into the context of the post-non-classical model of cognition as a self-developing system (according to V.S. Stepin) [9], taking into account the human subject and the subjective reality created by him, depending on the place and time (according to D.I. Dubrovsky) [5, pp. 22-35]. From the conditional moment of realizing oneself as a thinking person in the surrounding world, a reasonable person needed calendar observations to plan the life of human collectives, especially those who were in harsh conditions of survival during winter periods in temperate geographical latitudes. Conducting calendar observations contributed to the development of economic relations both within the ancient collectives themselves and in intertribal relations. The types of calendar observations depended on the place and time of residence of specific tribes and peoples. This article will present the external possibilities of astronomical observations at historical sites of the

Southern Urals. This article will present the external possibilities of astronomical observations at historical sites of the Southern Urals, as a model for the formation of astronomical thinking when using various types of calendar observations.

2. Calendar observations on lakes

As a result of certain studies on the Bugodak, Karagaysky, Arakul, Argazi, Sugomak, Turgoyak, Allaki, Bolshoy Elanchik lakes, it was revealed that ancient inhabitants living on the shores of mountain lakes or islands used a mountain ridge on the opposite shore of the lake for calendar observations, where sunrises or sunsets were observed throughout the year over certain peaks mountains or in the hollows between them. For example, when observing from the shore of Lake Bolshoy Bugodak (Verkhneuralsky district of Chelyabinsk region), a picturesque picture of the year-round course of the Sun is unfolding against the background of the mountains and the sunset points are visible at both equinoxes and solstices (Fig. 1). Archaeological research was carried out on the investigated lake. The finds are represented by the Neolithic, Mesolithic, Eneolithic, Bronze and Early Iron Ages. It seems that the popularity of this small lake for several thousand years is explained not only by the presence of fish, but also by the ability to constantly monitor picturesque calendar cycles over the lake surface [6, p. 10-11].

Figura – 1. Panorama of sunsets all year round against the background of the hilly western horizon with the spurs of the Southern Urals on Lake Bolshoy Bugodak (Russia, Chelyabinsk region). Photo by A.D. Tairov, astronomical composition by O.O. Polyakova [by 6, Fig. 2]

Source: https://astroiss.ru/page26.html

3. Calendar observations in the mountains

In the mountains, however, observations were made from open peaks devoid of forest vegetation, from which a full circular view of the horizon was observed. Such an example is the Golukha mountain of the Chashkovsky ridge (Miass city District of the Chelyabinsk region), where ancient people could observe the sunrises and sunsets over certain mountain peaks or hollows between them [9; 6, pp. 25-32]. (Fig. 2).

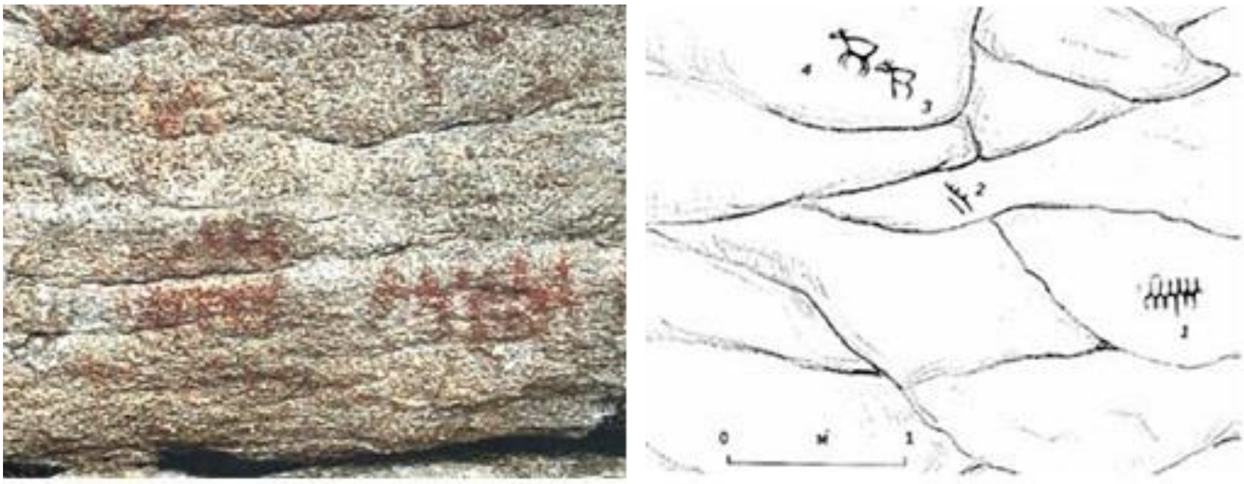
Figura – 2. From left to right: sunrises at the summer solstice, equinox, winter solstice, observed from the Golukha Mountain of the Chashkovsky ridge in the Southern Urals. Photo by O.O. Polyakova [by 7, Fig. 26, 27, 24].

Source: https://aaatec.org/documents/article/po2.pdf

The foot of Mount Golukha is dotted with fragments of ceramics from the Neolithic, Bronze, Iron Age and Middle Ages. At the top there is a ritual metallurgical site where the remains of copper casting and a Sarmatian arrowhead were found. At the same time, there are no such artifacts on neighboring vertices. In this regard, it can be concluded that the popularity of Mount Golukha among ancient people is most likely associated with constant year-round calendar observations accompanied by ritual celebrations.

Calendar signs on the rocks of Lake Bolshye Allaki, similar to the signs on the rocks of the Middle Urals in the neighboring Sverdlovsk region, presumably left by the ancestors of the Voguls, turned out to be interesting – in one sign with a straight horizontal line crossed by 12 vertical stripes. The horizontal line shows the duration of the solar year, and 12 vertical stripes show the beginning of the lunar months at the new moon (Fig.3). That is, the thinking of the local ancient people was already able to systematize knowledge into simplified signs, nevertheless, capable of transmitting the full cycle of calendar phenomena. Fragments of pottery from the Bronze, Iron and Middle Ages were found at the foot of the rocks [7, pp. 33-43].

Figura - 3. Images of calendar annual signs: a) on the north-western rock of the Allakskaya Pisanitsa on the Bolshye Allaki Lake [10; 7, Fig. 41b], b) on the Sokolinsky cliffs near the village of Makhnevo on the Tagil River in the Sverdlovsk region according to V.N. Chernetsov's [11, p. 73, Fig. 46; 7, Fig. 42a, 42b].



a b

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In the same place, probably, according to the assumption of F.E. Zhizhilev, the seasons were tracked by the displacement of solar shadows at sunrise from nearby rocks (Fig. 4) [7, pp. 10-42].

Figura - 4. Shadows from neighboring rocks at sunrise: a) at the equinox, b) at the summer solstice. Photo by O.O. Polyakova.

a b

Source: https://astroiss.ru/page49.html

It turned out to be interesting to observe the sunset and sunrise at the summer solstice around one northwest outlier, if the observer is on the site directly in front of the image of calendar signs: sunset occurs to the left of the outlier, and sunrise to the right of it [7, p. 39, Fig. 46] (Fig. 5).

Figura - 5. Sunset and sunrise at the summer solstice against the background of the southeastern side of the northwestern megalith with calendar drawings. Photo and astronomical composition by O.O. Polyakova.

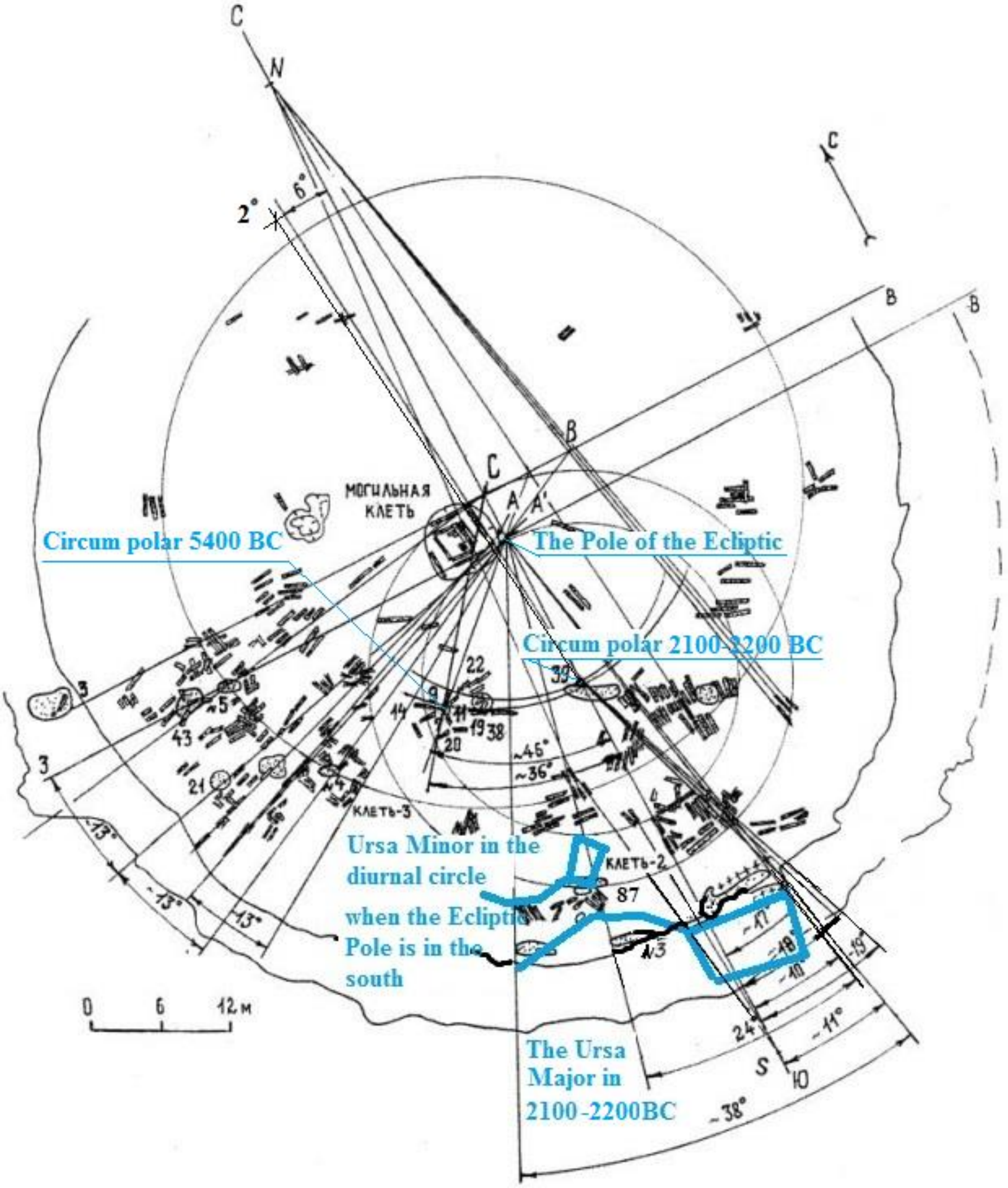
Source: https://astroiss.ru/page48.html

In the steppe, where there are few hills, people created various ways of calendar observations. For example, Sintashta [4, p. 342; 7, Fig. 53, 59] (Fig. 6, 7) and Arkaim [1, p. 32; 7, Fig. 69] (Fig. 8) were built not only as settlements with defensive walls, but the walls themselves served as reference points for calendar observations [7, pp. 51-77].

4. Calendar observations in the steppe

A striking example of the creation of artificial objects in the steppe for astronomical calendar observations is the huge, in comparison with other mounds in this area, in height and diameter, the Great Sintashta Mound in the Bredinsky district of the Chelyabinsk region. Only one person was buried in it, at ground level, with a slight displacement of the burial chamber from the center of the mound. The same feature is seen in some mounds of Western Europe [2, p. 42]. The Western fire pit No. 5 is a platform for observing the sunrise at the equinoxes, spring and autumn. Southwest-western crate No. 3 has a dimension of approximately 13° relative to the center of the mound, which is the 28th part of the circle, i.e. this crate served as a determinant of the lunar constellations passing by it. The southern cage has a variable size of 17° to 19° relative to the pit from pillar No. 39, which is approximately the 24th part of the circle, i.e. we have a diurnal circle with the Celestial Pole.

Figura - 6. The plan of the Sintashta Big mound (according to 4, p. 345). Astro composition by O.O. Polyakova.



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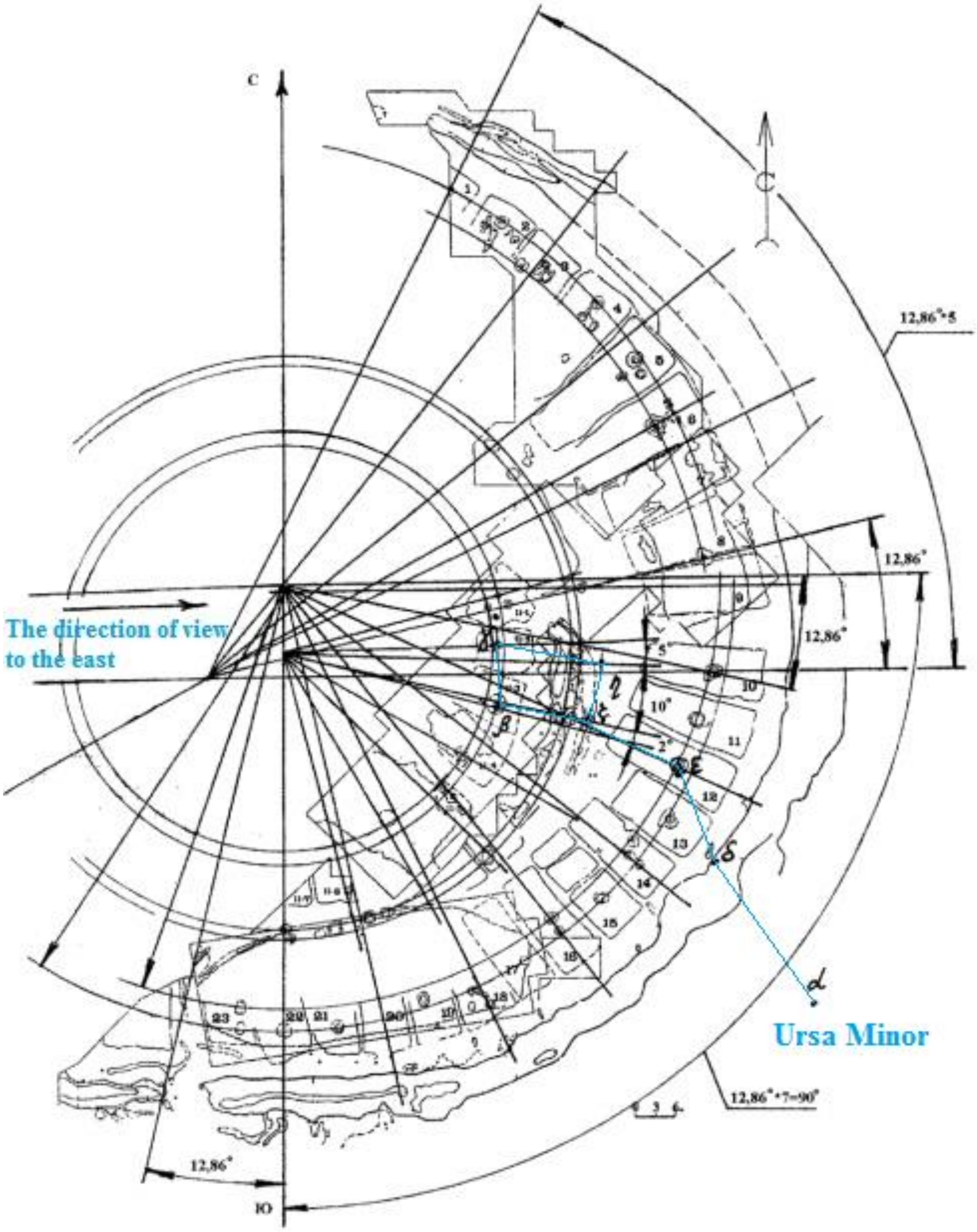
Another hole from pillar No. 11 indicates the ancient Celestial Pole, separated from the Celestial Pole during the construction of the mound by about 46°, which, in terms of the Precession rate of 50.3″ per year, gives the starting point of the calendar reference, about 3292 years ago from the time of the construction of the mound, i.e. 2100 +3292= 5392. This date is very similar to the biblical date of the Creation of the world 5508 BC. If this is the case, then the date of construction of the Great Sintashta Mound is approximately 2216 BC. But then it is necessary to look at the displacement of the grave cage from the former Pole of the World, which exactly stood on the alpha Dragon star in 2800 BC, not by 6° along the outer box, but additionally by 2° along the inner edge of the grave box. 6°+ 2° = 8°. Multiply 8° by 3600″ and divide by 50.3″ per year, as a result we get 572.5 years after 2800 BC, i.e. 2227 BC, which is very close to the previous calculation. The question of the accuracy of the calculation rests on the accuracy of the angle of displacement of the Pole of the World relative to the tomb cage, i.e., is it exactly 8° for 2227 BC or 8.16 ° for 2216 BC.

Figura -7. The plan of the half-submerged Sintashta settlement (according to 4, p. 22). Astro composition by O.O. Polyakova.



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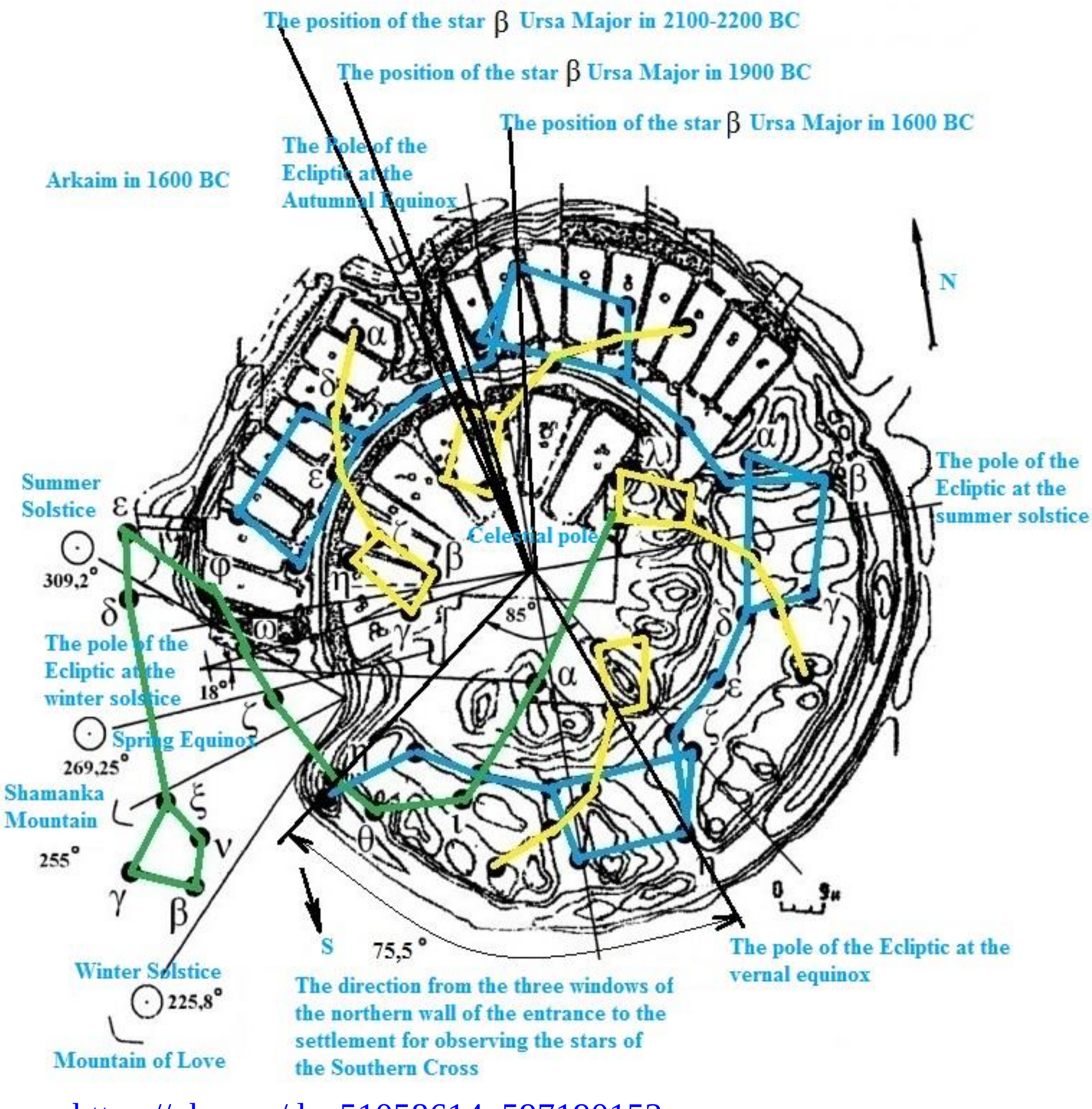
In half of the half-submerged Sintashta settlement [4, p. 22], two housing sectors have been preserved, each with 7 pairs of dwellings. One pair of buildings occupies a size of 12.86 °, i.e. the size of the lunar constellation. In the whole circle there should have been 28 pairs of dwellings for a whole number of lunar sites, and as a result 56 dwellings in the circle. And this suggests parallels with the structure of the first stage of Stonehenge, made with earthen ditches, ramparts and 56 Aubrey holes, having alternately white and black colors, which could symbolize new moons (black) and full moons (white).

If the Sintashta settlement is a Lunar calendar counting system, then the Arkaim settlement is built on the principle of calendar tracking of the rotation of Celestial polar constellations around the Celestial Pole.

Figura - 8. The plan of the Arkaim settlement (according to 1, p. 32). Astro composition by O.O. Polyakova.



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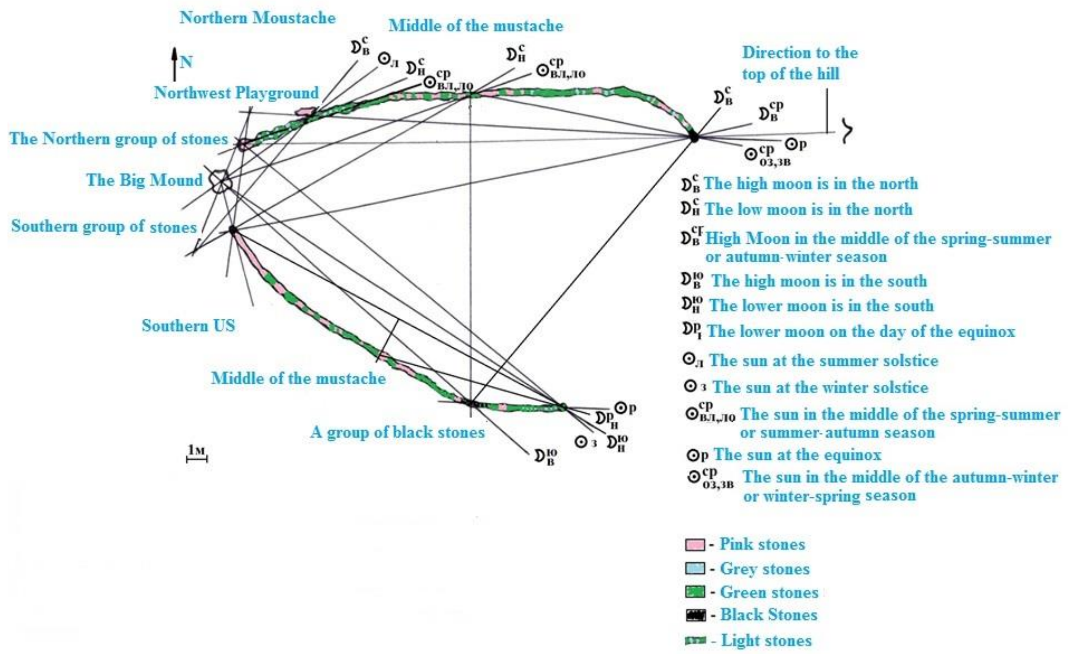
On the presented plan of Arkaim [1, p. 32], in the unearthed southern part of the settlement, in the outer circle, repeating long and short elements are visible, which suggests to us the idea of rotating a composition similar to the constellation Ursa Major, with its long part in the "tail" area and short part in the "bucket" area. The constellation had a dimension of 75.5 ° according to the lower stars in 1600 BC, which corresponds to the dating of the settlement after archaeological research. Four sectors with the Big Dipper on the four cardinal directions – as in the Avesta: "And created a Yima var, the size of a running (horse) on all four sides." In the inner part of the settlement, the "buckets" of the constellation Ursa Minor are stacked. The central area of the settlement, free of buildings, is bounded by segments of the end walls of dwellings at different distances from the center – these distances correspond to the positions of the former alpha Dragon polar star in 2800 BC, which later moved away from the Celestial Pole. It was very important for the ancient people to follow the Celestial Pole and the stars around it as the highest divine entities. Observations of the Sun and the Moon were conducted behind the outer walls of the settlement, which did not obscure the horizon, from the large entrance.

Also, in the steppe, where there are few peaks on the horizon, we studied mounds with "whiskers", on which the method of calendar observations consisted in the fact that the Sun rose, approximately, over one peak, and the observer's position shifted daily along the "mustache" [6; 7, pp. 105-150] (Fig.9).

Figura - 9. Plan of azimuths of the solar-lunar directions on the Kondurovsky mound with "whiskers". Astroscheme O.O. Polyakova. Color composition by A.I. Matsyna and O.O. Polyakova, 2004 [7, p. 125, Fig. 108]



Source: https://aaatec.org/documents/article/po6r.pdf

Similar calendar observations, with the displacement of the observation platform around the complex, depending on the observed calendar events on the horizon in the form of sunrises or sunsets, the Moon, the Southern Cross constellation, the rotation of the polar constellations around the top of the complex, could have been carried out by ancient people on the Kambulat rock complex in the Chebarkul district of the Chelyabinsk region. Observation platforms around the complex were noticed by A.V. Kuzmin and M. Larin on the platforms trampled around the stone complex and perpendicular to the sawn stones (Fig. 10) [2, folders 54, 56, 58, 59, 62].

Figura - 10. Observation platforms on the Kambulat rock complex are located around the entire Kambulat rock complex. Photo by M. Larin.

Source: https://astroiss.ru/page89.html

The same team, consisting of A.V. Kuzmina and M. Larin, in addition to the author of the article, and with a history teacher at the Chelyabinsk Institute of Railways. Alexander Borisovich Levchenko, with programmer Anton Levchenko, on the summer solstice of 2021, began an archaeoastronomical study on the Miass River in the Bolshoy Balandinsky settlement, a famous archaeological monument of the Bronze Age, and noticed that the river at sunset at this time of year is illuminated with a bright orange color (Fig. 11) [2, folder 68].

Figura - 11. Sunset at the summer solstice with a view of the Miass River from the Big Balandinsky settlement. Photo by O.O. Polyakova.

Source: https://astroiss.ru/page101.html

This observation led us to think about cultural parallels with the Indian religious cultural monument, the Rig Veda, which describes the "obscure" deity Apam Napat for science, which is one of the hypostases of Agni, representing "fire in the waters", "flowing downhill", where "some connect, others approach the sea – speech we are talking about rivers" [8, II, 35]. As a result of our observations, we assumed that calendar observations of sunrises or sunsets along those sections of riverbeds that coincided with the azimuths of sunrises or sunsets at the equinoxes and solstices were invented by ancient people living on the banks of rivers. We do not claim that such observations were first conducted on the banks of the Miass River in the Chelyabinsk region of Russia, but the Miass River, as one of many similar rivers, could also have calendar values among other similar rivers. In 2022, research along the Miass River was continued with members of the Youth Club of the Chelyabinsk branch of the RGS, cadets of the CHVVAKUSH under the leadership of A.I. Matsyna [2, folders 82,85].

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