

# The oldest astronomical observatories in Ukraine

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**Abstract.** We present the data related to the revealed astronomical oldest observatories at the territory of Ukraine and describe briefly the principles of observations which could be realized at these sites with usage of megalithic stones. Among these oldest observatories are as follows: the stone complex at the Lysyna Kosmatska mountain (Charpatian region); Bakhchysaray Menhir in Crimea; a complex of shafts at the Mavrin Maidan near Pavlograd city.

**Keywords.** archaeoastronomy, oldest observatories, cultural astronomy

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**The Mavrin Maidan** ( $48^{\circ}33'34.92''$  N,  $35^{\circ}48'19.08''$  E) is located in the Dnipro region near Pavlograd city. It is a complex of shafts having the correct relief form. The Mavrin Maidan reminds the shape of a spider from the height of the bird's eye (Fig. 1, left). It is really a mystical place with remarkable acoustics, where trees do not grow and a water does not stay in the rainy season. The sizes are as follows: diameter of the central depression is 54-60 m, depth is 10 m; length of whiskers is 65-200 m; area is 5.5 hectares. In the center of this construction is a bulk circle, in the middle of which there are three "entrances" and long wavy shafts on the outer edge of the circle. On the day of spring equinox, the Sun goes beyond the horizon exactly in the center of one of the valleys.

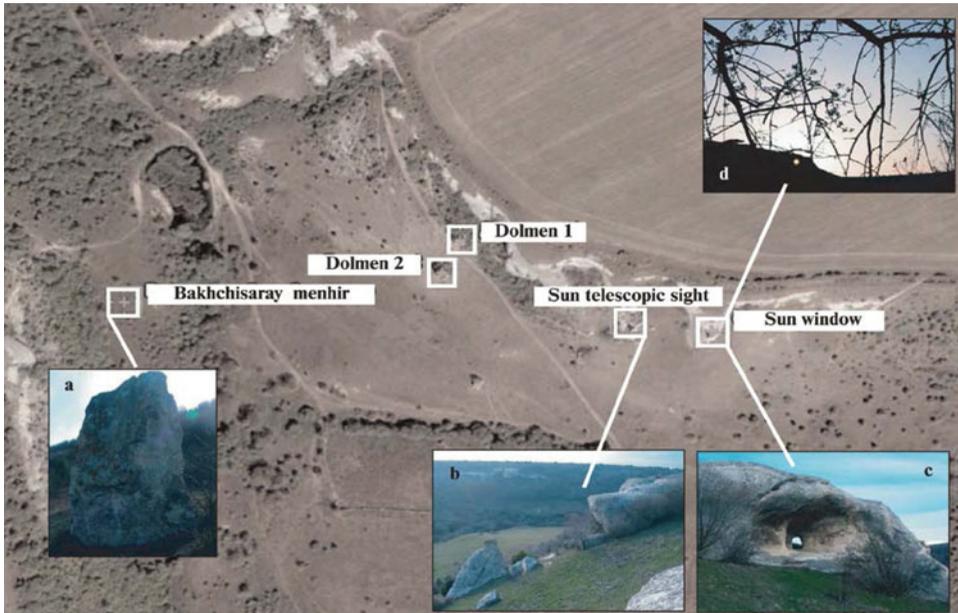
In 1987, the Mavrin Maidan was investigated by the archaeologist Churilova L.M. who dated it to the II Millennium BC. The Mavrin Maidan under No.6348 is included into the list of regional archeological sites by the Resolution of the Dnipropetrovsk Executive Committee No.424 on Nov 19, 1990. The "Kosmopoisk" expedition (headed by Bondarenko K.) studied this place during the sunset on March 19-20, 2011, with compass, GPS Garmin, Belwar dosimeter, quartz watch, dowsing frame (Fig. 1, right) and reported: good acoustics; the word spoken at any point is well audible around the perimeter; radiation background is normal; difference between the readings of the clock in the center and outside is not detected; magnetic anomalies are not detected; openings in the circle can indicate "the House of the Sun on the longest and shortest days".

**The Bakhchysarai Menhir.** Among the most interesting astronomical places in the Crimea, pointing to the existence of ancient observatories of the Eneolithic era, are the Crimean menhirs (rocky ceilings, II Millennium BC) near the Bakhchysaray city (Fig. 2). The Bakhchysaray Menhir ( $44^{\circ}46'06.5''$  N,  $33^{\circ}54'57.2''$  E) is not as large as the Stonehenge (Ruggles (2015)), but also belongs to the archeo-observational sites of the solar calendar type (Vavilova & Artemenko (2011, 2014), Gullberg (2019)). The oldest sky images can be reconstructed with methods by Savanevych et al. (2015, 2018).

In the beginning of 2000s this archeoobservatory was studied by the Crimean astronomer A. Lagutin. Menhir and the window could serve as two diopters of a huge visual instrument that fixed an east-west visor axis, on which the Sun could be observed



**Figure 1.** The Mavrin Maidan, Dnipro region, Ukraine (II Millennium BC).



**Figure 2.** The Bakhchisaray Menhir, Crimea, Ukraine (II Millennium BC) at the Google Earth map. Photos by A. Terebizh

only on certain days near spring and autumn Equinox. Namely, if anybody stays near the menhir and looks east, one can see the hole (window) in the rock on the opposite side of the beam (at a distance of about 300 m). It took several years to confirm or disprove this hypothesis, as weather conditions (fog and clouds) obstructed observations. But the success was exciting: the descending Sun through this window in the rock rays really fell into the eye observer near menhir (Vavilova (2008)).

**The megalithic stone complex at the southern slope of the Lysyna Kosmatska mountain** (Ukrainian part of the Carpathian mountains) covers area of about 400 sq. m. The sanctuary is an elongated (10×40 m) east-west slope of gigantic stone slabs. The top plates of enormous size form the 6-m long tunnel in the “north-east – south-west” direction. The astronomical character of the sanctuary is confirmed by the observations of the ethnological-archaeological expedition “Carpathians – Dniester” in 2006–2011 (Kohutyak (2011)). The scheme of observations coincides with the Stonehenge plan, where, for example, the stone tunnel is analogue of the “Stonehenge alley”, a summer solstice sunset event is related to the sacrificial calendar pit at the Lysyna Kosmatska (see, video, [www.youtube.com/watch?v=CTJp96HpcVs](http://www.youtube.com/watch?v=CTJp96HpcVs), in Ukrainian).

The more information is available at the UkrVO web-site ([Vavilova et al. \(2017\)](#)).

## References

- Gullberg, S.R. 2019, *Astron. Nachr.*, 340, 23
- Kohutyak, M. 2011, *Antiquities of the Hutsul region*, (Lviv, Manuscript), vol. 1, 447 p.
- Ruggles, C.L.N. 2015, *Handbook of Archaeoastronomy and Ethnoastronomy*, 1223
- Savanevych, V.E., Briukhovetskyi, O.B., Sokovikova, N.S. et al. 2015, *MNRAS*, 451, 3287
- Savanevych, V.E., Khlamov, S.V., Vavilova, I.B. et al. 2018, *AA*, 609, A54
- Vavilova, I.B. 2008, in: *Innovation in Astronomy Education*, Cambridge Univ. Press, p.321
- Vavilova, I.B., Artemenko, T.G. 2011, *IAU Proceedings*, 260, E7
- Vavilova, I.B., Artemenko, T.G. 2014, *J. Astron. History and Heritage*, 17, 29
- Vavilova, I.B., Yatskiv, Y.S., Pakuliak, L.K. et al. 2017, *IAU Proceedings*, 325, 361