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EARTHBOUND ASTRONOMY

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1. INTRODUCTION

The phenomena that form the subject of *archaeoastronomy* are usually taking place on the line where the earth's surface (land or sea) meets the sky, that is *on the horizon.*

In our modern times such phenomena do not form part of the everyday experience either of the common people or even of professional astronomers. We live indeed in a world of "Lost Horizons". Not many people are in a position of being able directly to experience such events as the moment of *rising and setting of celestial bodies, the heliacal rise or cosmic setting* of certain stars or constellations. Nowadays these phenomena can be directly observed only under special conditions and at special locations, such as in the desert, on the open sea or from an aeroplane or balloon, even though they were part of the direct everyday experience of the ancient, or even the Mediaeval man. The skyline, still visible to our ancestors, is nowadays distorted by tall buildings, or even more often, is hidden under thick layers of atmospheric pollution.

2. ORIENTATION ATTEMPTS TOWARDS THE RISING SUN

In our investigation an attempt was made to reconstruct the *medieval method* of orientation of churches. The basic rule in church orientation — from early Christian times on — was that the axis of the building (the nave) must be aligned with the East-West direction (Barlai, 1997; Romano, 1992). We tried to replicate that method at the ruined church of the also ruined monastery at KANA, a former medieval settlement (12th c.) now inside of Budapest. Following the old ecclesiastic architects we marked the axis of the ruined nave with two sticks and tried to observe *on which day the two sticks and the rising solar disc can be seen in a straght line.*

It has been found that the polluted air covering Budapest prevented us from sighting the rising Sun on the horizon. The solar disc remained hidden by the layer until it reched an altitude of 2–4 degrees. (Due to this fact instead of the direct sighting we were compelled to measure a sequence of the solar positions above the horizon and used extrapolation to determine the East point.

Table 1. The altitude of the solar disc versus the angle deviation from the axis of the ruined church.

Angle	Alt.	Angle	Alt.
5.167	2.733	7.118	4.603
5.300	3.025	7.567	5.013
5.583	3.250	7.902	5.300
5.733	3.458	8.857	6.160
6.242	3.833	9.102	6.360

These data form the points of the straight line: $y = 3D0.892482x - 1.74634$.

3. MODERN OBSERVATIONAL ATTITUDES

The minds of modern astronomers are otherwise directed. The investigations of astrophysicists are carried out close to the zenith and restricted to narrow hour angles in order to minimise the influence of the atmospheric extinction.

Still, one of the most significant astronomical experiment of the modern age was associated with the *rising Moon.*

In the early months of 1946 American and Hungarian scientists attempted to send a radio signal off to the Moon and obtain an echo from it. Both experiments were motivated by military considerations, and were naturally independent of each other. The Hungarian experiments were led by professor *Zoltán Bay* and they took place in the research laboratory of the *TUNGSRAM Company* in Budapest. The American attempt was made under the direction of *Colonel DeWitt* (who was himself an amateur astronomer), and was carried out in Belmar (New Jersey) under the code name *DIANA.*

On the *10 January 1946* the Americans succeeded in obtaining the radar echo from the Moon. Due to the constraint that their (flat) aerial (antenna) could be rotated only round a vertical axis, it was oriented towards the *rising Moon* (the moonphase first quarter). The Hungarian effort bore fruit on the *6 February 1946.* The Hungarian aerial being fully mobile, it was possible to follow the Moon in its movement (Mészáros, 1996).

Lately even astronomical practice is giving way to investigation not even earthbound. Modern telescopes carried by artificial satellites or non-returnable probes are completely outside the Earth's atmosphere. The range of the information gathering and processing capacity is expanded to use wavelengths outside the range of visible light by making observations in the frequency-domains of X-rays, IR and UV radiation.

The neutrino-astronomers go even further by building their laboratories deep underground, so that they can hope to resolve eg the discrepancies that exist between the prediction of the theoretical solar model and the actually measured flux of solar neutrinos. Mighty underground laboratories, which can be regarded as neutrino-telescopes, already commissioned or just being under construction, stretch from the USA to Japan from the Caucasus mountain to the Italian Peninsula. Big bodies of

water (the oceans, big lakes) are also being used for the detction of neutrinos of cosmic origin.

From the numerous neutrino experiments let us mention now only one being carried out in the water of *Lake Baikal in Siberia.* These experiments are a cooperative venture of *Russian, Hungarian and German* scientists. As the surface of the lake is frozen almost during the whole year, it has been possible to transport the measuring facilities on the thick layer of ice. Cables and photomultipliers which have to register the Cerenkov radiation from the nuclear reactions induced by neutrinos can simply be sunken into the water through a hole cut into the ice.

This shows that modern methods are applied below and on the Earth's surface, on the inside and outside of the atmosphere, in fact everywhere except on the skyline. This way, the horizon, the scene of the bulk of the ancients' observations and their greatest achievements, became the preserve of the archaeoastronomers' investigations, *a specialised field of spherical astronomy.*

It is justified indeed to refer to Archaeoatronomy as the *"Earthbound" branch of observational Astronomy.*

References

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