

rock-solid evidence for a prehistoric aurora

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Rock art images typical of the Late Stone Age and the Bronze Age were contemporary recordings of an intense ‘auroral storm’, says a report released by the Institute of Electrical and Electronics Engineers (IEEE) this month.

‘Look! Eenteresting’, exclaims my friendly Kazakh guide. He points at a beautifully executed image in the shape of a cross, carved into a rock and coloured with a bright white patina. ‘Very eenteresting’, he repeats, aware that he has exhausted his English vocabulary with these well-chosen words. I look at my GPS receiver and register the geographic coordinates of the image. The rock is located at 2470 meters above sea level. On one side, the entire horizon is blocked from view by a façade of mountain peaks, rising up for another 100 metres or so. The needle of my compass indicates that this is the north. Only the southern part of the sky can be seen from here, a wide blue expanse crowning the tops of distant snowclad peaks.

With a small team of three Kazakh people I have set up camp in this remote corner of Mongolia. Virtually untouched by human civilisation, the rough mountains of the Altai chain straddle the borders of Mongolia, Russia, China, and Kazakhstan. Our purpose: to survey one of the largest fields of rock art in eastern Asia. While my driver and translator, Kazbek, takes a nap in our sturdy van and the cook, Nurbek, prepares the fishes we have been given by a passing nomad on horseback, my guide Edilkhan takes me on a tour through the rock carvings. An estimated 10,000 images decorate numerous rocks scattered on the barren bone-strewn slopes of Mount Tsagaan Uul. As I log the exact geographic positions of as many petroglyphs as possible, taking account of altitude and the angle of inclination of the horizon, a pattern soon arises: all images were carved with a southern field of view. Not a single carving occurs on the other, northern side of the mountains.

Upon our return in the western world, our findings are fed into what is now arguably the largest digital collection of rock art images in the world, a database currently containing some 4 million items which is supervised by dr. Anthony Peratt, of the Los Alamos National Laboratory, New Mexico. As soon as the new data are plotted onto a digital image of the earth, dr. Peratt’s suspicions are confirmed: the directionality of the Altai petroglyphs is in step with an almost universal pattern. Except for the southernmost part of the earth, rock art images of the Neolithic (Late Stone) Age and the Bronze Age tend to be found only in places where the artists would have had an open view of the southern sky. What does this mean?

Ancient rock art comes in two kinds. *Pictographs* are painted images, whereas *petroglyphs* are carvings. The Palaeolithic (Old Stone) Age is renowned for the wonderful cave paintings seen in Spain and southern France. These are pictographs intended as realistic representations of the animal world, possibly imbued with some ritual or shamanic significance. A drastic change is seen in the transition to

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Neolithic art, when the attractive coloured paintings of animals make place for abstract, ‘geometric’ petroglyphs, which seem crude and clumsy by comparison to the cave art of the preceding era. It is worth asking what caused this unexpected shift in interest and style. Did Neolithic people lose their artistic skills? Or did they perhaps have something more important to communicate than hunting scenes, something they endeavoured to represent with equal dexterity and accuracy to the wildlife hitherto depicted?

Archaeologists have long been divided over the meaning and function of rock art. That the production of pictographs often bore a ritual connotation is beyond question, as it continues to play a role in the initiation rites of various indigenous cultures, including those of Arnhem Land in northern Australia. Wherever traditional societies evince their interpretations of local petroglyphs, the subject matter is likely to be mythological: the creatures shown are legendary gods or ancestors populating the world in a distant ‘age of creation’. From time to time, specialists have looked to the sky for solutions, arguing that the puzzling pictures of spirals, concentric circles and ‘ladders’ seen on rocks symbolised the sun, comets, or supernovae.

From their computer analysis of ‘abstract’ petroglyphs worldwide, focussing on Neolithic and Bronze Age imagery, Peratt’s team have drawn two important conclusions. The first of these was announced in an article published this month in the *Transactions on Plasma Science*, 35. 4 (2007) of the Institute of Electrical and Electronics Engineers (IEEE), the world’s leading professional association for the advancement of technology: geometric images of the Neolithic and Bronze Ages display a *consistent directionality*. The report concludes that “of those petroglyphs accurately surveyed and GPS logged, it was found that the light was observed totally from the direction of the south axial pole of Earth.” This cannot always be confirmed directly in the field because of a constant sweep of light across the sky from earth’s rotation and the general loss of exact direction while climbing arduous and dangerous terrain, yet can be demonstrated incontrovertibly when plotted onto a digital map. The upshot is that these petroglyphs were carved while the artists were looking at the sky in a southerly direction. But what were they looking at?

Dr. Peratt is a leading plasma physicist. Plasma physics is a branch of physics studying the properties of the ‘fourth state’ of matter – an ionised gas or *plasma*. Although plasmas are rare on earth – being restricted mostly to the auroras, lightning, fire and neon-tubes – more than 99% of the universe is believed to consist of plasma. The study of the behaviour of plasma, due to its many complexities, is still in its infancy and Peratt’s lifelong research has contributed much to our understanding of plasmas in space. When first confronted with pictures of geometric petroglyphs, Peratt was instantly struck by the striking similarities of these ‘stick-men’, ‘caterpillars’, ladders, spirals and concentrics to well-known plasma configurations he had been observing in space and in the laboratory for decades. According to the report, no less than 84 different matching morphologies were identified and some 40% of petroglyph types could be accounted for. Thus, the second conclusion of the report is that plasma configurations formed the subject of many of these rock art images.

Plasmas seen from the earth and with a fixed link to the south pole must have been a form of *aurora australis* or ‘southern lights’. The auroras of the type seen today in extreme northern or southern latitudes resemble dancing curtains of fire. Peratt’s computer analysis reveals that the plasma forms recognised in Neolithic petroglyphs represent a far more intense type of aurora – an ‘auroral storm’ of proportions never seen in recent centuries, in which the plasma underwent various types of

‘instabilities’ currently studied by plasma physicists. Using cutting-edge modelling software and the latest experimental devices, Peratt has been able to reconstruct the physical appearance of this super-intense aurora. On this model, the aurora took the form of a stupendous radiant pillar technically known as a z-pinch, which was surrounded by a sheath composed of 56 thread-like filaments. In the course of its development, this high-energy beam of light was pinched into a string of 9 disc-shaped segments, which were warped and fused together, while the surrounding filaments twisted around them. Detail for detail, the plasma model for this extreme auroral event ‘predicts’ the images captured in petroglyphs.

The geographic distribution of these ‘snapshots’ is consistent with optical perspective. Proper circles appear as ellipses or half-circles in the expected areas and areas closer to the equator are far richer in ‘plasmatic’ imagery than the northern half of the earth. Plasma-type images abound in the southwestern part of the United States, but not everywhere. In the Altai mountains of Mongolia, the overwhelming majority of petroglyphs depict recognisable animals, such as sheep, goats, horses, camels, and yaks. A few can be interpreted as archers or horsemen. Relatively few abstract images are found, and these do not include concentrics, swastikas, ladders, or caterpillars. But negative data are data, too, and the report concludes that “In the northern hemisphere at mid-latitudes, blinders block the intense synchrotron light from the center of plasma columns located near polar south. This is always outside a blocking cone of about $\pm 4^\circ$ - 8° of polar south (measured with allowance for the local magnetic declination on the compass).” The Altai chain is the spiritual centre of Siberian shamanism and the hypothetical homeland of the peoples speaking Altaic languages – the Turks, the Mongols, the Tungus, the Koreans, and the Japanese. Perhaps Mount Tsagaan Uul owed its sacrality to its use as an observation base of the intense aurora reconstructed by Peratt’s team. Once it was established as a sacred place, artists would have continued to enrich its rocks with all sorts of images – cattle and horsemen – not related to the auroral outburst itself.

The auroras are caused by fluctuations in ‘solar weather’. In solar flares, the sun spews large amounts of charged particles into space, which travel towards the earth in the solar wind. Friction of the solar wind with the earth’s ionosphere causes excitation of these particles and the auroral glow is the result. According to Peratt’s calculations, an increase of 1 or 2 orders of magnitude in the solar wind must have been responsible for the super-aurora recorded on rock. The spectacle must have been so awe-inspiring that it inspired an unparalleled flurry of rock-carving activity around the world. In the absence of writing systems, our ancestors turned to the most durable substance they knew to save the memory of these heavenly fire-works from oblivion. Little did they know that it would take some 5,000 years before scientists could recover the nature of their art. The evidence had been cast in stone alright, but the rocks had been truly silent witnesses.

acknowledgments

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further reading

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