The Monument in the Landscape: using remote sensing to understand the south Indian megaliths

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ABSTRACT - The south Indian megaliths are believed to be the constructions of iron-using cultures that date between 1500BC to 200AD, though it is now understood that the beginning of this cultural practice may date back to the Neolithic. Despite nearly 200 years of study and some attempts to classify the disparate structures which vary in scale, form and typology, but also exhibit startling similarities over large geographical regions, a complete understanding of the meaning these monumental constructions held for the societies that authored them still elude us. We have been investigating these monuments since 2007 in an attempt to understand the knowledge systems which were extant in the period of their construction, with reference to mathematics, geometry and space-time concepts. We have studied most of the major types of megalithic monuments that exist in peninsular India. We present the results from some of these surveys especially centered on the megalith type known as "stone alignments" or "avenues". Several of these alignment sites, like Hanamsagar and Vibhutihalli are spread out over a very large area, which makes it time-consuming to survey. Hence a case is made for studying these sites initially from high-resolution remote sensing imagery, both to plan field work as well as to understand the monument in its setting. The avenue type extant in southern coastal Karnataka typified by the monument at Nilaskal also would benefit from study of high-resolution satellite pictures of the region. The landscape-level study of the planning of these monuments with regard to site selection criteria, location with respect to quarries, settlement sites etc. are of great relevance to understanding the role these monuments played in the prehistoric societies that erected them. Often, the clues to the understanding of a monument in totality are distributed over an area much larger than the immediate surroundings of the monument. Thus the study of remote sensing imagery of the landscape around each of these sites on a scale of few tens of kilometers is expected to shed more light on the meaning of these monuments. We recommend the practice of using remote sensing imagery of megalithic sites, especially alignment and avenue sites, as an important and early component in the study, to be followed by intensive surveys on the ground of promising sites. This is not only because studying remote sensing imagery before undertaking the ground survey helps to plan the survey better, incorporating other features near the site that otherwise would have been missed, but also because it helps in arriving at a landscape-level understanding of the monument.

Keywords: high-resolution megaliths, remote sensing imagery

1.0 Introduction:

The South Indian megalithic complex has been an enigmatic ensemble right from the earliest days of study when Babington (1823) reported megaliths (Fig. 1) in Kerala. A large fraction of these monuments, usually (but not always) constructed of large stones, consists of burials or memorials. However, there exist several megalith types that are not sepulchral or memorial in nature, whose purpose of erection is still unclear. These non-sepulchral megalithic types – which neither contain remains of dead human beings nor mark a spot of interment of these, may take the form of menhirs, arrangements of a few or several menhirs (Fig. 2) in various patterns etc.

The "megalithic culture" of south India has been ascribed to the inhabitants of the south Indian Iron Age, and is cautiously dated to approximately 1500BCE to the first few centuries of the Common Era (Ehrich 1992, Bauer 2007). This dating is based on very few reliable dates and recent work (Morrison 2001) suggests that megalith-building might have begun as early as the middle of the south Indian Neolithic, around 2500BCE.

At any rate, understanding the megalithic monuments in their cultural context is a challenge that still holds, though new data from previously studied sites and the discovery of new sites are beginning to provide clues towards that goal. Of prime concern is an understanding of the role played by these monuments in the daily lives of the cultures that authored them. Considering the fact that the construction of these monuments must have entailed a large amount of time set aside from everyday chores of cattle-rearing, agriculture and other activities, they certainly were of high importance to their builders – who lived in huts built of perishable materials like wattle-and-daub and thatch but built their monuments to endure.

Our investigations: We have been studying megaliths of various types across south India, mainly in Karnataka and Kerala, from 2007. So far, we have studied around 36 sites and conducted detailed surveys at 6 of these. These sites contain

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monuments of the following types: cist and pit burials – some marked by boulder circles on the surface, dolmens, dolmenoid cists, menhirs – both single and part of small and large alignments, rock shelter chambers and irregular polygonal chambers etc. We have also studied rock art sites associated with the megalithic cultures studied.

Our objective was to study the orientations and other alignments of the various components at these sites and determine whether there are any intentional astronomical alignments of the whole or parts. This is part of a larger aim of understanding the knowledge systems extant at the time of the megalith-building activities – be it in mathematics and geometry or astronomy or engineering. In short, the immediate aim was to try and determine whether the megalith-builders had any knowledge of astronomy, which is codified in the structure and layout of the monuments they have left behind. By “astronomy”, we mean knowledge of the cycles of the heavenly objects such as the Sun and the Moon and knowledge of the points on the local horizon that correspond to significant aspects of these cycles. Examples are points of extreme sunrise and sunset – known as the Solstices (two points – for summer and winter solstice) and extreme points of moonrise and moonset – known as the Lunistices (four points – for northern and southern limits of Major and Minor Standstills).

Summarizing our results so far, we have found sites with sepulchral and memorial megalith types that vary in their approach to orientation. The megalithic dolmens of Meguti Hill, Aihole, Karnataka, for instance, have orientations that follow no pattern – we find dolmens aligned to every possible point of the compass. While all the dolmens and dolmenoid cists at Rajan Koluru, Karnataka, are aligned to cardinal south. There are sites like Hire Benakal, Karnataka, which show a preference for east- and west-facing dolmens and dolmenoid cists, though north and south orientation are not uncommon, too. Here, we shall deal with the results related to the megalith type known as the stone alignment or avenue, some of which seem to have an astronomical basis for their layout.

1.1 The stone alignment: One of the most enigmatic megalith types has been the menhir, or the single standing stone. These may be undressed field boulders rolled into position, minimally shaped and erected, or dressed stone slabs elaborately held by inserting in a pit and packing with smaller stones. They may occur singly or be part of large groups, sometimes erected in grid-like or other patterns, called stone alignments. Some researchers also refer to these as “avenues” (Moorti 1994, 2008). Single menhirs in Kerala have been found to be sepulchral – marking the spot of burials, usually pit- urn-burials (Sundara 1975, Satyamurthy 1992). In Karnataka, they are usually found to be non-sepulchral, although our investigations have found them in close proximity to cairn burials (Menon 2012, Menon and Vahia 2011).

Allchin (1956) has catalogued many stone alignments in northern Karnataka and Andhra Pradesh. He found most of these to be grids or staggered (diagonal) grids either aligned to the cardinal directions or around 15 degrees off from the cardinal directions. Rao and Thakur (2010) have found the alignment at Vibhutihalli to be astronomical in nature, i.e. aligned to points of solar and lunar significance on the local horizon. Our investigations have shown definite intentional alignments to the solar points and possibly lunar points for the sites of Nilaskal (Menon 2012) (Fig. 3) and Byse (Menon and Vahia 2010, Menon and Vahia 2011, Menon, Vahia and Rao 2012).

1.2 The alignments of north Karnataka: Two of the most important stone alignments in Karnataka are at Vibhutihalli, near Shahpur and Hanamsagar, near Rajan Koluru. Vibhutihalli, which is the best preserved stone alignment in Karnataka, consists of field boulders rolled down from a low granitic hill to the west of the monument and maneuvered into place. The alignment consists of less than thousand stones arranged in a diagonal grid, with several stones missing (see Fig.s 4 and 5). Hanamsagar (see Fig. 6) is also described as a diagonal grid by Allchin (1956), Paddayya (1995) and Rao (2005), with Allchin putting the number of stones comprising the alignment as 1000 and Paddayya as 2500. The purpose of these monuments were variously proposed as royal camping ground, or place for markets or fairs, prophylactic stones for preventing sickness in cattle etc.

These stones were guardedly ascribed to the megalith-building phase of the south Indian Iron Age by Allchin taking into consideration their proximity to cist graves and stone circles (Paddayya 1995). Sundara (1975) has cautioned that they may not belong to the south Indian megalithic complex.

Rao (2005) has suggested astronomical basis for the layout of the stones of Hanamsagar and Rao and Thakur (2010) have suggested the same for Vibhutihalli. However, our preliminary study of Hanamsagar shows that the stone rows may be curving away like concentric arcs (Fig. 6). We feel that the very shape attributed to the alignment is questionable and a proper aerial survey or high-resolution satellite image may be the best way to resolve this.

1.3 The stone alignments of southern coastal Karnataka: Our study has concentrated on the menhirs of Nilaskal and Byse. These, unlike the field boulders of the alignments of northern Karnataka, are made of quarried stone slabs or natural elongated stone slabs of lenticular cross-section, erected oriented north-south and in formation. In earlier studies, these were recorded as menhirs, ‘erected haphazardly, unlike those of Vibhutihalli or north Karnataka’ (Sundara 2004, Sundara 1975). They are also recorded as being about 20 in number (Sundara 1975) and “more than 30” (Poonacha 2011), though our studies have thrown up the remains of more than 100 menhirs scattered over a large area. As noted earlier, we have recorded evidence for many pairs of stones forming sight-lines to the sunrise and sunset points on the local horizon during both the solstices, at Byse as well as Nilaskal (Fig. 3).

The site at Nilaskal is situated on a gentle, east facing slope and the menhirs are found only on the slope up to the crest of the same, suggesting that the builders intended the slabs to be seen against the background of the sky, probably as markers to observe the motions of the heavenly objects. This was substantiated by modeling the terrain with data obtained from a Total Station survey of the site (see Fig. 7).

The habitation sites associated with Nilaskal and Byse are yet to be discovered. Also, the source quarries where the stones, including the large one shown in Fig. 2, were obtained from are yet to be traced. A landscape level study, with the relationships between the extensive monuments with the various aspects of the cultures that authored them, is essential to understand them in totality. Satellite imagery of the region on a suitable scale – both to plan explorations by identifying potential features in the vicinity as well as to identify relationships between the monument and, say a source quarry, to work out possible transport routes for the quarried blocks etc.

2.0 The case for remote sensing:

In the case of monuments like the alignments at Hanamsagar and Vibhutihalli, remote sensing can play a major role. Hanamsagar, as we have seen, is reported as a diagonal grid of rough, undressed stones of varying size, roughly spaced 15 to 40 feet from each other. Apart from the obvious confusion in the number of menhirs that comprise the monument – 2500 (Paddayya 1995) and 1000 (Sundara 1975 and Allchin 1956). Our own reconnaissance visit to the site showed lot of disturbance at the southern end of the avenue, which results in inability to fix the limits of the alignment. Without fixing the limits of the monument, it is very difficult to put forward astronomical hypotheses; conjectures such as Rao (2005) based on an approximation of the form of the avenue derived from Paddayya (1995) can be seen to be grossly erroneous with just a casual visit to the site.

Also, the rows are reported to be aligned to the cardinal directions (Sundara 1975, Paddayya 1995). Our random checks of the orientations in the avenue using a prismatic compass at various points of the alignment (Fig. 10) show that, though the north-south orientation of the menhirs is accurate to within one degree of arc, the east west is off by about seven degrees. An aerial view taken from the hill on the west seems to suggest a curvature in the alignment of the rocks (Fig. 6).

Hence, the very shape attributed to the avenue, which has been studied for long, questionable. A ground survey is arduous given the remoteness of the location as well as the fact that farmers have set up thorn fences between different plots within the avenue. A high-resolution satellite image of the region would be very useful in fixing the shape of the monument beyond dispute. Another opportunity lies in the possibility that the monument, which has been disturbed in recent times, can be studied from satellite images of the region taken ten or even twenty years ago – to see it in undisturbed condition.

Another study area that emerges is the landscape level study of the planning of these monuments, site selection criteria etc. Often, it is noticed that the clues to the understanding a monument in totality is much larger than the immediate surroundings of the monument itself, embedded in the surrounding topography on a much larger scale. We propose to study remote sensing imagery of the region around each of these sites (Vibhutihalli, Hanamsagar, Nilaskal and Byse) on a scale of a few kilometers to few tens of kilometers (see Fig. 9). This would help, as already noted, in understanding the megalithic monuments here with respect to the landscape use in the times of their authorship – with the matrix of habitation sites, transport and other routes, quarries and other resources fully outlined.

Obviously, this should not be the only study to be carried out on such megalithic sites, but it should be an important and early component in the study, to be followed by intensive surveys on the ground of the most promising sites. Another advantage of studying the remote sensing imagery before undertaking the ground surveys is that it helps enormously to plan the survey better, incorporating possibly other features near the site that otherwise would have been missed.

3.0 Conclusion:

A complete understanding of megalithic monuments - from the purposes for which they were erected, to the role they played in the daily life of the cultures that built them, can only be obtained from a variety of study strategies. Remote sensing, or rather, satellite imagery, aerial photography etc. helps enormously to plan surveys, understand locational preferences with respect to resources, geographical features etc. The subject area that we have been concentrating on - the understanding the astronomical knowledge of their builders, as evident from the form and orientation of the megalithic monuments themselves, is a challenging task – not only due to the nature of the task itself, but also because of the fact that a large number of these monuments are unprotected – and thus heavily disturbed by development activities. Hence there is an urgent need to study and document as many sites as possible immediately. Remote sensing helps us to zero in on potentially promising sites, plan the ground-based study of the sites better as well as understand the monument in the larger scale of its setting.

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Fig. 1: A megalithic dolmen at Marayoor in Kerala

Fig. 2: A menhir at Nilaskal, Karnataka, which is part of a large alignment

Fig. 3: Two of the menhirs at Nilaskal, Karnataka, framing the setting Sun at Winter Solstice

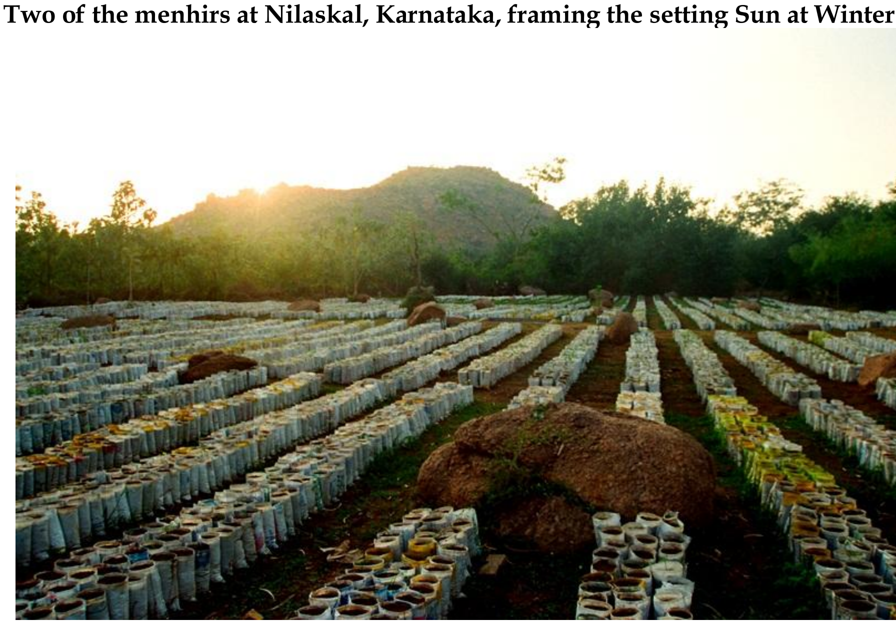

Fig. 4: Some of the boulders of the stone alignment at Vibhutihalli

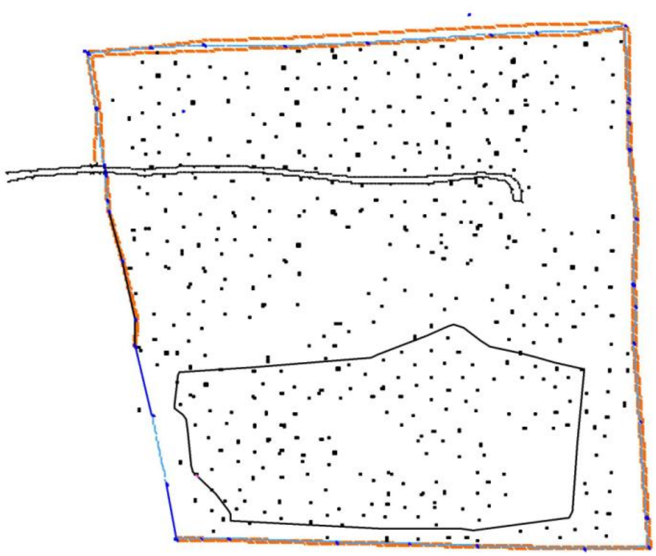

Fig. 5: A survey map of the stones at Vibhutihalli

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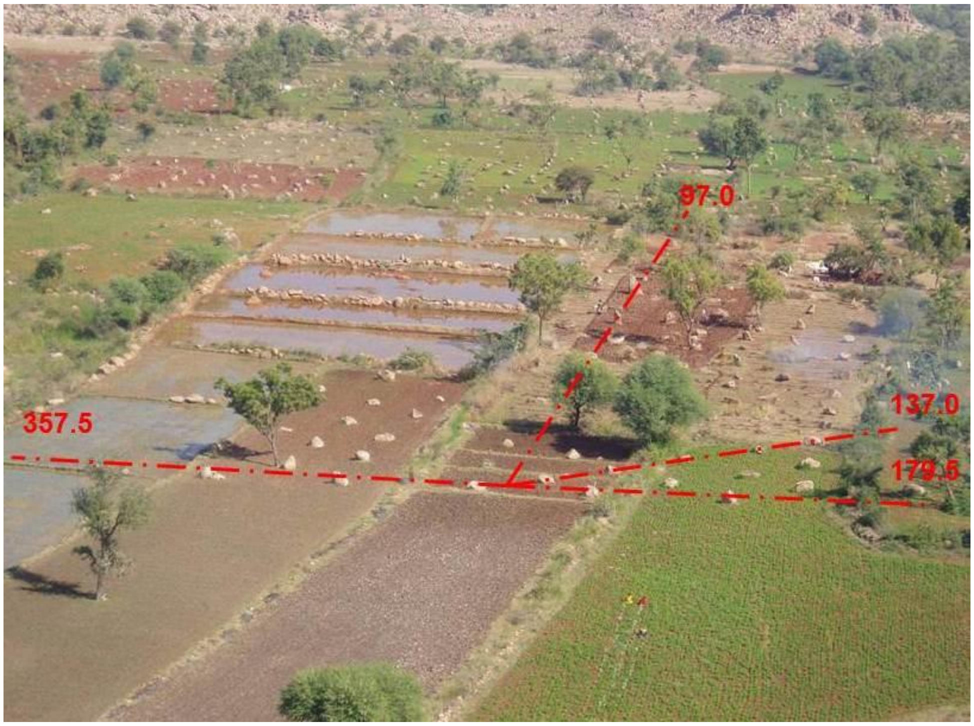

Fig. 6: Showing the stone alignment at Hanamsagar as seen from the west; arrows and numbers indicate orientation of the stone rows

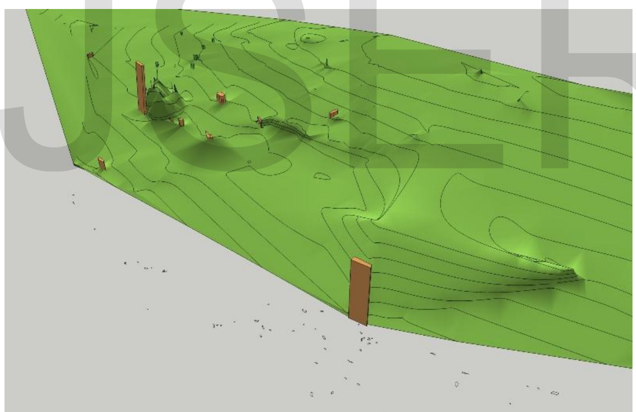

Fig. 7: Showing terrain-modeling of Nilaskal from data obtained with a total-station

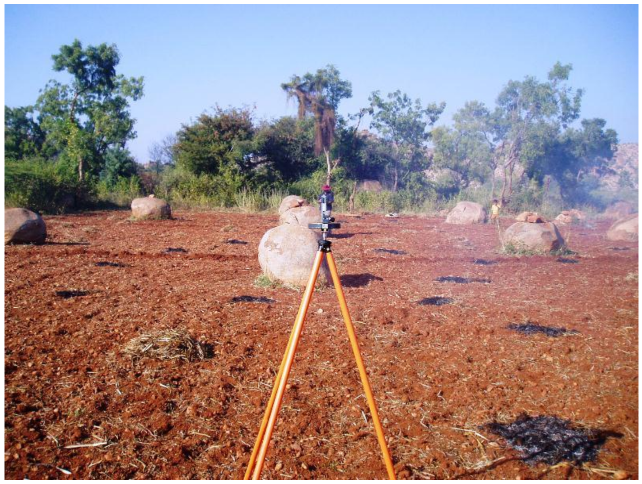

Fig. 8: Measurement of the orientations of stone rows at various points of the alignment at Hanamsagar

Fig. 9: Showing Google Earth imagery of the megalithic site at Nilaskal and surroundings

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