MEGALITHS IN ANCIENT INDIA AND THEIR POSSIBLE ASSOCIATION TO ASTRONOMY[1]

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Abstract

The megalithic monuments of peninsular India, believed to have been erected in the Iron Age (1500BC – 200AD), can be broadly categorized into sepulchral and non-sepulchral in purpose. Though a lot of work has gone into the study of these monuments since Babington first reported megaliths in India in 1823, not much has been understood about the knowledge systems extant in the period these were built – in science and engineering, especially mathematics and astronomy. We take a brief look at the archaeological understanding of megaliths, before taking a detailed assessment of a group of megaliths (in the south Canara region of Karnataka state in South India) that were hitherto assumed to be haphazard clusters of menhirs. Our surveys have indicated positive correlation of sight-lines with sunrise and sunset points on the horizon for both summer and winter solstices. We identify 5 such monuments in the region and present the survey results for one of the sites, demonstrating the astronomical implications. We also discuss the possible use of the typologies of megaliths known as stone alignments/avenues as calendar devices.

1. Megaliths and human existence

Space is a strange entity. All animals probably create some kind of map of their surroundings and use the local map to search for food and water, identify threats or simply find a place to rest. A sense of long-term safety drive animals, underground, above ground, to places that provide a vantage point for early warning and even to the skies. All animals scan the space

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within their reach all the time and therefore, for most animals, eyes are the most important tool to sense the world. We all like to visualise our world.

However, there is an additional dimension to our existence and that is another strange entity called time. It is probably a human realisation and time sensitivity is probably unknown to other animals that react to the present and do not refer to past or future except as a basis of rerunning an experience. Unlike space, the movement of time is unidirectional and humans realised this from a very early period. There is probably no better demonstration of this than death when a person irrevocably passes away. There is no argument, no appeal and no possibility of change of status. To be dead, is to be dead for all times. Then there are other intermediate time scales of years and human aging, seasons, and day and night. Until a sense of history and tradition arises, a lifespan is the longest time scales conceivable by humans. It is only when group existence and continuing traditions take root that humans become sensitive to longer time scale which goes into multiple generations. Yet, except for few truly exceptional humans, most are forgotten with 2 or 3 generations. At the same time, as human emotional roots become stronger, the desire of immediate generations to give respect to the dead, to communicate with them beyond their graves and to keep their memory alive is very strong.

This strange set of concepts of space and time come curiously together when megaliths are concerned. Probably driven by early horrors of seeing the bodies of their dead mutilated by other animals, humans have taken to hiding their bodies from the earliest times[2].

However, megaliths, especially sepulchral megaliths are an even stranger constructs since they are designed not only to bury the dead, but also to help us remember where they were buried long after they are gone. It is a strange use of space, designed to defeat the cruelty of time, which wishes to move on from every occurrence of an important event! In revenge, time also has a strange property of acting on common memory. Humans forget, and generations ignore much faster than we would like them to. Hence, it is necessary that to remember the most important facts of the past, they create markers in space to aid their memory. And yet, in most cases these original memories get lost in the mist of time and have to be recreated as best as we can.

Sepulchral Megaliths therefore have dual use. At the time around their construction, they serve as memorial markers for the dead and at later times, they are a rich source of material to understand human lives and beliefs from time immemorial.

There exist another class of megaliths, which again merge space and time in a more direct manner. Some of these at least have long been suspected of being astronomical observatories. These objects spread over space are *constructed* to keep track of time! These are the most curious of objects in that they connect concrete experiences of movement of time and space, its periodicity and its relation to nature and environment. Megaliths for time keeping are the earliest clocks that work on the time scale of months and keep a track of the movement of Sun and Moon in order to keep track of seasons. They represent the

[2] It is interesting that the skeletal remains of our closest ancestors, the gorillas and other higher primates are the most difficult to find since they were too intelligent to be caught in swamps but not intelligent enough to bury their dead!

first example of applied science since the architecture of stone observatories is astronomy. They are also the first scientific tools in the sense that they are not empirical constructs that are utilitarian, but are designed based on pre-existing observations and complex correlations which are then formalised into a utilitarian entity. These megaliths are the earliest observatories to predict seasons and give order to human life a measurement too that extends beyond the day to day existence. They are a product of a great inventive genius and a major break of human existence from that of other animals on the planet. While humans certainly controlled fire, had language and used wheel well before this time, these were ad hoc and empirical adaptations without any clarity about underlying behaviour of nature[3]. In that sense, therefore megaliths are the first *intellectual constructs* of humans the others being more intuitive.

Megaliths are therefore important structures that can provide a lot more information about not only the lifestyle of the people who made them but can also reveal details about their faiths and beliefs.

2. Megaliths in India[4]

In the Indian context, megaliths stretch from dates before 3000 BC till about 900 AD, but are known to be a continuing traditions in some parts of the country[5]. The oldest megaliths in India are found in the westernmost part of the country in the present day Afghanistan in the upper Indus Valley. Dated to about 3000 BC, they are in the form of stone circles. But they are also found in almost all parts of the subcontinent including central, southern and eastern India where they are a part of continuing traditions. There is also a broad time evolution with the megaliths in central India dated to be between 1000 BC and 500 BC while those in the east are much later and are dated till 900 AD. A large fraction of these are assumed to be associated with burial or post burial rituals including memorials for those whose remains may or may not be available. The most famous case-example is that of Brahmagiri, which was excavated by Wheeler (1975) and helped establish the culture-sequence in south Indian prehistory. However, there is another distinct class of megaliths that do not seem to be associated with burials. We discuss their broad features first and then discuss their relation to astronomy and cosmogony later.

In the subcontinent, megaliths of all kinds are found (figure 1). These are broadly (potentially overlapping) of two classes (after Moorti, 1994, 2008):

1. Sepulchral (containing remains of the dead) in which we include memorial stones where mortal remains may not be present but clear seem to be associated with a human life.
2. Non-sepulchral including large patterned placement of stones over a wide area.

[3] Even as late as 19th century scientists believed that heat was a fluid that flowed between objects when they were rubbed against each other. The theory based on atoms and their movement is a very recent construct.

[4] We use the term India in the general sense of South Asian subcontinent from Afghanistan to Assam in the East and Kashmir to Sri Lanka in the south.

[5] In principle of course, tombs and the memorial stones on top of coffins are also in the same tradition but we do not include them in the discussions. Here we restrict our discussions to non Christian and non Islamic traditions to mark the passing away of a person.

Figure 1Variety of Megaliths found in the subcontinent.

Figure 2: Stone circles of central India.

Sepulchral megaliths

The sepulchral (containing remains of the dead) megaliths can store the remains of the dead in a variety of forms. They could be primary burials, in which case the dead is interned soon after his or her death and it will contain a complete skeleton (in either flat or curled up positions) with some additional material as homage to the dead for the dead to use in afterlife. In some cases, these primary burials may also be in a sarcophagus made of terracotta. The whole chamber of burial therefore is a rich source of information. Similarly, secondary burials are also common when the remains of the dead, essentially his or her bones, are put in urns or pits are found. The location of the dead is most often marked with stone circles but Cairns, slab circles are also found on the surface. A common feature of these megaliths is that they generally are of dimensions of a typical human or even smaller and on occasion the area is isolated with stone circles. The structures tend to have large

stones made into a construct of one form or the other that is an abstract replication of a living habitat. However, a major difference is that unlike the house of the living, the house of the dead tend to be more sturdy and while it is nearly impossible to find an intact habitation site dating to 3000 BC, megaliths in good state of preservation can certainly be found. In the imagination of the people, the dead seem to live longer than the living and need better accommodation.

Apart from the direction of non-circular burials, it is not unusual for these to see the surface marker to have additional markers to mark a specific (often northern) direction. The bodies tend to be aligned either north – south (with the head in the north) or east west (with the head in the east) but random directions are also known (Sundara, 1975).

There is however, one class of non-sepulchral megaliths that should probably be classified with the sepulchral ones are the Hero Stones. These typically have an engraving on it either of a warrior or of god and generally assumed to have been installed to mark a bygone hero or someone lost from the group while travelling or in some accident. A distinct feature of these is that they are isolated, may or may not be dressed or carved. They also tend have little relation to the larger canvas of space in their neighbourhood except for an occasional tree providing a shade to the stone. However, it is believed that some of the dolmens are also probably equivalent of memorial construct of the dead with or without a burial under it.

Non-sepulchral megaliths

The most common amongst the non sepulchral megaliths are the menhirs, stone alignments and avenues (Moorti 1994, 2008). These are certainly more difficult to make, more elaborate in their construct and more spectacular to look at. They tend to be spread over a much larger area of several hundred square meters. They also seem to have been planned with care and set up with the labour of an entire community. It is likely that unlike the sepulchral structures, these have a certain time evolution and long traditions that are now lost. In most cases, their use is obscure and local speculations can include opinions that they were for the ghosts, for some unknown dwarf people or even for tying horses. However, invariably they are far too complex to admit of such simple explanations. They always have alignments which are either north south or east west with one prominent marker stone or a porthole in one stone pointing to either north or east. The earliest of these tend to have large stones put at specific locations but the later ones tend to be thin well-worked stones made with care and the boulder type ones also tended to be dressed.

In a separate chapter in this book, we (Menon and Vahia, 2010) will discuss examples of menhir sites in south India that seem to mark several cardinal directions. We will therefore not discuss them here.

3. A special case of Junapani

Junapani is a small area about 10 km north west of Nagpur, a city in central India. The region is referred to as Vidarbha region. Suvrathan (2010) has discussed the landscape and megaliths of this region in a detailed comparative study of history and archaeology of the region.

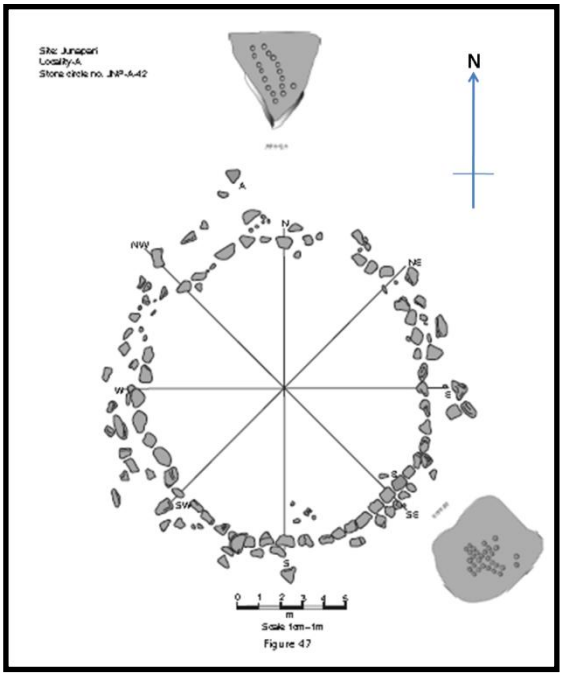
Figure 3: Google Earth image of Junapani showing stone circles.

The region was well populated with several centres of habitation from around 1000 BC to present and is believed to be an important region in the north south corridor of India. It boasts of several megalithic sites dated to between 1000 BC and 300 AD. The dates are based on the artefacts found in the graves connected with the megaliths which tend to have iron implements and iron enters this region around 1000 BC. One interesting feature of the region is that the megaliths tend to be essentially stone circle groups close to riverbeds. They are in a region known for its rich metallic soil. They are believed to be associated with local groups and clans. They also tend to have stones with cup marks on them placed around the stone circles.

Stylistically, they are uniform in typology, unlike the megaliths in southern India which tend to be menhirs, dolmens and other non-sepulchral structures as well as sepulchral megaliths including the stone circle typology. These will be discussed by Menon, S. M. separately in these proceedings.

Eighty-nine megalithic sites have been catalogued in Suvrathan (2010) in Vidarbha region out of which 51 are around Nagpur region. Out of these, 54 sites have only stone circles, 4 sites have a dolmen while 1 has a dolmen and a stone circle. Forty sites are purely habitation sites. Amongst these the largest site is Khairwada with about 1400 stone circles, cairns and habitation deposits spanning from megalithic to early historical period (Jamkhedkar, 1981). Junapani is the second largest site with 150 stone circles of similar period. The site was excavated by Thapar (1961). Three of the stone circles were excavated and two of these had human remains along with other funerary objects and in one case, the remains of an animal from the Equidae (horse) family were found. All the circles seem to belong the same period. However, the most usual features were the presence of cup-marked stones in the stone circles.

In order to understand the stone circles and to study whether they have any connection with astronomy or cosmogony of the people of this region, we conducted a preliminary survey of the same last winter. A detailed report of this study is in preparation (Abbas et al., 2010).



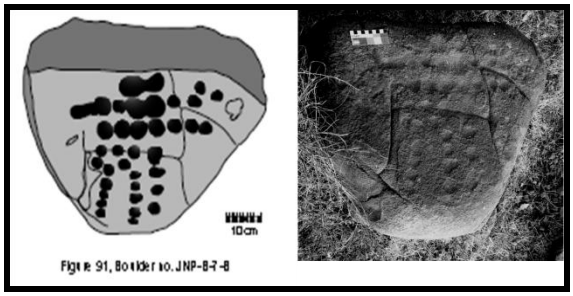
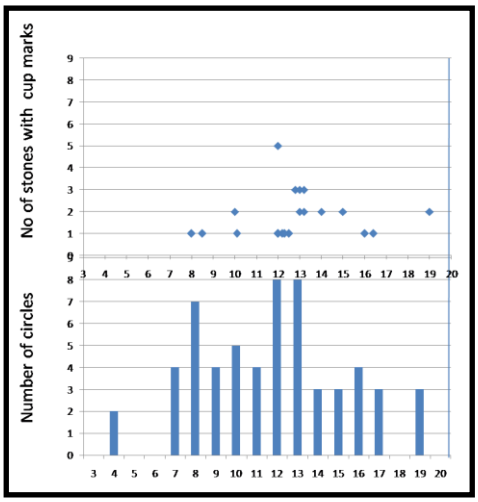


Figure 4: Cup-marked stone and its sketch

Figure 5: Drawing of a stone circle at Junapani. North is to the tope of the figure.



In figure 2 above we have given the picture of one of the stone circles. The stone circles are large enough to be seen in Google Earth images (figure 3).

Figure 6: Number of cup-marks and histogram of diameter of the stone circles.

Here we present our measurements of the stone circles and their possible astronomical relation. We surveyed and mapped 56 stone circles and a typical drawing is shown in figure 4. From the surface it appears that a large fraction of them are in good state of preservation. 20 of these circles had stones with cup marks on them. About 35% of which have cup marked stones on the side (figure 5).

In figure 6, we have given the histogram of the diameter of stone circles and the number of cup-marks in each circle. We have analysed the location of the cup mark with respect to their occurrence in the circle.

The cup-marks tend to be in either a straight line or in the form of the '+' sign. In addition, the line or one of the lines of the '+' sign tend to be radial or tangential to the circle. In figure 7 we have shown the distribution of the cup-mark stones around the circle. The cup-mark stones are not randomly placed. They seem to have definite orientation. They are spread over an angular range of 132 degrees out of 360 (37%) but account for 29 out of 35 (83%) of all cup marks. The probability of this arising due to chance is 2 x 10^{-8} (7.2 σ from expectation value). They also form 3 clusters:

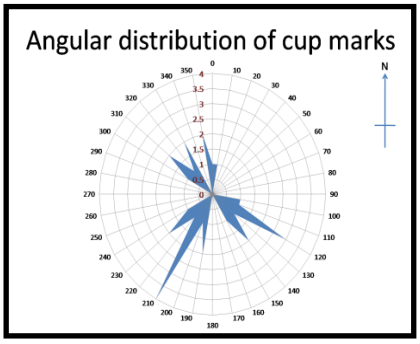


Figure 7: Angular distribution of cupmark stones along the stone circles

Cluster 1: Angle 118 ± 18 deg from North

1) Cluster 2: Angle 208 ± 18 deg from North
2) Cluster 3: Angle 334 ± 30 deg from North

In figure 8 we have given the orientation of cup-marks along the three major clusters of cup-mark stones along stone circles.

All this seems to suggest that the stone circles of Junapani seem to have cup-mark stones put at specific location with some directions in mind. It needs to be analysed if these are astronomy related or only direction oriented.

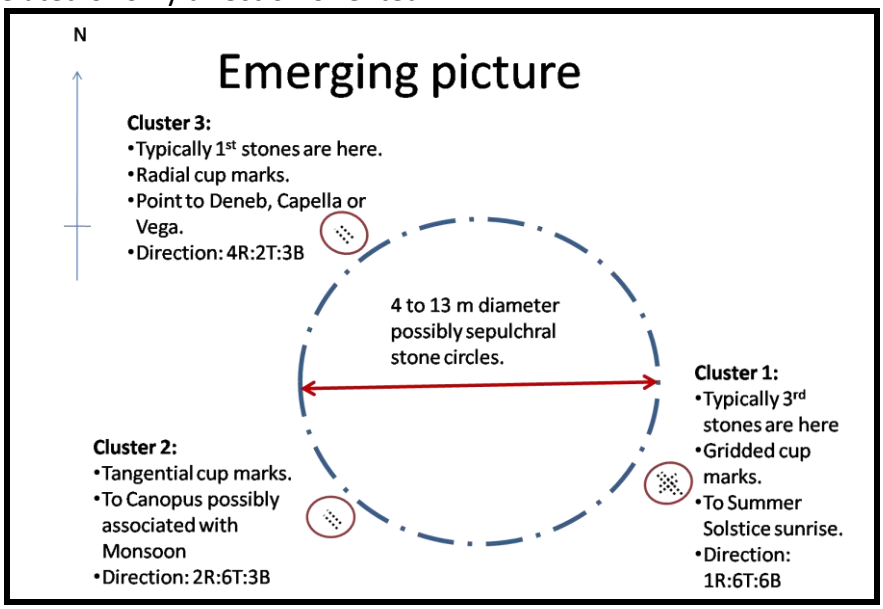


Figure 8: Stone cupmark direction and their location along stone circles

4. Megaliths, astronomy and cosmogony

The term Megaliths is a very broad term used to classify any large stone object placed at a specific location for some presumed purpose. Its utility has often been speculated upon and the purpose is often difficult to define. The sepulchral ones were obviously built in the memory of the dead but amongst the non-sepulchral ones, a fair number of such stone structures have been shown to be for astronomical purposes in other parts of the world. We call them astronomical observatories in the sense that they track the sunrise or sunset points over the period of a year to determine seasons and then probably expanded to study rising points of stars that were considered important for the people who built the structures.

On the other hand, it is quite reasonable to assume that humans have viewed the heavens with awe and wander from time immemorial and sooner or later, all the civilisations have declared the skies above as the abode of the gods. The connection between the ancestors, gods and humans is especially strong in Indian belief system from the earliest periods. In another paper in this volume, we (Menon and Vahia, 2010) has shown that a case can be made to show that some of the megalithic structures of ancient India involving menhirs seem to be of astronomical origin. It is therefore not surprising that from earliest periods, the human burials are in specific parts of the town and the bodies are oriented in some specific directions.

The connection between at least some of the non-sepulchral structures and astronomy is not difficult to see just as a connection between sepulchral structures and cosmogony. However, what our work at Junapani has done is to show that there seems to

be a connection even between sepulchral structures and astronomy possibly through cosmogony.

This does not seem to be as farfetched as it may appear at first sight. The advent of iron not only gave humans a power to make strong instruments but it also made it possible to chisel shapes into hard rock. Unlike rock art and rock etchings, these carved stones are far more long lasting. The first widespread use of this new method of expression seems to have been in making anthropomorphic figures and hero-stones (figure 9).

Figure 9: Anthropomorphic figure and hero stone

In the continuing sequence of parallel developments, one can simultaneously see some of the largest anthropomorphic figures such as the statue of Bahubali in Sravanabelagola, Karkala etc. At the same time, a lot of cave art in the early period of the present era, exquisitely carved caves can be seen with detailed description of mythological stories and mythological imageries and they often coexist with rock paintings that can be far more intricate and permit a different type of human expression.

Figure 10: Hero stone inside a dolmen

We would in fact like to take this similarity of growth further and discuss the temples of India. It is, for example, possible to see hero stones surrounded by large stone plates in the style of Dolmens and the idol inside being worshipped (figure 10). The hero images eventually get replaced by the images of Gods and structures resembling modern day temples can be seen.

From around the time of the rise of Buddhism, the nature of worship undergoes very profound changes. Initially the Stupas are built to worship the mortal remains of Buddha including his hair which is buried in the centre of a structure which is sealed and worshipers essentially circumambulate the stupa. From this, a gradual transformation with the image of Buddha in the centre of the structure arise as early as 2nd century BC.

Temples are not only the places of worship in India but they are in fact, a representation of the great cosmos on earth. The centre of the temple is occupied by the great lord Bramhan and then various directions are assigned to various gods, often of Vedic Origin. The images and other architectural designs are then fitted based on this directionality (figure 11). There have been conjectures amongst scholars about the possible origin of the temple from megaliths, especially the dolmen (Kramrisch, 1976).

Figure 11: The Trimurti from Elephanta Caves, near Mumbai, India and the *Ravalphadi Cave, Aihole*

However, even more fascinating is the structure of temples. In India there are predominantly two types of temples called the Dravida Style and the Nagar Style (figure 12). The former is a common style in south India while the latter style is common in north India. Many other styles also appear but they tend to be an admixture of the two styles. The most distinguishing feature of the Dravida style are the large entrances called Gopurams. These are large gates that tower higher than the inner sanctum sanctorum of the temple.

Figure 12: Somnath and Minakshi temple are classical examples of Nagar and Dravida Style temples

These Gopurams, with their appearance not dissimilar to the megalithic stone arrangements are also placed in cardinal directions. However, the Nagar style temples focus their cosmogony almost exclusively on the sanctus sanctum. The centre where the idol is placed boasts of the largest and the tallest tower and in a typical village, no structure taller than this temple is allowed. The temples also tend to have a pillar placed near the entrance that is typically used as a gnomon to indicate the movement of the Sun in the sky over the year.

Conclusion

The idea of space and time have always fascinated humans from the first time they looked around and noticed long term variations that they assigned to forces beyond their reach. Appalled by the idea of leaving the dead to the elements with all the mutilations that would be inevitable, they soon began to give a resting place to the dead. A desire to not let go of the dead, the myths about the presence of gods (probably aided by appropriate hallucinations, prophecies and soothsaying) the place of burial soon began to be treated as

sacred. Attempts to remain in touch with the dead by keeping track of their final resting place gave rise to the first sepulchral megalithic stone structures.

Independently, as the regularity and predictability and of these changes began to catch their notice, they soon realised its importance to their lives. Hence, as human intelligence rose above the mundane use of space to a mixed understanding of space and time, they created around them structures that tried to hold these together in the form of non sepulchral megaliths.

Compulsions of environment and the rising intelligence and technological skills of humans allowed humans to create megaliths that are impressive for their architectural subtleties and technological skills. From menhirs to dolmens of different shapes and sizes one can see their rising desire to keep track of the dead and the universe. With the arrival of use of architecture for habitation, they arrived at the first attempt to control their immediate environment for privacy and for better living. However, death continued to give a sense of time and its limitation to them and soon the megalithic architecture began to appear that would result in a fascinating variety of megalithic structures that seem to continue with the advent of worship of the great heroes and the gods that can be seen today in the form of temples. The megaliths of the temples are no longer recognisable for their roots, but then human limitations are not the nature's problem.

The megaliths in central India also have carefully laid out stones with cup marks of typical size of a few centimetres. These are placed at specific locations along the stone circles. The patterns of these cup marks and their orientation suggest that they were probably designed to mark out specific locations in the sky that corresponded to rising and setting time of specific stars associated with important changes in seasons and especially with the arrival of monsoon.

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