

Some Key Aspects of Rock Art Dating

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Abstract

One of the most frequently asked questions about rock art is; how old is it? Rock art can be broadly categorized into pictographs (rock paintings), petroglyphs (rock engravings), or geoglyphs (ground figures). The age estimation of rock art has long been a key aspect of rock art research, but continues to be attended by difficulties over methodology, misinterpretation of findings and overconfidence in the reliability or precision of results. The present paper intends to focus not only on the new insights but also new dating techniques. The main course of discussion would be around the multitude of methods and approaches that have been used in securing age estimates and how they compare in determining the timing of rock art depictions.

While dating rock art it has been related to stratigraphy. The style also has been used as a formal, denominator. As the comparable contexts too have a rather imprecise dating precise age is very difficult to identify. But the relative age is often easier to reach. Besides, a detailed chronology seems impossible to construct.

For most of the rock art researcher's main focus of their investigations for rock art dating at present has been to establish chronologies of different rock art sites, based on pigment analysis to direct dating to stylistic features. An endeavour has been made by some scholars to approach rock art with a view to reconstruct the lifestyle and environment of the people who created this art. While agreeing that chronology is crucial for rock art, it was admitted that, as yet, no absolute dating, or definite chronological order had been established so far. Some scholars advocate re-assessing the acceptance of chronology as the sole criterion of rock art studies. Doubts have been raised on constructing a universal standard for dating in this field.

Some of the important methods applied for dating by rock art researchers so far include minimum dating by archaeological excavation, radiocarbon analyses of mineral accretions or their inclusions, radiocarbon analyses of paint residues or their inclusions, geomorphological methods, minimum or maximum ages derived from biological accretions, lichenometry, colorimetry of patinae, radiocarbon analyses of charcoal and beeswax figures, and any other methods of "direct" dating of rock art. The new advances on rock art dating can be sub-divided into the different types of age-determination techniques yielding numerical, correlated, calibrated, or relative ages. 'Absolute' and 'Date' are now considered to be imprecise geochronology terms, because they connote far more precision than most age-determination techniques yield.

The analysis of the rock art elements are usually done in many tiers:

(1) Stylistic Analysis: In the graphical and technical characteristics, concept of impression, prevalence or lack of certain subjects, and the motivation behind the figures are usually

discussed. The significant variables are identified, and a time consuming process of considering hundreds of details which experience has shown not to be particularly relevant are ignored.

(2) **Chronological Analysis:** It is aimed at summarizing the considerations, which help determine first, the relative chronology and then the absolute chronology of the various phases. For the study of relative chronology the superimposition of each rock is very important. The case of superimpositions is analyzed in their order of distribution on the rock; groups of engravings are classified according to their degree of preservation and possible differences of patina existing among the engraved figures on the same surface are established. The data obtained are subsequently compared and the succession of engraving phases existing on the same rock determined. Any stylistic differences among the recognized phases are noted for possible clues to determine chronological placement. The stylistic successions of the numerous rocks are further examined and compared so that common and repetitive characteristics could be defined. A note must be taken of the possible chronologically valuable elements in each group that could contribute to the dating of the phase.

(3) **Ethnological Analysis:** It contributes to the reconstruction of the daily life, the activities, the economy, the socio-political structure, the beliefs, the mythology, the pattern of symbolism and the contacts and affiliations of the people who made the engravings. The symbols in rock art have been correlated to similar motifs associated with specific time periods. In some circumstances, such as Chinese rock art, correlated ages can be quite precise because they are in writing styles of known calendar age. In other cases, such as the geoglyphs of Peru, geoglyphs are correlated with pottery iconography. Indian rock art is correlated with its ethnographical parallels also. Iconographic correlations are controversial in some cases because motif identifications are sometimes subjective.

(4) **Numerical Method:** The development of accelerator mass spectrometry (AMS) radiocarbon (^{14}C) dating has revolutionized numerical age-determination of rock art, because milligram-quantities of material can be measured with a precision of less than 5%. Other important numerical approaches include thermo-luminescence and uranium-series dating. The radiocarbon dates on rock paintings are usually attained through three major techniques: (1) dating the carbon from black paintings with charcoal pigments; (2) dating other pigments that are also organic, and more rarely pigments that include discrete organic materials that can be removed physically; (3) dating the carbon extracted from mineral pigmented paintings in which organic matter was added in the preparation of the paints. All of these techniques have distinctly different advantages and challenges in their application. In the second category of rock art dating, organic pigments or organic inclusions, the problems are perhaps less difficult than for other techniques. Both these situations are rarely encountered. One more technique which is useful for both paintings and engravings, where calcium carbonate and calcium oxalate mineral coatings form on top of the rock art. If that layer can be removed, dating the oxalates that have formed yields a minimum age for the art.

(5) **Calibrated Method:** is used to get numerical ages to calibrate a time signal. For example the Cation ratio (CR) dating is based on the observation by researchers from countries like Russia, China, South Africa, Australia and USA. CR dating is still in its experimental stage. To some scholars it is controversial also. Its great advantages rests in its low cost relative to

radiocarbon dating and that age can be estimated in circumstances where no other technique will work. Another calibrated method is microerosion dating, used only by Robert Bednarik. It is believed that the microerosion dating is only applicable in places where petroglyphs are too young (generally less than a few thousand years) for a coating to form.

Future of Rock Art Dating

In spite of the potential problems that beset each technique, several hundred dates on rock paintings around the world have now been produced by several laboratories. We can be optimistic that most of those dates will stand the test of time and be accepted as reliable. Getting accurate dates on rock art is important as it will allow incorporation of rock art information into the other archaeology of a site. Some of the above methods and techniques hold great promise for the age determination of rock art of India. For example, where specific materials can be mechanically extracted from paint pigment (e.g., charcoal), AMS ^{14}C dating can be tested by understanding the potential for contamination in these specific materials. For many pictographs where organic matter is disseminated throughout the pigment, the plasma-chemical selective approach offers the only hope for numerical age control. For the petroglyphs and geoglyphs, minimum ages can be obtained for organic matter entombed by rock coatings. Lasers can extract carbon *in situ* on the sub-millimeter scale. But at present, there are problems related to exactly how to pre-treat the samples before carbon are removed by lasers. When these problems are resolved, then the great spatial precisions of lasers will open doors in rock art dating. All the above age determination tests need to be done on the replicated samples by different laboratories, using different techniques. We cannot be completely confident in the dates until an agreement is observed.

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