# Development of Archaeoastronomy in the English-Speaking World

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**Abstract**

While there are early examples of work that are now recognized as archaeoastronomy, the development of archaeoastronomy as a discipline has nearly all happened in the past 50 years. Development accelerated with the foundation of regular conference series. This in turn widened interest in astronomy from Megalithic Europe and the Maya to encompass wider geographical and historical range. This is turn has required archaeoastronomers to embrace a variety of methodological approaches.

## Introduction

Why bother with a history of archaeoastronomy? Given the amazing vitality of now, why bother with research methods of the past? The answer is that, like many disciplines, archaeoastronomy is an ongoing conversation. However, in this case, the people currently carrying out high-quality archaeoastronomical research come

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from a diverse range of backgrounds: people both inside and outside academia, people approaching from sciences and the humanities, and people looking at both the most ancient and most modern uses of the sky. Most researchers in the field have joined this conversation after it has started. While there is probably more opportunity for a newcomer to make a valuable contribution than in most studies, there is value in an awareness of some history of the discipline.

Archaeoastronomy is an interdisciplinary practice. One of the threads of its development has been the story of researchers learning to speak the same language. At a recent conference in Lima, Clive Ruggles (2011) commented on the difficulties of using the word "observatory". After much discussion of ethnocentricism, the word probably no longer carries the baggage of assumptions of what astronomy is for. Still, someone writing a research project aware of this past would probably do well to add a brief note that they are aware when they use the word that they are not blithely assuming the observers had the same systematic interest in the sky as modern observers (see also ▶ Chap. 9, "Ancient "Observatories" - A Relevant Concept?"). There have been similar discussions about other concepts such as "constellations". Brief reference to earlier work can prevent much misunderstanding in current discussion.

There is also a matter of prestige. Prestige comes with age and this leads to a quest for the earliest glimmers of study that might pass for an origin. For example, even the least ambitious histories of computing start with Babbage's analytical engine and now may start with the invention of the abacus. This is despite computing being a largely post-war subject and practitioners getting on with the process of developing hardware without reference to Babbage's work. Likewise it is possible to look into the past at speculation about archaeological sites and their astronomical uses to see earliest examples of archaeoastronomy. In doing this, it is clear the exact origins of any discipline are difficult to pin down precisely. People's views differ about what constitutes archaeoastronomy. What is merely speculation and when does a notion becomes recognizably part of an ongoing program of study? Anyone seeking to produce a history that represents the wide range of opinion among many leading archaeoastronomers would be wise to shroud claims in vague language laced with prevarications and caveats. To make a definite claim that archaeoastronomy started here is to invite criticism and disagreement. Acknowledging this, I venture that the discipline of archaeoastronomy started on October 26, 1963.

## Archaeoastronomy as an Academic Debate

This date is significant as it marks the publication of the paper "Stonehenge decoded" by Gerald Hawkins (1963) in the journal *Nature*. This date may seem arbitrary. Alexander Thom had published "A statistical examination of the megalithic sites in Britain" some years earlier (Thom 1955). This was followed in the early 1960s with other papers on megalithic mensuration and geometry and where Thom argued that prehistoric Britons used an accurate unit of length, the so-called

"megalithic yard". While this work would later attract attention, it was Hawkins' claims about astronomy at Stonehenge that started archaeoastronomy as a conversation rather than a collection of individuals largely talking to themselves.

Hawkins said that there was a very specific purpose for Stonehenge. He claimed it functioned as an elaborate astronomical computer. The stones marked alignments for the express purposes of accurate observation. He claimed that observers at the site marked the movements of the sun and moon, and even used a ring of pits around the stone circle, known as the Aubrey Holes (see ▶ Chap. 105, "Stonehenge and its Landscape"), as part of an eclipse calculator. The discovery of Stonehenge as a Neolithic computer was itself made with a computer. The combination of high technology and ancient mystery was a public success. Hawkins' further papers became the basis of a best-selling book, also called *Stonehenge Decoded*. Not only did he gain public attention for his work; archaeologists paid attention too and their response was scathing.

Glyn Daniel, editor at the time of the leading archaeological journal *Antiquity*, decided the claims should be rebutted and asked both an archaeological and astronomical expert to write papers. Richard Atkinson, who led excavations at Stonehenge in the 1950s and 1960s, wrote the response "Moonshine on Stonehenge" (Atkinson 1966) for *Antiquity*. In it, he took Hawkins to task for his lack of accuracy and for proposing alignments that used different phases of the monument to make observations. The astronomical expert was Fred Hoyle. His paper "Speculations on Stonehenge" (Hoyle 1966) was problematic for archaeologists. Hoyle largely endorsed Hawkins's findings and simplified the eclipse prediction mechanism. Despite this being the opposite of what he expected, Daniel stood by his word and published the article. Nonetheless archaeologists were unconvinced. Reflecting on how the use of a computer had led to the discovery of Stonehenge as a computer, Jacquetta Hawkes (1967) wrote the paper "God in the machine" which includes her oft-quoted phrase "Every age has the Stonehenge it deserves – or desires". Had this been the limit of astronomical work at archaeological sites, the nascent discipline of "astro-archaeology" could have died soon after birth. In Europe, the fact that this did not happen was due to the work of one man who could be described as archaeoastronomy's champion.

Alexander Thom was Chair of Engineering Science at Brasenose College, Oxford University. He had become fascinated by the construction of megalithic sites in the British Isles, particularly in his home country of Scotland. Following his retirement in 1961, he published results of an extensive survey of megalithic sites (Thom 1966, 1967). Unlike the work of Hawkins, Thom's analysis could not be easily dismissed.

Thom's key innovation was that he did not make claims based on the analysis of one site. His work was an analysis of multiple sites. The patterns emerging from the survey as a whole helped counter arguments that any one result could have arisen by chance, and therefore provided a much more serious challenge to archaeologists. Unlike Hawkins at Stonehenge, Thom did not just consider alignments between stones. He argued that horizon observation was important and that sites such as stone rows marked a backsight, a specific point from which an observer could stand

and quickly identify a specific foresight on the horizon for observation. Features such as notches between mountains provided a mechanism for high-precision observation that appeared to be replicated across the British Isles.

At that time, archaeologists at the time were deeply suspicious of the idea that Neolithic people might have made accurate astronomical observations, since this did not fit their own social models. In a BBC documentary, Atkinson famously described Stonehenge's builders as "howling barbarians". To think of them as proto-engineers was clearly ethnocentric, an impression bolstered by Thom's description of the builders of megalithic sites as "our boys".

Thom's work also suggested the existence of a prehistoric calendar in which the year was split precisely into eighths, with various sites marking sunrises and sunsets on the requisite dates. The solstices and equinoxes split into quarters, and then these quarters were further divided by cross-quarter days. These cross-quarter days were supposed to be Neolithic forebears of the Celtic festivals Imbolc (Candlemas, early February), Beltane (May Day), Lughnasadh (Lammas, early August), and Samhain (Hallowe'en). Few archaeologists could believe there was a mechanism to administer long-distance uniformity in time-keeping (or in mensuration, as implied by the widespread use of the "megalithic yard"). One of the few archaeologists who did attempt to set Thom's work in a social context was Euan MacKie. He proposed the existence of a class of astronomer-priests inspired by social models based on studies of people in the Americas (MacKie 1977).

## Early Archaeoastronomy in the Americas

The best description of the state of archaeoastronomy in the early 1970s is Elizabeth Baity's "Archaeoastronomy and ethnoastronomy so far" (Baity 1973). In her article, she covers the state of archaeoastronomy in Europe and then compares it to work in the Americas, lamenting that archaeoastronomy in the New World lacks a Hawkins and Thom to drive it forward (Baity 1973, p. 401). Baity's survey covers work in the Americas comparatively quickly, mentioning proposed alignments at Teotihuacan in Mexico, in the US southwest, and at Nazca and Tihuanaco in South America. What seems to demonstrate a lack of interest in fact reveals a fundamental difference between Europe and the Americas in terms of the nature of the archaeological evidence and archaeological practice.

In Europe, archaeology developed from ancient history. For prehistoric material, there is no written record. In the Americas, archaeology is considered a subdiscipline of anthropology. In some cases archaeology is informed by ethnohistorical records, particularly in the territories colonized by Spain. While the Spanish chroniclers were not modern anthropologists, their determination to record indigenous practices even as they were being stamped out has bequeathed us invaluable evidence. Baity was also able to draw upon ethnoastronomy in her survey of American research.

Initially this type of evidence was ignored. John Eddy's study "Astronomical alignment of Big Horn Medicine Wheel" (Eddy 1974) was recently described by Anthony Aveni (2008, p. 14) as "...a classic example of the application (or misapplication?) of the Stonehenge paradigm". The site is said to be around two centuries old, and Eddy associates it with the either the Crow, Sioux, Arapahoe, Shoshone, or Cheyenne Indians. There is some brief mention that the Crow called it the Sun's Tipi, but the bulk of the work is alignment analysis. Eddy matches alignments to positions of sunrises, sunsets, or the places where certain stars cross the horizon. He references both Hawkins and Thom in the process of producing what appears to be an objective analysis of the site. However, despite discovering numerous astronomical alignments, he finds little in the ethnographic data to support his hypothesis. This raises the question: is this because ethnographers have not recorded relevant astronomical practices by Plains Indians, or because modern researchers see astronomical meanings in alignments that were not thought significant by the builders? In his study, Eddy does not ask. However, in the Americas, there is a possibility of returning to indigenous people and asking relevant questions. It was this ability to reexamine what might be incomplete ethnographic records that shaped early archaeoastronomy in the Americas.

Gary Urton's study of Misminay (Urton 1981) proved how an anthropological approach can enrich an understanding of archaeology. Misminay is a village in the Andes near Cusco. At the time when Urton was conducting fieldwork, it had been little visited by outsiders, meaning that the villagers still had a distinctive local cosmology. The local calendar was regulated by the position and appearance of the sun, moon, and the rising and setting of stars at sunrise and sunset. This sort of astronomy is known from historical records in many places around the world, but the location and isolation of Misminay also revealed other astronomical features.

The particularly striking astronomical feature is the quartering of the sky by the Milky Way. The latitude of Misminay means that the Milky Way is seen arcing over the sky and dividing it in one way during the wet season and in a crosswise fashion during the dry season. This quartering of the sky was correlated with a quartering on the ground. Misminay sits at the crossroads of two irrigation canals which were seen as the terrestrial equivalents of the paths in the sky marked by the Milky Way. The land of the Inca was known as Tahuantinsuyu, the land of the four quarters. The cosmology of Misminay is not a perfectly preserved Inca cosmology, but it can be seen how the study, along with Spanish historical records, can add information to the use of sites and materials that purely archaeological data lacks.

Around the same time in the 1970s, historian Stephen McCluskey (1977) worked with the Hopi Indians of Arizona. He too found that horizon calendars had more significance than purely as markers of time. Here too there was an element of quartering of the cosmos, this time divided by the axes between the solstitial rising and settings of the sun. This produced a sacred geography, with each quarter marked by its own characteristics including its own color.

This ability to see how cosmology was lived also encouraged American archaeoastronomers to look for much more than simply alignments or horizon astronomy.

Ethnography revealed that it mattered how patterns of light and shade moved around buildings. Ken Hedges published "Rock art in the Piñon Forest of northern Baja California" (Hedges 1977) in which he argued that patterns of light and shade on rock art were used to mark the extremes of the solstices. A couple of years later, a pattern of light and shade was found at Fajada Butte that was termed a "sun dagger", whose appearance as a shard of light in shadow over or around a spiral petroglyph was said to have astronomical significance (Sofaer et al. 1979; see Fig. 41.5).

The importance of cultural practice was also recognized by the major force in American archaeoastronomy during this period, and throughout the 1980s and 1990s: Anthony Aveni. Aveni edited a series of volumes that collected together early archaeoastronomical research in the Americas — *Archaeoastronomy in Pre-Columbian America* (Aveni 1975), *Native American Astronomy* (Aveni 1977), *and Ethnoastronomy and Archaeoastronomy in the American Tropics* (Aveni and Urton 1982) — as well as his own book *Skywatchers of Ancient Mexico* (Aveni 1980). It is a measure of his work that a revised version of this last book was published twenty years later, duly updated to account for new discoveries. In contrast, contemporary work from Europe would need to be rewritten from scratch.

In his work, Aveni did something so obvious that it seems almost absurd that people needed to be told to do it: he made social questions a key feature of archaeoastronomy. While followers of Hawkins and Thom were attempting to demonstrate the use of astronomy in culture, Aveni discussed the social context of astronomical practices. Alignments and structures were interpreted in the light of associated art and ethnohistory in order to produce descriptions and interpretations of astronomical practices, not just evidence that they existed. Aveni led a change in practice that embraced anthropology as a primary means of uncovering astronomical practices.

The richness of the ethnographic record meant that archaeoastronomy in the Americas could also to some extent operate in the opposite direction to the European method, by starting with an astronomical meaning for a place informed by the ethnographic record directly, or though familiar cultural symbolism such as rock art, to direct a search for a connection to an astronomical target.

## A Spectrum of Approaches

The differences in evidence and methodology used are to some extent highlighted by the fact that two publications started in the late 1970s. The *Archaeoastronomy Bulletin*, published by in the Center for Archaeoastronomy in the USA, first appeared in 1977. It took its name from the new term "archaeoastronomy" used in Baity's 1973 survey (the term was originally suggested by Euan MacKie). In the UK, the journal *Archaeoastronomy*, published as a supplement to the *Journal for the History of Astronomy*, first appeared in 1979. This published papers on a mix of European and American topics as well as studies of sites further afield.

From 1979 to 1982, Michael Hoskin, editor of the *Journal for the History of Astronomy*, was President of the IAU's Commission for the History of Astronomy.

In this role he saw the opportunity to bring together researchers on both sides of the Atlantic, and in September 1981 an international conference on archaeoastronomy was held at Queen's College, Oxford. Many Europeans and Americans found themselves in a state of mutual incomprehension.

Americans, working within a culturally informed discipline, were baffled that so much archaeoastronomy could be done without reference to ethnographic or archaeological evidence. The patterns found by alignment hunters might be real, but often lacked any human meaning. In contrast, the European archaeoastronomers were surprised how easily astronomical claims were made for sites based on suggestive anthropological evidence, but with little attempt to confirm analytically the meaning read into a site from the ethnographic record. When the conference proceedings came to be published, the two sides remained apart, publishing two volumes, *Archaeoastronomy in the Old World* (Heggie 1982) and *Archaeoastronomy in the New World* (Aveni 1982). Despite the disagreements, the participants found the discussion valuable and a repeat "Oxford" conference was arranged to be held in the Yucatan, Mexico. Oxford conferences have continued to be held every 4 or 5 years, initially alternating between Europe and the Americas.

Anthony Aveni dubbed the two approaches as "green" and "brown" archaeoastronomy, after the colors of the covers of the two volumes (Aveni 1986). Also in 1982, the New York Academy of Sciences published *Ethnoastronomy and Archaeoastronomy in the Tropics*, with a blue cover. As a result, ethnoastronomy has sometimes been referred to as "blue" archaeoastronomy. Using the prefix archaeo- may seem odd for ethnographic work, but the influence from the Americas meant that archaeoastronomers and ethnoastronomers often found themselves asking similar questions both of ancient and modern uses of the sky outside the Western scientific tradition.

There was a belief in the 1980s and 1990s that the methodological division between the "green" and "brown" approaches was bad for archaeoastronomy. Archaeologist Stanisław Iwaniszewski (2003, p. 7) would later describe his belief in the need for an all-embracing theory as naive, but it was one that appeared to be shared by many who believed that the previously disparate methods of archaeoastronomy could be unified by welding together scientific analysis and humanistic insight. With hindsight, if this was the goal, then the following Oxford meetings were impressively self-defeating. *World Archaeoastronomy*, the volume of the second Oxford conference (Aveni 1989), drew in papers on subjects from beyond the Americas and Europe to include the Middle East, India, and China. The publications for Oxford III included papers from the cosmology of the Inuit to Australian aboriginal sky-mapping.

As a reflection of the increasing diversity of source material, methods, and uses of astronomy studied, the editors of one of the proceedings volumes from Oxford III, Clive Ruggles and Nicholas Saunders, proposed that what was being studied would be better labeled "cultural astronomy" (Ruggles and Saunders 1993a). The term had the virtue of no longer implying a hard division between archaeoastronomy and ethnoastronomy. On the other hand, it was not without criticism. One problem was: given that all astronomy happens within a culture, how do you divide the subject matter from the history of astronomy? Both "archaeoastronomy" and

"cultural astronomy" imply that the topic being studied is astronomy; in other words, there seems to be an implicit assumption that any pattern discovered in, say, alignment studies will have been astronomically motivated. Michael Hoskin (1997) therefore proposed that "archaeotopography" would be a better term, given that the alignments of tombs may be upon local rivers or roads rather than stars or sunrises. More people added that cosmology was a better term still, as the topic studied was perceived universal order, of which astronomy was a part.

None of the names had an immediate impact upon archaeoastronomy. Cultural astronomy has started to gain more use after 20 years among archaeoastronomers (cultural astronomers?) themselves, but has had little impact even among other academics. The main value of the discussions on terminology was that they engendered a broader discussion of the diversity of methods and practices in tackling humanity's relationship with the sky.

The 1990s saw more hybridity in methods, drawing from both Old and New World approaches to archaeoastronomical questions. The start of regular meetings of the Société Européenne pour l'Astronomie dans la Culture, pioneered by Carlos Jaschek, helped speed up the development of arguments by providing a regular forum for feedback. It also helped to provide a venue apart from the Anglo-American academics who had tended to dominate debates.

## The Archaeological (Historical, Anthropological, Sociological, etc.) Challenge

In 1992, archaeologist Keith Kintigh asked a deceptively important archaeoastronomical question: "It may be true that a building is lined up within half a degree of true north, but what do I do with that singular fact?" Kintigh's brief article, "I wasn't going to say anything, but since you asked: Archaeoastronomy and Archaeology" (Kintigh 1992) tackled a complaint common among many archaeoastronomers, not themselves archaeologists, who had worked with archaeologists: "Why am I so under-appreciated by archaeologists?" Kintigh's argument was that, rather like archaeoastronomers, archaeologists were much more interested in their own topic of study than other fields. Kintigh argued that if archaeoastronomers wanted to be seen as people with interesting answers to archaeological problems, then first they should be seen as answering the sort of questions that archaeologists ask.

Kintigh's observation has been repeated by others. Richard Poss (2005), whose interest is rock art, has argued that archaeoastronomers should work within the framework of art history, which includes considering to what extent treating petroglyphs as "art" is a culturally loaded term. In his introduction to the Oxford VII conference, Todd Bostwick (2006) argues that archaeoastronomy is anthropology, an extension of the "archaeology is anthropology or it is nothing" statement of Wiley and Philips during the development of American archaeology in the late 1950s.

To some extent, this process had started in Europe with the first Oxford conference. By Oxford III held in 1990, a volume of generally socially-led papers was published as *Astronomies and Cultures* (Ruggles and Saunders 1993b). The chapter "The riddle of Red Sirius" (Ceragioli 1993), in particular, was an example of social questioning. In it, Roger Ceragioli tackles the question of why the blue-white star Sirius is referred to as red in ancient texts. Rather than look for an astrophysical or atmospheric reason for a red Sirius, Ceragioli instead tackles the social importance of Sirius in the ancient world including its connection with vitality that makes it "ruddy".

A social scientist could argue that the color of Sirius was not really a social concern as the problem of a red Sirius was better known in astronomical circles. By the time of Oxford IV at Santa Fe, many papers tackled social practices. Stephen McCluskey's paper "Different astronomies, different cultures and the question of cultural relativism" (McCluskey 2005) tackled the social construction of knowledge and whether there was an inherent contradiction in saying that worldviews are relative while also arguing for an objectively independent reality. This kind of question was being asked at the same time by post-processual archaeologists who were questioning to what extent archaeological investigation of the past could produce objective knowledge.

The most striking evidence that archaeologists and archaeoastronomers are asking similar questions is a 2007 paper in *Antiquity*, the journal that took the lead in fighting Hawkins' claims about Stonehenge. The paper "The age of Stonehenge" (Parker Pearson et al. 2007) is a reassessment of Stonehenge. In a field where most papers have one or two authors, this paper is notable for having twenty credited authors. Among them is the now professor of archaeoastronomy, Clive Ruggles. What had changed to make this happen?

One obvious factor is that archaeoastronomy had changed. Despite starting at Stonehenge, archaeoastronomers in Europe had more to learn from their American counterparts than vice versa. Over the 1980s and 1990s, archaeoastronomers in the British Isles started to add society to their models. The result was that archaeologists now had more options than those put forward by Euan MacKie. Clive Ruggles is credited with adding a social dimension to ancient astronomy after reassessing Thom's work with his own extensive fieldwork.

Increasingly, people working in archaeoastronomy, both in Britain and elsewhere, also had a strong interest in other social questions. Back in the early 1980s Douglas Heggie, editor of the European Oxford I volume, made important contributions to British archaeoastronomy but since that time he has concentrated fully on work in mainstream astronomy. On the other hand Nicholas Saunders, coeditor of one of the Oxford III volumes a decade later, continues to work from time to time on archaeoastronomical problems, but the main focus of his research is on topics such as conflict landscapes, animal symbolism, and the use of color in the Americas. The current generation of archaeoastronomers in the UK, like those elsewhere, can converse with archaeologists and make valuable contributions to broader social questions.

It is also fair to say that archaeology itself has changed. While the 1980s and 1990s were times when archaeoastronomers attempted to find common ground, the opposite was happening in archaeology. The rise of post-processual archaeology led to attempts to ask questions beyond reconstructing broad social processes in human lifeways and instead to look for other ways of interpreting the archaeological record. This included cognitive and symbolic approaches to archaeology. Interpretative archaeologies now embrace concepts such as ritual and symbolism. This in turn has led to new interpretations of past landscapes and environments. When archaeologists returned to Stonehenge in the 2000s, they had changed the questions they were asking and found that archaeoastronomers could help in addressing some of them.

More recently, archaeoastronomers have had social relevance thrust upon them. As December 2012 approached, some prophets of doom were predicting the end of the world owing to what they interpreted (wrongly) as the "end of the Mayan calendar". The 2011 volume of *Archaeoastronomy: The Journal of Astronomy in Culture*, based in the USA, was a special issue exploring the meaning of the Mayan long count in both pre-Columbian and modern society. Anthony Aveni's book *The End of Time: The Maya Mystery of 2012* (Aveni 2009) aims not simply to debunk 2012 conspiracies, but also to ask why they have such a popular appeal. It seems that ancient astronomy has a social appeal and this in itself, which began in popular culture with Gerald Hawkins, is worth investigating as cultural astronomical phenomenon. Rather like the Mayan calendar, archaeoastronomy seems to have come a full-circle.

## Future Directions

It might seem that in some senses part of the archaeoastronomical project is complete. The return to Stonehenge and the common appearance of astronomy as a topic of discussion in journals such as *Antiquity, American Antiquity*, and *The American Journal of Archaeology* would show that archaeoastronomers have integrated with archaeologists. Yet there is a debate that continues on from the 1980s. Is archaeoastronomy a subdiscipline of archaeology or anthropology or is it an interdiscipline? Is there a subject that we can theoretically ground, or do we have a collection of techniques and methodologies that can be critiqued and sharpened but whose value lies in the theoretical framework of a host discipline? If the question of the 1960s and 1970s was "Is archaeoastronomy real?" and of the 1980s and 1990s, "What, exactly, is archaeoastronomy?", then the question since the late 1990s and 2000s has been "What can we do with it?"

In the 1990s, archaeoastronomers began to revive an interest in the possible astronomical significance of classical Greek temple orientations that extends right back to the nineteenth century. In one sense, this was the Thom paradigm applied to the culture that was the root of Western astronomy and already extensively studied by historians of astronomy. Since this early work, others have tackled the same material and proposed that astronomical symbolism was part of Greek society far beyond the writings of an educated elite. Recent papers have tackled the use of astronomical symbolism in religion, astronomical symbolism as a cognitive marker

of Greek colonization, and even proposed that correlations can be found between astronomical observations in specific landscapes and the operation of the Greek calendar (see ▶ Chap. 140, "Greek Temples and Rituals").

Oceania has become a focus of archaeoastronomical and ethnoastronomical research. A cluster of astronomers and anthropologists based in Australia has begun to explore the rich and varied use of astronomy in aboriginal societies (see ▶ Chap. 213, "Australian Aboriginal Astronomy - an Overview"; ▶ Chap. 214, "Australian Aboriginal Astronomy and Cosmology") . The questions do not simply have astronomical interest. For example, Duane Hamacher and Ray Norris have been examining aboriginal tales of meteorite impacts (Hamacher and Norris 2009). Some impacts may have been observed; some were definitely too ancient to have been observed by humans. Nonetheless, the process of transmission of the tales, their role, and their use in society are part of a wider concern as to how aboriginal people store and use information.

In the Pacific, among Polynesian peoples, linguistics, ethnography, and archaeology combine with astronomy to produce a rich environmental picture (see ▶ Chap. 215, "Archaeoastronony in Polynesia"). Astronomy here has ritual significance, but it also has practical value in navigating over extraordinary distances to other islands. Here archaeoastronomy can answer questions that show how broadly similar language and culture and maintain connections between distant peoples.

Expansion of geographical interest in archaeoastronomy has also led to a possible expansion of its uses. While there has been ethnoastronomical research in Africa since the 1970s, it has frequently been overlooked in comparison to the more intensive focus on places such as Mexico or prehistoric Europe. Jarita Holbrook has examined how an interest in African astronomy can benefit researchers within Africa including creating a place for African voices in a conversation that has largely been white and male. In 2006, Ghana hosted an archaeoastronomy conference to coincide with a local solar eclipse. The topics covered included social uses of the sky but also reflected a stronger than normal interest in education. As yet, it is too early to say how the proceedings, published as *African Cultural Astronomy* (Holbrook et al. 2008), will affect the development of archaeoastronomy in the region.

Since 2000, archaeoastronomers may have finally answered Michael Hoskin's concern about the term "cultural astronomy": "How do you differentiate between the sort of astronomy studied by archaeoastronomers and modern astronomy?" It is possible that you do not. The field of "space archaeology" has developed from contemporary archaeology. Its concerns are not just technological progress, but also the social meaning and implications of the space race. An overview paper, "The cultural landscape of interplanetary space" by space archaeologist Alice Gorman (2005), touched upon the impact of rocket testing on indigenous people in Woomera, the heritage value of Peenemünde, and preservation problems for the Apollo XI landing site. Recently, these problems have met some interest from archaeoastronomers who have found, like archaeologists, that the modern and Western subjects should be as accessible as ancient or non-Western ones.

Unsurprisingly, "traditional" foci of interest for archaeoastronomers such as the Mayans and the prehistoric peoples of Europe remain fertile grounds for research and look set to do so for many years.

Looking back, there are two themes running through the development of archaeoastronomy since the publication of *Stonehenge Decoded* by Gerald Hawkins. One has been the ever-growing role of the social dimension in research in archaeoastronomy. It is no longer possible to research a site without knowing something of the people who built it. The days of archaeoastronomy as a search for objective astronomical facts are gone. The other is that archaeoastronomy itself has grown by expanding as a conversation. Internally, the range of topics studied by early archaeoastronomers now seems somewhat parochial and narrow compared to current research. Also, the number of people in the conversation and the diversity of archaeoastronomers has grown. Originally, archaeoastronomy was primarily an interest of astronomers. The participation of archaeologists such as Euan MacKie was rare. Archaeoastronomers are now art historians, ethnographers, statisticians, historians, or scholars of religion as well as archaeologists and astronomers. The path to the future suggests that a healthy discipline will expand its diversity in geographical scope, eras studied, and people participating. This is a field that continues to hold many opportunities for new researchers.

## Cross-References


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