

Clive L.N. Ruggles
Editor

Handbook of
Archaeoastronomy
and
Ethnoastronomy

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Handbook of Archaeoastronomy and Ethnoastronomy

With 969 Figures and 88 Tables

 Springer Reference

Editor

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Preface

All human cultures have a sky. Through the ages, the celestial vault visible at night has formed a breathtaking spectacle, as it continues to do in places beyond the reach of modern lighting. For countless millennia, how people interpret what they perceive in the sky has played a vital role in human communities' understanding of the cosmos that they inhabit.

For human societies ranging from small groups of hunter-gatherers and herders through to states and empires, the sky formed a prominent and immutable part of the observed world. The repeated cycles of the sun, moon, and stars helped to regulate human activity as people strove to make sense of their world and to keep their actions in harmony with the cosmos as they perceived it. In some cases, this was simply in order to maintain seasonal subsistence cycles; in others it helped to support dominant ideologies and complex social hierarchies. This quest for knowledge and understanding – “science” in its broadest sense – links the earliest skywatchers to modern astronomers and cosmologists. Sky perceptions very different in nature from those offered by modern “Western” science persist in many indigenous cultures around the world.

Archaeoastronomy and ethnoastronomy, also referred to jointly as “cultural astronomy”, are concerned with humankind's perceptions and understanding of astronomical phenomena, throughout human history and among all cultures. Monumental and other human constructions, artifacts, cultural landscapes, historical accounts, and modern indigenous practices all bear witness to the extraordinary diversity of ways in which human communities have comprehended what they perceived in the skies and used or manipulated this knowledge for social ends. The twin disciplines have been recognized since the 1970s as a distinct academic field of endeavor of significant value in informing broader cultural questions.

Research in archaeoastronomy and ethnoastronomy has been burgeoning since the 1980s, when academics from across the divide between the social sciences and the physical and formal sciences began to work together in earnest to develop common goals and approaches. The result is a rich cross-disciplinary field with input from a wide range of academic disciplines including anthropology, archaeology, history (also the history of art, history of science, and history of religions), architecture, astronomy, and statistics. Nonetheless archaeoastronomy,

in particular, has long courted controversy and acted as a magnet for sensationalism and uncritical speculation. A contributing factor is doubtless that each of its main constituent disciplines, archaeology and astronomy, has huge popular appeal. Such uncritical or sensationalistic accounts, often widely available, tend to obscure and undermine serious scholarship in the field.

This three-volume handbook sets out to provide a definitive picture of the state of the art of research in archaeoastronomy and ethnoastronomy and to be a reliable and comprehensive source of reference regarding theory, method, interpretation, and best practice. It aims to be equally accessible to interested scholars regardless of the discipline in which they are qualified, as well as for tertiary-level students and serious general readers. Its authors are drawn from a full range of relevant disciplines and geographical areas.

Part I of the handbook comprises thematic essays addressing general themes such as cosmologies, perceptions of space and time, calendars, and navigation. The chapters here also highlight various aspects of the social context of astronomy such as its role in sustaining social and political power; its use in the service of world religions, particularly Christianity and Islam; and its relationship to astrology. There is discussion of various disciplinary approaches to the study of prehistoric, historical, and indigenous astronomical knowledge, a historical perspective on the development of archaeoastronomy itself, and coverage of issues relating to heritage and tourism.

Part II, “Methods and Practice”, covers topics ranging from social theory to field methodology, survey procedures, data analysis, and visualization. The opening chapters are concerned with the cultural interpretation of archaeological, historical, and ethnographic evidence. Several of the remainder deal with the identification and analysis of structural orientations and putative alignments upon various astronomical bodies; one with light-and-shadow interactions. A number of chapters here also provide broad definitions and explanations of key concepts that may be useful to readers unfamiliar with background matter in the relevant disciplines.

The case studies that form the remainder, and major part, of the handbook have been selected to best illustrate broader themes and issues while ranging as widely as possible both geographically and through time and also in terms of the nature of the society in question and of their astronomical perceptions and practices. The subject matter does not extend to the development of modern scientific astronomy from the European Renaissance onward, but does include topics such as Babylonian, Greek, and Islamic astronomy, focusing in the Greek case (for example) more broadly upon calendars, religious practices, and perceptions of the cosmos, rather than exclusively upon the development of mathematical astronomy.

I would like to thank all the authors for taking time out from their many other commitments to complete their excellent contributions to this handbook. My particular thanks are due to the section editors without whose thoroughness, reliability, and punctuality, not to say tenacity, it simply would not have been possible to produce a work of such impressive scope. Finally, I am immensely

grateful to the Springer staff, and particularly to our production editors Sylvia Blago and Simone Giesler, for their endless patience and good humor, as well as their unyielding support, at all stages in helping us to bring this project to a very satisfactory completion.

January 2014

Clive L. N. Ruggles

About the Editor



Clive L. N. Ruggles Emeritus Professor of Archaeoastronomy, School of Archaeology and Ancient History, University of Leicester, Leicester, UK

Professor Clive L.N. Ruggles obtained an M.A. in Mathematics from Cambridge University in 1974 and a D. Phil in Astrophysics from Oxford University in 1978. Having already published several papers in archaeo- and ethnoastronomy, he moved shortly after this to University College, Cardiff (now Cardiff University), where he became a research fellow in the Department of Archaeology, moving on in 1982 to the Mathematics Department at the University of Leicester to pursue research in statistical applications in archaeology and archaeoastronomy. From 1984, he held various posts at the university, first as a lecturer and subsequently senior lecturer (1989) in Computing Studies, and later directing a cross-campus computer-based-learning project while also affiliated to two different departments (Mathematics and Computer Science, and Archaeology). He moved full time into the newly created School of Archaeological Studies (now the School of Archaeology and Ancient History) in 1997, gaining promotion to a personal chair in 1999 and becoming emeritus professor in 2007.

Professor Ruggles has authored over 120 research and review papers in archaeoastronomy and ethnoastronomy as well as various other subjects, and has authored,

edited, or coedited 17 books including *Records in Stone* (Cambridge University Press, 1988), *Astronomies and Cultures* (University Press of Colorado, 1993), *Astronomy in Prehistoric Britain and Ireland* (Yale University Press, 1999), *Ancient Astronomy: An Encyclopedia of Cosmologies and Myth* (ABC-CLIO, 2005), *Cultural Astronomy in New World Cosmologies* (University Press of Colorado, 2007), and *Archaeoastronomy and Ethnoastronomy: Building Bridges Between Cultures* (Cambridge University Press, 2011). His early work focused on the Neolithic and Bronze Age standing stone monuments of Britain and Ireland, a topic of great controversy at the time between archaeologists and astronomers. Since then his interests have ranged from prehistoric perceptions of the skies in various contexts around the world to modern indigenous calendars in sub-Saharan Africa. He has undertaken fieldwork in several European countries, as well as in Egypt, the Americas, and Polynesia, concentrating most recently on major projects in Peru and the Hawaiian Islands. Throughout his career he has been concerned with developing sounder theoretical foundations and more robust methodologies and practice. In 2010, he was awarded the “Carlos Jaschek” prize by the European Society for Astronomy in Culture (SEAC) for outstanding contributions in the fields of cultural astronomy and archaeoastronomy.

From 2009 to 2012, Professor Ruggles served as president of the Inter-Union Commission on the History of Astronomy (ICHA), a joint Commission of the International Astronomical Union (IAU) and the International Union of the History and Philosophy of Science (IUHPS). He has also served as president of the Prehistoric Society (2006–2010), the International Society for Archaeoastronomy and Astronomy in Culture (ISAAC) (1999–2004), and the European Society for Astronomy in Culture (SEAC) (1993–99). He was editor from 1987 to 2001 of *Archaeoastronomy*, the supplement to *Journal for the History of Astronomy*, and coeditor from 1998 to 2010 of *Archaeoastronomy: the Journal of Astronomy in Culture*. He has organized two of the ten “Oxford” International Symposia on Archaeoastronomy, the principal conferences in the field, that have taken place between 1981 and 2014: Oxford III in St Andrews, Scotland, in 1990 and Oxford IX in Lima, Peru, in 2011. He is a fellow of the Society of Antiquaries of London.

Since 2008, Professor Ruggles has worked on behalf of UNESCO and the International Astronomical Union to advance their joint initiative to promote, preserve, and protect the world’s most important astronomical heritage sites. From 2008 to 2012, he chaired the IAU’s Working Group on Astronomy and World Heritage, and he continues as a special advisor to the IAU, liaising with UNESCO. He has also worked with UNESCO’s advisory body for cultural sites, ICOMOS, to produce a joint ICOMOS–IAU Thematic Study on the *Heritage Sites of Astronomy and Archaeoastronomy* (2010), and with their advisory body for natural sites, IUCN, as a member of the Dark Skies Advisory Group (DSAG). He is director of UNESCO’s Astronomy and World Heritage Web Portal Project.

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