

*Architecture, Mathematics and  
Archaeoastronomy*

**Abstract.** *NNJ* guest editor Giulio Magli introduces the papers on archaeoastronomy in *NNJ* vol. 15, no. 3 (Autumn 2013).

Most of the wonders of our ancient past have come down to us unencumbered by written information as to their scope, significance or design. This is obviously the case with monuments like Stonehenge, whose builders were illiterate. Yet it is also true of many magnificent monuments which were built by such literate cultures as the Egyptians and the Romans; just two of many striking examples are the Giza pyramids and the Pantheon, where existing sources are somewhat vague and/or too late to be of any great benefit.

However, there can be absolutely no doubt as to the interest of the builders of these monuments in the celestial cycles. Bearing witness to this are the stones themselves, which show clearly that astronomy was integrated as a key element of the design. For this reason the study of the relationship between ancient architecture and the sky – that is, archaeoastronomy – can be a efficacious instrument in gaining a better understanding of the ideas of the architects of the past, as well as of their symbolic world.

Archaeoastronomy is a fascinating, relatively new science. In recent years, this discipline has evolved from the mere analysis of possible astronomical alignments to a wide-ranging multi-disciplinary science examining “the ancient landscape, including the sky”. Modern archaeoastronomy proceeds with due caution and is profoundly bound up with archaeology. As such it has been able to free itself from existing prejudices as well as rid itself of that background of “fringe” theories which impaired its development for many years. The result is a powerful scientific tool which helps us understand the thought, religion and science of our predecessors.

It goes without saying that studying astronomy in architecture also means studying “architecture and mathematics” in the most profound sense, especially when we consider that mathematics, astronomy and architecture have gone together for the whole course of human civilization. It is no coincidence that, in Vitruvius’s words (1,10), the architect must know “*oriens occidens meridies septentrio, etiam caeli ratio, aequinoctium solstitium astrorum cursus*” before approaching his own discipline. So, thanks to the editor of the *Nexus Network Journal*, Kim Williams, archaeoastronomy has received attention in the pages of the *NNJ* pages in recent years, and a session of the ninth conference in the series “Nexus: Relationships Between Architecture and Mathematics”, held in 2012 in Milan, was devoted to it. In this present issue of the *NNJ*, the accepted papers presented at the conference are grouped and published, along with other invited contributions.

The works focus on the Mediterranean area but cover a broad chronological range and are ordered accordingly. The first contribution is thus Michael Rappenglück’s “The

Housing of the World: About the Significance of Cosmographic Concepts for Habitation”, an overview of the significance of symbolic – geometrical and astronomical – aspects of the planning of settlements and dwellings both in ancient times and in the ethnographical records. The three great civilizations of the classical world – the Greeks, the Etruscans, and the Romans – are covered in “Greek Temple Orientation: The Case of the Older Parthenon in Athens” by Robert Hannah, in “Astronomy and Etruscan Ritual: the case of the Ara della Regina in Tarquinia” by Giovanna Bagnasco Gianni, Susanna Bortolotto and Giulio Magli, and in “Architecture and Archaeoastronomy in Hadrian’s Villa near Tivoli, Rome” by Marina De Franceschini and Giuseppe Veneziano, respectively. Hannah concentrates on Greek temple orientation analysing the case of the older Parthenon in Athens; the team of Bagnasco, Bortolotto and Magli analyzes the orientation of one of the most important Etruscan sanctuaries, Ara della Regina in Tarquinia, while De Franceschini and Veneziano study the role of astronomy in the design of a section of Hadrian’s Villa. Finally, the classical age is represented also by the archaeoastronomical analysis of the fascinating site of Petra, in “Light and Shadows over Petra: Astronomy and Landscape in Nabataean Lands” by Juan Antonio Belmonte, A. César González-García and Andrea Polcaro. The final contribution, “Astronomical Knowledge in the Sacred Architecture of the Middle Ages in Italy” by Manuela Incerti, focuses on the astronomical knowledge in medieval sacred architecture.



### ***About the Guest Editor***

Giulio Magli is Full Professor at the Faculty of Civil Architecture of the Politecnico di Milano, where he teaches the only archaeoastronomy course ever established in an Italian university. He holds a Ph.D. in mathematical physics, but his research today focuses on archaeoastronomy and the relationship between architecture, landscape and astronomy in ancient Egyptian, Incan and Bronze Age Mediterranean cultures. In addition to his many papers in this field, he is the author of *Mysteries and Discoveries of Archaeoastronomy* (Springer Verlag, 2009) and *Architecture, Astronomy and Sacred Landscape in Ancient Egypt* (Cambridge University Press, 2013) as well as one of the co-authors of the recent UNESCO-IAU thematic study on astronomy and cultural heritage. He has served as visiting scientist at the Polish Academy of Sciences and the Tata Institute of Fundamental Research in Bombay, India, and has spoken at numerous international conferences on relativistic astrophysics, as well as on the role of astronomy in ancient cultures. Currently Director of the laboratory for science communication and experimental teaching (FDS) at the Department of Mathematics of the Politecnico of Milan, his activities include the development of public awareness of science. The results of his research in archaeoastronomy have been reported in National Geographic, Discovery News and on CNN.