Note

1. https://ui.adsabs.harvard.edu/

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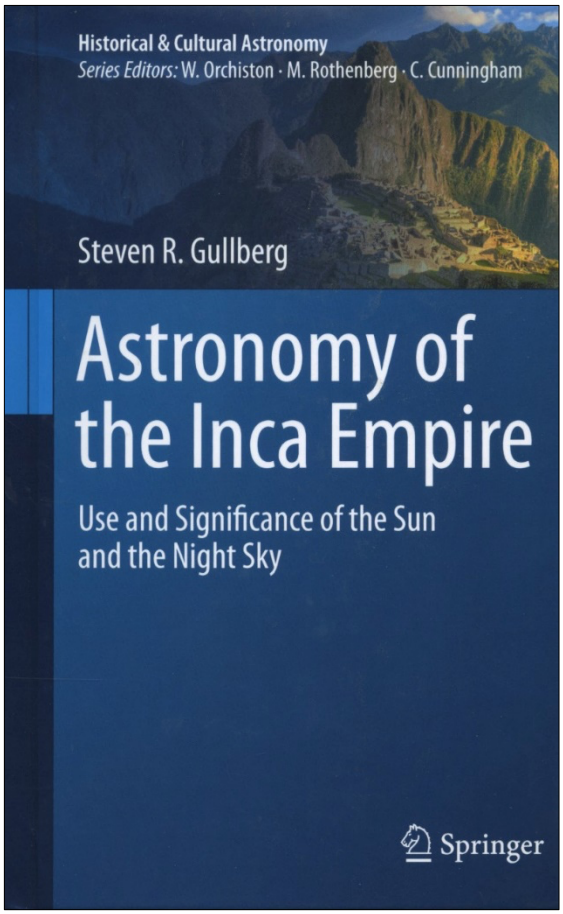
***Astronomy of the Inca Empire: Use and Significance of the Sun and the Night Sky*, by Steven R. Gullberg. (Cham (Switzerland), Springer Nature, 2020). Pp. xvii + 370. ISBN 978-3-030-48365-4 (hardback), ISBN 978-3-030-48366-1 (eBook) 162 × 240 mm, 135.19 Euros.**

I must begin this review with the admission that prior to reading this book I knew nothing of Inca astronomy. I am well versed and published in Mesoamerican astronomy, in particular the 'astronomy' of the ancient Maya, which I put in quotes because Maya astronomy is more astrology than astronomy and is all about prognostics, auguries, and spirit forces in the sky and how they relate to the people on the ground and how they effect crops, hunting, religious ceremonies, the weather, etc. Constellations, the Sun, the Moon, and Venus are tied to the 260-day divinatory calendar, that mystical confluence of thirteen numbers and twenty named days that pervades and influences Maya daily life.

What does Steven Gullberg mean by Inca astronomy? The subtitle to the book tells us he means the use and significance of the Sun and the night sky. His self-stated goal is

> … to illustrate the light and shadow effects ... [at] shrines, temples, and caves ... [and] to give illustration of the Inca's prowess with light and shadow to those not having visited these locations and to those who would like to do so. (page xi).

However, the book does much more than that—it records direct observations and azimuthal measurements from 31 sites in and near Cusco, in the Sacred Valley, and in the region of Machu Pichu, with photographs of every, or nearly every, one. To have personally visited each of these sites to gather documentation for this book is an achievement of no small proportion and should be recognized and honored.



In the end, though, I find the results less than satisfying. What constitutes an alignment? Sceptics and naysayers of archaeoastronomy are not wrong when they say that everything aligns with something, and Gullberg's definition of 'astronomical' does little to allay such criticism. In summarizing his findings from 31 sites he declares a site to be 'astronomical' if it "… was found to have a solar light and shadow effect or alignment relating in any way to the Sun." (page 306). I was surprised to see there were some sites that did not meet these loose criteria.

Gullberg begins his book, appropriately, with a background summary of the history of the Inca Empire gleaned from numerous ac-

cepted academic sources. The next chapter introduces the reader to the Inca culture, the cultural context of the sites, and site features to be explored. For the outsider, this chapter does a good service in introducing specific terms and nomenclature: *camac* and *camay*, 'life force/energy'; *intihuatanas*, carved 'power' stones, along with summaries of Inca social and religious organization.

Chapter Four reviews the key physical archaeological features in Inca astronomy, the *ceques* and *huacas*, ritual pathways leading out from Cusco uniting the Inca Empire and the sacred or ceremonial sites situated along these pathways. Gullberg's book intends to investigate the astronomical linkages between these archaeological sites and the Sun and night sky.

The next chapter introduces definitions of terms and basic principles within the field of archaeoastronomy for the uninitiated reader, and then, in Chapter Six, the author zeroes in on Inca specific astronomy, reviewing and presenting the work of previous important investigators in the field. The Sun, Moon, Pleiades, and Milky Way played important roles in Inca life and horizon stones marked their risings and settings. I was fascinated to learn that dark parts of the Milky Way were named as 'constellations' in their own right.

With these chapters as foreground and introduction, the reader is then taken on a tour of *huacas* or ceremonial sites in three regions, each with its own chapter: at or near Cusco, the Sacred Valley, and at or near Machu Pichu. These three chapters are the heart of the book: they present photographs, drawings, and measurements of a multitude of *huacas*, most of which probably no reader will ever have the opportunity to visit on their own, a wealth of images perhaps found nowhere else in a single volume. Not surprisingly, almost all express light and shadow phenomena, leading the author to present them as 'astronomical'.

The book gives proper credit to previous work and presents a bibliography very useful to the student of these matters. The book could be stronger on a number of fronts, in particular, the ethnographic one, but then that was not the book's intention. The primary focus is the author (with wife and son and assistant[s]) visiting these numerous sites and presenting them for us, the reader, to view. The tables of measurements and 'alignments' could perhaps be useful to specialists in such measurements. But for me, someone who has spent considerable time getting inside the Maya mindset that produced lunar and planetary tables and perhaps the most complex system of ancient calendars anywhere in the world, observing the play of light and shadow on carved stone surfaces does not convince me that the Inca engineers and stone carvers who created these sites had 'astronomy' in mind when they did so.

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Keeping Watch in Babylon: The Astronomical Diaries in Context, by Johannes Haubold, John Steele and Kathryn Stevens (eds.). (Leiden, Brill, 2019). Pp. viii + 315. ISBN 978-90-04-39775-0 (hardback), 160 × 240 mm, US$192.

Even for most historians of astronomy the study of Babylonian astronomy is often ignored, not because it lacks importance, but rather due to its seemingly forbidding nature. With many of the researchers in this field writing in French and German, combined with the original language of Babylonian which few understand, many in the English-only reading world have only a sketchy knowledge of the famed Astronomical Diaries. This book serves the important purpose of making the contents of the Diaries accessible to everyone.

The 10 chapters of the book are written by experts in various aspects of the Diaries (unusually for such a multi-author work, there is no list of authors with their academic affiliations and backgrounds). As Mathieu Ossendrijver writes, the

> Astronomical Diaries are attested between ca. 652 and 61 BCE. Nearly all of them originate from Babylon, the main center of Babylonian astronomy during that period. (page 58).

Each Diary covers a period of 6 to 7 months, and while astronomical data occupy the bulk of each report, they also include financial data, the level of the Euphrates River, and various historical and ominous events. As several chapters in this book contain no astronomical content, they will not be considered in this review. The editors set out the basic questions the book is designed to answer: "What is the origin of the Diaries? Who wrote them and why? And to what extent did they change over time?" (page 13).

Ossendrijver enumerates the astronomical data in the Diaries: lunar and planetary positions with respect to a suite of 32 bright stars along the ecliptic, appearances and positions of the planets and the Moon, solstices and equinoxes, first and last appearances of Sirius,