Steven Gullberg
Milton Rojas Gamarra

Inca Cosmovision

The Astronomical Legacy of an Andean Empire

Springer

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We dedicate this book to our loving wives and children, who without their great support we could not have performed our research and writing.
Alphabetically:
Gregory Richard Gullberg (son)
Jessica Gullberg (wife)
Steven Roland Gullberg II (son)
Sandra Andrea Ortega Olave (wife)
Amaru Phawaq Rojas Ortega (son)
Antarky Rojas Ortega (son)
Ayni Wayra Kawsaypacha Rojas Ortega (daughter)
Gabriel Inti Alejandro Rojas Ferrada (son)
We also dedicate our book to the Native Peoples throughout the Tawantinsuyo.

Preface

The Inkas worshipped the Sun, and their emperor was thought to be the son of the Sun. (Inka is the Quechua spelling of Inca and will be used throughout the book.) They spread across most of the Andes and evidence of their astronomy exists throughout their former empire. They used solar positions on the horizon for calendrical purposes and managed their crops and religious festivals in this manner. Many examples remain of the intentional light and shadow effects that demonstrate their sophisticated understanding of the Sun's movement and of solar horizon events.

Their astronomy can only be fully understood in its cultural context, and that is the focus of this book. *Inca Cosmovision: The Astronomical Legacy of an Andean Empire* explores the cosmic worldview of the Inkas from the perspective of oral traditions passed from one generation to the next among the Inkas' living descendants. You will learn about Inka astronomy in a way that you perhaps have never encountered. Milton Rojas Gamarra, one of the book's two authors, is a Quechua descendant of the Inkas. What you will read benefits from his and author Steven Gullberg's field research, but most significant is what you will experience from what we have written from the many stories Milton learned from his grandparents and great-grandparents, and from his *Amauta*, the term for a highly respected Indigenous teacher of Inka culture. Quechua is Milton's first language, so you will also benefit from the insight provided through the use of Quechua words. Doing so with the native language is important for a better understanding.

The chapters in the book that are based upon Milton's oral traditions must be viewed as such. There are no scientific references to cite. Instead, these are beliefs that have existed since the time of the Inkas, and in the minds of many Quechua descendants they still do. By embracing what is shared you will be

learning about the Inkas and their astronomy from their perspective, in such a way that has not previously been available. As you read you should immerse yourself in what is presented and enjoy this from the Inka worldview rather than the worldview of Western science or worldviews from previously attempted interpretations.

It also is our goal to capture these ideas from oral traditions and put them into print before they are lost. This book will enlighten you about Inka cosmovision to a depth that no other has before. We hope that you enjoy the journey!

Norman, OK, USA — Steven R. Gullberg
Cusco, Peru — Milton Rojas Gamarra
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Additionally, we most certainly must give our thanks to Jessica Gullberg for the wonderful watercolor paintings that she created to help us illustrate.

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About the Authors

Steven R. Gullberg holds a Ph.D. in astronomy from James Cook University (Australia) and is a Professor of Cultural Astronomy at the University of Oklahoma (USA), where he is Lead Faculty for the School of Integrative and Cultural Studies. He additionally serves as President of the International Astronomical Union (IAU) Commission C5 for Cultural Astronomy, and as well as the managing editor of the *Journal of Astronomy in Culture*, the journal of the International Society for Archaeoastronomy and Astronomy in Culture (ISAAC). He has conducted extensive field research on the astronomy of the Inkas in the Peruvian Andes and has published many research papers. He also is the author of *Astronomy of the Inca Empire: Use and Significance of the Sun and the Night Sky*. At the University of Oklahoma, he led the development of archaeoastronomy distance-learning courses designed to educate researchers around the world. Dr. Gullberg is regularly invited to give talks at international conferences as he endeavors to globally advance the field of Cultural Astronomy.

Milton Rojas Gamarra earned his Ph.D. in Intercultural Education at the University of Santiago (Chile). His doctoral thesis was in archaeoastronomy and his master's degree was in astrophysics. Milton is a Professor of Physics at the Universidad Nacional de San Antonio Abad del Cusco (Peru). Milton is a descendant of the original Quechua people and has dedicated himself to preserving their wisdom, their ethos, and their worldview. His first language is Quechua. Dr. Rojas Gamarra has studied the astronomy of the Inkas for more than 30 years and benefits greatly from the oral traditions that have been passed on to him by his grandparents and by his *Amauta*, Emilio Huaman Huillca. Milton shares his wonderful insight in this book.

1

Introduction

Civilizations create their own culture, their own ethos, and their own worldview, and this was certainly true of the Inkas. The Inka Empire (in Quechua, the Tawantinsuyo) in its evolution developed its own customs, habits, ways of being, and ways of behavior. The Inkas as well sought to answer fundamental questions such as "how to be" (*Imaynakay*), and "how to live" (*Imaynakawsay*) (Fig. 1.1).

Like other ancient civilizations, the Inkas tried to interpret and understand the cosmos—its origins, its primordial stages, and to seek a sense of its existence and through this they developed their worldview (*Kawsaypacha*). In the process, the Inkas built their own principles of life (*Kawsay*), standing out among them gratitude and reciprocity (*Ayni*—the force of reciprocity and help) and the creative life force of the *Pachamama*, *Kawsaypacha*, which means everything in the cosmos lives. Ayni is a reflection of the reality that exists in the energy of the world.

Kawsaypacha corresponds to energy in time and space. This book addresses these principles and describes how Andean culture was based on a rationality different from that of the European West—the principles that govern Andean thought are based on transversal concepts and principles of rationality, integrality, and cyclicality. Thus, a proper understanding and interpretation of the Inka legacy in cosmovision and astronomy can only be carried out properly when viewed within the context of Inka culture and its worldview.

The chapters that follow begin with the history of the amazing Inka Empire, its construction, and its expansion by conquest until its own conquest by the Spaniards. We will describe facets of Inka culture and you will learn about Quechua, the language of the Inkas, the language still predominant

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Fig. 1.1 Traditional Quechua celebration dress, author Milton second from the right. (Watercolor printed with permission. © 2024, Jessica Gullberg. All rights reserved)

throughout rural areas away from cities such as Lima and Qosqo (Cusco). A general understanding of the nature of Quechua is essential for truly sensing cultural context and after words in Quechua are introduced, we will continue to use them in order to give you a better sense. The book will introduce you to fundamentals of Archaeoastronomy and then will continue with facets of Inka astronomy. *Seq'es* and *wakas* and their relationships to Inka astronomy are discussed in detail before going on to explore constellations of the Inkas. We will examine Inka worldview and culture, including their perception of space and time and show how this all existed in daily life.

The Inkas organized their civilization with seq'es and waqas and both figure prominently in their cosmology. Waqas can be roughly thought of as shrines that often were believed to be sentient with great power and influence. The waqas needed to be cared for and thus were located on seq'es which were organizational lines, not always straight, with responsibilities for their care assigned to extended family lineages. There were 41 seq'es surrounding Qosqo and their astronomy, cosmology, and calendrical functions are explored.

Archaeoastronomy is the study of how astronomy was used by ancient cultures. Fundamentally important is placing what is found into cultural context because without doing so the data collected can be easily misunderstood.

Having set the stage, you will learn more specifically about the astronomy that was used in Inka culture and the culture's timekeeping. This will be a fascinating blend of astronomical and archaeoastronomical knowledge derived greatly from insight that has been passed from one Quechua generation to generation via oral traditions from the time of the Inkas up to today. The Inkas worshipped the Sun and thought their emperor to be the son of the Sun and his wife to be the daughter of the Moon.

Machu Piqchu may only be reached by train or by hiking. The Inka Trail (Qapaq Ñan) is the most popular route and the trek from Ollantaytambo lasts at least 3–4 days. Fascinating examples of Inka astronomy and cosmovision can be found along the way and many more are present at the journey's end in Machu Piqchu and Llaqtapata. Examples of intentional light and shadow effects and solar orientations abound throughout the empire and photographic examples from field research are shared. Original artwork enhances the book's illustration as well. Along with the Quechua cultural insight provided, these images will help to give you a visual sense of the astronomy of the Inka empire and its cosmovision.

Elements of Inka culture converged with science and astronomy, but the worldview of the Inkas was conceptually different from that found in what is referred to as Western culture. Not only does Inka astronomy have a different orientation, but the empire was filled with many sacred entities with great powers. This book, through the approach of employing Quechua terms and actual oral traditions passed down to author, Milton, will enable you to gain a much better understanding and appreciation of the cosmovision of the Inkas.

2

Inka Chronology

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An important part of understanding Inka culture is to know their history. By the time of the sixteenth century invasion from Europe the Inka empire had grown across the Coordillera de los Andes (Andes Mountains) and coastal regions from Argentina and Chile through Bolivia and Peru to Ecuador and into southern Columbia (see Fig. 2.1). The period of conquest for the Inkas was relatively short, but they learned from the many civilizations that preceded them. Celestial myths, beliefs, and astronomical knowledge developed with observations made over the centuries; the Inkas inherited this knowledge and adapted it to their needs. They instituted a state solar religion founded upon what they had learned, and temples and shrines were built to support this with displays of light and shadow (Gullberg, 2020).

Further advancement essentially came to an end by 1532 CE when Spanish conquistadors invaded Peru. The Spaniards did not appreciate local astronomical knowledge and instead continued with the European traditions. Catholic priests searched to locate and destroy everything related to Inka religion, including anything they could find related to worship of the Sun, Moon, and the stars (Gullberg, 2020).

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