

Planetarium María Reiche: A vintage planetarium in the digital age

Barthélemy J.C. d'Ans Alleman

Planetarium María Reiche/Instituto
Peruano de astronomía
bdans100@yahoo.com

Keywords

Planetarium, Cultural Astronomy,
Archaeoastronomy, Public Understanding of
Science, Women in Astronomy, Hands-on

The Lines and Geoglyphs of Nasca and Palpa are among archaeology's greatest enigmas because of their quantity, nature, size, and continuity. The several kilometres-long geoglyphs depict living creatures, stylised plants, and imaginary beings, as well as geometric figures (Figure 1). They are believed to have had both ritual and astronomical functions (e.g., *UNESCO World Heritage Centre, n.d.*), and today, they are considered one of the most emblematic places related to ancient civilisations. Based on the studies of mathematician María Reiche, who dedicated most of her life to researching and protecting this highly symbolic natural environment that survived intact for over 2,000 years, she postulated that the Nasca lines probably represented the largest open book of astronomy on Earth. To communicate the complexity of this region and its connection to ancient astronomy, we created a unique planetarium experience that explains basic astronomy and the cultural uses of the night sky.

The beginnings

Since the 1970s, the Nasca Lines (Figure 1) have been one of the favourite destinations for tourists who love archaeological mysteries. A tour of the Nasca Lines typically consists of a visit on the ground with very limited access to the geoglyphs due to cultural heritage protection. Aerial tours on a small plane enable visitors to appreciate the scale of the figures and lines. This adventure awakens tourists' imaginations, and many questions arise, particularly when the tour guides indicate that some of the lines could have been used for astronomical purposes. In the 1990s, a visit to Nasca would not be complete without participating in the evening talks by María Reiche, "La dama del desierto", given from the "Nasca Lines Hotel". In these talks, Dr Reiche disclosed the different interpretations of the function of the geoglyphs and the many anecdotes about studying and protecting this incredible archaeological wonder.

The origin of the María Reiche Planetarium

The Peruvian Institute of Astronomy was established at the end of the 20th century by science, technology, engineering and

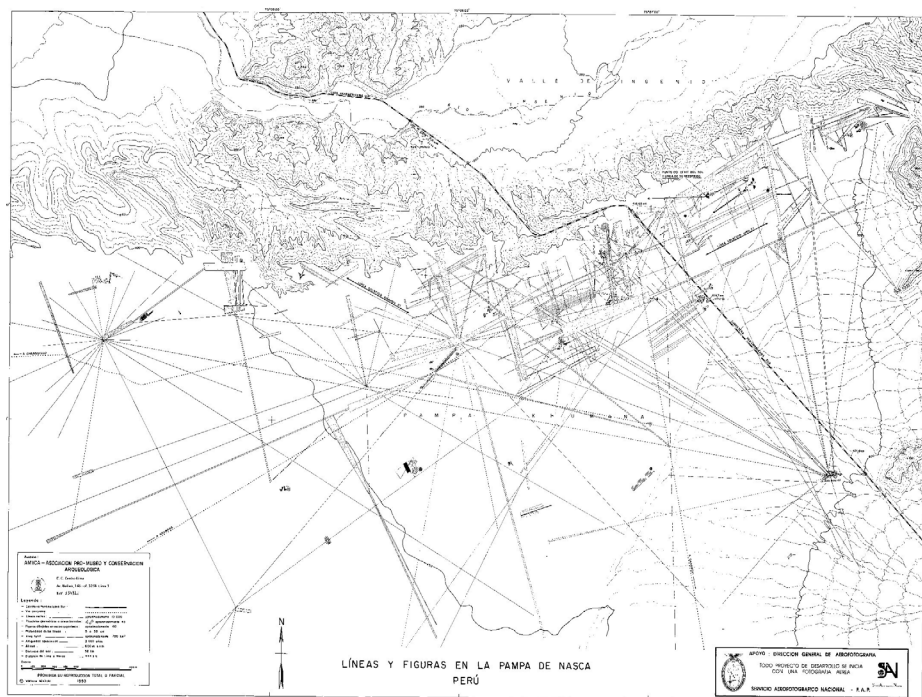


Figure 1: A map drawn by María Reiche and the National Aerophotographic Service of the Peruvian Air Force based on orthophotos. Image credit: Reproduced with the permission of María Reiche's estate.

mathematics (STEM) graduates – including the author – interested in astronomy. We acquired a portable planetarium and visited schools to teach astronomy classes. In this context, the María Reiche Association for the

Conservation of the Nasca Lines invited us to present in Nasca. We were lucky enough to give talks at the same hotel where Dr Reiche lived and gave her famous lectures. Months after the death of Dr Reiche,

the Hotel contacted us again as many people came expecting to hear the famous lectures. Thus, we decided to install a small planetarium to carry on the legacy of María Reiche's lectures by adapting her writings and interpretations into a full dome format.

A low-cost planetarium

We adapted our portable planetarium, replacing the inflatable dome with a fixed dome. We constructed the 6-meter-diameter dome with adobones as in the "Nascas" style, carved with clay in the "Nascas" style and decorated with motifs and application techniques of wall art of the ancients (Figure 2). We made the dome with a construction iron structure covered with reeds and plaster.

We use two projectors with two cylinders that show the Southern sky and the Western constellations. The great challenge was to generate a cylinder that could project the Nasca Lines in location and orientation as they are arranged, but on a scale large enough so that they can be seen without difficulty, to explain the sunrises, sunsets, and constellations in relation to the geoglyphs. Our portable planetarium system was crucial, allowing us to continue without high production costs. The system was composed only of a projector with a cylinder screen of stars, which was complemented by a second projector that worked alongside a cylinder that projected the lines and figures of Nasca onto the dome, supported by slides and multimedia projectors (Figure 3).

Perhaps one of the first planetariums dedicated exclusively to archaeoastronomy, the María Reiche Planetarium opened on 15 May 2000 in commemoration of the date María Reiche was born. Initially, it was very challenging to establish the planetarium in the tourist circuit because the tour operators were unfamiliar with planetariums, and changing established itineraries proved difficult. In response, we planned around the tours' times and schedules. We regularly updated the planetarium script to incorporate the latest research on the Nasca Lines, including developments from those who worked on the heritage site.

To attract a broader audience, we began to include astronomy observations of the sky every night alongside our archaeological



Figure 2: The exterior of the María Reiche Planetarium, built of "adobones" and cane. This image also shows the telescopes used for observation after the performances, weather permitting.

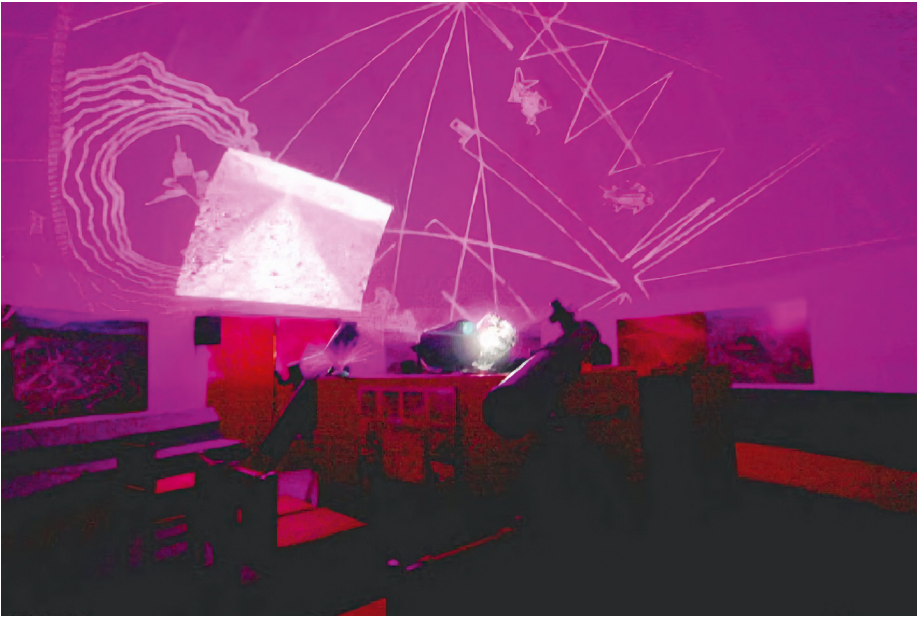


Figure 3: A photograph showing the projections of the mapping of the Nasca Lines with the cylinder adapted to our portable planetarium system. Image Credit: David Pickering

and astronomical topics in the planetarium. Using naked-eye and telescope observations, our visitors saw the craters of the Moon, the planets and other celestial objects at the end of the planetarium show, generating a space for conversation and exchanging ideas. Today, the planetarium shows are mixed with a full dome digital projector, allowing us to generate an immersive 360-degree flight over the Nasca Lines. We additionally maintain our “vintage” cylinders, as they are highly requested by our visitors, especially when we relate the contributions of María Reiche to cultural astronomy.

Cultural astronomy and local development

The popularity achieved by this small and exotic planetarium makes it the third most visited attraction within the tourist circuit in Nasca, with more than four performances every night of the year. To do this, we provide the shows in different languages, mainly English, French, Italian, German, and Spanish – the local language. In its lifetime, the planetarium has offered many internships among tourism and education students from the region. In addition, it opened doors to new projects related to astro tourism and cultural astronomy, not only in Peru – linking them with different cultures and destinations such as Ica, Lima,

Arequipa and Cuzco – but also exporting the concept and model to Mexico at the heritage sites of Chichén Itzá and Uxmal, as well as on Rapa Nui (Easter Island). Our format includes highlighting the culture of local populations, whether past or present, embedded into basic sciences alongside the experience of night sky observations.

This model ensures that visiting the María Reiche planetarium is a varied and attractive experience for all ages. We are also very pleased to contribute to the development of regional education. Though the project is sustainable thanks to tourism-oriented functions, the planetariums have contributed to local education. Each planetarium has telescopes that students can use to introduce astronomy to their peers, and various activities are organised with local astronomy clubs. In addition to offering free functions to local students, we have translated our shows into native languages, including Quechua, Yucatec Mayan, and Rapa Nui. This allows attendees to contribute new ethno-astronomical data and strengthen the content of the planetarium shows.

Two decades ago, this initial venture allowed us to emerge with very few resources. We continue to provide an experience in which cultural astronomy and traditional planetarium shows converge, linking with tourist and educational circuits. We hope

that this concept can be replicated in other cultural spaces.

Acknowledgements

I want to extend my gratitude to INVERTUR, who believed from the beginning in the project of a touristic planetarium, and to the current owners of the Hotel “Nasca Lines”. In addition, I would like to thank the population of Nasca and, in particular, express gratitude for the legacy of María Reiche.

References

UNESCO World Heritage Centre (n.d.). *Lines and geoglyphs of Nasca and Palpa*. UNESCO World Heritage Centre. <https://whc.unesco.org/en/list/700>

Biography

Barthélemy J.C. d’Ans Alleman is the Founder of the Peruvian Institute of Astronomy and President of the Inter-American Society of Astronomy in Culture. d’Ans Alleman is also the manager of the Planetariums and Educational Observatories María Reiche located in Peru (Nasca, Ica, Arequipa, and Cusco); Mexico (Chichén Itzá and Uxmal); and Chile (Rapa Nui). He is also a member of the IAU Inter-Commission C1-C2-C3-C4 Working Group on Astronomy in Culture.