BOOK OF ABSTRACT

Session I (S1)

Archeoastronomy and Skyscape in Prehistoric Great Britain and Northern Europe

Symbols and Stones: exploring theory and meaning of Neolithic astronomy

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keywords: symbol, Avebury, Sun, Moon, theory

Abstract
This paper will consider the role of theories and concepts in skyscape archaeology. It will examine the meanings attached to the word symbol as applied to sites considered significant in skyscape archaeology. This word is often used but not defined.
For example, Clive Ruggles (1999, 155) argued that, if we could only understand the astronomical symbolism at Neolithic monuments we would understand the cosmology of the period on its own terms, free from modern preconceptions. Lionel Sims and David Fisher (2017: 23) talk about the Moon's complex cycles, including its reappearance following a period of invisibility at dark Moon, which they interpret as a 'resurrection' which, in turn, comprises part of a 'symbolic repertoire (which) is more suitable for a cosmology that requires contradiction and complexity rather than the one-dimensional Sun'.
Altogether Sims and Fisher speak of symbolic loading, symbolic structure and symbolic repertoire, but they do not define 'symbol'. The Greek verb ballo means 'throw'. The Greek preposition 'sun' (sometimes Romanised as 'syn') means with, or together with, so literally 'throw together', but also to 'collect' and 'compare' (Ladner 1979, 223). As Peter Struck (2004, 78) writes, in its earliest meaning 'a symbol is one half of an object – usually a piece of cloth, wood, or pottery – that is deliberately split into and then allocated to the parties to an agreement. It is reassembled at a later time to verify the deal'. Behind the symbol, he continues, is therefore the notion of agreement and therefore a symbol was originally social.
A symbol is, for Deleuze and Guattari (1988: 130), actually a kind of sign, in a chain of signification, of the endless connections between multiple signs: 'every sign', they write 'refers to another sign, and only to another sign, ad infinitum' and 'all signs are signs of signs' while a symbol exists 'in a constant movement of referral from sign to sign'.
The paper will take these discussions and apply them to the neolithic sites of southern Britain, such as the Avebury complex. It will conclude that It is necessary to understand the ways in which concepts are used in order to understand Neolithic astronomy.

References

Deleuze, Gilles, and Félix Guattari 1988 (1999). A Thousand, Plateaus. London: Bloomsbury.
Geertz, Clifford 1973. The Interpretation of Cultures. New York: Basic Books.
Malville, Kim 2016. Passages between Worlds: Heaven, Earth, and the Underworld in the Andean Cosmos. Culture and Cosmos 20, nos. 1 and 2.
Ruggles, Clive 1999. Astronomy in Prehistoric Britain and Ireland. New Haven (CT) and London: Yale University Press.
Sims, Lionel, and David Fisher 2017. Through the Gloomy Vale: Underworld Alignments at Stonehenge. Culture and Cosmos 21 nos. 1 and 2: 11–30.
Struck, Peter, 2004, The Birth of the Symbol, Princeton: Princeton University Press.

Skyscapes of Callanish I: A Virtual Experience

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keywords: Callanish, stone circle, 3D simulation, skyscape

Abstract

Among the many megalithic sites in Britain, Callanish I (in English) or Calanais I (in Scottish Gaelic) on the Isle of Lewis is one of the oldest, largest and most iconic. It consists of a 13 m circle of menhirs, 3-4 meters high, surrounding a central slab (4 m) and a cairn set between the circle and the centre menhir. Radiating rows of stones form a cross shape with an "avenue" formed by two parallel stone rows towards the north-by-eastern direction, and much shorter rows closely towards the other cardinals.

The orientation of the double stone row forming the avenue (azimuth 191°) has been interpreted in connection to the Lunar Major Standstill setting (e.g., Ponting and Ponting 1981, Curtis and Curtis (2003)).

In 2005, Rennie commissioned Carty to take a laser scan of the stones. We have recently converted this to a 3D scenery for Stellarium (Zotti et al., 2021) to explore the views of the lowest Moon seen from the end of the avenue and elsewhere around the stones. The scanned area did not include the rocky outcrop that dominates the southern horizon right behind the stones (Ponting and Ponting 1981). We therefore have added commercial digital elevation data to our 3D model and started to carefully align the laser scan model against this.

Our present work with the virtual model demonstrates that the avenue appears to point towards the highest rock of this outcrop, and the lowest Moon can be observed to hide behind it and later regleam (see Figure 1) between the stones before finally setting. This application also allows us to re-investigate the recent work by Higginbottom & Mom (2023/24).

A final round of ground truthing (Reijs 2023) has still to wait for fair weather. A preliminary scenery can meanwhile, and hopefully our final model later in 2024, be studied in an accurate simulation in the Stellarium desktop planetarium, making this the first open-access 3D scenery of a site of archaeoastronomical relevance made available for Stellarium (Callanish3D 2023)

References

Callanish3D (2023), Website. URL: https://callanish.archaeoptics.co.uk/

Curtis M. R. and Curtis, G. R. (2003), 'Callanish 2006'.

Higginbottom G. and Mom, V. (2023) Presented at 2023 European Association of Archaeologists and also forthcoming as publication (2024) The Relevance of 'Far-Flung' Island Landscapes in Prehistoric Scotland Loch Roag in Maaike de Waal, Emily Gal and Rebecca Rennell: Coastal Archaeology in Small Islands: Research Perceptions, Biases, Methods and Approaches.

Ponting M. and Ponting, G. (1981), Decoding the Callanish complex: Some initial results, in C. Ruggles and A. Whittle, eds, 'Astronomy and society in Britain during the period 4000-1500 B.C.', British Archaeological Reports 88, pp. 63–110.

Reijs V.M.M., (2023). Using the Calanais I 3D scenery in Stellarium: some experiences when ground proofing.

Zotti G., Hoffmann, S., Wolf, A., Chéreau, F. and Chéreau, G. (2021), 'The simulated sky: Stellarium for cultural astronomy research', Journal for Skyscape Archaeology 6(2), 221–258.

Orientations of the cairns and other adjacent structures of the Giants' Churches

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keywords: Neolithic, Giants' Churches, cairns, solar orientations, lunar orientations

ABSTRACT

The Neolithic (ca. 3200–1800 BCE) Giants' Churches (hereinafter the GCs) are amongst the largest megalithic monuments of Northern Europe. These megastructures, built by the seal-hunting hunter-gatherers of Ostrobothnia, were originally located on the coast, usually on small outcrops, islands and peninsulas, but are nowadays located 10 to 35 km inland due to the post-glacial rebound phenomenon.

The GCs were built of stones of varying sizes in rakka boulder fields. Most of them are rectangular. In their walls the GCs have openings, "gates", and most of them have adjacent stone structures such as cairns, standing stones, rakka pits or large boulders either inside of them, as part of their walls, or in the immediate vicinity. Many GCs have nearby housepits and other signs of human activity (see Figure 1).

The original function of the GCs is not known. The prevailing hypothesis is that they were communal monuments used for gatherings and ritual activities – some of them even possibly for warfare (see Okkonen 2003: 220-6; Sipilä & Lahelma 2007; Ridderstad & Okkonen 2021). It has also been suggested that some of them were ritualized remains of former dwelling sites (Ridderstad 2015a).

The hypothesis of the ritual connection for the GCs is supported by archaeoastronomical studies, which have shown that the axes and gates as well as some of the cairns of the GCs were oriented towards solar and lunar events (Ridderstad 2013; Ridderstad 2015b; Ridderstad & Okkonen 2021). In this study, the cairns, standing stones and other stone-built features of especially the largest GCs were examined and shown to have orientations to both solar and lunar events. As a special case, the orientations of the triangular formations of cairns (see Figure 2), which appear to have had a special significance in the ritualization of certain types of GCs, were analyzed. It was found that their orientations often replicated some of the key orientations of the very largest GCs. The results obtained strengthen the hypothesis of the GCs as ritualized structures of former sites of hunter-gatherer activity.

References

Sipilä, Joonas & Lahelma, Antti (2007). "War as a Paradigmatic Phenomenon: Endemic Violence and the Finnish Subneolithic", in War and Sacrifice: Studies in the Archaeology of Conflict, eds. Thomas Pollard and Ian Banks, pp. 189–209. Brill, Leiden.

Okkonen, Jari (2003). Jättiläisen hautoja ja hirveitä kiviröykkiöitä – Pohjanmaan muinaisten kivirakennelmien arkeologiaa. Acta Universitatis Ouluensis B 52. University of Oulu, Oulu.

Ridderstad, Marianna (2013). "Placement and orientations of cairns around the Middle Neolithic Giant's Churches", in Ancient Cosmologies and Modern Prophets, Proceedings of SEAC 2012, eds. Ivan Šprajc and Peter Pehani, pp. 201–212. Anthropological Notebooks XIX Supplement.

Ridderstad, Marianna (2015a). "New observations of the Giant's Churches", in SEAC 2011 Stars and Stones: Voyages in Archaeoastronomy and Cultural Astronomy, Proceedings of the SEAC 2011 Conference, eds. F. Pimenta, N. Ribeiro, F. Silva, N. Campion, A. Joaquinito and L. Tirapicos, pp. 194–199. British Archaeological Reports International Series 2720.

Ridderstad, Marianna (2015b). "Orientations and other features of the Neolithic 'giants' churches' of Finland from on-site and lidar observations". Journal of Astronomical History and Heritage 18(2): 135–148.

Ridderstad, Marianna & Okkonen, Jari (2021). "Orientations of the Giant's Churches in Ostrobothnia, Finland", in From Alexandria to Al-Iskandariya – Astronomy and Culture in the Ancient Mediterranean and Beyond. Proceedings of the 17th Annual SEAC Meeting 2009 in Alexandria, Egypt; eds. Michael A. Rappenglück and Mosalam Shaltout, pp. 100–105. Tredition, Gilching.

SESSION II (S2)

ARCHEOASTRONOMY AND SKYSCAPE IN CONTINENTAL EUROPE AND IN THE MEDITERRANEAN: FROM PREHISTORY TO ROMAN PERIOD

The sky above the Neanderthals: do we know anything about it?

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keywords: Neanderthals, cultural abilities, navigation, sky, worldview

Abstract
Recent research indicates that Neanderthals had significant knowledge of the world, survival techniques, and artistic abilities. Whether the sky and its phenomena were also important to him arises.
An analysis and evaluation of the findings show that Neanderthals aligned dwellings, burials, and ritual objects to sky phenomena. Neanderthals had expertise in navigation over long distances, including in mountainous regions, indicating familiarity with the skies. The sun and celestial circumpolar area played a prominent role in this. Neanderthals possessed specific proto-mathematical skills that could have helped them observe the sky.
Evidence suggests they may have travelled by sea, possibly utilizing celestial knowledge for navigation. Sparse archaeological findings and myth reconstructions hint at the existence of Neanderthal narratives about the world.

References

Cârciumaru, M. et al. (2015): Contributions to understanding the Neanderthals symbolism. Examples from the Middle Paleolithic in Romania. Annales d'Université Valahia Targoviste XVII (2), 7–31.

Féblot-Augustins, J. (1993): Mobility Strategies in the Late Middle Palaeolithic of Central Europe and Western Europe: Elements of Stability and Variability. Journal of Anthropological Archaeology 12 (3), 211–265.

Finlayson, C. (2019): The smart Neanderthal. Cave art, bird catching, and the cognitive revolution. Oxford: Oxford University Press.

Pitarch M. et al. (2021): The symbolic role of the underground world among Middle Paleolithic Neanderthals. In: Proceedings of the National Academy of Sciences 118 (33), e2021495118.

Rappenglück, M. A. (2019): The prehistory of counting, calculating, and calculating aids in the Stone Age. In: From the abacus to the computer (ed. Gudrun Wolfschmidt). The history of computing technology,17–55. Hamburg: tredition (German).

Slimak, Ludovic (2024): The Naked Neanderthal: Penguin Books Ltd.

Smirnov, Yuri (1989): Intentional Human Burial: Middle Paleolithic (Last Glaciation) Beginnings. Journal of World Prehistory 3 (2), 199–233.

Semantic analysis of astronomical signs and symbols in the Magura prehistoric pictographic complex (Rabisha village, Bulgaria)

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keywords: Magura cave, prehistoric drawings, monochrome painting, solar calendar, astronomical signs

Abstract
The Magura cave is located near Rabisha lake, Rabisha village, Belogradchik municipality. Monochrome prehistoric drawings painted with bat guano found in one of the cave's galleries are of great scientific interest. In 1984, the cave with the drawings and the lake were included in the Tentative List of UNESCO World Heritage Sites. They are a little over 1000, multi-layered and from different periods, with different execution techniques (guano, ocher, graffiti).
One of the most impressive drawing rooms in the Magura cave is the Solar Hall because it depicts an annual solar calendar from the Late Eneolithic, with additions from the Bronze Age (Stoytchev, Gerassimova, 1994). By a scheme for dividing the paintings into groups a calendar within the tropical year is read from the so called "solar group" of paintings (Maglova, Stoev, Spasova, 2020). Time periods smaller than a month were reflected in the groups of graphic signs, as well as a chronological sequence of significant astronomical events (solstices and equinoxes, phases of the Moon) and introduction of intercalary days (Spasova, Maglova, Stoev, 2023).
This report presents a semantic analysis of astronomical signs and symbols related in storylines to calendrical records and cultic ceremonies and rites. The main elements of astronomical symbolism, which are the compositional and semantic center of the pictographic groups, are separated. A connection is made between the astronomical signs and classical geometric forms, as well as their place in the general arrangement of the pictographic record. To the already noted solar symbolism of the circle and the cross, we must add the triangle, the parallelepiped, the polygon, the ellipse, etc., whose sacred and aesthetic qualities as geometric figures have been known since prehistoric times. An attempt has been made to identify some of the astronomical images with the real prototypes on the celestial sphere.

References

Stoytchev T., Gerassimova V., 1994, Bronze-Age regional calendars in monochrome cave paintings in Bulgaria, Annuary of Department of Archaeology – NBU, vol.1, pp. 8-22.

Maglova, P., Stoev, A., Spasova, M. 2020. Eneolithic solar calendar in the Magura cave near the village of Rabisha, Belogradchik municipality, Bulgaria, in: Draxler, S., Lippitsch, M.E., Wolfschmidt, G., (eds.), Harmony and Symmetry. Celestial Regularities Shaping Human Culture, Proceedings of the SEAC 2018 Conference in Graz, Tredition: Hamburg, Germany, 45–53, ISBN-978-3-347- 14632-7.

Spasova, M., Maglova, P., Stoev A. 2023. A semiotic calendar system read in the prehistoric paintings of the Magura cave, Bulgaria, in: Maglova, P. and Stoev, A. (eds.) Cultural Astronomy and Ancient Skywatching, Proceedings of the 28th Annual Meeting of the European Society for Astronomy in Culture (SEAC) in Stara Zagora, TOTEM Sttudio, Bulgaria, ISBN-978-619-91961-2-0.

To see or to be seen: key cosmological principles in the Maltese Temple Period

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keywords: Landscape archaeology, Inter-visibility, Horizon, Temple Orientation, Cosmology.

Abstract
It can be argued that the Late Neolithic megalithic monuments in Malta, today generally accepted as ***Temples***, are the oldest freestanding megalithic structures in the world. Recent archaeological findings suggest that the first colonizers to the Maltese archipelago came from Sicily around 6,000 BCE (McLaughlin et al. 2020). These first immigrants seem to have abandoned the archipelago, and then later resettled it, apparently probably due to climatically circumstances (Grima et al. 2020: 234). However, the unique Maltese Temple Period goes from 3,800 to 2,400 BCE and is divided into to two core periods; the Ġgantija Period (3,800-3,100 BCE), and the Tarxien Period (3,100-2,400). This presentation will look at how the choice of temples' location and their orientation reflected their builders' worldview and belief system, their cosmology (Lomsdalen, T., 2022).
This is done with a methodology that combines landscape archaeology, horizon astronomy, skyscape archaeology, field observations and statistical analysis. Results illustrate that the temples were positioned in the most inherently visible part of the landscape and were not arbitrarily located. In addition, it is observed that temple orientations were not randomly chosen by their builders. The viewscape through the temple entrances displays stellar alignments towards Gacrux, the top star in the Southern Cross constellation, and Avior, the bottom star in the False Cross asterism. This research also suggests that, in the Ġgantija Phase (3,800-2,800 BCE), society was more stellar oriented whereas, in the subsequent Tarxien Phase (2,800-2,400 BCE) this seems to have been lost, and the sun starts to gain prominence. The cyclicality of these two stars may have been a seasonal indicator for timing of initiation rites and/or life sustainable agriculture, and could together with other stars have been a seafaring navigation from Sicily to Malta (Lomsdalen, T., 2013).
This presentation shall manifest these arguments through the concepts of viewscapes and cosmology, based on Geographical Information System (GIS), astronomical software, field observations and statistical analysis.

References

Grima, R., Stoddart, S., Hunt, C. O., French, C., McLaughlin, R. & Malone, C., 2020. Cultural landscapes in the changing environments from 6000 to 2000 BC. In: French, C., Hunt, C. O., Grima, R., McLaughlin, R., Stoddart, S. & Malone, C. (eds.) Temple landscapes: Fragility, change and resilience of Holocene environments in the Maltese Islands. Cambridge: MacDonald Institute for Archaeological Research, 223-238.

Lomsdalen, T., 2013. The Islandscape of the Megalithic Temple Structures of Prehistoric Malta, Culture and Cosmos. Special Issue on: Landscape - Seascape - Skyscape 17(2), 77-105.

Lomsdalen, T., 2022. Viewscapes and Cosmology in the Prehistoric Temples of Malta. Ph.D. Archaeoastronomy, University of Malta.

McLaughlin, R., Parkinson, E. W., Reimer, P. J. & Malone, C., 2020a. Dating Maltese prehistory. In: Malone, C., Grima, R., McLaughlin, R., Parkinson, E. W., Stoddart, S. & Vella, N. (eds.) Temple places: Excavating cultural sustainability in prehistoric Malta. Cambridge: McDonald Institute for Archaeological Research, 27-38.

Heraia: Seasonality and Skyscape at the Temples of Hera in South of Italy

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keywords: Skyscape, Doric Temples, Magna Graecia, Festivities

Abstract
In South of Italy, the three extra-urban temples dedicated to Hera (Heraion of Foce Sele at Poseidonia, Heraion of Tavole Palatine at Metapontion, Heraion of Capo Colonna at Kroton), placed at hundreds of kilometers apart from each other, are oriented in a precise arc of the horizon (95° azimuth ± 2°) (Iannelli 2020). The orientations of these three temples are considered for analyzing the season of a possible common religious festival dedicated to Hera. In the context of Greek religion, a 'festival' was defined as a recurrent day, or a sequence of days, during which precise ritual actions were performed to worship one or more gods/goddesses at a precise sanctuary (Chaniotis 2011). The methodology starts from the topographical surveys (UAV LiDAR and photogrammetric RTK Survey), followed by the elaboration of data in combination with astronomical databases (Zotti et al 2021). The day of the year when the sun was seen rising aligned to the temples at the epoch of their foundation is then calculated, which is at the time of the equinoxes (spring and fall).
A final contextualization of the results is placed within Gregory Nagy's interpretation of Hera as the goddess of timeliness and seasons, 'in charge of making everything happen on time, happen in season, and happen in a timely way' (Nagy 2020, 30, 307). In this way, Hera also became the patron goddess of rituals of passage, such as from the parthenìa of young virgins to become nymphe, brides, wives, and mothers of citizens, according to an equinox festival which would fully integrate them within the civic community. This project has been funded by CNR-ISPC within the project Casa delle Tecnologie Emergenti di Matera, with courtesy of the Archaeological Park of Paestum and Velia – Italian Ministry of Culture.

References

Assmann, Jan. 2011. Cultural Memory and Early Civilization: Writing, Remembrance, and Political Imagination. Cambridge: Cambridge University Press.
Aveni, Anthony, and Giuliano Romano. 2000. "Temple Orientations in Magna Graecia and Sicily." Journal for the History of Astronomy 31 (25): S51–57.
Boutsikas, Efrosyni. 2020. The Cosmos in Ancient Greek Religious Experience: Sacred Space, Memory, and Cognition. Cambridge: Cambridge University Press.
Chaniotis, Angelos. 2011. "Greek Festivals and Contests: Definition and General Characteristics." In Thesaurus Cultus Et Rituum Antiquorum (ThesCRA), VII:4–43. Getty Publications.
Iannelli, Nicola. 2020. "La Fondazione Dei Templi Della Magna Grecia Dedicati a Hera. L'orientamento verso la Stella Spica All'Equinozio d'Autunno." Working paper.
Nagy, Gregory. 2020. The Ancient Greek Hero in 24 Hours. The Belknap Press of Harvard University Press.
Parisi, Valeria. 2020. "Colonie in Festa. Qualche Riflessione sugli Aspetti Archeologici delle Feste nelle Città della Magna Grecia." Thiasos 9 (1): 279–95.
Sinachopoulos, Dimitris. 2019. "A Further Application of Google Earth in Studying the Orientation of Ancient Greek Monuments." Journal of Astronomical History and Heritage 22 (2): 211–24.
Soldati, Fabio. 2024. PeakFinder. http://www.peakfinder.org
Torelli, Mario. 2013. "Il Tempio, la Festa, il Passato. Immagine e Storia degli Edifici Templari Greci." Engramma 110: 37–52.
Williamson, Christina. 1993. "Light in Dark Places: Changes in the Application of Natural Night in Sacred Greek Architecture." Pharos. Journal of the Netherland Institute at Athens I: 3–33.
Zotti, Georg, and Susanne M. Hoffmann, Alexander Wolf, Fabien Chéreau, Guillaume Chéreau. 2021. "The Simulated Sky: Stellarium for Cultural Astronomy Research". Journal of Skyscape Archaeology 6(2): 221–258.

Light and Stars in the Sanctuaries of Ancient Peloponnese

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keywords: Ancient Greece, Ancient religion, Temple orientation

Abstract
Graeco-Roman civilizations have documented celestial phenomena in various records. However, their connection to cultural practices remains inadequately investigated, particularly in architectural, iconographic, and literary contexts not explicitly centered on sky observations.
References to astronomical phenomena in ancient literature passages such as the Homeric epics, suggest the potential for archaeoastronomical investigation into the Archaic and Classical periods of ancient Greece. For instance, this study implies that prior to the Homeric era, celestial navigation likely played a role in Mediterranean voyages.
In this perspective, we investigate the relationship between astronomical knowledge and rituals by comparing social behavior and religious practices at the sanctuaries of Artemis Orthia in Sparta and of Despoina in Lykosoura, ancient Arcadia. This analysis highlights the potential for archaeoastronomical evidence to elucidate some aspects of the sacred rituals described in literary and epigraphic sources. In particular, in the sanctuary of Despoina, we can discern a strong connection with the equinoxes. From contextual considerations, this suggests a temporal setting at the beginning of spring for the local sacred teletai, the initiatic ceremonies in honor of the goddesses Despoina and her mother Demeter.

References

A.F. Aveni - G. Romano, Temple Orientations in Magna Graecia and Sicily, in Journal for the History of Astronomy Supplement 25, 2000, pp. 51-57.

E. Boutsikas, 2020, The Cosmos in Ancient Greek Religious Experience. Sacred Space, Memory, and Cognition, New York 2020.

E. Boutsikas - C.L.N. Ruggles, Temples, stars, and ritual landscapes: The potential for archaeoastronomy in ancient Greece, in AJA 115, 2011, pp. 55-68.

S.L. Guglielmino - P.B. Cipolla - I. Rizzo Giudice, Astronomy in the Odyssey: The Status Quaestionis, in A. Orlando (ed.), The Light, The Stones and The Sacred: Proceedings of the XVth Italian Society of Archaeoastronomy Congress, 2017, pp. 165-180.

S.L. Guglielmino, Luce e astri nei santuari nell'antica Grecia: il contributo dell'archeoastronomia, in A. Lo Monaco (ed.), Il mondo è pieno di dèi, submitted.

Lo Monaco 2009: A. Lo Monaco, Il crepuscolo degli dèi d'Achaia: religione e culti in Arcadia, Elide, Laconia e Messenia dalla conquista romana ad età flavia, Roma 2009.

On the Orientation of Early Christian Churches in the Aegean Islands

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keywords: Early Christian Basilicas, Aegean Islands, Dodecanese, Cyclades, Orientation

Abstract
The present study examines the orientation of early churches in the Aegean Islands by remote methods; about 200 were located and measured. Almost all the churches are basilicas and the vast majority of them have three aisles. In many cases, the sacred function continues to this date, with successive newer churches built on top of old ones, occasionally well into the 20th c.
The early Christian basilicas in our study date from the mid-4th to the early-9th c., with the majority of them from the 6th c. The preliminary results show that the churches have a pronounced and significant peak centered to east and fall-off rather symmetrically on the sides.

References

Dallas, T.G. (2018). On the Orientation of Early Christian Churches in Perfaectura Illyricum. Mediterranean Archaeology and Archaeometry, 18(4), 131-138.

Deligiannakis, G. (2016). The Dodecanese and the Eastern Aegean Islands in Late Antiquity, AD 300–700. Oxford: Oxford University Press.

Gkioles, N., & Pallis, G. (2014). Άτλας των χριστιανικών μνημείων του Αιγαίου. Αθήνα: Γενική Γραμματεία Αιγαίου και Νησιωτικής Πολιτικής.

Rising at the Horizon of the Sky: the C2 paradigm at Thebes

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keywords: Ancient Egypt, horizon, winter solstice, landscape, skyscape, alignments, C2 Project.

Abstract

'He made these great and perfect monuments for all eternity. He knew how to orientate them towards the Horizon of the Sky'

This inscription can be read on the walls of the temple built by King Ramesses II at Abu Simbel dedicated to the most important gods of ancient Egypt. As the inscription reads, the king had orientated it to the Horizon of the Sky (Akhet en Pet), the Horizon being a most important section of Egyptian skies were celestial spirits (akh) were transformed either when setting or, better, at rising. It was already mentioned in the Pyramid Texts of the Old Kingdom (Belmonte and Lull, 22023). At some stage on the development of Egyptian hieroglyphs, the akhet change the spelling from an akh-bird plus phonetic complements, to a sun rising between two mountains (dju) as in the previous inscriptions. We do not know exactly when this happen and it is being the object of investigation. The symbolism was so important that ancient Egyptian built landscapes in an attempt to reproduce this phenomenology, as perhaps in the Giza plateau, or assume this as clear aspects of their worldview when the Sphinx assumed the character of Hor-em-akhet (Horus at the Horizon). In other cases, they look for natural spaces with a peculiar orography so that nature can recreate the same phenomenon. The city of Akhenaton at modern Tell el Amarna, called the Horizon of the (solar) Disk ((Akhetaten) would be a nice example of this (Belmonte et al. 2009). On occasions, these aspects were combined with important milestones either of the tropic year, notably the winter solstice (Belmonte and Urrutia-Aparicio, 2023), or relevant dates of Egyptian civil calendar. A re-interpretation of the location and orientation of the temples built by King Mentuhotep II and She-King Hatshepsut at Deir el Bahari are epitomes of this reality and exemplify an outstanding connection between land-, skyscape, time keeping and architecture (Belmonte et al. 2020).

Precisely next to the Deir el Bahari Bay and adjacent to it, there is one of the most fascinating, valuable but less known sacred places of ancient Egypt. This is the Royal Cache Wadi, or C2 in Theban nomenclature. This is the place where dozens of mummies of Kings and Queens of Egyptian New Kingdom were found at the end of the 19th Century by a famous family of tombs 'robbers' who were exploiting their finding until the plot was discovered by the officials of the Antiquities Service. Immediately, the tomb content was urgently emptied and the royal bodies sent to Cairo where they reside now in the recently created Museum of the Egyptian Civilization. The hypogeum was not scientifically excavated and, consequently, we do not even know today who was the original owner of the 'cache', which actually was at plain view of Egyptian priests and scribes for centuries, as the hundreds of graffiti in the neighborhood demonstrate. C2 has been the objective of a Spanish-Egyptian Archaeological Mission (the C2 Project, Pérez Accino and El-Leithy, 2023; the first author being the PI of the Project) for the last decade in an attempt to clarify the many doubts surrounding this important site of rude beauty and inextricable mysteries.

The multidisciplinary team of the project includes Egyptologists of the most diverse specialties. From

the onset of the project, the PI noticed the suggestive orography of the site, with a wadi going down form the scarps of the Qorn, the peculiar mountain dominating the Theban necropolis. The valley ended, as seen from a huge, perhaps unfinished or deliberately destroyed, niche excavated in the hard limestone of the cliffs, in a peculiar topographic feature resembling a valley within two hills (a 'dju' sign). This orographic feature permitted an open view of the eastern horizon above the hazes of the Nile Valley. Interestingly, exactly in the middle of the feature, the sun rises (and rose) at the winter solstice, forming an astonishing view of indescribable beauty, reproducing an akhet at a gigantic scale. In this presentation, we will briefly describe the epigraphic findings and shall discuss a few of the project archaeological findings in an attempt to contextualize what we believe was a site of important rituals centuries before that the royal mummies were translated to a well-known 'cache'. The skyscape certainly played a most relevant role in this phenomenology.

References

C2 Project webpage: https://fundacionpalarq.com/item/proyecto-c2-del-royal-cache-wadi-por-que-las-enterraron-alli/

Belmonte, J. A., Shaltout, M., Fekri, M., 2009. Astronomy, landscape and symbolism: a study on the orientations of ancient Egyptian temples. In J. A. Belmonte and M. Shaltout (Eds.), ***In search of cosmic order, selected essays on Egyptian archaeoastronomy***, Pp. 213–284. Cairo: Supreme Council of Antiquities.

Belmonte, J.A., Fekri, M., and Serra, M., 2020. ¿Atrapando el Solsticio? Un Análisis crítico de la orientación de los templos de Deir el Bahari. Papers on ancient Egypt, TdE, 10, 11-26.

Belmonte, J.A. and Lull, J., 2023. Astronomy of Ancient Egypt: a cultural perspective. Springer: Cham. ISBN 978-3-031-11828-9.

Belmonte, J.A., and Urrutia-Aparicio, M., 2023. The solstice delusion: challenging winter solstice alignments in ancient Egypt. In P. Maglova and A, Stoev (Eds.), ***Cultural astronomy and ancient skywatching***, Pp. 53-59. Stara Zagora: Al.

Pérez Accino, J.R. and El-Leithy, H., 2023. Graffiti as representation of archaeological features in the Royal Cache Wadi. In Polkowski, Paweł Lech (Eds.), Stone canvas: towards a better integration of "rock art" and "graffiti" studies in Egypt and Sudan, Pp. 253-266. Warsaw and Le Caire: Polish Centre of Mediterranean Archaeology, University of Warsaw; Institut Français d'Archéologie Orientale.

The Orientation of New Megalithic Monuments in Southern Iberia

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keywords: Megalithism; Orientation; Landscape Archaeology; Iberia; Andalusia.

Abstract
The orientation of megalithic monuments has been traditionally one of the main themes in Cultural Astronomy research. In the last two decades of the XXth century, Michael Hoskin endeavoured the task of measuring a comprehensive set of orientations of megalithic monuments, especially in the Iberian Peninsula and the Balearic Islands. The results showed that nearly 90% of the monuments, mostly passage graves, dolmens, and Tholoi tombs, were facing the eastern half of the horizon, demonstrating the likely intentionality of the megalithic builders to link these structures with the heavens. Hoskin (2001). New investigation in recent years have unveiled new megalithic monuments in several areas in Iberia. Two of these new areas located in the Spanish region of Andalusia, are presented here and the results are exposed.
Antequera, in southern Spain, hosts an impressive assemblage of megalithic monuments that have recently been declared World Heritage Site by UNESCO (2019) including as Universal Outstanding Value the relation of these megaliths with the sky. One of the peculiarities of these group is the relation they manifest to the local landscape, and particularly with the peculiar geomorphic shape of Peña de los Enamorados hill. In the recent years (García Sanjuán et al 2023), a new megalithic monument (Piedras Blancas) has been discovered in the vicinity of this hill. Possibly of the same age as Menga, it has been carefully excavated and the remains inside have been recovered and dated, allowing for a diachronic analysis of the orientation of the different stages.
In the province of Huelva, inside the medieval castle of Cumbres Mayores, a number of standing stones have recently been identified, possibly forming an enclosure. The archaeological excavations granted performing orientation measurements, that link particular directions with the solstices and the surrounding landscape.
The new megaliths allow a new reading the the megalithic phenomenon in Andalusia including the landscape and skyscape perspectives (Wheately et al. 2010).

References

García Sanjuán, L. et al., 2023, 'In the bossom of the Earth:a new megalithic monument at the Antequera Wolrd Heritage Site', Antiquity, 97(393):576-595

Hoskin, M., 2001, 'Tombs, Temples and Their Orientations', Ocarina Books: Bognor Regis

Wheatley, D.W., García Sanjuán, L., Murrieta Flores, P.A., Márquez Pérez, J.M., 2010. 'Approaching the Landscape Dimension of the Megalithic Phenomenon in Southern Spain', Oxford Journal of Archaeology, 29 (4): 387-405

Aveni, Anthony, and Giuliano Romano. 2000. "Temple Orientations in Magna Graecia and Sicily." Journal for the History of Astronomy 31 (25): S51–57.

Archaeoastronomy in Sicilian Prehistory: an update with research from the last 5 years

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keywords: Archaeoastronomy; Early Bronze Age; skyscape; Sicily; Muculufa; Riparo Cassataro.

Abstract
This contribution represents a report of the archaeoastronomy studies conducted in Sicily in the last 5 years. Archeoastronomy, or more generally cultural astronomy, studies in extreme synthesis the relationship between man, the sky and architecture in antiquity (Ruggles 2015; Magli 2016). More recently there is also talk of 'skyscape archaeology', to underline how the 'landscape-sky-observer' system is now frequently included in multidisciplinary studies involving an archaeological site (Silva 2017).
Sicily also has an ancient history of observations and studies related to archeoastronomy. In the second half of the 19th century the first pioneering studies of archaeoastronomy in Sicily were carried out by German and British scholars (Nissen, Koldewey, Puchstein and Penrose); the protagonists of these studies were numerous Greek temples and churches.
But it is at the end of the twentieth century that the first studies on Sicilian prehistoric monuments date back. The pioneer of these studies is the late archaeologist Sebastiano Tusa (1952-2019), who, together with the Palermo astronomer Giorgia Foderà Serio and the English historian Michael Hoskin (1930-2021), started two interesting multidisciplinary investigations campaigns: the first on the Sesi of Pantelleria (Tusa, Foderà Serio and Hoskin 1992) and the second on some rock necropolis built between the IV-II millennium BC (Foderà Serio and Tusa 2001).
In the second decade of the 21st century, interest in the discipline of archeoastronomy is rekindled with new studies (e.g.: Scuderi et Al. 2013; Foresta Martin and Magli 2016; Orlando, Tusa and Gori 2018; Orlando, Palio and Turco 2019; Orlando 2020).
With this contribution we want to present the studies carried out since 2020 regarding the orientations of the Sicilian dolmens (Orlando et Al. 2024) and the skyscape of the prehistoric sites of Muculufa (Butera, Caltanissetta) (Orlando And Riorden 2024), Riparo Cassataro (Centuripe, Enna) (Cavulli et Al. 2024) and of the Ripari di San Giovanni (Sambuca di Sicilia, Agrigento) (Cavulli et Al. 2024). The Early Bronze Age site of Muculufa, due to its uniqueness in possessing an astronomically oriented 'sanctuary', is projected to become one of the most important places in Sicily from an archaeoastronomical point of view.

References

Foderà Serio G. and S. Tusa 2001. Rapporti tra morfologia ed orientamento nelle architetture rituali siciliane dal IV al II millennio a.C., in L'uomo antico e il cosmo, Atti dei convegni lincei 171, Roma, 297-323.
Foresta Martin F. and G. Magli 2016. Astronomy and landscape at the prehistoric settlement villaggio dei Faraglioni, Ustica, Sicily, in Mediterranean Archaeology and Archaeometry 16 (2), 167-172.
Magli G. 2016. Archaeoastronomy. Introduction to the Science of Stars and Stones, New York.
Orlando A. 2015. Studio archeoastronomico della 'spirale megalitica' di Balze Soprane (Bronte, CT): analisi preliminare, in A. Puglisi-M. Turco (a cura di), L'Acqua, la Roccia e l'Uomo: Lago Gurrida e Sciare di Santa Venera, Nicolosi (CT), 86-89.
Orlando A. 2017. Argimusco: cartography, archaeology and astronomy, in A. Orlando (ed.), The Light, the Stones and the Sacred, Astrophysics and Space Science Proceedings 48, New York, 123-155.
Orlando A. 2020. Le tombe rupestri della Valle Alcantara: censimento, architettura, paesaggio ed orientamenti, in G. Sofia-S. Raffiotta (eds.), Terme Vigliatore (ME).
Orlando A., S. Tusa and D. Gori 2018. The prehistoric villages of the Eolian archipelago and Milazzo: astronomy and landscape, in Mediterranean Archaeology and Archaeometry 18 (4), 219-226.
Orlando A., O. Palio and M. Turco 2019. Analisi archeoastronomica della spirale megalitica di Balze Soprane (Bronte, CT) nell'area nord-occidentale dell'Etna, in in E. Antonello (ed.), Atti del XVI convegno SIA, Torino, 191-204.
Ruggles R. (ed.) 2015. Handbook of Archaeoastronomy and Ethnoastronomy, New York.
Silva F., 2017. The Role and Importance of the Sky in Archaeology: An Introduction, in Skyscapes, in F. Silva-N. Campion (eds.), Barnsley.
Tusa S., G. Foderà Serio and M. Hoskin 1992. Orientations of the Sesi of Pantelleria, in Journal for the History of Astronomy 23 (Archaeoastronomy supplement 17), UK, 15-20.

Exploring Etruscan Sacred Architecture: Temple Alignments and their Cultural Significance

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keywords: Etruscan world; Landscape Archaeology; orientation; Italy.

Abstract
The orientation As a part of the 'Tarquinia Project' of the University of Milan, we have explored since 2012 possible correlations between astronomical and calendrical aspects and the configuration of urban spaces and monuments, in Tarquinia and in the Etruscan world in general (Bagnasco Gianni 2019; Pernigotti 2019).
Making use of an inter-disciplinary approach, we were able to provide fresh data on well-known and long-excavated archaeological sites. In particular, the study of the orientation of the Etruscan sacred buildings has been investigated using data from different disciplines and methodologies, including archaeology, archaeoastronomy and landscape archaeology. Generally speaking, we observed the tendency by the Etruscans to orient the facades of their sacred buildings in such a way that their front was illuminated every day of the year by direct sunlight (Pernigotti 2021). However, notable exceptions exist – first and foremost, that of the hugest Etruscan temple ever built, Ara della Regina in Tarquinia (Bagnasco Gianni-Bortolotto-Magli 2013).
Furthermore, in many cases the reasons for the specific orientations remain to be investigated, especially in the case of multiple buildings and altars in sanctuaries. In some cases indeed, cultural motivations related for instance to prominent features of the landscape or, as in the case of certain urban sanctuaries, to the urban grid of the towns, have to be considered. In order to understand these aspects, a contextual analysis of the individual sites is necessary.
The talk will present a synthesis of the orientation data as well as recent results obtained for specific sanctuaries.

References

Bagnasco Gianni 2019.
Bagnasco Gianni-Bortolotto-Magli 2013.
Pernigotti 2019.
Pernigotti 2021.

Archaeoastronomy and Landscape at Troy

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keywords: Archaeoastronomy; Early Bronze Age; Troy; Turkey; skyscape; landscape; UNESCO

Abstract

Troy, in northeastern Turkey, is a UNESCO World Heritage Site, with universal value to humankind. Common ideas include that the Trojan War is a fact of history. Actually, its "historicity" is a construct of later Greek historians. Excavations at Troy since the 1870s and continuing today reveal an absence of secure evidence for such events as described in the epic cycle, especially the Iliad.

Recently, scholars challenge the idea that the Trojan War has any basis in fact (Sherratt 2010, 2017; Wiener 2007; Dickinson 2006; Holloway 1981). Yet the Iliad remains a compelling story. What might be behind it?

Many Homer scholars have noted the cognitive spatial structure within the poem, which orders the hierarchy of supernatural forces and places them onto opposed viewing platforms (Clay 2011, Tsagalis 2012). Others have hiked the region, copy of the Iliad in hand, identifying topographical features with the aid of the cognitive mapping provided by the poet (Cook 1973, Luce 1998).

But so far, no one has asked if this unique and unavoidable narrative structure might be embedded in the Trojan landscape, with special attention to the "skyscape" and horizon interactions. We propose to study this aspect.

Archaeology at Troy recently confirmed that the oldest artifacts found there, including a figural standing stone, and "cupmark" stones depicting constellations, correspond to an occupation almost 700 years before the conventional founding of the city (Govier 2019). We suspected this already, and this gives us a starting point for a date (3500 BCE) and typology: a megalithic site with ritual astronomical observations.

References

Clay, Jenny Strauss 2011. Homer's Trojan theater : space, vision, and memory in the Iliad. Cambridge and New York : Cambridge University Press.

Cook, J.M. 1973. The Troad: An Archaeological and Topographic Study. Oxford: Oxford University Press.

Dickinson, O.T.P.K. 2006. "The Mycenaean Heritage of Early Iron Age Greece." In Ancient Greece: From the Mycenaean Palaces to the Age of Homer (Edinburgh Leventis series), edited by S. Deger-Jalkotzy and I.S. Lemos, 115-122. Edinburgh.

Govier, Gordon, (ed.) 2019. "Oldest Archaeological Layer at Troy." Artifax 34.4. p. 14.

Holloway, R. Ross. 1981. Italy and the Aegean 3000-700 BC. Louvain-la-Neuve: Institut Supérieur D'Archéologie et D'Histoire de L'Art, Collège Érasme.

Luce, John 1998 Celebrating Homer's Landscapes. Troy and Ithaca Revisited. New Haven: Yale University Press.

Sherratt, Susan 2010. "The Trojan War: History or Bricolage?" Bulletin of the Institute of Classical Studies 53:1-18.

Sherratt, Susan, and John Bennet (eds.) 2017. Archaeology and Homeric Epic. Sheffield Studies in Aegean Archaeology. Oxford & Philadelphia: Oxbow Books.

Tsagalis, Christos. 2012. From Listeners to Viewers: Space in the Iliad. Washington, D.C.: Center for Hellenic Studies.

Wiener, M.H. 2007. "Homer and History: Old Questions, New Evidence," in: Morris/Laffineur (eds.), Aegaeum 28, 2007, 3-34.

Solar illumination of Newgrange passage tomb—advances in recording techniques and geospatial analysis.

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keywords: Cultural heritage, winter solstice, Newgrange passage tomb, GIS, Livestream on Internet, Social Media metadata

Abstract
The archaeological ensemble of Brú na Bóinne, East Ireland, includes the three mega-tombs named Dowth, Knowth and Newgrange. These were constructed during the Irish Middle Neolithic in c. 3200 BCE and are characterized by a vast cairn delimited in each case by numerous decorated kerbstones, a developed cruciform burial chamber and the greatest concentration of figurative megalithic art in Western Europe. Only one, Newgrange, is astronomically aligned on winter solstice sunrise. Design intentionality can be confidently inferred due to the existence of a so-called 'roof-box' – a small lithic slot opening or window aimed at the very sector of the horizon and sky which frames the rising Sun at this numinous time. Such an architectural construct is unique in the European passage tomb tradition, permitting direct light from the risen sun to accurately and periodically illuminate the chamber floor and end recess. Attributes such as these emphasize the economic, funerary, religious and social importance and role of such monuments in prehistory.
During 2020 and 2021, the Irish Government enforced widespread public health measures to combat the COVID-19 pandemic which had reached here in February 2020. This resulted in the closure of Newgrange passage tomb to visitors for the two-year period in question. To take advantage of the empty chamber coinciding with the mornings of solstice, the author was requested by Government to lead a multidisciplinary research team to undertake new research which would scientifically record and analyze the light phenomenon over an extended period. The remit additionally included livestreaming the phenomenon over the internet thereby communicating cultural heritage and cultural astronomy to a global audience. Investment to expedite this ambitious plan coupled with transdisciplinary thinking by members of the team identified a range of research aims and deliverables. This paper will present a description of the innovative recording technologies and image analysis techniques successfully employed to exactly document and archive a priceless cultural asset for posterity.

References

González-García, A. César. 2021. "Light and Shadow Effects in Megalithic Monuments in the Iberian Peninsula." In The Oxford Handbook of Light in Archaeology, edited by Costas Papadopoulos and Holley Moyes, 164–184. Oxford University Press.

Prendergast, Frank. 2024, forthcoming. Newgrange Solstice Research Report In Brú na Bóinne - Archaeological Ensemble of the Bend of the Boyne, edited by World Heritage Unit National Monuments Service for UNESCO.

Prendergast, Frank. 2022. "The Meaning of Dark, Light and Shadows: Inferences in Art, Materiality and Cultural Practices." Culture and Cosmos 26 (1):3–32 Available at https://arrow.tudublin.ie/arastbk/17/

Prendergast, Frank, Clare Tuffy, John Lalor, Claire Breen, and Sinéad Gargan. 2021. "Mapping the light fantastic at Newgrange." Archaeology Ireland 35 (Winter): 30–35 Available at https://arrow.tudublin.ie/arastart/14/

Prendergast, Frank. 2021. "The alignment of passage tombs in Ireland – horizons, skyscape, and domains of power." In Zeit ist Macht. Wer macht Zeit?/Time is power. Who makes time?, edited by H. Meller, A Reichenberger and R. Risch, 107–123. Mitteldeutscher Archäologentag vom 8. bis 10. Oktober 2020 in Halle (Saale)/13th Archaeological Conference of Central Germany October 8–10, 2020 in Halle (Saale): Tagungen des Landesmuseums für Vorgeschichte Halle (Halle [Saale] in Vorbereitung); Available at https://arrow.tudublin.ie/arastbk/12/

A diachronic study of the Roman landscapes and skyscape of Tarraco (Tarragona, Spain)

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keywords: archaeoastronomy, Roman landscapes, centuriations, Roman archaeoastronomy

Abstract
Tarraco (Tarragona, Spain) was the provincial capital of the largest Roman province in Hispania and in the Western Mediterranean, Hispania Citerior Tarraconensis. During centuries it experienced various periods of intense building activity and land transformations that modified both the rural and urban landscapes, more appreciably since the consolidation of the Roman power in the Iberian Peninsula, in the 2nd century BCE (Gutierrez-García and Serena Vici, 2018). Fortunately, various remains produced during centuries of territorial organization and development of Tarraco are still preserved, making this site a magnificent place in which to observe possible particularities of each constructive moment.
Several works have previously studied the presence of astronomical patterns in the configuration of the territory in Roman towns and centuriations (see e.g. González-García et al., 2019; Rodríguez-Antón et al., 2023) and, specifically in Tarraco, a connection between a "sacred" conception of the space and the layout of the land originated during the foundational rite has been suggested (Palet Martínez et al., 2010). On this basis, in this work we present a diachronic study of the evolution of the urban and rural design of Tarraco and the exploration of possible relations between the structures constructed in different phases of the Roman presence with the surrounding land and the sky. To do so, a wide range of methodologies have been employed, including an analysis of data obtained in situ in the main urban areas, complemented with GIS-based archaeomorphological and landscape research of the centuriated systems developed around this centre.
By this, our aim is to go beyond the practical aspects of Roman surveying and explore whether particular celestial objects in special moments of their cycles were considered in the various projects of land appropriation, territorial division of the Ager Tarraconensis and the urban development in one of the most relevant towns in Hispania. This would allow to determine whether Roman surveying techniques were flexible and adaptable enough to overcome the environmental constrains in order to fulfil other, more symbolic, criteria, which ones would those be and the reasons behind it.

References

González-García, A. C., Rodríguez-Antón, A., Espinosa-Espinosa, D. and García Quintela, M. (2019) Establishing a new order: the orientation of towns built at the age of Augustus. In Archaeoastronomy in the Roman World. Historical & Cultural Astronomy, 1st ed.; Magli G., González-García A., Belmonte Aviles J. A., and Antonello E. Eds.; Springer; pp. 85-102.

Gutiérrez Garcia-M.; A.; Vinci, S. M. (2018), "Large-scale building in Early-imperial Tarraco (Tarragona, Spain) and the dynamics behind the creation of a Roman provincial capital landscape" a Brysbaert, A.; Klinkenberg, V.; Gutiérrez-Garcia M., A.; Vikatou, I. (eds.), Constructing monuments, percieving monumentality & the economics of building, Sidestone Press, Leiden, p. 271-294.

Palet Martínez, J.M. and Orengo, H. and Fiz Fernández, J. I. (2010) Modelación y conceptualización del paisaje romano en el ager Tarraconensis: Tarraco y la centuriación del territorio. In C. Corsi and F. Vermeulen (eds.) Chamging landscapes. The impact of Roman towns in the Western Mediterranean. Proceedings of the International Colloquium, Castelo de Vide - Marvão 15th-17th May 2008, pp. 164-186.

Rodríguez-Antón, A., Magli, G. and González-García, A. C. (2023) Between land and sky. A study of the orientation of Roman centuriations in Italy, Sustainability, 15(4), 3388;

Maira, Hekate, Lagina, Sirius

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keywords: Lagina, Hekate, Sirius, Ancient Greek and Roman Religion, Ancient Greek Mythology.

Abstract
The sanctuary at Lagina in Caria is the only known major sanctuary dedicated to the chthonic goddess Hekate. The use of the area for ritual purposes can be documented since the 4th c. BC, although the buildings are dated in the late 2nd c. BC; it was active until the 4th c. AD. The excavations revealed some peculiar features: for example a trapezoid peribolos, as well as a different orientation of the temple and the altar. The temple is referenced in the bibliography for well over a century mainly because of its unusual programme of sculptural decorations that has puzzled the art historians on its ultimate meaning, while the building itself has only recently been studied in similar breadth.
By using remote tools (i.e. Google Earth) we study the orientation of the structures in the sanctuary at Lagina. Multiple celestial targets are found, which may be linked to Hekate: Venus, Major Lunar Standstill, Gemini and Sirius.
In our work we try to establish a cultural connection between them and Hekate. In this process we discuss the ancient myths pertaining to the goddess and we examine both her chthonic and ouranian aspects. Thus, we find references beyond her standard association with the Moon: Hekate's two torches as symbols of Venus, her common worship of her with Castor and Pollux in Samothrace, and a connection with Sirius via a mythological dog called Maira.
The latter association will be studied in more detail, as it may reveal information on the yet unknown rituals that took place in Hekate's sanctuary in Lagina. For example, the altar of Hekate is constructed in a manner that it was fit for a goddess that belonged to the sky and not the underworld. There are similarities between Hekate and Sirius' cults that could be a testimony for their connection at Lagina, not least that the dog was her sacred animal. Archaeological finds, such as coins, will also show a connection of Hekate to astral symbolism in the late Hellenistic period and the Roman Imperium, when astrology was important.

References

Tırpan, A. A., Söğüt, B. (2005): Lagina. Mugla: Anil.
Herring, A. (2020): Reconstructing the Sacred Experience at the Sanctuary of Hekate at Lagina. Journal of the Society of Architectural Historians 79(3), 247-263.
Williamson, C. G. (2021): Urban Rituals in Sacred Landscapes in Hellenistic Asia Minor. Leiden: Brill.

SESSION III (S3)

ARCHEOASTRONOMY AND CULTURAL ASTRONOMY IN THE REST OF THE WORLD

The INGÁ stone: an archaeological monument of the original people of Brazil to map the sky and turn it into a calendar

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keywords: Ingá Stone; archaeoastronomy; Itacoatiara; Science education.

Abstract
Located in the municipality of Ingá, in the State of Paraíba, Brazil (lat 7° 19' 30.2" S; long 35° 35' 6.8" W), Ingá Stpne is a spectacular remnant of South American archaeoastronomy: a river rock (temporary or intermittent river) in the Brazilian hinterland, approximately 3 meters high and 50 meters long. It is an Itacoatiara, an indigenous word that means "written in stone".
Pedra do Ingá (Cézar, 2013; Neves, 2023), as it is known, has hundreds of inscriptions indicating stars, sun, fruits, anthropomorphic figures and spirals. The figures represent the local fauna and flora, but are intermediated by a long line with around 160 rounded holes, which possibly represent the apparent trajectory of the Sun throughout the four seasons. There is also a series of star's itacoatiaras and the most representative is one made up of three aligned stars, probably the "Três Marias" (Orion's belt – Museu, 2018). The present work represents an archaeoastronomical view of the archaeological site, integrating a calendar and a map of the sky, representing the rainy and dry seasons present in that semi-arid region of Brazil. The work seeks to refute unscientific theories that the monument was created by people coming from the northern hemisphere and without astronomical connotations.
An effort will also be presented to identify indigenous constellations and their representation in sessions at the Planetarium "Circus Stellarium" at the State University of Maringá, to rescue the astronomical science of the original peoples of Latin America.

References

CÉZAR, T.H.S. Sítio Arqueológico Itacoatiaras do Rio Ingá: reflexões sobre a preservação do patrimônio cultural e a documentação como um instrumento para esta prática. Dissertação de Mestrado. Rio de Janeiro: Instituto do Patrimônio Histórico e Artístico Nacional, 2013.

MUSEU da Pedra do Ingá. Ingá, Paraíba, 2018.

NEVES, M.C.D. A Astronomia dos Antigos. In: CARUSO ***et al***. Caçador de estrelas. São Paulo: LF Editorial, 2023.

Cosmological Relations in the Muisca Myth of Bachue

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keywords: Bachue myth; cosmology; Iguaque; Milky Way; Muisca; serpents

Abstract

This research presentation outlines possible cosmological relations in the Muisca myth of Bachue, a traditional narrative that relates the origins of humanity and involves a woman and a child, two serpents and the sacred lake of Iguaque located in the northern Andes. The Muiscas is the name given to the indigenous peoples found in central Colombia by the Spanish conquerors. The research applied an interdisciplinary approach, considering archaeological, historical, ethnographic, astronomical, social and climatic perspectives.

The analysis focused on the iconography and forms of archaeological artifacts associated with the myth: cups, múcuras and tunjos. An animal with a long, wavy body, and the "humped animal" motif, stand out. Historical sources highlight the figure of a large animal with a curved back and associate it with mountain lakes. From El Infiernito archaeological site one can observe the Iguaque massif on the eastern landscape. Between 700 AD and 1000 AD (which synchronizes with the potential emergence of the first serpent-adorned cups, and, consequently, the origins of the myth), there were celestial and landscape alignments involving the Sun, the Milky Way and the Pleiades. These astronomical phenomena coincide with seasonal change.

It was observed that the design of the "humped animal" shares certain characteristics with the naked-eye view of the Milky Way. It is suggested that the Muiscas may have perceived the Milky Way as a colossal and curvaceous creature, with its bulge being the animal's arched back. Additionally, the position on the horizon for the heliacal rise of the Pleiades aligns with the lake's location. This suggests that this asterism could have served as a fertility pre-solstice indicator. The Muisca serpent-adorned cups can be interpreted as a representation of a cosmogonic/cosmological model, with concepts such as origin, opposition, duality, water and death, all present in the myth, materialized in these unique ceramic pieces.

References

Cey, G., 2022 [1569]. El Desencanto del Nuevo Mundo. Viaje a las indias 1539-1553. Bogotá: Pielago Perpetuo.

Francis, J. M., 2003. "Descripción del Nuevo Reino de Granada (1598)". Anuario Colombiano de Historia Social y Cultura, 30: 341–360 [online]. Accessed January 2023,

López Estupiñán, L., 2021. "Siembra de agua, mitología y cerámica en el altiplano Cundiboyacense". Cuadernos de Arqueología de la Universidad de Navarra 29: 259–274.

Martínez Celis, D. and A. Botiva Contreras, 2004. Manual de arte rupestre de Cundinamarca. Bogotá: ICANH-Gobernación de Cundinamarca.

Morales, J. D., 2003. "Arqueoastronomía en el territorio Muisca". BA diss., Universidad de los Andes, Bogotá. [online]. Accessed January 2023,

Sánchez, H. N., 2022. "Archaeoastronomy at the Villa de Leiva Archaeological Site: A Reinterpretation". Journal of Skyscape Archaeology 7 (2): 213–246.

Simón, P., 1891 [1627]. Noticias historiales de las conquistas de tierra firme en las indias occidentales: Segunda parte. Bogotá: Casa editorial Medardo Rivas [online]. Accessed January 2023.

Eflatun Pınar vs. Yazılıkaya: Vertical and Horizontal Hittite Celestial Orders

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keywords: Hittite religion, cosmovision, Eflatun Pınar, Yazılıkaya

Abstract
The Hittite spring sanctuary of Eflatun Pınar is located 70 km west of Konya, a few kilometers east of Lake Beyşehir. It was probably built during the reign of Tudhaliya IV (ca. 1240–1215 BC), which would be at the same time as the last revision of the rock sanctuary Yazılıkaya near Hattusa. The first Western scholar to see the monument was William John Hamilton in 1837. The monument consists of a 7 m wide, and 4.2 m high façade made of individual sculptured stone blocks that tower on the north side over a dammed spring basin measuring 30 × 34 m. Reliefs of five mountain gods form the bottom row of the weathered figures. In the middle of the façade is a pair of gods with unclear identities. They are flanked by hybrid creatures.
The whole ensemble supports two smaller winged sun discs and another winged sun disc across the entire width of the façade. Using the methods of comparative archaeology, the composition of the depictions of the gods in Eflatun Pınar is compared to the latest cosmological interpretation of Yazılıkaya. In Yazılıkaya, the hierarchy of deities is expressed in a horizontal, north-facing arrangement. In Eflatun Pınar, the vertical arrangement reflects the hierarchy. While the reliefs in Yazılıkaya were carved into the bedrock, in Eflatun Pınar, hewn natural stones were erected. In Yazılıkaya, many figures bear legends in Luwian hieroglyphs, whereas Eflatun Pinar is script-less.
Both depictions of gods are representations of the cosmos and its static horizons. In Eflatun Pinar, the underworld falls below the lake surface. The mountain gods correspond with the earth. The clear division of the sky into two different horizons, symbolized by the differently sized winged sun discs, stands out. Eflatun Pınar offers a simplified and more abstract depiction of the Hittite view of the cosmos and shows how it is entirely animated by deities. In Yazılıkaya, the same cosmovision is elaborated in more detail and even labeled in part but lacks the vertical hierarchical arrangement and abstract graphic explicitness that is preserved in Eflatun Pınar.

References

Balza, Maria Elena. 2023. "The King Tutḫaliya IV, the Eflatunpınar Monument, and the River of the Watery Abyss." In Administrative Practices and Political Control in Anatolian and Syro-Anatolian Polities in the 2nd and 1st Millennium BCE, edited by Clelia Mora and Giulia Torri, 13:37–51. Firenze, Italy: Firenze University Press.

Bachmann, Martin. 2017. "Manifestation Göttlicher Präsenz. Das Quellheiligtum Eflatun Pınar." In Innovation versus Beharrung: Was macht den Unterschied des hethitischen Reichs im Anatolien des 2. Jahrtausends v. Chr.? edited by Andreas Schachner, 23:105–20. Byzas.

Zangger, Eberhard, E. C. Krupp, Serkan Demirel, and Rita Gautschy. 2021. "Celestial Aspects of Hittite Religion, Part 2: Cosmic Symbolism at Yazılıkaya." Journal of Skyscape Archaeology 7 (1): 57–94.

Maira, Hekate, Lagina, Sirius

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keywords: Lagina, Hekate, Sirius, Ancient Greek and Roman Religion, Ancient Greek Mythology.

Abstract

The sanctuary at Lagina in Caria is the only known major sanctuary dedicated to the chthonic goddess Hekate. The use of the area for ritual purposes can be documented since the 4th c. BC, although the buildings are dated in the late 2nd c. BC; it was active until the 4th c. AD. The excavations revealed some peculiar features: for example a trapezoid peribolos, as well as a different orientation of the temple and the altar. The temple is referenced in the bibliography for well over a century mainly because of its unusual programme of sculptural decorations that has puzzled the art historians on its ultimate meaning, while the building itself has only recently been studied in similar breadth.

By using remote tools (i.e. Google Earth) we study the orientation of the structures in the sanctuary at Lagina. Multiple celestial targets are found, which may be linked to Hekate: Venus, Major Lunar Standstill, Gemini and Sirius.

In our work we try to establish a cultural connection between them and Hekate. In this process we discuss the ancient myths pertaining to the goddess and we examine both her chthonic and ouranian aspects. Thus, we find references beyond her standard association with the Moon: Hekate's two torches as symbols of Venus, her common worship of her with Castor and Pollux in Samothrace, and a connection with Sirius via a mythological dog called Maira.

The latter association will be studied in more detail, as it may reveal information on the yet unknown rituals that took place in Hekate's sanctuary in Lagina. For example, the altar of Hekate is constructed in a manner that it was fit for a goddess that belonged to the sky and not the underworld. There are similarities between Hekate and Sirius' cults that could be a testimony for their connection at Lagina, not least that the dog was her sacred animal. Archaeological finds, such as coins, will also show a connection of Hekate to astral symbolism in the late Hellenistic period and the Roman Imperium, when astrology was important.

References

Tırpan, A. A., Söğüt, B. (2005): Lagina. Mugla: Anil.

Herring, A. (2020): Reconstructing the Sacred Experience at the Sanctuary of Hekate at Lagina. Journal of the Society of Architectural Historians 79(3), 247-263.

Williamson, C. G. (2021): Urban Rituals in Sacred Landscapes in Hellenistic Asia Minor. Leiden: Brill.

SESSION IV (S4)

MIDDLE AGES

Archaeoastronomy analysis of the Buftea-La Cârna Medieval burial ground in Romania

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keywords: Ingá Stone; archaeoastronomy; Itacoatiara; Science education.

Abstract

The Buftea - ***La Cârna/Mănești*** site (near Bucharest) is the largest known burial ground from Medieval Wallachia (c. 1400 - c. 1600). The first research was initiated almost half a century ago by Aristide Ștefănescu. Further research was undertaken between 2020-2021, when around 1,000 burials have been investigated. Two contemporary cemeteries (II and III, c. 1400 – c 1450), were placed about 200 m from each other, and in between another cemetery (I, c. 1520 – c. 1630), surrounding a church. The dating is provided by coins found in some of the graves. If the hiatus of about seven decades between cemeteries II and III on the one hand, and cemetery I on the other hand, can be explained by written sources, a key question still arises: why have two separate and nearby cemeteries (II and III) in use at the same time?

The grave goods are almost the same in both cemeteries. To attempt an answer, we perform an archeoastronomy analysis using SkyscapeR using a measurement uncertainty of 0.1°. The paper will use 180 graves orientations (170 from II and 10 for III). The longitudinal azimuth axis (defined by a first point at the top of the head and a second one in between the shin legs or foot legs) of each grave was measured with a total station. The total number of graves investigated in each cemetery can only be estimated; the first excavations carried out, in 1980s, were only partially published. The altitude of the horizon was computed using heywhatsthat.com. A key difference between the orientation of the measurements for the two cemeteries is that III has a NE orientation while II covers the entire solar arc. The probability distribution function indicates a tendency to orientate graves towards the positive declinations (Spring and Summer) with 2 focus ranges for III (3-5°, 7-9°) and 3 for II (0°, 3-10°, 15°). The Sun's 0-15° declination interval points to a range spanning approximately 45 days after the Spring Equinox (or before the Autumn Equinox) which could indicate the interval Easter falls in.

Further investigation is required especially in relation to similar burial practices of that period and in relation to cemetery I which was built later around a new church dated ~16th century.

References

Ștefănescu 1978 – A. Ștefănescu, Un lăcaș de piatră ridicat în secolul XVI în vatra satului Mănești-Buftea, în: V. Vrabie (ed.), Ilfov - File de Istorie, București, 1978, p. 181–185.

Ștefănescu 1979a – A. Ștefănescu, Considerații arheologice privind necropola satului Mănești-Buftea (secolele XIV-XV), MCA 13, 1979, p. 375–378.

Ștefănescu 1979a – A. Ștefănescu, un sat domnesc pe Colentina: Mănești - Buftea, Documente și informații arheologice 1979, p. 39–44.

Silva 2024, SkyscapeR: Data Analysis and Visualization for Skyscape Archaeology.

Astronomical knowledge in medieval planetary diagrams

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keywords: medieval, planetary diagram, history of astronomy

Abstract
Up to the 12th century only a few of the numerous antique works on planetary astronomy were available in Europe. From the 8th century A.D. onwards the knowledge contained in these works was frequently illustrated by diagrams (Eastwood and Graßhoff 2004**).** They range from purely schematic representations of the ordering of the planetary spheres, to diagrams that provide information about the orbital periods of the planets, about distances to each other or about astronomical or astrological properties of individual planets. Other diagrams link the planetary representations with cardinal points or TO-maps or give quantitative representations of data from the antique texts to elaborate representations of planetary positions.
Interpretation of these diagrams is sometimes complicated: Even if the position of the planets has an astronomical meaning, it still needs to be clarified whether the signs of the zodiac are to be interpreted astronomically or astrologically, whether only the sun is aligned with the signs of the zodiac or also the planets, whether the positions of the planets or the apses are drawn in the diagram, or whether the data originate from calendar calculations or actual observation. In addition, medieval astronomers often displayed different sets of data in one diagram that in later time would have been kept separate. However, a careful analysis of such diagrams in favorable cases makes even possible the determination of the date of the displayed planetary constellation. Hints for interpretation can be found above all in the texts of Pliny (Mayhoff 1906), Beda Venerabilis or Hrabanus Maurus (Migne 1844).

References

Beda Venerabilis, "De natura rerum liber". In: Migne J.P. (Ed.), Patrologia Latina, Vol. xc, Col. 0208A-0211° (1844).
Eastwood E. and G. Graßhoff, „Planetary diagrams for Roman astronomy in medieval Europe", Transactions of the American philosophical Society xciv (2004) Pt. 3.
Hrabanus Maurus, „Liber de computo", Migne, J. P. (ed.) Patrologia Latina Vol. 107: Col 0669-0728B (1844) Cap. xviii 0694C.
Plinius maior, „Historia naturalis" Lib. II 13-14 (63-64). K. Mayhoff ed. Leipzig Teubner (1906).

Orientation of the Church dedicated to San Massimo in Marmora (Cuneo - Italy)

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keywords: astronomical alignment, cultural astronomy, orientation of churches, liturgical architecture

Abstract
The orientation of Christian churches reflects the historically well-documented concepts that one should face east to pray and the architectural and liturgical principle that temples and churches should be built facing east. The church dedicated to San Massimo in Marmora in the province of Cuneo, Italy, shows a face orientation slightly misaligned from this canonical east-west direction, since the profile of the mountains shifts the position of the sun's rising and setting.
Furthermore, the presence of a fresco of Santa Lucia and 2 sundials suggest considerable attention to the determination of time by the builders and local inhabitants. We experimentally measured the alignment of the church with the sunset at the autumn equinox 2023 and the spring equinox 2024.
As these measurements must be refer to the time of the construction of the church, we considered the historical framework of the site. The parish church of San Massimo, which stands in an isolated position surrounded by the cemetery, was remodeled in the 18th century, but retains the bell tower and other elements of the medieval structure. Outside, around the side entrance, a series of frescoes dating back partly to the 14th century and partly to the 15th century can be seen. Inside are other medieval frescoes: among those from the 14th century, an Annunciation, a St. Mary Magdalene, and a haloed warrior on horseback with a crusader shield. It could be San Giorgio, after whom the church was co-titled in 1386. Also in the church, walled up in the right chapel, is a fragment of a Roman arula (1st century AD) depicting a winged Victory.
Dendrochronology was used to verify the foundation dates suggested by the frescoes, which turn out to be around 1350 AD. We then reproduced the equinoctial sunset of 1350 A.D. to determine how accurately the alignment of the church could be used to define the onset of spring and fall at the time of the construction of the house of worship.

References

Balestrieri, R.(2017) L'Orientamento delle chiese romaniche in liguria V la scheda sintetica atti del XVII Convegno (Roma, 6-8 settembre 2017).
Balestrieri, R.(2014) L'Orientamento delle chiese romaniche in liguria IV. Strade e cattedrali atti del XIV Convegno SIA (Padova, 17-18 ottobre 2014).
Feustel, O. (2009). The Holy Alignment: Geodesic and Astronomical Fundamentals for Calculating the Adjustment of Medieval Naves. In: Williams, K. (eds) Nexus Network Journal. Nexus Network Journal, vol 11,1. Birkhäuser Basel.

SESSION V (S5)

CULTURAL ASTRONOMY

"Homage to a Child of Jupiter": recovering an old astrological reading for a Giorgionesque painting in the National Gallery

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keywords: Children of Planets – Astrological Iconography – History of Astrology – Giorgione – Renaissance Art.

Abstract
The so-called "Homage to a Poet" in the National Gallery (NG1173) is one of the most contentious Giorgionesque paintings, frequently regarded as a work by the master himself during the early stages of his career. As is often the case with the paintings in Giorgio da Castelfranco's catalogue, the interpretation of the bizarre subject is particularly controversial. Art historians have proposed a very large number of readings, including the tribute to an unknown poet laureate, the hero Jason with his sons Plutos and Philomelos, and the engraver Girolamo Campagnola honoured by his lutenist and painter son Giulio (the real author behind the painting?). The most recent hypotheses appeared to be the most plausible, offering explanations for numerous details of the scene. The interpretation proposed by Dal Pozzolo (2009) regards the "Homage" as a representation of the reign of an exiled Saturn, evoking both an astrological and a Jewish theme that would have been particularly appealing to Giorgione and his collaborator Campagnola.
Ludemann (2013) identifies the main figures as Apollo and Phaeton, depicted in Ovid's Palace of the Sun, thereby reiterating the astral dimension of the work. In the present study, I propose the recovery of an old astrological reading of the painting by Pigler (1950), which interpreted the scene as a variation of the classical medieval iconography of the Children of the Planets (in this case Jupiter) and drew a parallel with some similar paintings by Hieronymus Bosch from the same years. A tentative explanation of the heterogeneous elements and details visible in the landscape (some birds, a leopard, a presumed hermit, four books, a lute, a bowl with flowers, an eastern or Jewish hat) according to the "Planetenkinder" scenario will lead to a new possible identification of the sovereign: the Epirote humanist and Hellenist Nicholas Leonicus Thomaeus, at the time of his "coronation" as a lecturer of Greek at Padoa University (1497). If this is the case, the painting is an ironic and playful homage that manipulates the idea of planetary influence, showing the process of evolution and adaptation of astrological theories and iconographies in the making.

References

Dal Pozzolo, Enrico Maria, "Saturno in esilio", in Giorgione, catalogo della mostra (Castelfranco Veneto, 2009/10) (E. M. Dal Pozzolo e L. Puppi, eds.), Milano 2009, cat. 35, pp. 413-415

Herrera, Breanne, The Children of the Planets: Freedom, Necessity and the Impact of the Stars, (MA dissertation). Budapest: Central European University, 2012

Ludemann, Peter, "Sed tu sapientius opta: un dipinto "giorgionesco" reinterpretato", Venezia Cinquecento, 2013, 45, pp. 5-39

Pigler, Andrew, "Astrology and Jerome Bosch", The Burlington Magazine, 1950, 92, pp. 132-136

On the probable use of a synesthetic method in the composition of Scorpio by Karlheinz Stockhausen

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Abstract
With this study, I intend to advance a hypothesis regarding the method chosen by Karlheinz Stockhausen to compose Scorpio, one of the twelve pieces of the Tierkreis suite dedicated to the twelve zodiacal constellations. It is known that the constellation of Scorpio, among all the others distributed along the ecliptic, is the most easily recognizable for the particular arrangement of the stars that compose it, which seem to draw the real shape of that arachnid. The peculiarity of Stockhausen's piece dedicated to it, a characteristic that makes it appear different from the other eleven, is that, instead of being based on the application to the sonic material of numerical methods similar to those already used in the rest of the suite, it seems rather to have been composed by drawing inspiration from the particular shape of that constellation.
It will be tried to demonstrate, in fact, how Stockhausen tried to "draw" that sinuous shape of the arachnid both from a graphical point of view - therefore reproducing its silhouette with the particular arrangement of notes adopted on the score -, and using the ascending and descending sequences of sounds that the synesthetic note pattern produces. Beyond the methodological-compositional aspect, I therefore hope that this study may have a certain relevance also in the possible understanding of the mental mechanisms that, through appropriate musical writing, allow us to translate a purely visual perception into another one totally acoustic. In other words, through this analysis, I try to highlight one of the possible ways in which the transition from a pure visual pareidolia to auditory pareidolia occurs.

References

Adamo A., Pianeti tra le note, Springer, 2009.
Adamo A., … e tornammo a riascoltar le stelle, Giornale di Astronomia, III, Settembre 2013.
Adamo A., Cosmology for Composers, Preprint, Research Gate, 2019.
Alpher, R. A.; Bethe, H.; Gamow, G., The Origin of Chemical Elements, Physical Review. 73 (7): 803–804, 1948
Bondi, H.; Gold, T., The Steady-State Theory of the Expanding Universe, MNRAS 108 (1948) 252.
Burbidge, E. M.; Burbidge, G. R.; Fowler, W. A.; Hoyle, F. (1957). Synthesis of the Elements in Stars, Reviews of Modern Physics. 29 (4): 547
Capponi, Paola, I nomi di Orione, Marsilio, 2005, pag. 19
Kohl, Jerome, The Evolution of Macro- and Micro-Time Relations in Stockhausen's Recent Music, Journal Article, Perspectives of New Music, Vol. 22, No. 1/2 (Autumn, 1983 - Summer, 1984), pp. 147-185
Stockhausen, K.H., How time passes by, Published in Vol.3 in the English edition of Die Reihe musical journal 1959. The original version dates from 1957.

Restoration of astronomical photographs on glass plates

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keywords: Photograps – Restoration – Glass plates – Solar Pictures – Museum material

Abstract
Glass plates were used since 1816 to fix images using different types of light-reactive chemical emulsions. These plates fixed positive and negative images until the use of the Daguerre method became popular at the end of the 19th century. Successors of this process and through emulsions in variants of Silver Bromide, towards the beginning of the 20th century they were already used to capture astronomical images and study them as part of the observational process.
In the present work we will focus on solar pictures taken at the San Miguel Cosmic Physics Observatory between the years 1940 and 1970. These plates were abandoned for 23 years and stored, if it can be considered this way, in conditions that were not always satisfactory, for which deteriorated in various ways. This work explains the techniques and processes to which parts of the plates were subjected, how they were cleaned and the images that were obtained from them for their subsequent catalogue, use and study.

References

Berselli S., Gasparini L., (2000). L' archivio fotografico. Manuale per la conservazione e la gestione della fotografia antica e moderna, Zanicheli Editori, Bolonia, p.44.
Cataneo, B. (ed.) (2012). Il restauro della fotografía. Materiali fotografici e cinematografici, analogi e digitali, Nardini Editore, p. 101.
Merlo, David y Balbi, J Nicolas. (2023) Restauración de Placas de Vidrio. Boletín de la Asociación Argentina de Astronomía RAAA Número 65
Osterman, M. (2001), An annotated bibliography relating to albumen on glass processes. Advanced Residency Program in Photograph Conservation, George Eastman House/Image Permanence Institute, Rochester, NY.

Quantifying The Lives of Astrophysics

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Abstract
ASTROMOVES is a qualitative study of the lives and career moves of astrophysicists and those in adjacent sciences. UKRI provides a good overview of qualitative research as research "focused more on the meaning of different aspects of people's lives, and on their accounts of how they understand their own and others' behavior and beliefs."
ASTROMOVES data collection used semi-structured interviews with 43 scientists. However, in order to report on the project, provide context and explore trends, it was necessary to create and assign numbers to the qualitative data.
This presentation shows the details of how the rich content of the interviews were reduced to numbers and the decisions that went behind those numbers. Numbers are necessary to capture the demographics of the interview sample. Other numbers were generated in order to compare to the results found by others doing statistical surveys. Career age was a key number important to many parts of my analysis.

References

Holbrook, J. C. ASTROMOVES: Astrophysics, Diversity, Mobility. Proc. Int. Astron. Union 15, 286–292 (2019).
UK Data Service, Qualitative data. UK Data Service https://ukdataservice.ac.uk/learning-hub/qualitative-data/ (2024).
UKRI ESRC, Qualitative research. https://www.ukri.org/who-we-are/esrc/what-is-social-science/qualitative-research/ (2022).

Geological and geomorphological approach to the study of some rocky sites in Sicily (Italy)

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keywords: geology; Sicily; protohistory, geomorphology, archaeology.

Abstract
A modern, multidisciplinary approach to the study of a potentially astronomically-oriented site, primarily in the "megalithic" field, cannot prescind from a thorough territorial examination, which should consider both geologic and geomorphologic evidence. Terrain analysis, as well as the study of rocks and in particular of any potential erosional process, can indeed help to identify sites which underwent a clear anthropic intervention, distinguishing them from those more likely to hold a "natural status". This study aims to analyze 4 sites located mainly in Oriental Sicily and featured by diverse geologic and geomorphologic characteristics:
- Motta Camastra (Valle Alcantara – Messina): site characterized by the outcrop of sedimentary rocks named "turbidities" (Tinterri et Al. 2012), which feature multiple "natural" holes that are interpreted as possible solar calendars;
- Cozzo Olivo (Gela - Caltanissetta): site characterized by the outcrop of sedimentary limestone rocks and gypsum (Beneo et Al. 1955), which feature particular "natural" dissolutions engendered by the action of weather elements. The site shows an acclaimed presence of archeological evidence (rock-cut tombs) and, according to some scholars, even possible evidence of solar calendars (Maurici et Al. 2019);
- Monte Petrulla (Licata - Agrigento): significant upland featured by the presence of a settlement of indigenous residential units relative to the "Castelluccio Culture" (Early Bronze Age, XXII-XVI centuries BC) and by the presence of groups of rock-cut tombs scattered around a wide area. Furthermore, more important and monumental burials characterized by lesene fronts are retrieved on the highest peak of the mountain. It has been surmised the presence of holed stones with the function of solar calendars which may actually have a "natural" origin given the outcrop of sedimentary rocks (Base Limestone) (Grasso et Al. 1997) that feature particular "natural" erosive ridges engendered by the action of weather elements;
- Santa Maria di Licodia (Catania): the Pietra Pirciata (holed stone) is a characteristic sedimentary rock belonging to the Flysch Numidico (Monaco et Al. 2012); it features, in the upper part, a clear entrance of a rock-cut tomb which, according to legend, was created by the Cyclopes Carlapone. A wide hole in opposition to the main opening is interpreted to work as a 'solar calendar'. Both holes appear to have an anthropic origin since similar geomorphologic evidence was not detected in the surrounding rocky outcrops.
These 4 cases display a study method applicable to any site potentially featured by an archaeoastronomical significance which can help to highlight any possible anthropic activity in the realization of the aforementioned sites.

References

Beneo E. et Al. 1955. Carta geologica d'Italia alla scala 1:100.000 Foglio 272 Gela. Litografia Artistica Cartografica, Firenze.
Grasso M. et Al. 1997. Carta geologica della struttura a pieghe di Licata - scala 1:50.000. Università di Catania, SELCA Firenze.
Maurici F. et Al. 2019. Civiltà del sole in Sicilia. Palermo: Kalos.
Monaco G. et Al. 2012. Carta geologica d'Italia alla scala 1:50.000 Foglio 624 Monte Etna e relative Note Illustrative. Università di Catania, S.EL.CA Firenze.
Tinterri R. et Al. 2012. Foredeep turbidites of the Miocene Marnoso-arenacea Formation (Northern Apennines). Periodico semestrale del Servizio Geologico d'Italia - ISPRA e della Società Geologica Italiana Geol.F.Trips, Vol.4 No.2.1.

The Universe in the Russian Icon: Cosmology of Raymond Lull in the Icon of the Mother of God "Joy of All Who Sorrow"

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keywords: astronomical models, geocentrism, Russian icon, Ramon Lull

Abstract
This presentation will investigate the astronomical connections found in Russian icons, focusing specifically on the portrayal of the Mother of God known as "Joy of All Who Sorrow".
During the latter part of the 17th century, icons depicting the Mother of God as the "Joy of All Who Sorrow" began to appear in Russian iconography, drawing influence from Western European iconographic traditions. This image has been depicted in various forms due to its diverse pictorial sources. The icon derives its name from a passage in the stichera that describes the Intercessor as bringing joy to those who mourn and suffer. One notable version of this icon is preserved in the State Historical Museum in Moscow, offering a particularly detailed and nuanced interpretation of the iconography with rich semantic content.
The icon's composition reflects prevalent 17th-century Russian intellectual beliefs regarding the Universe's structure. Divided into three sections, the icon portrays Earth, Heaven, and the "Kingdom of God" - Paradise. The upper segment symbolizes "The Kingdom of God," featuring central figures such as the Savior, the Blessed Virgin Mary, and celestial beings encircled by a mandorla, with groups of individuals seeking divine assistance on either side. The middle section presents a unique depiction of the sky separating the "Kingdom of Heaven" from the earthly realm below, showcasing celestial phenomena like the Sun, Moon, stars, and zodiac signs moving across eleven concentric celestial spheres above the Earth. Additionally, seven planetary bodies are shown beside each celestial sphere, with angels descending towards Earth through this celestial archway. Although the religious and edifying meaning of the icon is clear, a third theme – the world order – finds powerful resonance in the icon. The artist sought to depict the intricate structure of the firmament based on a developed astronomical system. What kind of system is this?
The research investigates potential astronomical influences on the portrayal of the central celestial aspect of the icon. The methodology employed in this study involves a comparative examination and analysis of cosmological models prevalent in Russia during the relevant historical period. These models are evident in texts such as "Christian Topography" by Cosmas Indicopleustes (15th century), "Lucidarium" by Honorius of Autun (16th century), and "Great and Wonderful Science" by Raymond Lull, which was translated into Russian in the 17th century and gained popularity among educated Russians. Each source will be scrutinized to identify the astronomical model based on criteria such as the structure, quantity, and arrangement of celestial spheres, the sequence and nomenclature of planets, and the zodiac signs delineated in these writings. The objective of the study is to demonstrate that Lull's astronomical framework was intricately mirrored in the cosmic configuration of the icon, serving as a blueprint for the artist in illustrating the cosmic order.

References

Svjatskij D.O., Astronomija Drevnej Rusi (Astronomy in Ancient Rus'), Moscow: Russkaja panorama, 2007.
Mil'kov V.V., Polyansky S.M., Kosmologicheskie proizvedenija v knizhnosti Drevnej Rusi (Cosmological works in the book literature of Ancient Rus'), 2 Vol., S-Pb:Mir, 2008-2009.
Rajkov B. E., Ocherki po istorii geliocentricheskogo mirovozzrenija v Rossii. Iz proshlogo russkogo estestvoznanija (Essays on the history of the heliocentric worldview in Russia. From the past of Russian natural science) M.—L.:1937.
Retkovskaya L.S., Vselennaya v iskusstve Drevney Rusi, Pamyatnini kul'tury (The Universe in the Art of Ancient Rus', Cultural Monuments), Volume 32, Moscow: GIM, 1960.

Count Ermanno Stradelli, the "legend" of Jurupari and the constellations of the Amazonian peoples

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keywords: Jurupari, Ermanno Stradelli, Amazonian constellations, Pleiades, Ethnoastronomy, Legends.

Abstract
The Italian-Brazilian Count Ermano Stradelli (1852-1926) spent a significant part of his life in the Amazon jungle, between Brazil and its geographic limits with Venezuela and Colombia, developing ethnographic work of significant importance for the areas of Anthropology, Linguistics, and Cultural Astronomy. Some indigenous groups from the North and Northwest of the Amazon narrate versions of a cosmological myth, about a character known as Jurupari.
The Franciscan religious in this region between the end of the 19th century and the beginning of the 20th century associated the figure of Jurupary with evil, and the devil himself. When publishing, in 1890, the Leggenda dell'Jurupary, in the Bollettino della Societá Geografica Italiana, Stradelli presents a detailed narrative of an origin myth and a ceremonial complex of punishment with the death of women who enter the universe of male knowledge.
The main characters in this narrative help us interpret part of the worldview, ritual cycles, and astronomical calendar of the indigenous peoples of the North and Northwest Amazon. Thus, in addition to Jurupari associated with the Sun, the Pleiades cluster, and the planet Venus, we can describe Pinon, a snake generally related to the Scorpion constellation (Scorpius), an otter in the vicinity of the western constellation Orion, and the Manatee associated with the constellation of Southern Cross (Crux). The "legend" of Jurupari appeared in different versions, in the voices of explorers and missionaries who were contemporary to Stradelli, but his impeccable work in collecting data and information was essential for understanding the extent and depth of this myth.

References

BROTHERSTON, Gordon; SÁ, Lúcia. 2004. Peixes, constelações e jurupari: a pequena enciclopédia amazônica de stradelli. Rev. do Museu de Arqueologia e Etnologia. São Paulo: 14: 345-358.

CARVALHO, Sílvia Maria S. 1979. Jurupari: estudos de mitologia brasileira. São Paulo: Ática.

CASCUDO, Luis da Câmara. 1967. Em Memória de Stradelli. 2a. edição atualizada. Manaus: Edições do Governo do Estado do Amazonas.

RAPONI, Lívia (org). 2016. A única vida possível – itinerários de Ermanno Stradelli na Amazônia. São Paulo: UNESP.

STRADELLI, Ermanno. 2009. Lendas e notas de viagem - A Amazônia de Ermanno Stradelli. Trad. Notas. Aurora Fornoni Bernardini. São Paulo: Martins Fontes.

STRADELLI, Ermanno. 1964. La Leggenda del Jurupary e outras lendas amazônicas. Caderno 4. São Paulo: Instituto cultural ítalo-brasileiro.

Schickard's original multiplication cylinders identified in Uppsala

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keywords: old calculators, Napier's bones, Schickard's calculator

Abstract
In August 2004 the Director of the Astronomical Observatory in Uppsala asked me to write a report about the old calculators, clocks and telescopes at the Observatory. The only expected problem was described as "Calculator from the 16th or 17th century". I realized that it was not a complete calculator, only a part on top of a box with a mechanism that could rotate the cylinders. It seemed reasonable to believe that the cylinders was placed in a box with vertical and horizontal slits that allowed only one number to be visible on each cylinder.
With this idea in mind I ask for "ancient calculators" on Internet. One alternative was "Napier's bones" that agreed perfectly with the arrangement of the numbers on our cylinders (Napier 1617). The section "Kepler's lost calculator" showed a sketch depicted in a letter from Wilhelm Schickard to Kepler (Hansch 1718).
This sketch corresponded well to my expected image of our calculator and I told the Director about the possibility that we may have parts of "Kepler's lost calculator". He moved immediately the enigmatic object to the safe box. However, in 2024 I realized that we have Schickard's six original multiplication cylinders and an unidentified seventh cylinder. The axis of five of the cylinders is very worn. These five cylinders have numbers similar to Schickard's numbers in his illustrations in Kepler's *Harmonice Mundi*, Linz 1619.

References

Napier J., 1617. Rabdologiæ. Edinburgh, Scotland. 1617.
Hansch, G. 1718. Joannis Kepleri aliorumque epistolae mutuae. 1718.
Henriksson G., 2004. Astronomin som exakt vetenskap, den matematiska astronomins utveckling till och med Johannes Kepler. Uppsala oktober, 2004.

Towards an Evolutionary Semiotic Approach to the Sky: From Ecosemiotics to the Semiotics of Culture

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keywords: ecosemiotics, landscape semiotics, skyscape.

Abstract
In a paper read at the SEAC 29 Meeting at Timisoara, I explored the concept of the sky as a semiotic phenomenon, but I needed more space to complete the discussion. While in the previous paper, I discussed celestial semiotics with the help of phenomenology, ecosemiotics, Peircean semiotics, and Gibson's theory of affordances; in this paper, I chose to discuss the topic from the position of cultural semiotics. In such a tradition, the sky is conceived as being analogous to a text with its language. Therefore, in contrast to the previous one, this type of research examines the ways in which specific cultural meanings are invested into astronomical events and phenomena. Since cultural meanings are culture-dependent, and there may be no readable relationship to an object or concept for an external observer, and their association must be learned, the dyadic relationship between the signifier and signified may offer important insights into the nature of celestial signs.
My proposal entails a two-stage operation. When studying hunter and gathering groups, we can semiotically analyze their celestial environment, commencing the process with ecosemiotics. This allows us to infer how these human groups 'read' and interpret their skies. However, when dealing with more intricate groups such as sedentary bands, chiefdoms, or early states, researchers must also incorporate the Saussurean dyadic structure of semiotic inference. These socially more complex groups inhabited transformed or built landscapes saturated with culture-specific meanings, necessitating a more nuanced approach.

References

Chang, Briankle G.. 1987 World and/or Sign: Toward a Semiotic Phenomenology of the Modern Life-World. Human Studies, 10(3-4): 311-331.
Eco, Umberto. 1976. A Theory of Semiotics. Bloomington and London: Indiana University Press.
Gibson, James J. 2015. The ecological approach to visual perception. Classic Edition. New York and London: Psychology Press.
Rochberg Francesca 2004. The Heavenly Writing: Divination Horoscopy and Astronomy in Mesopotamian Culture Cambridge: Cambridge University Press.

An Update on Problems in Ancient Near Eastern Solar Astronomy and Mythology

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keywords: Ancient Mesopotamia and Anatolia, II-I millennia BC, pre-scientific solar astronomy, cult centers, solar worship.

Abstract
The present discussion tackles several main issues in the pre-scientific conception of the Sun, which are well attested in the records from ancient Mesopotamia and then followed by those from ancient Anatolia. This especially entails issues of if and how various mythological conceptions are related to pre-scientific forms of solar astronomy or to the observable astronomical events. Crucial topics of investigation are as follows: where does the Sun go at night? What are the main theoretical models that ancient Near Eastern mythology uses in descriptions of the sky (heaven)? What is known today about the ancient clusters of individual stars and constellations associated with the zodiac? In this context, different theoretical models, which can be traced back to the pioneers of ancient Near Eastern astronomy, will be presented and re-evaluated, with the aim of moving forward on these issues.
The second part of the discussion will be devoted to solar worship on Earth. In particular, comprehensive studies on the location and use of the former cult centres dedicated to the ancient Near Eastern solar deities have been neglected by research. The latter may be due to the changing history and subsequent destruction of these buildings. Nevertheless, individual buildings are known from ancient records and present-day excavations. The joint study of the ancient Near Eastern understanding of the Sun and of major cult centers of solar deities will contribute to filling the gap between modern science and ancient practices that include pre-scientific astronomy and solar worship.

References

Heimpel, Wolfgang: The Sun at Night and the Doors of Heaven in Babylonian Texts. Journal of Cuneiform Studies 38/2, 1986, pp. 127–151.
Horowitz, Wayne: Mesopotamian Cosmic Geography (2011; 2nd edition). Winona Lake, Indiana: Eisenbrauns.
Huot, Jean-Louis: L'Ebabbar de Larsa aux IIe et Ier millénaires (Fouilles de 1974 à 1985). Bibliothèque archéologique et historique BAH vol. 205. Beirut : Presses de l'Ifpo (2014).
Koch, Johannes: Neue Untersuchungen zur Topographie des babylonischen Fixsternhimmels. Wiesbaden: Harrassowitz (1989).
Paule, forthcoming: Paule, Anna: Man, Myth, Cosmos. The Sun and Solar Eclipses in Ancient Mesopotamia (Second and First Millennia BC). In Wolfschmidt, Gudrun (ed.), Der Mensch im Kosmos: Lebenswelten und Kosmologien. Man within the Cosmos: Lifeworlds and Cosmologies. Proceedings der Jahrestagung der Gesellschaft für Archäoastronomie, Weimar 2023. Nuncius Hamburgensis 53. Hamburg: tredition (forthcoming).
Vallet, Regis, Abd-El-Ali, Jamal, Al-Debs, Rateb, Bachelot, Luc, Charpin, Dominique, et al.: Preliminary Reports on the XIVth and XVth Campaigns at Larsa. Sumer –Journal of Archaeology of Mesopotamia 66, 2020, pp. 135–175.
Van der Waerden, Bartel L.: History of the Zodiac. Archiv für Orientforschung 16, 1952–53, pp. 216–230.
Woods, Christopher E.: The Sun-God Tablet of Nabû-Apla-Iddina Revisited. Journal of Cuneiform Studies 56, 2004, pp. 23–103.

Differences and similarities between star and sky related mythology motifs

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ABSTRACT
Skylores are an essential component in cultural astronomy. Understanding the culture and creation stories enriches the scope and relevance of Archaeoastronomical studies (Gullberg, 2020; Hamacher, 2023). Cultural knowledge is often only partially available or may sometimes have disappeared entirely. Comparative studies help complete the recorded information in a tradition by analyzing different recurrent myths in a particular region.
The database by Berezkin (2015) is probably the largest database of myth and folktale motifs and contains the absence/presence of over 2200 motifs in almost a thousand different traditions. The database has specificities that make it ideal for areal studies. The motifs cover the whole world, contrary to other databases covering mainly Europe and Eurasia. At the SEAC 2023 conference, we have shown, using state-of-the-art classification tools, that sky-related motifs form clusters very well correlated to the clusters obtained on the complete database.
This presentation will introduce new results showing the similarities and differences between sky-related and star-related motifs in mythology and folklore. Sky-related motifs include motifs broadly connected to the sky, such as thunder, lightning, sun, and moon, and motifs like the one of a ladder leading to the sky. The star-related motifs relate to constellations, particular stars, the Milky Way, or Venus as the 'morning or evening star.' Our study suggests that the distribution of sky-related and star-related motifs is different, and we would like to propose some possible explanations based on analyzing their geographic distribution using classical approaches and data analytics. Using various examples, we will discuss the main hypotheses on why some Starlore motifs are so widespread worldwide and identify factors that stabilize or destabilize motifs geographically and over time.

References

Berezkin, Yuri E. "Folklore and mythology catalogue: its lay-out and potential for research." The Retrospective Methods Network S10 (2015): 58-70.

Gullberg, Steven. Astronomy of the Inca Empire, Springer (2020).

Hamacher, Duane. The First Astronomers: How Indigenous Elders read the stars, Allen and Unwin (2023).

Thuillard, Marc, Jean-Loïc Le Quellec, Julien d'Huy, and Yuri Berezkin. "A large-scale study of world myths." Trames: A Journal of the Humanities and Social Sciences 22, no. 4 (2018): A1-A44.

Thuillard, Marc, "A large-scale study of skylore and sky-related cosmological myths in the world." Proc. SEAC2023, Warsaw.

Astronomical terminology at the beginning of the 17th century

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keywords: history of astronomy, natural language processing, topic modeling, terminology

ABSTRACT
In 1543, Nicolaus Copernicus published his magnum opus, ***De revolutionibus orbium coelestium*** (translated as "On the Revolutions of the Heavenly Spheres"). This pivotal publication represented a notable change in the comprehension of the universe and not only transformed the landscape of astronomical inquiry, which had previously been intertwined with astrology, religion, mythology, medicine, and other disciplines, but also necessitated a complete overhaul of astronomical terminology. Following this significant publication, renowned astronomers such as Galileo Galilei, Tycho Brahe, Johannes Kepler, and Maria Kunitz shared the outcomes of their individual research efforts (Taton and Wilson 1989), frequently writing in Latin.
Previously, Inga Elmqvist Söderlund has had a look into frontispieces and illustrated title pages in 17th century books on astronomy (Elmqvist Söderlung 2010). I have decided to analyse astronomical ***termini technici*** in a selection of the works mentioned above using topic modeling for a quick overview of the diverse subjects in the large book corpora. This analysis involved utilizing several Python packages (TextBlob, SpaCy, NLTK) for natural language processing (NLP), including frequency and sentiment analysis, as well as word clouds, to detect shifts in astronomical terminology. A similiar survey for English books using Google Books n-gram Viewer has recently been conducted by Roberto de Andrade Martins (Martins 2021).
I will present some examples of astronomical terminology and the change over time. While I would have liked the analysis to be more conclusive, it yielded the result that my text selection was not broad enough and that I need to extend the time period and incorporate more texts.

References

Martins, R. de A. (2021) „The transformation of astronomical culture in the seventeenth century", in Studies in History and Philosophy of Science II. Extrema, Brazil: Quamcumque Editum, S. 175–204.

Elmqvist Söderlund, I. (2010) Taking possession of astronomy: Frontispieces and illustrated title pages in 17th-century books on astronomy. (unpublished thesis)

Taton, R. and Wilson, C. (1989) Planetary astronomy from the Renaissance to the rise of astrophysics. A, Tycho Brahe to Newton, Cambridge: Cambridge Univ. Press.

BOOK OF ABSTRACT

SESSION VI (S6)

POSTER

On A new hypothesis on the etymology of the name Antares

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keywords: Scorpio, Orion, etymology, phonetic transformations, mythology

Abstract
The weak motivation, weak at least from a logical point of view, always considered at the origin of the etymology of the word Antares, may suggest that the name dedicated to the alpha star of the Scorpio constellation derives rather from something else. Usually it is presumed that the reason for the existence of that name lies in the fact that the name seems to have been obtained from the simple combination of the preposition anti-, indicating something that opposes someone/something (or similar to someone/something), and Ares: Greek name both for the bloodthirsty deity - to clarify, the Mars of the Romans - and for the red planet connected to it. This misleading assonance, in our opinion, between the name Antares and those two parts presumed to compose it, has prompted me to seek an alternative motivation for its origin, which I believe should be sought not only in the physical opposition (they really are on opposite sides of the sky) and narrative between Scorpio and Orion as told by myth, but also from the similarity between that red star and the other, Betelgeuse, of the same color, present in the constellation of Orion. In this case, the name Antares could be the result of the combination of that same preposition anti- and the name of the "great hunter"; a combination that could then have undergone the various phonetic changes highlighted by this study over time. This hypothesis, if valid, would this time be based not only on astronomical reasons, but also on other factors borrowed from different fields such as mythology, linguistics, anthropology, history and, in my opinion, much more solid than those proposed instead by tradition and always supremely assumed to be valid.

References

Allen, R.H., Star Names: Their Lore and Meaning, Dover Publications, (1963).
Arato di Soli, Fenomeni e Pronostici, a cura di G. Zannoni, Sansoni, 1948.
Cattabiani, Alfredo, Planetario, Mondadori, 2007.
Lankford, John (a cura di-), History of Astronomy: An Encyclopaedia, Garland Encyclopedias in the History of Science, 1996.
Heiberg, J.L., Syntaxis Mathematica, Teubneri, Lipsia, 1903.
Høg, Erik, Astrometric accouracy during the past 2000 years, Contribution to the history of astrometry No. 7, 2017.
Igino, Mitologia Astrale, Biblioteca Adelphi 539, 2009.
Liddell-Scott on-line Greek's English Lexicon, http://stephanus.tlg.uci.edu/lsj/#eid=1
Pannekoek, Anton, A history of Astronomy, Dover1961.
Ridpath, Ian, Mitologia delle Costellazioni, Franco Muzzio Editore, 2012.
Tolomeo, Claudio, a cura di S.Feraboli, Le previsioni astrologiche (Tetrabiblos), - Fondazione Lorenzo Valla / Arnoldo Mondadori Editore, 2010.
Toomer, G.J. (a cura di-), Ptolemy's Almagest, Duckworth, 1984.

The Pietre dell'Incavallicata Megaliths (Calabria, Italy): A Solstitial Marker?

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keywords: Monoliths, Skyscape, Solstice, Elephant, Prehistory, South of Italy

Abstract
The megaliths of Pietre dell'Incavallicata, located at 730 m a.s.l. in the Sila Grande mountains (Campania, CS, Calabria) are made of two sandstone monoliths about 5 meters high, standing out from the natural bedrock and carved by both natural and, probably, human action. The first monolith resembles an elephant, just like the fossilised exemplar of Elephas Antiquus found in the lake Cecita nearby. The second monolith, much more eroded, was assimilated to the legs of a colossus. Well known by the locals and brought to public attention about 20 years ago by Domenico Canino (2007), their purpose remains unknown. After an intuition by Nilo Domanico, this study proposes to investigate their topographical arrangement in relation to the sun's turning points on the local horizon. This can be precisely done since, on a hill half-kilometre away, a third hollow monolith is located, marking the solstitial direction with great accuracy. A first test was made on winter solstice looking from the back of "the elephant" and "the colossus' legs" towards the hill of "the hollow monolith" in the direction of the sun rising. A second test will be performed on the summer solstice: from that same hill, the sun may be seen setting in the middle of the two main monoliths. Historical sources recount the presence of an arch on the site, so that it is possible the two monoliths were joined on the top, and the sun might have been framed within it on its northern setting position. Combining these skyscape observations with topographical UAV surveying, geological analysis, archaeological comparisons, and historical records, it may be possible to give a new interpretation of the site. Yet, some problems arose from the lack of any archaeological excavations which prevents any chronological assessments and "the hollow monolith's" fall on the ground. Nevertheless, there are hints to suggest that the site of Pietre dell'Incavallicata is a site of skyscape interest and a prehistoric solstitial marker.

References

Canino, Domenico. 2007. Le Pietre Dell'Incavallicata. Cosenza: Falco Editore.

Guerricchio, Alessandro, Valeria Biamonte, Marco Guerricchio, Roberto Mastromattei, and Maurizio Ponte. 2008. "L'Elephas e Il 'Condottiero' Di Campana (Sila Greca - Calabria)." Bollettino Della Società Geografica Italiana, Serie XIII 1: 163–68.

Maurici, Ferdinando, Vito Francesco Polcaro, and Alberto Scuderi. 2019. Civiltà del Sole in Sicilia: Indicatori Solstiziali ed Equinoziali di Presumibile Epoca Preistorica. Palermo: Edizioni Kalós.

On the orientation of the sacred buildings on the hill of the Valley of the temples in Agrigento. New considerations and a dating proposal.

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Abstract

This contribution summarizes the studies previously conducted on the orientation of the temples of the ancient Greek colony of Akragas, whose dating is between the end of the 6th and the second half of the 5th century BC. Considering that the 'topographic' or 'stellar' motivations reached by scholars who have previously addressed the question is not exhaustive. Observing the topographic conditions on which the sacred buildings were placed, was the starting point for our research: those who were involved in the design of the temples of Akragas could have easily overcome the minimal orographic difficulties that encountered since we are talking about just a few centimeters to achieve a precise East West direction. The orientation, therefore, while taking into account the city layout, must have been dictated by an 'other' reason that we sought in the astronomical dynamics linked to the fundamental moments in the life of a Greek man starting from the assumption that his every action it was linked to Sky, to the seat of the divinities and the construction site of each construction was certainly linked to rites in which the astronomical element had fundamental value.
Our proposal for Akragas consists of specific dates of the solar calendar (vernal equinox) also consistent with the lunar calendar (the first new moon immediately following the spring equinox). From our calculations, dates emerged which agree well with the archaeological dating and emerged very specific 'years' in which we believe the construction of the sacred building could have begun. Interweaving of archaeological data with astronomical data can act as a stimulus and open new horizons of understanding with respect to the knowledge of ancient man and, in this case, push for a rereading of the entire civic, public and sacred construction site of ancient city of Akragas.

References

AVENI, A.F. and ROMANO G. 2000: Temple Orientations in Magna Graecia and Sicily. *Journal for the History of Astronomy*, 31, 1–57.

BOUTSIKAS, E. 2007: The Orientations of Greek Temples: A statistical Analysis. In Pásztor E. (ed), Archaeoastronomy. *Archaeology and Ethnography: papers from the Annual Meeting of SEAC*, 19-23.

BOUTSIKAS, E. 2009: Placing Greek Temples: An Archaeoastronomical Study of the orientation of Ancient Greek Religious Structures. *Archaeoastronomy: the journal of Astronomy in Culture*, 21, 4-19.

BRIENZA, E., CALIÒ, L.M., FURCAS, G.L. and GIANNELLA, F. 2016: Per una nuova definizione della griglia urbana della antica Akragas contributo preliminare ad una nuova immagine della città. *Archeologia Classica,* 67, 57-110.

DINSMOOR, W. B. 1939: Archaeology and Astronomy. *Proceedings of the American Philosophical Society*, 80 (1), 95-173.

HANNAH, R. 2005: Greek and Roman Calendars. Constructions of time in the classical world. London.

HANNAH, R., MAGLI, G. and ORLANDO, A. 2017: Astronomy, topography and landscape at Akragas' Valley of the Temples. *Journal of Cultural Heritage* 18, 1–9.

HANNAH, R., MAGLI, G. and ORLANDO, A. 2018: The role of urban topography in the orientation of greek temples: tha cases of Akragas and Selinunte. *Mediterranean Archaeology and Archaeometry*, 16 (4), 213-217.

The so-called ‘eyes’ of Milazzo Castle (Northern Sicily): an Astronomical approach

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keywords: Middle Ages, Sicily, summer solstice, Milazzo, castle

ABSTRACT
The Milazzo Castle (national monument), with a surface area of over 7 hectares, of which 12,070 square meters are covered by buildings, stands out over the Milazzo landscape at the top of the ancient "Borgo" representing one of the largest fortified complexes in Europe. The reasons for its location are based on the extraordinary strategic value of the Milazzo peninsula that extends towards the Aeolian Islands, guarding a natural harbour that has always been one of the most important ports in Sicily.
The castle on the north-west side is protected by the natural overhang, while towards the south-east, the slope towards the city and the port is defended by the progressive alternation of the walls. The mass of the castle, cleverly placed at the top of the promontory, also dominates the isthmus.
The iconographic scheme of the complex is articulated and is formed by: Norman keep with a square plan; block of the domus with a rectangular plan; rectangular 'Swabian' wall enclosing the two buildings just mentioned, with protruding towers with a square plan and with internally juxtaposed factories that have elongated rectangular or trapezoidal plans; polygonal 'Aragonese' wall with semi-cylindrical bastions enclosing the Norman and Swabian complex; further sixteenth-century wall with triangular bastions towards the south-east.
From a spur on the medieval walls that overlook the promontory towards “Tono’s Beach”, stands out a quirky drawing made with igneous black stonework whose origins have been object of motley speculations. The hypothesis that we want to follow and develop is strictly related to the archaeoastronomical meaning of the exact index of summer solstice, which is an expression of Norman and Swabian mystical and esoteric traditions. The eyes were laid on the spur at the end of the Norman-Swabian walls, and in origin featured bulging pupils without paws, which were added at the end of the XIX century. The paws were included around 1870, since Perdichizzi (1692) only refers to eyes.

References

AGNELLO G., Il Castello svevo di Milazzo, in “Rivista dell’Istituto di Archeologia e Storia dell’Arte”, Roma 1955, vol. XIII.
CAVALLI M., Plutarco Iside e Osiride, Piccola Biblioteca Adelphi, 179, 1985, 10ª ediz., pp. 229.
CHILLEMI F., Milazzo, Guida alla città perduta, Libreria Ciofalo Editrice - Messina 2011.
FIORILLA S., Manufatti da una discarica del Castello di Milazzo. Archivio Storico Messinese 91/92, Società Messinese di Storia Patria, 2010-2011, pp. 75-136.
ORLANDO A., TUSA S., GORI D. 2018, The prehistoric villages of the Eolian archipelago and Milazzo: astronomy and landscape, in Mediterranean Archaeology and Archaeometry 18 (4), pp. 219-226.
PERDICHIZZI F., Melazzo Sagro. Chiese e Storia 1692.
POLTO C., Milazzo: la forma e l’immagine. Secc.XVI-XIX. HUMANITIES - Anno VI, Numero 12, Dicembre 2017 , pp. 47-71.

Byurakan Astrophysical Observatory as a Cultural Astronomy Centre

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Byurakan Astrophysical Observatory (Armenia)

keywords: IAU Outstanding Astronomical Heritage, UNESCO Heritage, Interdisciplinary Sciences, Scientific (Astro) Tourism, Cultural Astronomy, Scientific Journalism.

Abstract
The Byurakan Astrophysical Observatory (BAO, founded in 1946) is an astronomical cultural heritage (included in the IAU Outstanding Astronomical Heritage (OAH) in 2021) and serving as Armenian National Value since 2013. Since 2015, BAO serves as one of the IAU's Regional Offices of Astronomy for Development (ROAD), for the South West and Central Asian (SWCA) Region. It has a unique national-style architectural ensemble, a nice garden recognized as arboretum and its photographic plate archive is also an astronomical heritage. Moreover, the famous Markarian Spectroscopic Sky Survey 1874 spectroscopic plates having 40 million low-dispersion spectra have been included in UNESCO "Memory of the World" documentary heritage international register in 2011.
BAO and Armenia in general are very active in organization of meetings and schools for young scientists related to astronomical heritage and astronomy in culture: Conference "Astronomical Heritage in the National Culture" in 2012, Symposium "Relation of Astronomy to other Sciences, Culture and Society" (RASCS) in 2014, Young Scientists Conference "Cultural Astronomy in the Armenian Highland" in 2016, UNESCO Regional Conference "Astronomical Heritage of the Middle East" in 2017, International Conference "Astronomy in the Crossroads of Inter- and Multi- Disciplinary Sciences" in 2021, Armenian Astronomical Society 25th anniversary meeting RASCS-2 in 2024, summer schools and Byurakan Science Camps related lectures, etc. BAO's territory and garden have been recognized as arboretum, BAO has Viktor Ambartsumian's house-museum and UNESCO heritage centre. At last but not least, BAO is a Scientific (Astro) Tourism centre recognized by the IAU and Armenian Institute of Tourism; a number of related projects have been accomplished. BAO is the initiator of the Scientific Journalism in Armenia as well. We will give a review on BAO's cultural activities and show how an astronomical/astrophysical observatory can also serve as a cultural centre.

References

Farmanyan, S. V.; Harutyunyan, V. L.; Mikayelyan, G. A.; Mickaelian, A. M. 2019, Byurakan Astrophysical Observatory as a Tourism Center, ASP Conf. Series, Vol. 520, pp. 259-264
Farmanyan, S. V.; Mickaelian, A. M.; McKim Malville, J.; Bagheri, M. 2019, Astronomical Heritage of the Middle East, ASP Conf. Series, Vol. 520, 308 p.
Mickaelian, A. M. 2023; Byurakan Astrophysical Observatory (BAO): current activities and statuses, Communications of the Byurakan Astrophysical Observatory (ComBAO), Vol. 70, No. 1, pp. 9-17
Mickaelian, A. M.; Farmanyan, S. V. 2019, Armenian Archaeoastronomy and Astronomy in Culture, ASP Conf. Series, Vol. 520, pp. 3-13
Mickaelian, A. M.; Farmanyan, S. V. 2021, Astronomy in the crossroads of interdisciplinary and multidisciplinary sciences, Trends in Tech. & Sci. Res. (TTSR), Vol. 5, No. 1, pp. 1-8
Mickaelian, A. M.; Gigoyan, K. S.; Mikayelyan, G. A.; Paronyan, G. M.; Gyulzadyan, M. V.; Kostandyan, G. R. 2020, BAO plate archive project: digitization, electronic database and scientific usage, ComBAO, Vol. 67, No. 2, pp. 293-301
Mickaelian, A. M.; Sargsyan, L. A.; Mikayelyan, G. A.; Gigoyan, K. S.; Nesci, R.; Rossi, C. 2021, The Digitized First Byurakan Survey (DFBS) as UNESCO Documentary Heritage, ComBAO, Vol. 68, No. 2, pp. 390-399.

On the orientations of some 'rocky altars' of the Val Demone (North-East Sicily)

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keywords: Val Demone; Sicilia; rock-cut altars; protohistory, horizons

Abstract
In Val Demone, one of the three ancient valleys into which Sicily was divided in medieval times, there are some so-called 'altars' carved into the rock, monuments that have sparked the imagination of local and non-local scholars (Pantano 1994; Todaro 1992). In particular, there are numerous speculations on the 'gnomonic' value of these places, sites for which, among other things, there is little certain information (and in some cases none) on the construction chronology and their real history. Rocky palmenti are also often mistakenly considered 'altars', but palmenti are monuments generally made up of 2 basins which have been used since ancient times to produce wine (e.g. Olcese et Al. 2020).
This contribution will deal with 3 rocky 'altars' that are in the following sites (all located in the province of Messina): the Vignarazza district in San Cono (Tripi), the Rustica district (Roccella Valdemone) (Orlando et al. 2016) and the Argimusco district (Montalbano Elicona) (Orlando 2017).
For each of the altars considered, it will essentially provide the planimetric reliefs and the reliefs of the horizons visible from these sites, showing how in some cases mountains/saddles/hills can be used to create useful calendar references.
This research activity, which began several years ago, it is part of a broader project aimed at studying the orientations of pre-protohistoric rock-cut tombs and sites in Sicily, places often reused in subsequent periods. (e.g. Orlando 2020).

References

Olcese G., Razza A. and D.M. Surace 2020. Vigne, palmenti e produzione vitivinicola, in La Rivista di Engramma 141-143 (anno 2017), pp. 311-319.

Orlando A. 2020b. Le tombe rupestri della Valle dell'Alcantara: censimento, architettura, paesaggio ed orientamenti, in Sofia G. e S. Raffiotta (a cura di), Apertas Indique Portas Urbs Habet. Terme Vigliatore: Casta Editore, pp. 98-127.

Orlando A. 2017a. Argimusco: cartography, archaeology and astronomy, in Orlando A. (a cura di), The Light, the Stones and the Sacred, Astrophysics and Space Science Proceedings 48, Springer, pp. 123-155.

Orlando A., Magro M.T. and M.S. Scaravilli 2016. The oriented altars of Rocca Pizzicata and the rocky sites of Alcantara Valley, in Mediterranean Archaeology and Archaeometry 16 (4), pp. 203-206.

Pantano G.M. 1994. Megaliti di Sicilia. Edizioni Fotocolor, Patti (ME).

Todaro G. 1992. Alla ricerca di Abaceno. Armando Siciliano Editore, Messina.

An Early Bronze Age open-air sanctuary at Troy with depiction of Orion constellation

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keywords: Troy; Turkey; skyscape; Early Bronze Age; sanctuary

Abstract
Troy, in northeastern Turkey, is a UNESCO World Heritage Site, with universal value to humankind. One of its values is as a site where archaeological methods advanced from the 1870s to today (Blegen et al 1951; Pernicka et al 2014; Pernicka et al. 2016).
Carl Blegen's excavations at Troy during the 1930s were considered exemplary for the period, and therefore his documentation of an intriguing area named "The Ledge" are reliable; the Ledge is securely dated from its material culture to part of the long period called "Troy II" which represents the middle to late Early Bronze Age (EBA) in the context of prehistoric Western Anatolia. The Ledge measured approximately 6 meters in width and was at least 16 meters of length; the overhang of approximately 1.10 meters appeared to be a combination of a natural limestone feature with manmade cuttings to enlarge and regularize the space (M Rawson, unpublished 1932 excavation notebook) and so the feature could be considered either a rock shelter (abri or riparo), or the memory and recreation of such, from an earlier tradition.
During the 90 years since the discovery of The Ledge at Troy we have gained a new and better understanding of the signals for open air ritual activity (Richards & Thomas 1984; Holloway et AL 1990; Bachhuber 2011). Blegen documented that for a period of several centuries, observants gathered at the Ledge for ritual feasting, carefully depositing the ceramic vessels and other objects there as part of their ritual actions.
Our renewed look at some of the objects deposited at the Ledge show that it was not just a place of local ritual observation, but that possibly people coming from places as far away as inland Anatolia and even Sicily may have known of the Ledge. Troy's location at a land/maritime crossroads may have made it a place where passage thanksgiving was offered to the deities of the Ledge.
We also asked the question: if the Ledge was such an important ritual place, what might its orientation and material culture tell us about the deities honored there? The short axis orientation of the rocky shelter site, on the west side of the hill of Troy, was to the north of northwest, with the long axis connecting the line from the summer solstice rise to the winter solstice set (Blegen et al. 1951, vol 1, part 2, figs 291 & 416).
Unfortunately more precise measurements cannot be made, because as the Blegen excavations removed the deposit in 1933, the fragile rock overhang collapsed onto the floor, and the site was never cleared or restored (D Rawson, unpublished 1933 excavation notebook). Nonetheless, we can suppose that the solstice solar/horizon phenomena might play a role (e.g. Cavulli et al in press). But the astronomical picture is even more interesting. At least two of the graffiti covered sherds that Blegen uncovered there show a figure that could be a representation of the Orion constellation (Blegen et al 1951, vol 1, part 2, fig. 371), one of them shown with much intriguing detail. This leads to an analysis of the time of year and day when observants would watch Orion setting over the Aegean, and what significance this could relay.

References

Bachhuber 2011 = Bachhuber, Christoph. "Negotiating Metal and the Metal Form in the Royal Tombs of Alacahöyük in North-Central Anatolia." In Interweaving worlds : systemic interactions in Eurasia, 7th to 1st millennia BC, edited by Toby C. Wilkinson, Susan Sherratt and John Bennet, 158-174. Oakville, CT : Oxbow Books.
Blegen et al 1951 = Blegen, Carl W., and J.L. Caskey, M. Rawson, J. Sperling. Troy. The First and Second Settlements. Princeton: Princeton University Press.
Cavulli et al in press= Cavulli, F., Lo Vetro D., Orlando A., Gullì D. and S. Luglio. Ricerche multidisciplinari ai Ripari di San Giovanni (Sambuca di Sicilia, AG). Oxford: Archaeopress.
D Rawson = Dorothy Rawson. Unpublished 1933 excavation notebook. University of Cincinnati Department of Classics Archives. Open access https://drc.libraries.uc.edu/communities/36381741-ab90-47cf-93b0-a42c845cd222
Holloway et al1990 = Holloway R.R., Joukowsky M., Lukesh S. 1990. La Muculufa, The Early Bronze Age Sanctuary: The Early Bronze Age Village. Louvain and Providence : Revue des Archeologues et Historiens d'Art de Louvain, XXIII.
M Rawson = Marion Rawson. Unpublished 1932 excavation notebook. University of Cincinnati Department of Classics Archives. Open access https://drc.libraries.uc.edu/communities/36381741-ab90-47cf-93b0-a42c845cd222
Pernicka et al 2014 = Pernicka, Ernst, and Charles Brian Rose, Peter Jablonka, eds. Troia 1987–2012: Grabungen und Forschungen I. Forschungsgeschichte, Methoden und Landschaft. Teil I. (Studia Troica Monographien 5). Bonn: Dr. Rudolf Habelt GMBH Verlag.
Pernicka et al 2016 = Pernicka, Ernst, and Sinan Ünlüsöy, Stephan W. E. Blum, eds. Early Bronze Age Troy. Chronology, Cultural Developments and Interregional Contacts. (Studia Troica Monographien 8). Proceedings of an International Conference held at the University of Tübingen May 8–10, 2009. Bonn: Dr. Rudolf Habelt GMBH Verlag.
Richards & Thomas 1984 = Richards, C. and J. Thomas. "Ritual activity and structured deposition in Later Neolithic Wessex." In R. Bradley and J. Gardiner, eds., Neolithic Studies: A Review of Some Current Research. British Archaeological Reports British Series 133, 189-218.

Determination of spatial and astronomical vectors in the cromlech near the village of Dolni Glavanak, Madjarovo Municipality, Bulgaria by 3D modeling

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keywords: megalithic monument, cromlech, 3D modeling, drone technology, image processing

Abstract
The cromlech near the village of Dolni Glavanak is an ancient megalithic structure from the Early Iron Age (VIII-VII centuries BC). It is built of 15 vertically placed large, roughly shaped blocks of hard volcanic rock (rhyodacite) with a height of 1.50 - 1.70 m and medium dimensions at the base - 0.80 x 0.50 m. The average width of each of them is about 1 m, at a thickness of 0.5 m. They are approximately 90 cm apart. The rock blocks form an irregular circle with a diameter of about 10 m. Between the vertical blocks, smaller blocks are placed horizontally (with a height of not more than 20-30 cm), all of which are situated directly on the rock base, without making special holes-bases for them (Mikov, 2002). An excellent panorama of the local horizon, which is with a zero height for observing sunrises and sunsets of bright celestial objects is evident from the center of the cromlech.
The archaeological research of the cromlech has established a cultural layer with a high concentration of archaeological materials (ceramics, animal bones, fragments of plaster, flint concretions) from the second phase of the Early Iron Age (Nehrizov, 2004, 2015).
The report presents visualization of the cromlech and analyses the three-dimensional spatial data obtained from photographs of the cromlech with a drone, which allows the extraction of archaeoastronomical data and their interpretation with greater accuracy. The monument shows oriented structural details to certain positions of the Sun during its sunrise, culmination and sunset at the points of summer and winter solstice, as well as spring and autumn equinoxes.

References

Mikov, R. Emergency archaeological surveys in connection with restoration and strengthening activities on the archaeological cultural monument "Thracian megalithic structure - cromlech" in the land of the village of Dolni Glavanak, Madzharovo municipality, Haskovo region. AOR in 2001. Sofia, 2002, pp. 73-74.

Nehrizov, G., Thracian cult megalithic monument (cromlech) near the village of Dolni Glavanak. – Bulletin of the Historical Museum in Haskovo, vol. 2, 2004, pp. 123-140.

Nehrizov, G., Dolmens and Rock-cut monuments. In: A Companion to Ancient Thrace. J. Valeva, E. Nankov, D. Graninger (Editors), Wiley-Blackwell, 2015, 126–143.

New evidence relating to the naming of the planet Uranus

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keywords: Uranus, Urania, poems, coins, naming proposal, Jesuits, Vienna

ABSTRACT
When then planet Uranus was discovered in 1781, several European astronomers proposed a potential name for it. One of these astronomers was Jesuit Maximilian Hell (1720-1792), the first director of the University Observatory in Vienna (Austria). To promote his naming suggestion Urania, Hell composed the Latin poem Lis Astronomorum de Nomine ("The quarrel of the astronomers about the name"), which he published in the Ephemerides astronomicae ad meridianum Vindobonemsem ("Ephemerides for the Meridian of Vienna") (Fig. 1). Hell had two accomplices: one of them, fellow Jesuit György Alajos Szerdahelyi (1740-1808) from Budapest also had a poetic vein and composed a Latin poem telling the Historia Uraniae Musae, the fictional "History of the Muse Urania". The second, hitherto seemingly anonymous accomplice had coins minted from platinum, which carried the name and symbol of Urania and sent them to Hell for use in his PR campaign. However, Maximilian Hell died before finding out who had the coins minted for him and long before the planet had an official name.
In this paper, I discuss a German version of that poem (Fig. 2), which is held in the Nachlass of Maximilian Hell in Vienna and can be attributed to Hell himself. I also present newly found letters, which prove that Jan Ingen-Housz (1730-1799), the discoverer of photosynthesis and then personal physician to Empress Maria Theresa, is the origin of the coins and that Maximilian Hell was unaware of this.
The study concluded that Hell's naming proposal Urania was discussed among a small circle of friends in Vienna and Budapest in the 1780s and that Maximilian Hell was enthusiastic enough about his Urania that he incited two of his closer friends to help propagate the name.

References

Aspaas, Per Pippin and Kontler, László (2019). "Coping with Enlightenments", in: Maximilian Hell (1720–92) and the Ends of Jesuit Science in Enlightenment Europe. Brill. pp. 344-387. doi:10.1163/9789004416833_010.

Pärr, Nora (2013). Maximilian Hell und sein wissenschaftliches Umfeld im Wien des 18. Jahrhunderts. Bautz.

Vickers, Doris (2022). "Uranus: Hell's naming suggestion", in: Hoffmann, Susanne M. and Wolfschmidt, Gudrun (eds), Astronomy in Culture - Cultures of Astronomy (Featuring the Proceedings of the Splinter Meeting at the Annual Conference of the Astronomische Gesellschaft, Sept. 14-16, 2021). Hamburg: tredition, pp. 428–446.

The jewellery of Nordic Bronze Age women as a sign of astronomical knowledge

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ABSTRACT
Some pieces of jewelry are generally accepted to be more than just decoration. They are signs of social, political or religious status and only few selected persons are allowed to wear them. The neck collars and belt plates of Nordic Bronze Age women certainly belong to the most striking archaeological objects of that time and region. In previous work I have shown , that trigonometric measurement of the patterns on this pieces reveal astronomical knowledge on a highly developed level that has not been expected in this culture. In this presentation I would like to explore the reasons that led to my study and discuss the consequences of the outcome of it on the evaluation of the position of the women bearing this jewellery in Nordic Bronze Age society, as well as on the judgment of astronomical symbols in Nordic Bronze Age culture.

References

Aner, Ekkehard & Karl Kersten: Die Funde der älteren Bronzezeit des nordischen Kreises in Dänemark, Schleswig-Holstein und Niedersachsen. Neumünster: Karl Wachholtz Verlag, Band 1 (1973), Band 2 (1976), Band 3 (1977), Band 4 (1978), Band 5 (1979), Band 6 (1981), Band 7 (1984), … Band 21 (2017).

Bergerbrant, S.: Bronze Age Identity: Costume, Conflict and Contact in Northern Europe 1600-1300 BC. Stockholm: Studies in Archaeology No. 43. Lindome: Bricoleur Press 2007.

Reiter, S. & Karin M. Frei: Examining alternative constructures of power and mobility in the Early Nordic Bronze Age: A case study of a local elite female from Denmark. Les nouvelles de l'archéologie, 163; 2021, 24-32.

Santillana, Giorgio de & Hertha von Dechend: Hamlet's Mill: An Essay on Myth and the Frame of Time. Cambridge, Mass.: Harvard University Press 1969.

Wokke, Astrid: Astronomie der nordischen Bronzezeit: Schmuck der Frauen - Gürtelscheiben und Halskragen astronomisch/geometrisch untersucht. In: Wolfschmidt, Gudrun (H.): Orientierung, Navigation und Zeitbestimmung. Wie der Himmel den Lebensraum des Menschen prägt. Hamburg: tredition (Nuncius Hamburgensis; Band 42) 2019 S. 34-45.

Wokke, Astrid: Stereografische Projektion in der nordischen Bronzezeit? Gürtelscheiben und Halsketten: Himmelsscheiben und Ekliptik? In: Wolfschmidt, Gudrun (Hg.): Maß und Mythos, Zahl und Zauber. Vermessung von Himmel und Erde. Hamburg: tredition (Nuncius Hamburgensis; Band 48) 2020, S. 228-243.

Plato and the precession of the equinoxes

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keywords: History of astronomy, cultural astronomy, Plato's cosmology

Abstract
The discovery of the precession of the equinoxes is attributed to Hipparchus (II sec. B.C.). Whose thesis was confirmed by Ptolemy (II sec.) who estimated a deviation of 2°40' in 265 years, therefore 1° every 100 years and a precessional cycle that was completed in 36,000 (100 x 360°) years. A thesis that remained in vogue throughout the Middle Ages but "curiously" the precessional cycle was called Great Year or Platonic Year (Sacrobosco 1230~).
The idea that Plato (427-347 B.C.) may have referred to the precession of the equinoxes was proposed by James Adam, in his edition of the Republic (1902), established in 36,000 years the famous passage in the Republic (546) referred to the 'perfect number', just as, in the passage of the Timaeus (39), 'the perfect number of time fulfils the perfect year'. Adam connects the perfect number and the perfect year with the cosmic shifts mentioned in Politicus (268-274). Adam seeks confirmation of this in the fact that we find the period of 36,000 years sometimes actually called the 'great Platonic year' in early astronomical treatises, and infers that Ptolemy or some of his predecessors had understood the Platonic Number, and that we can perhaps trace the knowledge of the Number as far back as Hipparchus. Adam finds it difficult to believe that Hipparchus was uninfluenced by Plato's Number (Adam1902: 302-305).
Adam's proposal was crushed by the prestigious astronomy historian Thomas Heath (1913). In more recent times it was revived by Giorgio de Santillana and Herta von Dechend (1969), but curiously the two historians of science made no reference to Adam's proposal, limiting themselves to pointing out that in Plato's dialogues there are passages that seem to refer to astronomical phenomena related to the precession of the equinoxes.
I came to the conclusion that the 36,000-year Perfect Year corresponded to the precessional cycle independently of Adam. Reading La metafisica della storia in Platone by Konrad Gaiser (1991), I understood that the periods (3,000, 9,000 and 36,000 years) that recur in Plato's tales, were in perfect harmony with the precessional cycle and with the epochal overturns between the seasonal and sidereal time to which Plato refers (Zedda 2023). Imagining an interpretative scenario in which the 3,000 years correspond to the time it would take the **γ** and **ω** points to cross a zodiacal sign with the precession estimated at 36,000 years and the 9,000 years required to cross three, determining a situation in which the zodiac signs in conjunction with the equinoxes went to mark the solstices and vice versa.

References

Adam J. (1902): The Republic of Plato, II, Oxford.
De Santillana G., Von Dechend H. (1969): Hamlet's Mill, An essay on myth and the frame of time, Boston.
Gaiser K. (1991): La metafisica della storia in Platone, Milano.
Heath T. (1913): Aristarchus of Samos: the ancient Copernicus, Oxford.
Plato (IV sec. B.C.): Timaeus, Republic, Politicus.
Sacrobosco (1230~): De sphaera.