

**IAU Division C Inter-Commission C1-C3-C4
ARCHAEOASTRONOMY & ASTRONOMY IN CULTURE (WGAAC)**

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TRIENNIAL REPORT 2018–2021

The WGAAC presently has 89 members – 58 Working Group Members and 31 Working Group Associates. Astronomy in Culture is interdisciplinary, and the Associates make valuable contributions from backgrounds in fields other than astronomy.

Working Group Members:

Alan Alves-Brito (Brazil), Elio Antonello (Italy), Megan Argo (UK), G.S.D. Babu (India), Ennio Badolati (Italy), Juan Belmonte (Spain), Kai Cai (USA), John Carlson (USA), Brenda Corbin (USA), Milan Dimitrijevic (Rep. Serbia), Steve Durst (USA), Marta Folgueira (Spain), Jesús Galindo-Trejo (Mexico), Alejandro Gangui (Argentina), Beatriz García (Argentina), Rita Gautschy (Switzerland), César González-García (Spain), Steven Gullberg (USA), Duane Hamacher (Australia), Abraham Hayli (France), Dieter B. Herrmann (Germany), Bambang Hidayat (Indonesia), Thomas Hockey (USA), Susanne Hoffmann (Germany), Jarita Holbrook (South Africa), Andrew Hopkins (Australia), Matthaios Katsanikas (Greece), Edwin C. Krupp (USA), Ioannis Liritzis (Greece), Alejandro López (Argentina), Claudio Mallamaci (Argentina), J. McKim Malville (USA), Javier Mejuto (Honduras), Areg Mickaelian (Armenia), Eugene Milone (Canada), Simon Mitton (UK), Andrew Munro (USA), Raymond Norris (Australia), Wayne Orchiston (Australia), Robert Preston (USA), Michael Rappenglück (Germany), Rosa Ros (Spain), Clive Ruggles (UK), Irakli Simonia (Rep. Georgia), Magda Stavinschi (Romania), Christiaan Sterken (Belgium), Linda Strubbe (USA), Woodruff Sullivan (USA), Virginia Trimble (USA), Ana Ulla (Spain), Johnson Urama (Nigeria), David Valls-Gabaud (France), Iryna Vavilova (Ukraine), Tiziana Venturi (Italy), Murli Verma (India), Gudrun Wolf-schmidt (Germany), Georg Zotti (Austria).

Working Group Associates:

Bryan Bates (USA), Patricio Bustamante (Chile), Nicholas Champion (UK), Brian Davis (USA), Margaret Davis (USA), Sona Farmanyan (Armenia), Roslyn Frank (USA), Robert Fuller (Australia), Cecilia Gomez (Argentina), Akira Goto (Japan), Liz Henty (UK), Stanisław Iwaniszewski (Mexico), Olaf Kretzer (Germany), Trevor Leaman (Australia), Flavia Pedroza Lima (Brazil), Monica Martinez-Borravo (Mexico), Steve Miller (UK), Armando Mudrik (Argentina), Gregory Munson (USA), Cristina Negru (Romania), David Pankenier (USA), Fabio Silva (UK), Emilia Pasztor (Hungary), Manuel Pérez-Gutiérrez (Spain), Eduardo Rodas (Honduras), William Romain (USA), John Saul (France), Ivan

Šprajc (Rep. Slovenia), Doris Vickers (Austria), Alexander Wolf (Russian Fed.), Mariusz Ziółkowski (Poland).

1. Objectives:

The Working Group for *Archaeoastronomy and Astronomy in Culture* (WGAAC) is in part a discussion and collaboration group for IAU members regarding *Astronomy in Culture*, and as well for certain others with interests in these areas. A primary motivation is to facilitate interactions between researchers, but the WG also has significant interest in promoting education regarding cultural astronomy in all respects. The WGAAC is the focal point within the IAU for both vigorous research in the field of *Astronomy in Culture* and in public education for how astronomy has been used in many societies.

This field is also serviced by non-IAU organizations such as *International Society for Archaeoastronomy and Astronomy in Culture* (ISAAC), *Société Européenne pour l'Astronomie dans la Culture* (SEAC – *European Society for Astronomy in Culture*), *Sociedad Interamericana de Astronomía Cultural* (SIAC – *Inter-American Society of Astronomy in Culture*), and *Society for Cultural Astronomy in the American Southwest* (SCAAS). However, it is the IAU WGAAC that focuses on cultural astronomy within mainstream astronomy with its mission to:

- Advance the field of archaeoastronomy/cultural astronomy
- Promote research and publication
- Promote strong initiatives for educators on different levels for multiple aspects of cultural astronomy to include the exploration of literature, poetry, music, films, etc.
- Promote public outreach to educate regarding astronomy in culture
- Use the fascination with astronomy in culture to inspire youth interest in pursuing any aspect of astronomy in their futures
- Increase the understanding of how astronomy was used in cultures within developing nations where such has not yet been fully explored
- Facilitate interactions with other members and groups within the IAU
- Facilitate interactions between researchers in the field
- Encourage engagement in this research by additional IAU members
- Promote collaboration between the IAU, ISAAC, SEAC, SIAC, and SCAAS for the advancement of archaeoastronomy and astronomy in culture
- Promote the inclusion of archaeoastronomical research in other fields, such as Archaeology, Anthropology, Indigenous Studies, and Native American Studies.

As well as facilitating internal interactions between the WGAAC and other IAU bodies, we strive as well to enhance strong links between the WGAAC and ISAAC, SEAC, SIAC, and SCAAS. The WGAAC serves as a focal point for collaborative world-wide efforts in Astronomy in Culture.

2. Triennium Work (2018–2021):

During the 2018–2021 triennium the WGAAC organized five committees for members to further its initiatives:

Committee 1 – development of a comprehensive eBook regarding a survey of *Astronomy in Culture*. This will be similar in concept to the IAU's *Big Ideas in Astronomy* and is to be posted/published on the IAU website and made readily available to the public. We anticipate this book will be ready for electronic publication by the end of 2021. The WGAAC plans for other books to follow.

Committee 2 – development of initiatives for public outreach regarding *Astronomy in Culture*. We have begun this work and will add affiliation with Commission C2 to further the effort.

Committee 3 – development of initiatives for educators and others regarding examples of cultural astronomy found in literature, poetry, music, films, etc. As part of our affiliation with Commission C1 we are developing a compilation of such cultural information regarding this aspect of astronomy and are working toward additional educational initiatives as well.

Committee 4 – development of initiatives to gather knowledge regarding *Astronomy in Culture* in developing nations, especially where such has not yet been fully explored. Much has been learned about archaeoastronomy in many parts of the world, but there still are geographical gaps in the collective knowledge of the field. Commission C4 is a key affiliation here and we are in the process of compiling what is known.

Committee 5 – development of initiatives for the advancement and promotion of strong cultural astronomy research, publication, and collaboration among scholars throughout the world. This also is meant to attract those in other fields (such as archaeology, anthropology, and Native American studies) who explore ancient cultures and inspire them to include astronomy in their research and assessments. This committee has made good progress and continues its efforts.

Archaeoastronomy, a major part of cultural astronomy, very much relates to Commission C3 and C3 influences much of the above activity. The work of these committees is ongoing, and this will make important contributions to the growing field of *Astronomy in Culture*. The IAU through its WGAAC will continue to exert great influence on the further evolution of the field.

Significantly, we have now formed a 6th committee. In November 2020 the WGAAC was tasked with leading a joint collaborative initiative with the Royal Astronomical Society of the United Kingdom, and this was joined by the American Astronomical Society. The initiative addresses cultural sensitivities at world astronomical sites. Goals of the effort include developing a program to better educate astronomers as to Indigenous concerns, developing materials that will provide insightful information to the public, and developing information that can be used proactively when future observatory sites are considered. Work is well underway, and the team plans to offer workshops in 2021 and 2022 at major astronomical events of the IAU, the RAS, and the AAS. This will be an ongoing project and presentations are anticipated at other astronomy events as well. IAU members presently serving on the joint committee are: Steven Gullberg (Chair, USA), Megan Argo (UK), Rick Fienberg (USA), Duane Hamacher (Australia), Jarita Holbrook (South Africa), Alejandro López (Argentina), Javier Mejuto (Honduras), Wayne Orcheston (Australia), Rosa Ros (Spain), Oana Sandu (Germany), and Gudrun Wolfschmidt (Germany). WGAAC Working Group Associate Steve Miller (UK) serves on the committee as well.

The WGAAC encourages research and publication regarding *Astronomy in Culture*. WG members have prolifically published during the 2018–2021 triennium – a still growing list includes over 240 books and papers. Here are representative examples from 43 of our members:

Belmonte J. A. 2019, Gheorgiu, D.; Nash, G.; Bender, H.; **Pasztor, E.**, Essay review on Land of the Shamans: archaeology, cosmology and landscapes. *Journal for the History of Astronomy* 50, 482–483.

Campion, N. 2020, *The Archaeology of Cultural Astronomy: Material Culture, Astronomy and Power*. Oxford: British Archaeology Reports.

Dimitrijević, M. S. 2019, Milutin Milanković and the reform of Julian Calendar on Ecumenical Congress in Constantinople in 1923, International Conference The Life and Work of Milutin Milanković: Past, Present, Future, 19–21 July 2019, Belgrade, Proceedings, ed by Slavko Maksimović, Faculty of Architecture, 87–92.

Draxler, S., Lippitsch, M. E. & **G. Wolfschmidt** (eds.) 2020, *Harmony and Symmetry. Celestial regularities shaping human culture*. Proceedings of the SEAC Conference 2018 in Graz. Hamburg: tredition (SEAC Publications; Vol. 01).

Frank, R. M. 2018, Collective social memory as manifest in skyscape narratives. *Journal of Skyscape Archaeology* 4(1): 124–128.

Gautschy, R. 2020, The Karnak Clepsydra: Votive Gift or Utilitarian Object?, 171–183, in: K. Gabler, R. Gautschy, H. Jenni, C. Reymond & L. Bohnenkämper, “*Text-Bild-Objekte im archäologischen Kontext. Festschrift für Susanne Bickel.*” Hamburg: Widmaier Verlag (Lingua Aegyptia – Studia Monographica).

González García A. C. & Belmonte, J. A. 2019, Lunar Standstills or Lunastices, Reality or Myth? *Journal of Skyscape Archaeology* 5(2), 177–190.

Goto, A. (2018), House and burial orientations of the Hokkaido Ainu, indigenous hunter-gatherers of northern Japan. *Mediterranean Archaeology and Archaeometry* 18(4), 173–180.

Gullberg, S. R. (2020), *Astronomy of the Inca Empire: Use and Significance of the Sun and the Night Sky*. Springer Nature.

Gullberg, S. R., Hamacher, D., López, A. M., Mejuto, J., Munro, A. & W. Orchiston (2020), A cultural comparison of dark ‘constellations’ of the Milky Way. *Journal of Astronomical History and Heritage*, 23(2), 390–404.

Henty, L. 2020, Skyscape archaeology: the place of the sky in the academy. Chapter 1 in Liz Henty & Daniel Brown (eds), *Visualising Skyscapes: Material forms of cultural engagement with the heavens*. Oxford: Routledge.

Herrmann, D. B. (2019), *Atlas astronomischer Traumorte: Entdeckungsreisen auf den Spuren der Sternkunde*. Stuttgart, Germany: Franckh-Kosmos.

Hockey, T. 2020, Archaeoastronomy Sites of the USA: Likelihood of Preservation. *Bulletin of the American Astronomical Society*, LII.

Hoffmann, S. M. & N. Vogt 2020, Cataclysmic variables as possible counterparts of ancient Far Eastern guest stars. *MNRAS*, 494, 5775–5786.

Holbrook, J. C. 2019, The Square Kilometre Array Art Exhibition, in: Daniel Brown & Liz Henty (eds.), *Visualizing Skyscapes*. London, Routledge.

Liritzis, I., Laskaris, N., Vafiadou A., Karapanagiotis I., Volonakis, P., Papageorgopoulou, C. & M. Bratitsi (2020), Archaeometry: an overview. *Scientific Culture*, 6(1), 49–98. doi: 10.5281/zenodo.3625220.

Krupp, E. C. 2019, The Moon and Planets in Indigenous California. Oxford Research Encyclopedia of Planetary Science. Oxford University Press.

Leaman, T. M. & D. W. Hamacher 2019, Baiami and the emu chase: an astronomical interpretation of a Wiradjuri Dreaming associated with the Burbung (Baiami-bu dhinawan yanhamanha: Gibbirgirbaang winhanga-durin-ya Wiradjuri Yarrudhumarra-bu Burbung). *Journal of Astronomical History and Heritage*, 22(2), 225–237.

López, A. M. 2020, Cultural astronomy perspectives on ‘development’. In: Astronomy in Focus – XXX, Proceedings IAU Symposium No. XXX, 2018, ed by M. T. Lago, *Focus Meeting 15: Astronomy for Development*, IAU, XXX General Assembly, 580–581.

Mejuto, J. & E. Rodas-Quito 2019, *Etnoastronomía en Honduras: Retos y desafíos in Libro de resúmenes del I Congreso de Investigación en Ciencias Espaciales*, pág. 29, UNAH, Tegucigalpa.

Mudrik, A. 2020, *Luna e identidad entre migrantes europeos y sus descendientes en el sur de la región chaqueña argentina*. Avá, 35.

Mickaelian, A. M. & S, V. Farmanyan 2019, *Armenian Archaeoastronomy and Astronomy in Culture*, ASP CS 520, 3.

Munro, A. M. 2019, *The Archeological Pertinence of Archaeoastronomy: Lessons-learned from Collaboration*, Paper presented at the joint 2019 European Association of Archaeologists (EAA) and European Society for Astronomy in Culture (SEAC) conference in Bern, Switzerland.

Munson, G. E., Williamson, R. A. & B. C. Bates (eds) 2020, *Before Borders: Revealing the Greater Southwest's Ancestral Cultural Landscape. Occasional Papers on Cultural Astronomy No. 1*, SCAAS Multimedia Publications, Dolores, CO.

Orchiston, W. & M. Vahia (eds.) 2021, *Exploring the History of Southeast Asian Astronomy: A Review of Current Projects and Future Prospects and Possibilities*. Cham (Switzerland): Springer International Publishers.

Pankenier, D. 2019, Parallel Planetary Astrologies in Medieval China and Inner Asia. *International Journal of Divination and Prognostication*, 1(2).

Pasztor, E. 2020, Visualisation of the sky in traditional cultures of Eurasia and its ancient representations. In: Henty L. & D. Brown (eds), *Visualising Skyscapes. Material Forms of Cultural Engagement with the Heavens*. Routledge, Oxon.

Pérez-Fernández, E., Martínez García, B., Braña-Rey, F. & **A. Ulla-Miguel** 2020, *O ceo na pedra. Un proxecto de innovación educativa para o Ensino Secundario, no eido da astronomía cultural*. III Xornadas de Educación Patrimonial de Galicia.

Rappenglück, M. A. 2020, Capturing Heaven and Earth by Counting, Measuring and Constructing: The Prehistory of Mathematics, Metrology and Astronomy in the Paleolithic. In *Maß und Mythos, Zahl und Zauber – Die Vermessung von Himmel und Erde*. Tagung der Gesellschaft für Archäoastronomie in Dortmund 2018, edited by **Gudrun Wolfschmidt**, 88–126, Hamburg: tredition (Nuncius Hamburgensis; Vol. 48).

Rodríguez Díaz, A., **Pérez Gutiérrez, M.** & D. M. Duque Espino 2019, “estrechando el círculo” de la fornacis de ptolomeo: el oppidum de hornachuelos (ribera del fresno, badajoz) / “narrowing the circle down” of Ptolemy’s fornacis: the oppidum of hornachuelos (ribera del fresno, badajoz) conimbriga, lviii.

Romain, W. 2020, Subduing the Demons of Tibet: Geomantic Magic During the Yarlung Dynasty: A Landscape Archaeology Assessment. *Time and Mind: The Journal of Archaeology, Consciousness and Culture*.

Saul, J. M. 2020, Comment la mythologie permet de dater la préhistoire, *Bulletin trimestriel du Group Ile-de-France de Mythologie Française*, Lettre 114 (June) pp. 9–15.

Savchuk, V. S., Kushlakova, N. M., **Vavilova, I. B.** & N. Kibalchich 2019, In the history of world rocket-space technics: discussion questions of domestic and world historiography. *Space Science & Technology*, 25(6), 70–83.

Silva, F. 2020, A probabilistic framework and significance test for the analysis of structural orientations in skyscape archaeology, *Journal of Archaeological Science*, 118, 105–138.

Simonia, I. 2019, Ancient Astronomical Knowledge: The Unity of Diversity. Astronomical Heritage of the Middle East. ASP Conference Series, Vol. 520, Proceedings of a conference held (13–17 November 2017) the Armenian National Academy of Sciences in Yerevan, Armenia. Edited by **Sona V. Farmanyan, Areg M. Mickaelian, J. McKim Malville** & Mohammad Bagheri. San Francisco: Astronomical Society of the Pacific, p. 59–70.

Šprajc, I. 2019, Lunar orientations in the Maya architecture. In: Milan Kováč, Harri

Kettunen & Guido Krempel (eds), *Maya cosmology: Terrestrial and celestial landscapes*, *Acta Mesoamericana* 29, 27–44. Munich: A. Saurwein.

Sterken, C., Hearnshaw, J. & **D. Valls-Gabaud** 2019, *Under One Sky: the IAU Centenary Symposium, IAU Symposium 349*. Cambridge: Cambridge University Press.

Wolfschmidt, G. (ed.) 2020, *Maß und Mythos, Zahl und Zauber: Die Vermessung von Himmel und Erde. Measure and Myth, Number and Magic: Measuring Heaven and Earth*. Proceedings der Tagung der Gesellschaft für Archäoastronomie in Dortmund 2018. Hamburg: tredition (Nuncius Hamburgensis; Vol. 48).

Wolfschmidt, G. (ed.) 2020, *Himmelswelten und Kosmvisionen – Imaginationen, Modelle, Weltanschauungen. Sky Worlds and Cosmovisions – Imaginations, Models, Worldviews*. Proceedings der Tagung der Gesellschaft für Archäoastronomie in Gilching 2019. Hamburg: tredition (Nuncius Hamburgensis; Vol. 51).

Ziólkowski, M. 2020, The Moon and Planets among the Inca and in the Andes. In *The Oxford Research Encyclopedia of Planetary Science*. Oxford University Press.

Zotti, G. & S.M. Muzaffari 2020, New Light on the Main Instrument of the Samarqand Observatory, *Journal for the History of Astronomy*, 51(3), 255–271.

During this triennium several WG members worked to advance cultural astronomy education through degree programs and courses that they created at their universities.

3. In Memorium:

We will deeply miss our friend and colleague, William Liller (Chile), who recently passed in 2021.

4. Closing Remarks:

The WGAAC and its members had a very productive triennium as work continued during the present pandemic. The joint initiative between the IAU, RAS, and AAS is exciting and the committee looks forward to seeing its efforts improve mutual understanding. The WG's other committees continue fascinating work as well. The WG's first eBook to be published later this year will be a banner achievement and a major contribution. The WG will actively explore all aspects of *Astronomy in Culture* and will promote educational public outreach initiatives. A primary goal is to help educators to learn aspects of cultural astronomy and then use this to inspire students at all levels to pursue endeavors in science. The field of *Astronomy in Culture* has reached a stage of increased momentum in its evolution and advancement. The IAU and its WGAAC will continue to play a central role in guiding the further development of and education for this field that is integral to the history of astronomy.

Steven Gullberg

Chair of C1-C3-C4 WG Archaeoastronomy and Astronomy in Culture (WGAAC)

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