

IAU Division C Inter-Commission C1-C2-C3-C4

Working Group for Astronomy in Culture (WGAC)

Triennial Report: 2021 to 2024

Steven Gullberg (Chair, USA)

Javier Mejuto (Co-chair, Honduras)

Organizing Committee

Beatriz Garcia (Argentina), Steven Gullberg (USA), Duane Hamacher (Australia), Jarita Holbrook (UK), Alejandro Martin Lopez (Argentina), Javier Mejuto (Honduras), Rosa M. Ros (Spain)

Membership

The WGAC continues to grow and presently has 118 members - 69 Working Group Members and 49 Working Group Associates. Cultural Astronomy is interdisciplinary and our Associates, frequently with backgrounds in fields such as anthropology and archaeology, make many valuable contributions.

Working Group Members

Danielle Adams (jm; USA), Alan Alves-Brito (Brazil), Elio Antonello (Italy), Megan Argo (UK), G.S.D. Babu (India), Ennio Badolati (Italy), Juan Antonio Belmonte (Spain), Kelly Blumenthal (jm; USA), Kai Cai (USA), John Carlson (USA), Brenda Corbin (USA), Hannah Dalglish (jm; UK), Milan Dimitrijevic (Rep. Serbia), Steve Durst (USA), Marta Folgueira (Spain), Jesus Galindo-Trejo (Mexico), Giangiacomo Gandolfi (Italy), Alejandro Gangui (Argentina), Beatriz García (Argentina), Rita Gautschy (Switzerland), César González-García (Spain), Steven Gullberg (USA), Duane Hamacher (Australia), Saeko Hayashi (Japan), Abraham Hayli (France), Bambang Hidayat (Indonesia), Thomas Hockey (USA), Susanne Hoffmann (Germany), Jarita Holbrook (UK), Andrew Hopkins (Australia), Gordon Houston (USA), Matthaios Katsanikas (Greece), E. C. Krupp (USA), Mary Beth Laychak (USA), Annette Lee (jm; USA), Ioannis Liritzis (Greece), Alejandro Lopez (Argentina), Claudio Mallamaci (Argentina), J. McKim Malville (USA), Sac Medina (jm; Germany), Javier Mejuto (Honduras), Areg Mickaelian (Armenia), Steve Miller (UK), 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), Sara Schechner (USA), B. S. Shylaja, (India), Irakli Simonia (Rep. Georgia), Timothy Spuck (jm; USA), 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 Wolfschmidt (Germany), Georg Zotti (Austria).

(jm – junior member)

Working Group Associates

José Balbi (Argentina), Priscila Faulhaber (Brazil), Bryan Bates (USA), David Begay (USA), Herman Bender (USA), Suresh Bhattarai (Nepal), Patricio Bustamante (Chile), Nicholas Champion (UK), Walmir Cardoso (Brazil), Barthelemy d'Ans (Peru), Brian Davis (USA), Margaret Davis (USA), Marcelo do Amaral Ferriera (Brazil), Dimitri Douchin (Australia), Eisvandi Parham (Rep. Iran), Sona Farmanyan (Armenia), Roslyn Frank (USA), Robert Fuller (Australia), Cecilia Gomez (Argentina), Akira Goto (Japan), Stanislaw Iwaniszewski (Mexico), Muhammed Khan (Pakistan), Hossein Khezri (Rep. Iran), Olaf Kretzer (Germany), Olanrewaju Lasisi (Nigeria), Trevor Leaman (Australia), Flavia Pedroza Lima (Brazil), Monica Martinez-Borravo (Mexico), Nancy Maryboy (USA), Armando Mudrik (Argentina), Gregory Munson (USA), Cristina Negru (Romania), Daniel Palumbo (USA), David Pankenier (USA), Maryam Papari (Rep. Iran), Fabio Silva (UK), Emilia Pasztor (Hungary), Manuel Pérez-Gutiérrez (Spain), Maaike Pierik (Netherlands), James Ricker (USA), Eduardo Rodas (Honduras), Mahdi Rokni (Rep. Iran), William Romain (USA), John Saul (France), Ivan Šprajc (Rep. Slovenia), Ann Thresher (Australia), Doris Vickers (Austria), Alexander Wolf (Russian Fed.), Mariusz Ziółkowski (Poland).

Objectives

The IAU *Working Group for Astronomy in Culture* (WGAC) is a leading organization for the advancement of all aspects of the growing field of Cultural Astronomy. Cultural Astronomy deals with the astronomy of past cultures, contemporary Indigenous cultures, and other aspects of contemporary Cultural Astronomy as well. The WG is in part a discussion and collaboration group for researchers and others who explore Cultural Astronomy; IAU members with such interests gather here. A fundamental goal is to facilitate interactions between researchers, but the WG also has significant interest in promoting the use of Cultural Astronomy in education. It is the focal point within the IAU for Cultural Astronomy and how it relates to other branches of astronomy, for research in the field, and for educating the public regarding examples of how astronomy is being and has been used in culture throughout world history. The WGAC works to further the following objectives:

- Advance the field of Cultural Astronomy
- Promote research and publication
- Advance awareness of Indigenous concerns at sites where observatory facilities have been built upon culturally sacred grounds; assist future site selections with such insight

- Promote strong initiatives and give support for educators on different levels regarding their use of multiple aspects of cultural astronomy in the classroom
- Pursue exploration of astronomy in contemporary literature, poetry, music, films, etc.
- Promote public outreach to educate regarding Cultural Astronomy
- Use the fascination with astronomy in culture to inspire youth interest in pursuing any aspect of astronomy or other STEM in their futures
- Increase the understanding of how astronomy was used in cultures within developing nations, especially where such has not yet been fully explored
- Facilitate interactions between researchers in the field
- Promote the inclusion of Cultural Astronomy in research in other fields such as archaeology, anthropology, Indigenous studies, and Native American studies

Activity in the 2021 – 2024 Triennium

The WGAC is affiliated with all four of the Division C commissions: C1 Astronomy Education and Development, C2 Communicating Astronomy with the Public, C3 History of Astronomy, and C4 World Heritage and Astronomy. Our collaborations with each greatly enhance what the WG is able to contribute. We also enjoy collaboration with other WGs in the Division.

Members contribute toward eight principal activity areas of the WGAC: Culturally Sensitive Sites, Education, Public Outreach, Contemporary Cultural Astronomy, Developing Nations and Indigenous Astronomy, Interdisciplinary Collaboration, and Conference Presentations. The many members of the WGAC also actively perform rigorous research and publication of Cultural Astronomy.

Voluminous examples of our work this triennium appear in our annual reports for 2021 and 2022. The following selected examples represent work reported to us for 2023 and there was even more accomplished by additional WGAC members. What follows will help to illustrate the scope of all that we do and how much the field continues to grow:

Culturally Sensitive Sites

The Culturally Sensitive Sites committee is a joint initiative led by the IAU WGAC that includes the Royal Astronomical Society and the American Astronomical Society. The joint committee has over 20 members located around the world and meets via Zoom. Our primary mandate is to provide astronomers with insight as to Indigenous concerns regarding observatories that have been or are to be built upon culturally sacred lands. We also endeavor to provide outreach to the public and to establish best practices to be considered for responsible siting when new observatory/facility projects are proposed.

WGAC members who also serve on the CSS Committee are **Steven Gullberg, Javier Mejuto, Alejandro Lopez, Danielle Adams, Megan Argo, Hannah Dagleish, Duane Hamacher, Saeko Hayashi, Jarita Holbrook, Annette Lee, Steve Miller, Daniel Palumbo, Rosa Ros, Ann Thresher, Steven Tingay, and Gudrun Wolfschmidt.**

Ann Thresher and **Daniel Palumbo** are the principals involved with the Next Generation Event Horizon Telescope (ngEHT) Responsible Siting team and their organization is making impressive progress. The Southern Wide-field Gamma Ray Observatory (SWGRO) team is also progressing well.

In 2023 we expanded our presence and message with additional presentations about cultural sensitivities and responsible siting at the American Astronomical Society AAS 242, Santa Fe, New Mexico, USA, at the 15th Biennial History of Astronomy Workshop, University of Notre Dame, South Bend, Indiana, USA, at the Society for the Social Studies of Science, Honolulu, Hawaii, USA, and at the International Astronomical Union Symposium 386, Addis Ababa, Ethiopia.

We wrote an article about our Culturally Sensitive Sites activities that was published in the April 2023 issue of the RAS's *Astronomy & Geophysics*. It looks great and publications like this do a lot to help spread the word about cultural sensitivities.

Education

Educational activity related to Cultural Astronomy is expanding considerably, as given example by the activity of the WGAC members below:

Nicholas Champion continues his graduate program in Cultural Astronomy at the University of Wales Trinity Saint David. He was an organizer of a summer course on "Cultural astronomies in Medieval and Early Modern Europe," sponsored by the Polish Academy of Sciences (Warsaw) in association with the Centro Interuniversitário de História das Ciências e da Tecnologia (Lisbon), and the Sophia Centre, University of Wales Trinity Saint David.

Rita Gautschy taught archaeoastronomy tailored for archaeologists and is a leader in the development of "SEACTeach" – a series of open-access video lectures for archaeoastronomy and ethnoastronomy created by the Société Européenne Pour L'Astronomie Dans La Culture (SEAC).

Cecilia Gomez taught "Introduction to Astronomy in Culture," an undergraduate seminar and postgraduate subject of the Faculty of Astronomical and Geophysical Sciences of the National University of La Plata (UNLP).

Cesar Gonzalez-Garcia worked on the development and implementation of an Immersive Projection Dome (Archaeo-Planetarium) at the Institute of Heritage Sciences together with Trevinca Skies S. L.

Steven Gullberg taught Cultural Astronomy at the University of Oklahoma and supervised graduate students. He is working with **Duane Hamacher** on the development of a global online certificate program for education in Cultural Astronomy to be offered by the International Society for Archaeoastronomy and Astronomy in Culture (ISAAC).

Duane Hamacher taught Cultural Astronomy at the University of Melbourne and supervised graduate students. He is working with **Steven Gullberg** on the development of a global online certificate program for education in Cultural Astronomy to be offered by the International Society for Archaeoastronomy and Astronomy in Culture (ISAAC).

Susanne Hoffmann has organized a project called Planetarian University aiming at closer collaboration between planetariums and universities and has given numerous related talks.

Annette Lee taught Native American astronomy and organized virtual workshops and lectures.

Alejandro Lopez taught Cultural Astronomy at Universidad Nacional de Córdoba, Argentina and Universidad Nacional de La Plata, Argentina. He provided technical-pedagogical advice on the teaching of astronomy, with a cultural astronomy perspective and emphasis on naked eye direct observation, for teachers and students in elementary schools of District 11 of the City of Buenos Aires. He was a leader in organizing the Basic and Advanced Cultural Astronomy Schools associated with the Sociedad Interamericana de Astronomía en la Cultura (SIAC) conference held in Merida and Pisté, Yucatan, Mexico.

Nancy Maryboy and **David Begay** continued their series of presentations by Indigenous speakers through their Indigenous Education Institute.

Javier Mejuto taught Cultural Astronomy at the Universidad Nacional Autónoma de Honduras where he is the Dean of the Faculty of Space Sciences and the Head of the Archaeoastronomy and Cultural Astronomy department.

Areg Mickaelian organized and presented a number of educational and outreach programs:

1. Astronomical School Lectures in Armenian provinces. The lectures included Cultural Astronomy.
2. Network for Astronomy School Education (NASE) international courses for Armenian teachers.
3. 9th Byurakan Science Camp (9BSC), Byurakan, Armenia
4. 3rd Space Camp, Dilijan, Armenia
5. Public lecture at Lsaran forum, Yerevan, Armenia: How Astronomy Helps Humanity to Survive

Armando Mudrik lectured in the postgraduate course "Introducción a la Astronomía en la Cultura", taught by the Facultad de Ciencias Astronómicas y Geofísicas de la Universidad Nacional de La Plata.

Andrew Munro taught Cultural Astronomy at the University of Oklahoma.

Greg Munson and the Society for Cultural Astronomy in the American Southwest (SCAAS) host a monthly Journal Club for open discussion of selected articles. The online forum is for education and public outreach and is also available on the SCAAS YouTube channel.

Wayne Orchiston delivered 12 lectures in New Zealand and Australia. He gave seven presentations as the featured speaker for the University of Science and Technology of China Lectures in Astronomical History and Heritage. He also continues with graduate student supervision at the University of Southern Queensland.

Rosa Ros and **Beatriz Garcia** had another great year with NASE and secondary educators throughout the world. Cultural astronomy has become an integral part of astronomical inspiration and the WGAC supports this outstanding initiative. 20 courses were given with over 600 teachers participating.

Irakli Simonia has a Ph.D. program in Archaeoastronomy at Ilia State University.

Alexander Wolf gave a master class in Cultural astronomy at Altai State Pedagogical University in Barnaul, Russia.

Georg Zotti continues with his development of significant educational capability in Stellarium that visually demonstrates light and shadow effects of Cultural Astronomy. He as well taught: Einführung in die Archäoastronomie (Introduction to Archaeoastronomy) as a semester course lecture at Vienna University.

Public Outreach

Members of WGAC strive to share cultural astronomy and do so by speaking to the general public, astronomical groups, and at many schools. The WGAC seeks to excite the public with cultural astronomy in an effort that includes inspiring youth for STEM, both in astronomy and in other fields. Many contributions were made during the year to further this most important endeavor, as illustrated by the examples below:

Danielle Adams gave four public talks related to Arabian astronomy.

Suresh Bhattarai gave newspaper, radio, and television interviews about the culture and practices of different ethnic groups in Nepal.

Milan Dimitrijevic gave three public talks regarding astronomy in culture.

Rita Gautschy gave two magazine interviews, a public talk, and participated in the making of a film regarding time in Babylonia and ancient Egypt.

Steven Gullberg delivered a public outreach talk sponsored by Mensa that was about Inca astronomy.

Susanne Hoffmann is working on closer collaboration between planetariums and universities. She gave four talks at Planetarium Jena on such as ancient constellations and organized monthly science talks.

Ryan Khan was an invited guest speaker for the Space Generation Advisory Council Diversity and Gender Equality Group regarding Culture in Astronomy – Indigenous Astronomy in Pakistan.

Hosein Khezri spoke about Solar Calendars and Circular Astronomical Cities in Ancient Iran as part of his effort to both preserve these places and develop them for astronomical tourism.

Ed Krupp continued delivering his popular public lectures about stellar topics with six more at the Griffith Observatory, the Palomar Observatory, and the Egypt Exploration Society of Southern California.

Treavor Leaman spoke about Indigenous astronomy six times - at the Sydney Observatory, the C.G. Jung Society of South Australia, Brungle Public School, Walla Walla Forbes, CSIRO Parkes, and Blayney Public School.

Areg Mickaelian took part in organizing several public outreach events in Armenia regarding astronomical heritage and education that included cultural astronomy.

Armando Mudrik worked with development of a cultural astronomy website, a co-organizer and speaker at an outreach event in Cordoba, Argentina, and as a teacher-coordinator of an outreach course.

Greg Munson with the Society for Cultural Astronomy in the American Southwest (SCAAS) reports that their monthly journal club meetings are open to the public. SCAAS also sponsored public outreach at the Canyons of Ancients National Monument in Colorado in the USA.

Georg Zotti delivered 10 invited public talks.

Contemporary Cultural Astronomy

Contemporary Cultural Astronomy is a growing area of emphasis in an exciting part of our field. Here we relate astronomy in culture happening right now that includes areas such as astronomy found in literature, poetry, music, films, and as well cultural

practices at sites such as Stonehenge and Machu Picchu. A concerted effort of research in this area will take place in the new triennium.

Some of this activity during the past year was related to cultural astronomy in planetarium shows and also with efforts to promote astro-tourism.

Developing Nations and Indigenous Astronomy

The astronomy of living Indigenous cultures often is passed on through oral traditions from one generation to the next. It is critically important to learn all that we can from members of these cultures in our efforts to better understand their astronomy, cosmology, and their ways of knowing. Here are some of the efforts being made:

Suresh Bhattarai and colleagues have been exploring the world heritage sites in Nepal and their association with astronomy in order to explore astronomy in culture. Many temples in Nepal have been built with certain orientations and designs that need to be explored further. Volunteers show their interest to work and hopefully by the end of 2024, there will be good results. As Nepal has several indigenous groups, their cultural heritage is being explored from the perspective of Astronomy in Culture. Suresh and colleagues plan to continue the efforts to unravel the mysteries that indigenous people have been performing since ancient times in Nepal.

Robert Fuller's cultural astronomy group at Western Sydney University is doing regular mapping and photogrammetry of sensitive rock art (engravings) in the Sydney region, which is one of the densest rock art regions in the world. This work is being done with the National Parks and the relevant Aboriginal Local Area Land Councils, with one of the aims being to train the relevant Land Council personnel to do this type of surveying and recording for the purpose of heritage documentation and future restoration. The group is making connections between rock art and cultural astronomy. The same group also participated in a Baiame (local cultural ancestor) Trail, which was a five-day trip with Aboriginal knowledge holders to connect knowledge to sites and rock art.

Steven Gullberg is writing a book with a Quechua descendant of the Incas about Inca astronomy and cosmology from the perspective of the oral traditions that have been passed from one generation to the next down regarding what his co-author has learned from his parents and grandparents. They are working to capture these oral traditions before they are lost.

Ed Krupp initiated a multi-site major lunar standstill livestream broadcast program, 2024-2025, with site assessments and broadcast tests at Chimney Rock National Monument (in conjunction with U.S. Forest Service, University of Colorado, and Fiske Planetarium), at Roden Crater (in conjunction with James Turrell and Skystone Foundation), and at Griffith Observatory.

Alejandro Lopez advised as an expert in Cultural Astronomy in the training process of young Moqoit guides for Campo del Cielo, in collaboration with the Dirección de Patrimonio Cultural Chaco, by coordinating the continuation of the project “NAUECQATAXANA: Programa de formación de jóvenes guías moqoit para Campo del Cielo.”

Wayne Orchiston and Darunee Lingling Orchiston have been exploring the evolving Indigenous astronomical systems of South and Southeast Asia as well as Aotearoa/New Zealand. They also have developed and are promoting a system of multidisciplinary ethnoastronomy research to learn even more about the astronomy of Indigenous cultures.

Timothy Spuck has been a primary developer of Cosmovisions of the Pacific, a collaborative effort of the Indigenous Education Institute (IEI), the Imloa Astronomy Center of Hawaii, and Associated Universities, Inc. (AUI). Funded by the Heising-Simons Foundation, the first meeting was held at the Northwest Indian College in Bellingham, Washington, USA with a major goal of the program being to facilitate the collaboration of Indigenous and non-Indigenous researchers. The second phase will take place this year at the Kahalu’u ma Kai in Kona, Hawaii, USA. **Nancy Maryboy** and **David Begay** are principals, and **Kelly Blumenthal** and **Steven Gullberg** are both invited members of the endeavor.

Interdisciplinary Collaboration

The following are the reported collaborative activities this past year, but there were many others as well. And within the WGAC, WG Associates represent several disciplines other than astronomy.

Suresh Bhattarai and colleagues have been in contact with the officials from the Nepal Panchanga Nirnayak Bikash Samiti (NPNS). NPNS is a government organization committed to serving the people and the nation with astrological, religious and festival decisions. Nepal Astronomical Society (NASO) and NPNS are exploring the possibility of collaboration under “Astronomy in Culture” in Nepal. They had several meetings with officials from both organizations and agreed to start a collaboration. They are forming a Working Group where experts from both organizations will guide the collaboration.

Monica Martinez Borrayo engaged in collaboration with Instituto de Astronomía y Meteorología, Universidad de Guadalajara.

Rita Gautschy designed and taught an archaeoastronomy course tailored for archaeologists.

Susanne Hoffman engaged in multiple collaborative activities. Collaboration with Prof. Wayne Horowitz for a Babylonian dictionary of astral names are several approaches to link Babylonian astronomy with other indigenous astronomies from all over the world.

Collaboration throughout the year with an emeritus art historian, Prof. em. Dr. Dieter Blume, and the institute for Roman languages of the University of Jena resulted in a planetarium presentation on Dante Alighieri and his unintentional invention of the Southern Cross. An interdisciplinary collaboration with a Greek colleague, Dr. Giouli Korobili, on Aristotle's meteorology.

Ed Krupp continues to serve as a Skystone Foundation board member for James Turrell's Roden Crater.

Armando Mudrik participated in the research group "Modos de conocimiento, giro ontológico y cosmopolítica: Etnografías comparadas." Museo de Antropología, Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba; the research group PICT 2017-3132, "Imaginarios, cultura y globalización en heterodoxias sociorreligiosas de la Argentina, Sección Etnología y Etnografía, Instituto de Ciencias Antropológicas, Facultad de Filosofía y Letras, Universidad de Buenos Aires; and in the research group "Núcleo Naturaleza Cultura" - Instituto de Antropología de Córdoba-CONICET/Museo de Antropología, Facultad de Filosofía y Humanidades, Universidad Nacional de Córdoba.

Areg Mickaelian gave an invited talk at the symposium From the Universe Back to Earth: Developing Astronomy to Meet Today's Natural Challenges, held in Bandung, Indonesia.

Conference Presentations

The following WGAC members reported over 90 conference attendance/presentation activities during 2023. Several of them organized such events. Our members continually make a very positive global impact on Cultural Astronomy. The conferences are not listed by name in the interest of space in this report.

Danielle Adams, Monica Martinez-Borrayo, Nicholas Champion, Milan Dimitrijevic, Parham Eisvandi, Rita Gautschy, Cecelia Gomez, Cesar Gonzalez-Garcia, Steven Gullberg, Duane Hamacher, Susan Hoffmann, Jarita Holbrook, Muhammed Khan, Alejandro Lopez, Javier Mejuto, Areg Mickaelian, Armando Mudrik, Wayne Orchiston, Maryam Papari, Michael Rappengluck, and Georg Zotti.

Member Awards and Honors

Congratulations to these WGAC members for their 2023 awards and honors!

Steven Gullberg was promoted at the University of Oklahoma to Professor of Cultural Astronomy. He also received his college's Faculty Achievement Award for 2023.

Tom Hockey was named the University of Northern Iowa's Distinguished Scholar for 2023-2024.

Wayne Orchiston was elected as an honorary member of the Royal Astronomical Society of New Zealand. A festschrift for Wayne, *Essays on Astronomical History and Heritage: A Tribute to Wayne Orchiston on his 80th Birthday*, was published by Springer. He was chosen as the recipient of the American Astronomical Society History of Astronomy Division Leroy E. Doggett Prize for lifetime achievement in and contributions to the History of Astronomy.

Virginia Trimble was named the American Physical Society's winner of their Abraham Pais Prize.

Member Publications Developed in 2023

WGAC members contribute to cultural astronomy in our activity areas with research and publication. Many significant publications (as authors/co-authors/editors/co-editors) were reported for 2023 and are listed here; they illustrate our contributions to Cultural Astronomy. The publications of our members are prolific – those below represent the books and papers submitted for this report, and there are more. Given are author names and titles only for consideration of the length of this report and the titles are good indicators of the work being done. Anyone desiring full reference information on any particular source may contact Steven Gullberg at srgullberg@ou.edu

Danielle Adams - Rising Star Paradigms: Encoding Seasonal Times in Arabic Saj‘a Rhymes; When the Scorpion Climbs: Evolutions of Arabic Saj‘a Rhymes for Forecasting Seasonal Times; When the Star Rises: How a Calendar Arises from Arabian Sunrises.

Megan Argo - When Aliens Land.

Juan Belmonte – On the orientation of historic Christian churches of Fuerteventura: conciliating tradition, winds and topography; archaeoastronomy and the alleged “Stonehenge calendar;” An archaeology of the sky in Gaul in the Augustan period; Los Paisajes Culturales y El Celaje en Los Sitios de la Unesco: Canarias Como Paradigma; Astronomy of Ancient Egypt: a cultural perspective; El Celaje en El Camino de Santiago Arquitectura, Tradición y Simbolismo; Caral, the Moon, and the River in the Preceramic Andes.

Monica Martinez-Borrayo – TripulanteXXI: Ruta de astronomía para re-habitar la ciudad.

Nicholas Champion - Teaching Cultural Astronomy: An Update from the University of Wales Trinity Saint David; Countering the threat of the space pollution: awareness raising via sustainability narratives; Cosmo-logics: exploring the imaginal terrain of outer and inner space; Creating a Curriculum in Cultural Astronomy: Further Thoughts; Some Reflection on What Cultural Astronomy is.

Walmir Thomazi Cardoso – Historical Sources and Astronomical Constellations in the Northwest Amazon.

Milan Dimitrijević - The Secret (Astronomical) Lore of Yoginis I; The Secret (Astronomical) Lore of Yoginis II; Astronomy and Astronomers In the Serbian Banat; A Possible Mention of the Presocratic Anaximenes About Exoplanets?; The Cult of Dionysus in Ancient Athens – An Archaeoastronomical Perspective; Theodore Metochites and His Student Nicephoros Gregoras on the Courts of King Milutin and King Stefan Dečanski; The Meteorological Knowledge and Beliefs in Ancient Greece; From Aristotle to Einstein: A Historical and Conceptual Evolution of Time; On Conditions for Acceptance or Rejection of a Calendar Reform; The Panagia Gorgoëpikoos (St. Eleftherios) Church in Athens and the Ancient Athenian Calendar; Djordje Stanojević and Calendar Reform; Ševarlić Branislav M.

Robert Fuller - The Role of Astronomy in Australian Indigenous Knowledge; The Astronomy of the Aboriginal Peoples of the Sydney Basin

Alejandro Gangui - On the orientation of historic Christian churches of Fuerteventura: conciliating tradition, winds and topography.

Rita Gautschy - Timed Events in the Temple of Karnak. The Khoiak Festival in the Times of Amenhotep III.

Cecilia Gomez - Asterisms and Time Cycles. Perspectives from Central West Chaco; Laboratory Studies and Research in Cultural Astronomy. Cosmvision and Reinterpretations of the Sky among the Chaco Indians and Creoles; Sky and Society: A Look from Ethnography.

César Gonzalez-Garcia - Mapping human mobility and analysing spatial memory: palimpsest landscapes of movement in the Gobi-Altai Mountains, Mongolia; Knowledge of the Sky among Indigenous Peoples of the South American Lowlands – First Archaeoastronomical Analyses of Orientations at Mounds in Uruguay; Landscapes, orientation and celestial phenomena on the “Coast of Death” of NW Iberia; Between Land and Sky – A Study of the Orientation of Roman Centuriations in Italy; In the Bosom of the Earth. A New Megalithic Monument at the Antequera World Heritage Site; Las Orientaciones de las Iglesias de Ibiza y Formentera; When Location Matters: The Dolmens of the Central Pyrenees, A Reappraisal; The Romanesque Churches Along the Way of Saint James, Challenges and Potential Outcomes of an Astronomy and Culture Project; Foreword, in, Astronomy of Ancient Egypt: A Cultural Perspective; Caral, the Moon, and the River in the Preceramic Andes; Cultural Astronomy Advisory Network.

Steven Gullberg – Inca Cosmology: The Astronomical Legacy of an Andean Empire; Fundamentals of Mathematics, Physics, and Astronomy for Archaeoastronomy; The Ushnus in the astronomy of the Inca culture; The archaeoastronomy of Tikal: A reanalysis; Preface – Workshop on matter, astrophysics, gravitation, ions and

cosmology-MAGIC23; Special Issue: Workshop on matter, astrophysics, gravitation, ions and cosmology-MAGIC23; Chankillo Archaeoastronomical Complex: UNESCO World Heritage Site; Cultural Astronomy in Latin America; Review Volume of the 10th International Workshop on Astronomy and Relativistic Astrophysics, from Quarks to Cosmos-IWARA 2022; Inca Cultural Astronomy; Essays on Astronomical History and Heritage; Cultural Astronomy and Modern Skywatching; When Aliens Land; Preface: 10th International Workshop on Astronomy and Relativistic Astrophysics, from Quarks to Cosmos-IWARA 2022.

Duane Hamacher – Using the Significant Horizons methodology to determine potential astronomical use of Aboriginal stone arrangements; The Role of astronomy in Australian Indigenous knowledge; The Astronomy of the Aboriginal Peoples of the Sydney Basin; Using the Significant Horizons Methodology to Determine Potential Astronomical Use of Aboriginal Stone Arrangements.

Jarita Holbrook - Cultural Astronomy and Modern Skywatching; When Aliens Land

Stanislaw Iwaniszewski – A Revision of Some Lunar Glyphs of the Lunar Series at Quirigua.

Ed Krupp - Are They Stars?; Total Lunar Eclipse: Lost and Found; Planet Arithmetic, Part 1: Celestial Subtraction; Planet Arithmetic, Part 2: Astronomical Addition; Griffith Observatory and Zeiss: Astronomical Allies.

Trevor Leaman - Using the Significant Horizons methodology to determine potential astronomical use of Aboriginal stone arrangements; The Role of astronomy in Australian Indigenous knowledge.

Annette Lee – Spirits Dancing: The Night Sky, Indigenous Knowledge, & Living Connections to the Cosmos; When Aliens Land.

Alejandro Lopez – Heaven on Earth: Inter-Ethnic Dialogues with Sky Entities; When Aliens Land.

Javier Mejuto – Honduras Between Archaeoastronomy and Ethnoastronomy: Copan, Rock Art, and Tolupan Cosmology; When Aliens Land.

Areg Mickaelian - Byurakan Astrophysical Observatory (BAO): current activities and statuses.

Steve Miller - When Aliens Land.

Armando Mudrik - Towards the east, towards Jerusalem”: orientations in Jewish religious practices in the southern Argentinean Chaco; Muchos cielos; Chapter 2: Astronomies of the European Immigrants and their Descendants in the Southern Argentinean Chaco Region.

Ray Norris - The Role of astronomy in Australian Indigenous knowledge.

Wayne Orchiston - Accredited meteorites of New Zealand. 1: The Makarewa Meteorite; Colonial astronomy as an element of Empire in British India; The marine telescope made by J.H. Marriott in 1844: New Zealand's first telescope; Indian initiatives to establish 'Western' astronomical observatories prior to Independence. 1: The aristocrats; The role of temporary Western observatories in the development of professional astronomy in Thailand.

David Pankenier - A Legendary Sibling Rivalry and Competing Astral Traditions in Early China; When the Heavenly Signs Were Untimely.

Manuel Perez - Cult Activity and Orientalizing Building in the Cerro De San Vicente (Salamanca, Spain).

Michael Rappenglück - People experienced the prehistoric Chiemgau meteorite impact – geoarchaeological evidence from southeastern Germany: a review; Only the Skyscape or the Whole Word? Reflections on a Well-suited Methodology and Philosophy of Science Concerning Cultural Cosmology; Mensch, Lebenswelt und Welt-Organismus – Die Vorstellung vom kosmischen Lebewesen in verschiedenen Kulturen einst (und heute) / Human being, living world and world organism - The concept of the cosmic living being in different cultures in the past (and today).

William Romain - In Search of the St. Louis Mound Group: Archaeoastronomic and Landscape Archaeology Implications; The Milky Way Path of Souls at Cahokia; High Resolution LiDAR Drone Imagery at Cahokia; Archaeoastronomy of Leary Site: Ioway Tribe.

Ivan Sprajc – Group E of Uaxactun, Peten, Guatemala: Archaeoastronomical Hypotheses and Archaeological Reality.

Alexander Wolf - Stellarium: Finally at 1.0! And Beyond; Revisiting Star Names: Stellarium and the Ancient Skies Database; Stellarium 23.4 User Guide.

Georg Zotti - Stellarium: Finally at 1.0! And Beyond; Revisiting Star Names: Stellarium and the Ancient Skies Database; La simulazione della luce nei modelli digitali con valore astronomico: strumenti a confronto (Simulation of light in digital models with astronomical value: comparing tools); Die Schattenphänomene der Zenitsonne am Inkaheiligtum Ollantaytambo; Mehr als nur ein Steinkreis; From Urban Orientations to 3D Visualisation: A First Study on Solar Irradiation in Pompeii within Ancient Virtual Skies; Himmelsgloben und ihre astronomische Bedeutung bei Peter Anich; A Calendar Observatory in Tibet; Skyscapes of Kuelap, Peru; Advanced Virtual Archaeoastronomy; Die Steine von Callanish: Ein 3D-Datensatz für Stellarium; Kosmologien. — Man within the Cosmos: Lifeworlds and Cosmologies; Stellarium 23.4 User Guide; Astronomischer Almanach für Österreich 2024.

Cultural Astronomy Journals

The following journals focus upon or otherwise frequently publish articles of Cultural Astronomy and their editors who are members of the WGAC are listed. Their efforts contribute greatly to the advancement of the field:

Journal of Astronomy in Culture (**Steven Gullberg, William Romain, and Kelly Blumenthal**, Eds.)

Cosmovisiones/Cosmovisões (**Alejandro Lopez, Walmir Cardoso, and Priscila Faulhaber**, Eds.)

Journal of Astronomical History and Heritage (**Wayne Orchiston**, Ed.)

Journal of Skyscape Archaeology (**Fabio Silva**, Ed.)

Wayne Orchiston also serves as Senior Editor for Springer Nature's Historical and Cultural Astronomy book series.

Future

The WGAC continues with a busy and productive triennium. We serve as the IAU's focal point for Cultural Astronomy and as well carry on our efforts to advance the field across the globe. In this endeavor, as illustrated above, we are enjoying considerable success.

Cultural Astronomy has evolved into a robust field of study that fills a distinct need for cultural understanding. The activities of the WGAC have broadened far beyond what is typical for a working group considering such as its number of members, its association with multiple commissions, and as well the support it is providing to other organizations. The time has come where further contributions of Cultural Astronomy could be better served by the work of a regular commission of the IAU.

We will continue to advance efforts to enlighten astronomers globally as to Indigenous sensitivities at astronomical sites built upon sacred grounds. This includes insight as to how astronomers can best interact with those expressing these concerns as well as responsible siting advice for future site selections.

We will expand our efforts in development, education, and outreach and intend to develop closer relationships with the OAD, OAE, OAO, and OYA to explore additional ways of using Cultural Astronomy to enhance their initiatives wherever possible. These endeavors will also include assistance with programs such as WG Key Initiatives (NASE), WG Star Names, and Astronomy Day in Schools (ADiS).

We continue our research of Indigenous astronomy. We also pursue the compilation of materials regarding archaeoastronomy in developing nations.

A primary goal is to further enhance what is known of world cultures by understanding their cosmologies and how and why they use/used astronomy. We also serve to highlight the role Cultural Astronomy has played with other branches of astronomy.

We will work to further enhance contributions in all ways helpful for the IAU. We look forward to continuing to increase our membership and to the contributions that all of our members will make!