



## POST MEETING REPORT FORM

1. **Meeting Identification Number:** Symposium 399
2. **Meeting Title:** Indigenous Astronomy in the Space Age
3. **Coordinating Division:** Division C Education, Outreach and Heritage
4. **Dedication of meeting (if any):**
5. **Location (city, country):** University of Melbourne, Australia
6. **Dates of meeting:** 7-11 July 2025
7. **Number of participants:** 202 (in-person and virtual)
8. **Total Amount of IAU Grant funds received (in euros):** E 20.000
9. **Number of IAU Grant recipients:** 17
10. **List of represented countries:** Argentina, Australia, Austria, Bangladesh, Benin, Brasil, Canada, China, Colombia, Ethiopia, France, Germany, Honduras, Iceland, Indonesia, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Peru, Philippines, Romania, Saudi Arabia, South Africa, Spain, Taiwan, Tanzania, Thailand, Türkiye, UK, USA.
11. **Anticipated number of separate papers in the proceedings:** 30
12. **Report submitted by:** Duane Hamacher (Chair), Jarita Holbrook (co-Chair)
13. **Date and place:** 16 September 2025
14. **Signature of SOC Chairperson:**

A handwritten signature in black ink, appearing to read 'Jarita C Holbrook', is written over the signature line.

Jarita C Holbrook

## Summary of IAU Symposium 399 Indigenous Astronomy in the Space Age

**Date:** 2025 July 7 - 11

**Venue:** University of Melbourne, Australia

**Coordinating IAU Division:** Division C “Education, Outreach and Heritage”

### Scientific Organizing Committee (Female 7 / Male 11):

Name	Institution	Country	Gender
Duane Hamacher (Co-Chair)	University of Melbourne	Australia	Male
Jarita Holbrook (Co-Chair)	Smithsonian Centre for Astrophysics	UK	Female
Gerhard Wiesenfeldt	University of Melbourne	Australia	Male
Efrosyni Boutsikas	University of Kent	UK	Female
Robert Fuller	Western Sydney University	Australia	Male
César González-García	INCIPIIT	Spain	Male
Alice Gorman	Flinders University	Australia	Female
Steve Gullberg	University of Oklahoma	USA	Male
Annette Lee	Native Skywatchers	USA	Female
Tanya Hill	Melbourne Museum	Australia	Female
Gail Higginbottom	INCIPIIT	Spain	Female
Javier Mejuto	National Autonomous Univ. of Honduras	Honduras	Male
Ricardo Moyano	University of La Serena	Chile	Male
Ray Norris	Western Sydney University	Australia	Male
Emilia Pasztor	Türr István Museum	Hungary	Female
Clive Ruggles	University of Leicester	UK	Male
Georg Zotti	VRVis	Austria	Male
Stacy Mader	CSIRO Astronomy and Space Science	Australia	Male

### Local Organizing Committee (Female 7 / Male 8):

Name	Institution	Country	Gender
Duane Hamacher (Co-Chair)	University of Melbourne	Australia	Male
Gerhard Wiesenfeldt (Chair)	University of Melbourne	Australia	Male
Stephi Barnard	University of Melbourne	Australia	Female
Martin Bush	University of Melbourne	Australia	Male
Casey Domingo	University of Melbourne	Australia	Female
Amanda Goldfarb	University of Melbourne	Australia	Female
Harriet Hurley	University of Melbourne	Australia	Female
Bridget Kelly	University of Melbourne	Australia	Female
Kevin Orrman-Rossiter	University of Melbourne	Australia	Male
Morgan Saletta	University of Melbourne	Australia	Male
Asha Stabback	University of Western Australia	Australia	Female
Ray Norris	Western Sydney University	Australia	Male
Stacy Mader	CSIRO Astronomy and Space Science	Australia	Male
Robert Fuller	Western Sydney University	Australia	Male
Tanya Hill	Melbourne Museum	Australia	Female

(i) Final scientific programme

Monday, 7 July: Archaeoastronomy, Theory, Method

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<b>09:00 – 09:50</b>	<b>Welcome</b>
09:00 – 09:10	<b>Duane Hamacher and Jarita Holbrook</b> – IAUS 399 Co-Chairs <i>Welcome to IAUS 399</i>
09:10 – 09:20	<b>Annette Xiberras</b> – Wurundjeri Elder <i>Welcome to Country</i>
09:20 – 09:35	<b>Barry Judd</b> – Deputy Vice-Chancellor (Indigenous), University of Melbourne <i>Supporting Indigenous Endeavours</i>
09:35 – 09:50	<b>Marcia Langton</b> – Associate Provost (Indigenous), University of Melbourne <i>Why Indigenous Astronomy Matters</i>
<b>09:50 – 10:50</b>	<b>Session 1: Frameworks &amp; Theory</b>
09:50 – 10:10	<b>Alejandro Martin-Lopez</b> – University of Buenos Aires <i>Astronomical Heritage's Cosmopolitics: Shamanism and Hegemonic Modernity</i>
10:10 – 10:30	<b>Wayne Orchiston</b> – University of Science and Technology of China & USQ <i>New Directions in Cultural Astronomy: Researching the Past</i>
<b>11:00 – 13:00</b>	<b>Session 2: Tools &amp; Methods</b>
11:00 – 11:20	<b>Susanne Hoffmann</b> – IAU Working Group on Star Names, Germany <i>Introducing the All-Skies Encyclopaedia</i>
11:20 – 11:40	<b>Georg Zotti</b> – VRVis Vienna <i>Introducing: Stellarium Skycultures 2.0</i>
11:40 – 12:00	<b>Elizabeth Brooker</b> – James Cook University <i>Using Stellarium to Obtain Star Position Data</i>
12:00 – 12:20	<b>Kazuhiro Sekiguchi</b> – National Astronomical Observatory of Japan <i>“arcAstro-VR” for Archaeoastronomy</i>
12:20 – 12:40	<b>Irma Hariawang</b> – TB Astronomy Alumni Association <i>Using Machine Learning to Interpret the Insights into Borobudur's Celestial Reliefs</i>
12:40 – 13:00	<b>Maitane Urrutia-Aparicio</b> – Universidad Europea de Canarias <i>Pathways to the Oases: Introducing machine learning to archaeoastronomical study of funerary structures in Northwest Arabia</i>
<b>14:00 – 15:40</b>	<b>Session 3: Archaeoastronomy I</b>

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14:00 – 14:20	<b>Clive Ruggles</b> – University of Leicester <i>Lunar observations at Stonehenge</i>
14:20 – 14:40	<b>Ivan Ghezzi (presented by Clive Ruggles)</b> – UE Chankillo <i>Astronomy before Chankillo: insights from Landscape Field</i>
14:40 – 15:00	<b>Juan Antonio Belmonte</b> – Instituto de Astrofísica de Canarias <i>Revealing ancient Indigenous astronomies through their architecture</i>
15:00 – 15:20	<b>A. César González-García</b> – Institute of Heritage Sciences, INCIPIT <i>Cultural Astronomy of a Paĩ Tavyterã (Guaraní) ceremonial house in Amambay</i>
15:20 – 15:40	<b>Gail Higginbottom</b> – University of Bournemouth <i>The Cultoon stone circle: investigations continue</i>
<b>15:50 – 17:30</b>	<b>Session 4: Archaeoastronomy II</b>
16:10 – 16:30	<b>Jose Lull</b> – Universidad Autónoma de Barcelona <i>How Indigenous is ancient Egyptian astronomy?</i>
16:30 – 16:50	<b>Po-Sheng Ou</b> – National Taiwan University <i>Reconstructing the Skyscape on the Island of Mountains</i>
16:50 – 17:10	<b>Ide Nada Imandiharja</b> – Bandung Institute of Technology <i>Testing the connection between the appearance of Comet 1P/Halley in 760 CE</i>
17:10 – 17:30	<b>A. César González-García</b> – Institute of Heritage Sciences, INCIPIT <i>Cultural Astronomy of a Paĩ Tavyterã (Guaraní) ceremonial house in Amambay</i>
17:10 – 17:30	<b>Kharisma Nabila</b> – Universitas Gadjah Mada, Indonesia <i>Tracing the Ancient Indonesian Javanese Inscriptions on the Appearance of Supernovae: An Archaeoastronomical Review of the Turun Hyang B and Jaring Inscriptions</i>

## Tuesday, 8 July: Indigenous Astronomy

<b>09:00 – 10:40</b>	<b>Session 5: Indigenous Astronomy in the Pacific</b>
09:00 – 09:20	<b>John Goldsmith and Quinton Tucker</b> – Celestial Visions/Koya Aboriginal Corporation, Australia (Video) <i>Australia's Cultural Night Sky</i>
09:20 – 09:40	<b>Robert Fuller</b> – University of Western Sydney <i>Aboriginal Astronomy of the Sydney Basin</i>
09:40 – 10:00	<b>Isaac Warbrick and Jade Kameta</b> – Auckland Univ. of Tech, Aotearoa/New Zealand <i>It's not a Horoscope" – A Māori system of celestial observation and implementation for achieving Indigenous well-being</i>
10:00 – 10:20	<b>Exodus Chun-Long Sit</b> – IAU NAEC, Hong Kong–China (Video) <i>Indigenous Astronomy and Ancient Constellations in the Pacific places</i>

10:20 – 10:40	<b>Regina Indah Syalaisha</b> – Bandung Institute of Technology, Indonesia <i>Calendrical Diversity on a Small Island: Sabu Raijua Traditional Calendar</i>
<b>11:10 – 12:50</b>	<b>Session 6: Indigenous Astronomy in Africa</b>
11:10 – 11:30	<b>Ladislau Batinoluho</b> – DarkSky Tanzania <i>Investigation of Indigenous Astronomical Knowledge in Improving Livelihood for Rural Communities in Tanzania</i>
11:30 – 11:50	<b>Neil Rusch</b> – University of the Witwatersrand, South Africa <b>(Video)</b> <i>Counter-Mapping: Building bridges and locating a place in space for /Xam San cosmology</i>
11:50 – 12:10	<b>Dafon Aimé Segla</b> – Université d'Abomey-Calavi <i>Predicting seasonal changes in a community village in southern Benin Republic (West Africa)</i>
12:10 – 12:30	<b>Habtamu Fekadu Etefa</b> – Dambi Dollo University, Ethiopia <b>(Video)</b> <i>Investigating the Indigenous Names of the Seven Days in Ethiopia's Week of the Borena Calendar</i>
12:30 – 12:50	<b>Paul Nyarko-Mensah</b> – University of Pretoria, South Africa <b>(Video)</b> <i>An Almost Forgotten "Star Compass" of the Mfantse Fishermen</i>
<b>14:00 – 16:20</b>	<b>Session 7: Indigenous Astronomy in Asia</b>
14:00 – 14:20	<b>Kang-Shian Pan</b> – Dabang Elementary School No. 1, Taiwan <i>Reconstructing the Seven Stars (fkuu) Story in Taiwan Indigenous Cou Culture</i>
14:20 – 14:40	<b>Megumi Yamauchi</b> – Independent Researcher, Japan <i>Activities on the constellations of the Indigenous Ainu peoples of Japan</i>
14:40 – 15:00	<b>Akira Goto</b> – Nanzan University <i>Heaven as an Interactive Arena for humans and nature among the Ainu</i>
15:00 – 15:20	<b>Martine Joy Irog</b> – Philippine Astronomical Society, Philippines <i>Ethnoastronomy in the Cordilleras: Exploring the Astronomical Beliefs of the Bontoc</i>
15:20 – 15:40	<b>Joshua Jewel Palolan</b> – Cagayan Museum and Historical Research Center <b>(Virtual)</b> <i>What is in Heaven, is also on Earth: a Preliminary Exploration of Cagayan Indigenous Astronomy</i>
<b>16:10 – 17:50</b>	<b>Session 8: Indigenous Astronomy in the Americas</b>
16:10 – 16:30	<b>Chris Cannon</b> – University of Alaska at Fairbanks, USA <b>(Video)</b> <i>In the Footsteps of the Traveler: the astronomy of Northern Dene</i>
16:30 – 16:50	<b>Mary Motah Weahkee</b> – Society for Cultural Astronomy in the American Southwest <i>Traditional Eyes and Scientific Instruments: Indigenous Interpretations of Cultural Astronomy Research in the Greater American Southwest</i>
16:50 – 17:10	<b>Daniel Pedreros Cifuentes</b> – Secretaría de Educación del Vaupés, Colombia <b>(Video)</b> <i>The Culture of the Sky of the Jaguars of Yurupari</i>

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17:10 – 17:30	<b>Priscila Faulhaber</b> – Museum of Astronomy and Related Sciences, Brasil ( <b>Video</b> ) <i>The Amazonian Tikuna/Magüta animate constellations</i>
18:30 – 20:00	<b>Indigenous Space Futures</b> – Panel Discussion <i>Melbourne Museum, Carlton</i>

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### Wednesday, 9 July: General Meeting, Panel & Excursion

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<b>09:00 – 10:30</b>	<b>Panel Discussion</b>
	<b>Square Kilometre Array Observatory (SKAO)</b> – Indigenous Partnerships Enabling Mega-Science Infrastructure: Wajarri Yamaji and the Ska Project <i>Talk (45 mins) and Panel Discussion (45 mins)</i>
	<b>Panellists</b>
09:00 – 10:30	<ul style="list-style-type: none"> <li>• <b>Des Mongoo</b> - Chair, Wajarri Enterprise Ltd</li> <li>• <b>Jennylyn Hamlett</b> - Wajarri Liaison Officer, Wajarri Yamaji Aboriginal Corporation</li> <li>• <b>Antony Schinckel</b> - SKA-Low Site Construction Director, SKA Observatory</li> <li>• <b>Jonathan Rogers</b> - Australian Government Department of Industry, Science and Resources</li> <li>• <b>Rebecca Wheadon</b> - CSIRO Site Entity Lead, CSIRO</li> </ul>
11:00 – 12:35	Joint General Meeting of ISAAC and IAU Commission C5: Cultural Astronomy
14:00 – 15:30	<b>N’arwee’t Carolyn Briggs (Senior Boon Wurrung Elder)</b> – Botanic Gardens <i>Plants and Aboriginal Astronomy (15 minute sessions)</i>

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### Thursday, 10 July: Dark Skies & Space Futures

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<b>09:00 – 10:40</b>	<b>Session 9: Dark &amp; Quiet Skies I</b>
09:00 – 09:20	<b>Shea Estering</b> – University of Canterbury <i>Protecting Our Dark Skies: Indigenous Knowledges and the Law</i>
09:20 – 09:40	<b>Nalayini Davies</b> – DarkSky International <i>How dark sky conservation supports the resurgence of cultural/Indigenous astronomy</i>
09:40 – 10:00	<b>Danielle Adams</b> – Flagstaff Dark Skies Coalition <i>Indigenous Ties to Dark Skies: Arabian Astronomy at the Limits of Naked-Eye Visibility</i>
10:00 – 10:20	<b>Ahmad Hariz Bely</b> – Universiti Sultan Zainal Abidin <i>Spatial Modeling of Artificial Light at Night (ALAN) at the Pusat Astronomi Borneo</i>
10:20 – 10:40	<b>Joyful Mdhluli</b> – IAU office of Astronomy for Development, South Africa <i>Astrotourism: A Tool to Promote Dark and Quiet Skies</i>

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**11:10 – 12:50**

**Session 10: Dark & Quiet Skies II**

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11:10 – 11:30 **Peter Swanton** – Australian National University  
*Space age threat to dark and quiet skies*

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11:30 – 11:50 **Barbara Horváth** – Széchenyi István University  
*Protecting dark and quiet skies from interference by satellite mega-constellations*

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11:50 – 12:10 **Jessica Heim** – University of Southern Queensland, Australia **(Video)**  
*Cultural Astronomy, Dark Skies, Satellite Constellations and the Space Environment*

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12:10 – 12:30 **Samantha Lawler** – University of Regina, Canada **(Video)**  
*Protecting dark and quiet skies from Satellite pollution.*

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**14:00 – 16:20**

**Session 11: Indigenizing Astrophysics**

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14:00 – 14:20 **Hilding Neilson** – Memorial University of Newfoundland & Labrador  
*Indigenizing the Drake Equation: how Indigenous methods can help us understand life in the Milky Way Galaxy*

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14:20 – 14:40 **Dionysios Gakis** – University of Texas at Austin  
*Echoes of Star Stories: Integrating Indigenous narratives into modern stellar astrophysics*

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14:40 – 15:00 **Jamie Rooney and Kerri Douglas** – University of Melbourne, Australia  
*No Silver Bullet: the path of co-design in First Nations Led Astrotourism*

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15:00 – 15:20 **Anton Binneman** – SARA0, South Africa  
*MeerKAT, the SKA and Indigenous Knowledge*

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15:20 – 15:40 **Tumo Fortunate Kedumele** – Botswana Int. Univ. of Science & Tech., Botswana **(Video)**  
*Cultural Astronomy for Sustainable Development: A study on Indigenous San Communities in Botswana and Namibia*

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**16:10 – 17:50**

**Session 12: Indigenous Space Futures**

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16:10 – 16:30 **Morgan Saletta** – University of Melbourne  
*Space: A global commons for all humanity*

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16:30 – 16:50 **Andrea Rodríguez–Antón** – Institute of Heritage Sciences (INCIPIIT–CSIC)  
*Is there a place in the space for refugees? Astronomy of the Western Sahara from the exile*

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16:50 – 17:10 **Hae-Seo Kim** – University of California at Irvine, USA  
*Moon Ritual and Shamanic Outer Space in South Korea*

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17:10 – 17:30 **Antonia Wibowo** – National Research and Innovation Agency, Indonesia  
*Observatory and Sustainable Development Goals*

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17:30 – 17:50 **John Barentine** – Dark Sky Consulting, LLC, USA **(Video)**  
*Unacceptable to our people!: diverse cultural beliefs, Indigenous rights, and the future of human activities on the Moon*

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19:00 – 21:30      **Conference Dinner, Keynote, and Awards Ceremony**  
*Woodward Conference Centre*

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19:30 – 19:50      **Joaquín Viluche** – Autonomous Intercultural Indigenous University, Colombia  
*Keynote Lecture during Conference Dinner*

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**Friday, 11 July: Education, De-Colonisation, and the Arts**

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**09:00 – 10:40      Session 13: Education**

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09:00 – 09:20      **Saeed Salimpour** – Deakin University, Australia  
*Astronomy and Culture: Using social semiotics to make deeper connections in Astronomy education*

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09:20 – 09:40      **Jose Balbi** – Museo del Observatorio de Fisica Cosmica, Argentina  
*Learning of the Outside*

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09:40 – 10:00      **Cintia Duran** – International Astronomical Union, Mexico  
*A Sun That Never Sets: Methods of Outreach and Educational Commitments for Astronomy*

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10:00 – 10:20      **Yuko Kakazu** – NAOJ & TMTIO, Japan **(Video)**  
*Ale Lau Loa: Indigenous Culture-based learning*

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10:20 – 10:40      **Milagros Varguez** – Native Skywatchers, Mexico  
*Mexican Archaeoastronomy in the Planetariums of the World*

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**11:10 – 12:50      Session 14: Decolonising Astronomy**

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11:10 – 11:30      **Doug Sam** – University of Oregon, USA  
*Colonialism and Eclipses: Native Americans, and Astronomers Contest the Creation of the Astronomical West, 1860–1890*

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11:30 – 11:50      **Thilina Heenatigala** – Earth-Life Science Institute (ELSI), Japan  
*Perspectives from the United Nations Science Summit on Decolonising Astronomy and Space Exploration*

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11:50 – 12:10      **Jarita Holbrook** – Harvard–Smithsonian Center for Astrophysics, USA/UK  
*Astrophysicists & Discrimination*

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12:10 – 12:30      **Valentina Bassich** – Imperial College London, UK **(Video)**  
*First Nations Astronomy as a Path to Decolonising Australian Museums: Challenges and Opportunities*

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**14:00 – 15:20      Session 15: Poetry and Performance**

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14:00 – 14:20      **Estelle Castro-Koshy** and **Temiti Lehartel** – Université de Bretagne Occidentale, France  
*The ambivalent resonance of spent energy: Re-imagining the Space Age through Indigenous / First Nations Poetry*

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14:20 – 14:40      **Romaine Moreton** – RMIT University, Australia  
*OSPAPIK Poetry Performance*

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14:40 – 15:00	<b>Daniel Peluso</b> – SETI Institute, USA <i>Celestial Harmonies</i> Musical Performance
15:00 – 15:20	<b>Bon Mott</b> and <b>Simon Rose</b> – Second Space Projects, Australia <i>Researching Lightning's Origins with First Nations People in Minnesota, Turtle Island and Australia</i> (Performance Art)
<b>15:30 – 17:00</b>	<b>Session 16: Indigenous Ecosystem Learning</b>
15:30 – 17:00	<b>Native Skywatchers Team</b> – Native Skywatchers, USA <i>Indigenous Ecosystem Learning (Includes Hawaiian Star Compass Interactive Performance)</i>
<b>17:00 – 17:30</b>	<b>Conference Review and Wrap-Up</b>
17:00 – 17:30	<b>Jarita Holbrook</b> and <b>Duane Hamacher</b> ISAAC Council

## Videos

**Luis Gonzalez** – University of British Columbia, Canada

*What is above is Below: Celestial representations in the architecture at Quilcapampa La Antigua.*

**Leandro De Paula Neto** – Instituto IRATU, Brasil

*Archaeoastronomy Among Shell Mounds*

**Aysegul Yelkenci** – Istanbul Kultur University, Turkey

*An archaeoastronomical overview of Hittites geography*

**Erica Ellingson** – University of Colorado at Boulder, USA

*Moonrise at Chimney Rock*

**Javier Mejuto** and **Eduardo Rodas** – UNAH, Honduras

*Unveiling possible Hidden astronomical landmarks in the Copan Valley*

**Cuahtémoc Méndez Rosas** – TRIBU cultura astronómica, Mexico

*Ancient Astronomy in Mexico*

**Hannah Maresfin** – Himpunan Astronomical Amatir Jakarta, Indonesia

*Ethnoastronomy of Aceh Traditional Guidance in Agriculture*

**Ryan Eckerson** – University of Iceland, Iceland

*Revealing Gylfi's Illusion: A Systematic Analysis and Proposed Astronomical Interpretation of Mythological Elements Found in Gylfaginnin*

**Etsegenet Alemu** – Space Science & Geospatial Institute, Ethiopia

*Cultural Astronomy of Ethiopia: Borana Indigenous Astronomical knowledge*

**Joyful Mdhuli** – IAU office of Astronomy for Development, South Africa

*Astrotourism: A Tool to Promote Dark and Quiet Skies*

**Armando Mudrik** – Instituto de Antropología de Córdoba, Argentina

*Light pollution and its perception in rural contexts in the central–northern region of Santa Fe province, Argentina*

**Fiorella Nava** – University Nacional de San Agustín de Arequipa, Peru

*Architectural Heritage in Astronomical Observatories: Adapting Terrestrial Architectural Designs to Space Environments*

**Giuliana Rotola** – IAU Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference (CPS), Italy

*Decolonizing the Outer Space Treaty: Integrating Marginalized Perspectives in Space Governance*

**Stephen Case** – Olivet Nazarene University, USA  
*Colonial Skies: John Herschel, Colonialism, and the History of Astronomy*

**Posters**

**Thiago Siqueira** – Federal University of Rio de Janeiro, Brasil  
*Catholic Churches in Downtown Rio de Janeiro*

**Patrick McCafferty** – Chemnitz University of Technology, Germany  
*Newgrange: a religious temple to the oldest recorded eclipse*

**Gregory Munson** – Society for Cultural Astro. in the American Southwest, USA  
*Envisioning the Cultural Landscapes of the Greater American Southwest*

**Youla Azkarrula** – Independent Scholar, Indonesia (**Virtual**)  
*Introducing: Stellarium Sky Culture Maker*

**Mulugeta Markos Tediso** – Dambi Dollo University, Ethiopia  
*Investigating the Ethno Geometric Pattern of Positional Astronomy in the Archaeoastronomical Research Site of the Oromoo Calendar*

**Mulugeta Markos Tediso** – Dambi Dollo University, Ethiopia  
*Opening African Astronomical Heritage Research Division at the Qellem Wallaga Zone*

**Barthélemy d'Ans Alleman** – Instituto Peruano de Astronomía, Peru  
*Iconographic evolution of a Lunar myth*

**Trevor Leaman** – University of New South Wales, Australia  
*The Terrestrial Emu, Wiradjuri Country: is it an earthly counterpart to the Celestial Emu recognised from Aboriginal skylore? Could it also be part of a larger terrestrial 'Sky Map'?*

**Dimitri Douchin** – University of Western Sydney, Australia  
*The Elvina Trail platform as a Milky Way site*

**Abduselam Mohammed Yasin** – Dambi Dollo University, Ethiopia  
*Investigating the Connection between the Waaqeffannaa Religion and Borena Calendar in the Oromoo Culture*

**Edilberto Suárez-Torres** – Universidad Distrital, Bogotá, Colombia  
*Ancestral Astronomy in Colombian Ecuador*

**Auta Stella de Medeiros Germano** – Univ. Federal do Rio Grande do Norte, Brasil  
*Some Indigenous and other traditional communities' patterns in Rio Grando do Norte's skies*

**Gregg Wade** – Royal Military College of Canada, Canada  
*Guerillas amongst the soldiers: Indigenization and Decolonization of Science curriculum at Canada's most colonial post-secondary institution*

**Hong-Bing Ong** – National Taiwan University, Taiwan  
*Contesting the Night Sky: A Preliminary Study of Landscape, Scientific Knowledge, and Indigenous Peoples in Hehuan Mountain Dark-Sky Park*

**Nilakshi Veerabathina and Fajer Jaafari** – University of Texas at Arlington, USA  
*Creating an Archeoastronomy Course as part of an Astronomy Minor Track for Non-Science Students*

**Bridget Kelly** – University of Melbourne, Australia  
*Common constellations across cultures*

**Kang-Shian Pan** – Dabang Elementary School No. 1, Taiwan

*Introduce Practical Astronomy with Taiwan Indigenous Cou Culture to School*

**Karen Knierman** – Arizona State University, USA  
*Indigenous Astronomy Education and Outreach at Arizona State University*

**Emiru Diriba Hirpa** – Dambi Dollo University, Ethiopia  
*Investigating the significance of cultural astronomy research for forming Space Science Club*

**Trevor Leaman** – University of New South Wales, Australia  
*The Wiradjuri Murriyang Project: creating constellation artworks for Stellarium and related educational content*

**Joshua Sokol** – Freelance Science Journalist, USA (**Virtual**)  
*How we loved and lost the stars: the fate and stakes of the night sky as narrative nonfiction*

**Ray Norris** – CSIRO / University of Western Sydney, Australia  
*The Seven Sisters story as a tracer of human migration*

## **(ii) Summary of the scientific highlights of the meeting**

During the IAUS 399, we discussed 11 major topics on the intersection of astronomy and culture, bringing together disciplines spread across the Arts and Sciences, covering all time domains from ancient times to futurism.

- 1) Theory and Method
- 2) Archeoastronomy
- 3) Indigenous Astronomy
- 4) Indigenous Partnerships
- 5) Safeguarding Dark and Quiet Skies
- 6) Indigenizing Astrophysics
- 7) Decolonising Astronomy
- 8) Indigenous Space Futures
- 9) Education and Pedagogy
- 10) Poetry and Performance
- 11) Indigenous Ecosystem Learning

In the following, we summarize scientific highlights discussed at the IAU Symposium 399.

Astronomy is considered the oldest science, with observations of the Sun, Moon, and stars setting the earliest foundations for marking time, forecasting weather, navigating land and sea, predicting seasonal change, and serving as a memory palace for oral traditions that passed knowledge to successive generations over thousands of years. Even the modern scientific process of astronomy has roots in history, religion, cultural traditions, and philosophy. As we continue to research, debate, and discuss this fact, we are becoming better equipped to refine our approach to studying the cosmos and understanding our place within it. ISAAC has been pioneering this research for more than 40 years. With eyes to the future, we are able to explore how our understanding of space, astronomy and culture can guide us forward as we expand our presence in space. This symposium brought together astronomers, Indigenous elders, educators, and social scientists to understand how ancient systems of knowledge can inform research and engagement practices. The modern era is dominated by astronomical discoveries, cutting-edge technologies, and a growing human presence in space. We are well into the Space Age, seeing significant advances in space exploration and plans to build habitats for humans on the Moon, Mars, and beyond, as proposed by NASA's Artemis Project. A range of social challenges accompany the technological and scientific advancements that are required to realise humanity's space-based ambitions. How can we address critical issues in the astro/space sector? IAUS 399/Oxford XIII recognised the important impact of cultural astronomy on astrophysics and the space sector with regard to addressing pertinent questions about the future of humanity in the Space Age.

The symposium addressed the following questions: (1) How can the astronomical and space communities support Indigenous Knowledge, engage collaboratively with First Nations communities, and pave a future for the next generation of Indigenous astronomers? (2) How can we safeguard astronomical knowledge and heritage while establishing roadmaps

and guidelines for humanity's future in space? (3) How are Indigenous astronomies, ground-based observatories, humanity's expansion into space, and the relationships between them juxtaposed in our future vision as we progress through the Space Age? This symposium addressed pressing issues to guide future synergies between Indigenous knowledges, cutting-edge astrophysics, and our collective future in the Space Age.

**(iii) List of participants**

<b>Surname</b>	<b>First Name</b>	<b>Country</b>
Balbi	José	Argentina
Lopez	Alejandro	Argentina
Mudrik	Armando	Argentina
Allen	Rebecca	Australia
Anderson	Ian	Australia
Barnard	Kate	Australia
Baily	Judith	Australia
Barker	Kathryn	Australia
Barnard	Kate	Australia
Brosnan	Leanne	Australia
Blake	Kelly Ann	Australia
Bush	Martin	Australia
Budden	Leigh	Australia
Canizares	Lilliana	Australia
Carter	Paul	Australia
Carr	Courtney	Australia
Cavanagh	Bonnie	Australia
Clark	Sharon	Australia
Clark	Barry	Australia
Clitheroe	Kelly	Australia
De Napoli	Krystal	Australia
Douchin	Dimitri	Australia
Forrester	Vincent	Australia
Francis	Sione Napi	Australia
Fuller	Robert	Australia
Goh	Andrea	Australia
Goldfarb	Amanda	Australia
Goldsmith	John	Australia
Gooda	Dean	Australia
Gooda	Peta	Australia
Green	Jimi	Australia

Green	Kate	Australia
Hamacher	Duane	Australia
Heckenberg	Sadie	Australia
Heim	Jessica	Australia
Hill	Tanya	Australia
Judd	Barry	Australia
Kelly	Bridget	Australia
Langton	Marcia	Australia
Leaman	Trevor	Australia
Lee-Waddell	Karen	Australia
Liousas	Vaia	Australia
Lowres	Sandy	Australia
Macgregor	Peter	Australia
Maskey	Christian	Australia
Moreton	Romaine	Australia
Murray	Jack	Australia
Norris	Ray	Australia
Oldfield	Janine	Australia
Orrmon-Rossiter	Kevin	Australia
Padgham	Lorraine	Australia
Patston	Tim	Australia
Papavassiliou	Mara	Australia
Peter	Clare	Australia
Pigdon	Andrea	Australia
Ramos	Marysabel	Australia
Rooney	Jamie	Australia
Rose	Simon	Australia
Saletta	Morgan	Australia
Salimpour	Saeed	Australia
Sanders	Deen	Australia
Stabback	Asha	Australia
Swanton	Peter	Australia
Vickers	Doris	Australia
Watt	Asha	Australia
Watt	Michelle	Australia
Weil	Danton	Australia
Wiesenfeldt	Gerhard	Australia

Williams	Liz	Australia
Yuna	Dwi Y	Australia / Indonesia
Higginbottom	Gail	Australia / Spain
Zotti	Georg	Austria
Rahman	Shafayet	Bangladesh
Segla	Dafon	Benin
Barbosa	Priscila	Brasil
Cardoso	Walmir	Brasil
Germano	Auta	Brasil
Heringer	Maria Clara	Brasil
Neto	Leandro De Paula	Brasil
Siqueira	Thiago	Brasil
Syalaisha	Regina Indah	Brasil
Gonzalez	Luis	Canada
Lawler	Samantha	Canada
Lussier	Danielle	Canada
Neilson	Hilding	Canada
Rondeau	Joelle	Canada
Sedlak	Adriana	Canada
Wade	Gregg	Canada
Sit	Exodus Chun-Long	China
Idrobo	Gloria Pena	Colombia
Suarez	Iliana	Colombia
Suarez Torres	Ediberto	Colombia
Cifuentes	Daniel A Pedreros	Columbia
Alemu	Etsegenet	Ethiopia
Etefa	Habtam	Ethiopia
Hirpa	Emiru Diriba	Ethiopia
Tediso	Mulugeta	Ethiopia
Wakgari	Dereje	Ethiopia
Yasin	Abduslam M	Ethiopia
Castro-Koshy	Estelle	France
Hoffmann	Susanne	Germany
McCafferty	Patrick	Germany
Mejuto	Javier	Honduras
Eckerson	Ryan	Iceland
Azkarrula	Youla	Indonesia

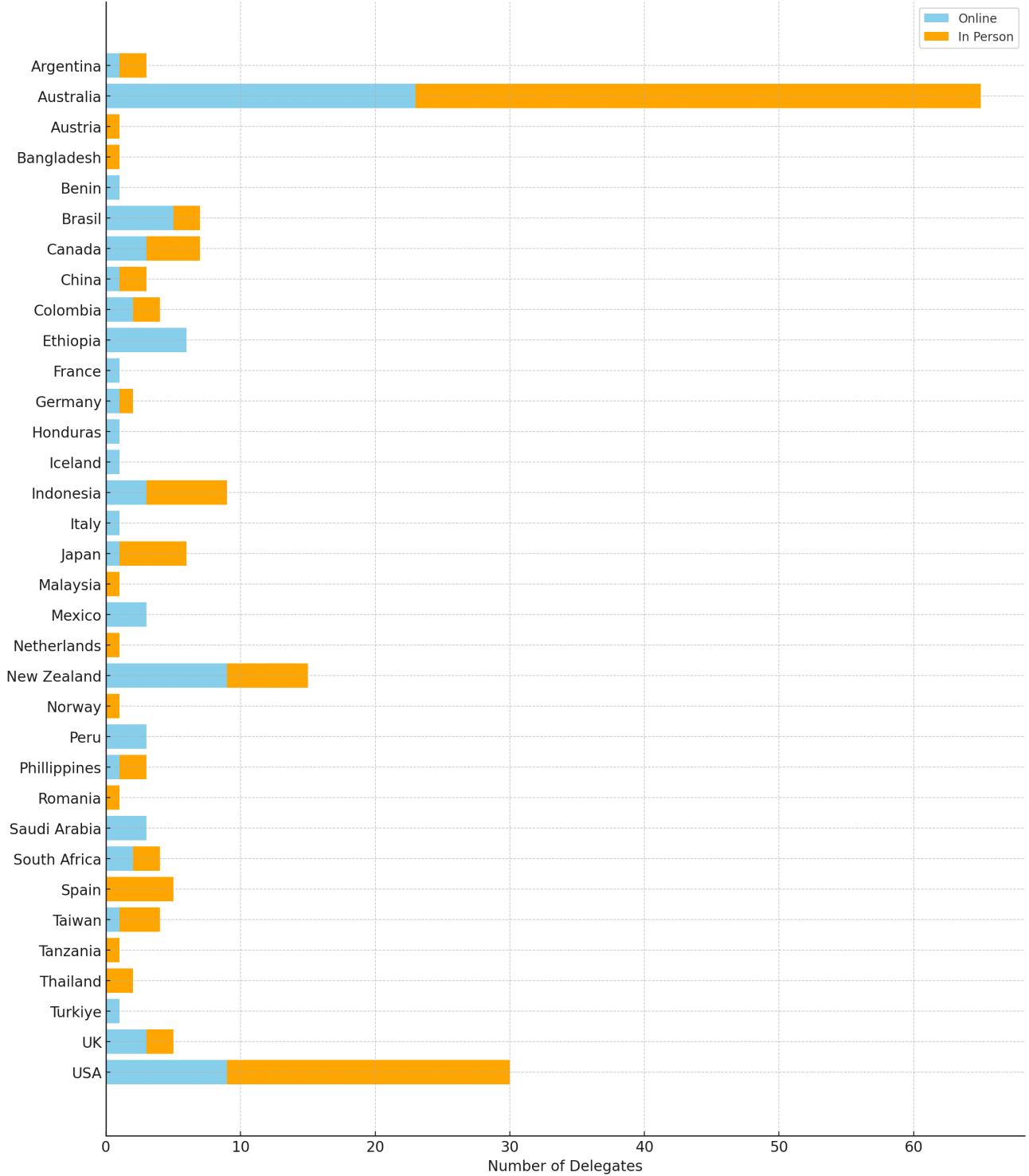
Hariawang	Irma	Indonesia
Imandiharja	Ide	Indonesia
Maresfin	Hannah	Indonesia
Mumpuni	Emanuel S	Indonesia
Nabila	Kharisma	Indonesia
Pramora	Theofilus	Indonesia
Wibowo	Antonia	Indonesia
Rotala	Giuliana	Italy
Duran	Cintia	Japan
Goto	Akira	Japan
Heenatigala	Thilina	Japan
Kakazu	Yuko	Japan
Sekiguchi	Kazuhiro	Japan
Yamauchi	Megumi	Japan
Bely	Ahmad	Malaysia
Mendez Rosas	Cuauhtemoc	Mexico
Sanchez-Garcia	Elsa	Mexico
Varguez	Milagros	Mexico
Yap	Xiao Shan	Netherlands
Cobalis	Tim	New Zealand
Davies	Gareth	New Zealand
Davies	Nalayini	New Zealand
Davis	Corrine	New Zealand
Esterling	Shea	New Zealand
Gill	Marie	New Zealand
Kameta	Jade	New Zealand
Kedumele	Tumo Fortunate	New Zealand
Leaning	Elizabeth	New Zealand
Moko-Painting	Te Kahuratai	New Zealand
Perrott	Yvette	New Zealand
Rein	Yvette	New Zealand
Warbrick	Issac	New Zealand
Watene	Krushil	New Zealand
Friestad	Vetle	Norway
Van Gelder	Leslie	New Zealand
Alleman	Barthelemy	Peru
Chuctaya	Fiorella	Peru

Ghezzi	Ivan	Peru
Fayloga	Joy	Philippines
Irog	Martine	Philippines
Palolan	Joshua Jewel	Philippines
Urrutia-Aparicio	Maitane	Romania
Zakri	Wafa	Saudi Arabia
Binneman	Anton	South Africa
Mdhluli	Joyful	South Africa
Nyarko-Mensah	Paul	South Africa
Rusch	Neil	South Africa
Belmonte	Juan Antonio	Spain
Gonzalez-Garcia	A. Cesar	Spain
Lull	Jose	Spain
Rodriguez-Anton	Andrea	Spain
Ong	Hong-Bing	Taiwan
Ou	Po-Sheng	Taiwan
Pan	Sherry	Taiwan
Yen	Ya-Chen	Taiwan
Batinoluho	Ladislau	Tanzania
Orchiston	Wayne	Thailand / China
Orchston	Dunaree	Thailand / China
Yelkenci	Aysegul	Turkiye
Bassich	Valentina	UK
Fowler	Kate	UK
Holbrook	Jarita	UK
Oldham	Lindsay	UK
Ruggles	Clive	UK
Adams	Danielle	USA
Alling	Robert	USA
Baring	Matthew	USA
Barentine	John	USA
Bonilla	Eliud	USA
Brooker	Elizabeth	USA
Cannon	Chris	USA
Case	Stephen	USA
Ellingson	Erica	USA
Freeman	Reneida	USA

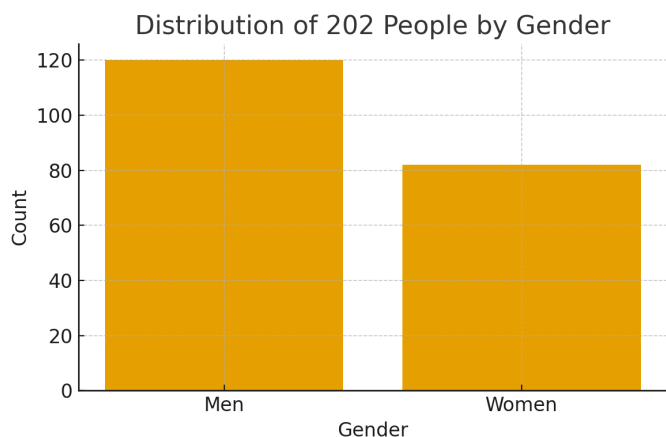
Gakis	Dionysios	USA
Gullberg	Steven	USA
Hardy	Patty	USA
Harvey	Alvin	USA
Horvath	Barbara	USA
Houston	Gordon	USA
Jaafari	Fajer	USA
Kim	Hae Sue	USA
Knierman	Karen	USA
Motah Weahkee	Mary	USA
Mott	Bon	USA
Munson	Gregory	USA
Nourse	Andrew	USA
Peluso	Daniel	USA
Sam	Doug	USA
Sarbin	Barbara	USA
Sokol	Joshua	USA
Veerabathina	Nilakshi	USA
Walling	Rosemary	USA
Young	Patrick	USA

## Distribution by country

Delegates per Country (Online + In Person) — Reverse Alphabetical Order



## Distribution by Gender



### (iv) List of recipients of IAU grants, stating the amount received, country and gender

Surname	First Name	Institution	Country	Gender	Amount (Euro)
Hariawang	Irma	Independent / Karadenta Estetika Indonesia	Indonesia	F	€ 1,800
Wibowo	Antonia	National Research and Innovation Agency	Indonesia	F	€ 700
Martin-Lopez	Alejandro	University of Buenos Aires	Argentina	M	€ 1,700
Balbi	José	Dirección de Escuelas (Prov. de Buenos Aires)	Argentina	M	€ 900
Duran	Cintia	International Astronomical Union	Mexico	F	€ 900
Irog	Martine	Philippine Astronomical Society, Inc.	Philippines	F	€ 900
Bely	Ahmad	Universiti Sulatn Zainal Abidin	Malaysia	M	€ 1,200
Imandiharja	Ide	Institute of Technology Bandung	Indonesia	F	€ 1,000
Nabila	Kharisma	Universitas Gadjah Mada	Indonesia	M	€ 1,200
Heenatigala	Thilina	Earth-Life Science Institute	Sri Lanka	M	€ 1,200
Sekiguchi	Kazuhiro	National Astronomical Observatory of Japan	Japan	M	€ 1,200
Batinoluho	Ladislaus	The Open University of Tanzania	Tanzania	M	€ 1,200
Gakis	Dionysios	University of Texas	USA	M	€ 1,200
Kim	Hae Sue	University of California	South Korea	F	€ 1,200
Peluso	Daniel	SETI Institute	USA	M	€ 1,200
Motah-Weahkee	Mary	Comanche Nation	USA	F	€ 1,200
Harvey	Alvin	MIT	USA	M	€ 650
Brooker	Elizabeth	James Cook University	USA	F	€ 650

Number of recipients: Female 8/Male 10

Total 20,000 EURO

## **(v) An Executive Summary of the Meeting**

Astronomy is considered the oldest science, with observations of the Sun, Moon, and stars setting the earliest foundations for marking time, forecasting weather, navigating land and sea, predicting seasonal change, and serving as a memory palace for oral traditions that passed knowledge to successive generations over thousands of years. Even the modern scientific process of astronomy has roots in history, religion, cultural traditions, and philosophy. As we continue to research, debate, and discuss this fact, we are becoming better equipped to refine our approach to studying the cosmos and understanding our place within it. The modern era is dominated by astronomical discoveries, cutting-edge technologies, and a growing human presence in space. We are well into a new phase of the Space Age, seeing significant advances in space exploration and plans to build habitats for humans on the Moon, Mars, and beyond. A range of social challenges accompany the technological and scientific advancements that are required to realise humanity's space-based ambitions. How can we address critical issues in the astro/space sector?

ISAAC has been pioneering this research for more than 40 years. With eyes to the future, this symposium was a joint meeting between the International Astronomical Union (IAUS399), the International Society of Archaeoastronomy and Astronomy in Culture (Oxford XIII), and the Australian Association for Astronomy in Culture (AAAC I). It examined how our understanding of space, astronomy and culture can guide us as we expand our presence in space by bringing together astronomers, Indigenous elders, educators, and social scientists to understand how ancient systems of knowledge can inform research and engagement practices. IAUS 399/Oxford XIII was an in-person and virtual symposium that recognised the important impact of cultural astronomy on astrophysics and the space sector - addressing pertinent questions about the future of humanity in the Space Age. The symposium took place during Australia's NAIDOC Week 2025, which celebrates Aboriginal and Torres Strait Islander people and culture. The symposium addressed three core questions:

- (1) How can the astronomical and space communities support Indigenous Knowledge, engage collaboratively with First Nations communities, and pave a future for the next generation of Indigenous astronomers?
- (2) How can we safeguard astronomical knowledge and heritage while establishing roadmaps and guidelines for humanity's future in space?
- (3) How are Indigenous astronomies, ground-based observatories, humanity's expansion into space, and the relationships between them juxtaposed in our future vision as we progress through the Space Age?

This symposium aims to bring scholars, elders, scientists, and policy makers together to address pressing issues to guide future synergies between Indigenous knowledges, cutting-edge astrophysics, and our collective future in the Space Age. It was one of the rare IAU symposia that attracted researchers from several disciplines outside of astrophysics. The combination of studying culture alongside science is a potent formula to build these types of engagements.

This symposium builds upon the following symposia:

1. **IAUS278 – Archaeoastronomy and Ethnoastronomy: Building Bridges Between Cultures** – Lima, Peru. Jan 5 – 14, 2011.
2. **IAUS260 - The Role of Astronomy in Society and Culture** – Paris, France. Jan 19 – 23, 2009.

And is related to several other symposia that include Division C (Education, Outreach and Heritage) topics such as:

3. **IAUS358 – Astronomy for Equity, Diversity and Inclusion – a roadmap to action within the framework of the IAU 100<sup>th</sup> Anniversary** – Tokyo, Japan. Nov12-15, 2019
4. **IAUS367 - Education and Heritage in the Era of Big Data in Astronomy. The first steps on the IAU 2020–2030 Strategic Plan** – Mendoza, Argentina. Dec 8 – 12, 2020.
5. **IAUS386 – Dark Sky and Astronomical Heritage in boosting Astro-Tourism around the Globe** – Addis Ababa, Ethiopia. Nov 13 – 17, 2023.
6. **IAUS394 – All Inclusive AGN** – Cape Town, South Africa. Aug 6 – 15, 2024.

We see this family of symposia as critical to building and maintaining a healthy global astrophysics community that is ethical, inclusive, responsible while projecting itself into the future.

IAUS399 was hosted at the University of Melbourne in Melbourne, Australia, from 7-11 July 2025. Throughout this report, the cross disciplinary aspects will be emphasized along with the groundbreaking elements of this unique symposium. The inclusion of those from underrepresented groups including Indigenous Australians was very important. For this report, Indigenous is intentionally capitalized. Starting with the Local Organizing Committee (LOC): Symposium Chair, Associate Professor Duane Hamacher (UniMelb) in the School of Physics, built a comprehensive, cross-faculty programme in Cultural & Indigenous Astronomy. Along with LOC Chair, Dr Gerhard Wiesenfeldt (UniMelb), is an Historian of Science, they assembled nineteen other individuals from not just the University of Melbourne but Universities and research institutions across Australia. Importantly, the LOC included Indigenous Australians that are part of the astrophysics community, including Krystal De Napoli (Gamilaraay) and Pete Swanton (Gamilaraay). IAU Members on the LOC include Ray Norris, Brad Tucker and Duane Hamacher. The Science Organizing Committee chair Jarita Holbrook (Harvard Smithsonian Center for Astrophysics, USA) led the SOC in the double-peer review of the 155 submitted abstracts. As with the LOC, the SOC included Indigenous Australians within the astrophysics community Dr. Stacy Mader (Gidja) and Indigenous American Dr. Annette Lee (Lakota). Given the breadth of topics the SOC included anthropologists, archaeologists, astrophysicists, historians of science, computer scientists and those that identify as cultural astronomers. Seven IAU members on the SOC are Jarita Holbrook (UK), Clive Ruggles (UK), Georg Zotti (Austria), Javier Mejuto Gonzalez (Honduras), Annette Lee (USA), Steve Gullberg (USA) and Ray Norris (Australia).

This IAU Symposium brought together astrophysicists, social scientists, and Indigenous Elders to explore the future of astrophysics in the Space Age by drawing from important lessons about the intersection of astronomy, culture, and society over the last 30 years. The symposium engaged with the latest scholarship in Indigenous Astronomy / Cultural Astronomy to address social issues within astrophysics and examine the cross-cultural relationships between astrophysics communities and

Indigenous communities around the world. Some of the goals of the Symposium was to think critically about who have been allowed to participate in Space endeavours and those that have been excluded, alongside ways to be more inclusive. The benefits of preserving dark skies and how dark skies are related to the preservation of Indigenous astronomies. Focusing on theories and methods, there was space to rethink existing ones and introduce new ones.

The IAU proceedings will explore new research methodologies and emerging theoretical frameworks, scrutinise pathways to decolonise astronomy, and discuss ways Indigenous knowledge can guide modern astrophysics. 155 abstracts were submitted under eight topics:

1. Decolonising Astronomy, Astrophysics and the Space Sciences.
2. Astronomy and the Arts, which included Art, Music and Performances.
3. Astronomy in Religion and Spirituality
4. The Preservation of Dark and Quiet Skies
5. Collaboration and Education in Astronomy, which included new ways of collaborating with those in and outside of the astronomy/astrophysics community. Also, new ways of formally and informally teaching astronomy and cultural astronomy.
6. Studies of Human Built Environments such as the archaeoastronomical studies of archaeological sites.
7. Theoretical Frameworks in Cultural Astronomy
8. Human Society and Our Space Futures

For the Symposium, the schedule allowed for sixty talks and seventy-five talks were accepted to allow for dropouts. We hosted delegates from 30 countries, with strong representations from the Global South. We focused on supporting scholars from countries that are not in the top 20 OECD wherever possible, and placed a focus on supporting Black, Indigenous, and People of Colour scholars from around the world to bring personal experiences, cultural authority, and elevate profiles and voices. However, issues arose when the visas of several delegates were not approved or cancelled due to political issues. These included scholars from sub-Saharan Africa, Southeast Asia and South America. This raised issues about hosting meetings in countries with largely racist political positions regarding immigration and visas, such as Australia and the USA, as these scholars had all the same approved paperwork as those from “more acceptable” countries in the eyes of immigration. We were frustrated to lose a large contingent from Africa for this very reason, as we aim to address this in the future (with regard to hosting ISAAC meetings) to the best of our ability.

The inclusion of Indigenous Elders was an important part of the Symposium, and the opening included the ‘Welcome to Country’ by Wurundjeri Elder Aunty Annette Xiberras. ‘Welcome to Country’ is uniquely Australian Indigenous protocol of greeting and welcoming strangers to their traditional lands. It is part of both decolonizing and Indigenising formal spaces such as conferences and part of Australia’s efforts to heal the rifts between Indigenous and other Australian communities. The UniMelb Deputy Vice-Chancellor (Indigenous), Professor Barry Judd (Pitjantjatjara) spoke on the need to support Indigenous Endeavours. UniMelb Associate Provost, Distinguished Professor Marcia Langton (Yiman/Bidjara), spoke about the importance of Indigenous Astronomy. Supported by Pro-

Vice Chancellor (Indigenous), Professor Tiriki Onus (Yorta Yorta/Dja Dja Wurrung), these opening talks by UniMelb leadership reinforced their support of this Symposium from the top down.

Two public events were held: a public lecture by Professor Clive Ruggles on *Pacific Star Knowledge* as the first of the annual July Lectures in Physics, and an all-Aboriginal panel discussion on *Indigenous Space Futures* held at the Melbourne Museum to a sold-out audience.