

Newsletter of Division C Education, Outreach and Heritage

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Division C – Education, Outreach and Heritage – like Division B- Facilities, Technologies and Data Science - is one of the two supporting divisions within the IAU. Division C's remit is broad, encompassing astronomy education research, science literacy, training for teachers, communicating with the public, cultural astronomy, preservation of tangible and intangible astronomical heritage, and history of astronomy. These areas are encapsulated by the four Commissions: Astronomy Education and Development, Communicating Astronomy with the Public, History of Astronomy, and, World Heritage and Astronomy, plus the Commission B7: Inter-Division B-C Commission Protection of Existing and Potential Observatory Sites. Further, the Division collaborates with the IAU's Office of Astronomy Outreach, Office of Astronomy for Development, Office of Astronomy for Education, and Office for Young Astronomers.

Division C has had a successful triennium (2018-2021), and especially so in the last year in spite of the global COVID-19 pandemic. In 2018, Division C restructured its working groups in response to the IAU Strategic Plan 2020-2030, resulting in the organization of ten working groups within the Division. With the four interdivision/intercommission working groups, the total number of working groups associated with the Division is now fourteen. Full reports are available at <https://iau.org/publications/iau/>.

Here follows a summary of the work carried out by the Commissions and Working Groups. Names of Commission president and vice-president or Working Group chair and co-chairs follow the group's title. We hope this condensed version of all the activities shows the Division's breadth.

Symposia, Conferences and Workshops supported by the Division:

1. IAUS 367 Education and Heritage in the Era of Big Data in Astronomy. The first steps on the IAU 2020–2030 Strategic Plan - VIRTUAL MEETING and in conjunction with the solar eclipse in Argentina, December 2020
2. 2nd Shaw-IAU Education workshop, virtual, October 2020.
3. 1st Shaw-IAU Education workshop in Paris, France, December 2019.
4. IAUS 358: Astronomy for Equity, Diversity, and Inclusion — a roadmap to action within the framework of the IAU 100th Anniversary, Mitaka, Japan, November 2019

## Commissions

### Commission C1: Astronomy Education and Development

Paulo Sergio Bretones, Boonrucksar Soonthornthum

- Project "Big Ideas in Astronomy: A Proposed Definition of Astronomy Literacy" booklet released in May 2019.
- AstroEDU Meeting: Promote Astronomy Education Research
- Inaugural AstroEDU Meeting: Astronomy Education Conference: Bridging Research & Practice in Germany in September 2019.
- Regional Workshop on Space Science Education Research in the Middle East in UAE in October 2019.
- IAU100 Global Project.
- Astronomy Day in the Schools in November 2019.
- Astronomy Education Journal (AEJ) website open, first issue in summer 2021. Continue to promote studies, collaborations with teachers, students and researchers.

### Commission C2: Communicating Astronomy with the Public

Richard Tresch Fienberg, Oana Sandu Barbulete

- WG: CAP Conferences (note CAP Journal is handled by the OAO). Many practitioners are now recognized and became Associate members of C2.
- MOU with IAU OAO and IPS in 2019.
- Formalized close relation with OAO.
- With IPS, exchange of reps and presentation at each other's regular conference. Membership grew.
- CAP 2020 was scheduled for September 2020 in Australia. Rescheduled to September 2022.
- Will hold a virtual CAP in May 2021 with central theme "CAP in the Age of Global Crises."

### Commission C3: History of Astronomy

Wayne Orchiston, Christiaan L. Sterken

Sara Schechner, Secretary, Commission C3

- "Journal of Astronomical History and Heritage", published 2 newsletters. 3 WGs - full report will be published in the Journal.
- Informal project groups to facilitate research and collaborations at Commission level: Asian Astronomy; Biographical Encyclopedia of Astronomers; Historical Instruments, Archives, and Observatories; Indian and Southeast Asian Stone Inscriptions; Johannes Kepler. The progress report for these project groups will be published in the Journal.
- Inter-Union Commission of History of Astronomy, based in the International Union of History and Philosophy of Science and Technology. Organizing a symposium in Prague. Members are recognized by the professional organizations for their work in this field.

### Commission C4: World Heritage and Astronomy

Gudrun B. E. Wolfschmidt, Juan Antonio Belmonte Aviles

- Originally created based on MOU with UNESCO. "Portal to the Heritage of Astronomy"
- Members increased.
- IAU list of "Outstanding Astronomical Heritage" (OAH) presented at GA in 2018.
- WG1 "Astronomical Heritage in Danger" list has 15 sites. Help nominate the World Heritage; 2 sites were declared as such in 2019 World Heritage Convention: Jodrell Bank Observatory in UK and Risco Caido and the Sacred Mountains of Gran Canaria Cultural Landscape in Spain.
- Organized conferences and facilitated collaborations.
- Continue to add to the IAU's list of OAH, and help nomination and inscriptions on the World Heritage List.
- Working with Commission C1 to increase visibility.

### Commission B7: Inter-Division B-C Commission Protection of Existing and Potential Observatory Sites

Constance Walker, James Lowenthal

- Meeting during 2018 IAU GA with CIE (International Commission on Illumination). MOU is in the making.
- Report to be presented at UN Office of Outer Space Affairs (UNOOSA) Committee on the Peaceful Uses of Outer Space (COPUOS) Science and Technology Sub-committee in April 2021.
- SATCON1 workshop was held in June 2020.
- Involvement in various workshops and presentations at large conferences such as AAS.
- Individuals' efforts made significant achievements in Tucson AZ, USA.
- World educational/outreach events IAU100 Dark Skies for All Global Project in 2019.
- Globe at Night. IAUS367.
- IAU's First e-Light Pollution Exhibition, art campaign with theme "Together Under One Sky."

#### Inter-Division B-C Commission WG Site Protection

Richard Green, Saeko S. Hayashi

- Dark and Quiet Skies Workshop co-sponsored by the IAU, IAC, and UNOOSA, held online.
- Follow-up workshop planned for October 2021.
- The late April 2021, meeting of the COPUOS Scientific and Technical Committee will be the first to be held in virtual format. The prospect of UN endorsement makes the substantial effort well worthwhile.

#### Inter-Division B-C Commission WG Technical Working Group

Diane Turnshek

- Activities are included in Commission B7 report.
- Highlights of the Working Group's efforts for 2020 may be provided in the Annual Report for this WG.

#### Inter-commission B7-C1 WG: Achieving Sustainable development with a Quality Lighting Framework

Margarita Metaxa, Constance Elaine Walker

- IAU's First e-Light Pollution Exhibition and Talk;
- A world-wide children's art campaign with as central theme: "Together under one sky!"
- A workshop dedicated to light pollution issues "Turn on the Night!".
- Intend to establish a strong professional network of integrating the concept of quality lighting and light pollution into the national educational environmental curriculum in the context of the UN protocol on sustainability under resolution 42/187 and the IAU Resolution 2009B5 Right to Starlight.

## Commission Working Groups

### C1 WG: Astronomy Competitions for Secondary School Students

Boonrucksar Soonthornthum

- Pandemic challenges and opportunities.
- Attended the 2nd Shaw Workshop organised by the OAE and had fruitful discussions with the OAE etc.
- During 2020 the rapid development of online teaching and competitions has been the primary interest of the WG.
- The Global e-Competition on Astronomy and Astrophysics (GeCAA) in 2020. 2<sup>nd</sup> GeCAA or IOAA will take place in 2021.
- Inclusivity for students unable to travel for financial, political or perhaps even cultural reasons, and allow for tasks which are not possible in- person such as simultaneous observations from different locations.

### C1 WG: Astronomy Education Research & Methods

Urban Eriksson, Robert Paul Hollow, Akihiko Tomita

(a) Astronomy Education Research (AER, Urban Eriksson chair)

(b) Teachers and Educators Training (TET, Akihiko Tomita chair) and,

(c) Astronomy Literacy and Curriculum Development (ALCD, Robert Hollow chair).

- The first Astronomy Education Conference: Bridging Research and practice, held in Germany in Sep. 2019, and its proceedings have been published. [https:// iau-dc-c1.org/iauaastroedu2019/wp-content/uploads/AstroEDU\\_Proceedings\\_2019.pdf](https://iau-dc-c1.org/iauaastroedu2019/wp-content/uploads/AstroEDU_Proceedings_2019.pdf), next one will be in May 2023 in Canada.
- The Astronomy Education Journal (AEJ) [www.astroedjournal.org](http://www.astroedjournal.org). Work in progress: AER surveys in iStar database.
- Networking of TET, NASE practice. Total solar eclipse in Dec. 2020.
- ALCD aligns with OAE mandates. OECS curricular paper published. IAU "BIG Ideas in Astronomy" booklet.

### C1 WG: Astronomy Education Resources (AstroEDU)

Edward Leocadio Gomez

- Transitioning to OAE. Training, MOU etc.

## Commission Working Groups

### C1 WG: Network for Astronomy School Education (NASE)

Rosa M. Ros, Beatriz Elena Garcia

- Main goal is to train teachers in didactics of Astronomy.
- The NASE courses are given in the language of the country, and all material is translated with the important cooperation of the Local Group of teachers and astronomers in the country that hosts the course. Has Local Working Groups (LWG) in each country. Increased worldwide activities during the pandemic. New online courses created in short period.
- Ran 110 new courses.
- Involved in UNESCO International Day of the Light.
- Plan for 2021 "Herschel experiment". Books published and are available on the NASE website. NASE newsletters distributed to the course participants. Now there are videos.
- Always using the NASE approach: learning by doing."

### C2 WG: CAP Conferences

Lina Canas, Oana Sandu, Ramasamy Venugopal

- Prepared CAP 2020 in Australia which is now rescheduled in September 2022.
- Organizing CAP 2021, a virtual one.

### C4 WG: Astronomical Heritage in Danger

Alejandro Martin Lopez

- The main achievement of the WG during 2020 has been to homologate and prepare to publish the list of sites of astronomical heritage that are at risk that we have gathered during these years of work. It is a set of 15 sites in America, Africa, and Asia. The list is attached as an appendix.
- Case of naming exo-world. While a major conference had to be rescheduled, three events took place to discuss the issues. Collaboration with Inter-American Society of Astronomy in Culture (SIAC).
- Participated in the newly formed IAU-RAS-AAS committee on sensitive astronomical sites.
- Addressing conflicts between large astronomical consortia and facilities, and the local population.
- Interacted with amateur astronomers.

#### C4 WG: Windows to the Universe: Classical and Modern Observatories

Matthias Hunsch, Ian S. Glass

- The aim of the WG is to advance the WHL (World Heritage List) nomination project “Route of astronomical observatories”, which focuses on the possible serial (multi-site) transnational nomination of a number of classical observatories all over the world, combining observatories in different continents, connected by architectural and landscape features, by comparable scientific instrumentation or by scientific cooperation.
- Pandemic situation worldwide limited activities in 2020. For the future, it is intended to support observatories in sensitizing the public to the heritage issue by means of talks, guided tours, observing nights, exhibitions, and other activities in cooperation with C1 “Astronomy Education and Development”.
- In this context, also the preservation of a dark and quiet sky above the more modern observatories should be addressed.

## Inter-Commission Working Groups

### Inter-commission B4-C3 WG: Historical Radio Astronomy (Inter-Union IAU-URSI)

Richard T. Schilizzi, Leonid I. Gurvits

- Making effort in preserving historical radio-astronomical equipment.
- List of books published or in preparation.
- Presence at URSI GA in 2021.

### Inter-commission C1-C3-C4 WG: Archaeoastronomy and Astronomy in Culture

Steven Gullberg, Javier Mejuto Gonzales

- Membership - this field is interdisciplinary, and the Associates make valuable contributions from backgrounds in fields other than astronomy. Collaborate with other professional organization in terms of astronomy and culture. Developing an eBook on Astronomy in Culture to be published by the end of 2021.
- Trying to address geographical gaps in the collective knowledge. 5 committees. 6th was formed in November 2020 which is IAU-RAS-AAS committee on astronomical sites and indigenous culture.
- Preparing for workshops in 2021-2022 at IAU, RAS, and AAS. Publications and presentations.

### Inter-commission C1-C3-C4 WG: Ethnoastronomy and Intangible Astronomical Heritage

Duane W. Hamacher

- The aim of this WG is to provide an avenue for recording, preserving, and safeguarding culturally specific Knowledge Systems and traditions related to astronomy. This includes intangible heritage, such as language, oral tradition, song, dance, and social customs relating to astronomy. Involved in "One Sky, many Worlds" a travelling Indigenous Astronomy art and knowledge exhibition, to be launched in 2021 in Ottawa, Canada. Outcomes included in national curricula in member countries (such as in Australia).
- The field of Astronomy in Culture has reached a stage of increased momentum in its evolution and advancement. Will continue to guide further development of and education.

### Inter-commission C1-F2-F3-H2 WG: Education and Training in Astrobiology

Muriel Gargaud

- This Working Group has been created in October 2015 and renewed in 2018 to coordinate training, education, and outreach activities in astrobiology at the international level.
- Online resources, programs, courses.
- Collaboration with NASE, targeting public and high school teachers.

## Division Working Group

### Division C WG: Star Names

Eric Mamajek

- This WG consists of an international group of astronomers with expertise in stellar astronomy, astronomical history, and cultural astronomy who research and catalog proper names for stars for the use by the international astronomical community and to aid the recognition and preservation of intangible astronomical heritage.
- During the 2018-2021 triennium, WGSN continued to exhaustively search for star names from cultural astronomy literature, research their etymologies, maintain the IAU Catalog of Star Names, support IAU public naming campaigns, and respond to queries from IAU leadership and the public about nomenclature, among other activities.
- Three members of WGSN were drafted to the Steering Committee for the IAU100 NameExoWorlds public naming campaign which added 113 very diverse IAU star names (and 113 exoplanet names) from around the world with more than 780,000 people engaged.
- Constructing a database of star and asterism names and etymologies (especially for Indigenous names) to help preserve their heritage, and to include etymologies for IAU star names on the IAU website (hopefully to be completed during the next triennium).
- A preliminary statistical analysis of adopted IAU star names that pre-date the NameExoWorlds campaigns finds that they are from Arabic (44.3%), Latin (6.5%), Greek (4.9%), Chinese (2.4%), and other languages and cultures <2% each.
- While the adopted IAU names largely reflect the names in common usage by astronomers in recent centuries, WGSN is hoping to diversify the pool of IAU star names further in the years ahead through a mix of researching cultural names and IAU public naming campaigns.

## Inter-Division Working Group

### Solar Eclipses (Divisions C and E)

Jay M. Pasachoff

- Report on the educational and outreach aspects of the activities of the IAU Working Group on Solar Eclipses of Divisions C (Education, Outreach, and Heritage) and E (Sun and Heliosphere) over the last triennium and with plans for the next triennium; 2019 and 2020 total eclipses in Chile and Argentina. Next total eclipse is in Western Australia in 2023.
- Websites: [www.eclipses.info](http://www.eclipses.info), and for specific expeditions: [www.totalsolareclipse.net](http://www.totalsolareclipse.net).
- The Working Group on Solar Eclipses has as its task the coordination of solar eclipse efforts, particularly making liaisons with customs and other officials of countries through which the path of totality passes and providing educational information about the safe observation of eclipses for the wide areas of the Earth in which total or partial eclipses are visible.
- Among our successes is the distribution of material for tens of thousands of eye-protection filters.