

IAU Commission C1: Astronomy Education and Development

Triennial Report (2021-2024)

1. Commission C1 Organizing Committee

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2. Commission C1 Working Groups:

- Commission C1 WG: Astronomy Competition for Secondary School Students
- Commission C1 WG: Astronomy Education Research & Methods
- Inter-Commission C1-C2-C3-C4 WG: Astronomy in Culture (WGAC)
- Inter-Commission C1-F2-F3-H2 WG: Education and Training in Astrobiology
- Inter-Commission C1-C3-C4 WG: Ethnoastronomy and Intangible Astronomical Heritage

3. Activities of Commission C1 during 2021-2024

During the past 3 years, Commission C1 under IAU Division C has actively undertaken its roles in promoting Astronomy Education and Development through the operations of the 2 working groups: Astronomy Competition for Secondary School Students and Astronomy Education Research & Methods.

The working group on Astronomy Competition for Secondary School Students has continuously organized the International Olympiad on Astronomy and Astrophysics (IOAA) annually co-hosted with the member countries in many regions across the globe. The 14th IOAA was successfully hosted by Colombia in November 2021 a hybrid format even the COVID-19 was still severely spread out. In August 2022, the 15th IOAA was held successfully in Kyiv, Ukraine in hybrid format and during August, 10-20 2023, the 16th IOAA was also successfully organized fully on-site in Chorzów, Poland with 53 countries around the world participated on this event. And in 2024, the 17th IOAA has already planned to be organized in Brazil. The WG has also made a survey of a National Astronomy and Astrophysics Competition practices aims to

collect information about the national selection procedure of the participated countries, intensive training in astronomy and astrophysics for students in each country and sponsor methods.

The working group on Education Research & Methods has continued actively organized the “Astronomy Days in Schools (ADiS) project”, an interdisciplinary approach on Astronomy and Culture for schools’ education which planned to be held 4 times in a year during equinoxes and solstices. The project has begun since 2021 as one of the IAU 100 Global Projects and is organized by the sub-WG of Astronomy Days in Schools under the WG of Astronomy Education Research & Methods. During 2021-2023, the ADiS has organized successfully 4 times in a year with the cooperation of the core countries, namely Japan, Thailand, Iran, Bulgaria and Romania. We are preparing the activities for the equinoxes and solstices in 2024.

During 2021-2023, the “Astronomy Education Journal (AEJ)” has been continuously published. Vol.1 and Vol.2 have been published in 2021-2022 and Vol.3 is under preparation in corresponding with AstroEdu2023 which has already held in May 2023 at the University of Toronto, Canada.

Commission C1 has also cooperate with other Commissions of Division C especially the endorsement of inter-commission members and the participation of inter-commission activities.

4. Commission C1 Working Group: Astronomy Competitions for Secondary School Students (2021-2024)

The IAU EC renewed the WG Astronomy Competitions for Secondary School Students in September 2021. Since that time, the WG has prepared a feedback survey for participants of international competitions (Olympiads) and has been preparing an updated version of the survey of astronomical competitions, which we expect to disseminate through the NAEC and NOC network shortly. Also discussed was what to include in a set of guidelines for astronomical competition participants and organizers.

The International Olympiad on Astronomy and Astrophysics during 2021-2023

The 14th IOAA was successfully hosted by Colombia in November 2021 a hybrid format, with the organizers and executive committee present in Colombia and teams and team leaders participating remotely, using Zoom meetings and the OlyExam Olympiad software. The competition was a success with 47 countries participating, although some lessons were learned for future hybrid events regarding the (un)reliability of remote/computerized solutions (overloading of Zoom and the exam platform, errors in entering data). Nonetheless such events are possible even at the scale of the Olympiad. The event was also used for outreach to teachers and pupils to encourage them to teach and learn science (including astronomy) and explain why STEM education is useful and what the benefits of STEM competitions such as Olympiads are. This included 1-hour live panel discussion with scientists and educators participating as organizer of the IOAA broadcast online including audience questions.

The COVID-19 pandemic continued to impact activities relating to astronomy competitions and events, with many events taking place only virtually. However in some countries where vaccination rates are high the restrictions were gradually being eased and this

trend is likely to continue. At this time the organizers of the 15th IOAA expect to be able to host an in-person even during the summer.

Finally, during August 14-22, 2022, the 15th International Olympiad on Astronomy and Astrophysics (15th IOAA) has managed to be organized in hybrid format at Kutaisi, Georgia. There were 209 students from 37 main and 6 guest teams participating the 15th IOAA. In addition, 24 students from 6 countries participated in on-line mode. This year, 28 Gold, 38 Silver and 55 Bronze medals were awarded.

In August, 10-20 2023, the 16th IOAA was also successfully organized in Chorzów, Poland with 236 contestants from 50 countries and 2 more countries, namely France and Afghanistan, as the observers participated. This year 27 Gold, 41 Silver, 50 Bronze medals, 29 honorary mentions and 2 prizes of team competition were awarded.

The 17th IOAA is planned to be organized in Brazil and the 3rd IOAA Junior in Nepal in 2024.

A Survey of National and regional competitions and information

WG members have as previously been active both in gathering information about local competitions and interested persons and in organizing such events. Some examples (WG member sources in parentheses) include:

- Poland was able to hold all three rounds of the national Olympiad in person thanks to relaxed Covid-19 restrictions. The event was also used to publicize astronomy education and encourage pupils to study astronomy. [G. Stachowski]

- Slovenia held its annual national astronomy competition for primary and secondary schools, including for the first time an additional competition for 6th grade primary school students (age 11-12). Astronomical educational content for teachers and pupils was published on the DMFA Slovenia (national Mathematical, Physical and Astronomical Society) website and Youtube channel. [A. Gustin]
- Lithuania held its National Astronomy Olympiad and an astronomy quiz "Under Starry Skies" for middle school and high school students virtually. Virtual lectures devoted to new discoveries in astronomy for teachers and high school students were delivered by astronomers of Vilnius University. [J. Sudzius]

- Hungary organized 3 rounds of national astronomical Olympiad competition and a Mini-Olympiad for 5 countries. [T. Hegedus]

- Indonesia held its astronomy Olympiad virtually and hosted the IAU NASE course for teachers. There was also a national research competition for high school students which includes an astronomy component. [H. Malasan]

At present, the WG has prepared a feedback survey for participants of international competitions (Olympiads) and has been preparing an updated version of the survey of astronomical competitions, which we expect to disseminate through the NAEC and NOC

network shortly. The survey aims to collect information about the national selection procedure of the participated countries, intensive training in astronomy and astrophysics for students in each country and sponsor methods.

The survey is intended for the participating countries to learn, to get ideas and find ways to improve as well as to help guide new country participants.

In April 2023, the IOAA executive committee surveyed the selection process of all countries participated in IOAA, 44 countries answered questions. Most countries has two or three round of competition to selected students as a national representative. The first round of competition is usually an online competition or a paper competition. The next round is more challenge, including observation competition. National representatives are trained before they depart for the IOAA event. Most countries get support for the National competition from their governments, i.e. Ministry of Education, or National Astronomical Society. Some countries, students have to find their own travel fund, either totally or partially financial supports. More survey will continue to be done in 2024.

4. Commission C1 Working Group: Astronomy Education Research & Methods, annual report in 2021-2023

4.1 Astronomy Day in Schools (ADiS)

The Astronomy Days in Schools project, which began as one of the IAU 100 Global Projects, has been organized by the sub-WG of Astronomy Days in Schools under the WG of Astronomy Education Research & Methods.

The project website (<https://adis.narit.or.th/>) is hosted by the National Astronomical Research Institute of Thailand (NARIT) starting in 2021.

The project hosts a quarterly online program on the occasion of the equinox and solstice, which is a key feature of the project. Students and teachers from different countries present the astronomical, cultural, and social aspects in the scenes of their daily life and at their schools at that time.

Member of the ADiS sub WG (alphabetical order of family name)

Kazuya Ayani, Bisei Astronomical Observatory, Japan
Hasan Baghbani, Iranian Teachers' Astronomy Union, Iran
Julie Bolduc-Duval, University of Toronto, Canada
Paulo Sergio Bretones, Universidade Federal de São Carlos, Brazil (co-chair)
Sze-leung Cheung, National Astronomical Research Institute of Thailand, Thailand
Parham Eisvandi Dehnoei, Iranian Teachers' Astronomy Union, Iran
Rosa Doran, NUCLIO, Núcleo Interactivo de Astronomia, Portugal
Urban Eriksson, Lund University, Sweden
Rahimeh Foroughi, Iranian Teachers' Astronomy Union, Iran

Rica Sirbaugh French, MiraCosta College & Center for Astronomy Education, United States

Edward Leocadio Gomez, Las Cumbres Observatory, United Kingdom

Maryam Hadizadeh, Iranian Teachers' Astronomy Union, Iran

Robert Paul Hollow, CSIRO, Australia

Hossein Khezri, Iranian Teachers' Astronomy Union, Iran

Carmen Aleida Pantoja, University of Puerto Rico-Rio Piedras, Puerto Rico

Maryam Papari, Iranian Teachers' Astronomy Union, Iran

Mahdi Rokni, Students' International Network for Astronomy, Iran

Rosa M. Ros, Universitat Politècnica de Catalunya, Spain

Saeed Salimpour, OAE, Germany

Boonrucksar Soonthornthum, National Astronomical Research Institute of Thailand, Thailand

Akihiko Tomita, Wakayama University, Japan (co-chair)

Online programs at equinoxes and solstices, date and participating countries during 2021-2023 are as follows:

March equinox: on March 21, 2022, Japan, Iran, and the sub WG members

June solstice: on June 28, 2022, Japan, Thailand, Iran, Bulgaria, Romania

September equinox: on September 30, 2022, Japan, Thailand, Iran, Bulgaria, Romania, Egypt

December solstice: December 23, 2022, Japan, Thailand, Iran, India, Russia, Bulgaria, Romania, Spain, Columbia, Peru

March equinox: March 26, 2023, Japan, Thailand, Iran, Bulgaria, Romania

June solstice: June 21, 2023, Japan, Thailand, Iran, Bulgaria, Romania

September equinox: September 30, 2023, Japan, Thailand, Iran, Bulgaria, Romania

December solstice: December 22, 2023, Japan, Thailand, Iran, Bulgaria, Romania

An archive is available on our YouTube channel:

https://www.youtube.com/channel/UCZgkhOGcFwJGLVo_BnVzY9w (its shortened URL: <http://bit.ly/3uDICG4>), where edited videos with English subtitles are stored.

Presentations

“Launch of the new Astronomy Day in Schools (ADiS) and its results to date” Akihiko Tomita, Paulo Bretones, the 31st General Assembly of the IAU, Division Day - Division C, contributed talk (No.853), August 5, 2022, Busan, Korea.

“Astronomy Day in Schools project: practice on equinoxes and solstices” Akihiko Tomita, Paulo S. Bretones, 9th International Conference on Geoscience Education (IX GeoSciEd), August 21, 2022, Matsue, Japan.

“Classroom Activities Related to Equinoxes and Solstices: Examples from the Astronomy Day in Schools” Tomita Akihiko, Paulo Bretones, the 4th Shaw-IAU Workshop on Astronomy for Education, 15 and 16 November 2022, online.

All ADiS activities organized during 2023 both equinoxes and solstices were presented at AstroEdu2023 which had already organized in May 2023 at the University of Toronto, Canada and APRIM2023 in August 2023 in Koriyama, Japan.

4.2 Astronomy Education Journal (AEJ)

AEJ aims to meet the needs of the astronomy education community by providing a location for all manner of practical, newsworthy and scholarly publications involving developments in the field. In a sense, the journal tries to capture the original spirit whilst taking on board the important lessons from the, now out-of-print, Astronomy Education Review. By focusing on building community collaboration, disseminating important news and opinions, while also maintaining a section on more formal, technical, Astronomy Education Research (AER).

Editorial Team

Publishers and Co-editors:

Urban Eriksson
Paulo S. Bretones

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Saeed Salimpour

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Akihiko Tomita (Japan)

Archives

Vol. 1 No. 1 (2021): Astronomy Education Journal-December 2021

Vol. 2 No. 1 (2022): Astronomy Education Journal-December 2022

Vol. 3 No. 1 (2023): Astronomy Education Journal-December 2023

See the website: <https://astroedjournal.org/>

Astronomy Education 2023 (AstroEdu2023)

The inaugural AstroEdu Conference in 2019 (Under WG7: Commission C1), held in Garching at the ESO Supernova, Germany, showed that there is a need for a conference dedicated to bringing together researchers and practitioners from astronomy, astronomy education, general education and other communities. The second AstroEdu Conference 2023 (has been shifted to OAE with the cooperation of Commission C1), with the theme of Bridging Research & Practice, was successfully held from 10 to 12 May 2023, generously hosted by the Dunlap Institute for Astronomy, University of Toronto, Canada, in a hybrid format with over 140 registered participants. The conference had three keynote speakers and 46 talks that covered Astronomy Education Research, Astronomy Education Practice, Indigenous perspectives in (astronomy) education, and Future of Astronomy Education. In addition, there were 15 workshop sessions, over 50 posters, and a special panel discussion on the Future of Astronomy Education. The 2023 conference themes provided an overview of what has happened in the five years and looked ahead into the future. For more information about the conference visit:

<https://astroeducon.org/2023/>

Conference Themes

1. Theory and Methodology: Astronomy Education Research Highlighting the developments and innovations in research methodologies and theoretical perspectives.
2. Tangible Outcomes: Astronomy Education Practice
3. Highlighting the innovations in bringing astronomy into the classroom and beyond.
4. The Future of Astronomy Education: Learning from the past, building the present, and looking forward to the future

SCIENTIFIC ORGANISING COMMITTEE

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Paulo S. Bretones (Universidade Federal de São Carlos, Brazil)

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Michael Fitzgerald (LCO, Australia/USA)

Tania Johnston (ESO, Germany)

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John Percy (University of Toronto, Canada)
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Ilana MacDonald (University of Toronto, Canada)
Leo Alcorn (University of Toronto, Canada)
Saeed Salimpour (Deakin University/IAU OAE, Australia/Germany)

Reported by Tomita Akihiko: Co-Chair IAU ADiS and Editorial Board of Astronomy Education Journal (AEJ)

5. ADiS Presentations at IAU GA2022

The IAU GA2022 XXXIst General Assembly International Astronomical Union were held during August 2-11, 2022 in Busan, Republic of Korea. Members of Commission C1 contributed 3 presentations on August 5, 2022, 13.30-16.00 at IAU GA2022 Division C Day on the title “Launch of the new Astronomy Day in Schools (ADiS) and its results to date” as follows:

Contributor	Title
1. Akihiko Tomita	Launch of the new Astronomy Day in Schools (ADiS).
2. Hassan Baghbani	Teachers’ International Network for Astronomy (TINA).
3. Mahdi Rokni	Students’ International Network for Astronomy (SINA).

6. Other Collaboration

President of Commission C1 (B. Soonthornthum) has been invited to join the working group of Pro-Am relations in Astronomy which is one of the strategic actions of the IAU as to “Encourage communication of science and critical thinking through IAU member in public engagement, professional-amateur and citizen science activities” (IAU Strategic Plan 2020-2030). The aim of the Pro-Am relations working group is to encourage more astronomical activities between IAU professional astronomers and amateur astronomers both in research and education. It is expected that the IAU Pro-Am relations program would support the mission of the Commission C1 on astronomy education and development.

Reported by Boonrucksar Soonthornthum (IAU Commission C1 President)