



IAUS367

## **Education and Heritage in the Era of Big Data in Astronomy. First steps on the IAU 2020-2030 Strategic Plan.**

The IAUS 367 was originally proposed to be developed in Bariloche city, Río Negro Province, Argentina. The pandemic situation, forced the organized to move the activities to the virtual and for this reason the meeting was completely online synchronous. The transmission was made using a webinar platform provided by IAU and managed by ITeDA Mendoza, Argentina.

### **Overview**

Astronomy education has become a major topic for the IAU 's goals. Scientific results from this field have great potential to enhance the teaching and learning of Astronomy for learners of many ages.

The primary goal of this Symposium was to give perhaps for the first time a global vision of Education and Heritage in the frame of the goals of the IAU, taking into account the Plan 2020-2030 and to propose an eventual 'next steps' road map and a global astronomy education agenda for the next decade, while honouring the education from the past.

In this sense, we would foster inclusiveness in the advancement of astronomy and facilitate the advancement of the next generation of astronomers and scientists, through encouragement of the use of new methods of learning and best practices (including distance education: Moocs) in pedagogy at university level, as well as the use of astronomy for teaching and education at school level, which are part of the definitions of the proposed Office of Astronomy for Education (OAE), which also pursues the establishment of a Network of Astronomy Education Contacts (NAECs) to provide accessible materials and astronomy literacy guidelines globally. All this topics were part of the goals of this symposium, and we believe that they were reached.

A total of 537 assistants from 73 countries in 5 continents (list attached), were part of the formal meeting, developed along 5 days, which was the first IAUS completely virtual. A partial view of the assistants is in the Figure 1. The number of assistants to the Public Conferences was over the 500 at the zoom room but also at the YouTube channel opened specially for the Symposium (Figure 2). All the talks were recorded and are at that channel.

The full program included 23 Invited Talks (4 public conferences), 50 oral contributions, 110 poster contributions, 3 Workshops (Education of Astronomy), 1 Round Table (Inclusion, Innovation) and 2 Associates events (Galaxy Forum, Light Pollution), under the coordination of **division C, and the support of divisions A, B, E and F.**

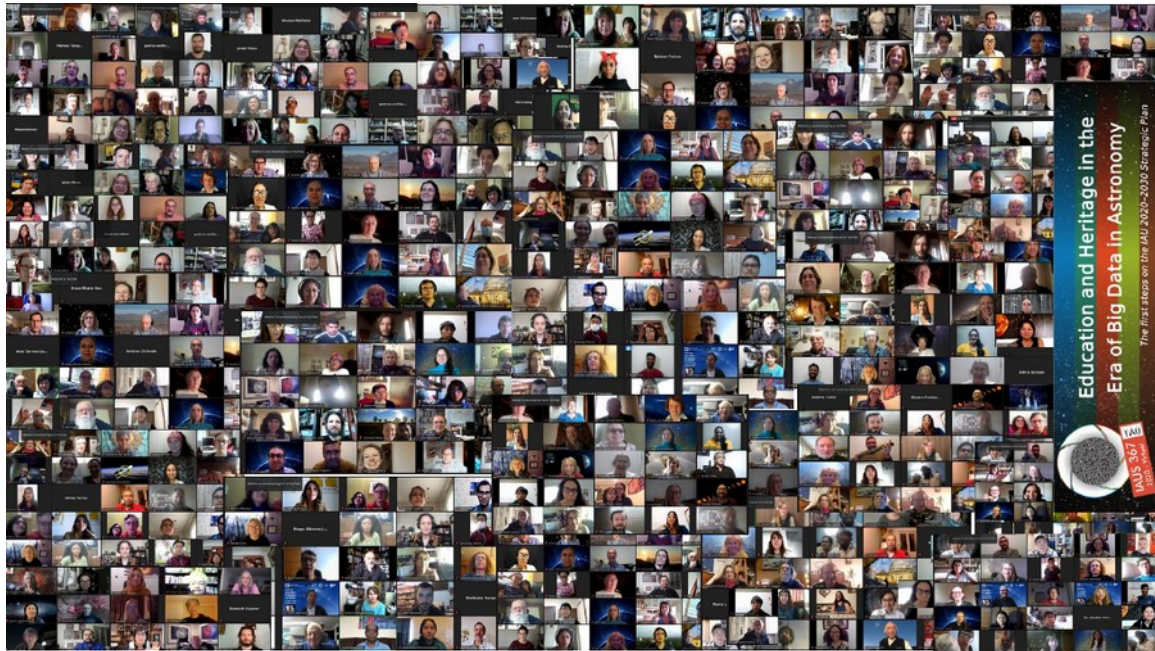


Fig. 1 IAUS367-Group Photo

## Scientific Topics

The main topics of the meeting along the 10 sessions (see program in the attached document) were:

- State-of-the-art of astronomy education in countries/continents in the framework of the 2020-2030 IAU plan, including the meta-analysis of astronomy education research on contents/school grade levels/focus on education cross studies.
- Literacy in Astronomy.
- Use of Astronomy Education Research experiments and results by teachers and in non-formal education activities (museum, planetarium, etc.)
- Innovations in education methodologies and instrumentation, including distance education: Moocs
- Research into the value and influence of astronomy education in other disciplines
- Big Data in education and data-driven education activities (see
- Astronomy as interdisciplinary approach to science education in all levels.
- Inclusive education in Astronomy in all the fields, and the role of the women in Astronomy.
- Citizen Science taking advantage of astronomical events (i.e. solar eclipses, star showers)
- Cultural Astronomy and heritage and education: from Stonehenge to the Space telescopes.

The details of the workshop, sessions, programs, parallel activities and satellite events, are at the website (<http://sion.frm.utn.edu.ar/iaus367/>)

## Special activities

An important characteristics of this symposium were the spaces proposed for exchange and discussion; the satellite activities combined the professional activities and the Communication with the Public.



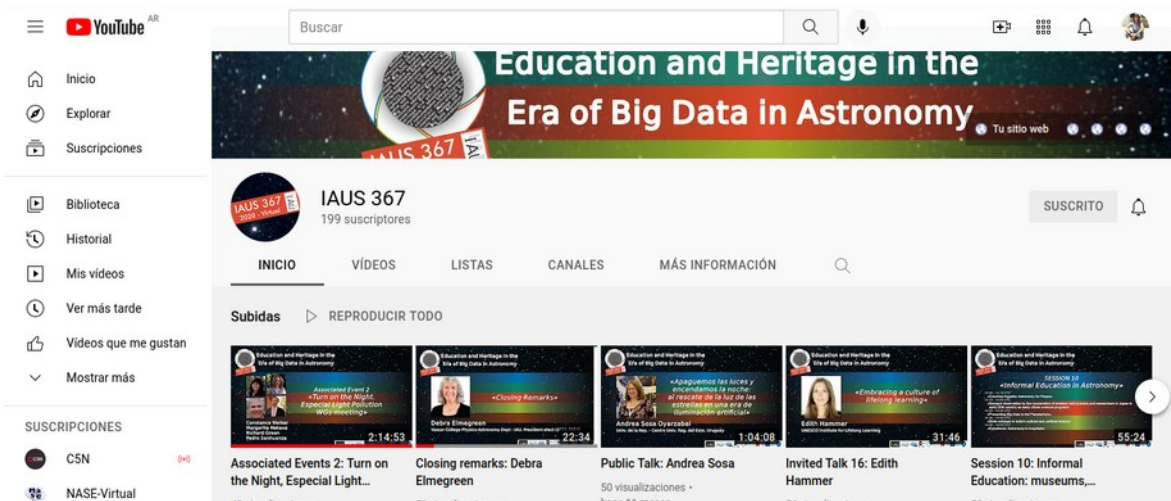


Figure 2. [IAUSS367 YouTube chanel](#)

The [Educational Program](#), organized in parallel session, was devoted to:

1. Conferences for the public given by [Jay Pasachoff \(Eclipses, in English\)](#), [Andrea Sosa \(Light Pollution, in Spanish\)](#), [Nikos Prantzos \(Astrobiology, in English\)](#), and [Juan Belmonte \(Cultural Astroomy, in Spanish\)](#)
2. Satellite events
  - a) [Galaxy Forum](#), chair: Steve Durst
  - b) [Turn o the Night, LightPollution workshop](#), chairs Connie Walker, Richard Green, Margarita Metaxa and Pedro Sanuenza.
3. Workshops on Didactics of the Astronomy in English and Spanish
  - a) “Eclipses” by NASE Program, chaired by Rosa Ros, in [English](#) and [Spanish](#).
  - b) [“Costrucción de dispositivos didácticos”](#), by Nestor Camino
4. [Research, innovation, literacy and inclusion in Astronomy Education, round table \(in Spanish\)](#) (chaired by Nicoletta Lanciano, Amelia Ortiz and Néstor Camino)

## Conclusions

The exchange and discussion along the week of the IAUS367 were really fruitful. The opening talk, an overview of the IAU and its Offices with emphasis on where education and heritage fit into the IAU structures and its Strategic Plan by Ewine van Dishoeck, and the closing remarks by Debra Elmegreen were the finishing touch for the successful symposium, that put in evidence the power of science in general and astronomy in particular for education in different topics and at different levels.

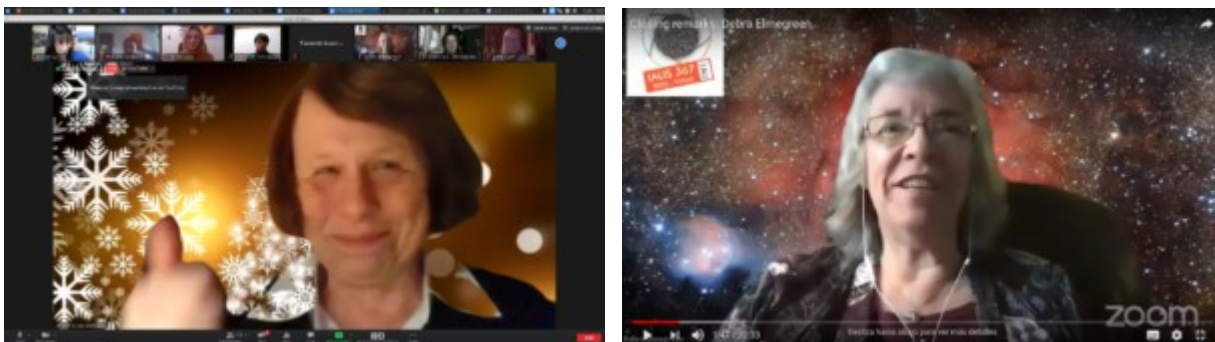
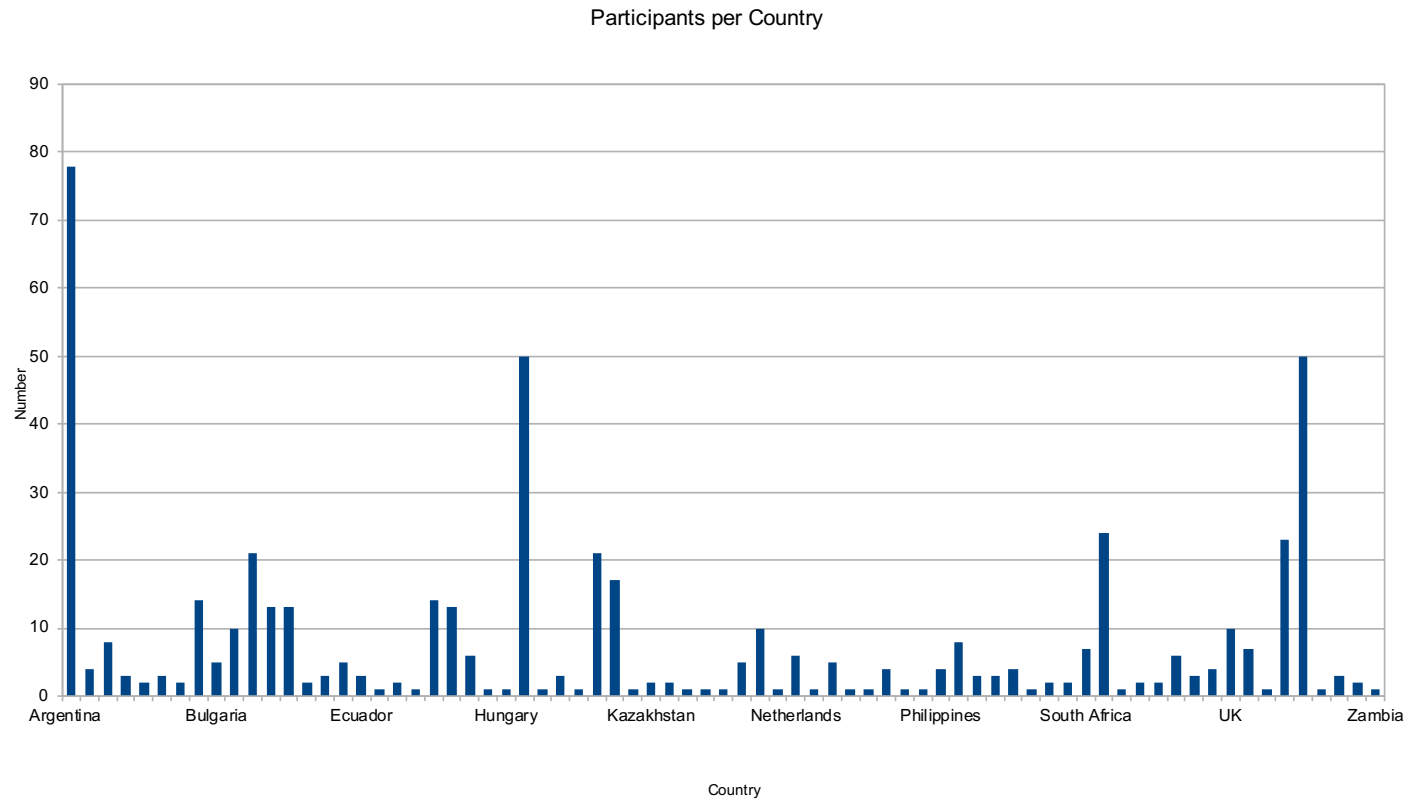


Figure 3. Ewine van Dishoeck, IAU President (left) and Debra Elmegreen, IAU Presiden elect (right) at the closing ceremony (print screen at zoom room)

Argentina	78
Armenia	4
Australia	8
Austria	3
Azerbaijan	2
Bangladesh	3
Belgium	2
Brazil	14
Bulgaria	5
Canada	10
Chile	21
China	13
Colombia	13
Czech Republic	2
Denmark	3
Dominican Rep.	5
Ecuador	3
El Salvador	1
Ethiopia	2
Finland	1
France	14
Germany	13
Ghana	6
Greece	1
Hungary	1
India	50
Indonesia	1
Iran	3
Israel	1
Italy	21
Japan	17
Jordan	1
Kazakhstan	2
Kenya	2
Latvia	1
Lithuania	1
Madagascar	1
Malaysia	5
Mexico	10
Mongolia	1
Netherlands	6



New Zealand	1
Nigeria	5
Norway	1
Pakistan	1
Panamá	4
Paraguay	1
PERU	1
Philippines	4
Poland	8
Portugal	3
Puerto Rico	3
Rep. of Korea	4
Romania	1
Russia	2
Singapore	2
South Africa	7
Spain	24
Sri Lanka	1
Sweden	2
Switzerland	2
Tanzania	6
Thailand	3
Turkey	4
UK	10
Ukraine	7
Un.ArabEmirates	1
Uruguay	23
USA	50
Vatican-CityState	1
Venezuela	3
Vietnam	2
Zambia	1
<b>TOTAL</b>	<b>539</b>

# TIMELINE FOR THE IAUS367 VIRTUAL

(All times UTC)



## Color code

- Red** : opening ceremony and closing remarks.
- Black** : Symposium invited talks and sessions
- Green** : Associated events/workshops/round tables.
- Blue** : Public conferences.

TUESDAY December 8		Chair
11:00 - 11:30	<p><b>Opening ceremony:</b></p> <p><b>Beatriz García, SOC Welcome</b></p> <p><b>Juan Pablo Paz, Secretary of Scientific and Technological Articulation, MINCyT-Argentina</b></p> <p><b>Ewine van Dishoeck, IAU Welcome</b></p>	Beatriz García / Rosa Ros
11:30 - 12:00	<p><u>Invited Talk 1</u></p> <p><b>John Hearnshaw</b></p> <p><i>"The IAU Strategic Plan 2020-2030, a blueprint for forging a new social revolution in astronomy and for using astronomy as a tool for building a progressive society"</i></p>	Susana Deustua
12:00 - 13:10	<p>Session 1:</p> <p><b>State of the Art in Astronomy Education.</b></p>	Paulo Bretones
13:10 - 13:30	Break	
13:30 - 14:00	<p><u>Invited Talk 2</u></p> <p><b>Néstor Camino</b></p> <p><i>"The earthly gaze upon the sky: a single worldview or many worldviews in dialogue?"</i></p>	Julieta Fierro
14:00 - 15:00	<p>Session 2:</p> <p><b>Citizen Science and Solar Eclipses.</b></p>	Beatriz García
15:00 - 15:30	<p><u>Invited Talk 3</u></p> <p><b>Alex Young</b></p> <p><i>"Engaging the Public through Solar Eclipses, 2017 and Beyond: A NASA Perspective"</i></p>	Hebe Cremades
18:00 - 20:00	<b>Associated Event 1: Galaxy Forum</b>	Steve Durst

<b>WEDNESDAY December 9</b>		<b>Chair</b>
11:30 - 12:00	<u>Invited Talk 4</u> <b>Marcus Pössel</b> <i>"The IAU Office of Astronomy for Education"</i>	»» Rosa Ros
12:00 - 13:00	Session 3: <b>Astronomy Education Research.</b>	»» Akihiko Tomita
13:00 - 13:30	<i>Break</i>	
13:30 - 14:00	<u>Invited Talk 5</u> <b>Georg Zotti</b> <i>"Stellarium: simulation for research and outreach"</i>	»» Andrea Sosa
14:00 - 15:00	Session 4: <b>Influence of Astronomy in other disciplines. Astronomy to promote science vocations.</b>	»» Rosa Ros
15:00 - 15:30	<u>Invited Talk 6</u> <b>Susana Deustua</b> <i>"IAU Strategic Plan for Education "</i>	»» Amelia Ortiz
15:30 - 16:00	<u>Invited Talk 7</u> <b>Chris Impey</b> <i>"Online Resources for Astronomy Education and Outreach"</i>	»» Mariana Orellana
18:00 - 20:00	<b>Discussion and round table: Research, innovation, literacy and inclusion in Astronomy Education (in Spanish).</b>	»» Nicoletta Lanciano / Amelia Ortiz / Néstor Camino
21:00 - 22:00	<b>Public Talk</b> Jay Pasachoff: "This Solar Eclipse and Others" (in English).	»» Néstor Camino

<b>THURSDAY December 10</b>		<b>Chair</b>
<b>10:00 - 11:00</b>	<b>NASE Workshop: Eclipses!!</b> (in English) for Europe, Africa, Asia and Oceania.	Rosa M. Ros/ Beatriz García / Mahdi Rokni / Noorali Jiwaji
11:30 - 12:00	<u>Invited Talk 8</u> <b>Michael Fitzgerald</b> <i>"A review of astronomy education research from 1904 to 2019"</i>	Hidehiko Agata
12:00 - 13:00	Session 5: <b>Innovation in Education.</b>	John Hearnshaw
13:00 - 13:30	<i>Break</i>	
13:30 - 14:00	<u>Invited Talk 9</u> <b>Boonrucksar Soonthornthum</b> NARIT (Next C1 President). <i>"Astronomy Education in the Era of Digital Transformation Strategies on"</i>	Paulo Bretones
14:00 - 15:00	Session 6: <b>Literacy in Astronomy.</b>	Robert Hollow
15:00 - 15:30	<u>Invited Talk 10</u> <b>Carolina Ödman.</b> <i>"Astronomy for Development"</i>	Boonrucksar Soonthornthum
<b>18:00 - 20:00</b>	<b>NASE Workshop: Eclipses!!</b> (in Spanish) for Europe and Latin America.	Rosa M. Ros / Ricardo Moreno / Beatriz García / Claudia Romagnoli / Viviana Sebben
<b>21:00 - 22:00</b>	<b>Public Talk</b> <b>Juan Belmonte: "Astronomía, Paisaje y Patrimonio Mundial: de Gran Canaria a Chankillo pasando por Menorca" (in Spanish).</b>	<b>Silvia Torres</b>



FRIDAY December 11		Chair
11:30 - 12:00	Invited Talk 11 <b>Shanshan Li</b> <i>"The vigorous development of data driven astronomy education and public outreach (DAEPO)"</i>	 Dongni Chen
12:00 - 13:00	Session 7: <b>Big Data in Education Session.</b>	 Chenzhou Cui
13:00 - 13:30	Break	
13:30 - 14:00	Invited Talk 12 <b>Alejandro López</b> <i>"Cultural Astronomy. A scientific frame to understand academic astronomy as part of the Social World"</i>	 Cesar González García
14:00 - 15:00	Session 8: <b>Cultural Astronomy and Heritage.</b>	 Nicolás Maffione
15:15 - 15:45	Invited Talk 13 <b>Cesar González García</b> <i>"Our Sky, the Sky of Our Ancestors"</i>	 Alejandro López
18:00 - 20:00	<b>Workshop: Construcción de dispositivos didácticos que materializan los estados de iluminación del suelo y del planeta (in Spanish).</b>	 <b>Néstor Camino</b>
21:00 - 22:00	<b>Public Talk</b> <b>Nikos Prantzos: "The quest for extraterrestrial intelligence and the Fermi paradox" (in English).</b>	 <b>Julio Fernández</b>

<b>SATURDAY December 12</b>		Chair
11:30 - 12:00	Invited Talk 14 <b>Karen Hallberg</b> "Women in science: the need for a global cultural change"	Beatriz García
12:00 - 13:00	Session 9: <b>Astronomy and Inclusion. The role of women and girls in Astronomy.</b>	Lina Canas
13:00 - 13:30	Break	
13:30 - 14:00	Invited Talk 15 <b>Jarita Holbrook</b> "ASTROMOVES: Astrophysics, Diversity, Mobility"	Katrien Kolenberg
14:00 - 15:00	Session 10: <b>Informal Education: museums, planetariums, etc.</b>	Néstor Camino
15:00 - 15:30	Invited Talk 16 <b>Edith Hammer</b> "Embracing a culture of lifelong learning"	Julieta Fierro
15:30 - 16:00	<b>Closing Remarks:</b> <b>Debra Elmegreen</b>	<b>Rosa Ros / Beatriz García</b>
18:00 - 20:00	<b>Associated Event 2:</b> <b>Turn on the Night, Especial Light Pollution</b> <b>WGs meeting (in English).</b>	<b>Constance Walker / Margarita Metaxa / Richard Green / Pedro Sanhuenza</b>
21:00 - 22:00	<b>Public Talk</b> <b>Andrea Sosa: "Apaguemos las luces y encendamos la noche: al rescate de la luz de las estrellas en una era de iluminación artificial"</b> <b>(in Spanish).</b>	<b>Nicoletta Lanciano</b>

## **MONDAY December 14**

**- TOTAL SOLAR ECLIPSE**

**Workshop and Conference on Solar Eclipses in Piedra del Aguila (virtual connection).**