

IAU Symposium

367

8–12 December 2020
Virtual Meeting, initially
planned for Bariloche,
Argentina

Proceedings of the International Astronomical Union

Education and Heritage in the Era of Big Data in Astronomy

Edited by

Rosa M. Ros
Beatriz García
Steven R. Gullberg
Javier Moldón
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ISSN 1743-9213

International Astronomical Union



CAMBRIDGE
UNIVERSITY PRESS



EDUCATION AND HERITAGE IN THE ERA OF BIG DATA
IN ASTRONOMY:
THE FIRST STEPS ON THE IAU 2020–2030 STRATEGIC PLAN
IAU SYMPOSIUM 367

COVER ILLUSTRATION:

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IAU SYMPOSIUM PROCEEDINGS SERIES

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International Astronomical Union



**EDUCATION AND HERITAGE IN
THE ERA OF BIG DATA IN
ASTRONOMY:
THE FIRST STEPS ON THE IAU
2020–2030 STRATEGIC PLAN**

**PROCEEDINGS OF THE 367th SYMPOSIUM OF
THE INTERNATIONAL ASTRONOMICAL UNION
VIRTUAL MEETING INITIALLY PLANNED FOR
BARILOCHE, ARGENTINA
8–12 DECEMBER, 2020**

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**CAMBRIDGE
UNIVERSITY PRESS**

CAMBRIDGE UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom
1 Liberty Plaza, Floor 20, New York, NY 10006, USA
10 Stamford Road, Oakleigh, Melbourne 3166, Australia

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First published 2021

Printed in the UK by Bell & Bain, Glasgow, UK

Typeset in System L^AT_EX 2 ϵ

*A catalogue record for this book is available from the British Library Library of Congress
Cataloguing in Publication data*

This journal issue has been printed on FSCTM-certified paper and cover board. FSC is an
independent, non-governmental, not-for-profit organization established to promote the
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ISBN 9781108490801 hardback
ISSN 1743-9213

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Preface

This special volume includes contributions from the IAUS 367 Symposium, *Education and Heritage in the Era of Big Data in Astronomy*. It was intended to hold the symposium in Bariloche, Argentina at the time of the total solar eclipse in December 2020. Unfortunately, due to the Covid-19 global pandemic those plans had to be changed and the symposium was instead conducted virtually.

The new format operations were moved to Mendoza in Argentina, from where transmission, recording, and management of the symposium were each controlled using a platform provided by the IAU. When the “new reality” caused us to change the style of the meeting, a new and great opportunity presented itself: more connected people from around the globe, more contributions presented from countries not always represented at international symposiums, more parallel activities, and more channels for communicating astronomy to all, not only to professionals (astronomers, educators, communicators) but also to interested others through an inclusive and diverse framework. The impact of the symposium proved that this type of meeting is not only possible but can work very well and that this likely will be the starting point for a new way to organize such encounters, where both presenciality and virtuality will coexist and, from now on, the hybrid format will become the rule rather than the exception.

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. Taking into account two of the goals of the IAU Strategic Plan for 2020-2030:

- 1) The IAU leads the worldwide coordination of astronomy and the fostering of communication and dissemination of astronomical knowledge among professional astronomers
- 2) The IAU stimulates the use of astronomy for teaching and education at school level

We consider that in this framework, new results and research methodologies from the cognition and learning science domains are now able to influence the work of astronomy educators, enabling them to make informed innovations for the teaching of astronomy and are part of the bases to reach the IAU objectives.

The primary goal of this symposium is 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 honoring 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. The invited speakers are not only international leaders in discipline-based education in astronomy and planetary science, but also in communication, history, inclusion, and protection of world’s heritage, including the dark sky.

As with most other sciences, astronomy is being fundamentally transformed by the Information and Computation Technology (ICT) revolution. The data volume is growing exponentially, can be accessed remotely, and the observations can be performed even without a real knowledge of a telescope. The new approaches to the data permit the development of new tools, techniques, and resources for data analysis and produce discoveries which probably never would be reached with only traditional data analysis.

There were 10 main sessions with the following themes and articles from each are included in these proceedings:

- 1) State of the Art in Astronomy Education
- 2) Citizen Science and Solar Eclipses
- 3) Astronomy Education Research
- 4) Astronomy in Other Disciplines to Promote Science Vocations
- 5) Innovation in Education
- 6) Literacy in Astronomy
- 7) Big Data in Education
- 8) Cultural Astronomy and Heritage
- 9) Astronomy and Inclusion; The Role of Women and Girls in Astronomy
- 10) Informal Education: Museums, Planetariums, etc.

The symposium's educational program also included the following: A Galaxy Forum South America 2020; a Discussion and Round table: Research, innovation, literacy and inclusion in astronomy (in Spanish); three public conferences on Solar Eclipses (in English), Astrobiology (in English), Landscape and World Heritage (in Spanish) and Light Pollution (in Spanish); three workshops on Eclipses (in English and in Spanish) and Didactic Devices (in Spanish); an Associated Event on Quiet Sky Protection and Sustainable Development (in English).

We wish to extend our gratitude to our organizing institutions: Universidad Nacional de Río Negro – Sede Andina – San Carlos de Bariloche, Instituto de Tecnologías en Detección y Astropartículas (ITeDA, CNEA-CONICET-UNSAM), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Sociedad Uruguaya de Astronomía (SUA), Asociación Chilena de Astronomía (SOCHIAS), Fundación Balseiro (Bariloche), Research Infrastructure FOR Citizens in Europe (REINFORCE), European Gravitational Wave Observatory (EGO), Comisión Nacional de Actividades Espaciales (CONAE) and Asociación Argentina de Astronomía (AAA).

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Ros Rosa María	Zotti Georg
Safonova Margarita	Zou Siwei

IAUS 367 - Attendees per Continents



Map of geographical distribution

Figure 2. Geographical distribution of participants in IAU S367.



Attendees photographed during the meeting online
(Photo by Beatriz García)