

The International Astronomical Union and its work to promote collaboration in research among astronomers world-wide

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Abstract

The IAU is celebrating its centenary in 2019, and is one of the oldest scientific unions. In this article I describe its work to promote collaboration in research among astronomers world-wide. The IAU also promotes astronomy education, astronomy outreach to the public, the careers of young astronomers and equity, inclusivity and diversity for those pursuing astronomy as a career. In its 100 years it has become a world leader for reaching out and promoting astronomy for the betterment of society as a whole.

Introduction

The International Astronomical Union (IAU) was formed on 28 July 1919 at a meeting of the International Research Council in Brussels, Belgium. It was the first of seven scientific unions to be established in the aftermath of the Great War, and is therefore the oldest of some forty international scientific unions that exist today. It was the only scientific union to have both national and individual members, a circumstance which has shaped its history and development and has led to a high level of individual involvement in the union's affairs.

At first the IAU operated as a closed “club” for about 200 individual members, who discussed classification schemes in astronomy, the adoption of standard stars for calibrating observations and other topics which helped optical astronomers collaborate. By 1925 there were 288 members, coming mainly from western Europe and North America. Germany and its allies in the War (Austria, Hungary, Bulgaria and Turkey) were excluded from membership, a situation which continued until after WW2.



Fig. 1. The first IAU General Assembly, held in Rome in 1922.

The IAU organized General Assemblies every three years. The first was held in Rome in 1922 with just 83 participants (Fig. 1), nearly all of whom were elderly and male. It was the first of just six general assemblies prior to WW2.

Early evolution of the IAU after WW2

After WW2, the IAU began to evolve in its function and outlook, so as to involve astronomers as people, as well as to be concerned with astronomy as a scientific discipline. The first sign of this evolution came in

1946 when a commission was created for the Exchange of Astronomers (Commission 38). It was one of about 50 commissions established over the years in different branches of astronomy. Some modest levels of funding were available to this commission, which promoted scientific exchanges of astronomers between countries for research visits of a few months. Most of these exchanges were within Europe or between Europe and the United States, but a few astronomers came from China to visit Europe or the U.S.A.

The Exchange of Astronomers programme was continued for 63 years from 1947 until 2009, by which time 558 grants had been made to support the travel expenses of astronomers on exchanges to other countries. At its height in the 1960s, between 15 and 20 awards were made annually. The programme slowly declined thereafter, probably because of the ready availability of travel funding from within institutional research budgets.

The next significant advance for the IAU came in 1964 with the establishment of IAU Commission 46 for the Teaching of Astronomy. This commission received some funding from the IAU's Executive Committee and ran a number of programmes, the most notable of which was launching the International School for Young Astronomers (ISYA) in 1967. About 30 graduate students doing PhD or MSc thesis research were accepted into the school where they received high-level lecture courses and practical classes from expert astronomers in various branches of astronomy. Typically one or two schools have been held annually since that time; the 42nd ISYA concluded in Kunming, China, in November 2019. About 1500 students have participated in the ISYA schools, and many are prominent professional astronomers still active today.

Another initiative of Commission 46 was the Working Group for the World-wide Development of Astronomy (WGWDA, later known as Program Group WWDA). This committee helped promote the world-wide development of astronomy in developing countries, by undertaking visits to universities and observatories in the third world, giving lectures, assisting with teaching curriculum development and encouraging international collaborations. The present author chaired PGWWDA from 2003–10, after which these activities were absorbed into the new Office of Astronomy for Development (OAD).

These two commissions, C38 and C46, were the only ones of the IAU to be accorded funding and a budget. They helped transform the union from an inward-looking society for putting astronomical research on a more international basis to a more outward-looking organization involved with both people and research.

New IAU offices established from 2010

A major event in the IAU's history was the International Year of Astronomy (IYA) in 2009. It was proposed to celebrate 400 years since Galileo's first use of a telescope in astronomy in 1609. The IYA was a major success involving thousands of public outreach events in over a hundred countries, which reached millions of people world-wide.

The IAU produced its first Strategic Plan (Miley, 2009), also in 2009. This marks the time when the IAU reached out beyond the ranks of the about 10,000 professional astronomers who were IAU individual members, and started on an ambitious programme to influence the scientific and economic well-being of society as a whole through the promotion of astronomy to the public and to students.

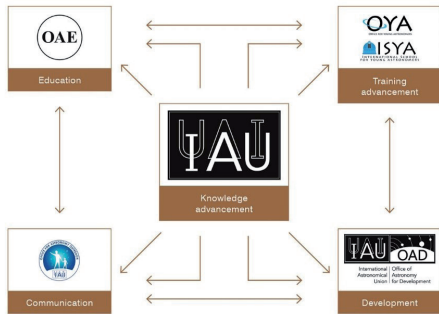


Fig. 2. Relationship between the IAU and its four offices, for development, outreach, young astronomers and education.

The Strategic Plan 2010–20 resulted in the establishment of the Office of Astronomy for Development (OAD) in Cape Town. The OAD is based at the South African Astronomical Observatory with support from South Africa’s National Science Foundation. It has a small contingent of professional staff who promote astronomy-based projects, often in developing countries, with the aim of social and economic development and the training of students at all levels.

OAD was the first professional office of the IAU (other than the IAU headquarters and secretariat in Paris). In 2012, a second office was established for public outreach, especially for communicating to the public the many amazing discoveries being made by astronomers. This was the Office for Astronomy Outreach, OAO in Tokyo, based at the National Astronomical Observatory of Japan.

A third office was established in 2015 in Oslo. This was the Office for Young Astronomers, OYA, based at the University of Oslo and supported financially by the Norwegian Academy of Science and Letters. The main function is to support the ISYA schools for young astronomers.

Finally, in 2020 the IAU will establish a fourth office, this time the Office for Astronomy Education, OAE. It will be based in Heidelberg, Germany, at the Max Planck Institute for Astronomy. OAE will help train teachers at high schools and universities to teach astronomy and give support with curriculum development and resources. It will be supported by the Klaus Tschira Foundation and by the Karl Zeiss Foundation.

All four of these offices (Fig. 2) are based in astronomical institutes and are supported financially by academies or foundations in their host countries, which form a strong partnership with the IAU. They represent the future for the IAU in reaching out to students, young people and the public to use astronomy for the betterment of society as a whole.

The IAU and its working groups

The IAU has a structure of an Executive Committee overseeing nine Divisions, about three dozen Commissions and some 54 Working Groups. These last mainly concern themselves with specific projects in astronomical research. However, several Working Groups are engaged in helping people. One of them is the WG for Women in Astronomy, established in 2003 to help promote the careers of female astronomers.

Overall, 18.3 per cent of the IAU’s 13,665 individual members are women. The percentage is growing, though there is still much work to do to achieve anything like equality. Argentina (40%), Italy (27%), France (26%) and Turkey (28%) are examples of countries with higher percentages of female astronomers than the average.

As for the IAU Executive Committee, it is notable that that three successive presidents have (or will be) women, and soon there will be four female IAU presidents or



Catherine Cesarsky



Silvia Torres



Ewine van Dishoeck



Debra Elmegreen

Fig. 3. The IAU has had (or will have) four female presidents, including three in succession from 2015–24.

past presidents (Fig. 3). They are Catherine Cesarsky (France, 2006–09), Silvia Torres (Mexico, 2015–18), Ewine van Dishoeck (Netherlands, 2018–21) and Debra Elmegreen (USA, 2021–24). The current IAU General Secretary, Teresa Lago from Portugal, is also female.

In 2015 a Working Group for equity, diversity and inclusion was established. The WG’s objective is to address the systemic structure, functions, processes and attitudes that result in the exclusion or restricted participation of under-represented groups in the field of astronomy. Key to achieving this goal is research into and the development of strategies, tools and resources that will enable the equal participation in astronomy of people of different ethnic, cultural, religious background, gender and disability identities.

In 2018 a Working Group was established for Junior Members of the IAU. This was a new category of membership to encourage young astronomers in their first few postdoc-

toral years to join the union. At the present time there are 534 IAU Junior Members, and hopefully many will become full members after a maximum of six years.

These developments represent something of a social revolution in the way the IAU is engaging with people and leading the way for promoting a better society both within and beyond the bounds of the Union.

Throughout the world there are hundreds of thousands of amateur astronomers, some of whom own their own telescopes and undertake useful research. The IAU has engaged with this large group in a rather perfunctory way in the past. An IAU workshop for amateur astronomers was held in April 2019 in Brussels, as part of the Union’s centenary celebrations, and at the 2019 Executive Committee meeting in Rome in 2019, a proposal was made for a new Working Group to engage with this group. It could be one of the next big developments for the IAU in reaching out beyond the membership of professional astronomers.

A social revolution has been launched

This article has shown how the IAU has evolved dramatically since WW2. It is hardly recognizable in terms of its original organization and goals of a century ago. What was once an inward-looking body engaged purely with the procedures of astronomical research is now a dynamic and outward-looking organization, interacting with people, especially students and the public.

A large part of this success must be attributed to the IAU’s unique body of individual members, whose number has grown strongly in recent decades. It is the individual members, especially through the Commissions and Working Groups, who have promoted these enormous changes in the outlook of the Union. This is a model for other sci-

entific unions to follow, and especially for the work to promote the careers of women in science, for promoting the careers of young astronomers, for bringing students into astronomy or into science in general, for helping people with disabilities to have careers in astronomy, for engaging with the public, and for helping to develop astronomy and science in developing countries.

Looking to the future, the IAU has recently published a new Strategic Plan for the years 2020 to 2030 (van Dishoeck & Elmegreen, 2018). There are five major goals for the coming decade:

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 promotes the inclusive advancement of the field of astronomy in every country.
3. The IAU promotes the use of astronomy as a tool for development in every country.
4. The IAU engages the public in astronomy through access to astronomical information and communication of the science of astronomy.
5. The IAU stimulates the use of astronomy for teaching and education at school level.

Future developments will be engaging with the large number of amateur astronomers and helping to promote astro-tourism, which is perhaps the new frontier now growing rapidly around the world (Fig. 4).

More about the history, centenary celebrations and development of the IAU can be obtained from the IAU Centenary Symposium, held in Vienna in August 2018



Fig. 4. Astro-tourists on a star-gazing tour at Mt John Observatory, New Zealand. Astro-tourism has become one of New Zealand’s principal tourist attractions, and may a focus for the IAU in the years to come.

(Sterken, Hearnshaw & Valls-Gabaud, 2019), and from a recent book to mark the IAU centenary (Andersen, Baneke & Madsen, 2019).

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