

**Part 8. The International School for Young
Astronomers; education and outreach**

International School for Young Astronomers (ISYA) since the 1960s: Participants and Host Institutions

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Abstract. This paper discusses the main outcomes of the *International School for Young Astronomers* (ISYA), an IAU programme developed since 1967 under the auspices of Commission 46 Astronomy Education & Development, at present Commission C1. An assessment of the impact of the ISYA is given from various surveys and communications with the participants and organizers of the past ISYAs.

Keywords. IAU programme: International School for Young Astronomers (ISYA), Education

1. Introduction

The history of the IAU is not simply the story of astronomers working together in a multinational cooperation. It is also the history of the internationalization of astronomy teaching avoiding political interference. During the IAU GA at Hamburg (Germany), in 1964, the foundations for an International School for Young Astronomers (ISYA) were laid, a school dedicated to the students from developing countries. The first one took place in 1967. The context in which the ISYAs developed has changed drastically over the past 50 years. The ISYA started in a period of “mild” Cold War and now we are at the age of the WTO (*World Trade Organisation*) which shapes the national priorities in terms of development in a totally different manner. Besides the ISYA, ideas were blossoming on how to provide contacts between remote places and the main astronomical institutions. Various programmes were created: the Visiting Professor Project in the '70s, the *Visiting Lecturer Programme* in the '80s and then the *Teaching for Astronomy Development* (TAD) in the '90s, all with the aim of increasing the cooperation with countries in need of development.

We will not present in this paper the main features upon which the ISYAs were established and how they have evolved, as they are already presented in [Gerbaldi \(2007\)](#); [Gerbaldi et al. \(2011\)](#), and in this symposium by ([Engvold 2019](#)) and ([Aretxaga 2019](#)). The impact of the ISYA programme is analyzed through the focus on the participants and the host institutions: their wishes and their achievements. Indeed, an ISYA is much more than planning a series of lectures: it opens the door to the exchange of ideas across national boundaries and not only in the restricted field of astronomy.

All the Reports on the ISYAs are found at the URL: https://www.iau.org/science/grants_prizes/iau_grants/international_school/list/.

The 41 ISYAs till 2018 took place in 27 countries and 37 different institutions, 10 countries hosted an ISYA twice or three times (Argentina, Brazil, China, Egypt, India, Indonesia, Iran, Malaysia, Morocco and Thailand).

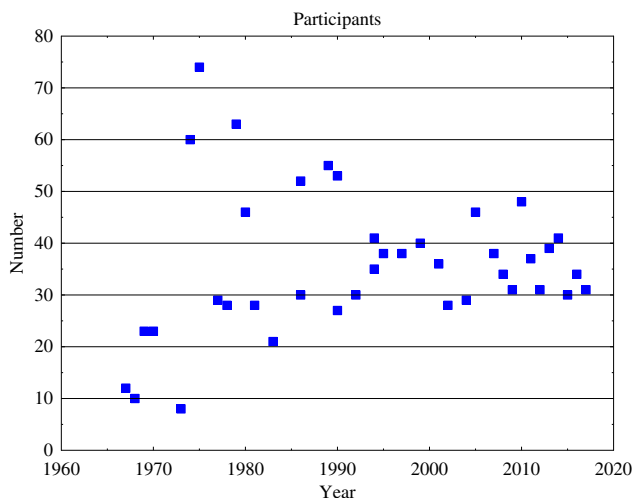


Figure 1. The number of participant in each ISYA till 2017.

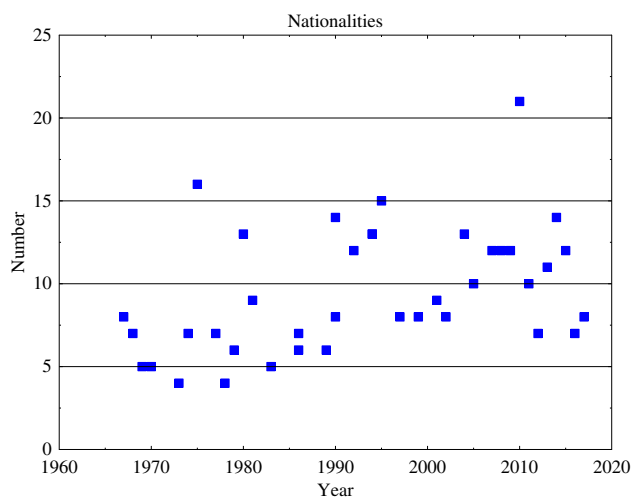


Figure 2. The number of nationalities for all the ISYAs till 2017.

2. Some numbers

From the ISYA reports available in August 2018 on the IAU webpages, 1397 participants attended the Schools from 1967 till 2017.

Figure 1 displays the numbers of participants per ISYA. This number stabilized below 50 as of 1992. The budget allocated is one factor, but it was also recognized that in order to have a better tutoring of the participants the number of attendees must not be over 40. Three ISYAs in the 70s had more than 60 participants, mainly due to a large participation of local students: 1974 – Argentina, 1975 – Greece and 1979 – Spain.

Figure 2 displays the number of nationalities in each ISYA and this number is roughly constant and, since 1992, never has had less than six nationalities.

The number of nationalities relies also upon factors such as: the cost of the international travel, the cost of the boarding and lodging, and the possibility of obtaining a visa. This last factor cannot be foreseen when the applicants are selected, and more importantly, it

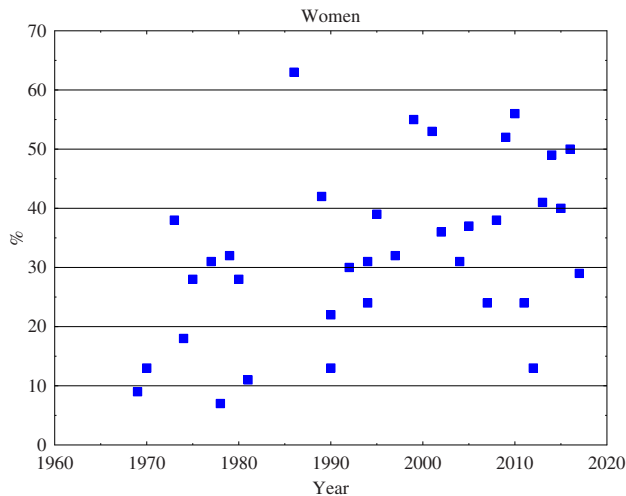


Figure 3. Percentage of female participants for all the ISYAs till 2017.

would have been against the ICSU (International Council for Scientific Unions) rules of non-discrimination, as followed by the IAU.

Before 1990, three Schools took place in communist countries: Cuba in 1989, China in 1986, Yugoslavia in 1980, broadening the point of view of the students, as lecturers came from Germany, Italy, Mexico, Netherlands and Spain. Moreover several participants also came from non-communist countries.

In the 2007, the ISYA in Malaysia and also for the one in China (in 2011), North Korean participants were present as no visa restriction applied for them in these countries. An earlier participation by DRRK students had failed following an international political clash just before the School.

Figure 3 represents the percentage of women attending an ISYA. This number is still erratic and varies according to the region. Nevertheless, the percentage of women attending an ISYA increased significantly after 1985.

In Sub-Saharan countries, the number of women studying sciences (STEM) at university is low, as noticed for the ISYA in 2012 in South Africa, with a percentage of 13%.

Another low percentage is that of the 1990 ISYA in Morocco, but for the 2004 ISYA it was already up to 34%. The exceptional value of 63% for the 1986 ISYA in Portugal has to be checked, as the gender was assigned on the names basis only.

Any statistical consideration is uncertain as the selection of the participants is distorted by personal motivations of the applicants and the letters of recommendation. It also depends strongly on the number of women in undergraduate STEM studies.

3. Impact of the ISYAs: the Participants

What do the attendees get out of an ISYA?

The main outcomes of various evaluations can be summarized as:

- a much broader perspective on astronomy and how science works;
- practice in asking penetrating and challenging questions;
- access to up-to date lecture materials and reference addresses;
- to learn and work in an international environment;
- practice in spoken English.

Evaluations are done immediately at the end of the School and a few years later via e-mail.

3.1. Assessments

The student feedbacks are collected through a “Student Evaluation Form” immediately at the end of the School. Such surveys on outcomes, overall School feedback, and recommendations have been included in the ISYA Reports since 2008, as initiated by J.-P. De Greve, the ISYA Chairperson at that time.

One can read in the analysis of this Questionnaire for the 2012 ISYA: *“For me the most useful part of the ISYA lies in the opportunity to have met & interacted with participants from all across Africa and also lecturers and tutors from around the world, plus the experience of Capetown/Sutherland, SA (...) I will be an ambassador for Astronomy science in my country”*.

Through such questionnaires – which are anonymous – the attendees may express specific recommendations for improving future ISYAs, not necessarily applicable to the next one which will take place somewhere else and with different expectations, but it provides insight into the attitudes and thoughts of the participants, not forgetting that the questionnaires were completed on the ISYA last day, hence their content may contain some emotional aspects.

3.2. Surveys

Initiated by D. Wentzel, ISYA secretary in 1992, surveys among the participants to evaluate the ISYA impacts have been conducted 3 to 4 years after an ISYA through an e-mail questionnaire. The reply rate was of about 30–40%. The major problem is the lack of continuity in the e-mail addresses of the participants. Six such surveys have been included in the Reports of the ISYAS from 1992 to 1999.

A typical comment is extracted from the answers given in 1997 on the 1992 ISYA in China from a Chinese participant’s reply: *“Now (in 1997) I am a graduate student at Princeton University, USA... For the first time I could share the love of astronomy... I found out at the ISYA how to apply previously learned unconnected physics.”*

Nowadays, the rate of answers is much smaller. As an example: 28 participants attended the 2007 ISYA in Malaysia, for a survey done in 2014, but only five answers were received and three email addresses failed. The rate of reply was only 18%. The overflow of mails as well as the simplicity to open several mailboxes render the participants difficult to be caught up. Nevertheless there is a general trend among the answers.

For most of the students it is the first time that they are learning and working in an international environment. These schools give them a much broader perspective, offering the possibility to make a critical choice for their life: research career or not. This is clearly pointed out by the participants in the Surveys, and as in the Survey in 2000 of the 1995 ISYA in Brazil, a participant explained that the School permits to recognize that a research career would not be a good choice.

What is strongly valued is the interaction with the faculty members and the possibilities offered of a follow up of their future studies: a PhD. Surveys of the lecturers should be carried out to complement the one done for the participants.

Another method can be used to trace the participants: the ADS data base. Limitations occur here too, as their names for the publications may have changed, either in the case of the female participants or simply the spelling of the name (first name and given names, translated names from a non-Latin alphabet, etc.) and recent rules of non-publishing the emails of the authors.

Surveys done at about 4–5 years after an ISYA give valuable outcomes and the impact – or not – of the ISYA, as such interval of time corresponds more or less to the number of years needed to obtain a PhD. A much later survey lets us knowing who is still active in research. Let’s give the example of the survey of the 1995 Brazil ISYA.

In 2000, from the 39 participants, the emails of 36 could be traced, and 13 answers (33%) were received. Two participants obtained a PhD in 1999, four were PhD students, five started a PhD, and two were involved in astronomy education. The PhDs were obtained either in their home country or abroad, the advice of a lecturer having an important role.

A survey from ADS in 2018, that is 24 years after the ISYA, showed that all, except the two in the astronomy education field, were still publishing. It must be emphasized that it is impossible to follow up any publication in the field of education as the publications related to that field are not referenced in ADS.

Where do these astronomers get a position, is another outcome to be analysed. From the affiliations collected in the publications it can be concluded, for that ISYA, that it is about half and half: half got a position in their home country, half abroad but in two cases with a dual affiliation with their home country.

These results have no statistical significance. To do a more comprehensive analysis, detective methods have to be developed to trace back the former participants.

4. Impact of the ISYAs: the Host Institutions

The host institutions are located in “astronomically developing countries” but regional situations have to be taken into account. A developed institution or university may offer to host an ISYA such as INAOE (Mexico, 2005 ISYA) or SAAO (South Africa, 2012 ISYA) and have participants from neighbouring countries with much less developed institutions and fewer opportunities for their students (Aretxaga 2019).

From the ISYA reports it is possible to collect some information on what motivates astronomers or universities to organize an ISYA, but the international or national political context also plays a role, even if it is not specifically expressed in the documents available in the IAU archives. Finally the completeness of any survey from the host institution can be questioned.

The support of the international community to hold an ISYA is unanimously acknowledged and gives a strong signal of recognition, which is an important factor for further development.

4.1. Motivations to host an ISYA

Some examples of the motivations to hold an ISYA are given.

Total eclipse of the Sun

The 1975 ISYA in Greece and the 1999 ISYA in Romania took place at the time of a total eclipse of the Sun, where the opportunity of that event was used to put the light on national institutions.

In the 1974 ISYA in Argentina, in a context related to solar energy, 20 faculty members participated to the School with the topics: Solar physics, solar energy and the solar environment. Most of the lecturers were from Argentina or Latin America. The “Sociedad Argentina de energia solar” was created at that time.

Astronomy in a University

The 1978 ISYA in Nigeria supported the creation of the first Department of Astrophysics in Black Africa at the university of Nsukka. In 2018, the teaching of astronomy is still very active in several universities in Nigeria.

The 2015 ISYA took place at the Facultad de Ciencias Espaciales, Universidad Nacional Autónoma de Honduras. Below is the quote from a mail in 2018 from the host : “*One of the principal aspects of ISYA for the development of Astronomy in our university is the fact that it helped us to focus in research.*”

Scientific collaboration

An ISYA gives the opportunity to enhance collaborations between an ISYA lecturer and the host institution. As an example, the 2009 ISYA at Trinidad was followed by a STEM program (called Carib-STEM) and other collaborations in research took place in astrobiology and continue at the St Augustine campus following the lectures by Ed Guinan.

Telescopes in use or in project

The emphasis can be put either on the inauguration of a telescope for teaching purposes, or to advertise the project of a national telescope, leading to new collaborations.

One of the very first ISYAs took place in Argentina, in Córdoba in 1970, as a homage to the centenary of the Córdoba National Observatory, the director of that ISYA being Jorge Sahade, later IAU President.

The 2001 ISYA in Thailand coincided with the inauguration at Chiang Mai of 40-cm and 50-cm telescopes dedicated to university teaching of astronomy, as well as to outreach purposes. The project of a large national telescope was underway. At the 2014 ISYA in Thailand, the 2.4-m telescope was in operation.

The 1997 ISYA in Iran was also connected to the project of a large national telescope.

Lobbying by the Director & Deputy Director of the ISYA

The lobbying by the Director and Deputy Director of the ISYA is very important to convince colleagues to hold an ISYA, as they have a broad overview of the development of astronomy in the world. Such lobbying can best be done during the IAU General Assembly and also during symposia attended by young astronomers from astronomically developing countries.

4.2. *From one ISYA to another*

There is a hidden link between the ISYAs: since 1992, there have been six ISYAs with the ISYA director of the host Institution being a young astronomer in a previous one. Also nine participants of an ISYA later became lecturers in an ISYA taking place in their home country or elsewhere.

5. Conclusion

An in-depth analysis of the past ISYAs is needed, but it can be achieved only if coherent archives are set up including:

- complete reports with selection of the participants, programme, time-table, budget, etc;
- list of students with gender, full name, affiliation if any;
- list of the lecturers with gender, full name, affiliation, name used in publications.

Systematic surveys of the ISYA participants and lecturers have to be done at regular intervals of time. The knowledge of the emails of both participant and lecturers is crucial for such an analysis.

Discussions have to be undertaken with the IAU Officers on the deployment of such archives and on the content which can be open to public access.

An illustration of the overall feedback of the ISYAs is best illustrated by the testimony of Dr Paula Olivera, reproduced here with her permission: “*ISYA 2009 was my first Astronomical school. By then I was a Physics undergraduate. One of the lecturers (Louise Edwards) became my Thesis Adviser, and from there I decided to apply for PhDs in astronomy and many other schools... ISYA 2009 was also my first contact with international academics. This helped me understand the professional life of a researcher and the steps I needed to take to become one. In summary, I’m an Astronomer thanks to ISYA.*”

My participation in ISYA 2015 was the perfect way to give something back to ISYA and to my country Honduras. The school allowed me to reconnect with my University after being away to undertake my Ph.D...

6. Discussion

MONTMERLE: Do you have an idea – even rough – of the fraction of former ISYA students returning to their countries (if they have job opportunities) rather than in other countries?

GERBALDI: Not yet. Such an analysis can be made (in particular) through ADS to retrieve the affiliation of the authors. But the names used in publishing may be different from the one used at the ISYA (Latin alphabet, composite names, etc.).

ALVES-BRITO: What to do to improve the number of women attending ISYA? Is there any sort of policy to help with this?

GERBALDI: To improve the number of women in scientific (STEM) studies at undergraduate studies.

ALVES-BRITO: Does IAU support “local” international advanced schools in Astrophysics?

GERBALDI: Schools at, say, undergraduate level are supported by OAD, from a call for proposals each year.

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