

SpS2-The International Year of Astronomy 2009

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Part I: Introduction

IAU Welcome

The International Astronomical Union (IAU) launched 2009 as the International Year of Astronomy (IYA2009) under the theme, The Universe, Yours to Discover. IYA2009 marked the 400th anniversary of the first astronomical observation through a telescope by Galileo Galilei. It has been, and still is, a global celebration of astronomy and its contributions to society and culture, with a strong emphasis on education, public engagement and the involvement of young people, with events at national, regional and global levels throughout the whole of 2009. UNESCO endorsed IYA2009 and the United Nations proclaimed the year 2009 as the International Year of Astronomy on 20 December 2007. These proceedings aim to give a brief account of IYA2009, from its inception to the present and how its legacy will influence the future of astronomy communication on a planet-wide scale.

Astronomy is one of the oldest fundamental sciences. It continues to make a profound impact on our culture and is a powerful expression of the human intellect. Huge progress has been made in the last few decades. One hundred years ago we barely knew of the existence of our own Milky Way. Today we know that many billions of galaxies make up our Universe and that it originated approximately 13.7 billion years ago. One hundred years ago we had no means of knowing whether there were other solar systems in the Universe. Today we know of more than 400 planets around other stars in our Milky Way and we are moving towards an understanding of how life might have first appeared. One hundred years ago we studied the sky using only optical telescopes and photographic plates. Today we observe the Universe from Earth and from space, from radio waves to gamma rays, using cutting-edge technology. Media and public interest in astronomy have never been higher and major discoveries are front-page news throughout the world.

We are now in a position to reflect upon IYA2009, taking an objective view on projects that have taken place and we can see how the astronomy education and public outreach landscape is changing. There are certainly many initiatives to consider, from the twelve Cornerstone projects to the thousands of national activities that have brought together hundreds of thousands of people in many countries for astronomy-themed events. Take, for example, the Sunrise Event on New Year's Day in Busan City, South Korea, where more than 400 000 people took part. In Brazil, the 2009 Brazilian Olympiad of Astronomy and Astronautics saw more than 750,000 students participate from 32,500 schools. In Paraguay, the IYA2009 launch featured a concert with more than 1600 musicians and an audience of over 15,000.

IYA2009 was not strictly limited to Earth-bound activities. The IYA2009 logo and motto were proudly displayed on the Ariane 5 rocket that sent two frontline space observatories into space in May 2009: ESA's Herschel and Planck flagship missions. Also that month,



Figure 1. IYA2009 Opening Event, Paris, France on 14 January 2009. *Credit: IAU/José Francisco Salgado*

astronauts performed repairs and equipped the NASA/ESA Hubble Space Telescope with the latest in instrument technology. To honour IYA2009, astronaut Mike Massimino took onboard with him a replica of Galileo’s telescope as well as an IYA2009 flag. So, evidently, it was a momentous event on and off our planet!

However, it is important to not just note successes, but also areas for improvement. IYA2009 should be seen as a learning experience; since it was the first time ever that such a huge network, consisting of as many as 148 nations working together on a single science communication venture, was put together, not all challenges could be met. Looking back on these will give future astronomy popularisers a head start and help them make their own projects as effective as possible. Finally, perhaps, looking back at the actions and events and the popular reaction, we will be able to truly gauge how often and how deeply IYA2009’s motto, **“The Universe, Yours to Discover”**, was fulfilled during the Year.

Welcome Statement by UNESCO

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Six months have passed since the opening ceremony of the International Year of Astronomy (IYA) was held in UNESCO headquarters in Paris. At this gathering of more than 900 professional and amateur astronomers, professors, scientists and students, strong messages of support to science were expressed by ministerial representatives from Italy, France, Japan and Czech Republic. In addition, a space industry representative, Thales

Alenia, affirmed that we are living in a golden age of science and that we should continue to stimulate innovation in science and technology as it is the only way to avoid another global crisis of the kind we are experiencing at the moment.

The opening ceremony gathered eminent scientists such as Nobel Prize laureates, world-renowned astronomers, astrophysicists and writers, who presented the latest discoveries and scientific developments in astronomy and shared their views and vision of the Universe in the decades to come with great enthusiasm. Many speakers referred to the valuable contributions made by people of different cultural backgrounds and underlined the importance of international cooperation, especially in the development and implementation of projects that necessitate major observational infrastructure and capacity, both in space and on the ground.

As the United Nations lead agency for the IYA, UNESCO has ensured that all member states are aware and involved in the celebration of the Year. Highlighting the scientific, educational and cultural components, the Director-General, Mr Koichiro Matsuura, encouraged all nations, through a joint statement with the IAU President, Professor Catherine Cezarsky, to consider the IYA as an excellent opportunity to cooperate at regional and international levels, and especially in forging links between professional and amateur astronomers, to promote astronomy education in developing countries in particular and to help safeguard natural and cultural heritage sites linked to astronomical observations. In response to the call of the Director-General, numerous national committees have been created and have registered as IYA national nodes, whose main objective is to widen the reach of astronomy to non-scientists.

In close cooperation with IAU, the World Heritage Centre of UNESCO is implementing the Astronomy and World Heritage initiative, launched in 2003, which encourages the nomination of cultural properties linked to astronomy. Many State Parties to UNESCO's World Heritage Convention (1972) have designated national institutions that could identify the most representative sites and propose them for nomination on the World Heritage List.

UNESCO supports several IYA Cornerstone projects, such as the Galileoscope project. Eight sub-Saharan African countries (Ethiopia, Ghana, Kenya, Mozambique, Nigeria, Senegal, Tanzania and Uganda) will receive high quality, low cost, easy-to-assemble Galileoscopes, which will be distributed to schools through UNESCO's Associated Schools Project (ASP). The ASP is a network of educational institutions in developing countries ranging from kindergarten to teacher-training institutes that have been selected by ministries of education to carry out pilot and innovative activities. We hope to identify more countries in Africa and in other regions in the near future that will participate in the Galileoscope project.

The other UNESCO-supported Cornerstone projects are Universe Awareness, Developing Astronomy Globally, From Earth to the Universe and Dark Skies Awareness. All these focus on generating the interest, imagination, fascination and knowledge of the general public, and especially younger people, in astronomy. UNESCO sponsors stargazing events organised by the Observatoire de Paris/Meudon for the general public such as the one held in celebration of 100 Hours of Astronomy. Support will also be provided to other outreach activities such as lectures and exhibitions.

To build up the skill set of teachers, UNESCO and IAU's Commission 46 on Education Development conducted a pilot teacher-training workshop in Ecuador and Peru last June. The workshop introduced a new teaching methodology in astronomy, which was evaluated positively by the participating teachers and which has rekindled their interest in teaching this subject, once equipped with new materials and skills.

All the activities mentioned are being implemented in the framework of UNESCO's Space

Education Programme, which promotes space-related subjects and disciplines in schools and universities. As we all know, space not only brings a new dimension to science education, but also provides new knowledge and perspectives, especially in the study of the Earth, its systems and resources. Stimulating and maintaining the interest of the younger generation in science through space will hopefully lead them to take up science and engineering careers in the future.

But more important, space subjects develop the critical thinking process, problem-solving and participatory decision-making skills of individuals. These traits are fundamental and central to quality education in preparation of the next generation of scientists, future custodians of the planet Earth and future explorers of outer space.

Let me conclude by assuring you of the continuous commitment of UNESCO in science education and capacity building with a view to sustaining a safe and secure planet and peaceful exploration of outer space. I wish you a good meeting and fruitful discussions on the way forward of the International Year of Astronomy beyond 2009.

IYA2009: Behind the Scenes

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The recipe for an International Year

International Years have a long and varied history, from the first International Polar Year in 1882/1883, to modern equivalents such as the International Heliophysical Year in 2007/2008. Studying these previous initiatives, it became clear that a recipe of sorts involving the necessary components of a successful International Year could be concocted. First and foremost, a good idea is needed. This must be something to capture people's imagination, be relevant to society, and ideally have the potential to continue beyond the year in question. Next, it must be possible to put a strong case together in order to persuade policy makers of the value of having a year dedicated to the theme. This leads to the next two recipe points: a UN Body recommendation, leading to a UN Proclamation. Without these, official International Year status would be impossible. These are large hurdles to overcome, but the list continues. A large network, ideally already in existence and that can be built upon, is required if the initiative is to have global reach. There must be ideas for national and worldwide activities, as well as the funds to realise these. Finally, there must be genuine enthusiasm, engagement and excitement from all involved parties. Clearly, this is a demanding recipe!

IYA2009 proclamation roadmap

From the very beginning it was recognised that astronomy ticked many of the recipe boxes, and was an ideal candidate for an International Year. However, the route to official UN Proclamation was necessarily long. The following list outlines some of the key moments.

- 2002: The idea Franco Pacini reasoned that as mathematics had a Year in 2000 and Physics was set to have one in 2005, there was potential for astronomy to achieve the same level.
- 2003: IAU GA, Sydney IAU members voted unanimously in favour of Resolution B3, which recommended that 2009, the 400th anniversary of Galileo's accomplishments and the real birth of modern telescopic astronomy, be declared the Year of Astronomy.
- 2005: UNESCO endorsement Italy submitted a request to UNESCO.
- August 2005: UNESCO endorsed 2009 as the International Year of Astronomy.

- 2006: IAU GA, Prague Special session helped to reinforce plans for IYA2009 that would come to the fore in the event of a positive decision by the UN.
- 2007: Lobbying took centre stage. In order to convince the UN that a particular topic deserves International Year status, many countries must show their support.
- December 2007: UN Proclamation: **17 December 2007**, the news that astronomers had been waiting for arrived: the UN accepted this recommendation. 2009 was officially to be the International Year of Astronomy!

Strategic planning: setting up the Network

Once the UN Proclamation was confirmed, organisation could begin in earnest. The IAU was the logical choice for the central coordination role, as it is the world's largest body of professional astronomers. One problem became quickly apparent: the IAU had 64 national members, although 194 sovereign states are recognised by the UN.

A plan was devised to overcome this. Countries with professional astronomers, most often through academia, were researched. If this was not possible, or sometimes in conjunction with, professional organisations, active and visible amateur and enthusiast astronomers were identified. Neighbouring countries were also asked to support nearby nations who might be lacking in experts. Help was also requested from UNESCO delegations. Over time, a long list of astronomy experts from nations around the globe was amassed. These would later become National Nodes and Single Points of Contact.

During this research phase, successful transnational science communication and education institutions often cropped up. Great potential was seen in these lending their valuable expertise by supporting and implementing activities around the globe. The first set of Organisational Nodes had been discovered.

Strategic planning: defining the project

It is now possible to list some of the defining moments of the planning process for IYA2009, in chronological order:

2003 Establishment of the IAU Working Group, which defines IYA2009.

2005 Establishing rationale and vision.

2006 Goals and objectives.

2006–2007 Launching and devising initial projects:

(a) Portal to the Universe (idea presented for the first time in the C55 Business Meeting in the IAU GA in Prague)

(b) The Universal Times Cosmic Diary

(c) “*Connect people with the night sky and to help them become aware of light pollution issues*” Dark Skies Awareness

(d) “*Arrange a series of live webcasts over a 24-hour period from telescopes around the world.*” 100 Hours of Astronomy (Around the World in 80 Telescopes)

(e) “*Type of Opening: International Polar Year of World Year of Physics?*” IYA2009 Opening Ceremony

(f) SPoCs meeting in Garching, March 2007

(g) CAP2007 conference in Athens, October 2007

(h) Logo studies, 2007

July 2007 The IYA2009 Secretariat was established at the European Southern Observatory's headquarters in Garching, near Munich in Germany. This is to be the central hub of IYA2009 activities, coordinating during the planning, execution and evaluation phases.



Figure 2. IYA2009 The development of the logo



Figure 3. The role of the Secretariat expressed graphically

By this point a significant amount of groundwork had been completed, and a clear view of the Year was emerging. Figure 3 shows schematically how the various aspects were designed to be interconnected.

Strategic planning: funding the project

It was recognised as early as the “International Year Recipe” stage, that without adequate funding any venture on such a grand scale would be doomed from the beginning. National funding was deemed to be the responsibility of National Nodes. It was agreed that this was the only practical way of delegating over so many countries. Global funding would be used to finance the IYA2009 Secretariat, to provide operations and communication products, and to provide seed funding to the Cornerstone projects. Initial estimates placed this funding as 300 000 EUR to 1 million EUR, if major sponsors could be found. The next step was fundraising. Organisations, institutions and agencies related to astronomy, space science and the natural sciences were contacted. Many of these were from the Organisational Associates list formed earlier. Private companies were offered the opportunity to become Global Official Partners or Global Sponsors. The strategy was to

initially send direct mail and then follow up with personal calls to specific contacts and fundraisers. An elaborate Google Spreadsheet was used to keep track of proceedings. Thirty three Organisational Associates agreed to provide financial backing, along with three Global Sponsors. Unfortunately, no Global Official Partners were found, but a very respectable total of 650 000 EUR had been guaranteed.

Global Projects: Cornerstones

IYA2009 is supported by 12 Cornerstone projects. These are global programmes of activities centred on specific themes and are some of the projects that help to achieve IYA2009's main goals. Some are based on new ideas, such as From Earth To The Universe, 100 Hours of Astronomy, and the Galileoscope. Others are independent projects, including Universe Awareness and She is an Astronomer. Some consortia of organisations have joined under the same umbrella, such as the Galileo Teacher Training Program and Dark Skies Awareness. One Cornerstone, Galilean Nights, is a follow-up from an earlier initiative.

A franchising approach was taken with these Cornerstones. They have a common identity and central coordination. Key is that they have common goals, defined by IYA2009. They are also encouraged to share resources and expertise. Cornerstones are also financially independent thanks to seed funding from the IYA2009 Secretariat, of around 15 000 EUR per project.

Global Projects: Special projects and products

IYA2009 Special projects are intended to give large global projects (which satisfy the vision of IYA2009) greater international recognition and an opportunity to link with celebrations worldwide.

Criteria were established, which projects must satisfy. These include aligning with at least one of IYA2009's goals; being global in scope; being financially independent; and evidence must be given of successful implementation, in the form of human resources, funding, planning, or other relevant factors. In total, 16 projects have met these criteria. Special products are commercial products that satisfy the vision of IYA2009 to achieve greater international recognition, are an opportunity to link with celebrations worldwide, and to use the IYA2009 global network to reach out. As with the Special projects, specific criteria must be met to achieve Special product status. These include aligning with IYA2009's vision, being available globally, being adaptable to other languages, and offering a financial contribution (minimum 5000 EUR per product). During IYA2009 there were eight Special products.

Keeping the momentum

Having such a large network presents its own problems, one of which is ensuring adequate communication to maintain momentum. Several methods have been adopted to help. First is the website, which features news articles and points of interest. There are also daily updates on the web and new media outlets, such as Twitter, Facebook, and Portal to the Universe. This is in addition to weekly newsletters sent to the Single Points of Contacts, Cornerstones, Media Partners and any others who wish to be included. The Communicating Astronomy with the Public journal is published quarterly, and features IYA2009 stories, updates and best practices. Taken together, a lot of time and effort has been put into keeping the momentum of IYA2009 up over the Year.

What's next?

IYA2009 was never planned as simply a year-long series of activities; from the initial planning stage it was seen as a springboard to increased astronomy popularisation among the public, and improved networking among professionals and enthusiasts. Now the challenge is to realise this aim, and ensure that IYA2009's legacy lasts far into the future.

Part II: National Node Reports

IYA2009 Activities Status Report - Brazil

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Introduction

Starting in 2007, Brazil has built a large National Network for IYA2009, consisting of 249 Local Nodes spread all over the country. Out of that total, 25% are universities and research centres, 15% are planetariums and science museums, and 60% are amateur astronomers groups. A small staff of with 10 members (the Brazilian National Node) helped the Brazilian Single Point of Contact to coordinate all national activities.

National activities summary

The balance of 2009 first half has shown a total of 1114 IYA2009 events in the country. All were free and open to the general public. The breakdown of those activities shows that public observing sessions, combined with general astronomy talks, were the preferred kind of activity (41% of the total events number). Public star parties came close (34%), followed by workshops and conferences (14%), special planetarium sessions (6%), trade fairs and exhibitions (4%) and others (1%).

IYA2009 highlights

The most significant events in the first half of 2009 were:

IYA2009 Opening Week: Held between January 19 and 28, this was a huge celebration of astronomy in the whole country to start IYA. Some 225 public events were scheduled simultaneously in 57 Brazilian cities, with 15 000 people attending.

Astronomy in Carnival parades In February, during the most popular festival in Brazil (the Carnival), astronomy was chosen as the theme for three “Samba School” parades, in the cities of Rio de Janeiro, Brasilia and Atibaia. Millions of people watched those parades all across the country.

100 Hours of Astronomy (100HA) A huge success: with 212 public events in 64 cities, Brazil was ranked second worldwide in 100HAs total number of events. About 40 000 Brazilians took their first glance through a telescope during 100HA.

Brazilian Astronomy and Astronautics Olympiad (OBA) Major IYA2009 educational event in Brazil, OBA was held in May 2009, reaching about 860 000 students and 75 000 teachers, in 10 300 schools spread all over the country.

Milky Way Marathon A national “star-hunting” educational campaign against light pollution, held from June to September. Will be conducted every year.

Cosmic Landscapes A FETTU-type photographic exhibit, shown in more than 250 cities throughout Brazil during the second half of 2009.

SNCT (National Science and Technology Week) The official science popularisation week in Brazil, coordinated by the Brazilian Government. SNCT took place in late October and included dozens of IYA2009 events in 2009.

Year-end prospects At least 2500 public events in Brazil are expected for the whole year of 2009, with two million people participating in at least one IYA2009

event. Most of the structure, and the National Network built for IYA2009, will be maintained in activity for the subsequent years by the professional and amateur communities in order to further increase scientific awareness and to improve formal and informal science education after 2009.

International Year of Astronomy 2009 in France: Highlights and Perspectives

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The main task of our steering committee, consisting of professional astronomers providing voluntary help for IYA2009 in France, has been to trigger the proposal of projects and ensure their coherence, visibility and coordination. Emphasis was towards observational projects coupled with astronomical animations, projects oriented towards disabled persons (e.g., translation of conferences in sign language, Braille astronomy books, accessibility of observing sites, video recordings for hospitals) and projects for younger public (with “Main à la Pâte” and “Science à l’Ecole”) and universities.

The year began with the international Opening Ceremony at UNESCO in Paris, where more than 100 countries were represented in a gathering of about 1000 people, including students. Amongst other international events in France, the IAU Symposium 260 in January, the Invisible Universe colloquium in June and the Mars workshop in September may be mentioned.

French amateur astronomers efficiently coordinated observations and related astronomical activities for 100 Hours of Astronomy, which gathered more than 70 000 attendees in 50 observing sites and for Galilean Nights, for which more than 100 observing sites were open. As far as other international Cornerstones are concerned, Dark Skies Awareness was highlighted (e.g., project of the first international reserve in Europe around the Pic-du-Midi observatory), as well as Developing Astronomy Globally, with special efforts towards French overseas regions and territories. Also, we have participated in Cosmic Diary and She Is An Astronomer, have provided a French translation of the various documents prepared for the Galileoscope project, and have developed the Mutual Event of Galilean Satellites task group.

Amongst other French projects of interest for a wide public, it makes sense to mention the 100 conferences on astronomy that took place throughout the year and all over the country, the public observing sessions in conjunction with the 40th anniversary of Apollo 11 (“Nuits des Etoiles”), the numerous special planetarium shows, the special exhibitions in science museums, the exhibitions in public transport sites, the special events in conjunction with the European Heritage days in September, and the numerous astronomical activities during one

whole week of November (“Fte de la Science”). Besides, an impressive variety of high quality books, DVD, movies, e-exhibitions (free downloadable), plays, concerts and stamps devoted to astronomy have appeared throughout the year. Finally, it is already obvious that all these activities will not disappear at the end of 2009. Sustainable outreach projects are already on track, e.g., websites, exhibitions, planetarium shows, and professional–amateur collaborations.

IYA2009 in Mexico

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The celebration of the International Year of Astronomy in Mexico has been full of very interesting developments. Although professional astronomers are located in very few cities in our vast country, the associated activities have extended out to many more locations.

Star party

Global star parties near 22 archaeological and historical sites took place on 31 January. Many of the star parties were surrounded by displays, conferences, concerts and videos. These events were possible through the sponsorship of many public and private institutions, as well as the participation of amateur astronomers. This activity was very successful.

Exhibits

A large exhibit of astronomical images in Mexico City has also been of great interest to the general population. We have collected 96 astronomical images of very high quality (Tenorio-Tagle, Perez, Cruz-Gonzalez & Torres-Peimbert, private communication). This exhibit has been shown along several avenues in Mexico City, where it has been well attended. It has also been displayed in Guadalajara, Guanajuato and will be displayed at the Fair of Astronomy. A reduced version has exhibited in the cities of Cuernavaca and Queretaro and in several shopping malls in Mexico City. We have also prepared a small image exhibit, of 24 images with captions, that is being shown in many intermediate schools in Mexico City where it is accompanied by astronomical lectures. This modest exhibit is being copied by several groups around the country. Exhibits with historical instruments of the Observatorio Astronomico Nacional have been shown in Mexico City, Guanajuato and Ensenada. A series of photographs of women astronomers by the French photographer Robin Cerrutti have been displayed very prominently.

Cultural events

Several other cultural events have adopted astronomy as their theme, in particular, the Festival Cervantino adopted Galileo and the Telescope: 400 Years as the central theme for its 35th presentation. Among their initiatives was to commission twenty graphic artists to depict one aspect of Galileo and so the exhibition, Twenty Faces of Galileo, was created. An art contest for children in three different levels (kindergarten, grades 1–3 and 4–6) was organised, and the winning

pictures will be exhibited at the Fair. In addition two science fiction story contests were organised, one for youngsters under 16 and another without age limit. The winners will have their stories published. Moreover a set of astronomical radio spots lasting two to three minutes are being broadcast daily in several radio stations around the country and can be copied without charge for distribution.

Fair of Astronomy

To close the activities we are planning a Fair of Astronomy to be held in downtown Mexico City. The setup is extraordinary, and will include equipment related to physics or astronomy from the science museum of the National Autonomous University of Mexico (UNAM) and a set of exhibits of astronomical topics. We are planning multiple activities running continuously and that encompass astronomical lectures, physics workshops and short planetarium shows, as well as a representation of Galileo's workshop; a cosmic ray detector with the corresponding explanations, a puppet show with the life of Galileo, and a variety of child-oriented workshops. We plan a set of exhibits that will include 100 astronomical images; basic optical concepts and telescopes; the Solar System and the search of extraterrestrial life; historical instruments; the location of the Solar System in the Milky Way; 3D images from space explorations; Eighteen Basic Astronomical Questions; the winners of the astrophotography contest; and the winners of the children's art contest about the Universe. In addition a very singular exhibit, Twenty Faces of Galileo, is to be presented, where different artists will illustrate their view of Galileo. It is directed at the general public and will surely be of interest to many high school students.

Conclusion

In conclusion, the efforts have been very fruitful and the community very supportive. We have reached many youngsters and members of the general public.

IYA2009 in Russia: Preliminary Results

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The International Year of Astronomy 2009 (IYA2009) is a great event for the scientific and cultural life of all nations. Although IYA2009 activities are on several levels, the majority of IYA2009 events take place locally and nationally. The National Committee of Russian Astronomers is responsible for the IYA2009 event organisation in the Russian Federation and serves as a National Node. It establishes collaborations between professional and amateur astronomers, science centres and science communicators, teachers, lecturers and popularisers.

The Russian National Node current activities are reported here, in particular:

(a) Organising the All-Russia Conference "Astronomy and Society" (25–27 March, Moscow), the central event of the International Year of Astronomy 2009 in Russia;

(b) Organising the UNESCO congress “Astronomy and World Heritage: Across Time and Continents” (20–24 August, Kazan);

(c) Establishing a service at the IYA2009 site where questions from the community concerning astronomy will be answered, with participation of professional astronomers in preparing the answers (25 experts answered about 150 questions by mid-October);

(d) Developing pages of the websites of research institutes and university departments of astronomy that will primarily address the general community, schoolchildren, amateur astronomers and cover scientific, social, and educational activities of the corresponding institutions; creating public relations and popular astronomy structures in observatories and institutions;

(e) Establishing and supporting contacts with organisations of amateur astronomers, participating in the Astrofest congress of amateur and professional astronomers, defining and formulating problems where amateurs are able to contribute to professional astronomy;

(f) Special events for children and youths: competitions of children’s astronomical drawings, with winners determined by an open ballot; visits of astronomers with lectures to schools, summer camps, orphan homes; astronomical Olympiads, conferences and team observations;

(g) Preparing an expert prognosis of the future of astronomy (see results in Malkov [2009], *Proceedings of Science*, in press);

(h) Organising the Autumn 100 Hours of Astronomy (24–27 September, with extension of this period in some institutions): about 15 000 visitors;

(i) Publishing a calendar for 2009, issuing a postage stamp and envelope on the occasion of IYA2009; as well as participation in some Cornerstone IYA2009 projects.

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IYA2009 in South Africa

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Activities in South Africa were coordinated by a steering committee chaired by the South African Astronomical Observatory (SAAO), with representatives from all major astronomy-related bodies including government, research, outreach and amateur organisations. In the years preceding IYA2009, the build-up activities included national stakeholder meetings; astronomy education and outreach surveys; setting up of websites and email groups; consolidation of astronomy resources; development of the “astroguide” and “astroCD” (two useful resources to assist outreach volunteers); and a series of training workshops to equip stakeholders with astronomy outreach skills.

IYA2009 in South Africa kicked off in style on New Year’s Eve with a once-in-a-lifetime opportunity for the public to enjoy a full night at the SAAO in Sutherland, home to the Southern African Large Telescope (SALT). For the first time in its 37-year history in Sutherland the SAAO dedicated an entire night to the public with astronomers showing people how the telescopes worked, discussing

what they do and even carrying out observations for the public. The rural town of Sutherland came to life for a week-long star party that preceded this unique night, with members of the community participating actively in the celebrations and hosting the hundreds of people who made the long trip. This event was soon followed by another mass media event — the official launch of IYA2009 in South Africa by the Minister of Science and Technology at a partial solar eclipse on 26 January. Both these events were broadcast on national television and radio and published in many newspapers.

The momentum from these events carried South Africa through many other activities including the well-attended public lecture series that was linked to a special issue of *Quest* (a popular science magazine); an astronomy-themed Scifest Africa (the biggest Science Festival in the region), as well as National Science Week (the biggest science outreach event on the South African calendar); and participation in various Cornerstones including Dark Skies, 100 Hours of Astronomy (part of which was a SALT inclusive “Around the World in 80 Telescopes” webcast), Universe Awareness, Galileo Teacher Training, From the Earth to the Universe, and Developing Astronomy Globally. The very popular “telescopes on Lion’s Head” full Moon hike has established itself as a popular way of doing “extreme astronomy” and outreach training workshops with stakeholders and volunteers were held all over South Africa, as well as in four other African countries.

A grant from the Department of Science and Technology attracted people from all outreach areas in the country including science centres, planetariums, observatories and astronomy societies, all of whom are now involved in the IYA2009 celebrations. This grant also gave rise to an astronomy travelling exhibition and an equipment resource pool both available for willing volunteers to use to promote astronomy. Things are still at full pace with many activities lined up for the rest of 2009† and we still look forward to events such as the Southern African Association of Science and Technology Centres (SAASTEC) conference to be held in Sutherland; a closing star party just before the new year; and the Communicating Astronomy with the Public conference in Cape Town from 15–19 March 2010.

Situated in one of the most underdeveloped regions in the world, South Africa continues to lead the development of astronomy in Africa, with one of the driving factors being the understanding that astronomy gives us perspective. Perspective about how small we are in the Universe, yet how special the conditions are for us to be alive. Perspective, in the bigger context, about the importance (or lack thereof) of skin colour, country borders, ethnicity, religious beliefs, xenophobia and wars. Perspective about the astronomical implications of environmental degradation. Perspectives that are needed in order to make the world a better place!

IYA2009 in Japan

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IYA2009 has been extremely successful and well accepted by the Japanese public and media. Let me give some typical numbers for the year up to October; 2700 events officially recognised by the IYA2009 Japan Committee have been held, 500 books related to astronomy or the Universe and 1000 bookstores all through Japan have registered for the IYA2009 special book exhibition “Starry Night Book Fair”, 170,000 visitors came to the IYA2009 Tokyo Exhibition, 4.4 million people reported their stargazing to the “Look up the Sky” webpage, and there have been 50 million hits on the IYA2009 Japan website.

The IYA2009 Japan Committee was established in July 2007 and made up from representatives of a variety of astronomical research, education and outreach organisations. In Japan about 200 observatories with 0.3–2-metre aperture telescopes, 300 planetariums and many science museums are run by the local authorities for the public, and their wholehearted contribution as well as the participation of educational organisations and schools made the IYA2009 Japan activities both wide in perspective and strong.

The IYA2009 Japan Committee hosted 17 Japanese projects, among them:

(a) IYA2009 opening event: held on 4 January in 40 science museums with 6000 participants;

(b) You are Galileo!: distributed thousands of telescope kits for children in Japan and overseas;

(c) Stars of Asia: IYA2009 Asia cooperated to publish a book of Asian myths and legends of stars;

(d) IYA2009 Travelling Exhibition on Astronomy: Tokyo, Sendai, Niigata, Nagoya, and Osaka;

(e) Look up at the Sky!: Ten million people stargazing. The target is 10% of the Japanese population;

(f) Starry Sky Book Fair: IYA2009 special book fair in cooperation with book-sellers;

(g) Reproduction of Galileo’s Telescopes: hands-on experience of Galileo’s observations;

(h) 22 July, Total eclipse & safe sunglasses: caused a boom in Japan. The day was almost cloudy yet still many people enjoyed the event. The need for safe glasses was widely recognised;

(i) 7 July, Traditional Tanabata Light Down Campaign: the Star Festival “Tanabata”;

(j) Tanabata Lectures: about 90 universities held IYA2009 Tanabata lectures for the public;

(k) Mr Galileo and his Friends: A series of cartoons about IYA2009 characters. Visit our website!

Japan also actively joined in the IYA2009 Cornerstone projects, i.e.;

(a) 100 Hours of Astronomy,

(b) Galileo Teacher Training Program,

(c) Dark Skies Awareness,

(d) Universe Awareness,

(e) Cosmic Diary,

(f) Developing Astronomy Globally,

- (g) Galileo Telescopes,
- (h) Galilean Nights, etc.

We will hold an IYA2009 Grand Finale for two days in December and discuss the IYA2009 Legacy.

Finally, it is already obvious that all these activities will not disappear at the end of 2009. Sustainable outreach projects are already on track, e.g., websites, exhibitions, planetarium shows, and professional–amateur collaborations.

IYA2009 in Spain

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IYA2009 is a truly national, collaborative effort in Spain. Research centres, universities, science museums, schools, amateur astronomical societies... all are actively involved in the organisation of IYA2009 activities with a keen interest to transform the event in 2009, together with many other countries, into a worldwide astronomical celebration. IYA2009 is being promoted in Spain at the highest level by the CNA (*Comision Nacional de Astronomia*). There is a steering committee which coordinates at national level and a 16-person Working Group. CSIC (National Research Council) and the Ministry of Science and Innovation have funded the national coordination. The Spanish Astronomical Society has also actively promoted different initiatives, run by hundreds of other bodies.

Statistics: 1 January – 30 June 2009

- (a) Spanish network for IYA2009: 150 organisations;
- (b) Number of activities organised within the framework of IYA2009: at least 1985;
- (c) Number of bodies that have organised one or more IYA2009 activities: at least 1000;
- (d) Cornerstone IAU projects that Spain participates in: 9;
- (e) Cornerstone national projects: 11.

Some IYA2009 highlights in Spain include:

- (a) 26 March: teachers and students in 639 schools measured the Earth's radius, participating in a simple, cheap and educational initiative;
- (b) The most important results of Spanish astronomy during the last three decades have been presented in a book using the format of brief interviews with the authors. A special contribution of the Spanish Astronomical Society for IYA2009;
- (c) Dozens of amateur astronomical societies have shown the wonders of the night sky to thousands of people in national/international star parties through the year;

(d) Astronomy has been accessible to people with special needs, with several projects such as the production of a free open source software for motor disabled people and a planetarium programme for visually impaired people;

(e) Museums and planetariums have launched two special IYA2009 programmes that are being shown in many planetariums: *Evolution*, a tribute to Galileo and Darwin, and *Jors, Jars, Jurs and the Galigalitos*, a show for children;

(f) A 2009 and 2010 calendar, several TV programmes, radio podcasts and an ambitious exhibit about the role of women in astronomy have been produced;

(g) More than 300 activities were celebrated in Spain during 100 Hours of Astronomy.

IYA2009 in Romania: Between Education and Outreach

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The International Year of Astronomy has the potential to become one of the very first steps in showing that astronomy is the locomotive of science, thanks to education and outreach activities. Worldwide celebrations of astronomy are, in Romania, part of a “Triennium” of three years of activities dedicated to the International Heliophysical Year (IHY2007), the National Year of Astronomy celebrating 100 years of the Bucharest Observatory (NYA2008) and the International Year of Astronomy (IYA2009).

All the activities represent direct examples of outreach connected with education, ideas linked with practices for making the public aware of the beauty and value of astronomy. The first step of this journey was the opening ceremony in Sibiu, well known as a cultural capital of Europe (2007). At this time an agreement was established between the National Commission of UNESCO for Romania and the authorities of Sibiu. Assisted by teachers, children launched small rockets into the sky, drawing attention to the 500th anniversary of the birth of Conrad Haas, the first person to describe a multistage rocket in writing.

Professional astronomers have participated as consultants for the science items in the news. Hand in hand with amateurs astronomers they have organised attractive national events for the public such as “She is an Astronomer”. The astronomical amulet which young women wear during the year is also supporting the programme and one of the IAU Global Cornerstone projects. 100 Hours of Astronomy has been a national success. At the international level, the Romanian programme, run by the Society for Meteors and Astronomy was highly commended. Also worth mentioning is the Hands-on-Universe project chaired by the Romanian university of Craiova.

IYA2009 projects can give people involved in outreach activities a chance to show how science is best communicated through the mass media, and particularly through science journalism. We think that education (the relationships between astronomy and mathematics, physics, chemistry, biology, music, literature, history, for example), cultural heritage (IAU/UNESCO: “Astronomy & World

Heritage — Universal Treasures”), science journalism (improving the dialogue between scientists and media professionals), and outreach (leaflets, presentations, books, postal marks, workshops, such as “The Nights of the Cultural Institutes” held at the British Council, Romania, training sessions) are interconnected and might be used to spread useful astronomical information. All these have a high potential to attract young students, not only to the study of astronomy but also to science.

One of the platforms involved is the Science Newspaper, one of the IYA2009 media partners that act as a platform for teachers, scientists, and the public.

As a conclusion, we think that better science communication leads to a more efficient outreach that in turn contributes to a better education.

Part III: Organisational Node Reports

ESO's Activities for the International Year of Astronomy 2009

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The European Southern Observatory (ESO) has played a major role in the International Year of Astronomy 2009 (IYA2009) project since planning began in 2003. ESO is hosting the IAU's IYA2009 Secretariat, which coordinates the Year globally. ESO is an Organisational Node and one of the Organisational Associates of IYA2009, and was also closely involved in the resolution submitted to the UN by Italy, which led to the UN's 62nd General Assembly proclaiming IYA2009.

ESO IYA2009 projects and activities

There has been a range of ESO-specific activities throughout 2009, from local to global in scope, and aimed at a range of levels of interest.

In Search of our Cosmic Origins is a planetarium show about ALMA, the Atacama Large Millimetre/submillimeter Array. The show, produced by ESO and the Association of French Language Planetariums in collaboration with the Planetarium of Augsburg, is available in multiple languages and in formats for full-dome video and classical planetariums.

ESO, in collaboration with the IAU, has produced a book and movie celebrating the 400th anniversary of the telescope, *Eyes on the Skies* (Christensen & Schilling, 2009). The hardcover book is available in several languages, as is the movie on DVD and Blu-ray. Over 270 000 copies of the movie have been distributed, and it has also been broadcast numerous times on television.

The GigaGalaxy Zoom project reveals the full sky as it appears with the unaided eye from one of the darkest deserts on Earth, then zooms in on a rich region of the Milky Way using an amateur telescope, and finally uses the power of a professional telescope to reveal the details of an iconic nebula.

In terms of events, IYA2009 has been featured in ESO exhibitions throughout the year, including the global IYA2009 opening ceremony at UNESCO in Paris, the German IYA2009 opening event in Berlin, and many more. ESO will also participate in a number of activities near its headquarters in Garching, near Munich, Germany, including the Open House day on the Garching campus, planned for 24 October 2009.

Activities in Chile

ESO has organised a wide range of activities and projects for IYA2009 in Chile, our host nation. These include the distribution of a special multi-latitude Southern Hemisphere planisphere, running a series of Science Cafs, promoting a network of schools, revisiting classical science experiments such as the determination of the size of the Earth, opening a permanent astronomical exhibition at the Huanchaca Museum of the Desert in Antofagasta, and hosting Open House at Paranal, La Silla, and APEX/ALMA. ESO is also a partner in the GalileoMobile

IYA2009 Special Project, has supported the first Regional Congress “Astronomy at Schools” in the II Region of Chile, and has arranged several exhibitions of images in Chile including TWAN (The World at Night), ESO Heritage and GigaGalaxy Zoom.

IYA2009 Global Cornerstone projects at ESO

In addition to its ESO-specific activities, ESO is involved in many of the IYA2009 Global Cornerstone projects, and is playing a leading role in four of them:

Around the World in 80 Telescopes (Pierce-Price *et al.*, 2009), part of the 100 Hours of Astronomy organised by ESO, was a record-breaking and unprecedented, live, 24-hour public webcast giving members of the public a snapshot of 80 research observatories around the world during a single 24-hour period. The webcast reached well over 107 000 viewers (estimated 200 000) over the 24 hours. The Portal to the Universe (Christensen & Gay, 2008) is a global, one-stop portal for online astronomy content, for content providers, laypeople, press, educators, decision-makers and scientists. ESO, together with ESA/Hubble, is providing the portal infrastructure.

In the Cosmic Diary, professional scientists put a human face on astronomy through blogs, talking about not just the latest astronomical news, but what it is like to be an astronomer. The project is coordinated from the IYA2009 Secretariat at ESO, and 14 of our researchers are participating in the project’s ESO blog.

ESO is providing the infrastructure and resources for the Galilean Nights, which will encourage people all around the world to participate in stargazing events from 22–24 October 2009.

References

- (a) Christensen, L.L. & Gay, P. 2008, *The Portal to the Universe: A comprehensive gateway to what’s new in astronomy*, in ASP Conference Series 400, ISBN: 978-1-58381-672-1
- (b) Christensen, L.L. & Schilling, G. 2009, *Eyes on the Skies 400 Years of Telescopic Discovery*, Wiley-VCH, ISBN 3-527-40865-7
- (c) Pierce-Price *et al.* 2009, CAPjournal, 6, 18.

IPS Activities during IYA2009

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The International Planetarium Society (IPS) is the global association of planetarium professionals. It has nearly 700 members from 35 countries around the world. They represent schools, colleges and universities, museums, and public facilities of all sizes, including both fixed and portable planetariums. The primary goal of the Society is to encourage the sharing of ideas among its members through conferences, publications and networking.

During the International Year of Astronomy, the IPS is strongly encouraging

all planetariums worldwide, whether members or not, to embrace Cornerstone projects suggested by the IAU. The IPS especially supports the Galileoscope, 100 Hours of Astronomy and Globe at Night. In addition, the IPS is distributing, free to all its members, a planetarium show called *Two Small Pieces of Glass*, presenting the history of the telescope.

IYA2009 and planetarium shows

A planetarium show consists of a script, which may or may not have been previously prepared. Usually, for live shows, planetarians tend to improvise for the audience, based on their dome experience. But most of the shows are pre-recorded, and involve varying levels of pre-production.

For IYA2009, the IPS strongly encouraged all planetariums and other major content developers to produce shows related to the theme. Here is a list of shows produced in 2009 with a Galilean theme:

Probing the Heavens with Galileo, produced by Sternevent and distributed by Carl Zeiss of Germany;

Touching the Edge of the Universe, produced by the University of Applied Sciences in Kiel, Germany for the European Space Agency (ESA);

Galileo: The Power of the Telescope, produced by the Milwaukee Public Museum, Wisconsin, USA;

Galileo Skies produced by the Virginia Living Museum, Virginia, USA;

Le reve de Galileo (Galileo's Dream), produced and performed by the planetarium at the Cite des sciences et de Industrie in Paris, France. This production is a "live" performance in the planetarium by actors in costumes;

ALMA: In Search for our Cosmic Origins, produced in French and English by ESO, the French planetarium affiliate of the IPS and Mirage 3D;

Augen im All (Eyes in the Universe), produced by European Space Agency (ESA) and planetariums in Germany, Austria, and Switzerland;

Galileo Live! — A "live" performance in the planetarium of Galileo's life and discoveries produced by Canadian planetariums and nationally funded;

Evolution (Evolucion), produced by Spanish planetariums;

Pingo's Birthday (O Aniversario do Pingo), produced by the Rio de Janeiro Planetarium and nationally funded;

Two Small Pieces of Glass, produced by IPS members: Imiloa Astronomy Center of Hawaii; Buhl Planetarium & Observatory at the Carnegie Science Center; Interstellar Studios. The show was distributed free to all IPS members worldwide. Preliminary data shows an estimated 10%+ increase in attendance.

The IPS website had primary links to:

IYA2009 Dark Skies Awareness, (particularly in connection with Earth Day on 28 March and International Astronomy Day on 2 May);

Galileoscopes, Estimated that some 25 000+ telescope units were distributed through IPS planetariums/museums resulting in increased public star parties;

100 Hours of Astronomy, planetariums worldwide participated in hosting events from 2–5 April;

Galileo Teacher Training Program, Let There Be Night.

All in all, the IPS was well represented by planetariums worldwide and seems to have satisfied the IAU ideal behind IYA2009 well.

The International Year of Astronomy 2009: Activities of the Astronomical Society of the Pacific

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The Astronomical Society of the Pacific (ASP) is a partner, along with the American Astronomical Society, of US activity to celebrate the IYA. I will describe the ASP's signature IYA2009 activities and resources, with special emphasis on those that will carry the education and outreach momentum engendered by IYA2009 beyond the calendar year 2009.

The Astronomical Society of the Pacific (ASP), founded in California 120 years ago was the first organisation of astronomers in the US. From the beginning it included both amateur and professional astronomers, and was devoted to what we would now call education and public outreach. As a consequence, the aims of IYA2009 match the ASP's mission well, that is "to increase the understanding and appreciation of astronomy by engaging scientists, educators, enthusiasts and the public to advance science and science literacy". We list below some of the Society's IYA2009 activities. In some of these, the ASP is leading the effort; in others, we serve as a link to disseminate IYA2009 materials prepared by others. From the outset, the ASP has given priority to services and activities that will last beyond the calendar year 2009. Galileo's discoveries of late 1609 were important, but progress in astronomy did not stop abruptly on December 31 of that year. It would be a shame if the momentum of the IYA2009 developed this year were to dissipate.

One of our major contributions is the ASP's Discovery Guides. These are coordinated online¹ resources for use by amateur astronomers in their outreach activities. They are specifically linked to NASA's IYA2009 calendar of monthly themes and objects. The Discovery Guides is one of the programmes we hope to continue after 2009.

Next in importance is our participation in the Galileo Teacher Training Program. The ASP ran a very successful training programme at its annual meeting about a month after the IAU General Assembly.

We have also developed a web-based³ directory linking users to educational resources, both those of the ASP and others, which will definitely be continued after 2009.

Next, we list a number of activities in which we supported the work of others. We helped mount a display in the San Francisco area of the From Earth to the Universe materials. We have also worked on dark skies awareness and have distributed more than 2000 Galileoscopes to our members and other astronomers in the US. The ASP was also substantially involved in a television programme called

400 Years of the Telescope; we also distributed toolkits to amateur astronomers on the design of telescopes. Finally, in the summer of 2008, the Society held a symposium on IYA2009 activities, which was published as a book³ and is a useful compendium of IYA2009 activities.

Links 1 For more information see <http://www.astrosociety.org/iya/guides.html>

2 [http:// www.site.galileoteachers.org/](http://www.site.galileoteachers.org/)

3 <http://www.digitaluniverse.net/cosmicclearinghouse/>

4 http://www.aspbooks.org/a/volumes/table_of_contents/?book_id=433

Part IV: IYA2009 Global Projects

Status Report for IYA2009 Special Projects

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IYA2009 acknowledges that the Cornerstone projects are not the only large initiatives that have contributed to the vision and goals of IYA2009. For this, a category within the global structure has been set aside for IYA2009 Special projects, intended to give large global projects that satisfy the vision of IYA2009 greater international recognition and an opportunity to link with celebrations worldwide. These projects were selected according to some very clear criteria: they should satisfy at least one of the IYA2009 goals and align with the IYA2009 vision; they should be global projects; they should be financially independent; they should demonstrate sufficient potential for successful implementation, and the bulk of the project should be implemented during 2009.

Several proposals were presented to the IYA2009 Secretariat and accepted as Special projects. Here we give an overview of the status of implementation and results of these.

(a) The World at Night (TWAN) - one people, one sky: TWAN is a bridge between art, humanity and science. Its aim is to create and exhibit a collection of stunning photographs and time-lapse videos of the world's most beautiful and historic sites against a night time backdrop of stars, planets and celestial events.

(b) 400 Years of the Telescope: The main feature of this project is the high definition documentary, *400 Years of the Telescope*, with footage from the globe's major observatories and a series of interviews by an international group of professional astronomers. But the project also includes a full-dome and traditional planetarium programme, *Two Small Pieces of Glass*, coordinated outreach programmes with educational organisations, amateur astronomy organisations, national broadcasters and planetariums, an interactive website¹, the *400 Years of the Telescope* companion coffee table book and DVD, and a monthly newsletter.

(c) The mutual phenomena of the Galilean satellites of Jupiter: In this project the organisers encourage people to participate in observations of the mutual phenomena of the Galilean satellites of Jupiter, as part of an international network of observers. This network started gathering scientific data of high interest more than 20 years ago to find out more about the Galilean satellites of Jupiter: Io, Europa, Ganymede and Callisto. At the end of the campaign, all the observations will be collected and published in an international journal.

(d) *Around the World, Around the Sky*: This film takes up the title of a ten-film series on the history of astronomical observatories from antiquity until today broadcasted by Arte in 1990 - *Tours du Monde, Tours du Ciel*. This new project also deals with astronomy and observatories, but is set in the present, with a new story and a new treatment. It is a journey of exploration around the world, visiting working astronomical observatories to understand their observations and discoveries of the Universe.

(e) *Millions of Earths*: This is a 52-minute documentary, directed by Alain Tixier. The planets of our little Solar System are no longer the only ones on our map of the Universe. For the last thirteen years, hundreds of others - exoplanets - have been recorded. Where are they? Who records them day after day and how? *Millions of Earths* conducts a survey among different teams of researchers and finds out about the innovative techniques used to spot these new celestial bodies.

(f) Celebrating the 1919 Eclipse at Principe: In the spring of 1919, British astronomer Arthur Eddington travelled to the small island of Principe, to carry out what would become one of the landmark experiments of contemporary physics. His measurements confirmed Albert Einstein's theory of general relativity and kick-started our modern understanding of the Universe and how it evolved. Ninety years later, a group got together and went back to commemorate this event with the people of So Tom and Prncipe.

(g) The Sky - Yours to Discover: Most of the constellations we identify in the sky nowadays are based on those listed centuries ago. This project invites children and young people to gaze up at the sky and identify stars, connect stars with imaginary lines, create new constellations and original stories related to them.

(h) *BLAST!*: it's astrophysics Indiana Jones-style! The movie takes the viewer on a journey around the world and across the Universe to launch a revolutionary new telescope on a NASA high-altitude balloon. The movie follows this arduous scientific pursuit through several catastrophic failures in exotic locales before arriving at transcendent triumph on the desolate Antarctic ice.

(i) StarPeace: This project is organised by the non-profit non-governmental organisation Sky Peace and by the Astronomical Society of Iran, aimed at connecting people living on two sides of the land or sea borders of different countries by conducting joint star parties to show how the sky, being the same everywhere, could act as a bridge to join the people of the world regardless of the race, culture or nation they belong to. It is made possible by volunteer participation of active amateur astronomical groups around the globe.

(j) GalileoMobile: An itinerant science education project aimed at bringing IYA2009 closer to young people in South America, by fostering the will to learn through the exciting wonders of our Universe, while supplying local teachers with educational resources to sustain activities. GalileoMobile aspires to extend its impact through the production of a documentary. The trip will take place in October and November 2009, when the GalileoMobile will visit Peru, Bolivia and Chile.

(k) *Naming Pluto*: A 13-minute British documentary about Venetia Burney Phair, the English schoolgirl who named the planet Pluto in 1930, aged 11 years. Featuring Sir Patrick Moore, Dr. Allan Chapman, the Royal Astronomical Society and NASA, *Naming Pluto* looks back at the extraordinary human story of a young girl who made astronomical history and witnesses her long awaited reunion with planet she named, 77 years later, on the evening of her 89th birthday.

(l) *The Eye 3D*: In June 2009, a film crew of German 3D film experts travelled to Chile's Atacama Desert, one of the most arid places on earth, home of the VLT (Very Large Telescope) of the European Southern Observatory (ESO), to make a 3D-documentary about the most powerful optical telescope in the world.



Figure 4. IYA2009 Cornerstone Chairs present at the IAU GA. From left to right : Rick Fienberg (Galileoscope), Carolina Ödman (UNAWA), Kevin Govender (Developing Astronomy Globally), Mariana Barrosa (Cosmic Diary), Lars Lindberg Christensen (Portal to the Universe), Catherine Cesarsky (IAU IYA2009 EC WG Chair), Megan Watzke (From Earth to the Universe), Rosa Doran (Galileo Teachers Training Program), Mike Simmons (100 Hours of Astronomy), Constance Walker (Dark Skies Awareness), Pedro Russo (IYA2009 Coordinator) and Helen Walker (She is an Astronomer). Credit: IAU.

Links

<http://www.400years.org>

100 Hours of Astronomy

Mike Simmons¹, Douglas Pierce-Price² and the 100 Hours of Astronomy Task Group

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The 100 Hours of Astronomy Cornerstone project of IYA2009 (100HA) was a worldwide event consisting of a wide range of sidewalk astronomy activities, live webcasts from research observatories and science centres, and other public outreach events during the period 2–5 April 2009.

100HA began with an opening event at the Franklin Institute in Philadelphia, USA, in combination with a major exhibition of early astronomy artefacts that included one of Galileo's two existing telescopes on loan from the Museum of the History of Science in Florence, Italy. Live internet streaming from the Franklin Institute carried the opening ceremonies, a virtual tour of the exhibition and activities with students who had built small telescopes. This led into a webcast from

science centres worldwide, organised by the Association of Science-Technology Centers, which included a variety of presentations.

An unprecedented 24 hours of live webcasts from research observatories around the world followed. Organised and hosted by ESO, Around the World in 80 Telescopes drew large online audiences throughout the 24-hour period, including not only individuals but also crowds at astronomy institutions ranging from planetariums and science centres to amateur astronomy clubs. Recordings of the segments from all observatories are available for viewing online¹.

Amateur astronomers worldwide took the spotlight on 4 April. The 24-hour Global Star Party began at thousands of locations as darkness swept across the planet. Photos from many of the star parties can be viewed in the 100HA Photo Gallery².

Thousands more events of various types took place worldwide as well, as organisers improvised to take advantage of the attention paid to these four special days. Other Cornerstone projects and Task Groups conducted special programmes as well. The IYA2009 Solar Physics Task Group led SunDay on 5 April, a day devoted to solar observing and educational outreach. Educational and commercial facilities that offer remotely operated telescopes participated under the banner of 100 Hours of Remote Observing by donating time. Major partners, both organisers and collaborators, are listed online³. The 100HA Task Group is particularly grateful to its sponsors, led by the major sponsor, Celestron, which is also a Global Sponsor of IYA2009.

Total attendance at all 100 Hours of Astronomy events cannot be accurately known since there were thousands of events conducted that were not registered on the 100HA website, but an estimated one million people - and possibly more - took part in each of the two largest components, Around the World in 80 Telescopes and the 24-Hour Global Star Party. 100 Hours of Astronomy was truly a worldwide event, as seen in media coverage from around the world that touted local events as part of the larger global effort. 100HA demonstrated the tremendous interest in astronomy among the public, and that this interest is universal. It also showed what can be accomplished with a grassroots effort of thousands of enthusiastic volunteers organised through social networks with minimal central resources. Planning is underway for a post-IYA2009 follow-up that will take advantage of the networks and excitement created by this historic event.

Links

¹ <http://www.100hoursofastronomy.org/component/webcast/webcast/6>

² <http://www.100hoursofastronomy.org/photo-galleries>

³ <http://www.100hoursofastronomy.org/partners>

Cosmic Diary: Meet the Astronomers, See Where They Work, Know What They Know

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² IAU - International Astronomical Union

One of the Cornerstone projects of the International Year of Astronomy 2009, the Cosmic Dairy is not just about astronomy, but more what it is like to be an astronomer.

The official website¹ went live on 1 January 2009. It presents a collection of blogs which aim to put a human face on astronomy. Professional scientists blog in text and images about their lives, families, friends, hobbies and interests, as well as their work, latest research findings and the challenges that face them.

Currently, the Cosmic Diary has 58 bloggers from 30 different nationalities, posting in different languages: English, Portuguese, German, Japanese, Turkish and Spanish.

The first bloggers were “recruited” in 2008 through the National Single Points of Contact. They were later joined by institutional blogs from NASA, ESA, ESO, JAXA and the Royal Observatory Greenwich (Cosmic Diary 1894).

The topics of the posts are free; bloggers write about what they want so through the Cosmic Diary we can read about science, politics, family life, travels and holidays.

In addition to the regular posts, some of the bloggers have been asked to write a feature article about a scientific topic. Throughout the year, a number of bloggers have explained their specialist fields of expertise to the public via these features. These translate cutting-edge scientific research to a wide audience, giving people unprecedented access to those at the forefront of scientific discoveries. The articles are posted online, with a new one going live every two weeks. In total we will have 26 articles by the end of 2009. The idea is to use these later to produce the Cosmic Diary Book, which will be the legacy of this project.

Some facts and figures, from 1 January 2009 to 30 July 2009:

(a) a budget of 11 000 Euros from IYA2009 funds, divided between editing and coordination (53%), web development (30%) and design (17%);

(b) 1157 posts;

(c) 116 241 Visits + RSS Feeds (number unknown) (source: Google Analytics);

(d) an average 543 visits/day + RSS Feeds (number unknown) (source: Google Analytics);

(e) visits came from 216 countries/territories (source: Google Analytics);

(f) traffic sources: 49.89% from referring sites; 28.66% from search engines; 21.44% direct traffic; 0.01% others;

(g) Cosmic Diary Facebook group with 602 members.

Link

<http://www.cosmicdiary.org>

Portal to the Universe

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The science of astronomy never ceases to amaze. Every day new results are published that trigger a cascade of press releases, blogs, podcasts and media coverage.

As is the nature of the internet, new providers pop up, while old ones disappear all the time. To accommodate to these oft-changing sources of astronomy information the European Southern Observatory (ESO) set up the Portal to the Universe (Christensen & Gay, 2008) – a dynamic project that serves as a global, one-stop portal for online astronomy content. The Portal is a service to laypeople, press, educators, decision-makers and even scientists. Content providers also benefit from the added visibility of their products and the increased traffic to their materials.

The portal indexes and aggregates content including news, blogs, video and audio podcasts, images, and videos. Web 2.0 collaborative tools, such as the ranking of different services according to popularity, help the user to sift constructively through the wealth of information available. A range of “widgets” (small applications) have also been developed to tap into all sorts of existing “live data”, such as near-live pictures of the Sun, live positions of spacecraft and live observations from telescopes.

The Portal enables real-time access to content by aggregating (pulling) from providers of astronomy information, and distributing (pushing) this content to users. The Portal also indexes and archives, and thereby maintains a central repository of useful information. Modern internet standards such as RSS feeds and standardised metadata make it possible to tie all the suppliers of astronomy information together with a single automatically updating portal that only requires minimal human moderation. The result is a technologically advanced site that brings together strands of astronomy content from across the Internet.

In its first six months of operation, the PTTU had more than 250 000 visitors, featured more than 3500 press releases, almost 2100 podcast episodes and 21 000 blog posts.

Among the latest developments for the Portal is that we now have a real Editor-in-Chief, Adam Hadhazy, who will be taking the lead in exploiting the Portal’s potential. A new section for astronomy twitter feeds has been made, as well as an intelligent algorithm to sort astronomy content from non-astronomy content. The latter turned out to be very important as much good astronomy content is produced by “mixed” channels that include social science and many other non-astronomy stories.

We encourage participation from anyone interested. We welcome content on the Portal from media outlets, bloggers, and astronomy enthusiasts. Everyone can submit astronomy and space-relevant RSS feeds for press releases, podcasts, blogs, and image archives.

ESO, together with ESA/Hubble, is providing the portal infrastructure and is partly sponsoring the project together with IAU/IYA2009.

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IYA2009 Cornerstone She is an Astronomer**H. J. Walker¹**¹STFC Rutherford Appleton Laboratory, UK

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Gender equality is a fundamental principle of human rights. It is one of the UN Millennium goals to promote gender equality and empower women, and it is an IAU/UNESCO IYA2009 goal to improve gender-balanced representation of scientists at all levels. Although some countries do have a high percentage of women working as astronomers, women are significantly underrepresented at senior levels in most countries. The IAU itself finds only 13% of its members are women. The aim of the IYA2009 Cornerstone project, *She is an Astronomer*, is to provide information to female professional and amateur astronomers, students and those interested in the gender equality problem in science. One of the outcomes from the project was Resolution B4 on Supporting Women in Astronomy, adopted by the IAU General Assembly in Rio de Janeiro.

An objective of the project is to build a database where people can get information about the subject, ask questions and find answers. A website¹ has been developed with the assistance of Quentin Stanley, Anita Heward and Emily Baldwin, using information supplied by the Task Group and the web group. The website is hosted by the Royal Astronomical Society. This is the main tool to address the aims and objectives of the project; it will grow during the year and remain as a legacy after IYA2009. The main areas where information is being gathered are:

- (a) profiles of living and historic female astronomers, a largely invisible part of the astronomy community in the past;
- (b) resources available to women astronomers;
- (c) events taking place during the year;
- (d) an area for national ambassadors of *She is an Astronomer* to populate with information;
- (e) a forum where issues and topics can be discussed (which will start later in the year).

We are still gathering data, statistics and resources, and these are the areas where it is difficult to track down material in a form where it can be compared from country to country.

The website was launched in April and immediately astronomers began getting in touch with news and events. People from 26 countries have contacted the *She is an Astronomer* website. Around 90 women were invited to send in their profiles and by the end of July we had received 27 replies from 11 countries. The profiles are from women at all stages of their careers, and doing a wide variety of jobs. We have profiles for around 20 female astronomer pioneers. There are examples of different types of events which people are holding to celebrate *She is an Astronomer*, and the posters for IYA2009 at the IAU show that there have been a lot more events taking place, which is really great news. Some countries have very active ambassadors, such as Athena Coustenis in France and the group in Spain led by Francesca Figueras, who as part of their programme created a

calendar with 12 historic female astronomers. This was such a huge success that the calendar text has been translated into English and the calendar for 2010 will be available as a download from the website (in both Spanish and English).

The profiles we received show that women have a real passion for astronomy; they love doing it. They will work hard and put in long hours. They think the situation for women is getting better, but active support is needed. One of the questions in the profile is “what recommendation would you make to young women starting their career in astronomy” and this has provided to be an amazing resource of hints and suggestions. There is advice for the individual such as do what you enjoy, keep a positive attitude, pick the one thing you excel at, get a mentor, get a life, start your family (if you want one) when you are young, energetic and flexible. For the female astronomer as part of a family, the advice is to find (and/or train) a supportive partner, to explain to your family why you love your work so they will understand and support you, and to discuss things with them and keep on discussing. We are urged to learn how the system works, join committees, get information and support, and give talks.

Link

<http://www.sheisanastronomer.org>

Dark Skies Awareness: An IYA2009 Cornerstone Project

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The preservation of dark skies is a growing global concern, yet it is one of the easiest environmental problems people can address on local levels. For this reason, Dark Skies Awareness was created as a Cornerstone project of the International Year of Astronomy 2009. Its goal has been to raise public awareness of the impact of artificial lighting on local environments by getting people worldwide involved in a variety of programmes. The programmes provide resources on light pollution for new technologies such as a presence in Second Life, social networking and podcasts, for local thematic events at national parks and observatory open houses, for international thematic events like International Dark Skies Week and Earth Hour, for a programme in the arts like an international photo contest, for global citizen–science programmes that measure night-sky brightness worldwide, and for educational materials like a kit with a light-shielding demonstration. Dark Skies Awareness has also supported the concept of Dark Skies Communities through the IAU 2009 B5 resolution, the Starlight Reserve Concept and the International Dark Sky Places programme.

The Dark Skies Awareness programmes have been successfully implemented around the world during IYA2009. The 33 countries noted for their participation in these and other education outreach programmes on dark skies awareness are Argentina, Australia, Austria, Brazil, Canada, Chile, China, Columbia, the Czech Republic, Finland, France, Germany, Greece, Hungary, Iran, Ireland, Italy, Japan, the Former Yugoslav Republic of Macedonia, Mexico, the Netherlands, New Zealand, Poland, Portugal, Romania, the Russian Federation, Saudi Arabia,

Slovakia, Slovenia, South Africa, Turkey, the United Kingdom and the United States. In particular, these comprised half of the countries that contributed over 15 700 measurements during the two weeks of the GLOBE at Night citizen science campaign - twice the number of measurements on average from previous years. In terms of programme sustainability beyond IYA2009, many of the resources can be downloaded (the posters, brochures, guides, etc.) and so are sustainable at least as status quo. Funding is hopeful for future podcasts, two of the star hunt programmes and the educational kits. The Second Life presence will continue for as long as the IYA2009 island is open and the social networking sites will continue at least as they are now. The Dark Skies Discovery programme in the United Kingdom has funding to continue, as does Earth Hour and the US National Park Service programme. The Earth and Sky Photo Contest is most likely a one-time event. For as long as the Dark Skies Awareness website is running, Dark Skies Communities, as well as the other programmes, will be promoted. For information on how to become involved in any of these programmes, people are invited to visit www.darks skies awareness.org.

IYA2009 Dark Skies Awareness was partially funded by the IYA2009 Secretariat Office, as well as from the US National Science Foundation (NSF) Astronomy Division, via the US National Optical Astronomy Observatory (NOAO). NOAO is operated by the Association of Universities for Research in Astronomy, Inc. under cooperative agreement with the NSF.

Developing Astronomy Globally

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The Developing Astronomy Globally (DAG) Cornerstone project was initiated in order to ensure that IYA2009 benefits those countries that do not have strong astronomical communities by stimulating astronomy in underdeveloped regions. From the outset DAG was seen as a project to kick off activities that would last well beyond 2009. As such it was aligned with the IAU's strategic plan for development entitled *Astronomy for the Developing World*.

Coordinated from South Africa, DAG started off by conducting a global astronomy survey targeting mainly underdeveloped regions. The purpose of the survey was to establish a "bottoms-up" evaluation of the state of astronomy in any given country. This data could then be used to plan development activities both for the country and for the region. Focus areas of the survey were threefold: professional, public and school level education. Participants in the survey were asked to rank their countries within each focus area and provide associated explanations and descriptions of the local situations. This survey continues to grow with a dynamic user-controlled web page for each country.

Early in the year DAG coordinated the attendance of African students at the IYA2009 opening event in Paris. This project involved selecting students from five African countries and arranging all the logistics necessary to get them to the opening ceremony. Funds were provided by UNESCO and feedback from the students was extremely positive. From there the administration of grants continued,

with DAG managing a full grants process (including preparation of calls, selection of grants, payments and monitoring) for astronomy “seed funding” aimed at developing countries across the globe. An initial 12 grants were awarded to Rwanda, Kenya, the Former Yugoslav Republic of Macedonia, Nepal, Uganda, Tajikistan, Mongolia, Uruguay, Ethiopia, Nigeria, Gabon and Nicaragua (each grant was less than 1000 and carried project-specific implementation conditions). DAG has also developed, together with the IAU’s Commission 46, a model for “astronomy stimulation visits” and proceeded to raise funds and rally support for a pilot programme in East Africa. This programme is envisaged to take place in Nairobi, Kenya, in November 2009. Other projects included the coordination of a committee for the selection and distribution of donated telescopes worldwide (Galileoscopes and Celestron telescopes); the consolidation and distribution of “offline” electronic resources that will be available on CDs and DVDs and be free to copy (targeted at countries or regions without abundant internet access); and the development of a new interactive website which includes dynamic country surveys and the establishment of an opportunities database for students and lecturers from developing regions.

In terms of the future of DAG, beyond IYA2009, much of what has been started will feed well into the IAU strategic plan for astronomy in the developing world. Almost all activities have served as pilot projects that have demonstrated what can be done to develop astronomy globally. The momentum of IYA2009 has been utilised to drive these pilot projects thus far, but after 2009 they will fall into the hands of the IAU’s Global Development Office (which should be established soon after IYA2009) as well as the IAU’s Commission 46 (Astronomy Education and Development).

The Galileo Teacher Training Program

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Training teachers in the use of modern tools for science education is certainly the trend of the future. Never before has the challenge of triggering student’s interest in science topics and the promotion of a more dynamic and interactive classroom environment been so crucial. The vision of the Galileo Teacher Training Program (GTTP) is to be a provider of a strong network and a source for a dynamic training for educators worldwide. In 2009 more than 50 nations had GTTP representatives named in an effort that may be seen as the seeding effort of the project. Training sessions are being promoted in all corners of the planet and a strong network of educators and promoters raises a promise of a strong legacy of IYA2009.

GTTP is being built with the support of an already existing network of astronomy education promoters, the Global Hands-On Universe Association. The European branch of this group has piloted a well-structured effort in Europe, an effort awarded a silver medal by the European Commission in the scope of the



Figure 5. Galileo Teachers Training Program Session at ES/ESERO in the Netherlands, Credit: ESA/GTTP

Long Life Learning Awards in the category of Information and Communication Technologies. GTTP is being built using such experience as guidance, but facing a much bigger challenge since it also aims to embrace nations that are only very recently awakening to the new technologies.

All participants of GTTP training sessions are entitled to a participation certificate. Educators applying the learned tools in classroom are awarded a Galileo Teacher Certificate and promoters of training session a Galileo Ambassador Award. All sessions must be submitted and approved by the GTTP task group. The minimum requirement for a session is to address elementary themes and/or concepts of astronomy, use resources that address at least three types of activities, such as naked eye or small telescope observations, hands-on activities, and new technologies, including robotic telescopes and data mining.

In summary, GTTP is much more than training teachers; within the scope of the programme we also foresee the creation of a good repository of rated resources, the existence of an efficient network that will act as a 24-hour helpdesk. As an additional support to those engaging in this challenging path, we also intend to

promote several thematic campaigns where GTTP teachers are invited to apply the learned resources to the study of specific themes and promotion of real scientific research in classroom.

GTTP will certainly be a strong and sustainable legacy of IYA2009, empowering educators to use astronomy as a trigger to a new paradigm in science education, based more on IBSE (Inquiry Based Science Education). GTTP can also be a powerful tool to promote global citizenship awareness and a tool to help bridge the gap between the developed and developing world. Experienced teachers may be a good link to newcomers and the network of ambassadors will certainly be built beyond all borders.

An Update on Universe Awareness

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Universe Awareness (UNAWA) has almost four years of experience enthusing young children with the scale and beauty of the Universe. UNAWA is an outreach programme with a strong social vision aiming at broadening the minds of children, awakening their curiosity in science and stimulating global citizenship. UNAWA uses the inspirational aspects of astronomy to instil a culture of peace and tolerance. Universe Awareness started in 2004 as an idea. In 2006 UNAWA obtained a grant from the Netherlands Ministry of Education, Culture and Science to develop the international programme for three years. This grant allowed for the establishment of a small international office based in Leiden, the Netherlands, and some travel. In 2007, UNAWA was chosen as one of the global Cornerstone projects of the International Year of Astronomy 2009, and this has played an important role in bringing a number of new participants into the programme.

After almost four years, UNAWA has been implemented in over 30 countries around the globe. Each country's programme is suited to its local conditions. UNAWA is implemented in schools, science museums, by development NGOs, astronomers, educators, etc. Most participants are volunteers, but in some countries national funding has been secured to hire people and produce resources. UNAWA has grown significantly thanks to the International Year of Astronomy. Some countries are running a UNAWA programme without the knowledge of the UNAWA international office. When we come across such groups, we extend a warm welcome and invitation to join the international network.

UNAWA has brought together volunteers and participants from a number of professional backgrounds. From creative artists to professional astronomers, child development specialists and journalists as well as students and teachers, the diversity of the UNAWA community is one of its greatest assets. In terms of products, UNAWA can boast a collection of educational resources that are found on its international resource website¹ and distributed across the websites of the various national UNAWA programmes. UNAWA has received substantial coverage in the national and international press, for example, in *Physics Today*. In ad-

dition to this, a number of books, DVDs and other products have come out of the community's work. National UNAWE programmes, sometimes with the help of the international office, have received a number of small grants that have enabled specific projects to be carried out. As an example UNAWE was awarded an IYA2009 grant from the European Astronomical Society that enabled the translation into English of an astronomical story-book from children, originally produced in Spanish by Spanish-speaking partners from over ten countries.

Owing to its innovative approach and visible success, UNAWE has been called in as expert in various projects, for example, the UNESCO World Report on Cultural Diversity. This enables UNAWE to bring the voices of the people on the ground to high-level circles. To conclude, the success of UNAWE probably lies in its novel approach using astronomy for young children's development, its social goals, the geographic and professional diversity and the openness of its community.

Link <http://www.unawe.org>

From Earth to the Universe in IYA2009

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From Earth to the Universe (FETTU) is an image collection of astronomical objects ranging from our home planet through the galaxy to the furthest corners of the Universe. These images contain data from both telescopes on the ground and in space that observe in many different types of light, from radio to optical to X-rays and beyond.

FETTU, one of the IAU IYA2009 global Cornerstone projects, has shown the incredible appeal of astronomical images and the science they contain to the general public. This series of images, with captions now translated into dozens of languages, has appeared in nearly 70 countries and on every continent except Antarctica.

The goal of FETTU has been to engage the largest possible populations, in particular those who might not generally visit science centres or planetariums. The images were selected using a number of criteria, including the diversity of the objects, wavelengths and others. But their inherent aesthetic appeal was a major factor, because FETTU displays these images as much as art as science. Furthermore, the FETTU exhibits were largely placed in non-traditional science venues such as public parks, transportation stations, art festivals, shopping malls, libraries, etc.

By combining the beauty of these images with their placement in accessible venues, FETTU has been embraced tremendously around the world. With some 500 separate exhibitions over the course of IYA2009, it is impossible to list any decent representation of the highlights here. It can be said, however, that the presence of astronomy has been felt in countries of all sizes, regions, and politics through FETTU. This includes recent displays in halls of the Iranian Parliament, in the heart of Moscow, in a prison in Portugal, and across Bolivia.

We believe the success of FETTU demonstrates that the wonders of astronomy are universal in their appeal and remind us that no matter where we are, we all live under the same sky. We hope that the reach of FETTU can continue into 2010 and beyond and provide one model for science outreach in the future.

More information on FETTU, a project produced and directed by the Chandra X-ray Center at the Smithsonian Astrophysical Observatory: www.fromearthtotheuniverse.org

Astronomy and World Heritage: The IYA2009 Cornerstone Project

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Introduction

The cosmos has captivated the imagination of civilisations throughout the ages. The desire to understand or interpret what people see in the sky is often reflected in architecture, petroglyphs, urban planning and other cultural representations. These material testimonies of astronomical observations, found in all geographical regions, span all periods from prehistory to today.

UNESCO and the IAU are working together to promote collaboration in research and education as part of UNESCO's Thematic Initiative, Astronomy and World Heritage. This project creates an opportunity to evaluate and recognise the importance of astronomical heritage in terms of the enrichment of the history of humanity, the promotion of cultural diversity, and the development of international exchange.

The fact that Astronomy and World Heritage has been recognised as one of the IYA2009 Cornerstone projects reflects the fact that support from the international community is vital if we are to save cultural properties connected with astronomy from progressive deterioration and to recognise astronomical heritage by the inclusion of the most representative of these properties on the World Heritage List.

Conversely, our status as an IYA2009 Cornerstone project has given us an opportunity to develop several key projects during 2009, namely:

(a) the ICOMOS–IAU Thematic Study on the Heritage Sites of Astronomy, which will become a document of the Convention;

(b) the expansion of the Astronomy and World Heritage Timeframe currently held on the UNESCO website into a more broadly accessible database and a public forum; and

(c) the publication of a special issue of UNESCO's quarterly *World Heritage Magazine* with Astronomy as its featured theme. This is published in three languages and is distributed to States Parties and other interested organisations and individuals throughout the world. A separate article in this volume ("Astronomy and World Heritage" by Clive Ruggles) describes these activities in more detail.

The Cornerstone project has also brought about some key collaborations, most notably between the Thematic Initiative and

(a) the Ancient Skies project¹, a global scientific project that is striving to collect, verify and publish available information about various human cultures, their astronomical knowledge and its representation in the sky within a single web accessible knowledge base; and

(b) the Starlight Initiative, which is working to protect the natural heritage of the dark night sky.

In the remainder of this article we focus upon the background to the Initiative itself and the complementary activities that have supported the key projects mentioned above.

The World Heritage Convention, science heritage, and the development of the Initiative

The 1972 Convention concerning the protection of cultural and natural World Heritage has provided a unique opportunity to preserve exceptional properties world-wide and to raise awareness about scientific concepts linked to these properties.

UNESCO's mission regarding World Heritage is to assist the States Parties to this Convention to safeguard sites inscribed on the World Heritage List, to support activities led by States Parties in the preservation of World Heritage, and to encourage international cooperation in heritage conservation.

In 1994, the World Heritage Committee adopted a Global Strategy whose objective is to promote activities for a representative and balanced World Heritage List, in order to fully reflect the cultural and natural diversity of heritage of outstanding universal value.

Properties with a relationship to science are amongst the least represented on the UNESCO World Heritage List and the significance of these properties, located in all the regions of the world, is not sufficiently recognised. Recognising this, and recognising also the absence of an integrated thematic approach for sites that have a symbolic or direct connection to astronomy, the UNESCO World Heritage Centre, in close consultation with its States Parties, developed, in 2005, the Thematic Initiative "Astronomy and World Heritage". Its main aim was, and remains, to provide an opportunity to identify the properties connected with astronomy, to keep their memory alive, and to preserve them from progressive deterioration, through the inscription of the most representative properties on the World Heritage List.

A principal objective of the Initiative has always been to establish a link between Science and Culture through the recognition of the scientific values of cultural sites linked to astronomy. The identification, preservation and the promotion of these properties are fields of action in the implementation of this programme.

Implementing the Initiative

In May 2007, the Executive Committee of the IAU unanimously adopted a proposal to establish an official partnership with UNESCO within the framework of

the Initiative in order to ensure its effective implementation. An Implementation Strategy for the Initiative was developed jointly by UNESCO and the IAU, and this was duly examined by the World Heritage Committee at its 32nd session in Quebec, Canada, in 2008.

In signing the Memorandum of Understanding in October 2008, whose purpose was to carry out this implementation strategy, UNESCO and the IAU underlined the fundamental role that culture plays in scientific progress and, conversely, that science plays in our cultural enrichment. This is a step towards the recognition of the importance of astronomical heritage world-wide, in terms of its enrichment of the history of humanity, the promotion of cultural diversity, and the enhancement of international exchange.

The collaboration aims to share best practice, to increase the role of the World Heritage Convention, and provide an opportunity to raise public awareness — especially among the young — about astronomical heritage. This will allow us to enhance the links between science, education, culture, and communication. UNESCO and the IAU are also working together to encourage States Parties to the World Heritage Convention to actively participate in the development and implementation of the Thematic Initiative.

The significance of this collaboration lies in three essential questions:

- (a) How can we identify astronomical sites of Outstanding Universal Value?
- (b) How can we protect and promote them?
- (c) What benefits can States Parties and communities draw from adopting this path?

Milestones, supporting activities, and the IYA2009

The Global Thematic Study on astronomical heritage being developed jointly by the International Council on Monuments and Sites (ICOMOS) — the Advisory Body to the World Heritage Committee that is concerned with cultural nominations — and the IAU Working Group on Astronomy and World Heritage represents the first major milestone for the Initiative. It will establish a methodological approach for the consideration of sites associated with astronomy on the basis of the World Heritage criteria, and provide support for the preparation of possible nominations for the World Heritage List.

The Working Group discussion meetings held in 2009 in Spain, Brazil, Russia and Italy have succeeded in widening the input to the Thematic Study, resulting, for example, in the inclusion of a section on Space Heritage contributed by a group of authors from the Russian Federation as well as the addition of several important case studies.

The publication of an issue of the UNESCO World Heritage Magazine devoted to astronomical and science heritage is another milestone achieved during 2009 itself.

Beyond 2009, the focus of the Initiative will shift towards common efforts to promote the identification and preservation of astronomical sites and their associated technological heritage through public awareness-raising campaigns and

international projects. This is a crucial and vital step in safeguarding these sites for future generations.

In his address on the occasion of the Opening Ceremony of the IYA2009 in January 2009, the Director-General of UNESCO underlined that *“the sky belongs to everyone, and everyone has the right to enjoy the wonders it holds, to seek to discover its greatest mysteries. Astronomy brings us together, across borders, religions and beliefs; it is an instrument of peace and understanding among peoples.”*

Link <http://www.ancient-skies.com>

Part V: Selected Activities and Programmes

Astro–Gyaan: FAQs in Astronomy

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As most astronomy popularisers and educators know, the public are curious about astronomical phenomena. However, most astronomical information they receive is not based on serious texts, but on media reports and press releases. The majority of the population will not make a deliberate effort to acquire knowledge which may not be directly useful in their daily lives and will be happy to gather whatever information comes their way, without paying too much attention to its authenticity. Even in the case of media reports, people’s attention spans are short and they are likely to avoid long documentaries. The project Astro–Gyaan (AG) has been tailored to suit this behaviour pattern.

In Sanskrit-based languages, “Gyaan” means knowledge. In almost every public talk by astronomers, people tend to ask typical questions like “what is a black hole?”, “are there aliens?”, “what makes the Sun shine?” etc. If these questions are answered in a short, crisp manner aided by graphics and animation, we would succeed in quenching the thirst for knowledge of a significant majority. This is the basic premise of the AG project. The list of questions is as follows:

What makes the Sun shine?	What is meant by the expansion of the Universe?
Does solar activity affect the Earth?	Why is the sky blue?
What are comets?	Are the shapes of the constellations real?
Why can we not see a very long total solar eclipse?	What is cosmic microwave background radiation?
Why was Pluto made a dwarf planet?	What causes tides?
Are all stars like our Sun?	What causes the phases of the Moon?
How do the stars form?	Are we alone in the Universe?
Do other stars have planets like the Earth around them?	Why do astronomers probe Universe in multiple wavelengths?
What is a galaxy?	What are the next steps for Indian space science?
What is a black hole?	Which are India’s major observational facilities?

What are cosmic rays?	Is astrology a science?
What are dark matter and dark energy?	How to become an astronomer?

Key features of the project are as follows:

the total number of questions was 24;

each question was answered by a different prominent Indian astronomer;

the length of each film was restricted to between 1 and 1.5 minutes;

the selection of speakers automatically included diverse representation from different research institutes in India as well as diversity in gender, geography and ethnicity.

The answers were aided by animations and graphics available in the public domain with appropriate credits. The entire cost of the project is borne by the Homi Bhabha Centre for Science Education (HBCSE), Mumbai, India. The clips are offered to the state television for free while the IPR is maintained with HBCSE. HBCSE plans to upload these clips to the web in the near future and also to distribute them on CDs to schools and colleges. The original clips are shot in the English language, but they will be translated to various regional languages for wider audiences.

We hope that a project like AG will help change people's outlook towards astronomy and create a positive image about scientists working in the field.

Astronomia.pl Portal Activity in 2008–2009

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Astronomia.pl or Polish Astronomy Portal¹ is the main astronomical portal in Poland. During IYA2009 it was the task of the portal to manage the Polish national website for IYA2009. The portal also engaged in preparations to start the Galaxy Zoo 2 project in Poland, organised the International Conference of Young Astronomers ICYA2009, and gave patronage and media support to many astronomical events. The next big task is the Aurora Polaris project, aimed at elderly learners and blind people. Astronomia.pl also supported global activities. The main content of the website is news coverage of science, education and communication topics from astronomy, a database of articles, newsletters, discussion forum, galleries and more. The portal and its activity are described in detail in Czar¹ & Pomierny (2006, 2008) and Czar¹ (2005).

IYA2009 Polish website²: The main task of the portal during IYA2009 has been creating and maintaining the Polish national website for IYA2009. The website acts as a database of events in Poland, and it is also a source of basic information about astronomy in Poland and holds addresses of scientific and educational institutions related to astronomy.

International Conference of Young Astronomers (ICYA2009)³: About 150 participants from more than 30 countries attended the conference, organised by the

biggest Polish universities and astronomical societies from 7–13 September in Krakow. The plan is to organise the conference each year in a different country. Aurora Polaris⁴: Aurora Polaris is a cooperative project between institutions from Poland, the United Kingdom, Slovakia and Greece. It is funded by the Grundtvig programme of the European Union. During the project resources have been created for visually impaired people and for elderly learners. The task of the Astronomia.pl portal was to prepare podcasts about astronomical topics.

Galaxy Zoo and Galaxy Zoo 2⁵: Galaxy Zoo is a programme aimed at the general public. People were encouraged to classify galaxies. Preparation of a Polish version was a great success and attracted many people to try this task. It is the only non-English version of the project website.

Star count global activities: Astronomia.pl supported global activities during IYA2009. One example is a star counting project, for which we have prepared Polish materials and promoted them in our country. During 2008–2009 we supported GLOBE At Night 2008–2009 and The Great World Wide Star Count 2008 in this way.

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Czart, K. & Pomierny, J. 2006, IAUS, 2, 62

Czart, K. 2005, EAS Publication Series, 16, 97

Links

1 The portal addresses are <http://www.astronomia.pl> and the separate websites <http://www.kopernik.pl>, <http://www.planetarium.pl> and <http://www.astrowww.pl>

2 <http://www.astronomia2009.pl>

3 <http://www.icya2009.org>

4 <http://www.aurora-polaris.eu>

5 <http://www.galaxyzoo.org>

Special Session 2 IYA2009: Poster Overview

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The International Year of Astronomy 2009 (IYA2009) featured tens of thousands of events worldwide. These were organised and implemented by the many professionals, amateurs and volunteers who built IYA2009 into the most successful science education and public outreach project ever undertaken. Not even the two full weeks of the IAU General Assembly would have been enough to hear the reports from the different grassroots initiatives. Below you can find the full list of posters (and authors) presented during the Special Session, and this list gives an overview of the multiple initiatives around the world.

List of Posters

- New Astronomical Observatory in Morocco: Contribution to Research and Education (Zouhair Benkhaldoun)

- Space Sciences in the Developing Countries: Position and Potential (Babagana Abubakar)
- IYA2009 Activities in Armenia (Areg Martin Mickaelian)
- Joyful and Scientific aspects of Astrophotography (Mojtaba Taheri, Mohammad Javad Ajdadi, Sara Khalafinejad)
- IYA2009 in Cuba (Oscar Alvarez)
- Astronomical Society of Shiraz University and Similar Societies (Sara Khalafinejad, Saeed Hojjatpanah, Fatemeh Kamali)
- IYA2009 in Uruguay (Tabare Gallardo)
- OA-UNI: an Astronomical Observatory in the Peruvian Andes (Erick Meza, José Ricra, Antonio Pereyra)
- The UNI –Astronomy Group, 23 Years of Astronomical Outreach in Perú (Erick Meza, José Ricra, William Cori, Antonio Pereyra)
- The Secrets of the Birth and the Death of Galileo Galilei (Elena A. Gavryuseva)
- The Role of Langitselatan as the Media on Astronomy Education in Indonesia (Avivah Yamani, Ferry M Simatupang, Aldino Adry Baskoro, Emanuel Sungging Mumpuni)
- Ecuador Taking Part in the IYA2009 Celebration (Ericson Daniel Lopez)
- IGP's Activities for the IYA2009 (Jesús Antonio Dalmau Cam, José Kaname Ishitsuka Iba)
- IYA Activities at the University of Texas at Austin (Mary Kay Hemenway)
- 1000 Telescopes for 1000 schools in the UK (Helen Joan Walker)
- Australian Aboriginal Astronomy: Comets, Meteors, and Cosmic Impacts (Duane W. Hamacher)
- *Noche de las Estrellas*, a Massive Celebration in Mexico (S.Torres-Peimbert, J. Franco, I. Cruz-Gonzalez, B. Pichardo)
- Pakistan Celebrates IYA2009 (Malik Ghulam Murtaza)
- The Activities of Infinity — IYA2009 (Piero Galeotti)
- Sky Observation and Astronomy Teaching in the Tertiary Level in India (Rabindra Kumar Bhattacharyya)
- IYA2009 in Albania (Mimoza Hafizi)
- Education in Astronomy: Discussing Science Technology and Society (Artur Justiniano Junior)
- The Multiverse and the Mind: Exploring Cosmology's New Infinities (D. Kala Perkins)
- The You are Galileo! Telescopes (Hidehiko Agata)
- IYA2009/Peru: The UNMSM will Establish the Astronomy career as Homage to IAU (Maria Luisa Aguilar Hurtado)
- Developing Astronomy at the Brazilian Pantanal Region (Telma C. Couto da Silva, Marcos G. G. C. Lima, Celio R. Pinheiro, Denilton C. Gaio, Shozo Shiraiwa)
- Activities of the IYA2009 in Argentina (Olga I. Pintado)
- The Astronomy Club in an Isolated School in Argentina (Olga I. Pintado, Analia Juarez, Lidia Salvatierra, Carola Gomez)
- Japanese IYA2009 Activities (Kazuhiro Sekiguchi)

- Encouraging Spanish-speaking Children to Explore the Universe with UN-AWE en Español (R. M. Ros, C. Ödman)
- International Year of Astronomy 2009 Activities in India (Ranjeev Misra, Dipankar Bhattacharya)
- International Year of Astronomy 2009 Activities in Turkey (Ali Alpar)
- Non-scientists' Perception of Telescopes and the Light They Collect (Erika D. Grundstrom, Roger S. Taylor)
- The IYA09 Activities and Approaches of IIA (Prajval Shastri, Sabyasachi Chatterjee)
- The International Year of Astronomy in Minas Gerais. The Activities of the Center of Sciences Gaia: Itinerant Planetarium (Peter Leroy Faria)
- Students As Starry Messengers For IYA2009 - Puerto Rico (Carmen Pantoja, Mayra E. Lebrón)
- The International Year of Astronomy in Puerto Rico – Progress Report (Mayra E. Lebrón, Carmen Pantoja, Daniel Altschuler, José Alonso)

- IYA2009 - Puerto Rico Activities for the Visually Impaired Public (Carmen Pantoja, Gloria Maria Isidro, Mayra E. Lebrón).



Figure 6. The IAU IYA2009 EC WG present at the IAU GA in Rio de Janeiro, Brazil. From left to right: Ian Robson, Norio Kaifu, Kevin Govender, Mariana Barrosa (ex-officio), Claus Madsen, Catherine Cesarsky (Chair), Dennis Crabtree, Mary Kay Hemenway, Lars Lindberg Christensen (Secretary), Pedro Russo (ex-officio). Credit: IAU

Part VI: Legacy & Conclusions

Building on IYA2009: The IAU Strategic Plan Astronomy for the Developing World

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Fostering astronomy in developing countries has long been regarded by the IAU as an important task. During the past two decades the IAU has conducted a range of educational activities under the auspices of Commission 46. These activities were directed mainly towards stimulating astronomy at university level. The IYA2009 and the increase in scope and size of astronomy outreach activities that it has inspired led the IAU Executive Committee to conduct a review of our educational and development. The EC charged me with leading an effort to produce a strategic plan for this area. After obtaining input from a large number of experts and stake holders, we produced a blueprint for IAU educational and development programmes during the period 2010–2020. This plan, *Astronomy for the Developing World: Building from IYA2009*, has been approved by the Executive Committee and two resolutions endorsing it have been submitted for

endorsement at the closing business meeting of this General Assembly. I shall here briefly review some aspects of this plan¹.

Firstly, it shows that astronomy can play a unique role in furthering education and capacity-building throughout the world. Astronomy combines science and technology with inspiration and excitement. The South African government's 1996 policy on science and technology puts an argument for this view succinctly: *"It is important to maintain a basic science competence in flagship sciences such as physics and astronomy for cultural reasons. Not to offer them would be to take a negative view of our future, the view that we are a second-class nation, chained forever to the treadmill of feeding and clothing ourselves."*

Secondly, the plan summarises present educational activities and analyses the present state of astronomy development globally. The programme groups (PGs) of IAU Commission 46 have long conducted an impressive range of activities to further astronomy in developing countries. These include the organisation and funding of national and regional astronomy schools and visits by astronomers to developing nations. A new PG is presently being set up, directed at primary and secondary schools. Outside the formal IAU ambit, there are now also several complementary activities devoted specifically to astronomy education and outreach, including programmes for children.

Thirdly, the long-term vision of the plan is that eventually all countries should participate at some level in astronomical research and that all children throughout the world will be exposed to knowledge about astronomy and the Universe. The plan outlines specific goals for working towards this vision.

Fourthly, the "meat" of the plan is a strategy for achieving these goals, namely:

(a) An integrated strategic approach that includes primary, secondary and tertiary education, research and public science outreach. For each country the mix of relevant activities will be based on the future potential for research and education. Because of its relative underdevelopment, sub-Saharan Africa will receive special attention.

(b) Using IYA2009 as a springboard. Many of the IYA2009 global Cornerstones will be continued and supported, after the IYA2009 has finished. Examples of activities that should be continued are the Galileo teacher Training Program, UNawe and the Galileoscope. Also, the huge network of IYA2009 contacts (e.g., SPoCs) that has been built up in IAU member states and other countries is a valuable resource that will be used for future capacity-building activities.

(c) Enlarging the number of active volunteers by recruiting more members and augmenting the pool of volunteers by doctoral students, postdoctoral trainees and talented non-member experts on pre-tertiary education and outreach, including amateur astronomers.

(d) Initiation of new activities. Major proposed new initiatives include (i) an endowed lectureship programme to provide semi-popular lectures on inspirational topics at the high-school level and (ii) long-term institute twinning between established astronomy institutes and university departments in less developed countries.

(e) Creation of a small Global Development Office (GDO). Mobilising a large number of volunteers and implementing new programmes needs professional co-ordination.

(f) Increasing regional involvement and the adoption of a bottom-up approach, with a substantial degree of decentralisation.

(g) Exploiting the internet and new tools, such as archives, robotic telescope networks and the Tunisian mobile science outreach “astro-bus”.

Fifthly, the plan envisages a flexible implementation of the strategy, in step with available funding. The annual direct cost will be an order of magnitude larger than that of the present cost of the IAU development programme. Obtaining resources will be a huge challenge that will need action on various fronts. Several possibilities are outlined in the plan.

A vigorous fund-raising campaign will be needed, coordinated by the GDO. Although this is a difficult time for fund-raising, the funding climate is likely to improve during the decade. Before attempting to raise external funds, there are three prerequisites.

1. A credible plan. Without one that appeals to potential fund-givers, there is no chance of obtaining increased funding.
2. Management must be seen to be sufficiently professional to warrant support. Setting up the GDO is essential.
3. The IAU must show commitment and has approved an increase in funding for relevant activities from 10.

Should astronomical researchers become involved in such development activities? I suggest that the answer is a resounding yes, both for reasons of morality and expediency. Facilities needed to carry out frontier astronomical research become more expensive every year. The willingness of society to fund these magnificent machines sets an ultimate limit on what can be achieved. The decision of whether or not to construct a billion-dollar astronomical research facility is inevitably a political one. By devoting a tiny fraction of astronomical resources to global development and education, we enhance the image of astronomy as a whole and make politicians more receptive to research proposals. Mobilising astronomy in the service of global development is a cost-effective strategy.

The rationale for using astronomy to stimulate sustainable international development is clearly stated in the plan and illustrated on its front and back covers. Astronomy provides an inspirational and unique gateway to technology science and culture, three fundamental characteristics of developed nations. By mobilising large numbers of talented and creative scientists, engineers and teachers in the service of international development the plan will be a cost effective spin-off of one of the most profound adventures of our civilisation, the exploration of the Universe.

Link

¹<http://iau.org/static/education/strategicplan091001.pdf>

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Since its inception, the International Year of Astronomy 2009 was planned to be more than just a series of activities occurring over 12 months. It has been designed and implemented as a springboard for the popularisation of astronomy with a much longer timeframe in mind. In 2010, the IYA2009 Secretariat and external assessors will carry out a thorough evaluation of IYA2009. Lasting effects will be a key area of focus, and we already have some idea of what to anticipate. Perhaps the most impressive statistic from IYA2009 is the sheer size and scale of the astronomy network that has been created: the largest in history. 148 countries, from Afghanistan to Zimbabwe, have joined together to work toward the common goal of making astronomy accessible to all; the International Year of Astronomy 2009 truly has been international! Individuals and groups in all of these countries have been collaborating both internally and across borders on projects beneficial to us all. The relationships forged between scientists, communicators, teachers, and enthusiasts during IYA2009 should remain far into the future, and it is hoped they will only become stronger with time. Sharing resources and expertise is a win-win situation, as IYA2009 has shown.

Some of the Cornerstones will be incorporated into IAU plans. A prime example is Dark Skies Awareness, since participation in the protection of the sky is an essential duty of the IAU. Thanks to Developing Astronomy Globally and also to the general networking effort, developing nations have enjoyed increased links with astronomy groups and organisations at home and abroad. New openings and opportunities at both the professional and amateur level instigated during IYA2009 are set to continue, allowing expertise within these countries to be maximised, and helping global astronomy research and science communication. The IAU has been at the forefront of these efforts, and consolidating links between the IAU and developing nations is seen as a priority in the brand new IAU Strategic Plan for Astronomy Development. From the IYA2009 networks, we know that efficient organisation is the foundation of success. This is when having an organisation like the IAU to coordinate efforts really comes into its own. Education was a strong theme during the Year, emphasised in particular by the Galileo Teacher Training Cornerstone, and there is much potential in building on the existing efforts to extend the reach of science in general and astronomy in particular, on a world level. Thus, IYA2009 is a springboard for the enhancement of IAU educational activities as set in the Strategic Plan.

Combining increased opportunities for developing nations with improved education, the Universe Awareness project (UNAWAWE) tackled difficult issues head-on during IYA2009. Its aim of creating internationally an awareness of our place in the Universe and on Earth, targeted at children in underprivileged environments, has inspired many. Clearly this programme must continue in 2010 and beyond. Providing a wealth of educational material is a factor that deserves to be highlighted. During IYA2009 resources were disseminated and put to good use.

Celestron and Japanese “You are Galileo” telescopes, as well as large numbers of Galileoscopes have been donated, mainly to developing countries. The Galileoscopes, low-cost telescope kits, result from one of the IYA2009 Cornerstones, allowing educators to utilise excellent quality, but accessible tools to improve their astronomy communication. Galileoscopes will continue to be sold after 2009, but at a higher price.

Many other astronomy-related products have been developed during 2009. As an example, consider the Cosmic Diary, an IYA2009 Cornerstone. Throughout the year professional astronomers have been keeping blogs about their lives and work, allowing the public to see what life as a scientist is really like. As part of the initiative these bloggers have produced feature articles about their areas of expertise, explaining complex ideas in easy-to-understand language. These features will form the basis of a book to be published in 2010, providing both a legacy and an additional avenue of communication.

Several movies, often accompanied by books, have been produced and shown on TV. *400 years of the Telescope*, the most extensively shown, has also given rise to a widely distributed, splendid planetarium show. *Eyes on the Skies*, an IAU-produced, highly educational DVD movie celebrating the 400th anniversary of the telescope, subtitled in many languages, can look forward to an extended career in classrooms, astronomy clubs and homes, while *Tours du Monde, Tours du Ciel* flies its viewers all over the world and beyond to visit observatories at all wavelengths, including cosmic ray experiments; an unforgettable experience. *Blast!* has also been extremely popular with audiences of all kinds. Theatre productions and music have all been successful as well. All of these products provide a foundation to build upon for years to come.

Other Cornerstones, and most of the Special projects, will also survive 2009. Large steps forward have been made for the designation of astronomical sites by the UNESCO World Heritage programme. These give historical sites prominence and prestige, and help ensure that the public is aware of their importance. More work remains to be done in the coming years. Protecting and preserving our astronomical cultural heritage for future generations to appreciate must remain a priority.

Other ventures are set to continue, such as the Special project, The World At Night, which shows stunning images above landmarks worldwide. In the same vein, From Earth to the Universe, a set of astronomical images ready with captions for exhibits, which has been displayed all over the world, will be kept up-to-date and available. Another IYA2009 Cornerstone project, the Portal to the Universe, is entrenched in the area of astronomy news and is expected to expand further. Its long-term aim is to become the ultimate source of astronomical updates for the public, allowing anyone and everyone to have easy access to the latest developments in this science.

She Is An Astronomer, which promotes gender-equality, has gathered much interesting material on its website and will soon hold an international workshop in England. In conjunction with the Cosmic Diary, this Cornerstone can help to present a modern image of astronomers to the public. The stereotype of oddball figures with long beards in towering observatories is not only inaccurate, but also

damaging. Helping to reshape preconceptions and expectations is notoriously difficult, but also necessary. The extent to which IYA2009 has had a positive impact in this area will only be known with time.

Last but not least, large-scale public observing programmes, following the model of the famous worldwide events, 100 Hours of Astronomy and the Galilean Nights, will continue to be organised.

In conclusion, with IYA2009 we hope to have fostered: an increased awareness by society that we are living in an extraordinary era of discoveries about the Universe; a modern image of astronomers in the eyes of the public; a clear demonstration that a career in astronomy is also for women and minorities; the creation of international networks of scientists, communicators, teachers and amateurs, which should remain in existence far beyond 2009; a wealth of educational material on astronomy, books, films, movies for television, DVDs, theatre, planetarium shows, and music related to astronomy; the inception of a new set of goals for the IAU embedded in the Strategic Plan, of a partnership between IYA2009 and UNESCO; and the birth of many vocations at the professional and amateur level. It is evident that there are many strands to astronomy popularisation. IYA2009 has put the wheels in motion, but in many ways the work is only just beginning. For the Year to have a lasting legacy, the momentum gained must be effectively utilised to keep pushing forward, breaking barriers and keeping this most dynamic of sciences at the forefront of people's imaginations.

Acknowledgements: IYA2009 would not have been such a worldwide success without the vision, drive and sense of organisation of Lars Lindberg Christensen, and the skill, enthusiasm and hard work of Pedro Russo, splendidly assisted by Mariana Barrosa and the staff writer Lee Pullen. In the first half of 2010, the IYA2009 Secretariat will prepare a comprehensive final online-only report, an Executive Summary as a printed brochure and a coffee-table book on IYA2009. This will of course require the help of all involved to send them the reports on their activity in a timely manner. This is the last favour that I am asking from the many individuals who have made this very special year surpass our expectations, and in particular from all the Chairs of Cornerstones, Special Groups and Task Groups, and our marvellous army of SPoCs (Single Points of Contact).

I also wish to thank all of our sponsors, starting with Thales Alenia Space, Celestron and History Channel, following with our long list of generous Organisational Associates. Thanks also go to our enthusiastic Media Partners.