



COMMISSION 46
ASTRONOMY EDUCATION AND DEVELOPMENT
Education et Développement de l'Astronomie

Newsletter 62 – March 2005

**Commission 46 seeks to further the development and improvement of
astronomical education at all levels throughout the world.**

Contributions to this newsletter are gratefully received at any time.

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Update on the proceedings of SPS4, IAU General Assembly, Sydney 2003

Follow-on of Cosmos in the Classroom, 16-18 July 2004, Boston, USA

Space Technology and Education, 6-8 April 2005, Aalborg, Denmark

A new parallel session at JENAM, 4-7 July 2005, Liege, Belgium

Astrobiology Summer School Science Experience for Teachers (ASSET), 10-16 July 2005, SFSU, USA

Education and Public Outreach, 14-16 September 2005, Tucson, Arizona

Third International Conference on Open and Distance Learning, 11-13 November 2005, Patra, Greece

Useful websites for information on astronomy education and outreach meetings

Information to be found on the IAU C46 website

Officers & Organizing Committee of Commission 46

EDITORIAL

Thanks to everyone who has made a contribution to this edition of the Newsletter. For the October 2005 issue the copy date is **Friday 7 October**. If you can include photos or illustrations with any material, please do so.

Here is general guidance for material for the Newsletter.

IAU C46 NEWSLETTER - GUIDANCE FOR CONTRIBUTORS

The editor is happy to accept articles on any aspect of astronomy education and development, including obituaries and other articles on people. 500-2000 words are the approximate upper and lower limits. Send contributions to me by email, at b.w.jones@open.ac.uk, copied to t.j.moore@open.ac.uk

You can either send a Word attachment or include the text in the body of the email. Illustrations should be sent as separate, individual files, preferably as JPEGs up to 1 Mbyte but only if the desired quality demands it.

Shorter contributions, up to a few hundred words, such as meeting announcements, meeting reports, and other news items, are also welcome.

I try to edit as lightly as possible, and I certainly don't care whether US English or British English is used. I also leave local turns of phrase untouched unless the meaning is obscure. Clarity, conciseness, and being interesting or informative are my prime concerns. Only in a few cases is heavier editing necessary.

Shortly after the next Newsletter appears (in October) I'll be asking National Liaisons to prepare their **triennial reports** for submission to me by 31 January 2006, and covering astronomy education and development in their countries during the period since the last reports. I published these 02 January 2003 (on our website), and they covered up to about December 2004 in some cases, but earlier in others. This time I don't want early reports. Please cover the period up to 31 December 2005.

In gathering information for the reports, please bear in mind that reports should normally be organised under some or all of the following headings ...

- Overview (optional)
- Elementary (primary) school
- Secondary school
- College and University
- Education conferences
- Observatories and planetaria
- Other public events

Improvement of the C46 website is an ongoing process. Peoples' time is presently a strong constraint, but I'm hoping that in the not-too-distant future we can devote more time to it. I thank Tracey Moore for implementing (most of) the various suggestions various people have made.

At present I'm working on my inaugural professorial lecture. Actually, I've been Professor of Astronomy at the Open University for some years, but these things are organised well after the event and illness has caused a further delay. But the point I really want to make is that our graduate students and post doctoral fellows, all near the beginning of their careers, have asked me to include how I got into astronomy and how I arrived at my present interests in astronomy. We have no on-campus undergraduates at the Open University, but it seems that many of those are equally interested, and as my lecture will be webcast, they too will hear the answer. I was a bit surprised by the request, but perhaps I shouldn't have been. I think it's great good fortune to make a career out of astronomy, teaching, public understanding, and research. I think that the widespread love of astronomy has prompted this interest in how professionals have got into it. This love can start early.



The editor, with his 5 year old grandson Ezra, on a recent cold winter evening

Barrie W Jones
(for contact details see Officers & Organizing Committee of Commission 46)

MESSAGE FROM THE PRESIDENT

As I write, science education is under siege to some extent in the United States, since the President's 'No Child Left Behind' mandates are leading so many teachers to teach to the required grade-level exams, taking time away from science teaching. Still, there is good support from NASA for educational efforts. Perhaps the public education carried out over the last decade by the Space Telescope Science Institute will lead to an outcry when the general public realizes that it is actually NASA's plan to allow the Hubble Space Telescope to die in the next three years or so. The latest National Science Foundation budget cuts back on their educational division; we will see what budget actually emerges from the Congress, which always substantially modifies the President's requests.

Recently, I have become sensitive to well-meaning speakers or writers who ask students to "explain it in terms your grandmother can understand". Why do we demean grandmothers, implying that they can't understand complex things? And what if your grandmother is Marie Curie or the modern equivalent? I was therefore amused to read the following statement in the magazine *Science* for 18 February 2005 (p 1041) ...

"On average, students in grade 6 in this country spend less than 16 minutes a day on science.... I'm glad that my grandsons have a scientist as a grandmother, because I can supplement that easily."

... biologist and University of California Provost M R C Greenwood, speaking at the American Association for the Advancement of Science meeting in Washington DC, February 2005, on the need to improve K-12 Science Education. So I don't think that we should assume that either grandmothers or grandfathers need any special explanations. We must think of other ways to communicate to students that they must be able to write well and explain concepts in simple terms.

It was a pleasure for me to visit the exhibit 'Le Soleil: Mythes et Réalités' at the Cité des Sciences et l'Industrie in Paris, which ran from April 2004 through January 2005. Hundreds of thousands of people of all ages saw the exhibit, which quite nicely ran the gamut from suntanning, through calendars, through ancient monuments, up through solar energy and observations of the sun with scientific spacecraft. Such public expositions have the possibility of inspiring the students who attend. http://www.cite-sciences.fr/francais/ala_cite/expo/tempo/planete/soleil/index_soleil.php.

I was amused to read how the young George Ellery Hale, as a teenager, wanted a telescope, but his father delayed granting the request. Finally, young George told his father that the transit of Venus was coming up and he needed it by then. So the transit of Venus in 1882 turned the trick, and Hale went on to become the greatest telescope builder of all time, including the 1 m at Yerkes, the 2.5 m at Mt Wilson, and the 5 m at Palomar Mountain.

With best wishes

Jay M Pasachoff

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ASTRONOMY IN ANGOLA

Up to 1975, when Angola got its independence from Portugal, official astronomy in the country was almost non-existent, although some of the work of Dr. Bettencourt Faria, of Portuguese origin, was noticed. He tried with his own means to develop some sky observations in collaboration with meteorological services.



Observing the Venus transit of June 2004 at Luanda

After independence a civil war between Angolans started lasting for about 30 years and during this period astronomy was forgotten, although isolated efforts were made by engineer Abílio Alves Fernandes a professor of the Angolan State University in the city of the Lubango (south of Angola), who kept some telescopes to watch the sky with his students.

With the approach of the Total Solar Eclipse of 21 June 2001, a new stage of astronomy started in Angola. At the end of 1999 the Faculty of Sciences of the Agostinho Neto University (State University) began an operation to prepare for the event and selected two graduates of Geographic Engineering (the only one in Angola that teaches Astronomy and Geodetic Astronomy) to make a thesis related to astronomy. For that, these two students (Katia da Rosa and Jaime Vilinga) went for a five months stay at the Monte da Virgem (Mount of the Virgin) Observatory of the University of Porto in Portugal, having written a memorandum 'A millennium of eclipses in Angola - from 1500 to 2500', where the total and annular eclipses of the Sun occurring during this period in Angola had been calculated with maps and tables illustrating the conditions of visibility for each eclipse. In this work, great attention was given to the solar eclipse of 21 June 2001, containing tables of visibility for the main and secondary cities of Angola. This work was presented to the University some days before the eclipse and had a great reception because for the first time an astronomy document concerning Angola had been written by Angolans.

An information campaign was launched all around countryside alerting people about the care to be taken on observing the Sun during eclipses and on the other hand to demystify this natural phenomenon. The government of Angola bought and distributed for all the country with the support of the airplanes of the Angolan Armed Forces, four million eclipse glasses. After this eclipse of the Sun, that lasted for four and half minutes, only two cases of blindness (of two young people in the south of Angola) had been reported.

On 18 and 19 June 2001, at the National Institute of Oils (Sumbe, a province of the South Kwanza) an International Conference concerning total eclipses of the Sun took place.

For the organization of the solar eclipse event, contacts with some international scientists had been established, mainly with Dr Serge Koutchmy director of research of the CNRS - France. Among the visitors that came to Angola were French scientists, Rumanians, Slovaks, Polish, Portuguese and Austrians. The observation site was in the city of Sumbe, south of Luanda, where the President of the Republic, Jose Eduardo Dos Santos, and his government came to watch the eclipse, despite the country still being at war at that date. A truce was announced, and a government commission headed by the Vice Minister of Science and Technology Dr Pedro Teta, was created to guarantee the organization and security of the eclipse event.

On 4 December 2002, another total eclipse of the Sun, but with a shorter duration and in the rainy season, occurred in Angola. The Ministry of Science and Technology and the University Agostinho Neto organized again a scientific session with the support and contribution of the Institut d'Astrophysique de Paris. The Angolan southeast city of Mavinga was chosen as the ground based observation site with scientists from France, Switzerland, Germany, Mali, Iran, Cameroon, Algeria, Russia, Theca Republic, Senegal, Brazil, Poland and Austria.

With the Angolan Air Force support an airborne operation was performed with a small CASA Aviocar C-212 cargo airplane, modified (open door) to observe the solar eclipse above the clouds. Serge Koutchmy from France was the head of this experiment, but due to the low performance of the airplane we couldn't get above the cloud ceiling (7000 meters) although as far as the technical side of the operation was concerned, it was a success. The flight took place above the city of Sumbe along the Atlantic coast.

A new book was announced, 'Eclipses Africaines', written by Jean-Yves Daniel, General Inspector of the National Education of France, and Serge Koutchmy. Two days before the eclipse an International Conference 'Astronomy, Scientific Education and Culture' took place in Luanda.

As result of the scientific experiments, cooperation was established between the University Agostinho Neto of Angola and the Institut d'Astrophysique de Paris, with agreement to build a solar observatory on the terrace of the Faculty of Sciences (Luanda), the building of which is in the final phase. An Angolan student, Katia da Rosa, last year finished her master's degree in astronomy (2003/2004) at the Paris Observatory. Jaime Vilinga carries out his PhD work (2003/2006) on solar physics at the Institut d'Astrophysique de Paris (Université Pierre et Marie Curie – Jussieu Paris 6 - France) and the construction of the Luanda solar observatory is under his responsibility.

Three expert investigations have been carried through in the south of Angola at Tchivinguiro (Lubango) with French astronomers, to evaluate the quality of the atmosphere at night, and to plan the construction of a night sky observatory in that location.

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ASTRONOMY IN CUBA

INTRODUCTION

Early in January 2005 we visited Cuba on behalf of IAU Commission 46 (Astronomy Education and Development) and the Program Group for the World-wide Development of Astronomy. The host institution was the Institute of Geophysics and Astronomy (IGA) in Havana. Professor Jorge Pérez Doval at IGA, who is head of the astronomy department there, made the arrangements for our week-long visit. We are very grateful to him for his putting in place a busy schedule for both of us during our time in Cuba. We visited the solar radio and optical observatories at La Lisa and Cacahual, and also a 60 cm Cassegrain reflector at the Arroyo Naranjo Observatory (all operated by IGA).



John Hearnshaw, Julieta Fierro, and Jorge Doval at the Arroyo Naranjo Observatory.
The dome houses a 60 cm Cassegrain reflector

Our stay was limited to Havana and its immediate surroundings. However most visits were in different venues, and transport, mainly in an IGA minibus, was provided to take us from place to place, and to and from the hotel in Habana Vieja, the old city. Our main base was at IGA, some 12 km west of the city centre in a pleasant leafy suburban area known as La Lisa, close to several other scientific institutes. We each gave four lectures during the week. Lectures by John Hearnshaw were in English, with running translations into Spanish by Julieta Fierro or Ramón Rodríguez. Lectures by Julieta were in Spanish.

Cuba has a highly integrated but ethnically mixed population of 11.2 million. Historically, Cuba gained independence from Spain in 1898 after the Spanish-American war, but was then ruled from the USA until full independence in 1902. This was much later than most Latin American countries (e.g. Argentina in 1816, Mexico and Venezuela in 1821).

It is interesting that Cuba has put much emphasis on excellence of education and health care. Both are free for all citizens. The result is that Cubans are outstandingly healthy and the life expectancy of the population (74 men, 78 women) is similar to that of the United States or western Europe. Also the literacy rate is very high at 96.7 per cent, comparable to that of many developed nations.

Whatever the case might be to try and justify the US embargo of Cuba, the fact is that it has made Cuba one of the world's most isolated countries. The embargo is a political act, and our visit to Cuba was largely motivated by the fact that scientists believe in the free exchange of ideas and scientists between nations as one of the basic principles of the International Council of Scientific Unions (of which the IAU is a member). For these reasons we went to Cuba to explore whether contacts and communication between Cuban astronomers and those elsewhere in the international community could be improved through the auspices of the IAU, especially with the assistance of IAU Commission 46.

CURRENT SITUATION OF CUBAN ASTRONOMY

The IGA is the main institute for astronomy in Cuba. It is an institute under the umbrella of the Ministry of Science, Technology and the Environment (CITMA). IGA was formed in 1974 after merging formerly independent departments of geophysics and of astronomy which had been founded in 1964. It is situated in suburban Havana, some 12 km west of the city centre in La Lisa. It has quite a large and attractive tree-studded campus, with several mainly single story buildings.

At present some 120 people are employed at IGA, including 76 technical staff. The institute is divided into four departments, of which astronomy (with some 20 staff members) is one. The others are space geophysics (including ionospheric physics), the physical environment (includes studies of soil, water, pollution etc), and regional geophysics (studies of the Earth's gravity field, magnetic field, electrical conductivity etc). The astronomy department is led by Professor Doval and there are nine astronomers; the remaining 11 in this department are engineers and technicians.



Members of the astronomy department at IGA, with Julieta Fierro (fourth from left)

Their work is strongly focussed towards areas of astronomy introduced in the era of Soviet collaboration. These have been solar radioastronomy, optical solar spectroscopy, satellite observations and also various problems in computational astronomy. From time to time Solar System objects such as comets and asteroids are observed. Instrumentation has largely been supplied by the Russians, notably for the solar radio and solar optical work. However the era of Russian collaboration ended abruptly in 1989, and consequently the infrastructure for Cuban astronomy has not been upgraded in the last decade and a half. Understandably in the austerity period of the 1990s, astronomy did not receive a high priority from the government. On the other hand, Cuba has put many resources into the biotechnology area, and we saw (in passing) several of the ten high-tech biotechnology institutes that the Ministry of Science and Technology (CITMA) operates. Some of these are world-leaders in vaccine research and development.



Solar radio observatory with Ramon Rodriguez

Astronomy has not in the past figured prominently in any of Cuba's universities. This is perhaps surprising, as science education at all levels has been vigorously promoted in Cuba, and physics is certainly one of the subjects which is widely taught at university level. Many universities around the world with strong physics departments have come to regard astronomy as an excellent vehicle for attracting able students into the physical sciences. That connection appears not to have been widely promoted in Cuba, even at the pre-eminent Universidad de Habana.

This lack of training in astronomy at tertiary level also has the consequence that few new young astronomers are being trained to PhD level in Cuba, and this may have consequences for future staffing at institutes like IGA. However one young astronomer at IGA is currently doing a PhD in stellar astrophysics at the Astronomical Institute of the Canaries in Spain. He is studying symbiotic stars, and is the only Cuban astronomer we met doing research on stars.

In recent years a new theoretical gravitation and cosmology group has been founded in the Physics Department at the Universidad Central de las Villas in the city of Santa Clara in central Cuba. This group is headed by Dr Rolando Cárdenas, who came to Havana to meet us. This group has published recently in the Physical Review and its members have an excellent reputation for their work. They organized an international workshop on gravitation and cosmology in Santa Clara in 2004 and plan another such meeting in 2006.

Our main impression of Cuban astronomy is that they have excellent people at IGA, although they are trained in just a few areas of astronomy which may no longer be at the forefront of the most exciting research. The basic infrastructure for doing science in Cuba is actually very good, and the conditions which prevail in many sciences are far from typical of many developing countries. However, astronomy has been somewhat neglected since the fall of the Soviet Union in 1989 and the main needs for Cuban astronomy now are new equipment, new areas of research and the training of new young astronomers who have opportunities for overseas work experience.

The development of a flourishing theoretical gravitation and cosmology school at the university in Santa Clara is a new and welcome development which we did not get to see at first hand.

Cuba has a number of planetariums for astronomy education at school level. The one we saw in La Lisa, across the road from IGA, was quite impressive with an older model Zeiss projector. However a much better one, with a Goto projector, was being planned for central Havana by Oscar Álvarez at CITMA with help from the Japanese. We were told about other planetariums. Apparently one in Santiago de Cuba in eastern Cuba is now in poor repair and is not operational. It also has a Zeiss projector from the 1960s.

As mentioned, IGA is an institution run by the Ministry of Science, Technology and the Environment, CITMA. Dr Oscar Álvarez at CITMA commented to us that

"The astronomical education in Cuba is not widespread in the educational system; nevertheless the public interest in astronomy is very high as has become reflected by the attention paid to educational and scientific program broadcasts by the national television channels."

CITMA also operates the Humboldt University in Havana. The formal title of this institution is the Instituto Superior de Tecnologías y Ciencias Aplicadas and during our visits there we learnt that they are contemplating introducing astrophysics courses into the curriculum. This could be a welcome development, as the training of new young astronomers in the universities appears not to be very widespread in Cuba at present.



From left to right, Lilliam Alvarez (Scientific Director at the Cuban Ministry of Science, John Hearnshaw, Julieta Fierro, and Lourdes Palacio (Director of IGA)

RECOMMENDATIONS FOR THE IAU

The problems facing Cuban astronomy are by no means typical of developing countries. Cuba's problem is almost entirely a political one which arose from being the meat in the sandwich during the cold war era. With the end of the cold war, Cuba has found itself unwillingly cast aside by their former Russian allies and ostracized by the United States. The political blockade of Cuba has caused enormous economic hardship. But in spite of that, they are a surprisingly happy people, and even optimistic about the future.

In spite of the problems, the basic infrastructure for science and education in Cuba is very good, and Cuba would almost certainly be a thriving first world nation if these political impediments were absent. It could resume this status quite quickly, perhaps in a few years, if the economic blockade were to end.

Since the problems of Cuban astronomy, in common with the problems in all facets of the Cuban economy, society and life in general, so obviously stem from this one imposed political cause, it is hard to recommend meaningful solutions without engaging in politics. However, the IAU is a non-political organization, and fortunately there are tangible ways it can help Cuba while staying true to its non-political ideals. This is especially so, because many countries welcome contacts with Cuba, notably Canada, Mexico, Venezuela, France, Spain, the United Kingdom and Germany.

Our recommendations for the IAU are as follows:

- The biggest help the IAU could give to Cuba now is probably to give every encouragement to Cubans, especially in senior positions in the Ministry, for Cuba to resume financial membership of the IAU (Cuba is currently an interim member only as dues have not been paid in recent years).
- The next most important step for the IAU to take is for the Commission 46 Program Group for the Exchange of Astronomers to look sympathetically on any applications for young Cuban astronomers to travel abroad for research or study visits. This Program Group should actively solicit and encourage applications from Cubans, and bring the opportunities available to the attention of the astronomers at IGA and at the university in Santa Clara.
- Cuba would benefit from further international contacts, and if the TAD Program Group of Commission 46 could send astronomy lecturers or teachers in future, they would be very warmly received and help encourage young Cuban astronomers.
- IAU Commission 46 may be able to help Cuba with access to some printed journals. For example astronomers at IGA cannot subscribe to the US edition of *Sky and Telescope*, because of the economic embargo from the US. From 2005 there is a new Australian edition of the same magazine, and it may be that a way can be found for the IAU to contribute to IGA's subscription from Australia.

CONCLUSION

Cuba has developed a unique society with much emphasis on science education, universal healthcare and the development of biotechnology industries. But in the current political and economic climate, astronomy has not been seen as a high priority. As a result, astronomers in Cuba have been under-resourced and largely isolated from the international community over the last 15 years.

The IAU can take steps to alleviate this situation until such time as the political situation changes, as inevitably one day it will. Encouraging Cuba to resume membership of the IAU would certainly help. Encouraging exchange visits of Cuban astronomers to other friendly developed nations would be of much benefit to astronomy in Cuba, especially if young Cubans could return home with new and up-to-date skills. The IAU Exchange of Astronomers program could play a vital role here in promoting contacts which are so greatly needed.

ACKNOWLEDGEMENTS AND THANKS

Our visit to Cuba was hosted by the Institute of Geophysics and Astronomy in Havana. IGA is an institute of the Ministry of Science, Technology and the Environment (CITMA). We thank the director of IGA, Dr Lourdes Palacio Suárez for her kind hospitality in receiving us at her institution, and we thank especially Professor Jorge Pérez Doval, the Head of the Astronomy Department at IGA, for the detailed program of appointments throughout our stay, and for arranging the transport to get us to so many interesting venues. We also wish to thank Dr Oscar Álvarez, an astronomer attached to CITMA, for our initial contact with Cuba and for his helpful advice on many matters, including his assistance in

making a hotel reservation for us in Havana. We also thank all the astronomers at IGA for their friendly interactions during our visit.

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PROMOTION OF ASTRONOMY IN EAST AFRICA

Paper presented at the commemoration of the African University Day, 12 November 2004 at the Open University of Tanzania, HQ Kawawa Road, Dar es Salaam, Tanzania.

My aim is to sow some seeds of scientific thoughts on astronomy which we can then use to germinate and develop a culture of cooperation in developing science in our societies. This is a subject that is close to my heart.

Astronomy is an intricately multidisciplinary science; but each of its component disciplines is very basic and even cutting-edge. It is often sidelined in developing countries, apparently due to misconceptions about its usefulness to society and the practicalities of imparting or teaching it arising from a basic lack of resources. However, specific parts of this wide science that tries to understand our Universe as a whole are amenable to training, especially considering the wide interest that everybody has in the mysterious world beyond our Earth.

Observational astronomy is uniquely cross-border in nature – thanks to the fact that nobody has claimed ownership to large patches of space beyond our atmosphere! The fascination of the night skies that is shown by young and old is not matched by an equivalent understanding of the behaviour and movement of heavenly bodies. The cross-border nature of this science is dramatically illustrated in a recent picture of the Earth as seen from space at night (National Geographic Society, 2004). The world picture of visible light from urban areas escaping to space shows large areas of the western world blazing away, followed by the newly emerging economic areas of Asia and South America, while the whole of the African continent is in darkness except for the coastlines of the north and South Africa, and a few isolated cities. The need to wake up to the realities of our world has been signalled by astronomers.

To start with, observational astronomy is well within the scope of training at our Universities especially at an institution such as ours where we have the opportunity to lay the hand of science across all sections of society and across the borders as well. There are sufficient theoretical and practical aspects of interest to the public to cater for a foundation level course to start with, which would be combined with practical work. The nature of the processes that take place in stars can be covered in a course in astrophysics which could also easily be incorporated into the undergraduate physics program as an option for students doing physical sciences. We will then be able to get graduate teachers who are able to respond to the need for teaching of astronomy in secondary and even primary schools.

Observational aspects of astronomy are indeed cross border since similar night skies are seen from neighbouring countries. Indeed, in currently available sources, the total lack of information in providing information about important events in astronomy that is specific for our locations, at low latitudes, is an example of impediment to development of scientific methods in our society. This is reason enough for promoting the science of astronomy at universities in Africa. In fact besides South Africa, which has a very strong program covering all aspects of astronomy, very few (mainly North African countries) have a significant astronomy base. Our colleagues across the border in Kenya are also just beginning to initiate an astronomy program at the University of Nairobi (IAU, Commission 46, Newsletter 61, 2004).

The international body that oversees astronomy worldwide is the International Astronomical Union (IAU), and even a cursory look at their activities shows only a minute African contribution. Even in its Commission 46, which deals with Teaching and Development of Astronomy, we see only a few African countries (mainly North African) participating in its activities. Hence there is a need to join hands to share expertise and take a leap forward in advancing this science and indeed all other sciences. We need to build this base early to prepare our students to be ready for the challenges and hurdles of the future.

References

'Earth at Night' poster, National Geographic Magazine, November 2004.

International Astronomical Union, 2004, 'A visit to the University of Nairobi', IAU Commission 46 Newsletter No. 61, October 2004. See online at

<http://astronomyeducation.org>

<http://physics.open.ac.uk/IAU46/newsletter61.html>

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EU-HOU: HANDS-ON-UNIVERSE, EUROPE

Bringing frontline interactive astronomy to the classroom

EU-HOU, is a project accepted by Europe and is now on-going within a budget of nearly 850 000 euros, 44% co-funded by Europe over two years.

EU-HOU is in keeping with the general goal of renewing the teaching of science. A re-awakening of interest for science in the young generation is foreseen through astronomy and the use of new technologies, which should challenge middle and high schools pupils. The primary target group will thus be the school teachers, who will be involved through a pilot school scheme widely advertised.

The project is based on real observations, possibly acquired by the pupils themselves in classrooms thanks to either a European and worldwide network of automatic telescopes operated via the Internet, or didactical tools (Webcam system, radiotelescopes) developed within this project. These observations can be manipulated in classrooms with specific software designed to be pupil friendly. They are integrated into pedagogical resources constructed in close collaborative work between researchers and teachers. All the expected outputs will be made available on a central Web server, and teacher training sessions will ensure a large dissemination within the European educational system.

PROJECT OBJECTIVES

The overall objectives of the project will be to identify in Europe, gather, organize and produce, pedagogical resources ready to use in European classrooms. This initiative can be separated into several specific objectives.

- Continuous production of new innovative pedagogical resources: user-friendly software, astronomical data, exercises, multimedia support. These resources should be trans-disciplinary in essence (astronomy, physics, mathematics, history, language ...), and will be available in English and in the various European national languages.
- Pedagogical use of worldwide telescope network operated remotely through the Internet.
- New innovative observing tools (Webcam, radiotelescopes ...) to be used directly by pupils.
- Creation of a European network, gathering researchers and middle and high school teachers, hence promoting scientific and technological education. It will help to gear the education system to research and development both at European and at national level.
- A specific Web site offering a free multilingual portal.

- Dissemination through workshops and teacher training sessions.

The expected impact is to answer the demand of teachers willing to introduce in their classrooms a new innovative way to teach science in order to stimulate pupils.

The partners are:

France	Pierre & Marie Curie University/coordinator
Spain	Complutense University of Madrid
Greece	Filekpaideutiki Etaireia
Italy	IDIS Foundation - City of Science
Poland	Centre for Theoretical Physics of Polish Academy of Sciences
Portugal	NUCLIO - Interactive Astronomy Nuclei
Sweden	Chalmers Centre for Astrophysics and Space Science
UK	Armagh Planetarium

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SCIENCE COMMUNICATION IN THE 21ST CENTURY

On 14 May 2004 a discussion meeting took place at the Royal Astronomical Society, London - 'Science Communication in the 21st Century'. This meeting was aimed at looking at recent developments in teaching and learning methods coupled with the advent of new technologies, leading to innovative educational programmes. The meeting was chaired by Martin Barstow (University of Leicester) and opened with an introduction to science communication by a 'double act' of Paul Roche (Cardiff University, Faulkes Telescope Project) and Robin Clegg (Head of the UK Particle Physics and Astronomy Research Council's Science and Society programme).

In the UK, PPARC play a leading role in science communication, with a variety of initiatives targeting schools (students and teachers) and the general public. Of particular interest to the formal educational sector is the range of display materials covering particle physics, astronomy and space science, access to meteorite and lunar rock samples, and the small award grant scheme (up to £10k). PPARC's Science and Society team also work closely with the research community to promote dissemination of scientific results, and provide access to media training courses and fellowships allowing greater interaction between scientists and the media. PPARC are now working closely with other research councils and related bodies to help establish a more unified approach to science communication, and the opening of the national network of 'Science Learning Centres' in autumn 2004 provides a focus through which these efforts can be channelled.

This broad introduction to the topic was then followed by a series of talks looking at specific projects. Highlights were as follows.

Sarah Rusholme (National Space Centre) posed the question: Is there a future for visitor centres? She noted that around the year 2000/2001, 8 new Millennium Landmark Science and Discovery Centres opened in England. Each had overhead-intensive education at the heart of their mission, but had to operate in a crowded and competitive visitor attraction marketplace with little or no revenue funding. Following some tough times, these Millennium Landmark projects have recently been allowed access to Department for Education and Science funding, specifically to support the work of their education and programmes teams for the next 3 years. In response to visitor feedback or external evaluation, there will be a crop of new or revitalised planetaria springing up all around the UK over the new few years. These projects will go hand in hand with new exhibitions, many focussing upon contemporary space science, and new staff appointments to ensure wider participation with a range of audiences. It seems that the UK government has begun to see the specific niche that Science and Discovery Centres fill, supporting the formal education sector and engaging the public in science.

Chris Impey (University of Arizona) talked on 'Teaching with Electrons', discussing different ways in which instructional technologies could be used to facilitate learning of astronomy among non-science university students. The premise of the future is that essentially every 18-year-old will have computer access and will own a handheld web device, probably a cell phone. Among the conventional web technologies that have great potential for education are (1) VRML or Java 3D, which allow the user to interact with 3D objects in a virtual environment, (2) Flash MX, which allows the creation of highly interactive applications with advanced graphics, (3) WebStart, a protocol from Sun that allows data to be shared and passed between applets, (4) ALICE, a natural language basis for designing Q&A tools, and (5) SMIL, a browser-independent language for delivering synchronized multimedia presentations over the web. All of these have excellent applications in astronomy, with its rich archive of visual material and its importance for representing 3D spaces. Another way to deliver astronomy content and class information over conventional cell phones uses VoiceXML, with menu navigation by voice command. The most powerful learning environments will employ real research products, where students can learn at first hand the nature and limitations of real data. Spurred by Moore's law and its network bandwidth analog, all these tools will facilitate a future of ubiquitous computing, where students can learn anytime and anywhere.

Ian Griffin, from the Museum of Science and Industry in Manchester and former Head of the Office of Public Outreach (OPO) at the Space Telescope Science Institute, gave a presentation summarizing outreach programmes associated with the Hubble Space Telescope (HST). With an annual budget exceeding three million dollars, OPO is responsible for managing the public face of HST. OPO has over 40 staff with expertise including astronomers, programmers, writers, artists, journalists, educators and web developers. OPO is organized into four teams broadly aligned with target audiences. The News team is responsible for all press releases, the Web team develops HST's extensive internet presence at <http://hubblesite.org>, the Formal Education team integrates HST science into content and curricula for schools and colleges while the Informal Science Education team work with science museums and other centres of informal learning to integrate HST science into venues outside the classroom.

There is considerable cooperation between teams - although the News team develop science stories for press releases, the other teams use the information in the releases to create material suitable for their own audiences which was made available to them in parallel with the news release. Thus, the day after the 2003 close approach between Mars and Earth, OPO released the press release images to press, museums had special content, educators had age appropriate materials and lesson plans, and internet visitors to Hubblesite to look through several pages of back-up material. The integrated and well funded approach to developing press, web and education content is quite powerful, and Ian ended by showing some statistics illustrating the impact of this programme.

A second double act of Heather Couper (writer and broadcaster) and Nigel Henbest (Pioneer Productions) ended the meeting, discussing 'The Media and the Message'. Heather looked at how linking science to individual scientists and telling their stories was the key to holding interest. She argued that if we are really going to get astronomy across – through books, magazines, TV or radio – we need to involve human stories and personalities in a way that has never been done before. The conclusion is that people are basically interested in people, and stories about people.

Nigel brought the meeting to an end, discussing the role of television as possibly the most obvious and powerful medium for putting astronomy across to the general public. With an exciting and topical astronomical result in hand, the challenge is to create a show that is as absorbing as it is informative. While astronomy has powerful images, the most exciting topics are often impossible to film in the detail viewers expect. TV graphics are increasingly the key but there is a problem of the extent to which these depictions can be justified scientifically when real time and distance scale cannot match those on the screen.

Overall, this was a stimulating meeting which generated a great deal of interest and highlighted the increasingly significant role that technology plays in communicating astronomy to all audiences.

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ROBOTIC OBSERVATORIES IN eEDUCATION AND eRESEARCH (ROER)

ROER undertook a three year analysis of the value-chain supporting astronomy; education and research. The major conclusion drawn from the study showed that there were a number of *cultural inhibitors* which were blocking this chain. ROER has built a new business model, which is before NASA (our un-solicited proposal was submitted on 6 January 2005), and incorporates a Web Scheduling Service.

The Web Scheduling Service is designed to relieve science teachers from the *complexities* associated with their requirement to schedule and connect to research instruments around the world. Making use of Australia's time-zone advantage, the model provides the services to allow day-time students across the Americas and Europe, to access Australian facilities while its night-time 'down under' and vice versa.

The jewel in the crown of the proposed service is the inclusion of video conferencing with mentoring by duty astronomers at the telescope, providing a virtual classroom. The proposed service has been designed to be scalable over the next decade, allowing the inclusion of upwards of 25000 duty astronomers to be available worldwide. Utilising an aging workforce in Australia, the staffing would take advantage of the idle IT expertise (suffering the after effects of the Dot.Com bubble burst) in space science and technology education.

Robotic observatories have grown in numbers from twenty to 2630 within a decade, and over 84 of these have specialized in K12 education (primary and high school students, aged between 5 to 18). For example, there is NASA's spin-off the TIE Foundation with 150+ schools participating, and the Faulkes Telescopes in the United Kingdom with Australia. Ninety three countries around the globe currently have, in their own ways, advanced their communication networks and robotic observatories. The time has now arrived where integrated and standard compliant services be researched and developed. The solution must be coordinated and compatible with services which address and feed national research and education networks.



Peter Mellander (Anssen Technologies) and Ian Tasker (ROER).

Australian astronomical instrumentation engineer, Peter Mellander is seen in the photograph with the Anssen Technologies Allira Series 14 research telescope located in metropolitan Sydney. Anssen Technologies have a strategic alliance with ROER and have built the Anssen Technologies Observatory (ATO) as part of ROER's R&D platform for industry to interact with high school and tertiary students. For further information please see <http://www.anssentechologies.com.au/testobservatory/allira.html>

ROER is taking an innovative commercial approach. The Robotic Observatories in eEducation and eResearch program has already launched two of its themes this year (2005). In summary, here are our first two themes.

Astronomy Education in the Central Coast

This proposes an observatory, planetarium (an 18 metre tilted dome which seats 200 persons) and virtual classroom to be located at Mount Penang on the Central NSW Coast. Potentially connecting to Australia's academic research network through Newcastle University's Ourimbah Campus, as a tourist draw card servicing Sydney high schools.

A regional public Star Party event is in preparation with a 'Donate a Star' theme to raise funds to assist the Kariong Juvenile Detention Center to conform to optional light pollution standards. The Centre is located at one end of the 165 hectare eco-tourism technology parklands. This community event will have newspaper, radio and TV coverage with a dozen or more Australian celebrities, politicians and philanthropic special quests in attendance, as we kick-off with launching the Central Coast Astronomical Society.

Astronomy in Australia's Backyard

This entails a national road show for science teachers and duty astronomers, international promotions of local city council sister city cultural exchange programs and a new lifestyle TV series on 'Astronomy in Australia's Backyard', possibly supported by an existing international astronomy periodical.

In Australia we have a number of gardening and home renovation lifestyle TV programs that descend upon selected people's backyards to stage remarkable conversions, usually filmed over a weekend period. Corporate advertising and sponsorship provides the means to fund these \$15000-20000 weekend renovations. We have simply proposed an applied technology equivalent. However, the implications and benefits are far wider reaching.

We know what project management is and we inevitably use it in our daily lives. However within the commercial global infrastructure, it is common to find optimized programs, many having related themes initiated under multiple projects and collaborators. Our aim is to bring many of these projects together under single guidance objectives. This is called 'program management' and permits modeling efficiencies between programs versus projects.

Many funding agencies find program management as an entity too difficult to achieve and consequently miss out on the leverage opportunities that accrue from program management. The recent free trade agreement between the USA and Australia has opened up many new commercial opportunities which will assist our efforts. ROER's aim is to provide the expertise and guidance to achieve the benefits that will come to everyone as part of the big picture.

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NEWS OF MEETINGS AND OF PEOPLE

UPDATE ON THE PROCEEDINGS OF SPS4, IAU GENERAL ASSEMBLY, SYDNEY 2003

A Special Session, SPS4 Effective Teaching and Learning of Astronomy took place 24-25 July 2003 during the IAU General Assembly in Sydney. The proceedings are being edited by Jay Pasachoff and John Percy, and will be published by Cambridge University Press, UK. They should be available in mid-2005. Worth waiting for!

Barrie W Jones

(for contact details see Officers & Organizing Committee of Commission 46)

FOLLOW-ON OF COSMOS IN THE CLASSROOM, 16-18 JULY, BOSTON, USA

(Adapted from a message from Andrew Fraknoi)

We want to let you know about a number of developments related to the meeting.

A new resource guide for teaching introductory astronomy, based on the various web sites suggested at the conference, is now available at <http://www.astrosociety.org/education/resources/educsites.html>

The posters and handouts from the meeting have been collected (the volume is almost 400 pages) and are now being readied for publication by the second week of January. The loose-leaf notebook will be published by the ASP.

A number of papers from the meeting are now being published in the Astronomy Education Review, starting with volume 3, issue 2

<http://aer.noao.edu/AERIssue.php?issue=latest>

The editors welcome additional contributions of research papers, short innovation summaries, or opinion pieces inspired by the topic of the conference - the joys and tribulations of teaching introductory astronomy to non-science majors. See the journal site for instructions on how to submit articles.

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Barrie W Jones

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SPACE TECHNOLOGY AND EDUCATION, 6-8 APRIL, AALBORG, DENMARK

We would like to turn your attention to the Space Technology and Education Conference (STEC) 2005 which will be hosted at Aalborg University in Denmark 6-8 April 2005. The conference is organized in cooperation with the European Space Agency (ESA) Education Department.

The conference aims at bringing together students and their professors, who work with 'hands-on' space education. Emphasis will be on student satellites, but other student space activities are welcome too.

For the students attending the conference the aim will be to share knowledge obtained throughout their work on space related projects. For the attending professors the aim will be inspiration and sharing of ideas and knowledge about running student space projects.

For more information go to the conference website: <http://www.stec2005.space.aau.dk>

Please distribute this invitation to your students and colleagues for whom you think this conference will be interesting.

Please note that the ESA Education Department through the SSETI association is running a participation program that will help a number of students to cover their travel and accommodation expenses. To get more information on this particular issue check the STEC2005 website.

Hope to see you there.
The STEC2005 organising committee
student.registration@esa.int

Note from the Editor

At <http://www.astroex.org> are astronomy exercises in English, French, Spanish, and several other languages, from the European Space Agency and the European Southern Observatory.

A NEW PARALLEL SESSION AT JENAM, 4-7 JULY, LIEGE, BELGIUM

A new parallel session (the third until now, organized during JENAM) will be at Liege during JENAM 2005. It is Astrophysics, and How to Attract Young People into Physics. See <http://www.astro.ulg.ac.be/RPub/Colloques/JENAM/education/education.html>
It would be great if members of this Commission could take part. Unfortunately, there is no financial support for participants.

Magda Stavinschi
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ASTROBIOLOGY SUMMER SCHOOL SCIENCE EXPERIENCE FOR TEACHERS (ASSET), 10-16 JULY 2005, SFSU, USA

The Astrobiology Summer Science Experience for Teachers (ASSET) **10-16** July, 2005 will be held at San Francisco State University, USA. ASSET Applications accepted 1 March - 8 April 2005.

Attention: High School Science Teachers. Would you like to learn more about the new interdisciplinary field of Astrobiology? Are you looking for a contemporary thematic science curriculum that is standards based? Are you in search of an exciting professional development opportunity? Are you ready to share your enthusiasm for science teaching with others? If so, we invite you to become an ASSET teacher. Applications will be accepted March 1 - April 8, 2005.

Details and application available at <http://www.seti.org/ASSET>

EDUCATION AND PUBLIC OUTREACH, 14-16 SEPTEMBER 2005, TUCSON, ARIZONA

Building Community: The Emerging Education and Public Outreach (EPO) Profession - a symposium that will be the centerpiece of the 117th Annual Meeting of the Astronomical Society of the Pacific - is now accepting proposals for contributed 30 minute clinics, 2 hour participatory workshops, and poster papers.

Scheduled for 14-16 September 2005, in Tucson, Arizona, this international meeting will focus on building and supporting a vibrant and connected community of individuals and groups engaged in EPO in the disciplines of astronomy, astrobiology, space, and Earth science.

The conference is designed to be useful for all individuals who bring the excitement of astronomy to non-astronomers, whether they are veterans or new to the job. The shared goal is to get to know each other and to find ways of working together to improve the quality and the dissemination of our education and public outreach efforts.

Proposals should be made on line at the meeting web site: <http://astrosociety.org/events/meeting.html>

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THIRD INTERNATIONAL CONFERENCE ON OPEN AND DISTANCE LEARNING 11-13 NOVEMBER 2005, PATRA, GREECE

The Third International Conference on Open and Distance Learning (ICODL 2005): Applications of Pedagogy and Technology, will be held at the Hellenic Open University, Patra, Greece, 11-13 November 2005. The conference languages will be Greek and English.

Though this is not an astronomy conference, there are not many conferences with a focus on open and distance learning, which is why I have brought it to your attention. Papers on astronomy should be acceptable.

Here is the published schedule (2005).

Start of registration	10 May
Paper submission deadline	05 April
Acknowledgment of acceptance of papers	15 May
Submission of final papers	15 June

The papers should concentrate on the following themes:

- European Union, open universities and open and distance learning (ODL)
- The Hellenic Open University: challenges and perspectives of open access and distance learning
- Teaching and the role of the tutor
- Learning in an ODL environment
- Cultural studies and ODL
- Social sciences and ODL
- Sciences and ODL
- ODL and languages teaching: the teachers training
- ODL, adult education and life long learning
- Information and communication technologies
- Planning and development of teaching material and innovative ODL programmes

In order to see the conference programme, the manner of registration, the dates, and further instructions on how to submit your paper, visit the websites of the Hellenic Open University (<http://www.eap.gr/>) and the Hellenic Network of Open and Distance Education (<http://www.opennet.gr/>) after the end of January 2005. You can also email Antonis Lionarakis of the Hellenic Open University Patra, Greece alionar@eap.gr

Barrie W Jones

(for contact details see Officers & Organizing Committee of Commission 46)

USEFUL WEBSITES FOR INFORMATION ON ASTRONOMY EDUCATION AND OUTREACH MEETINGS

The following websites contain information on future (and recent) meetings and conferences on, or very relevant to, astronomy education and development. In compiling this short list I am well aware of a strong European bias. **Please email me URLs for relevant websites in other areas of the world.**

UK

The Association for Astronomy Education <http://www.aae.org.uk>
The British Association of Planetaria <http://www.bap.redthreat.co.uk>
The National Schools Observatory <http://www.schoolsobservatory.org.uk>

Europe

The European Association for Astronomy Education <http://www.eaae-astro.org>
The European Astronomical Society <http://www.iap.fr/eas>
The European Southern Observatory <http://www.eso.org/outreach/eduoff>

USA

(among several other good sites)

The Astronomical Society of the Pacific <http://www.astrosociety.org>

Barrie W Jones

(for contact details see Officers & Organizing Committee of Commission 46)

INFORMATION TO BE FOUND ON THE IAU C46 WEBSITE

The IAU C46 website <http://astronomyeducation.org> (or <http://physics.open.ac.uk/IAU46>) contains the following information.

- Overview (of C46, in English, French, and Spanish)
- Offices and Organising Committee
- Program Groups
- National Liaisons (directory)
- Online Newsletters
- Presidents and Current Vice-President
- Resolution on the Value of Astronomy Education (passed by the IAU General Assembly 2003)
- IAU Working Group on Communicating Astronomy
- External links
- Announcements/News
- Minutes from the last IAU General Assembly
- Commission 46 Terms of Reference, Rules & Guidelines

OFFICERS & ORGANIZING COMMITTEE OF COMMISSION 46

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Retiring President	Syuzo Isobe isobesz@cc.nao.ac.jp National Astronomy Observatory, 2-21-1, Osawa, Mitaka, Tokyo 181, Japan
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Organizing Committee (OC)

The officers 2003-2006 are: the President, the Vice-President, the Retiring President, and three former Presidents in active liaison – Julieta Fierro, Derek McNally, and John Percy. For details of the Organizing Committee, and for the other members of the Program Groups, see the website <http://astronomyeducation.org> (and <http://physics.open.ac.uk/IAU46>)

National Liaisons**Barrie W Jones (PG Chairperson)**

These are listed on the website <http://astronomyeducation.org> (and <http://physics.open.ac.uk/IAU46>)
