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

Newsletter 75 – October 2011

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.

PLEASE WOULD NATIONAL LIAISONS
DISTRIBUTE THIS NEWSLETTER
IN THEIR COUNTRIES

This newsletter is available at the following website
http://astronomyeducation.org
(this is a more memorable URL for the IAU C46 website than
www.iaucomm46.org, to which the new URL links)
and also at
http://physics.open.ac.uk/~bwjones/IAU46/

CONTENTS

EDITORIAL

Thanks to everyone who has made a contribution to this edition of the Newsletter. Please note the text in this Editorial highlighted in RED.

For the March 2012 issue the copy date is **Friday 16 March 2012**. If you can include photos or illustrations with any material, please do so. Feel free to encourage others to submit material – anything with an astronomy education or development aspect will be considered.

IAU C46 NEWSLETTER – GUIDANCE FOR CONTRIBUTORS

> The editor is happy to accept articles on any aspect of astronomy education or development, including obituaries and other articles on people. 500-2000 words are the approximate upper and lower limits. Shorter contributions, up to a few hundred words, such as meeting announcements, meeting reports, and other news items, are also welcome.
>
> Send contributions to me by email, at b.w.jones@open.ac.uk. You can either send a Microsoft Word attachment (preferred) or include the text in the body of the email. **Illustrations must be sent as separate, individual files**, preferably as JPEGs or TIFFs no larger than about 3 Mbytes each. **DO NOT SEND ANYTHING AS A PDF.** Do not send a preliminary draft unless it is clearly marked as such.

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 what are needed. Only in rare cases is heavier editing necessary.

Book reviews

There are further book reviews in this issue. This feature first appeared in the October 2009 issue and was repeated in the March 2010 and March 2011 issues. Reviews must be of books centred on astronomy education or development. If there's such a book that you think is worth reviewing, please send your review to me.

The C46 websites

The "official" handsome website is at http://www.iaucomm46.org. Jay Pasachoff secured for C46 the more memorable URL http://astronomyeducation.org which links to the "official" website. I'm sure that you'll join me in thanking Jay.

My mini-website includes the things for which I am responsible: the Newsletter (including back issues – see below); National Liaison details; and National Liaison triennial reports for 2003-2006 and 2006-2008. The URL is http://physics.open.ac.uk/~bwjones/IAU46/. Everything on my website should also be on the "official" website.

Back issues of the C46 Newsletter

Since I took over as editor in October 1998, the Newsletters have appeared in March and October in every year.

Back issues are available at http://astronomyeducation.org (http://www.iaucomm46.org) and also at http://physics.open.ac.uk/~bwjones/IAU46/. Newsletter 49, October 1998, has been scanned from hard copy, so the quality of reproduction is only modest. This is also the case for earlier ones, edited by John Percy. These extend back to February 1992, but there are gaps.

Barrie W Jones
bwjones@talktalk.net

THE EDITOR IS TO RETIRE

I took over from John Percy as Editor in 1998. My first issue was in October that year, and I've edited March and October issues ever since. The next issue, number 76, due in March 2012, will be my last. This is primarily because of my poor health. But in any case it's time for a change.

I've enjoyed editing the Newsletter. But a new editor could bring a fresh approach. I'd be glad to facilitate the changeover.

Barrie W Jones
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MESSAGE FROM THE PRESIDENT

In the near future, we have the General Assembly in Beijing, China, 20 – 31 August, 2012. It is now a good moment to begin to think about Commission 46 matters for this General Assembly. In the next newsletter we will include information about the activities carried out by the Program Groups of our commission in recent years, in order to inform all the members who cannot be present in Beijing. It is important to give details about what we do, but it is very significant to promote new initiatives and to receive feedback about the required process. If you have any suggestions or proposals, please contact us. This is a good moment to introduce changes in our actions.

According to the Decanal plans, several structures of the IAU will change and the introduction of the OAD (Office for Astronomy Development) will be a catalyst for new changes. In particular, some of them will be intense in Commission 46. The IAU needs a more active commission more concerned with the education and development of astronomy in the world for 2012-2015. In order to discuss this new approach and other topics related, the OAD has organised a Workshop in Cape Town 12–14 December. All members of Commission 46 have a good opportunity to contribute to the future of astronomy development if you participate in this meeting.

This year Commission 46 will support a Special Session (SpS) in cooperation with other commissions. SpS17, titled "Light Pollution: Protecting Astronomical Sites and Increasing Global Awareness through Education" will take place in Beijing 29 – 31 August. The Co-Chairs are: Richard Green (United States), Beatriz García (Argentina), Constance Walker (United States), Xue Sui Jian (China Nanjing). Members of our Commission are involved in the SOC and it is essential to give our opinions and contribute to an educational approach in Light Pollution (LP) themes. The schools and the universities have a vital task in the social vision of this problem in the 21st century. Education should be essential for LP campaigns. At present there are some projects for Dark Sky Places and Starlight Reserves always from a professional approach. Mainly these projects are related to observatories and in some cases to tourism. It is necessary to think in a more general way. Our young students, our children cannot fall in love with astronomy and the Universe with a polluted sky. Humanity needs better skies in order to recognize the marvellous heavens.

More details of SpS17 are at http://www.iau.org/science/meetings/future/special_sessions/1049/

Important dates for the Beijing GA:
Abstract Submission
* 1 September, 2011 Online Abstract Submission Open
* 29 February, 2012 Online Abstract Submission Close
* 1 May, 2012 Abstract notification to submitters

Rosa M Ros
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THE FORTHCOMING TRANSIT OF VENUS

Perhaps the rarest scheduled astronomical event is a transit of Venus (passage de Vènus), when Venus is silhouetted against the solar disk. Such transits occur in pairs separated by 8 years with, then, an interval of 105.5 or 122.5 years before the first of the next pair. We on Earth have observed transits of Venus only in 1639, 1761/1769 (notable for the observations of Captain James Cook from Tahiti and from the expeditions of Guillaume le Gentil and Chappe d'Auteroche), 1874/1882, and 2004. Nobody alive had seen a transit of Venus until the one in 2004, and after the event of June 5/6, 2012, probably nobody will see another, unless we find a way to prolong lifespan until 2117.

Transits of Venus were once expected to be the key to determining the size and scale of the Solar System, transforming Kepler's relative distances from his third law into absolute distances, following timing methods of Halley and others. But an artefact, called the black-drop effect, limited the accuracy of these measurements.

Many plans are being made worldwide for outreach efforts to explain the importance of transits of Venus, to reproduce old observations using antique telescopes, to measure the size of the Astronomical Unit using the old timing methods, and to give people an opportunity to see the rare event. Even with the unaided eye looking through a suitable solar filter, one can see the dot of Venus on the surface of the Sun, and projection methods with telescopes or binoculars give even better views. Education efforts are necessary to explain not only the science but also methods of safe observing of the Sun, with or without Venus silhouetted against it.

Among the methods are as follows:
http://www.transitofvenus.org <http://www.transitofvenus.org/>, a website of Chuck Bueter
http://www.transitofvenus.info <http://www.transitofvenus.info/>, my own website for the event and for past transits of Venus and Mercury
http://www.transitofvenus.nl <http://www.transitofvenus.nl/>, Steven van Roode for his Transit of Venus, a project, including signing up for a newsletter
Monthly newsletters of van Roode's Transit of Venus Project are available at
http://transitofvenus.nl/wp/newsletters/

Michael Zeiler of New Mexico has made a new set of maps showing visibility of the 2012 transit of Venus:
http://www.eclipse-maps.com/Eclipse-Maps/Transits.html

The whole transit, which lasts almost 7 hours, will be visible from most of eastern China, Siberia, Japan, Australia, and New Zealand on June 6 and Hawaii and Alaska on June 5. The continental United States and most of Canada, Mexico, and Central America will see the transit from its beginning until sunset. Most of Europe (except the western Iberian peninsula), East Africa, and western Asia will see the transit from sunrise until its end.

In Universal Time, 1st contact is 22:09:42; 2nd contact is 22:27:30; third contact is 04:31:44; and fourth contact is 04:49:32. *(Opening gif files on my computer yielded scrambled text: Editor)*
Fred Espenak's map is visible at http://www.eclipse-maps.com/Eclipse-Maps/Transits_files/2012_Transit_of_Venus_NASA%3AGSFC_Fred_Espenak.gif,
at http://cdn.transitofvenus.org/images/stories/map2012-3color-crop2.gif,
and at http://eclipse.gsfc.nasa.gov/transit/venus0412.html
The visibility map from Her Majesty's Nautical Almanac Office, UK, is at
•http://astro.ukho.gov.uk/nao/transit/V_2012/
The visibility map from the European Southern Observatory is at
http://www.eso.org/public/outreach/eduoff/vt-2004/images/vt-2012-visibility.gif
Local times of the transit can be calculated at http://transitofvenus.nl/wp/where-when/local-transit-times/

Some notes

• I have arranged, jointly with Bill Sheehan, a special session on transits of Venus for the January 2012 meeting of the American Astronomical Society on January 8 about “Transits of Venus: looking forward,

looking back." I have been invited to give an evening lecture at the American Astronomical Society meeting in Anchorage, Alaska, a week after the transit.

• A NASA Transit of Venus Working Group (TOVWG) has been set up by Lou Mayo of NASA's Goddard Space Flight Center (Louis.A.Mayo@nasa.gov), coordinating public-outreach observations all over the world for the 2012 NASA Sun-Earth Day education program (http://sunearthd-y.nasa.gov). Based on the response to NASA's 2004 Transit of Venus Sun Earth Day program, Lou estimates their efforts may reach well over 50 million people by the time of the transit.

• A public-outreach program of observations is being coordinated by Jean-Eudes Arlot of the Institut de Mecanique Celeste (IMCCE) at the Observatoire de Paris in France. See http://meetingorganizer.copernicus.org/EPSC-DPS2011/EPSC-DPS2011-1774.pdf *(scrambled text on my computer: Editor)*

• Mayo, Arlot, and I all gave talks on October 6 related to public outreach on the occasion of the transit of Venus at the American Astronomical Society's Division of Planetary Science's meeting in Nantes, France, joint with the European counterpart society. Arlot's site from the 2004 transit is:
http://www.eso.org/public/outreach/eduoff/vt-2004/

• Video of our 3 talks is at www.vimeo.com/channels/ourlasttransitofvenus
<http://www.vimeo.com/channels/ourlasttransitofvenus>

• Filmmaker Maarten Roos is making a documentary film about transits of Venus, with a 6-minute teaser at http://vimeo.com/channels/ourlasttransitofvenus

• My 22 minute lecture about the transit of Venus, including both historical discussions and contemporary science, appeared recently on the Phi Beta Kappa website:
http://www.pbk.org/home/playpodcast.aspx?id=772

• Victoria Jaggard of National Geographic News interviewed me for her BreakingOrbit blog of March 1, 2011:
http://newswatch.nationalgeographic.com/2011/03/01/watch_planet_transit_2012_venus/

• My podcast one year in advance of the 2012 transit, audio plus a transcript, is at
http://365daysofastronomy.org/2011/06/05/june-5th-transit-of-venus/#comments and I will have another one just before the transit.

Jay M Pasachoff, Chair and Field Memorial Professor of Astronomy, Williams College;
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DVD FOR TEACHING BASIC ASTRONOMY

A DVD, "The Universe at Your Fingertips 2.0", about basic ideas in space (and Earth) science, has been published by the non-profit Astronomical Society of the Pacific. This is an educational DVD-ROM that contains:
* 133 field-tested hands-on activities, from programs and projects around the US
* 17 topical guides to the best sources of information in print and on the web
* 52 background articles on astronomy and education
* 55 of the best introductory astronomy images with detailed captions (and a guide to finding hundreds more)
* 12 short videos with instructions for doing some of the most often-used activities.
All written materials are presented in easy-to-print PDF format.

Activities come with full instructions and class/audience handouts. Most can be used in both classroom settings and in informal programs such as museums and nature centers.

The DVD-ROM is available exclusively through the Society's on-line AstroShop. To see the full table of contents and to order the disk, please go to:
http://astrosociety.org/uayf/
This disk is an expanded and completely updated version of the print guide to astronomy activities and resources published by the Society in 1995 and in use in many thousands of K-12 classrooms, teacher training programs, college labs, planetariums, museums, parks, and amateur astronomy clubs around the world. The new edition includes dozens of new activities and resources, including coverage of such recent topics as the search for planets around other stars, why Pluto got kicked out of the planet club, and how to respond to the Internet scare of the world ending in 2012 as a result of astronomical events.

The 133 activities, ranging from short discussions to sequences that take several hours, cover a host of topics that are the staple of national and state science frameworks and standards. Themes include scales of size, distance, and time; comparing planets; understanding basic sky phenomena, such as phases of the Moon, the daily motion of the Sun, seasons on Earth and other worlds; the multi-cultural origins of the constellations; the lives of stars; the expansion of the Universe; and ways of including astronomy learning with other fields such as geography, math, writing, and history.

(Founded in 1889 on the Pacific Coast of the US, today the Astronomical Society of the Pacific is an international scientific and educational organization dedicated to improving scientific literacy through astronomy.)

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VINNITSA PLANETARIUM

I send you the text about Vinnitsa planetarium and photos. I consider this publication (and others about Ukrainian planetaria) as very important not only for the astronomical community of the world, but for the planetaria themselves. Planetaria in the Ukraine suffer from many difficulties and one of them is attempts by the authorities (in some cases) to misappropriate the planetaria buildings because they are situated on very attracive and expensive land. I think that such publications may increase the immunity of planetaria against such attacks. Publications in this Newsletter, which is circulated around the world, may influence the decisions of authorities. Sergei Andrievsky

Vinnitsa is quite an old Ukrainian city. It is situated on the river Southern Bug. The name of this city comes from the XIV century when it was conquered by the Lithuanian grand duke Olgerd and gifted by him to his nephews. Vinnitsa is a touristic center mainly because of the museum (mausoleum) of a well-known surgeon of the XIX century, N I Pirogov, and the headquarters of Hitler ("Wehrwolf").

Vinnitsa has a beautiful central city park (Photo 1) in which the planetarium is situated.

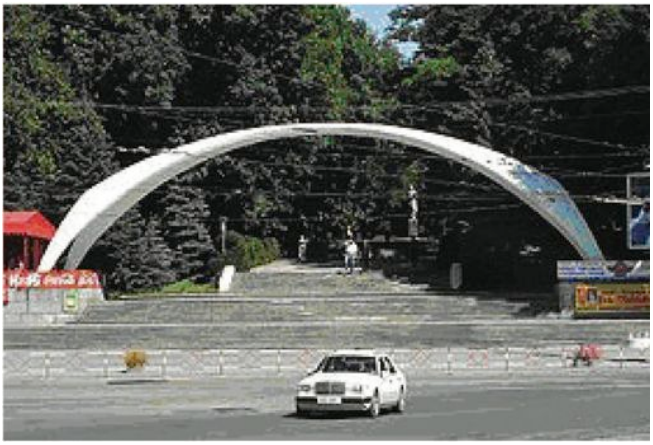

Photo 1, the central park in which the planetarium is situated

Construction of the Vinnitsa planetarium building started in1960. In August 1965 the planetarium opened its doors for the first visitors. In February 1968, a "Small Zeiss" projector was installed inside the planetarium, and up to now it gladdens Vinnitsa citizens and guests with beautiful views of the sky. Soon after the opening, a Moscow factory of visual aids manufactured for Vinnitsa planetarium several demonstrations: "Flight of bolid", "Variable stars", "Meteor shower", "Flight of the spacecraft Venus-4", "Aurora", "Lunohod" (Soviet Moon-robot on the Moon's surface), "Variable magnification zoom lens", all kinds of lunar and solar eclipses. The best views of the town were used to reproduce in the planetarium panoramic images of Vinnitsa. So, during more than 45 years at the end of each performance in the planetarium, the Sun "rises" above Vinnitsa. It should be also noted that at present the panoramic views of the north, tropics, and Moon are still in good shape.

From the "Zeiss" desk one can demonstrate principal points and lines of the celestial sphere, planets, and Earth's artificial satellite flyby. The stellar hall is equipped with a celestial globe, Moon, Mars and terrestrial globes. The Planetarium also has an exact copy of the first Earth artificial satellite, models of the second and third ones, as well as a model of the spacecraft "Luna-3" (Photo 2).

Photo 2, models of various celestial globes and artificial satellites

Here also, one can find a 3kg fragment of the Sikhote-Alin meteorite. Another meteorite example is from the Illinets crater, which is situated quite close to Vinnitsa city. This old crater was discovered by Professor A Volter in 1973. Its diameter is about 7 km. It is interesting to note that taking this discovery into account, the astronomical community of Ukraine decided to organize a three year International conference CAMMAC (Comets, Asteroids, Meteors, Meteoroids, Asteroids, Craters). This conference is attended by professional astronomers from Ukraine, Russia, England, Germany, France, and Japan.

Photo 3, Maria Levchenko, acting director of the Planetarium

The staff of the Vinnitsa planetarium was significantly reduced during the very difficult period of the Soviet Union destruction. One of the staff lecturers of the Vinnitsa planetarium is Maria Levchenko (Photo 3 and

Photo 4), who at present is acting director of the planetarium. She graduated from Odessa State University (Astronomy Department) in 1966 and started her work as a planetarium lecturer in 1967.

Photo 4, Maria Levchenko, acting director of the Planetarium

The director of the Vinnitsa city central park, Igor Lyubovski, helped the observatory to get additional equipment (from Donetsk city planetarium). This is a laser device that allows one to reproduce the aurora, meteor shower, bolid fall etc (renewal is showed in Photo 5). Despite the many difficulties, Vinnitsa planetarium is actively working and its staff members are always optimistic.

Photo 5, installation of a laser device at the Observatory

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SPACE SCOOP

Universe Awareness (UNAWE) has started a collaboration with the European Southern Observatory (ESO) to produce the astronomy news service Space Scoop — versions of ESO Science and Photo Releases that are written specifically for children aged between 7 and 11 years old. Space Scoop is meant to feed children's curiosity about the Universe, by allowing them to access ESO releases.

UNAWE - Sri Lanka launched Space Scoop in the *Sinhalese* language during the June 2011 meeting of the Sri Lanka Astronomical Association. UNAWE - Sri Lanka hope to translate Space Scoop in to the *Tamil* language in the near future and to publish articles in local papers.

Who can use this service?

Children — In a world where children are sometimes more technically savvy than grown-ups, Space Scoop is meant to feed their curiosity about the Universe, by allowing them to access ESO releases in their own language.
Parents — They can read about the latest discoveries in astronomy and explain them to children who are younger than seven years old or who do not use computers on their own.
Teachers — They can use Space Scoop as a resource in the classroom to discuss the latest discoveries.

Announcement: http://unawe-srilanka.blogspot.com/2011/06/space-scoop-launched-in-sri-lanka.html
First Space Scoop in Sinhalese: http://unawe-srilanka.blogspot.com/2011/06/astronomy-in-desert.html

Cheers!
Thilina Heenatigala
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VIRTUAL EXPERIMENTS

The Virtual Experiments Team at Southampton University have launched a new website and several new virtual experiments. The new website found at http://ve.soton.ac.uk now features various electronic computer science and chemistry Virtual Experiments.

Virtual Experiments can save time and resources and enable students to understand the concept of uncertainty in laboratory measurements more effectively. Laboratory skills are key in many science and engineering areas; teaching these skills can use a lot of resources and limited lab space caps future student numbers. Although the hands on element can be a major part, the analysis and understanding is also important, and some of these skills can be addressed using virtual experiments. Avoiding direct use of labs, targeting skills and reducing staff time commitment could all be benefits.

The Team are available for commission and have released guidance documentation with advice and more information: http://ve.soton.ac.uk/virtual_experiment_guidance_notes_external.pdf

If you would like a quote or to discuss anything, contact:
Paolo Memoli
p.memoli@soton.ac.uk

LATIN-AMERICAN JOURNAL OF ASTRONOMY EDUCATION

We are pleased to announce the release of the eleventh issue (pdf) of the “Latin-American Journal of Astronomy Education” (RELEA), available at the site: http://www.relea.ufscar.br/

Once again, we acknowledge your collaboration and valuable support. We would like to request, not only a wide advertising of this issue, but also a personal effort in launching a campaign for articles to be submitted to our Journal. In this aspect, we also ask you to read, in particular, our reflections and concerns in the editorial of this eleventh issue. Any comments and suggestions may be sent directly to Prof Paulo S Bretones at the e-mail below.

Editors: Paulo S Bretones; Luiz C Jafelice; Jorge E Horvath
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NETWORK FOR ASTRONOMY SCHOOLS EDUCATION

NASE (Network for Astronomy School Education) was born in the IAU General Assembly in Rio de Janeiro (Chair: Rosa M Ros (Spain). Vice-chair: Beatriz García (Argentina)). This PG of Commission 46 is promoting astronomy at secondary and primary schools in all countries interested. Currently the members of the group generated a "basic course in astronomy" in Spanish and English. In 2010 and 2011 this course had been taught 13 times in several countries with different target groups (primary and/or secondary school teachers) in developing and developed countries. The first time that the course is taught, a group of 3 members of NASE visit the country and teach the course in cooperation with IAU members in the country (if there are any) and some local teachers interested in astronomy. The group of teachers and astronomers who were with us in the country create a new NASE working group and they have to organise astronomy activities and repeat the course at least once per year. The Local NASE group is supported by local institutions: Ministry of Education, Universities and/or Observatories interested in cooperation with NASE.

We also created a set of complementary materials for the teachers that participate in the basic course, and have more ideas to continue and increase their activities during the academic course with their students. We have two sections on the website, one in Spanish and the other one in English.

Primary school teachers in Tegucigalpa, Honduras, in July 2011

The course

The basic course is adapted to each country. After several presentations of the course, the members of the group decided to introduce some changes in the contents, in the general structure of the course, and in the order to teach activities. Topics appear in table 1 and timetables in table 2. The course is detailed at the website of NASE (http://www.iau.org/education/commission46/nase).

The duration of the course is 4 days. The activities are distributed in lectures giving basic concepts about fundamental themes in astronomy, working groups for discussion of the situation of astronomy in the country, methodology on teaching astronomy, and the most important aspect of the course - the workshops

for practical activities. Our main idea is teaching by doing, and the workshops are specially designed for this. The course is also complemented with day and night observations, with and without telescopes, poster sessions in order to have a time to show the expertise of some participants, the visit to an astronomical/archaeo-astronomical site showing astronomy in the middle of cultures, and a final evaluation session.

All the activities, except workshops, are taught to the full group. The workshops are taught to small groups for promoting teacher-made activities. In some cases we divide into groups of primary and secondary school teachers in order to approach in a more appropriate way the different methodology in each.

Workshops	1 Local horizons and sundials
Lectures	1 Stellar evolution
	2 Cosmology
	3 History of astronomy
	4 Solar System
	2 Stellar, solar and lunar demonstrators
	3 Young astronomer briefcase
	4 Earth=Moon-Sun system: phases and eclipses
	5 Solar spectrum and sunspots
	6 Stellar Lives
	7 Astronomy beyond the visible
	8 The expansion of the Universe
	9 Planets and exoplanets
	10 Preparing observations

Table 1: Titles of lectures and workshops of the NASE Basic Course. The authors are: Francis Berthomieu (France), Alexandre da Costa (Portugal), Susana Deustua (USA), Julieta Fierro (Mexico), Beatriz García (Argentina), Mary Kay Hemingway (USA), Ricardo Moreno (Spain), Jay Pasachoff (USA), John Percy (Canada), Rosa M Ros (Spain) and Magda Stavinschi (Romania).

Timetable A

	1st day	2nd day	3rd day	4th day
0830-1000	**Documentation Opening Session**	**Workshop 3**	**Workshop 4**	**Workshop 8**
1000-1100	**Lecture1**	**Lecture 2**	**Lecture 3**	**Lecture 4**
1100-1130	break	break	break	break
1130-1300	**Workshop 1**	**Workshop 5**	**Work. Group 1**	**Workshop 9**
1300-1400	lunch	lunch	lunch	lunch
1400-1530	**Workshop 2**	**Workshop 6**	**Astronomy Visit**	**Work. Group 2**
1530-1700	**Workshop 10**	**Workshop 7**	**Astronomy Visit**	**Assessment Closing Session**
	dinner	dinner	dinner	dinner
1830-2030		**Observation 1**	**Observation 2**	

Secondary and primary school teachers at a workshop in Panama in July 2011

Timetable B (NASE basic course)

	1st day	2nd day	3rd day	4th day
0830-1000	**Documentation Opening Session**	**Workshop 10**	**Workshop 3**	**Workshop 9**
1000-1100	**Lecture1**	**Lecture 2**	**Lecture3**	**Lecture4**
1100-1130	break	break	break	break
1130-1300	**Workshop 5**	**Workshop 1**	**Work Group 1**	**Workshop 8**
1300-1400	lunch	lunch	lunch	lunch
1400-1530	**Workshop 6**	**Workshop 2**	**Astronomy Visit**	**Work Group 2**
1530-1700	**Workshop 7**	**Workshop 4**	**Astronomy Visit**	**Assessment Closing Session**
	dinner	dinner	dinner	dinner
1830-2030		**Observation 1**	**Observation 2**	

The first time that a workshop is taught, the instructor is a NASE visitant member (timetable A) and the second time, the instructor is a member of "WG NASE local" (timetable B). Local instructors receive, a month before, the contents of the workshop that they have to teach in order to have enough time to study the material prepared by NASE experts (table 1 shows the full list) in their languages. After two years using this methodology, we can say that it is very useful.

The complementary materials

Teachers need more materials after the basic course. We have this material in the website distributed in English and Spanish at primary or secondary level. There are about 500 papers including: activities, simulations, interactive projects, games, tales, videos, observations, pictures, articles,... all that teachers and students can need. The materials are classified in two parts: One for secondary schools (11-18 years old students) and the other for primary schools (4-10 years old). The primary school pages have been developed in cooperation with UNAWE Universe Awareness, an initiative involving Commission 46 too.

The courses organised in 2011

In 2011, the area of activity has been South America again, in order to reaffirm our initial actions. The members of NASE who visited the countries were Susana Deustua (USA), Beatriz García (Argentina), Ricardo Moreno (Spain), Rosa M Ros (Spain) and Viviana Sebben (Argentina), all of them good Spanish speakers who can teach and exchange opinions with participants teachers in Spanish.

At present we are preparing a course in Peru in November/December 2011 but the dates are not fixed yet.

Number course	City	Country	Dates	Number of particpants	Local institutions involved
6th course	Venado Tuerto	Argentina	May 26-28 2011	41 teachers primary & secondary	Ministerio de Educación en la Provincia de Santa Fe Secretaria de Estado de Ciencia, Tecnología e Innovación de Santa Fe CONICET
7th course	Rafaela	Argentina	June 22-25 2011	32 teachers primary & secondary	Ministerio de Educación en la Provincia de Santa Fe Secretaria de Estado de Ciencia, Tecnología e Innovación de Santa Fe CONICET
8th course	Tegucigalpa	Honduras	July 11-14 2011	51 teachers Primary	Secretaria de Educación de Honduras Universidad Autónoma Nacional de Honduras Observatorio de Suyapa y Facultad de Ciencias Espaciales
9th course	Managua	Nicaragua	July 12-16 2011	45 teachers primary & secondary	Universidad Nacional Autónoma de Managua Ministerio de Educación de Nicaragua Observatorio de la Universidad de Managua
10th course	Panama	Panama	July 18-22 2011	48 teachers Primary & secondary	Ministerio de Educación de Panama Universidad Nacional de Panama

11th course	Barranquilla	Colombia	July 21-24 2011	45 teachers primary & secondary	Secretaria de Educación del Departamento del Atlántico
12th course	Asunción	Paraguay	July 27-30 2011	48 teachers secondary	Universidad Nacional de Asunción Facultad de Ciencias Exactas y Naturales Facultad Politécnica
13th course	Reconquista	Argentina	November 2-5 2011		Ministerio de Educación en la Provincia de Santa Fe Secretaria de Estado de Ciencia, Tecnología e Innovación de Santa Fe CONICET

Table 3 (continued): List of NASE courses carried out during 2011.

Rosa M Ros
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FROM HANS HAUBOLD AT THE UN

I've had this from Hans, but due to poor health I've not had the opportunity to sift through it and select any material particularly relevant to us.

"Following past tradition, UNOOSA, through its Programme on Space Applications (UNBSSI), is co-sponsoring this year's COSPAR capacity building workshop, hosted by Argentina:
http://hea-www.harvard.edu/~gluna/cospar/index.html

We are also cooperating with DLR (Germany) to prepare the Germany/US Joint Space Weather Summer Camp 2011 http://www.dlr.de/desktopdefault.aspx/tabid-4820/8007_read-29068/ (poster attached). There we will focus on what GNSS can do for ISWI."

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BOOK REVIEWS

THE SKY'S DARK LABYRINTH

Stuart Clark, (Edinburgh: Polygon, 2011). Hardback, 272 pages, £12.99 ISBN 978 1 84697 174 7
e-book ISBN 978 0 85790 014 2

I first became acquainted with the work of science writer Stuart Clark in 2007, when I favorably reviewed, in the pages of *Metascience,* Clark's excellent work of nonfiction, *The Sun Kings: The Unexpected Tragedy of Richard Carrington and the Tale of How Modern Astronomy Began.* As the subtitle of that unexpected page-turner indicates, much of Clark's earlier book focuses on the work of Carrington, a Victorian-era self-funded astronomer, whose studies of sunspots and solar flares helped not only to establish the powerful effect of the Sun's magnetism on Earth, but also to bring about the transition from the study of astronomy primarily as tool for aiding navigation to astrophysics. Carrington's scientific career was cut short, however – he died, possibly a suicide, before turning 50 – because of a bizarre turn of events in his personal life. In his late forties, he married a woman he met on Regent Street in London. Although she accepted Carrington's second proposal of marriage, she insisted on living not with Carrington but with a much older man whom she passed off as her brother, who was later imprisoned for stabbing her repeatedly with a knife. A few years later, Rosa Carrington died of an overdose of the sedative prescribed after the traumatic episode and, soon thereafter, Carrington was rebuked by the coroner for not providing adequate medical supervision for his wife – Carrington was later found dead in his home.

I suspect that Clark's research into the strange tale of Carrington's personal life ignited the desire in him to write historical fiction, and the book under consideration in this review is the first in a trilogy of science-historical novels to which readers of this review can look forward. *The Sky's Dark Labyrinth,* which begins in1600, with the burning of Giordano Bruno by the Papal Inquisition for his heretical views on the Universe, interweaves the lives of Kepler and Galileo. Clark skillfully sets his tale against the background of religious persecution and social unrest not only in the Italian states but also within the Holy Roman Empire. *The Sky's Dark Labyrinth* is a compelling "read," which shares some of the virtues and some of the faults I found in its nonfiction predecessor, and also has strengths and weaknesses of its own.

Among the irritants the novel shares with *The Sun Kings,* perhaps the most annoying is Clark's too chary use of dates, which in the first case had me regularly resorting to assistance in Google, and in the current case had me checking the entries I coauthored on Kepler and Galileo for a forthcoming Thames and Hudson reference book, *The Great Scientists* (expected publication in 2012). For example, Clark never provides the dates of the protagonists' births, and only rarely tells us the date in which some important event occurs. Only some chapters have titles that identify the date and setting, so we read about the Church edict that bans the treatment of the Copernican system as real rather than hypothetical; but only considerably later in the book, in a chapter that identifies the year as 1623, do we learn that the anti-Copernican edict was published in 1616. This important information is granted to us only because the new Pope, Urban VIII, tells Galileo, whom he has summoned to Rome, that had he been Pope in 1616, that edict would never have been published.

Another irritant common to both books, but somewhat more annoying in the case of the novel, relates to the titles. In my review of Clark's nonfiction book, I point out that the subtitle is misleading, since the majority of the text doesn't focus on Carrington at all, but rather on the lives of scientific contributors to the evolving understanding of solar physics from the 18th century to the 21st. In the case of the novel, I find the title too vague – it could be about anything at all, and just as appropriate to a J K Rowling or Philip Pullman fantasy novel as to a more sober, if fictional, treatment of an important era of scientific endeavor. I also find the titles Clark confers on the book's three internal divisions so unspecific as to be useless; why Part I is called "Ascension," Part II ""Culmination," and Part III "Setting" remains a mystery to this otherwise quite satisfied reader.

A virtue that the novel shares with its nonfiction precursor is, as I put it in the earlier review, the way its coverage of the lives of the scientists involved in each narrative "illuminates how contributions to knowledge may be impeded or impelled by the drama called life." A striking example of this point in *The Sky's Dark Labyrinth* concerns the ways in which various crises prolonged the period from Kepler's participation in Tycho's data-collection to its resulting in the published *Rudolphine Tables* over two decades later.

Paradoxically, Clark also illuminates, as he does in *The Sun Kings* as well, that while "the unwished for can undermine the most insightful of scientific researchers, . . . it may also advance research." In Chapter 24 of the novel Kepler movingly explains how the personal and social traumas Kepler experiences (e.g., the deaths of his wife and some of his children, the trial of his mother for witchcraft, and his excommunication from the Lutheran Church) render him temporarily incapable of working on *The Rudolphine Tables,* but spur him to write the magisterial *Harmonices mundi libri V,* which includes Kepler's third law of planetary motion, describing how a planet's orbital period relates to its distance from the Sun. As Clark puts it, "He told himself that he would eventually return to the composition of *The Rudolphine Tables;* . . . but for now he had to follow his heart and look for the harmony. It was the only way to make sense of all the suffering. . . . " In Chapter 29, Kepler explains further to his mother what discovering the third law of planetary motion has done for his emotional and spiritual life: "Though it's hard to believe at the moment, there must be harmony in the world; God's perfection cannot allow it to be otherwise. It must be a harmony so grand that it reduces all earthly woes to triviality.... I have searched for this harmony for years now and . . . and I've found it." He goes on to explain to her the similarity between the ratio he has found linking a planet's period and its distance from the Sun to the ratio of notes in a musical scale. The chapter ends with his thinking to himself, now that he has clarified the mathematics that helps explain the workings of the Universe, "he would publish a book about the harmony of the Universe, presenting his newly discovered law of planetary motion to the world. Then, at long last, he would finish *The Rudolphine Tables.*"

Unfortunately, the passage in which Kepler explains his third law of planetary motion to his mother is an example of one of the novel's shortcomings: the presence of several examples of clunky exposition. Clark tries to explain away the awkward attempt to explain scientific material here by having Kepler's mother say, "I'll never understand the things you talk about, but don't stop talking," but this attempt merely calls attention to Clark's subsequent inelegantly inserted set of definitions of terms including "orbit," "semi-major axis," and "solar force." There are other such passages in the book, including one in Chapter 6, where senior members of the Papal hierarchy seem to think it necessary to explain the Aristotelian-Ptolemaic universe, with its crystalline spheres, to a junior member, who clearly already knows about the supposed attributes of the sublunar sphere, since he says, "Change is possible only beneath the Moon's sphere, where the perfect ether is corrupted by human sin and wickedness."

The identity of this younger Catholic official, Cardinal Pippe, highlights what for me personally may be the biggest shortcoming of this novel, though it might not be for another reader. As a biographer of other scientists (including Curie, Rutherford, Bohr, and Einstein), I prefer getting my information about scientists and their science straight and accurate, without having to try to figure out which features of a book are historically verifiable and which are, to use a word popularized by American comedian Stephen Colbert, merely "truthy." In his Acknowledgements (British spelling), which follow the end of the narrative, Clark identifies Pippe as the single "main character in this book who is entirely fictitious." Since there is no dearth of fascinating characters in the actual history of Kepler's and Galileo's lives, it's not clear to me why Clark felt the need to add a fictional heavy to the story. Clark ascribes to Pippe the tasks of telling the Pope that Galileo in *Dialogo* asserts "absolutely that the Earth moves" and that "Galileo has mocked you in his pages," by depicting "as an imbecile" one of the three interlocutors of that book, "the spokesperson for our way of life," whom Galileo has gone so far as to name "Simplicio." I am left wondering who actually informed the Pope of these facts, and if the Pope read *Dialogo* himself and made the discoveries on his own, why not simply say so.

Some other passages in the novel may be well written but also leave me wondering how accurately they represent the facts. Is it true, for example, that the name "telescope" was introduced at the banquet hosted by Prince Cesi of the Lyncean Academy in honor of Galileo's visit? Is it true that when Kepler went to Prague with the finally completed *Rudolphine Tables,* he stopped in the Church of Our Lady Before Tyn and kneeled over the tomb of Tycho Brahe, thanking him for helping Kepler to "unlock the elliptical orbits and the movements of the planets" and to discern "the greater harmony of the cosmos," even as the world around him "becomes more dissonant every day"?

Among the most awkward, if memorable, scenes in the book for me are ones that Clark must be making up. Perhaps inspired by the erotic overtones of Carrington's marital life in *Sun Kings*, Clark seems to have felt compelled to add some sexual spice to a tale that is compelling enough on its own terms. I felt slightly icky after reading about Kepler's letting "his hands rove across the swell of [his wife's] torso, finding the laces on

her dress," and about Kepler's own discomfort in witnessing a sexual encounter between Tycho's oldest daughter and her husband. I also didn't need to know that Galileo relieved himself in the bushes at Prince Cesi's party, although having his character do so enables Clark to have Galileo overhear a conversation (whose historical accuracy is also questionable), in which a senior member of the Papal administration warns Cesi to be careful in his endorsement of Galileo: "We cannot jump to conclusions about the meaning of these new planets. It goes too much against Scripture."

Although this review has mentioned a number of aspects of the novel that strike me as flaws, in conclusion I want to emphasize the book's many strengths, including one I haven't yet mentioned. I very much admire the ways, big and small, in which Clark brings a complicated period and its numerous locales to life. Having spent time in Prague, most recently at the 2006 meeting of the International Astronomical Union, I could envision the neighborhoods Clark describes as caught up in the skirmishes of the Thirty Years War. Along with others who attended the meeting, I was privileged to dine in the restaurant at the Golden Griffin, where, as Clark tells us, Kepler lived at the turn of the 17th century. Having contributed to and toured a fine exhibit at Dartmouth University in the 1990s on the theme of the *Schatzkammer,* literally "treasure room," I enjoyed Clark's inclusion of numerous passages on Emperor Rudolph's *Kunstkammer*, and was interested to learn that the monarch's dilettantish interests represented therein ultimately contributed to his inability to govern effectively. And being a devotee both of frozen desserts and of eating implements, I enjoyed seeing the small role ice cream and forks play in Clark's narrative.

In short, I not only recommend to readers that they devote some time to *The Sky's Dark Labyrinth* but also urge them to look forward, as do I, to the publication of Clark's two forthcoming scientific-historical novels. *The Sensorium of God,* about Newton, is slated for publication in autumn 2011. When *The Day Without Yesterday,* which links the stories of Einstein and Hubble, appears in spring 2012, Clark's trilogy will be complete. I hope to share my comments on both novels with readers of this review.

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ATLAS OF ASTRONOMICAL DISCOVERIES

Govert Schilling, (New York: Springer, 2011). Hardcover, iv + 234 pages, $39.95. ISBN 978-1-4419-7810-3

If you like your astronomical history delivered in a visually appealing fashion, you need look no further than the *Atlas of Astronomical Discoveries,* a new book by Dutch astronomy journalist Govert Schilling. In explaining the format of the book in the preface, Schilling, perhaps immodestly but nonetheless correctly, notes that the atlas "offers a spectacular review of the past 400 years of telescopic astronomy" in "one hundred breathtaking snapshots" of what he deems "the most important astronomical discoveries since the invention of the telescope." Schilling chooses to begin his history not with Copernicus (who is nonetheless mentioned four times in the text) but rather with Galileo, since Galileo's telescope opened up "a complete new world" to the human eye.

Schilling organizes his one hundred top astronomical hits in five sections. The first three cover major breakthroughs in the three centuries from 1608 to 1908, with the next hundred years broken up into two fifty-year-long periods. Each breakthrough is presented in a two-page spread, with one full page devoted to a gorgeous color photograph, brought to us by the finest astronomical instruments available to us today, and a second page devoted to two columns of text, with space allotted for a smaller illustration. A sidebar on the page of text includes not only identification of and a credit for each illustration but also relevant additional information. For example, the sidebar for the spread for 1838, about Bessel's discovery of stellar parallax, explains that among the consequences of parallax is that a solar eclipse that is total in one location may be only partial elsewhere, since "from different places on Earth, we see the Moon in different positions in the sky." I was interested to learn in the sidebar for 1842, about the discovery of the Doppler effect. Doppler mistakenly thought at first that the "striking red and blue colors of some stars" are attributable to the effect named for him, rather than indicating different surface temperatures.

Books in fields that develop as quickly as astronomy have the unfortunate tendency to need updating even before they are published. Often in the months between going to press and appearing on the market, new

research suggests ways in which material written only months earlier should be amended. There are a few such instances in Schilling's book. For example, the sidebar for the entry for 1611, about the discovery of sunspots, indicates that the powerful solar flares in the fall of 2003 accompanied increased sunspot activity. Further updating of this entry, however, might mention that the current solar cycle, number 24, is predicted to be the weakest in over a century, and – according to several independent studies of the solar interior, visible surface, and corona – solar cycle 25 will have significantly reduced activity, or may not even appear at all. Schilling, however, does note, in his entry on the Maunder Minimum, that "The next Maunder Minimum. . . can in theory occur at any moment, and bring the current period of global warming to a temporary halt."

I happen also to know that new research casts doubt on the received belief nicely summarized in Schilling's spread for 1761, "Mikhail Lomonosov Discovers the Atmosphere Around Venus." Based on their reexamination of important accounts of 18th-century observers of the transit of Venus and comparisons with better observations of the 19th-century transits and the 2004 transit, J M Pasachoff and William Sheehan argue that Lomonosov did not actually discover Venus's atmosphere but only inferred its existence from observations of the black drop effect, which has nothing at all to do with the planet's atmosphere. Their new research, however, currently in press, in no way invalidates Schilling's claim that "Lomonosov is the Einstein of Russia," whose real achievements include the discovery of the law of the conservation of matter, the prediction of the existence of Antarctica, and the founding of Moscow State University.

Updating issues are one thing, while issues of emphasis are something else entirely. In a few instances, Schilling seems to me to misplace his emphasis. In his entry for 1619, he says that "Kepler's first law says nothing more than planets follow elliptical orbits, with the Sun at one focus," but as even Wikipedia points out, "at the time, Kepler's laws were radical claims; the prevailing belief (particularly in epicycle-based theories) was that orbits should be based on perfect circles." Kepler's inference of elliptical orbits from his careful calculations for the orbit of Mars rang the death knell for geocentric models and bolstered claims for the Copernican heliocentric view.

As a scientific biographer, I particularly enjoyed the human drama Schilling deftly, if only occasionally, manages to fit into the two columns of text devoted to a given story. I smiled at the reminder of the reason we have no idea of Robert Hooke's appearance: when Newton became president of the Royal Society, the portrait of his recently deceased competitor and antagonist was "irretrievably misplaced." Other astronomical enmities appearing between the lines of Schilling's atlas include those between Harlow Shapley and Edwin Hubble and between Martin Ryle and Fred Hoyle. I was also interested to learn that Shapley chose a career in astronomy only "on a whim," having originally aspired to study journalism and having actually had "some experience as a crime reporter." I was amused to read not only that Hans Bethe set himself the duration of a train ride between Washington, DC, and Cornell "to solve the puzzle of the nuclear reactions in the Sun", but also that he succeeded in finding the solution "just before the conductor [invited] the passengers to the restaurant car for dinner."

Among other admirable aspects of Schilling's atlas is his inclusion of a healthy number of women astronomers, with four earning their own two-page spreads (Henrietta Leavitt, Jocelyn Bell, Linda Morabito, and - perhaps less well known - Geneviève Soucail, who discovered light arcs in 1987). Four others share spreads with a male colleague (Elizabeth Scott, Louise Webster, Vera Rubin, and Jane Luu), and a number of others are mentioned in passing (including Margaret Burbidge and Carolyn Shoemaker). In several entries, Schilling makes clear how unwelcoming to women the profession once was. In his entry for 1958, for example, we learn that at the time she was cutting her professional teeth, Elizabeth Scott focused on "the mathematical foundations" of astronomy, in part because women were "still not allowed to use the big telescopes at Mount Wilson Observatory." In light of the discrimination she faced early in her career, it is interesting to learn that, in the last decade of Scott's life, she directed the statistical expertise she developed with Jerzy Neyman (culminating in their discovery of superclusters} to a study of the status of women in science, proving "unequivocally" that they still faced an uphill battle in academia. With Scott's study in mind, it is particularly painful to read Schilling's account of 22-year-old Vera Rubin's nearly being laughed out of the auditorium at the December 1950 meeting of the AAS, where the distinguished audience of "prominent astronomers" dismissed her argument about the movement of galaxies with respect to the expansion of the Universe, and the "disbelief and criticism" with which her 1976 work with Kent Ford on large-scale motions in the Universe was met. (I am not sure how I feel about the fact that Schilling attributes

to spacecraft the same number of breakthroughs that he ascribes to women. The 1976 spread deals with Viking 1, while other spreads hail achievements by Voyager 1, IRAS, the Mars rovers Spirit and Opportunity, the COBE satellite, and the space probes Giotto, Galileo, and Huygens.)

Schilling frames the book with a pair of poignant open-ended questions. In his first two-page spread, "Mountaineering on the Moon: Galileo Galilei Discovers Mountains on the Moon," he concludes by asking, "How long before we see the first lunar mountaineers?" In his coda, "Giant Telescopes and the Future of Astronomy," he asks, "Are we on the threshold of great breakthroughs and paradigm shifts? Or will the flow of new discoveries slowly dry up, without us ever fully unraveling the secrets of the Universe?" In early July 2011, when I read the *Atlas of Astronomy,* Dennis Overbye of *The New York Times* not only reported that "The House Appropriations Committee proposed Wednesday to kill the James Webb Space Telescope, the crown jewel of NASA's astronomy plans for the next two decades" but also summarized his feelings about the final launch of the space shuttle by saying "America still has no vision at all for its space program, no plan for where to go next or how" and "I no longer expect to see boot prints on Mars during my lifetime, nor do I expect that whoever eventually makes those boot prints will be drawing a paycheck from NASA, or even speaking English." As an American, I can hope that funding for science somewhere in the world may still lead to major breakthroughs and paradigm shifts in my lifetime, but I am less certain than ever of the role America will play in them. I hope that readers of Schilling's excellent and beautiful book a decade from now will not find it a sad reminder of the prominent role America once played in the development of astrophysics and planetary science.

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NEWS OF MEETINGS AND OF PEOPLE

COSMIC RAYS

Cosmic rays are high energy charged particles, originating in outer space, that travel at nearly the speed of light and strike the Earth from all directions. Most cosmic rays are the nuclei of atoms, ranging from the lightest to the heaviest elements in the periodic table. Cosmic rays also include high energy electrons, positrons, and other subatomic particles.

Cosmic rays were discovered in 1912 by Victor Hess, when he found that an electroscope discharged more rapidly as he ascended in a balloon. He attributed this to a source of radiation entering the atmosphere from above, and in 1936 was awarded the Nobel prize for his discovery.

For the Ultra High Energy Cosmic Rays, we do not know, even a century after, which kind of particles they are, from where they come from, and why they arrive with such high energy. Finding the answers to these questions is part of the scientific work in our own century!

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SPS17: LIGHT POLLUTION

In the context of Resolution B5, concerning IAU involvement in protection of the night sky, this Special Session (SpS17, 29-31 August 2012, “Light pollution: protecting astronomical sites and increasing global awareness through education”) will be devoted specifically to reviewing and assessing the current status and plans for further action in support of world-wide, multidisciplinary efforts to create awareness, educate and inform, and also will discuss more technical aspects of protecting the night sky. Target groups range from school children and their teachers, university departments in various disciplines, through to the general public and authorities at local, national, world-regional and worldwide levels.

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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 send me by email 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

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INFORMATION THAT WILL BE FOUND ON THE IAU C46 WEBSITE

Among the information that will be contained on the IAU C46 website is the following

- Overviews (of C46, in English, French, and Spanish)
- Guidelines (including Programme Groups)
- Resolutions
- Newsletters (including triennial reports from National Liaisons)
- Organizing committee
- National contacts (liaisons)
- Links
- News

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