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

Newsletter 80 – October 2014

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://iaucomm46.frm.utn.edu.ar/newsletters/

CONTENTS

EDITORIAL

Welcome to IAU Commission 46 Newsletter 80, the fourth to be published under the editorship of Larry Marschall (Gettysburg College) and the first to be published after he became, officially, Professor Emeritus. This newsletter contains a message from Commission 46 President Prof. Jean-Pierre De Greve regarding the proposal to maintain Commission 46 under the new restructuring of the IAU. It also contains the semi-annual report on educational activities by OAD Director Kevin Govender, which is a regular feature of the newsletter. And we feature articles on several educational activities worldwide, the first a report on an astronomy summer school in West Africa, by Dr. Linda Strubbe of the University of Toronto, and the second, a report on the Astronomy Education Alliance meeting in Portugal by Thilina Heenatigala. We are happy, as usual, to have two book reviews by Naomi Pasachoff.

We are, saddened, however, by the news, just prior to publication, of the death of the long-time editor of this newsletter, Dr. Barrie Jones. A brief obituary, by Prof. Jean-Pierre De Greve appears in this issue.

As always, comments and contributions are both needed and welcome. 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 2015 issue the copy date is **Friday 27 February 2015**. 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 marschal@gettysburg.edu. 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, but feel free to contact me with preliminary ideas for contributions.

I try to edit as lightly as possible, and I certainly don't care whether US English or British spelling conventions are used, so you may notice an inconsistency in style insofar as such conventions can vary from author to author with no loss of comprehensibility. I also leave local turns of phrase untouched unless the meaning is obscure. Clarity, conciseness, and being interesting or informative are what is needed. Only in rare cases is heavier editing necessary.

Notes on Resources and Methods for Education

I welcome short notes pointing readers to resources useful for education. Such notes can just point to a website, or can include a paragraph describing the nature and application of the resources available. You will find several examples of these notes in this edition. I also welcome longer articles detailing methods and techniques and reports on educational activities and summer schools, and well as studies regarding the impact and effectiveness of such techniques for astronomical learning.

Book reviews

I welcome book reviews. Reviews should generally be of books centered on astronomy education or development or of historical interest for educators. If there's such a book that you think is worth reviewing, please send your review to me.

The C46 websites

The "official" C46 website is at http://www.iaucomm46.org. The IAU Office of Astronomy for Development (OAD) is at http://www.astro4dev.org/ and the IAU Office of Astronomy Outreach (OAO) is at http://www.iau.org/public/ .

Back issues of the C46 Newsletter

Back issues are available at http://iaucomm46.frm.utn.edu.ar/newsletters/. Newsletter 49, October 1998, has been scanned from hard copy, so the quality of reproduction is only modest. This is also he case for earlier ones, edited by John Percy. These extend back to February 1992, but there are gaps.

Larry Marschall
For further information on the editor, see my personal web page:
http://public.gettysburg.edu/~marschal/clea/lam.html
(for contact details see Program Group Chairs and Vice Chairs)

MESSAGE FROM THE PRESIDENT

NEWS ON THE SUBMISSION TO KEEP C46 AS COMMISSION IN THE NEW IAU STRUCTURE

Together with Beatriz Garcia, Vice-president of C46, I've introduced a letter of intent to maintain C46 as commission in the new structure. The submission reference number is #11. You'll find the letter of intent as a separate part of this Newsletter. As of October 15, all the letters of intent will be publicly visible. Then, the next steps in the process start. You'll find all the important dates of the future steps for determining the new commission structure at http://www.iau.org/administration/events/future/

I draw your attention to two of them:

a. 15 December 2014: Deadline for submission of Proposals for 2016 Symposia. If you want research in astronomy education and development to grow further, it's time to seek alliances to formulate a good proposal for a symposium on a relevant theme. There are only two months left!
b. 15 January 2015: Deadline for Full Proposals for the reform of the Commissions. The period between 15 October and 15 January can be used to refine and/or improve the Letter of Intent. The format and the content of the full proposal are the same as that of the Letter of Intent, though the information may be more extended or modified..

This global reform is a cornerstone of the modernization of the IAU. As C46 should remain to play a role in the Astronomy for Development Strategic Plan, I urge you all to support the C46 submission by

- looking carefully at its content and making suggestions for improvement
- actively looking for supporters when it comes to voting.

There is also a reform forum for IAU members were comments on the reform and/or the proposed commissions can be posted:
http://www.iau.org/science/commission-reform-forum/
It is interesting to read some of the reactions and to write your own opinion on the overal reform as well as on a specific aspect of it, as the Executive Committee takes the information into account when making its proposals for the General Assembly.

Jean-Pierre De Greve
President Commission 46
Vrije Universiteit Brussel
Brussels, Belgium
jpdgreve@vub.ac.be

==========

LETTER OF INTENT: TO MAINTAIN COMMISSION 46 UNDER THE REORGANIZED STRUCTURE OF THE IAU

What follows is the letter of intent form sent to the IAU for the maintain Commission 46.

Submission #11 of a Proposal for a Commission (Letter of Intent)

Submission detail
==========

Name of the Commission: Astronomy Education and Development

Regular Commission, Parent Division: Division C Education, Outreach and Heritage

First Co-Proposer:
First name: Beatriz
Last name: Garcia
Institute: Instituto en Tecnologias de Deteccion y Astroparticulas (ITeDA)
City: Mendoza
Country: Argentina
Email: beatrizgarciautn@gmail.com

Commission based on existing Commission: Division C Commission 46 Astronomy Education & Development

Rationale:

- C46 has gone through a serious revision as a result of the establishment of the OAD, and corresponding transfer of activities of several PGs to the OAD. Moreover, the fact that the new IAU structure has no PGs but Working Groups, provoked an internal revision, introducing new topics. So C46 has gone through a serious process of 'renovation' and 'innovation'.

- The OC adopted a new mission statement that clearly reflects the above, but also supports both the uniqueness of C46 and its place in the IAU structure: 'The commission seeks to further the development and improvement of scientific research into education and specifically astronomical education at all levels throughout the world, through stimulating, gathering and exchanging scientific research in the field. This research should address epistemological questions, as well as innovative teaching and learning processes appropriate to the needs of astronomy education. The commission will further encourage and develop efforts to disseminate this information at all levels. It also strive ~~s~~s for inclusion in working to provide people with special educational needs or people with visual, hearing and / or motor disabilities, a learning and participative space. ".

- C46 works on educational problems that support activities in the different Task Forces of the OAD.

- C46 realizes its mission through a thoroughly renewed structure with WGs such as Theory and Methods in Astronomy Education, Network for Astronomy School Education, and Astronomy and Inclusion.

- C46 has ~~aims that makes~~aims that make it distinct from other existing Commissions, in trying to make teachers better, trying to introduce astronomy across disciplines, and in using demonstrations and research to show how astronomy can improve the scientific learning of the young.

Website: http://iaucomm46.frm.utn.edu.ar

Renewed structure of the Commission:

a) WG1 National Liaison on Astronomy Education and Newsletter
This WG monitors the half-yearly publication of the Commission's online Newsletter (http://iaucomm46.frm.utn.edu.ar/newsletters/) and keeps track of the national liaison officers (http://iaucomm46.frm.utn.edu.ar/national-contacts/)

b) WG2 Network for Astronomy School Education (NASE)
The main objective of NASE is to educate new generations of teachers and re-educate the current ones. NASE works with university professors in order to train future teachers and cooperates with the departments of education in order to train experienced primary and secondary school teachers. NASE created a basic course for training teachers aiming at:
1) teaching astronomy to teachers
2) teaching teachers how to teach astronomy.
At the same time, NASE works with university professors to introduce them to new methods of teaching astronomy.

c) WG3 Public Understanding at the Times of Solar Eclipses and Transits
This WG is directed by Jay M. Pasachoff, Chair of the IAU Working Group on Solar Eclipses, and provides the outreach information and actions for solar eclipses.

d) WG Astronomy and Inclusion
This WG creates strategies, tools, resources to provide people with special educational needs or people with visual, hearing and / or motor disabilities, a learning and participative space, accessible, interesting and educational, without neglecting the basics of scientific dissemination, ensuring interaction in a playful context. The WG realizes its mission through an ~~interdisciplinbary~~interdisciplinary approach (astronomers, educators and disability specialists) in developing new teaching and learning strategies. It generates resources and tools of high-impact hierarchy in these minority populations which are usually away from astronomy, and creates a resource base of didactical approaches, models and tools for all the audiences.

e) WG Theory and Methods in Astronomy Education
This Working Group was established to fulfill two needs:
1. The growing amount of emerging astronomy projects, stimulated by the existence of the OAD and its annual calls for projects (but also many new initiatives outside this channel) require adequate research into educational tools, models, quality and impact evaluation.

2. Innovation and adaption of teacher training, curricula, pedagogical methods to the fast changing knowledge base, the societal changes and the corresponding changes in attitude of the young require research and experimentation. Modern astronomy education can play an important role in education reform, if change is based on underlying research in how to teach contemporary astronomy in an innovative competence-building framework.

Hence, the discussion within the WG is about a theoretical transdisciplinary approximation to "how to teach contemporary astronomy" at different levels.
Its goals are:

1. To develop a promotional strategy for enhancing astronomical educational research.
2. To identify the research needed for the design of strategies to teach modern astronomy.
3. To identify and indicate the most interesting and needed areas for such research.
4. To identify structures that can serve for research of education in contemporary astronomy (such as NASE and UNAWE).
5. To prepare the framework for a symposium or special session at the GA, or a symposium just after it .

==========

PROPOSAL FOR A NEW WORKING GROUP FOR COMMISSION 46

Dr.Mohammed Heydari-Malayeri informs us that he is proposing the establishment of a working group within Commission 46 to develop and maintain an IAU dictionary. Details can be found at http://dictionary.obspm.fr . If you are interested in participating in this project, please contact Dr. Heydari-Malayeri at the address below.

M. Heydari-Malayeri,
Observatoire de Paris, phone: (33) 1 40 51 20 76
F-75014 Paris, France. fax: (33) 1 40 51 20 02
e-mail: m.heydari@obspm.fr
http://aramis.obspm.fr/~heydari

[Note from the President of Commission 46: Beatriz and I, are waiting for the approval of the OC of Division C to include the new WG into the C46 structure.]

==========

UPDATE ON THE IAU OFFICE OF ASTRONOMY FOR DEVELOPMENT (OAD) FROM KEVIN GOVENDER, DIRECTOR OF OAD

1. **Background and Overview:**

The IAU Office of Astronomy for Development (OAD) was established in March 2011 in order to drive the implementation of the IAU Strategic Plan adopted at the 2009 General Assembly. The OAD is hosted at the South African Astronomical Observatory (SAAO) in Cape Town, South Africa. The OAD releases quarterly newsletters which are available on the OAD website or via the OAD mailing list (see www.astro4dev.org). This update to Commission 46 covers the period from 1 April to 30 September 2014, including a summary of projects funded for implementation in 2014. Any queries on the OAD and its activities can be directed to info@astro4dev.org – comments, suggestions, ideas and input are always most welcome.

2. **OAD Call for Proposals 2013 (for implementation in 2014):**

In July 2013 the OAD released its second annual open Call for Proposals for projects related to its three Task Forces: TF1 (universities and research); TF2 (children and schools); or TF3 (public outreach). The response to the Call was again quite overwhelming with 230 proposals received (54 proposals for TF1; 113 for TF2; and 63 for TF3). Of these 22 projects were selected for funding and these are listed below. Funded projects are monitored by the OAD and individual project reports/updates are available on the OAD website www.astro4dev.org)

TF1 (Universities and Research):

Title	**Country**
Starlight in the university lab	Belgium (for Nigeria and Zambia)
Institute Twinning between the University of Antioquia (Colombia) and the Leiden Observatory	Colombia
The Fourth East-African Astronomy / *Strengthening Astronomy Research at University in Rwanda (Phase II)*	Rwanda (for East Africa)
Joint Exchange Development Initiative for Africa	Namibia
Latin American School of Observational Astronomy	Mexico
West African International Summer School for Young Astronomers	Nigeria (for West Africa)
Regional School on Astrophysical Data Reduction	Nepal (for region)
Sustainment of the development of astrophysics in Vietnam at the Master/PhD level in the radio astronomy domain	Vietnam

TF2 (Children and Schools):

Title	**Country**
The UNAWE-UNESCO-Mobil I for Central America	Argentina, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica, Panama
eScience Cafe: Building a global science community	United States (reaching several globally)
The Universe - our home full of wonders	Poland
Modern Astronomy: Science/Technology Transfer in the SEA-ROAD Region	Australia, Thailand
E-Teacher Training: Taking astronomy to the Portuguese Speaking Countries community	Portugal, Mozambique, Angola, East Timor, Macau, Cape Verde, São Tomé and Príncipe, India, Brazil
Astro party	Bulgaria
Conduction of astronomical activities to motivate students in Public schools of Nepal	Nepal

TF3 (Public Outreach):

Title	Country
Nanotarium: The Most Inexpensive, Quality DIY Planetarium on Earth	United States
Coordinating Astronomy for Public Outreach in Viet Nam (Phase 2): Uniting Amateur Astronomy Clubs and Bringing Astronomy to a Broader Public	Vietnam
Training of Policy Makers in Ethiopia	Ethiopia
Accessible Citizen Science for the Developing World	United Kingdom
Communication and (social) media skills for young astronomers	South Africa
Yunnan Minority Regions Astronomical Popularization Footprint Map Plan	China
Documentary Series on Astronomy Research in India	India

3. **OAD Call for Proposals 2014:**

The OAD's 2014 annual call for proposals was released on 30 June 2014 and attracted 131 proposals, a significant reduction from the previous years (191 in 2012 and 230 in 2013). The drop in number was not unexpected as the focus of the publicity was placed on quality rather than quantity. For the first time we had published the low success rates of previous years (~10%) and the modest average grant amounts that were paid out per Task Force. We also tightened the selection criteria that were published in the hope that it would discourage low quality proposals. The first phase of processing the proposals went smoothly with the online system performing well and translations only required in Spanish, Portuguese and French. There were no complaints from proposers and all applications were consolidated and submitted to the evaluation teams within a week of the 31 August deadline. Recommendations from the evaluators are due by the end of October 2014.

4. **Regional Nodes and Language Expertise Centres:**

January 2014 saw the launch of the third Regional Office of Astronomy for Development (ROAD) in Addis Ababa, Ethiopia for the East African region. This was followed by the launch of the fourth ROAD in August 2014 (in Zambia for Southern Africa). Proposals for other ROADs are expected by the end of October 2014 in time for the next meeting of the IAU Extended Development Oversight Committee, the body that makes the selections. These include potential proposals for an Andean node, a Brazilian node, an Eastern European node, a Middle East/North African node and a West African node. There are also potential proposals expected for a Portuguese Language Expertise Centre. The first quarterly telecon with the regional coordinators was held in September 2014 – this will now be a point of regular information sharing and collaboration between regional nodes themselves and the OAD. If members of Commission 46 have any ideas, contacts or experience related to these proposed regions, please do get in touch.

5. **Special Project Highlights**:

The OAD welcomes innovative ideas from Commission 46 members for special projects that can be tested or coordinated from the OAD itself. These are independent of the annual Call for Proposals. Some highlights from 2014:

i. A publication in collaboration with the Institute for Monitoring and Evaluation at the University of Cape Town regarding the framework developed for OAD-funded projects was submitted to the South African Journal of Science and is currently under review.

ii. During March to May 2014, OAD visitor and astronomer Wanda Diaz worked on several activities relating to engaging visually impaired people with astronomy – the whole project is now referred to as AstroSense. During her time at the OAD Wanda made several school visits trying out resources at schools for the visually impaired; engaged with the then Deputy Minister of Science and Technology Michael Masutha on several occasions; delivered a TEDx talk; appeared on live and recorded radio programmes; acquired and assembled a Radio Jove radio astronomy kit for the OAD; and made use of the 3D printer at the OAD to develop materials for the visually impaired.

iii. The OAD has been engaged with several "historically black universities" in South Africa with the intention of using astronomy as a means to enhance the teaching of Physics. The project has taken the name AstroVarsity and has involved OAD visitor Julio Morales from Mexico, who contributed towards the development of a basic curriculum package for universities. The AstroVarsity project (led by OAD intern Laure Catala) has subsequently evolved into a larger activity involving Task Force 1 (Universities and Research) and various OAD-funded projects. The objective is a consolidation of university level resources and workshops into a package that will be piloted at the University of Zululand ideally before the end of 2014. Collaborators on this project currently include individuals from SAAO, the South

African Astro-informatics Alliance, University of KwaZulu-Natal, University of Zululand, University of Cape Town; University of North West and the AstroLab project.

iv. In June 2014 the OAD launched its Ideas List (an open list of ideas that are looking for volunteers to drive) as well as an OAD Visiting Fellowships programme which invites exceptional volunteers to visit the OAD and work on particular projects and ideas.

v. In April 2014 the OAD released its first "glossy brochure" to stakeholders summarising the activities of the OAD to date – this is available for download on the OAD website or one can request a hard copy by post.

vi. The OAD partnered with the GalileoMobile project to send Galileoscopes (small telescopes) to the Latin American countries during their mobile expedition.

vii. The OAD has been working on an online version of the Young Astronomer Events which will be released prior to the next General Assembly in order to allow the activity to take place online between meetings;

viii. August 2014 saw the launch of the OAD-IUCAA visiting fellowships for African individuals. This basically provides opportunities for young astronomers to travel to India and spend time at the Inter University Centre for Astronomy and Astrophysics (IUCAA) to gain experience in research and outreach

ix. The OAD was part of a successful proposal (EU Space Awareness – led by the current Universe Awareness Programme) to the EU Horizon 2020 programme. In this proposal the OAD is part of a consortium that seeks to address education and awareness in several countries with the role of the OAD to expand the activity globally.

6.**Some highlights of Meetings/Conferences in 2014:**

Once again the OAD welcomes input from Commission 46 members in terms of meetings or conferences at which information about the OAD would be useful. We would also welcome Commission 46 members delivering presentations on behalf of the OAD at their institutions or meetings they attend (we would of course provide any necessary materials or information):

i. TEDx Westerford in Cape Town took place in April 2014 and featured OAD visitor Wanda Diaz (talk available on the OAD website)

ii. OAD director joined Wanda Diaz and Deputy Minister of Science and Technology during a visit to the Pioneer School for the Blind in Worcester, South Africa;

iii. OAD Task Force 1 vice-chair Katrien Kolenberg presented the OAD activities at Harvard-Smithsonian Centre for Astrophysics in the US;

iv. The IAU Executive Committee meeting took place in Canberra, Australia from 29 April to 1 May. OAD director joined the meeting by video to present an update on the work of the OAD. Steering Committee members Patricia Whitelock and George Miley attended in person;

v. The South African Astronomy Town Meeting took place on 25th June, with the OAD director presenting as chair of one of seven strategic planning panels. Focus was on the development of a long term strategy for astronomy in South Africa, a matter of obvious interest for the OAD which ideally would form part of such a strategy.

vi. The OAD was represented at the Fourth East African Astronomy Meeting in Rwanda by Task Force 1 Chair Ed Guinan;

vii. OAD Director presented an invited talk at the "Oxford X: Astronomy, Indigeneous Knowledge and Interpretation" conference in Cape Town;

viii. The OAD's activities, with a focus on the "AstroSense" project, were presented at an exhibition for the Science and Technology Budget Vote in Parliament;

ix. OAD Director participated in a Google Hangout on the OAD that was hosted by CosmoQuest (this was an hour-long interview broadcast on the web - the video is then available on YouTube – links on www.astro4dev.org);

x. Another Google Hangout involving the OAD was hosted by "Astronomers without Borders" and featured several high profile personalities talking about "Astronomy In the Development of STEM Education" (links to videos on the OAD website);

xi. The OAD was represented at the 12th Asia-Pacific Regional IAU Meeting in Korea by the East Asian and South East Asian regional nodes. A special session was held on Astronomy for Development where several OAD collaborators and funded projects presented their work. Wayne Orchiston from the South East Asian Regional node made a presentation on behalf of the OAD. The OAD also shared an exhibition space with the IAU Office for Astronomy Outreach (OAO) who hosted a lunch with "Astronomy for Development" as one of the topics. Kaz Sekiguchi from the OAD Steering Committee was also in attendance;

xii. A presentation was made to colleagues in the Astronomy group at the South African Department of Science and Technology to update them on the work of the OAD and discuss what would be required for ongoing DST support.

xiii. The OAD was represented at the 3rd Middle East and Africa Regional IAU Meeting in Lebanon. TF1 Chair Ed Guinan presented on behalf of the OAD. Claude Carignan from the OAD Steering Committee was also in attendance;

xiv. The OAD was represented by George Miley at the United Nations/Austria Symposium on "Space Science and the United Nations" in Graz, Austria.

7.**Future Outlook:** The OAD has developed a funding framework which defines various fundraising routes, including innovative methods such as crowdfunding, to support projects that could not be funded by the IAU. The Monitoring and Evaluation Framework, applied to 2014 projects, will be expanded into an impact assessment design for the 2015 to 2020 half-decade. Each Task Force has chosen flagship projects which the OAD is helping to drive. The OAD will continue to work to finalise agreements for more regional nodes and language expertise centres before the next IAU General Assembly. At that General Assembly the OAD will organise Focus Meeting 20: Astronomy for Development, which plans to include a panel discussion with representatives of all IAU Divisions. We also plan to have an exhibition area jointly with the IAU Office for Astronomy Outreach from where we will help coordinate Young Astronomer Events. Commission 46 members are invited to submit abstracts for FM20 on www.astronomy2015.org. The OAD is currently undergoing a review of the first 3 years of its existence. The review will culminate in February 2015 in time to have the results presented to the next IAU Executive Committee Meeting and the General Assembly in 2015. This review will help to determine the way forward for the OAD.

8.**For More information/Contact:** For more information or to provide suggestions and input, please visit the OAD website (www.astro4dev.org) or contact us at info@astro4dev.org.

Kevin Govender, Director
IAU-OAD
kg@astro4dev.org

==========

EDUCATIONAL REPORTS

AN INQUIRY-BASED SUMMER SCHOOL FOR ASTRONOMY IN WEST AFRICA

In October 2013, over 75 undergraduate science students and teachers from Nigeria and Ghana attended the week-long West African International Summer School for Young Astronomers (WAISSYA), held in Abuja, Nigeria. The school was organized and taught by a collaboration of astronomers from the Canadian Institute for Theoretical Astrophysics (my affiliation), the Dunlap Institute for Astronomy and Astrophysics, the University of Toronto, the Centre for Basic Space Science at the University of Nigeria Nsukka, the National Astronomical Observatory of Japan, and the Nigerian National Space Research and Development Agency (NASRDA), and in collaboration with the Institute for Scientist & Engineer Educators at the University of California, Santa Cruz.

WAISSYA Students using Sunspotters to observe the sun, facilitated by Kelly Lepo

WAISSYA students work in groups to figure out how to measure distances to astronomical objects

WAISSYA students taking a tour of the National Space Research and Development Agency in Abuja, Nigeria

Toronto team members [l-r] Kelly Lepo, Linda Strubbe, Nigerian team member Daniel Okoh, Toronto team members Jielai Zhang, Heidi White

West Africa has huge potential to develop a strong astronomy community, thanks especially to its large number of talented students interested in science; however, lack of interest from funding bodies and non-existence of facilities have so far impeded progress. Nigeria is especially interested in building up a critical mass of West African astronomers and establishing collaborations with universities/astronomy institutes outside the region; this brought about the idea for WAISSYA through conversations at the IAU General Assembly in Beijing in 2012. Our main goals for the Summer School were: (1) to introduce West African students to astronomy, to a level they could continue learning from books and courses on their own afterwards; (2) to exchange ideas about teaching and learning in West Africa and North America, with the goal of strengthening teaching in both places; and (3) to build a foundation for a sustained astronomy partnership between West Africa and Canada.

It was important to us to use results of science education research to design teaching plans that would be as effective as possible. Two findings that we focused on particularly were that we should teach scientific thinking along with scientific content, and that we should incorporate rigorous assessment to evaluate the effectiveness of the program. The teaching activities we designed included: (1) community-building group discussions, on topics like why one might study astronomy; (2) lectures and problem sets, using interactive techniques like multiple-choice questions where students vote, discuss together, then vote again (often called "think-pair-share questions"), on the topics of stars, the solar system, extrasolar planets, galaxies, cosmology, and instrumentation; (3) solar observing with Sunspotter telescopes and hands-on lab activities about convection, magnetic fields, and radiative diffusion; (4) lectures on cultural astronomy, astronomy in Africa and the Office of Astronomy for Development, and how to apply to graduate school; and (5) the focal point, a two-day inquiry-based lab on the Cosmic Distance Ladder that the Toronto team designed.

During the Cosmic Distance Ladder lab, two of our goals were for students to understand how the methods of parallax and inverse-square law for light work for measuring astronomical distances, and to improve their ability to make scientific arguments, by arguing for the validity of distance measurements; we developed rubrics to measure student learning in both of these areas. The lab began with students asking questions about images of astronomical objects (e.g., the Sun, the Small Magellanic Cloud dwarf galaxy); then they investigated their questions in small groups. We facilitated by listening, occasionally chatting with groups about their ideas and progress, and introducing new tools to consider. Students could explore their questions in many possible ways, and share their learning orally, by writing and by drawing pictures. Through the activity, students progressed from, "What are sunspots?" and "We know the distance to the Sun because we were taught it" to discovering the method of parallax *themselves*—mental steps that were significant and exciting for them to take, and also for us to be part of. In later discussions, students enthusiastically debated the nature and applicability of parallax and the inverse-square law for light.

We evaluated the effectiveness of the school in a variety of ways. Before, directly after, and six months after the school, we gave our students astronomy concept inventory questions and surveys

about their self-confidence as scientists. (A concept inventory is a set of questions validated by education researchers testing many students, often including common misconceptions as "distractor" answers. The self-confidence survey was adapted from earlier psychology research by Chemers et al. 2006, and assessed students' levels of self-efficacy for doing science, self-identity as a scientist, and commitment to a science career.) The fraction of concept inventory questions our students answered correctly rose by 50% from before to directly after the school, with largest gains for topics that we taught most interactively. We found that our students' scores had dropped six months later, and are trying to figure out how to strengthen our curriculum for next time, guided by these results. We found that our students' self-confidence and interest in a career as a scientist began and remained very high.

We also solicited daily written and oral reflections from our students about their learning: many students reported they learned the importance of seeking explanations and solving problems themselves, which they would bring back to solving problems in their own communities. One student told us, "This process has actually made me realize that I can think and find answers to questions on my own without external help. I can now say I can think like a scientist," which of course made us very happy! Other students said, "I learned that…the solution to a problem can be the generation of a new problem," "There's no question that is too dumb to ask. … Sometimes you find that that question that sounded initially dumb was the same one that will help you to get your answer," and "Learning in this method has confirmed that I can study Astronomy." We find that quantitatively and qualitatively assessing our students' learning is crucial for offering measures of the effectiveness of our teaching, and pointing to concrete ways we can improve for the future.

We are trying to support our alumni in several ways. We organized a Facebook group where students can discuss career ideas and astronomy questions, and are working on creating a forum where each week, a different University of Toronto astronomer will introduce themselves and their research, and answer questions from the students. Shortly after the Summer School (November 3, 2013) was a solar eclipse, visible as almost total in Nigeria; we gave students eclipse glasses, and many shared photos on Facebook of observing and sharing the eclipse with friends and colleagues. We also hoped to have two of our alumni visit Toronto this year, one for the Dunlap Institute Instrumentation Summer School, and one for the International Astronautical Congress; unfortunately both of their Canadian visas were declined. We would be grateful for any ideas readers have about how to help West African students secure visas to North America, and opportunities for astronomy fellowships for which our students might be eligible.

We are planning to hold the school again early next year in Nigeria, having had to postpone from October 2014 due to the Ebola outbreak. We are grateful for a grant from the IAU Office of Astronomy for Development Task Force 1 which will help support this second school. Anyone interested in participating or learning more is very welcome to contact me!

We are preparing to publish a more extensive article about the school in an education journal, and are preparing some of our teaching activities to share on the IAU platform *astroEDU* (www.iau.org/astroedu).

Websites for learning more about the West African Summer School for Young Astronomers (WAISSYA):
http://www.astronomynigeria.com
http://www.cita.utoronto.ca/outreach-dr-linda-strubbe-leads-the-nigeria-short-course-in-astronomy
http://dunlap.utoronto.ca/education/west-african-summer-school
http://www.astro4dev.org/blog/category/tf1/west-africa-school/

WAISSYA collaboration:
Linda Strubbe (WAISSYA Director, Toronto), Bonaventure Okere (WAISSYA Director, Nigeria), Kelly Lepo, Heidi White, Jielai Zhang, James Chibueze, Daniel Okoh, Johnson Urama, Augustine

Ubachukwu, F.E. Opara, Pius Okeke, Peter Martin, Norman Murray, Kevin Govender, Lisa Hunter, Wolfgang Kerzendorf, Valerie Murray, Duy Nguyen.

The author: Dr. Linda Strubbe is a Postdoctoral Fellow at the Canadian Institute for Theoretical Astrophysics in Toronto, where she researches black holes and leads education and outreach activities. Linda is a member of the IAU Office of Astronomy for Development Task Force 2, and Editor-in-Chief of the IAU/OAD project *astroEDU*. Email her at linda@cita.utoronto.ca.

Linda Strubbe
Canadian Institute for Theoretical Astrophysics
Toronto, ON, Canada
linda@cita.utoronto.ca

==========

REPORT ON ACTIVITIES: ASTRONOMY EDUCATION ALLIANCE MEETING 2014, CASCAIS, PORTUGAL

The 17th edition of Global Hands-on Universe (GHOU) gathering took place from Monday 08 to Friday 12 September 2014, at the Centro de Congressos do Estoril, in the city of Cascais, Portugal. GHOU 2014 brougt many partners together and focused on astronomy education to create a week long "**Astronomy Education Alliance Meeting**" which ran parallel to the European Planetary Science Congress (EPSC).

The gathering was opened officially by the chair of EPSC 2014; Professor Manuel Grande of Aberystwyth University, UK. Distinguish Mayor of Cascais, Carlos Carreiras addressed the participants on his welcome speech highlighting the importance of hosting such an event and added *"it is said that in order to care we need to know. We trust in you to share with us all the knowledge of the fabulous world that exists beyond our planetary limits."* Núcleo Interativo de Astronomia (NUCLIO), the main organiser of EPSC and GHOU, coordinated five workshops in educational topics such as enquiry based learning, hands-on materials and tactile resources for astronomy. The week also included resource fair to showcase astronomy educational materials.

Group Photograph of Participants in the AEAM Meeting

Participants in the European Planetary Science Congress

The meeting gathered more than 100 participants from 27 countries. Much of the presentations focused on best practices in astronomy education at different levels of age

groups and backgrounds. There was also a clear indication of the need to shape the standards of astronomy education which was highlighted on Leiden University's astronomer, Pedro Russo's talk on "Astronomy Education 2020: A 5-year Vision".

Videos of the presentations along with abstracts will be available on the http://handsonuniverse.org/ website at the end of October 2014.

Thilina Heenatigala
Galileo Teacher Traning Program, Astronomers Without Borders, and IAU-OAD
thilina@astronomerswithoutborders.org.

==========

BOOK REVIEWS

CELESTIAL SLEUTH: USING ASTRONOMY TO SOLVE MYSTERIES IN ART, HISTORY AND LITERATURE

Donald W. Olson, (New York: Springer, 2014). xvi + 355 pages. PB $39.99. ISBN 978-1-4614-8402-8. eBook $29.99. ISBN 978-1-4614-8403-5.

This book, which has emerged from an Honors College course, "Astronomy in Art, History, and Literature," taught since 1994 by Professor Don Olson, a member of the physics faculty at Texas State University, is sure to interest not only people like me with my doctorate in English literature coupled with a deep interest in astronomy, art, and history, but also students majoring in the humanities or social sciences who are taking astronomy to fill a requirement. Anyone who has ever faced a class will appreciate the enthusiasm Olson engenders in his students as they set out together to solve astronomical mysteries that can lead them to make personal contributions to knowledge. What professor wouldn't want to read student evaluations like those Olson's course yields (available at http://www.txstate.edu/honors/current/continuing/courses/course-offerings/spring-2010/hon-2380b.html), including, "This course is immensely innovative and the subject matter is fascinating." "Dr. Olson encourages his students to get involved in the material with a direct, hands-on approach. Very engaging!" "[Because of this course] I no longer am quick to take things at face value. I'll be more likely to look deeper into literature, art, and events." "My view of the sky is now tied into other elements. I always see astronomy in other disciplines now." These students may not become professional astronomers, but the tools Olson's honor course provides them will serve them in good stead in whatever careers they choose. The book, which includes numerous color plates, is also a treat for the eye and would not embarrass any coffee table on which it might happen to be placed, even if it is of normal book size.

The introductory material preceding the body of *Celestial Sleuth* explains how Olson, with his Ph.D. in relativity and cosmology, was inspired first by an English- professor colleague at Texas State and then by a history-professor colleague, formerly a Marine, to make a career out of pursuing links between astronomy and other disciplines. A Foreword by Roger Sinnott of *Sky & Telescope* also explains the genesis of the project in a 1987 unsolicited manuscript submitted to the journal by Olson. The main champion of that article, about "the phase of the Moon, ocean tides, and a famous battle of WWII," which all the editorial staff admired but didn't quite know what to do with, Sinnott has become a participant in many of the sleuthing expeditions on which Olson and colleagues have led the

students. Sinnott's Foreword alerts us to the research techniques that expedition members have used to solve complex issues, ranging from simple apparatus like a GPS, to computer programs, to old postcards purchased on the Internet.

The first of the book's three section, "Astronomy in Art," describes the underlying questions that motivate the sleuthing of the Honors College expedition members: "For projects applying astronomy to art, our Texas State group always attempts to answer four questions: Where was the location of the artist? When was the artist there? Which way was the artist looking? What objects did the artist see in the sky?" In the first chapter, about the skies in some works by Monet and Turner, we learn in a charming detail that during the Texas State expedition's August 2012 fact-finding trip to Étretat to suss out the answers to these questions regarding Monet's famous February 1883 sunset painting, they boarded at the Detective Hotel with "rooms named after famous detectives: Sherlock Holmes, Inspector Clouseau, Charlie's Angels, Columbo, and Hercule Poirot." How did the group make up for the fact that Monet painted the sunset painting in February while they had to travel in August because of university calendar restrictions? "Prior to our trip, we had corresponded with the Société Astronomique du Havre," one of whose members took photos in February, which enabled them to "calculate accurate values for the celestial and topographic coordinates of this region of the sky." The group also calculated tide levels for Étretat in February 1883, since, as Monet pointed out in a letter of mid-February of that year, "I need the Sun or the cloudy weather to coincide again with the tide, which must be low or high in accordance with my motifs." After personally watching the tides covering the beach, the expedition members figured out "exactly how high the tide had to rise to match the water level in Monet's sunset painting." They also checked weather reports for Normandy from three sources for February 1883. From computer planetarium programs, they were able to settle on a date for the sunset painting between the third and the seventh of February, 1883, but other factors ruled out every day but the fifth. For example, they knew from Monet's own words that on the third, he was not yet working on the beach where the painting is set and that on the fourth he complained that he had to lose a whole day of work to entertain his visiting brother. They also ruled out the sixth and seventh of February because of weather and tide level or both. Using "astronomical calculations, the state of the tides, Normandy weather observations, and Monet's letters," the Texas State group was able to calculate not only a date but also a precise time for the scene in *Étretat, Sunset,* namely, February 5, 1883, 4:53 p.m. local mean time."

In Chapter 2, "Vincent van Gogh and Starry Skies Over France," we learn that the Texas State Honors College group does not just travel cold to the site of the expedition's research project. Before embarking on their on-site research, the students and Olson do preparatory work at their home institution. Olson's group's van Gogh project was particularly intriguing, since it involved making the first study of the night sky in a work— *White House at Night*— rediscovered only in 1995, after having been hidden in the latter days of World War II in a storeroom at the Hermitage Museum in St. Petersburg. Olson and his students did their preparation by studying the four previously well-known van Gogh night sky paintings— *Cafe Terrace at Night, Starry Night Over the Rhone,* which depict the skies above Arles in southern France, and *Starry Night* and *Road with Cypress and Star,* which depict the skies above nearby St. Rémy. Using planetarium computer programs for France at the season and location of the work, they identified the brightest stars visible in mid-June 1890, when the newly discovered work was painted, as well as the planets prominent at that time. But to identify precisely the bright object in the "new" painting's sky, they traveled to Auvers-sur-Oise in May 2000, where, assisted by local residents, they walked by the locations of may of van Gogh's paintings, and fairly confidently identified one house as the subject of the painting. A memoir they found in local bookstores, written by Paul Gachet, a younger

contemporary of van Gogh, confirmed their identification of the house. They were able then to stand "in the exact spot where Vincent must have set up his easel." Their computer calculations for June 1890 enabled them to identify Venus appearing to the right of the house, in the western sky above it. A website providing the locations of many van Gogh paintings in Auvers-sur-Oise credits the Texas State group with identifying the bright celestial object above the white house as Venus. Before leaving France, the group also consulted weather records for June 1890, which led to the conclusion that *White House at Night* was painted about 8 p.m. local time on June 16, 1890.

In the third of the four chapters in "Astronomy in Art," devoted to astronomical skies in some works by Edvard Munch, I was impressed to learn that the research done by Olson's Texas State expedition to Oslo in May 2003 proved not only that the red skies in the iconic painting *Scream* resulted from "the blood-red afterglows" caused by the eruption of Krakatoa in 1883-84 but also that a historical marker indicating that Munch viewed the landscape for the painting from a point on the Valhallveien Road could not be accurate: "The numerous nineteenth-century maps that our Texas State group consulted at the Oslo City Museum show that this modern Valhallveien road with the horseshoe bend did not exist in the nineteenth century." Their work indicates that the actual location is a viewpoint "about 400 ft. lower in elevation and 2,000 ft. west of the historical marker." Presumably the dissemination of their results led the Oslo evening paper in 2012 to call for the removal of that incorrect marker. Another Texas State group traveled again to Norway in August 2008 in the attempt to answer questions about Munch's depiction of the sky in several other less well-known paintings.

The final chapter in the book's first section deals with Olson's celestial sleuths' attempts to figure out the dates for Ansel Adams's photographs of moonrises; the photographer himself, despite his meticulous record-keeping, "never recorded the dates for any images, even his most famous works." The preparatory work before their fact-finding trip to Yosemite included reading and verifying through their own computer planetarium programs the conclusions of *Sky & Telescope* editor Dennis di Cicco's 1991 essay dating Adams's *Moonrise, Hernandez, New Mexico*, as well as for searching the university library for early published appearances of Adams's *Moon and Half Dome*, again using their own computer programs to narrow down the possible dates for the photograph. At the park, they also made use of the Yosemite Research Library's weather observations archives, which helped them to close in on the date of December 28, 1960. A bonus for readers of the book (and of this review) is being alerted to opportunities in future years, thanks to a lunar cycle identified by ancient Greek astronomer Meton of Athens, to photograph the Moon over Yosemite just as Adams saw it. On December 29, 2017, for example, if the skies are clear, "observers in Ahwahnee Meadow will see the waxing gibbous Moon...[rising up] into the late afternoon sky...just as it did on that winter day in 1960."

History enthusiasts will find as much to fascinate them in the three chapters that make up Part II of Olson's book as art enthusiasts will find in Part I. Did you know that diverse historical events, including the first Marathon run in ancient Greece, the Boston Tea Party, Paul Revere's ride, the sinking of the *Titanic*, the disastrous amphibious Marine landing on Tarawa Atoll in the Gilbert Islands in 1943, and the D-Day invasion of Normandy in 1944, were all influenced by astronomy, specifically by moonlight and/or ocean tides? (Those interested in the derivation of idioms will be particularly interested in the discussion of "Blue Moon" in chapter 6.) Similarly, lovers of literature will be intrigued to learn, among other things discussed in Part III, "Astronomy in Literature," about Chaucer's sophisticated use of astronomical references to the Moon and unusually high tides in "The Franklin's Tale"; a

supernova that Shakespeare might have seen and his choice of Rosencrantz and Guildenstern as members of the *dramatis personae* in *Hamlet*; the effect of the Moon shining through Mary Shelley's window on her idea for *Frankenstein*; and the effects of observing meteors on such literary giants as William Blake, Walt Whitman, and James Joyce.

I have had the pleasure of hearing Don Olson lecture on a number of occasions, including his memorable Donald Osterbrock Memorial Lecture, "Van Gogh's Starry Nights, Lincoln's Moon, Shakespeare's Stars, and More: Tales of Astronomy in Art, History, and Literature," given at the American Astronomical Society meeting in January 2009, and most recently a talk at the eighth meeting of INSAP (the INSpiration of Astronomical Phenomena), held at the American Museum of Natural History in New York in the summer of 2013. Although Olson lectured there on "Astronomical Dating of Monet's Paintings on the Normandy Coast," he ended with a teaser, promising to unravel the mystery of what is going on in the sky in a famous illustration from Wilkie Collins's nineteenth-century mystery *The Woman in White.* While we can hope, therefore, that there will be a sequel to *Celestial Sleuth* in due course, I recommend that, while awaiting it patiently, members of IAU Commission 46 read the current volume.

Naomi Pasachoff
Williams College
Williamstown, MA 01267
naomi.pasachoff@williams.edu

THE SPACE BOOK: FROM THE BEGINNING TO THE END OF TIME, 250 MILESTONES IN THE HISTORY OF SPACE & ASTRONOMY

Jim Bell, *The Space Book: From the Beginning to the End of Time, 250 Milestones in the History of Space & Astronomy* (New York: Sterling, 2013). 528 pages. HB $29.95. ISBN 978-1-4027-8071-4.

Jim Bell, professor of astronomy at Arizona State University and president of the board of directors of the Planetary Society, has undertaken what he himself calls the "daunting task" of covering "the entire history of astronomy and space exploration in just 250 milestones." To attain his goal, he has divided *The Space Book* into four sections of unequal length, beginning with 24 entries in a section called Birth of the Universe, which covers the period from the Big Bang to the Arizona Impact; continuing with 118 entries in a section called Observing the Heavens, which commences with the birth of cosmology among the ancient Sumerians in about 5000 BCE and concludes with the birth of a second new field, neutrino astronomy, in 1956; 98 entries in a section devoted to the Space Age, which covers selected highlights from *Sputnik* in 1957 to the projected launch of the James Webb Space Telescope in 2018; and concluding with 10 entries in a necessarily speculative section called Our Future, which begins with the very close approach of near-Earth asteroid Apophis in 2029 without actually impacting our planet and concludes—how else?—with the "ultimate fate of the cosmos" at the end of time. Each entry is a two-page spread, with a page of text on the left and a magnificent photograph on the right. Despite his differentiation of these four discrete sections in the table of contents, within the book itself there is no separation among them, which I found to be a disadvantage in navigating through the entries.

In his introduction Bell points out that he has been mindful to include among his entries not only the contributions of individuals—whether household names or those "famous

only in textbooks"—but also of "key groups of people" in ancient times whose anonymous efforts nonetheless helped advance human understanding of the cosmos. He also points out his effort to bring to the forefront some of "the undeservedly neglected," including "a number of extremely influential female astronomers who often had to work harder than their male colleagues to overcome the biases and prejudices of a male-dominated field." He draws the reader's attention as well to the fact that his book reflects the transition from the age of anonymous and individual scientific achievements to the realm of Big Science, exemplified by projects spearheaded by the Soviet Union, NASA, the ESA, and the newly emerging scientific powerhouses of India and China.

Just as Bell correctly points out that a different author "might certainly have assembled a different set of milestones," I likewise point out that a different reviewer would almost surely be drawn to different entries than those that especially appealed to me. The last two entries in Part I caught my eye initially because of the splendid photographs that accompany them. The entry on the emergence in 200,000 BCE of *Homo sapiens* is illustrated by part of a painting of a prehistoric horse from the Lascaux caves, which I hope to visit one day. Above the horse the anonymous painter included symbols that may represent stars and constellations in the night sky. The entry on the Arizona Impact, in turn, is illustrated by a photograph of a view I also hope to see one day, of the Meteor Crater east of Flagstaff, Arizona. But beyond the photos, Bell's text opposite the cave painting reflects him at his philosophical best. He defends his decision to include the emergence of human beings "as a significant milestone in the history of astronomy" by raising the "humbling, daunting, and perhaps even. . . scary" possibility that "we are the only intelligent, self-aware, technological species. . . in all the cosmos," which should remind us to "celebrate as truly extraordinary the appearance of a species that, through its achievements, provides a way for the universe to know itself." And the entry on the great meteor crater demonstrates Bell's efforts often (though not always, a point I will return to later) to call attention to the contributions of less well-known individuals who have helped us gain knowledge about our universe. Here he introduces the names of G. K. Gilbert, Daniel Barringer, and Eugene M. Shoemaker. Though Gilbert correctly identified lunar craters as caused by meteorites, he misidentified the cause of the crater in the photograph, attributing it to a volcanic explosion. Barringer, whose name is often used instead of the noun Meteor to identify this impressive geological feature, purchased the crater in the early 20th century and fruitlessly devoted years to drilling in search of a giant iron meteorite that he believed was buried there. It was Shoemaker who finally confirmed that Meteor Crater was in fact caused by a monumental impact.

My focus on these two entries also allows me to comment on one aspect of the book I admire and one with which I find fault. On one hand, I applaud Bell's choice of dating system, which substitutes Before the Common Era, or BCE, for Before Christ, or BC, which strikes me as appropriate usage in a book of secular orientation, which recognizes the achievements of all cultures and individuals, irrespective of their religion. On the other hand, I am disappointed in Bell's index, which is so selective as to be useless, a point demonstrated by its omission of the names of Gilbert, Barringer, and Shoemaker.

Among other entries in the book to which I was drawn was one on "what may be the world's oldest computer," an ancient Greek artifact discovered in 1901 by divers off the coast of the Greek island Antikythera. Bell's description of the so-called Antikythera mechanism—the oldest known orrery, which "could be used to determine the past and future positions of the Sun, Moon, and planets in the sky, to predict eclipses, and to display the phases of the Moon"—allows him once again to reflect philosophically: "it is both humbling and jarring to

discover evidence, from a single artifact, that a civilization was far more technologically advanced than we had thought before." I had the opportunity to see a reconstruction of the this ancient analog computer—like the one in the photograph illustrating this entry—when it was on display at the Children's Museum of Manhattan in New York City from May 2006 through October 2011.

I am glad that Bell includes an entry on the Transit of Venus of 1639, in which he rightly gives credit to Jeremiah Horrocks for correcting Johannes Kepler's calculations for the orbit of Venus, allowing Horrocks not only to predict a transit for that year, which Kepler missed, but also to become the first recorded observer of a ToV. Bell asserts that "Persian astronomer Abu Ali ibn Sina observed a Venus transit in 1032," but I do not believe that has been fully proven to date. At a session at the IAU in Beijing in 2012 I heard R. C. Kapoor describe his research into the question of whether the transit was actually visible from where ibn Sina lived or whether what he saw was only a sunspot, but as far as I know, Kapoor has not yet published his conclusions.

In this 200th-year anniversary of Fraunhofer's use of the spectroscope to detect over 500 dark lines in the solar spectrum, I am pleased to find among Bell's entries one devoted to the Birth of Spectroscopy, beautifully illustrated by "A series of high-resolution visible light spectra of the Sun showing Fraunhofer lines, from the McMath-Pierce Solar Facility at Kitt Peak National Observatory in Arizona."

Bell's entry on the discovery in 1977 of the rings of Uranus also gladdens my heart. In a review in *Physics in Perspective* in 2012, I expressed my disappointment in Ray Jayawardhana for failing to credit the late MIT planetary scientist Jim Elliot with this discovery in his 2011 book, *Strange New Worlds: The Search for Alien Planets and Life Beyond Our Solar System*, which describes the discovery but omits the names of Elliot and his collaborators. Bell, however, makes clear to whom the credit belongs for detecting the faint set of narrow rings indicating that "the seventh planet had become the second known planet with rings."

Since solar eclipses past, present, and future are always on the minds of members of my household, I am glad to note that Bell includes an entry on the upcoming August 21, 2017, North American solar eclipse, urging his readers to seize the opportunity "to catch a Moon shadow." While his illustrations for this entry are unobjectionable—the path of the Moon's shadow across the US during the forthcoming eclipse, and a "dramatic photograph, taken from the Russian Mir space station, of the Moon's shadow as it raced across the Earth. . . during the August 11, 1999, total solar eclipse," I might have chosen to use a gorgeous photo of the eclipsed sun itself.

Always a cheerleader for the recognition of the achievements of the forgotten women in the history of science, I am delighted to report that Bell does a fine job in this department. English astronomer Caroline Herschel's name appears in the albeit deficient index to the book with not one but five different page numbers following it. Bell also devotes an entry to another female comet-hunter, American Maria Mitchell (a biography of whom I reviewed for this newsletter in fall 2009). In his entry of the discovery of radioactivity in 1896, Bell gives appropriate credit to Marie Sklodowska Curie: "Because of radioactivity and the pioneering work of scientists like Becquerel and the Curies, we now know with astonishing precision, that the Earth is 4.54 billion years old, and that the solar system formed 4.567 billion years ago." From among "Pickering's 'Harvard Computers,'" Bell singles out Annie Jump Cannon

for spurring the development of stellar classification and Henrietta Swan Leavitt for discovering the relation between the period and luminosity of classical Cepheid variable stars. Bell also includes Vera Rubin along with Shapley, Hubble, and Zwicky in his entry on spiral galaxies; gives credit to Jocelyn Bell for discovering the first pulsar, the work for which her thesis advisor, Antony Hewish, was awarded the Nobel prize; to Margaret Geller along with the late John Huchra for their pioneering work in galaxy-mapping; and to Carolyn Shoemaker for her collaboration with her husband and David Levy in discovering the "string of pearls" comet SL-9 and predicting it would crash into Jupiter in July 1994. While I admire what Bell has chosen to include in his coverage of women's contributions to the history of astronomy, and respect his assertion that in his effort "to balance the timeline, I may have shortchanged many deserving people, discoveries, or events from more modern times," I nonetheless regret his failure to mention Cecilia Payne Gaposchkin. Gaposchkin's discovery that hydrogen and helium are the most abundant elements in the universe spurred the development of the field of stellar atmospheres. As the first woman full professor at Harvard University's Faculty of Arts and Sciences and the first female department chair there, she became a role model for subsequent generations of aspiring women scientists.

Let me conclude this review by tying it together with my review of Don Olson's book in this issue. While neither is a traditional "coffee-table book," both books, if left on an astronomer's living room coffee table or office desk, could do much to capture the interest of students or other visitors and to entice them to learn more about the profession.

Naomi Pasachoff
Williams College
Williamstown, MA 01267
naomi.pasachoff@williams.edu

==========

MISCELLANEOUS EDUCATIONAL RESOURCES

SCIENCE IN SCHOOL: A RESOURCE FOR INTERESTING ASTRONOMY EDUCATION PROJECTS

Science in School is the European Journal for science teachers. It is published and funded by the EITO forum and freely provided to everyone who asks for it. You can register free online at www.scienceinschool.org to receive the e-newsletter or a free print subscription. The latter has limited availability.

At the aforementioned website you'll find more than 40 projects and/or articles on astronomy and space science. And there is also a section on earth science.
Each edition contains an article (for example 'How I killed Pluto' by Mike Brown), gives information on cutting-edge science, and gives some teaching activities and science education projects, and end with some science topics. Online you'll find more material (such as events and book reviews such as 'The Astronaut's Cookbook: Tales, Recipes, and More). In brief, Science in School is a very interesting and inspiring source for science teachers to bring astronomy in the classroom. It is evenly interesting for teacher trainers who can bring some of the examples in the training programme.

An example from Issue 7 (2008)

http://www.scienceinschool.org/2007/issue7/catchastar

Students Catch a Star: researching and observing a solar eclipse
Students Jan Měšťan and Jan Kotek and teacher Marek Tyle from the Gymnázium Písek in the Czech Republic won the 2007 Catch a Star *competition.* ***Sai Pathmanathan*** *describes their prize-winning project.*

But there is more. If it is an aim of the professional astronomical community (and it is) to bring more astronomy in the curriculum and into the classroom, then we should contribute to the content of the magazine. Astronomers can get involved in different ways:

- by submitting articles or reviews
- By joining the referee panel
- By translating articles for publication online (with this you can help to get local best practices from non-English speaking countries widely known
- Tell your colleagues about Science in School (as I do now).

One of the great strengths is that many of the projects go across the disciplines (biology, chemistry, ….) and these disciplines are mentioned in the description. This not only gives students insight in how concepts integrate knowledge from different fields, but also allows astronomy projects to be useful in different disciplines. Offering teachers from different disciplines an integrated project that appeals to their pupils (and space is attractive to young people) will stimulate them to use it in the classroom.

So go to the website, get inspired by what others have developed and written, and inspire others by your own contribution.

Jean-Pierre De Greve
President Commission 46
Vrije Universiteit Brussel
Brussels, Belgium
jpdgreve@vub.ac.be
==========

OBITUARIES

BARRIE W. JONES

It is with great sadness that I inform you that Barrie W. Jones, Emeritus Professor of Astronomy at The Open University, died on October 4th 2014 after a long illness. Barrie Jones was well known for his research on extrasolar planets and on publishing various popular books on astronomy. He also showed a great interest in education, investigating distance education and self-study.

He served in the IAU as Vice-President of Commission 46, Astronomy Education & Development, in the period 2003-2006.
IAU members, and especially the members of Commission 46, will remember Barrie as the tireless driving force of the Commission's Newsletter, of which he was the chief editor up till 2012, and as the caretaker of the database of the National Liaison Officers.

Jean-Pierre De Greve
President Commission 46
Vrije Universiteit Brussel
Brussels, Belgium
jpdgreve@vub.ac.be

[*Editor's Note:* News of the death of Dr. Jones reached us just prior to the publication of this newsletter. We hope to publish an extended appreciation of his life in a future edition of the Newsletter which he so ably edited for many years.]

==========

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 URLs by email for relevant websites in other areas of the world.**

WORLDWIDE

IAU Office of Astronomy for Development (OAD)	http://www.astro4dev.org/
IAU Office of Astronomy Outreach (OAO)	http://www.iau.org/public/

UK

The Association for Astronomy Education	http://www.aae.org.uk
The British Association of Planetaria	http://www.planetaria.org.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://eas.unige.ch/
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

OTHER EDUCATIONAL RESOURCE WEBSITES

Project CLEA—Research Simulations in Astrophysics
http://public.gettysburg.edu/~marschal/clea/CLEAhome.html

The Nebraska Astronomy Applet Project -----Online Labs for Introductory Level Astronomy
http://astro.unl.edu/naap/

INFORMATION THAT WILL BE FOUND ON THE IAU C46 WEBSITE

Among the information that will be contained on the IAU C46 website http://www.iaucomm46.org/ is the following

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

ORGANIZING COMMITTEE OF COMMISSION 46

President **Jean-Pierre de Greve** jpdgreve@vub.ac.be
Department of Physics, Vrije Universiteit Brussel, Pleinlaan 2
B-1050 Brussels, Belgium

Vice President **Beatriz García (Argentina)** beatriz.garcia@iteda.cnea.gov.ar
National Technological University, Mendoza, and Institute in Technologies of Detection and Astroparticles, Mendoza, Azopardo 313, 5501 Godoy Cruz, Mendoza, Argentina

Retiring President **Rosa M Ros** ros@ma4.upc.edu
Department of Applied Mathematics 4, Universitat Politecnica de Catalunya Jorgi Girona 1-3, modul 3, ES-08034 Barcelona, Spain

ORGANIZING COMMITTEE MEMBERS (2012-2015)

Roger Ferlet	(France)	ferlet@iap.fr
Michele Gerbaldi	(France)	gerbaldi@iap.fr
Edward Guinan	(USA)	edward.guinan@villanova.edu
John Hearnshaw	(New Zealand)	john.hearnshaw@canterbury.ac.nz
Laurence Marschall	(USA)	marschal@gettysburg.edu
George K. Miley	(Netherlands)	miley@strw-leidenuniv.nl
Jay M. Pasachoff	(USA)	jay.m.pasachoff@williams.edu
Rosa M Ros	(Spain)	ros@ma4.upc.edu
Magda G. Stavinschi	(Romania)	magda_stavinschi@yahoo.fr
Silvia Torres	(México)	silvia@astroscu.unam.mx

Newsletter Editor: **Larry Marschall, Department of, Gettysburg College, 300 North Washington St., Gettysburg, PA, 17325 USA, phone +1 717 337-6020, fax +1 717 337-6027**