

Communicating Astronomy

Museo de la Ciencia y el Cosmos

La Laguna

25 February–1 March, 2002

An International Conference

Organised by:

Instituto de Astrofísica de Canarias (IAC)

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Terry Mahoney (Chair, IAC)
Luis Martínez (IAC)
Monica Murphy (IAC)

Programme of talks and social events

Sunday, 24 February

19:00	Welcoming cocktail & inauguration of the art exhibition <i>Cosmic Perspectives</i>	
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Monday, 25 February

Professional journals and circulars

8:00–8:45	Registration	
8:45–8:55	Welcome by IAC Director	Francisco Sánchez
8:55–9:00	Announcements	
9:00–9:45	Information obtainable from bibliometric studies	Helmut Abt
9:45–10:15	Scientific productivity of large telescopes	C. R. Benn
10:15–10:30	Counting publications in astronomy	L. J. Corral
10:30–10:45	Bibliometry or bibliometrics: a librarian's viewpoint	Monique Gómez
10:45–11:00	Peer reviewing	Helmut Abt
11:00–11:30	COFFEE BREAK	
11:30–12:00	The peer review process in modern astronomical professional publishing	John E. Beckman
12:00–12:30	Possible threats from rapid publication	Derek McNally
12:30–13:00	The IAU Working Group on Publishing	Michelle C. Storey
13:00–15:00	LUNCH	
15:00–15:30	The Astrophysics Data System: discovery tool and literature archive	Guenther Eichhorn
15:30–16:00	Editing <i>Astronomy and Astrophysics</i>	Peter Schneider
16:00–16:30	<i>Monthly Notices of the Royal Astronomical Society</i>	TBA
16:30–17:00	COFFEE BREAK	
17:00–17:30	Pluses and minuses of electronic publishing	Gerry Gilmore
17:30–18:00	<i>PASA</i> —an electronic astronomy journal	Michelle C. Storey
18:00–18:15	The Information Circular of Commission 26 of the IAU	Josefina F. Ling

Tuesday, 26 February

Conference proceedings and academic book publishing

9:00–9:30	Editing conference proceedings	Terry Mahoney
9:30–9:45	Genre conventions in astrophysics poster presentations	Anna Fagan
9:45–10:00	Web-based submission of conference proceedings papers	Johan H. Knapen
10:00–10:30	From final draft to publication: what do astronomers need to know?	J. J. Blom
10:30–11:00	Building and maintaining book series for a learned society publisher	Tom Spicer
11:00–11:30	Astronomy textbooks	Jay M. Pasachoff
11:30–11:45	Astronomy in the Spanish pre-university educational system: the particular case of the Canary Islands	Cristina Silvia Hansen Ruiz
13:30	BUS LEAVES FOR EL PORTILLO	
14:30	LUNCH AT RESTAURANT <i>EL PORTILLO</i>	
16:00	VISIT TO TEIDE OBSERVATORY	

Wednesday, 27 February

Professional journals and circulars (continued)

9:00–9:30	Communicating Heaven and Hell: handling the impact hazard on the Net	Benny Peiser
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Conference proceedings and academic book publishing (continued)

9:30–10:00	Editing the <i>Encyclopedia of Astronomy and Astrophysics</i>	Paul Murdin
10:00–10:30	Dictionaries: what the art of the lexicographer can do for astronomy	Terry Mahoney

Educating for astronomy

10:30–11:00	The creation of distance-learning material	Barrie Jones
11:00–11:30	COFFEE BREAK	
11:30–11:45	The Contribution of students to astronomical research	Miquel Serra-Ricart
11:45–12:15	Internet astronomy: a new form of education	J. E. F. Baruch
12:15–12:45	Teaching astronomy in the modern classroom	Margarita Metaxa
12:45–14:45	LUNCH	

Popular astronomy

14:45–15:15	The human factor	Heather Couper
15:15–15:45	Outreach from research centres: a luxury or a necessity?	Luis Antonio Martínez Sáez
15:45–16:15	Eavesdropping on the Universe	J. E. F. Baruch
16:15–16:30	Communicating astronomy from the observatory: the ING experience	Javier Méndez
16:30–17:00	COFFEE BREAK	
17:00–17:30	Developing and implementing a strategic communications plan	Chales Blue
17:30–17:45	Developing the Royal Observatory Greenwich (ROG): using a heritage site to inspire interest in modern astronomy	Robert Massey
17:45–18:00	The IAC and its observatories: a natural platform for outreach	Begoña López Betancor

19:00	Video conference to celebrate 45 years of <i>Sky at Night</i>	Sir Patrick Moore, Pieter Morpurgo and Ian Russell
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Thursday, 18 February

Popular astronomy (continued)

9:00–9:30	Bridging the gaps	Richard Tresch Fienberg
9:30–9:45	Which science concepts appear in popular science magazines? How do they interrelate? A particular case: stars	Jesús Pérez Ceballos
9:45–10:15	Communicating astronomy through the Internet	Mark Kidger
10:15–10:30	The Web: a new frontier in scientific outreach	Angel Gómez Roldán
10:30–10:45	Amusing astronomy	Ignacio García de la Rosa
10:45–11:00	Astronomy in a science museum	Erik Stengler
11:00–11:30	COFFEE BREAK	
11:30–12:00	Hands-on experiments on the planets: a tour of some museum experiments	Museum staff
12:00–12:30	Outreach and the professional astronomer: a survey of attitudes	Luis Díaz vilela and Inés Rodríguez Hidalgo
12:30–12:45	Amateur astronomy in Europe	Anastasia Pappa
12:45–15:00	LUNCH	
15:00–15:30	Science or nonsense?—the role of TV graphics	Nigel Henbest
15:30–16:00	The making of <i>SPACE</i>	Richard Burke-Ward
16:00–16:30	Writing for TV	Hugh Mason
16:30–17:00	COFFEE BREAK	
17:00–17:30	<i>Time for Space</i> : five minutes a week for astronomy	Inés Rodríguez Hidalgo
17:30–17:45	Achieving mind control—how SF writers use astronomy	Sheila Crosby
20:30	CONFERENCE DINNER AT <i>TABERNA “LOS MOSQUETEROS”</i>	

Friday, 1 March

Campaigning astronomy

9:00–9:30	Communicating lost libraries	R. Elizabeth Griffin
9:30–10:00	Radio pollution—the unseen threat to astronomy	Ian Morison
10:00–10:30	Fighting light pollution in the Canaries: a success story	Javier Díaz Castro

Astronomy and the news media

10:30–10:45	An observatory's links with the media	Ian Morison
10:45–11:00	A cosmic trip: from press release to headline	Carmen del Puerto
11:00–11:30	COFFEE BREAK	
11:30–11:45	How important are scientific criterio in EPO?	Luis Cuesta
11:45–12:15	Conference summary	TBA
12:15–13:30	Round-table discussion	TBA
13:30	END OF CONFERENCE	
19:30	PUBLIC LECTURE: ET—please phone Earth!	Heather Couper and Nigel Henbest

Information Obtainable from Bibliometric Studies

Helmut A. Abt

Kitt Peak National Observatory, PO Box 26732, Tucson, AZ 85726-6732, USA

First I list the sources for bibliometric information and describe their advantages and limitations. Then six examples are given of how such information can answer questions, namely (1) How long are papers cited? (2) Do citation counts measure the importance of research? (3) Are self-citations significant? (4) At what ages do astronomers do their most important research? (5) What size ground-based optical telescopes provide the most papers and citations? (6) What factors cause high publication output? Finally some interesting statistics will be presented.

Scientific productivity of large telescopes

C. R. Benn

Isaac Newton Group, Apartado 321, E-38700 Santa Cruz de La Palma, Spain

We compared the scientific productivity of large telescopes worldwide on the basis of their contributions to (a) the 1000 most-cited astronomy papers published 1991–8 (125 from each year), and (b) the 452 astronomy papers published in *Nature* 1989–98. One- and two-metre ground-based telescopes account for approximately half as many citations as do 4 m telescopes. This strong showing by 1 m and 2 m telescopes in the 1990s augurs well for the continued scientific impact of 4 m telescopes in the era of 8 m telescopes. The impacts of the various 4 m telescopes are similar, with CFHT leading in citation counts, and WHT in *Nature* papers. The *Hubble Space Telescope* has about 15 times the citation impact of a 4 m ground-based telescope, but costs over a hundred times as much. Citation counts are proportional to counts of papers published in *Nature* but for radio telescopes, the ratio is a factor approximately 3 smaller than for optical telescopes, highlighting the danger of using either metric alone to compare the impacts of different types of telescopes. Breakdowns of the citation counts by country, subject and journal are presented.

Counting publications in astronomy

L. J. Corral

Instituto de Astrofísica de Canarias, E-38200 La Laguna, Tenerife, Spain

We present the method followed in a study of the publication history of an astronomical institute. We found that the question of how many publications have been produced is not a simple one. We present other criteria to evaluate the production efficiency and some problems found in the citation data.

Bibliometry or bibliometrics: a librarian's viewpoint

Monique Gomez

Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain

From a librarian's point of view *bibliometry*, or *bibliometrics*—defined as the application of mathematical and statistical methods to documentary materials—can be a useful tool to manage collections and respond to users' needs. We will look at some of the usual applications of bibliometry in library management.

Peer Reviewing

Helmut A. Abt

Kitt Peak National Observatory, Box 26732, Tucson, AZ 85726-6732, USA

We explore the following topics and questions: (1) is reviewing necessary? (2) is peer review the best method? (3) the two main reviewing methods, (4) goals of reviewing, (5) referees, (6) editors, (7) controversial papers and (8) should referees be identified?

The peer review process in modern astronomical professional publishing

John E. Beckman

Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain

The peer review process is the cornerstone of the system for selecting research papers for publication. Although it has been refined through the years, a number of basic features have been common to its operation in all the main journals of reference, and also nowadays in those purely electronic journals which claim academic respectability. These are: the essential anonymity of the process, alleviated to some degree by the option to reveal one's name as a referee; the nomination and selection of referees by the editors; the possibility for the authors to seek at least one second opinion, and the final say of the editor in any crucial decision. In this paper I look at the functioning of the system in current circumstances, where the pressure from non-refereed electronic publishing (notably astro-ph for astronomers) might cause a weakening of this traditional method of selection. I consider whether the system is working fairly, whether it needs to be improved or replaced, and whether it is likely to survive. I base some of my conclusions on questionnaires sent out to the editorials of a number of relevant journals.

Possible threats from rapid publication

D. McNally

17, Greenfield, Hatfield, Herts AL9 5HW, UK

It is the intent to examine the effect of rapid publication as offered by the Internet on the manner in which science may be presented in the future. Examples of impact would include the inroad into research time of secretarial and typesetting demands; the future of peer review and whether it is still necessary; the need to time-stamp publications that are updatable; the generation of area cliques; the loss of efficiency in literature survey should journals as we know them decline as the vehicle for communication of attested scientific information, etc. The Internet has much to offer scientific communication: but if allowed to grow in an unregulated it way could lead to chaos and deep inroads in the research time of active scientists. A related problem affects the popular presentation of science. The media like to set up confrontations between scientists. That may not be the best way to inform the public. The media are showing signs of using limited groups of scientists. That cuts down on breadth and gives the public little impression where real debate lies. The use of simulations—often very striking works of art in themselves—give a mistaken impression of certainty. the merging of real images into simulation is now so smooth that a health warning should be attached to scientific simulation for public information.

The IAU Working Group on Publishing

Michelle C. Storey

CSIRO Publishing, PO Box 1139, Collingwood, VIC, Australia, 3066

The International Astronomical Union Working Group on Publishing has been formed as a Working Group of the IAU Executive. The Working Group's purpose is to address the continuing need to determine how the publication of research results should evolve in the world of the Internet, preprint servers and electronic publishing. This includes such issues as investigating best practice for publishing research results, helping to ensure that the publication of research results evolves in a direction of maximum benefit to astronomy, and finding techniques to maximize the usefulness of electronic access to research results contained within publications.

In this talk I will describe past and proposed activities of the IAU Working Group, and will seek feedback and ideas on how the Working Group on Publishing can best serve astronomers' needs.

The Astrophysics Data System: discovery tool and literature archive

*Guenther Eichhorn, Alberto Accomazzi, Carolyn S. Grant, Michael J. Kurtz, Vicente Rey Bacaicoa
and Stephen S. Murray*

Harvard-Smithsonian Center for Astrophysics, 60 Garden Street, Cambridge, MA 02138, USA

The Astrophysics Data System (ADS) is the search system of choice for astronomers worldwide. The database contains almost 2.5 million records. In addition the ADS has over 1.8 million scanned article pages from about 250,000 articles, dating back as far as 1829. More than 10,000 users query the ADS more than ten times per month. The ADS is accessed from almost 100 countries. Approximately 1/3 of the use is from the USA, 1/3 from Europe, and 1/3 from the rest of the world. Usage depends primarily on the number of astronomers in each country, but also on the gross domestic product of that country. In order to improve access from different parts of the world, we maintain nine mirror sites of the ADS in Brazil, Chile, China, England, France, Germany, India, Japan and Russia. We are currently in the process of developing a stand-alone ADS system that can be updated through DVDs. This would provide access to the capabilities of the ADS from sites that do not have Internet access. The ADS is funded by NASA Grant NCC5-189.

Editing *Astronomy and Astrophysics*

Peter Schneider

Astronomy and Astrophysics Letters, Editorial Office, Institut für Astrophysik, Universität Bonn, Auf dem Hügel 71,
D-53121 Bonn, Germany

I will outline the structure of the journal *Astronomy and Astrophysics* and in particular report on experience with peer review. I will discuss the role of peer reviewed journals in the era of electronic publications.

Monthly Notices of the Royal Astronomical Society

Authors to be announced

No abstract recieved.

Pluses and Minuses of electronic publishing

Gerry Gilmore

Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge, CB3 0HA, UK

Electronic publishing has the potential to affect our scientific lives as much as e-mail affects our daily lives. The huge success of astro-ph is a case in point. Other potential advantages are speed, volume and complexity of publication, matched to the complexity and size of modern data sets and numerical calculations. Potential disadvantages are diffusion of access and knowledge, impermanence, removal of political and financial control from the scientific community, and erosion of peer review. Arbitrarily cheap and easy publishing is not necessarily an unqualified benefit; expensive and difficult publishing is certainly undesirable.

These issues will be considered by an e-editor and paper-publisher.

PASA—an Electronic Astronomy Journal

Michelle C. Storey

CSIRO Publishing, PO Box 1139 Collingwood, VIC, 3066, Australia

PASA (Publications of the Astronomical Society of Australia) is a fully refereed ISI-listed journal for original research in astronomy, focusing on areas relevant to current research in Australia. The journal is owned by the Astronomical Society of Australia and published by a non-profit publisher, CSIRO Publishing. From 2002, *PASA* will be moving to principally electronic publication. All the steps involved in producing a quality journal will be preserved, except for the final stage of printing and posting a paper copy. *PASA* is also producing a quarterly broadsheet, the *PASA Update Bulletin*, to promote the contents of *PASA* and important news on Australian astronomy. Using the *PASA Update Bulletins*, readers can be made aware of the content that *PASA* is publishing, and they can access the papers either directly, or via the NASA Astrophysics Data System.

In this presentation I will outline the background to the decision to produce an electronic-only astronomy journal and discuss the consequences. I will describe the model to be adopted for publication of *PASA*.

The Information Circular of Commission 26 of the International Astronomical Union

Josefina F. Ling and José A. Docobo

Observatorio Astronómico Ramón María Aller, Universidad de Santiago de Compostela, PO Box 197, Santiago de Compostela, Spain

We describe the history, content and form of distribution of the Information Circulars of the International Astronomical Union's Commission for Double and Multiple Stars (Commission 26), which since 1993 has been published by the Ramón María Aller Astronomical Observatory of the University of Santiago de Compostela, Spain.

Conference proceedings: some general considerations

Terry Mahoney

Scientific Editorial Service, Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain
and
Astronomical Society of the Pacific Conference Series

I give a brief overview of the work and history of the ASP Conference Series and suggest ways in which astronomers could produce improved volume manuscripts by learning the basics of book production and good editorial practices.

Genre conventions in astrophysics poster presentations

Anna Fagan

Universidad de La Laguna, Departamento de Filología Inglesa y Alemana, Campus de Guajara, E-38071 La Laguna, Tenerife, Spain

Poster presentations have become a standard feature at most conferences, and for most researchers, the poster is often their first professional written communication in their discipline. Nevertheless, it is often a genre which is neglected by both analysts and textbook writers. Until recently, in fact, posters have received scant attention in published writing guides, perhaps due to the lack of prestige of the poster presentation compared to other forms of communication, or to the lack of generalized genre conventions across the different disciplines. This presentation critically examines some of the existing guidelines on making poster presentations and also looks at the writing conventions that professional scientists use in posters in the field of astrophysics. In spite of the generalized assumption that a poster should basically follow the standard IMRAD (Introduction—Materials and methods—Results And Discussion) model, the study of astrophysics showed—*inter alia!*—that this is not necessarily the case.

Web-based submission of conference proceeding papers

Johan H. Knapen^(1,2) and Saskia Prins⁽¹⁾

⁽¹⁾Isaac Newton Group of Telescopes, Apartado 321, E-38700 Santa Cruz de la Palma

⁽²⁾University of Hertfordshire, Department of Physical Sciences, Hatfield AL10 9AB, UK

We describe a web-based submission tool which allows authors to submit conference proceedings papers. The advantage for authors is that submission is relatively easy and uses standard Unix-based software tools. The advantage for the editors of the proceedings is much more significant, in that new submissions are automatically processed. Manuscripts that cannot be processed—for example, because of LaTeX errors or incorrect file names for figures—are not accepted and must be resubmitted. We used this submission tool for the proceedings of the conference *The Central Kiloparsec of Starbursts and AGN: The La Palma Connection*, held in May 2001 on the island of La Palma (ASP Conf. Ser., vol. 249, 2001, eds. Knapen, Beckman, Shlosman and Mahoney). We give statistics on the number of papers submitted (un)successfully and on common errors made by authors. We also outline possible future improvements.

From final draft to publication: what do astronomers need to know?

J. J. Blom

Kluwer Academic Publishers, Van Godewijkstraat 30, PO Box 17, 3300 AA, Dordrecht, The Netherlands

The World Wide Web continues to offer exciting new possibilities to publish scientific information. This triggers new technology and services developed and sold by publishing companies, which in turn changes the procedures for delivering content to the publishers by authors.

Customized information packages, pay-per-view and publishing-on-demand are among the latest trends. The specific opportunities for astronomers to take advantage of these trends will be discussed.

Building and maintaining book series for a learned society publisher

Tom Spicer

Institute of Physics Publishing, 76 Portland Place, London, W1B 1NT, UK

An academic book publisher wishing to expand their activities into a new subject area will generally do so through the foundation of a new book series in that field. I will describe the various processes involved in establishing and developing a new series, including the selection of appropriate topics, the commissioning of authors and editors, the financial assessment of individual titles, the development of their content, and the marketing and promotion of the series. Particular attention will be paid to the publication process from the point of view of the author.

Astronomy textbooks

Jay M. Pasachoff^(1,2) and Naomi Pasachoff⁽²⁾

⁽¹⁾Harvard-Smithsonian Center for Astrophysics

⁽²⁾Williams College

American college and university textbooks in astronomy are largely devoted to a survey course taken by perhaps 300,000 students a year. The course is not mathematically based, and is largely descriptive. Several dozen textbooks are available for the course; each of the major ones has a new edition every three or four years. Many fewer textbooks are available with mathematical content, given the much smaller enrolments on upper levels. Further, the fairly recent habit of American students of selling their textbooks back to mass marketers of used textbooks has cut the sales of all books very substantially from their second year of issue onward, reducing the reason for publishers to print advanced textbooks, which formerly sold slowly but steadily. The textbook market is currently undergoing consolidation, with a handful of publishers each selling several astronomy textbooks by different authors. The publisher of JMP's college texts, for example, was recently sold to another publisher that already has several astronomy texts.

The oldest age at which all American students are required to take courses with astronomy content is in junior-high school, commonly in 9th grade or age 15. Biological science, earth science, and physical science is a common sequence for grades 7, 8 and 9. Astronomy content appears in both earth science and physical science courses, and we were coauthors of such texts that sold over 1 million copies per year. More recently, JMP was the author of a recent stand-alone astronomy book, one of a dozen special-topics books for a different version of junior-high science. Together, we also participated in elementary-school texts, which have some astronomy content for each grade level. See <http://www.solarcorona.com>.

Finally, we discuss the process of writing a textbook, from conception of the idea through the editorial and publication process. The process is very different at different educational levels. We also address the question of copyright, both whether the copyright must be in house name rather than author's name and whether the assignment of copyright moots the question.

Astronomy in the pre-university Spanish educational system: the particular case of the Canary Islands

Cristina Silvia Hansen Ruiz⁽¹⁾, *Jesús Pérez Ceballos*⁽¹⁾ and *Erik Stengler Larrea*^(1,2)

⁽¹⁾GICEC, Departamento de Didácticas Especiales; Universidad de La Laguna; E-38200 La Laguna, Tenerife, Spain

⁽²⁾Museo de la Ciencia y el Cosmos, E-38205 La Laguna, Tenerife, Spain

Astronomy contents appear not only in the optional subjects of astronomy but also in several of the obligatory and the other optional subjects of the pre-university Spanish educational system. Astronomy contents in the curriculum established by law are analysed: when they appear and where, and which teachers have to teach the subjects. We classify the contents in the following fields: the Sun–Earth–Moon system, the Solar System, stars, galaxies, cosmology, instrumentation, classical astronomy, the history of astronomy and physics applied to astronomy.

Astronomy contents are scattered throughout the courses and appear in very different subjects. Thus, in general, astronomy contents are not taught from a physics point of view. It is deduced that there is a lack of astronomical knowledge among the teachers appointed officially to teach those subjects.

Communicating Heaven and Hell: handling the impact hazard on the Net

Benny Peiser

Liverpool John Moores University, Henry Cotton Campus, Webster Street, Liverpool L3 ET, UK

In 1997, CCNet was set up as a scholarly e-mail network in order to disseminate and discuss pertinent issues related to NEO research and the hazards to civilization due to asteroids and comets. Since then, the Cambridge-Conference Network has grown into one of the most lively and stimulating electronic science and astronomy networks. With its 1200 subscribers from around the world, CCNet has become one of the principal outlets for accurate information, critical analysis and thought-provoking debates on all matters concerning NEOs, natural disasters and efforts to prevent future impact calamities. At the same time as dealing with cosmic hazards, catastrophic mass extinctions and historical impacts, CCNet also accentuates the progress of technological advancement which has significantly boosted the chances for better search programmes and planetary defence systems. By balancing the growing awareness of Earth's catastrophic history with the prospect of future disaster prevention, CCNet steers clear of doom-mongering and cultural pessimism.

Editing the *Encyclopedia of Astronomy and Astrophysics*

Paul Murdin

Institute of Astronomy, University of Cambridge, Madingley Road, Cambridge, CB3 0HA, UK

EAA was intended to reflect the state of astronomy today as practised by the global astronomy community. I describe the process by which *EAA* was developed and implemented, including the commercial realities. I describe the current plans for the Web version.

Dictionaries: what the art of lexicography can do for astronomy

Terry Mahoney

Scientific Editorial Service, Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain

I define a range of reference-work genres and discuss how well or poorly astronomy is served in terms of these genres. My conclusion is that most reference works in astronomy are either encyclopaedias or encyclopaedic dictionaries. I argue that there is the need for both synchronic dictionaries as defined here and for a specialized dictionary of astronomy based on historical principles. Such works, however, cannot be properly produced without a corpus of quotations from current and past literature since otherwise they would lack authority, which must be founded on a study of actual usage.

The creation of distance-learning material

Barrie W. Jones

The Open University, Walton Hall, Milton Keynes, MK7 6AA, UK

Distance learning is a significant and growing aspect of education. It is particularly applicable at tertiary level and to life-long learning. The independent study aspect of distance learning is finding increasing use on conventional campuses. There are, however, pitfalls in distance learning—it is far from a quick and easy alternative to more conventional teaching methods, as you will see.

Contribution of students to astronomical research

Miquel Serra-Ricart, Luis Bellot, David Martínez and Angel Gómez

Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain

In 1999, about 1500 high-school students all around Spain participated in the observation of the Leonid meteor storm (18 November). This activity was prepared with two main goals in mind: to involve college students in a real investigation and to gather valuable data on the shower. We will present the mail results of this project.

Internet astronomy: a new form of education

J. E. F. Baruch

Department of Cybernetics, University of Bradford, Bradford BD7-1DP, UK

The growth of light pollution in all our major cities is denying our youth access to the night sky. In the past the night sky was a source of inspiration to countless generations, and more recently an interest in astronomy and the science, maths, computing, engineering and technologies that support the astronomy has led many into careers in those subjects. Light pollution is destroying this link. Robotic telescopes offer a new way of rebuilding the link for all school students, revealing once again the joys of the night sky, and helping to bring more bright young minds into the careers that are central to economic growth.

Teaching astronomy in the modern classroom

M. Metaxa

Arsakeio School, 63 Eth.Antistaseos, 15231 Athens, Greece

In this paper we will discuss why astronomy education in schools is important and the inevitable problems teachers face while they teach it in the schools. But what will science classrooms be like in the coming years and what role will astronomy play? How will teachers help all students to acquire skills, reasoning abilities, knowledge and attitudes that help them function in the 21st century? This paper puts forward ideas that will make the classroom a more exciting place in which to learn and apply astronomy.

The human factor

Heather Couper

Freelance writer and TV presenter

Are we communicating astronomy in the right way? Bear in mind the following: last year, the average British adult spent 99 hours watching soaps on television. The bestseller lists of books are dominated by tell-all biographies and celeb cookery books. Starry magazines like *Hello* and *OK* have never been so popular.

The conclusion is obvious: people are basically interested in people. Whether it's a hankering after a celebrity lifestyle, or wanting a furtive glimpse into the troubled existence of the cast of *Eastenders*, it's the human factor that turns people on.

In this talk, I argue that if we're really going to get astronomy across—through books, magazines, TV or radio—we need to involve human stories and personalities in a way that has never been done before.

Outreach from research centres: a luxury or a necessity?

Luis Antonio Martínez Sáez

Instituto de Astrofísica de Canarias, E-38205 La Laguna, Tenerife, Spain

It is a well-known and much discussed issue that science and technology do not figure in the cultural background of our citizens. Phrases such as “The two cultures”, or the dawning of a “third culture”, introduced by P. C. Snow and J. Brockman, well express what happens in societies such as ours, in which Culture is exclusively identified with humanities-based disciplines such as literature, philosophy or art.

This distinction has serious consequences for scientific knowledge. It is hardly to be expected that a society that is culturally alienated from science and technology will give its wholehearted backing to scientific investigation. Neither will its entrepreneurs feel particularly disposed towards developing their own technological capacity rather than simply “buying it in” so as to promote innovation and become more competitive.

When we seek to identify the root of these ills in order to remedy them, we often encounter a lack of national strategic planning for the popularization of science; we also detect an imbalance in the planning of middle education, or criticise the public media for their inability to report scientific and technological advances adequately.

But the world of research, and scientists themselves in general, must also take part of the blame for the cultural rift. To this purpose, this communication offers some reflections on the underlying reasons why research centres and individual investigators must learn to adopt an attitude that encourages the publicizing of the work they do, thereby furthering the means whereby society may become aware of the value of the science produced in such centres.

Eavesdropping on the Universe

J. E. F. Baruch

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Astronomy is an accessible subject. The questions that drive astronomy forward are in many cases easily understood by the lay public; what is the age of the Universe? Where did the Earth come from? What is there in space? Why does the axis of a spinning top always point in the same direction? The public are also able to understand the research links that help to generate answers to these questions. Observing programmes at the largest telescopes collect data which in many cases provide “yes” and “no” answers to these questions based on the brightness of a set of images or the presence or otherwise of a spectral line. The answer comes as the data build up in the control room of the telescope. This paper presents a proposal for enabling the public to eavesdrop on these events and partake in the thrills of astronomy.

Communicating astronomy from the observatory: the ING experience

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The Isaac Newton Group of Telescopes (ING) operates the 4.2 m William Herschel Telescope, the 2.5 m Isaac Newton Telescope and the 1.0 m Jacobus Kapteyn Telescope on behalf of the Particle Physics and Astronomy Research Council (PPARC) of the United Kingdom, the Netherlands Organization for Scientific Research (NWO) of the Netherlands, and the Instituto de Astrofísica de Canarias (IAC) in Spain. The ING is located at the Roque de Los Muchachos Observatory, La Palma, Spain. In this poster we show the strategy and the activities we have followed in order to reach our public relations objectives in the most efficient way. This is also a good example of how astronomy can be disseminated directly from the telescope.

Developing and Implementing a Strategic Communications Plan

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The National Radio Astronomy Observatory (NRAO) is undertaking a multifaceted education and public outreach programme to communicate the value of astronomy and the results of NRAO research to the media, the scientific community, and the general public. Within this framework, NRAO works through three principal programme areas: media relations, observatory visitor centres and educational programmes.

Balancing finite resources with multiple opportunities, NRAO—like many other research organizations—is faced with the need to approach outreach strategically. By clearly defining goals, target audiences, and desired outcomes, NRAO focuses on those objectives and strategies that best meet its capabilities and unique strengths. To enhance and unify these efforts, NRAO is developing overarching themes and messages to convey the coordinated nature of its communications plan.

Bringing the results of astronomical research (radio, optical, etc.) to the public and capturing media attention, however, will require:

1. Addressing the changing needs of the US and international media;
2. Competing for grant funds with other educational institutions; and
3. Developing and implementing strong marketing schemes to attract site visitors.

Developing the Royal Observatory Greenwich (ROG): using a heritage site to inspire interest in modern astronomy

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This paper reflects on the development and successes of outreach and education programmes at the ROG as part of its new role as a centre for public understanding of science. In particular the modernization of the antique 28 inch refractor as a public facility is assessed including its incorporation in the cutting-edge UK National Schools' Observatory project.

The IAC and its observatories: a natural platform for outreach

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One of the IAC's aims as a research centre is the popularization of science. Among the different ways to accomplish this goal is the open days and visitors' programme for the IAC's observatories and facilities. Soon after its official opening in 1985, the IAC started organizing guided tours at the Teide Observatory (Tenerife), which attracted the attention of the general public not only to its impressive instruments but also to the science carried out with them. This was the beginning of a long journey of scientific outreach that has taken us, among many other activities, to develop a complete programme of guided tours and open days at both IAC's observatories, i.e. the Teide Observatory (Tenerife) and the Roque de los Muchachos Observatory (La Palma). In this way, not only tourists but school and university groups, amateur astronomers, and—particularly since 1999—TV and cinema production companies that capitalize on the easy access to IAC's state-of-the-art scientific and technological facilities meet the challenge of the public's increasing thirst for scientific knowledge.

Bridging the gaps

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Is *Sky & Telescope (S&T)* a research journal or a popular magazine? Are its readers professional astrophysicists, amateur astronomers, or interested members of the general public? Do *S&T*'s editors have education and training in astronomy or in writing and publishing? Who writes for *S&T*: science journalists, astrophysicists, or backyard astronomers? Are the articles mainly about the science or the hobby? Who decides what gets printed and what doesn't: the editor or the publisher? Is the wall between editorial and advertising made of brick or bamboo?

The answer to all these questions is the same: yes! Publishing the world's leading astronomy magazine means learning to balance the competing interests of diverse constituencies with different needs and desires. Here's a look at how we do it, month after month, and how we plan to keep on doing it as both astronomy and publishing are transformed by the Internet and other new technologies.

Which science concepts appear in popular science magazines? How do they relate? A particular case: stars

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We present a method of analysis of the content of written language developed by the Research Group on Concepts in Science Teaching—GICEC—of the University of La Laguna. The method uses the Program of Frequency and Surroundings Analysis—PAFE—developed by the group. The analysis employs simple statistical techniques, incorporating procedures that involve language unit (generally word) counts. These procedures lead to specific word frequencies, connections between words, etc.

As an example of the technique, a study on the astronomy subject “stars” in different popular science magazines is shown. The importance of the subject in these publications is discussed. We demonstrate the scientific concepts which appear in the articles, as well as their connections, which give us an idea of the conceptual structure of the author. We show results obtained from analysing the subject of “stars” in different popular Spanish science magazines. When comparing the structures of different authors we try to check the existence of a common structure and to identify the most important concepts.

Communicating astronomy through the Internet

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Over the last few years the Internet has opened up as a new and powerful way of communicating astronomy to a wider public. The author has written a monthly column on comets and meteors for the Spanish magazine *Tribuna de Astronomía y Universo* since December 1986 and has regularly used data submitted by readers both to illustrate the column and for detailed analysis of phenomena. With the widespread use of the Internet among amateur astronomers around the world reader participation can be taken a lot further. A mailing list has been set up to coordinate amateur observations of comets and asteroids in Spain, which has been linked to a website where astronomers can see their latest results. The participation in this list is now more than 70 astronomers in at least six countries with several thousand messages being distributed through the list in its first six months of operation.

Through the facilities offered by the mailing list and website amateur data has been used in conferences and is being used extensively professionally. The comets mailing list has spawned a Hispanic meteors mailing list too. This offers a possible model for collaborations between professional and amateur astronomers in the future in other fields of astronomy.

The Web: a new frontier in science outreach

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What do we mean by popularizing science? In a nutshell, we could answer that it involves making the public aware of scientific concepts and phenomena. One of the tools to obtain these objectives is the Web, which is characterized, among other things, by its dynamism and interactivity. The Scientific and Cultural Association Shelios, whose main targets are the promotion and organization of scientific expeditions and the diffusion of science, particularly through the Web, has used this medium in recent years for scientific outreach, two examples of which appear in this communication:

1. *La Ruta del Sol (The Route of the Sun) Contests:* Orientated especially to everybody interested in astronomy and total solar eclipses, these interactive contests on the Web offered the possibility of making a parallel virtual route to the Shelios expeditions to Turkey 1999 and Zimbabwe (2001), in which the participant, through test-style questions that were renewed every few days, progressed through stages based on his or her knowledge. More than 1000 people participated in both editions.
2. *Live transmission of astronomical phenomena:* Using the Web, and with the collaboration of Terra-Lycos, we broadcast during one full hour the total solar eclipse of 2001 June 21 from Zimbabwe, this spectacle being followed by more than 200,000 people simultaneously. The video of the eclipse was accompanied of commentaries and interviews with the astronomers on the expedition.

Amusing astronomy

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One of the challenges facing communicators is to make the rigours of astronomy as a science compatible with amusement. Science centres are good laboratories to test this mixture, since they try to combine good science with a leisure-time atmosphere. Several approaches are examined ranging from the most serious to the most amusing. The experience of the Museo de la Ciencia y el Cosmos (Tenerife) in the communication of astronomy is presented, with emphasis being given to a new exhibition, *The Cosmic Tourist*, to be opened later this year. Three locations of our Solar System are recreated to “immerse” visitors in the study of the planetary sciences.

Astronomy in a science museum

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Astronomy is encountered by the visitor to a science centre in many different ways. Typical of these are planetarium sessions and a visit to a telescope where one is available. But there are other ways astronomy can be communicated in such an environment. Some examples are shown from the experience and future plans of the Museo de la Ciencia y el Cosmos of La Laguna.

Outreach and the professional astronomer: a survey of attitudes

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A questionnaire about attitudes of professional astronomers concerning outreach has been answered by a number of colleagues working at the Instituto de Astrofísica de Canarias. The role of outreach in the work of a researcher, the actual time and effort devoted to outreach, the valuation of popularization activities, either socially, economically or in the curriculum, and opinions concerning who should have the responsibility for organizing and performing outreach tasks are some of the questions that figured in the questionnaire. A statistical analysis of the results is presented.

Amateur astronomy in Europe

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I give an overview of amateur astronomy in Europe. In particular I will present information such as the number of amateur astronomers, societies, the kind of observations amateur astronomers undertake, publications, etc.

Finally I will show some examples of the contribution of amateur astronomers to astronomical discoveries.

Science or nonsense?—the role of TV graphics

Nigel Henbest

Pioneer Productions

As a science, astronomy is unparalleled in raising public interest; yet it is one of the most notoriously difficult for TV programme-makers. The most exciting topics in the Cosmos are often impossible to film—for example extrasolar planets, black holes, alien life and the Big Bang.

To portray such concepts, Pioneer Productions has consistently broken new ground in TV graphics, in shows such as *Black Holes*, *On Jupiter*, *Universe* and—most recently—*Edge of the Universe*.

To what extent, though, can these spectacular graphics be justified scientifically? In a controversial area, is it legitimate to show only one interpretation? And in a depiction that must perforce be more impressionistic than precise, for example the Big Bang, does a TV graphic take us too far from the real science?

The making of *SPACE*

Richard Burke-Ward

Freelance TV producer and writer

A one-hour TV documentary contains a maximum of five ideas. Any interviews in the programme will be cut down to less than three minutes. Astronomers need the media, the media need astronomers—but both parties have different expectations, and often both end up disappointed. Astronomers feel the media belittle their science, the media feel that astronomers are unable to communicate it adequately. Scientists present fine detail, but journalists want the “big picture”. This talk uses the BBC's hugely successful TV series *SPACE* to discuss how astronomers can harness the power of the media—without either party being disappointed with the result.

Writing for TV

Hugh Mason

Narrateo Limited

Everything you wanted to know about film making but were too embarrassed to ask: How is a documentary is made? Who are the people behind the camera? How is a script developed from an initial idea to a full script? What could be the participation of astronomers and astronomy writers? What should astronomers involved in TV know about rights? How much should you ask to be paid?

Time for Space: five minutes a week for astronomy

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Time for Space is a radio section devoted to outreach of astronomy and astrophysics, written and presented by the author. It is included in the programme *Canarias innova* (Innovation in the Canary Islands), which went on air for the first time on 2000 July 2 and can be listened to every Sunday on various frequencies of RNE (National Radio of Spain) in the Canary Islands. The programme, addressed to all lovers of science and technology, especially in this archipelago, is organized around a central topic, interviewing several experts. It also includes scientific and technological news of the week, reports, ephemerides, stories about science for children, contests for listeners, my section, etc. The initiative came from the Technology Transfer Unit (OTRI) of the Instituto de Astrofísica de Canarias (IAC), with the collaboration of RNE (see <http://www.iac.es/otri/>).

When I proposed those five minutes a week, my aim was to spread astronomical knowledge, transmitting basic concepts, fundamental theories, historical references, recent advances, biographies of important astronomers, etc. The section is aimed at the non-specialist public, so I try to adopt an entertaining tone, a style half way between relaxed and literary, according to the topic, and deliberately non-technical language, except for some unavoidable names and concepts, with many examples from everyday life.

In this contribution I explain the choice of the title and analyse the peculiarities of radio: the lack of time, the need for illustrating with words, of precisely limiting the contents, of making each section practically self-explanatory, given that part of the audience may be listening in casually. The choice of topics and the thinking up of titles is discussed. Finally, I give a short list of maxims for radio popularizers.

Acheiving Mind Control - How SF writers use astronomy

Sheila Crosby

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My mission in life is to make you miss your train and burn your lunch. In order to do that I need a stting that feels real, and the best way to do that is by using as much real science as possible. Not only does this avoid the sort of howler that makes readers throw the book in the dustbin, but it also creates the sort of details that make the story world come alive.

Communicating Lost Libraries

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Libraries of papers communicate ideas, hypotheses, theories and results. In parallel, libraries of data communicate the facts upon which the proofs of the theories rest. Just as ideas and information evolve and combine to build more sturdy edifices, so data—accruing and accumulating—combine to present the fuller story to confront the theory.

Unfortunately, inadequate attention has been paid to maintaining the compatibility of astronomy's inherited data libraries in line with the demands of modern research. The recent tendency to close photographic plate libraries and to write off their century-long data records as unuseable overlooks the uniqueness of the resource, and ignores the potential of such a library for modern variability studies. Measures are now being pursued to encourage the rescue of the information recorded in such observations before they become merely a Lost Library.

Radio pollution—the unseen threat to radio astronomy.

Ian Morison

Jodrell Bank Observatory

This paper looks at the growing threat posed by radio interference to observations made to study the radio Universe. Mobile telephony, personal computers which radiate in key area of the radio spectrum, and satellite communication systems are all posing a threat to viewing the Universe across the radio spectrum. One problem is that all transmitters radiate beyond their allocated frequencies and can thus spread into nominally protected bands. These levels are controlled to very low levels but still vastly exceed the incredibly weak signals from space. Examples will be given to highlight the problems we face. Thankfully, the technology that is enabling such interference to increase with time is also giving us the ability to reduce its impact on radio astronomy and the paper will end with a look at some of the techniques now being developed to contain this increasing threat.

Fighting light pollution in the Canaries: a success story

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The Sky Quality Protection Law for the Protection of the IAC's Observatories (*Ley 31/88 sobre Protección de la Calidad Astronómica de los Observatorios del IAC*) was passed in 1988 and has become known as the Law of the Canarian Skies. In 1992 the Regulations setting down the application of the sky law were approved and the IAC's Sky Protection Unit (OTPC) was created. Starting from this year, various activities have been carried out by the Unit with a view to limiting the light-contamination impact of existing lighting facilities. In this talk we describe the procedures, public-awareness campaigns, technical solutions and consequences of the application of the regulations since 1992.

An observatory's links with the media

Ian Morison

Jodrell Bank Observatory

This paper outlines the ways in which the Jodrell Bank Observatory has striven to improve its links with the media in an attempt to increase its public profile over the past few years. It will look at the preparation of press releases and the factors which must be considered to give them impact to first attract the eye of journalists and then provide them with appropriate material to make it easy for them to produce a good story. This will hopefully lead to coverage in the press, radio and sometimes by television and the ways to handle this will be discussed. The importance of building good relationships with the local press and radio will be stressed, and how scientists should be available to provide informed comment on stories in their area of expertise when requested—often at very short notice!

A cosmic trip: from press release to headline

Carmen del Puerto

Jefa de Ediciones del Instituto de Astrofísica de Canarias, E-38200 La Laguna, Tenerife, Spain

Falling into a black hole is one of the best-described horrors in science fiction literature. Whoever falls into a black hole and survives to tell the tale can resurface in some other part of space and at another moment in time. But one day astronomers discovered that black holes aren't merely fantasy, and that the peculiar physics concerning these astronomical bodies were of great scientific interest. This interest has been echoed in the news media, where there are frequent reports of the confirmation, or otherwise, of the existence of black holes. Investigators at the Instituto de Astrofísica de Canarias (IAC) have figured prominently on various occasions in discoveries concerning these mysterious objects in the Universe, and their work has been reported in major international journals such as *Nature* and *Science*.

In this talk, the circumstances surrounding the announcement of these researchers concerning black holes are described, together with other astronomical highlights from the IAC. The preparation of press releases by the IAC—occasionally in time to fill in important questions of detail in the press releases of scientific journals—is described and their effect on the media (press, radio and television) are analysed. Also dealt with is the question of how the IAC is currently handling the news requirements of audiovisual media. Images and animations are presented that have been expressly designed to illustrate each news item. Finally, particular emphasis is given to the diffusion and supply of documentation, both written and graphical, via Internet, a fundamental tool for any research centre aspiring to become a useful source of scientific information for the news media.

How important are scientific criteria in EPO?

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It is not possible to understand today's society without taking into account technical and scientific advances. Many topics of current interest are related with science; i.e. political decisions have important implications for scientific knowledge. In this situation, a scientifically literate public is essential, so science must reach out to society.

However, science is sometimes very hard to understand, with a complicated message and difficult language. This results in a distancing of science from society and its consequent rejection by the public. Moreover, communication between journalists and scientists is not always as good as it might be. Scientists occasionally use complicated words that confuse journalists. Also, most of the time science news reports are headline driven rather than based on scientific criteria.

A balance is necessary between the excessive rigour that scientists would impose on the one hand and journalistic sensationalism resting on scientifically unimportant details on the other. While the journalist understands how to get the public's attention with a news report, the scientist knows what is and isn't science.

The possibility of meeting these opposing criteria is discussed with reference to the creation of the post of scientific advisor in research centres as a fundamental element in the development of a harmonious relationship between science and journalism. In particular, I describe the position of Scientific Advisor at the Communication Department of the Instituto de Astrofísica de Canarias and outline the main problems of this job.

Posters

N.B.: This section is incomplete since many authors who stated a wish to present posters have not sent in their abstracts.

Astronomy in popular science magazines published in Spain

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We present an analysis of the astronomy content in popular science magazines—which subjects, how they are laid out, etc. Astronomy contents are classified into the following fields: the Sun–Earth–Moon system, the Solar System, stars, galaxies, cosmology, instrumentation, classical astronomy, the history of astronomy, physics applied to astronomy., astrology and extraterrestrial life. Astronomy popularization is evaluated in comparison with other science subjects. A comparison between the astronomy contents in different popular science magazines in the same period is presented.

Astronomy in the textbooks used by Spanish educational centres: the particular case of the Canary Islands

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The analysis of textbooks is important in a country where teachers often use the educational proposal of publishers. Taking in account the astronomy contents in the curriculum established by law, we analyse the astronomy contents of textbooks in the corresponding subjects. Discrepancies between the curriculum established by law and publishers' proposals are shown.

Monitoring the 0–2 GHz spectrum: a high-school radio-science awareness project

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A project to raise awareness of radio astronomy, radio-science and the importance of the radio-frequency (RF) spectrum will be run in several Australian high schools in 2002 and 2003. Students from city and country high schools will measure 0–2 GHz RF signal levels in their area and compare results via the Internet. Their data will give the students an appreciation of the requirements of a “radio-quiet” site for the Square Kilometre Array radio telescope, and may be used in the site selection process. Thus high-school students will have the opportunity to use “real” radio-science equipment in a project of international significance. Outcomes for the students will include an increased understanding of the value and use of the radio spectrum for communication and astronomy and practical experience in radio-science. It may also inspire some students to consider careers in this area.

