CAP journal
issue 7|November 2009
Communicating Astronomy with the Public

Live from Space
Video Blogging the Hubble Servicing Mission 4

Ten Commandments for Presentations
Golden Rules to Enhance Your Talks

Touring the Cosmos
A Guide to Free Astronomy Software

www.capjournal.org

Colophon

Published by
IAU DIVISION XII Commission 55: Communicating Astronomy with the Public

Sponsored by
ESA/ST-ECF and ESO

CAPjournal
Communicating Astronomy with the Public Journal
ESO ePOD
Karl-Schwarzschild-Strasse 2
85748 Garching bei München
Germany

E-mail:
editor@capjournal.org

Website:
www.capjournal.org

Phone: +49 89 320 06 195
Fax: +49 89 320 2362

ISSNs
1996-5621 (Print)
1996-563X (Web)

Contents

Editorial 3

Explained in 60 Seconds 4

Astronomy and the Media 5

Video Blogging the Hubble Servicing Mission 4 7

On the Journey From Earth to the Universe 9

Towards a Global Baseline for Astronomy Development 13

Ten Commandments for Presentations 18

Touring the Cosmos through Your Computer 26

Tafelmusik's The Galileo Project 30

Social Astronomy 30

How Can We Make a Friend Out of an Enemy? 30

Visualising Astronomy: Invisible — Impacts and Rings 33

Cover: A close-up of astronaut John Grunsfeld showing the reflection of astronaut Andrew Feustel, perched on the robotic arm and taking the photo. The pair teamed up together on three of the five spacewalks during the NASA/ESA Huble Space Telescope Servicing Mission 4 in May 2009. Credit: NASA

Editorial

In astronomy communication we often use the word astronomy as a blanket term to cover anything that has to do with space, i.e. astrophysics, space exploration, space sciences, human space flight, Earth observation, astrobiology, amateur astronomy and all related sciences and technologies. And if there is a single astronomy project that touches on all of these, that project is the NASA/ESA Hubble Space Telescope.

Hubble has been an astronomical powerhouse for the last two decades. Its discoveries have captured the imaginations of scientists and citizens alike, and have regularly thrust Hubble into the limelight. Hubble images are appreciated for their aesthetic appeal as well as for their illustrative power: they convey the beauty of the Universe, even to those who are too young to understand their context or implications.

In May this year, tuning in across the whole media spectrum, including television, blogs, newspapers, magazines, tweets and Facebook, the world followed the smooth, precise and professional movements of the astronauts as they carried out a flawless servicing mission. The Hubble Servicing Mission 4 (SM4) brought Hubble back to full performance level and we are all eagerly waiting to hear about the latest discoveries to come out of the revived Hubble.

In this issue, Ray Villard, a veteran communicator at the Space Telescope Science Institute describes his excitement at communicating SM4 in an innovative way: as a series of webcast programmes that take us behind the scenes of the technologically demanding and challenging Hubble Space Telescope repair mission.

Also in this issue, Tijana Prodanovic gives us ten golden rules to enhance presentations; our regular contributor, Matthew McCool, guides us through the jungle of free astronomy software available and Henri Boffin and Diane Scherzler share their feelings about the love-hate relationship between astronomers and the media.

Between issues you can stay in touch through our website, www.capjournal.org, where you will find the current issues in PDF format, an astronomy communication and education job bank, submission guidelines and back issues.

We also welcome astronomy and science communication events (conferences, meetings, etc.), training opportunities, job postings or courses offered. If you have astronomy and science communication-themed products such as books, DVDs, television programmes, magazines or websites that you would like to see reviewed by the CAPjournal editorial team, simply send the necessary information to: editor@capjournal.org. This is also where to send any questions, comments or opinions.

Happy reading,

Pedro Russo
Editor-in-Chief

Explained in 60 Seconds: The End of the Sun

Best Practices

Key Words

Written communication
Case study

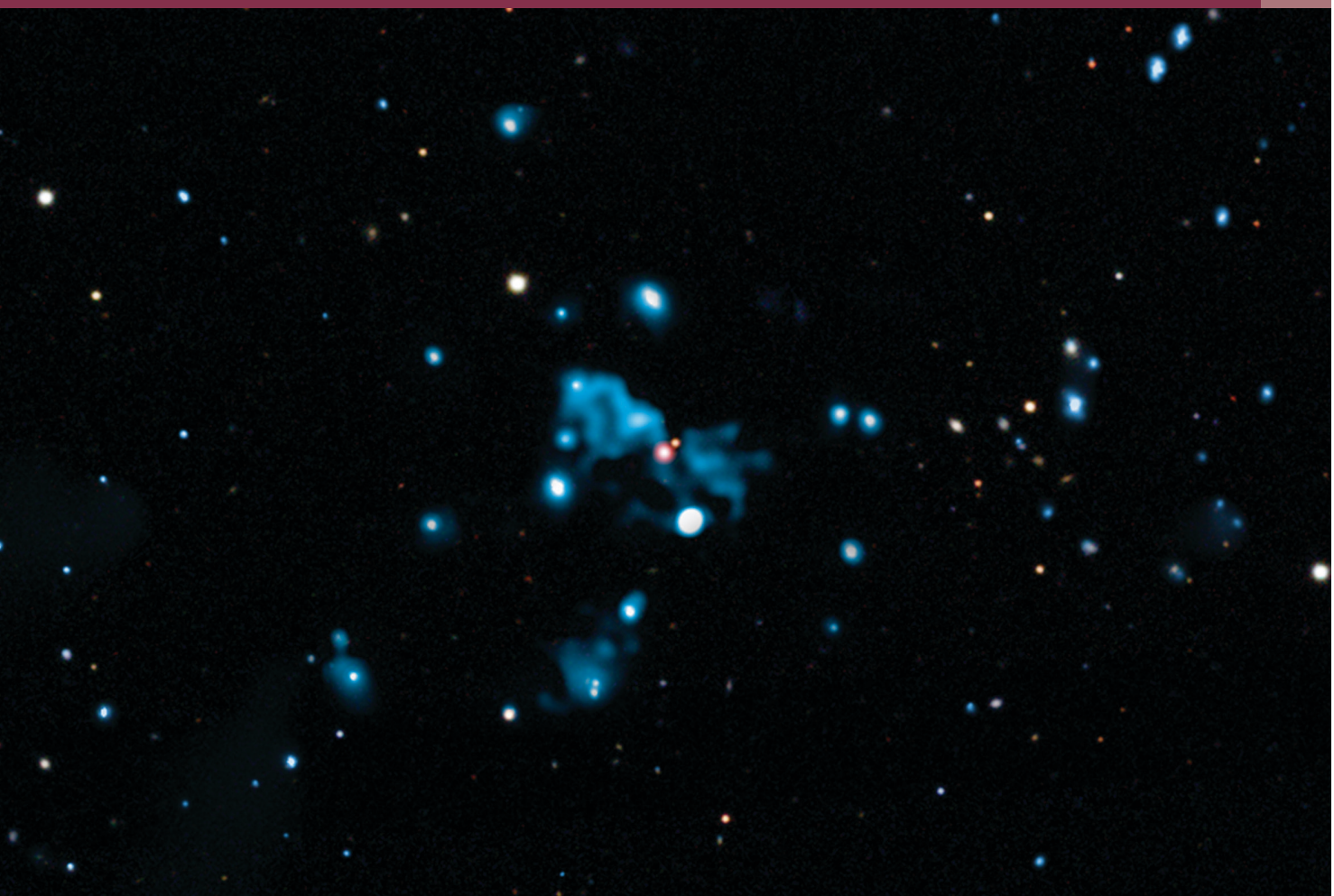
Our Sun is a star, a ball of gas just like the thousands of other twinkling pin-pricks of light in the night sky. Stars have finite lifespans, so eventually they "die". Our Sun has enough fuel to be a regular star for ten billion years. It's about halfway through that at the moment, in what we call the main sequence. This is when nuclear fusion converts hydrogen into helium. Each second the Sun turns four million tonnes of material into energy. No wonder it's so hot and bright!

In five billion years the hydrogen will be used up and the Sun will become a red giant — bad news for the Earth, which is destined to be boiled and engulfed. Eventually the Sun's outer layers will be cast off, becoming a beautiful nebula. The core will be left as a white dwarf, slowly cooling over an eternity. A peaceful end for our nearest star.

Lee Pullen
IAU/IYA2009

News

This is a composite image showing a small region of the Chandra Deep Field North. The diffuse blue object near the centre of the image is believed to be a cosmic "ghost" generated by a huge eruption from a supermassive black hole in a distant galaxy. The blue is a deep image from the Chandra X-ray Observatory, and in red is an image from the Multi-Element Radio Linked Interferometer Network (MERLIN), an array of radio telescopes based in the United Kingdom. An optical image from the Sloan Digital Sky Survey (SDSS) is shown in white, yellow and orange. Credit: X-ray (NASA/CXC/IoA/A.Fabian et al.); Optical (SDSS), Radio (STFC/JBO/MERLIN).



Astronomy and the Media[1]

Henri Boffin
ESO education and Public Outreach Department
E-mail: hboffin@eso.org

Key Words

Media relations
Journalists

In astronomy, as in other scientific or societal fields, communication is too important to be overlooked by any organisation. Public research organisations in particular should be accountable to the public for the tax money they spend. This is only possible if the public is informed about the work of the organisation. Communication is even more crucial when trying to secure additional funding for new projects. As one scientist said, perhaps a little bit too provocatively, *"the one percent spent on outreach brings the other 99 percent needed to get the project done"*. This may well be an overstatement, but the general principle is clear. Good communication is also a vital channel for maintaining the necessary excellent relations with local communities — some of the large astronomical observatories know a great deal about this. Communication is also essential for astronomy to fulfil a fundamental need in modern society: attracting bright youngsters to scientific careers. Although young people are increasingly moving away from science, there is a great need for future scientists. And even if young people don't become scientists, it is important that they are exposed to science as a whole: as adults, they won't be able to avoid relying on science in their daily life, and they will have to take decisions with a scientific dimension.

For all these reasons, the communication strategy of research organisations addresses various target groups: the general public, scientists, policy-makers, educators and industry. But with limited resources, one needs amplifying outlets to reach a significant fraction of the targeted audiences. It is impossible to prepare all kinds of communication material, with different emphases, at all levels of complexity, and in all languages, so communicators have to rely on excellent amplifiers. Media outlets are an example. Not only are journalists trained to adapt the material to their public, who they know very well, but it is well known that the public are informed about science primarily through these channels. The 2007 Eurobarometer on "Scientific research in the media" (Eurobarometer, 2007) shows, for example, that 61% of respondents in the European Union are informed about science by watching television programmes, 49% by reading science articles in general newspapers and magazines, 28% through the internet, 26% by listening to radio, and 22% by buying specialised press products. Similar numbers are observed in the US. Obviously, the media are an important channel for communicating science. However, there are *caveats*. Firstly, science on TV represents at most 2% of all news shown and, secondly, studies have revealed that only a quarter of all adults can read and understand the stories in the science sections of quality newspapers.

The crucial question is nevertheless whether the media are indeed an efficient channel for communicating astronomy. This is clearly a difficult question, and one which can be answered in several ways. Before

briefly attempting to do so, let me make a general remark. As discussed above and in various studies, there is no doubt that the media play a very important role by raising *public awareness* about science and its results, but it is doubtful how much the media are really able to *teach* science to the wide public. This is by no means an easy task. In their study of the public understanding of scientific terms and concepts, the US National Science Foundation (2004) found that less than 15% of people understand the term "molecule" while less than 50% know that the Earth goes around the Sun once a year! So any attempt to talk about topics such as gamma-ray bursts, redshifts, galaxies or interferometry faces formidable challenges. Scientists and science communicators must set realistic goals when interacting with the media and the public, and recognise that other activities are required to transform curiosity into knowledge, such as the internet, public events, science centres and so on. A nice example of a programme that tried to exploit several avenues was the Venus Transit Programme (Boffin & West, 2004; 2005). Other examples have been successfully organised in the framework of the International Year of Astronomy 2009.

Coming back to our main question, at first sight there are many reasons to be optimistic and to think that astronomy and the media have a love affair. For example, the online science section in *The New York Times* has two specific subsections, one on environment and the other on space & cosmos! Similarly, the British magazine *New Scientist* has a fairly successful specific space section, and one should not forget that the BBC's *Sky at Night* programme is the longest running television series, on air since 1957 (although no longer at prime time, but very late in the evening). Here again there is an important *caveat*, which is that often space and astronomical news are put together, but their share is far from equal. The NSF 2008 study, *Science and Technology, Attitudes and Understanding*, reveals that the NASA Space Shuttle programme has taken a very large share of all science-related news in 2005 and 2006, but this is of course not astronomy as such.

Another important unfortunate aspect is the general tendency for the media to cut down on science coverage. As a journalist from the French newspaper *Le Monde* told me, of the ten journalists working for the science section in 1998, only four are still in place ten years later. The others had all been moved to other sections.

Does astronomy sell?

In order to try to be a little bit more quantitative, I looked at the US magazine *Time*. Since 1948, astronomy has been featured on the cover no less than 12 times. That is, about once every five years or so. The covers encompass a wide spectrum of the hottest astronomical discoveries:

4 September 2006: How the stars were born (dawn of the Universe)
25 June 2001: How the Universe will end (dark energy)
5 February 1996: Is anybody out there? (exoplanets)
23 May 1994: Cosmic crash (Comet Shoemaker-Levy 9 and Jupiter)
16 April 1990: Smash! (colossal colliders are unlocking the secrets of the Universe)
23 March 1987: Bang! (Supernova SN 1987A)
16 December 1985: Skywatch (Comet Halley's return)
24 November 1980: Saturn, encounter in space (*Voyager* visit to Saturn)
20 October 1980: Showman of science (astronomer Carl Sagan)
27 December 1976: Stars, where life begins (exobiology)
11 March 1966: Astronomer Maarten Schmidt (quasars — exploring the edge of the Universe)
9 February 1948: Astronomer Hubble (expanding universe)

Twelve astronomy covers would be a nice result *per se*, especially when, by comparison, biology had only four covers in the same period, and chemistry only nine (mostly before 1965!). However, looking at other academic fields, things start to be less satisfactory. History was featured 24 times, and the environment took the front seat 90 times. The overall winner is medicine, which was featured on 248 covers. This is 20 times more frequently than astronomy! The same trend can be seen in the number of articles dealing with the various topics that appear in the magazine. In the 598 articles found by the search engine on the *Time* archive website, astronomy comes well behind most other scientific topics. Archaeology, biology, chemistry, physics, and the environment all do better, with, respectively, 1031, 1503, 2240, 2290 and 7764 articles. And again, medicine is the great winner with no less than 11 814 articles, almost 20 times as many as those devoted to astronomy!

This superficial study clearly illustrates that, while the media do not hesitate to talk about the greatest discoveries in astronomy, it is far from being the greatest hit. Is there any logic behind this? Given what I stated above, that journalists know their readers, I would assume so.

Looking back at another Eurobarometer — from 2005 this time — it is interesting to see that when asked "which science and technology developments are you most interested in?", astronomy only takes the 6th place, with 23% of respondents choosing it. People are more interested in economics and social sciences (24%), the internet (29%), humanities (30%), the environment (47%), and… medicine (61%). There is thus clearly the same logic here, although one could invoke the ubiquitous "chicken and egg problem" as a reason for this situation. Are journalists providing stories on subjects that are most interesting to people or are people interested in the stories reported by the journalists? As always, the truth must lie in the middle, but it is perhaps not such a surprise that what interests the majority of people is their health. A cause for optimism can be found however in the fact that the comparison between the 2001 and 2005 Eurobarometer surveys reveals an increase of 6% over four years in the percentage of people interested in astronomy. Let us hope that the International Year of Astronomy 2009, with its wide spectrum of amazing activities, will lead to a continuation of this trend.

References

- Boffin, H. & West, R. 2004, The Messenger, 116, 39
- Boffin, H. & West, R. 2005, in *IAU Commission 55: Communicating Astronomy with the Public 2005*, Robson I. & Christensen L. L. (eds), 266
- Eurobarometer 2005, *Special Eurobarometer on Europeans, Science and Technology*
- Eurobarometer 2007, *Scientific research in the media*
- NSF Science and Engineering Indicators 2004, National Science Board, Chapter 7, *Science and Technology: Public Attitudes and Understanding*

Notes

[1] This is a partial account of a presentation given at the IAU Symposium 260, *The Role of Astronomy in Society and Culture*, which was held at UNESCO, Paris, in January 2009.

Biography

Henri Boffin holds a PhD in astronomy and an MSc in science journalism. He joined the ESO education and Public Outreach department in 2003 and he is now the Public Information Officer for the Very Large Telescope, La Silla and the European Extremely Large Telescope, and still continues research whenever possible.

Video Blogging the Hubble Servicing Mission 4

Best Practices

Ray Villard
Space Telescope Science Institute
E-mail: villard@stsci.edu

Key Words

Audiovisuals and multimedia
New media
Case study

Summary

"Access Hubble Special Edition SM4" was a groundbreaking reality-TV event for NASA productions: a low-budget, fast-response product that took advantage of universal broadband access. The unscripted series of programmes caught the never-before-seen drama behind the technologically intensive and challenging Hubble Space Telescope repair mission.

Introduction

Space shuttle servicing missions to the Hubble Space Telescope always look very tidy on NASA-TV. The mission controllers at the Johnson Space Center (JSC) in Houston, Texas, all sit at blue control consoles in business wear. It's all button-down shirts and ties.

But in 2002 I found that there is a flipside to the servicing missions that isn't broadcast. Ann Jenkins, a colleague from NASA's Goddard Space Flight Center (GSFC) escorted me into the top security Payload Operations Control Center (POCC), where high-tech engineers and scientists from GSFC were packed in to oversee the upgrades and repairs on the pre-eminent space observatory on servicing mission SM3B. I discovered that they are definitely not a button-down crowd. They work hard, play hard and are openly passionate about what they are undertaking. When things go well, the POCC has a party atmosphere. When things go bad, jaws tighten, eyes tear up, and you can hear a mouse squeak.

I've always wanted to document the high-tech, backstage drama that unfolds during a servicing mission, which is one of the most unique space activities NASA has undertaken in its 51-year lifetime.

The opportunity came with the last scheduled Hubble-servicing shuttle flight, STS-125, in May 2009. In the years after 2002, the internet exploded with webcasting, YouTube, video blogs and social networking. The medium was there for the kind of project I envisioned.

The plan was to make a "reality TV" style daily report of the mission action behind the formal NASA video feed. The series was to be posted on the Space Telescope Science Institute (STScI) HubbleSite website[1]. We had a robust site planned among the education, news, and online outreach departments at STScI, with blogs,

Figure 1. Website for showcasing the "Access Hubble" for viewing and download. Credit: NASA/STScI

mission background material and children's activities.

We produced the video component with a small and nimble crew: video producer Mary Estacion and freelance videographer Vic Blandburg. Back at STScI our video engineer and our webmasters provided support for postproduction and posting of the daily three-to-six-minute reports. Animator Greg Bacon and science illustrator Ann Feild teamed up to make a stylish

Figure 2. Video producer Mary Estacion on location at the STS-125 launch site. Credit: NASA/STScI

opening "signature" graphic for the series that animated the mission patch. The programme title — a take-off on the show *Access Hollywood* — was "Access Hubble SM4"[2].

To pull off the programme we had to have access to the inner sanctum of the huge and windowless Mission Control Center (MCC) in Houston. I wasn't sure if the gambit would pay off. Would the Hubble engineers and scientists become combative at the sight of a camera crew? Would project officials insist on reviewing the broadcast before it was aired? Or worse, would they insist that certain individuals be profiled on camera?

Our approach therefore was definitely "guerrilla video". That is, a low-budget, fast response product that took advantage of universal broadband access and free video services for distribution. I had full confidence we could capture a great story this way if all the players could simply ignore the camera and let us record the unfolding drama without a long and formal review of the product.

Kennedy Space Center — launch!

On 10 May our crew headed for Florida's Kennedy Space Center (KSC) with no script and no story outline. We were simply looking for vignettes that captured the preparations for the launch of STS-125. The opening shot for the series had Mary standing in front of the iconic Vertical Assembly Building (VAB), built during the Project Apollo days.

With launch a day away, we used the opportunity to take a press bus out to within half a mile of the shuttle launch pad and record a story about photographers setting up remote cameras. The close proximity to the space shuttle allowed for dramatic shots. We'd never get this close to *Atlantis* again. My crew then high-tailed it back to Cocoa Beach to a Hubble Space Telescope (HST) public fair event that offered an opportunity for man-on-the-street interviews, and to informally introduce some project personnel that we'd see in later instalments.

Launch day caught the building excitement and tension with vignettes of the astronauts boarding the van to go to the launch pad, and spectators at the VIP viewing site on the Banana River, three miles from the launch pad. The opening scene to this segment has Mary driving by handwritten launch parking signs along the rural road to KSC and exclaiming: *"Today is the day!"*

Flight days unfold in Houston

After launch, the space shuttle *Atlantis* began its Hubble chase around the globe, and we hopped on a plane to Houston. There were no Hubble Access stories that day. In the third instalment on 13 May, Mary did a stand-up introduction in front of the JSC entry sign as I drove around the block because there is no street parking! Then we spent the next four hours trying to get proper security badging, which we thought had been all arranged after weeks of phone calls and e-mails to NASA.

Things got very dicey when JSC's security chief seemed indecisive about whether our crew could enter the high security MCC. I began to fear that despite our best efforts we'd be locked out, as was a producer from PBS's *Nova* series, who was left to stand in the MCC lobby and film interviews for the five days of spacewalks. Our web programme would be a flop if we were so cut off from the centre of the action.

Thankfully, JSC Public Affairs officials arranged for one of their staff escort us to the POCC and stay there with us for eight hours of shooting each day. Our arrival at the MCC was razor-thin timing. As we headed through the MCC labyrinth of corridors, we could hear applause as the shuttle was grappling HST. We missed it, but caught the engineers' excitement when Hubble was berthed in the shuttle cargo bay for five days of spacewalks.

Spacewalks start

At first the GSFC team didn't know what to make of our video crew. We had decided to be as non-intrusive as possible. My bringing along Ann Jenkins, our senior science writer, as liaison boosted our acceptance. She had formerly worked with the GSFC team, so if we were Ann's companions we must be OK!

It also helped that the crew was small and Mary, who was the on-camera talent and interviewer as well, was affable. Her enthusiasm for the mission was infectious. Over the course of five spacewalks the video crew was treated as part of the GSFC team.

Some of the best footage came from the first spacewalk on 14 May because things went sour quickly. An over-torqued bolt on the Wide Field Camera 2 would not come loose. If the bolt had broken, the Wide Field Camera 3 would not have been swapped out with WFPC2, and the new camera would have come back down to Earth as a 130-million-dollar museum piece!

The video captures the high anxiety on the engineers' faces. The best piece of footage was when the GSFC HST Project Scientist clasped his head with both hands in a show of relief when the stubborn bolt finally came loose. *"This took five years off of my life,"* he later said on the video segment.

Over successive spacewalks there was a rhythm of tension, triumph and fun as the repair drama unfolded. The most endearing shots that gave the programmes a cadence were comic relief vignettes when engineers decide to munch on Cheese Snack crackers, Start Smart breakfast cereal, and specially made "berthing brownies". There were great mini-tutorials where GSFC engineers did show and tell sessions with duplicate Hubble hardware they had in the POCC, such as replacement thermal insulation panels.

After the first couple days we realised that the project was bigger than anticipated. We'd start at 6 am for spacewalks. We'd finish videotaping by mid-afternoon. Editing would go on well into the evening, and the hours overnight would be spent uploading HD files to STScI in Baltimore. Sometimes postproduction was needed and our video engineer Ed Weibe would splice in spacewalk footage. Then there was the automated but still gruelling task of converting the finished piece into 12 different formats for the internet. By noon the following day each video had been posted. In hindsight this was more work than one producer could handle, though Mary held up remarkably well over the five exhaustive days of spacewalks.

The climactic "money shot" we all anticipated in the series was the teary goodbye in the POCC when HST was deployed back into orbit. It would be like watching a child go off to college, never to return.

Figure 3. Video editing required long hours at the JSC newsroom. Credit: NASA/STScI

We anticipated this moment for days. But much to our surprise and distress, it never came. The shuttle could not downlink live video because the *X*-band antenna was needed to do double duty as a radar antenna for measuring shuttle and HST separation distances. Safety, not showbiz, came first. This infuriated an ABC-TV news producer at JSC who was planning to carry the video live on *Good Morning America*. So there were a few tears, but the most dramatic moment never happened. The final video we shot at JSC was the celebratory sheet cake. We thought this would wrap up the series.

But the growing question in the back of my mind was whether we should change our plans and go back to KSC and cover the landing. At first it didn't seen as intimate as the material we had captured at JSC. We'd simply be standing with the rest of the press videotaping the *Atlantis* touchdown. We had no special behind-the-scenes access. Then our STScI director, Matt Mountain, weighed in and thought it looked bad — especially in the post-*Columbia* era — to imply mission success without showing the astronauts landing safely.

Mary and I headed back to KSC to capture the landing. This became our own version of the 1993 film *Groundhog Day* — where a TV weatherman awakes to repeat the activities on a day that infinitely repeats itself. With all of Florida covered by a tropical depression, we headed to the soggy KSC press site on three consecutive mornings to see if the weather would clear up enough for the shuttle *Atlantis* to land.

The video footage for these days involved watching a lot of weather radar, talking to media photographers and KSC veteran meteorologists. The impending landing was all the buzz in stores and restaurants along Cocoa Beach. We even tried for an impromptu interview with a Waffle House cook — but his company policies forbade talking to news media! On the third try, on 24 May, *Atlantis* was diverted to Edwards Air Force Base in California. We closed out the series with a great interview with the NASA astrophysics chief, Ed Weiler, who declared the mission a success. The series closed with Mary standing back again in from of the VAB. This was a nice visual and narrative wrap to the series.

A Critical Success

The "Access Hubble SM4" video series received wide appeal on our SM4 website. Viewership surged to 14 000. NASA-TV producers took note, and began running the Hubble Access segments as part of their daily Video File news feeds. NASA also added it to their Hubble portal website. The series made its way to YouTube where all segments earned a five-star rating. This project was groundbreaking for NASA productions. It was uniquely engaging and unscripted, and caught a never-before-seen drama behind the complex technological space ballet of repairing Hubble.

To our delight, the video captured the diversity of the scientists and engineers on the Hubble team. There were many young women engineers and a variety of ethnic backgrounds represented. The team was fun-loving and came across as everyday people. This broke all stereotypes of the bespectacled, introverted, humourless scientist as commonly portrayed in many science fiction films (one of the worst, most grotesque caricatures was Dr Okun played by Bret Spiner in the 1996 space invasion film *Independence Day*). More importantly, these engineers are passionate about their work and feel like the luckiest people on Earth to be part of the Hubble project.

Young adults can watch this series and decide that, unlike the film stereotypes, "normal" everyday people can be scientists and engineers. They can be munching on Cheese Snacks one minute and analysing a space telescope's electronic heartbeat the next.

The success of "Access Hubble SM4" reminds me of one of my favourite childhood stories, *Stone Soup*, where French soldiers entice townspeople into giving them food for a huge kettle filled with nothing but water cooked in the town square. The story is a lesson in cooperation where people at first might first feel apprehensive about participating.

The Access Hubble team came to KSC and JSC wanting to tell a story that had never been told in this way before. Busy scientists and engineers graciously put their time aside to let us share their once-in-lifetime adventure with the rest of the world. They brought life to the event with a range of emotions, from fun and playfulness to fear and tears.

This is the last scheduled Hubble Servicing mission, and we are all delighted to have had an opportunity to capture a unique event in America's space exploration history, and hopefully help inspire a new generation of space explorers.

Notes

[1] http://hubblesite.org

[2] http://hubblesite.org/servicing_mission_4/access_hubble_sm4.php

Biography

Ray Villard is News Director for the Space Telescope Science Institute in Baltimore Maryland. For the past 35 years he has communicated astronomy to the public through popular articles, planetarium programmes and public seminars and courses. A 22-year veteran of the Hubble Space Telescope Project, he has received several NASA service awards for his contribution. His latest book, *Infinite Worlds* (published by University of California Press), is an illustrated survey of extrasolar planets.

On the Journey From Earth to the Universe

Kimberly Kowal Arcand
Chandra X-ray Center/SAO
E-mail: kkowal@cfa.harvard.edu

Megan Watzke
Chandra X-ray Center/SAO
E-mail: mwatzke@cfa.harvard.edu

Key Words

International Year of Astronomy 2009
IYA2009 Cornerstone project
Image exhibition
From Earth to the Universe

Summary

The From Earth to the Universe (FETTU) project is a worldwide effort to bring the striking beauty and intriguing science of astronomy to the public. By showcasing some of the best images from the fleet of space-based observatories and wide array of telescopes (and astrophotographers) on the ground, FETTU strives to engage as many people as possible in the wonders of the Universe. As one of the 12 global Cornerstone projects being supported by International Year of Astronomy 2009, FETTU is, in fact, reaching its goals halfway through IYA2009. Over 60 countries in more than 250 separate exhibitions are participating in FETTU. From tiny villages to the largest cities — with budgets large and small — FETTU has been featured on every continent except Antarctica.

Since we have framed this project — largely by way of the title — as a journey, we decided to take a tour of the destinations that we have already visited, take stock of our experiences and look at where FETTU might go in the future.

Getting started

Like most trips into the unknown, this one required a fair amount of research, a lot of work, and then untold numbers of dead ends, restarts and decisions made on the go. In 2007, we agreed to head the IYA2009 Task Group on image exhibitions. Over several months, we came up with the basic structure for FETTU: a collection of beautiful astronomical images that would be made electronically available to anyone in the world who agreed to display the images in a public setting for the benefit of communicating astronomy.

The rationale behind the FETTU project was based on the premise that the inherent beauty of astronomical images could lead to a deeper experience of science. In fact, informal education and outreach through projects such as physical exhibits is recognised as a successful tool for learners of all ages and increases interest in science, technology, engineering, and mathematics in both children and adults[1].

We placed a "call for participation" to both the professional astronomy and astrophotography communities through a variety of outlets. Hundreds of images were submitted and some 125 were chosen using many criteria — from the feasibility of printing large sizes and at high resolution, to the observatory used, the type of object, and more.

One of the most important characteristics of the FETTU project — as in many successful travel adventures — turned out to be flexibility. For example, the FETTU concept dictated that there were to be no restrictions on how the exhibits were to be physically displayed as long as it was in the spirit of IYA2009. We encouraged those preparing the exhibits — who we dubbed "local organisers" — to use whatever monetary resources, venue options, cultural preferences, etc., to create the FETTU exhibit that worked best for their area.

Another aspect of travel is the opportunity to meet new people along the way. In the case of FETTU, there have been many companions and friends who have helped make the journey so successful. With a couple of long-time friends already lined up to help, (Lars Lindberg Christensen and Pedro Russo, to name just two), FETTU quickly tagged up with Gary Evans of the Science Photo Library in the UK.

Gary became an important partner in the early part of FETTU's journey. Employing much resourcefulness, Gary worked to produce a FETTU prototype of approximately

50 images on three-metre-long panels that appeared overlooking the water on Albert Dock in Liverpool, UK, from 7–28 June 2008 (see Figure 1). This successful exhibit helped to demonstrate that the concept and the actual production of FETTU were possible.

"Approximately 50% of the people walking along the dock stopped to look at the pictures and about one in six looked at the caption," said Evans. *"We witnessed children discussing the images with their parents, couples pointing out interesting features to each other, real interaction taking place, and it was just what we hoped to see."*

Figure 1. June 2008 — Liverpool, UK, From Earth to the Universe at the Albert Docks. Heavy foot traffic meant many people stopped to look at the images. The brightest and more visually "loud" images attracted the most attention. Credit: FETTU/IYA2009

On the way

With the success of the Liverpool prototype, FETTU was ready. In the autumn of 2008, we opened the www.fromearthtothe universe.org website, which has been attracting approximately 3000 to 5000 visits each month. We advertised the project through the International Astronomical Union, American Astronomical Society (AAS), and other organisations in the hopes of attracting local organisers — who received no financial support from us — to take on the task of creating FETTU in their area.

To date, the response has been outstanding. As of July 2009, there have been or are planned to be over 250 separate FETTU exhibitions in more than 60 countries (on every continent except Antarctica). Figure 2 shows the locations of the 250 FETTU exhibits and the boxes on these pages collect a few randomly selected FETTU impressions.

In the United States, NASA funded two semi-permanent exhibits in the international airports at Chicago and Atlanta, as well as a 50-image travelling version (see

Iran

FETTU locations overall: Qeshm Island, Pasabandar Harbor, Khoy, Shiraz, Tehran

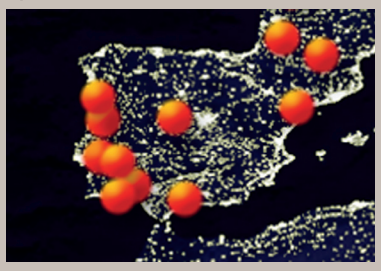
Qeshm Island, Persian Gulf, Iran

"When we saw the excited and wondering faces of people as they saw the beauties of our Universe or when they heard about the huge distances, it was the biggest success for all of us. Especially since we are exhibiting the photos in border regions where there is not much education and most of the inhabitants are poor people, the joy and the smiles that filled their faces when they saw the photos and colours and their huge size was really a big success...

In countries like Iran we don't have access to photos of space telescopes or big ground-based observatories, and opportunities such as FETTU help us to bring astronomy and science more effectively to the public. Photo exhibitions are a good tool to teach people astronomy and make them interested in science."

Irene Shivaei, co-founder of the StarPeace organisation

Spain



FETTU locations overall: Andalucia, Seville, Malaga, Madrid, Granada

Malaga, Spain

"We got one of the FETTU platinum exhibits placed at the Malaga main train station, with one and a half million visitors in one month. And we are about to inaugurate one more platinum exhibition at the Alhambra, the most visited monument in Spain.

It could be expected that people just passing by at train stations would remain quite indifferent to this kind of exhibition, but the reactions were absolutely to the contrary. The impressive images, the size and appeal of the LED-back-illuminated panels, made people stop, read... and even take notes!"

David Galadi-Enriquez, director of public outreach of the Calar Alto Observatory

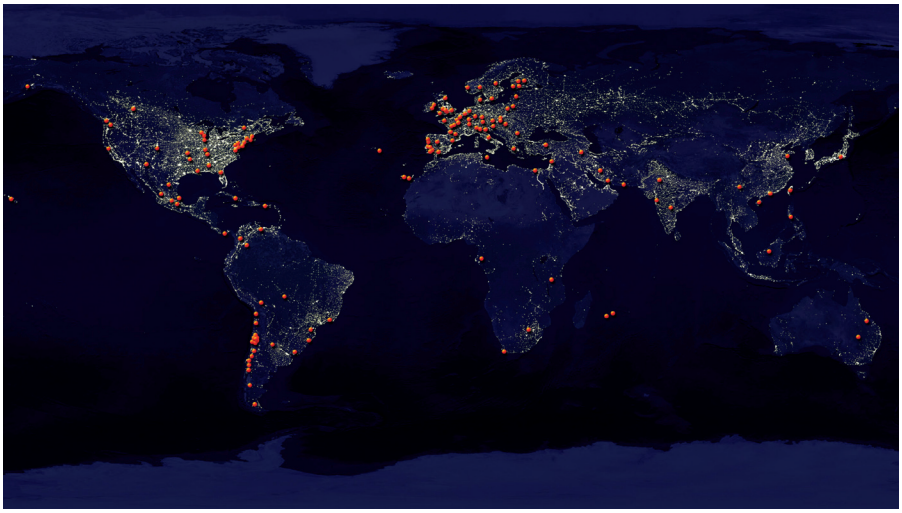


Figure 2. Locations of FETTU exhibits worldwide. Over 60 countries in more than 250 separate exhibitions are participating in FETTU. Credit: FETTU/IYA2009



Figure 3. FETTU travelling exhibits in the United States. Left: outside the Smithsonian's Air and Space Museum in Washington DC, July 2009. Middle: FETTU was part of the World Science Festival's family activities in Washington Square Park, NYC, June 2009. Right: Tactile exhibit unveiled at the Martin Luther King, Jr. Library in Washington, DC, July 2009. Credit: FETTU/IYA2009

Figure 3) that will visit several of the country's largest cities, and a tactile and Braille subset of special image stands that are being provided to the blind and visually-impaired communities.

The wide range of FETTU exhibits has truly reflected the diversity of the communities and countries in which it has landed. From public parks to airports to art festivals to shopping malls to even prisons, FETTU has found its way into incredibly exciting places[2].

Suffice it to say, FETTU would not have happened if it were not for those mentioned in this article and hundreds of others — from the local organisers, to the participating observatories, and everyone in between — who employed creativity and passion to bring the wonders of the cosmos to everyday people (see example stories in the insets).

Where to next?

Even though we still have several months to go in this year, plans are now being considered for what to do beyond IYA2009. There will be literally thousands of large-format astronomical images that have been created for FETTU. It would be a waste for them to go into storage, or, even worse, be discarded.

We are discussing ideas to develop a means for an informal "FETTU swap" where a location that perhaps could not raise the funds for production might be able to get panels from somewhere else where the exhibit has concluded for the cost of shipping. We are hoping to find funds to make this possible before FETTUs around the world begin to be dismantled.

To sum up, the journey for FETTU has been great so far, but it's not done yet. We hope FETTU travels as widely as possible during IYA2009, but our intentions are to extend the project far beyond this year. After all, a journey around the world doesn't seem so difficult when compared with going from the Earth to the Universe.

USA

FETTU US locations overall: Atlanta, Georgia; Chicago, Illinois; Anchorage, Alaska; Memphis, Tennessee; Washington, DC; Bay Area, California; Madison, Wisconsin; and many others

Madison, Wisconsin, USA

"A recurring theme [for the FETTU exhibits] is that the images make it easy for people to stretch their imagination and put words to questions that they've either wondered about before but had trouble articulating or never realised that they could wonder about before coming across a particular image...

Another constant with each showing is witnessing children teaching their parents as well as parents sharing knowledge with their children."

Laura Trouille, University of Wisconsin graduate student in physics and astronomy




Figure 4. FETTU on display in Shanghai, China (upper left), Coimbra, Portugal (upper right), Geneva, Switzerland (lower left), and Mendoza, Argentina (lower right). Credit: FETTU/IYA2009

Notes

[1] National Academy of Sciences, *Learning Science in Informal Environments: People, Places, and Pursuits*, 2009

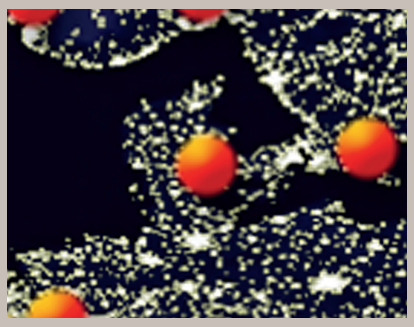
[2] See http://www.fromearthtotheuniverse.org/table_events.php for a full list.

Biographies

Kimberly Arcand is the visualisation & media production coordinator for NASA's Chandra X-ray Observatory. Along with Megan Watzke, she is co-chair for the IYA2009 From Earth to the Universe Task Group.

Megan Watzke is the press officer for NASA's Chandra X-ray Observatory. Both she and Kim Arcand are based at the Chandra X-ray Center at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., USA.

Denmark



FETTU locations overall: 20 public places in major cities, including Copenhagen

Copenhagen, Denmark

"The city of Copenhagen bought their own copy of the exhibition and this is now touring the schools of Copenhagen. I guesstimate that by the end of the year more than 100 000 people (2% of the Danish population) will have seen the exhibition.

Most people are amazed about the fantastic images. Personally, I've been surprised about the wide audience who are fascinated by the exhibition: small kids with their grandparents, drunks in the street, ministers... In this way we reach a lot of people — and make an impact as far as I can judge — with a rather modest effort. In particular, I appreciate that exhibitions like this can be located in places where people normally do not expect to see astronomy and hence reach people who would not actively seek information about astronomy."

Kristian Pedersen, astronomer at the Niels Bohr Institute/Copenhagen University

Towards a Global Baseline for Astronomy Development

Lolan Naicker
South African Astronomical Observatory
E-mail: ln@saao.ac.za

Kevin Govender
South African Astronomical Observatory
E-mail: kg@saao.ac.za

Key Words

Global astronomy survey
Astronomy development

Summary

Astronomy is a field that has captured the minds of human beings for as long as we have been on the planet. Called by various names, the greatest strength that astronomy brings to just about every culture is the innate ability to stimulate curiosity. As a tool for inspiring minds about the wonders of science, there are few fields that are as accessible or familiar. However, the fact that astronomy is part of so many cultures does not necessarily translate into curious minds.

Introduction

In many developing countries there is a traditional or cultural awareness of the skies but general scientific astronomical knowledge amongst the public is low. This lack of scientific knowledge could be a result of poor media attention and a lack of education in the field. Without public understanding or astronomy-literate students, the situation translates into a lack of professional skill in the area of astronomy related sciences. When talking about the development of a field — in this case, astronomy — one has to consider development amongst all these target groups.

The Global Astronomy Survey (GAS)[1], conducted as part the Developing Astronomy Globally (DAG) Cornerstone project and carried out across developing countries, serves as a means of identifying a country's strengths and weaknesses, a basis on which to develop improvement plans, and a baseline with which to measure change.

Aims

I. To obtain a baseline, i.e. to know what each country has already achieved, what it is presently capable of, given its resources, and what its ambitions are.

II. To provide a basis for the creation of regional structures that will allow astronomy activities to be co-ordinated regionally.

III. To allow more effective planning of activities and projects that would help in the development of astronomy at all levels in a country.

IV. To measure improvement in the level of astronomy related activities over time.

Overview

The survey allows a country to self-evaluate and give itself a status in each of the following areas:

- Professional (Research) Astronomy: This will assess tertiary education, research training and research infrastructure in order to address professional astronomy research capacity within the country.
- Public Understanding of Astronomy: This will assess the level of activities and events that stimulate an interest in astronomy among the general public.
- Astronomy in Schools: This will assess primary and secondary education. It will address astronomy in the classroom and gauge the exposure to mathematics and science amongst young people.

The status of a country is classified according to four "phases" of development:

- Phase 1 countries would be *well established* countries with links to the International Astronomical Union (IAU) and functioning astronomy research and outreach communities.
- Phase 2 countries would have existing astronomy research and outreach communities but remain *in need of support* in order to get astronomy well established.
- Phase 3 countries would have a non-existent astronomy community but show *strong potential* in the form of physics or mathematics research and outreach communities who are willing to drive the development of astronomy.
- Phase 4 countries would have a non-existent astronomy community and would have *limited potential* for the development of such a community, i.e. no research or outreach communities.

Table 1. Recommended development plan based on phase overviews.

	Phase 1 countries (Well established)	Phase 2 countries (In need of support)	Phase 3 countries (Non-existent with strong potential)	Phase 4 countries (Non-existent with limited potential)
Professional development	– Use as regional hub	– Link with IAU network – Student/researcher exchange programmes co-ordinated by regional hubs	– Provide guidance on student and research opportunities internationally (with clause to return to home country) – Combine with IAU Commission 46's TAD/ISYA/ WWDA programmes	– High-level discussions with government department of Science and Education – Explore astronomy status in neighbouring countries and likelihood of collaborations
Development of public understanding of astronomy	– Use as regional hub	– Provide training for local "champions" – Feed public info and stories to champions regularly – Link with relevant Cornerstones (e.g. 100 Hours)	– Training workshop on Communicating Astronomy to the Public (involve IAU Commission 46) – Link with activities of region – Provide resources for public outreach	– High level discussions with government departments of Science and Education – Explore astronomy status in neighbouring countries and likelihood of collaborations
School-level education and development	– Use as regional hub	– Provide training for local "champions" – Provide education resources and networks (link with Galileo Teacher Training and UNAWE Cornerstone-projects for IYA)	– Training workshops on "astronomy in the classroom" – Link with activities of region – Provide educational resources – Introduction of astronomy into the school curriculum	– High level discussions with government departments of Science and Education – Explore astronomy status in neighbouring countries and likelihood of collaborations

So, the higher the phase number, the more a country is "in need" of assistance.

The survey is used to plan education and public outreach activities more effectively by structuring the overall plan in line with the phase overviews as shown in Table 1.

Progress

Forty complete country surveys have been received, as of mid-IYA2009. Geographically, the response is given in Figure 1.

Figure 1. Survey response geographical distribution. Light coloured markers show eight countries that have submitted incomplete or unapproved surveys. Credit: DAG/IYA2009/Google Maps

The classification of professional, public and school development into phases is shown in Figures 2, 3 and 4.

Considerations

The GAS is an insider's view of the level of astronomy in three key areas and as such it contains answers that are factual, but may be incomplete and possibly represent the opinions of only a small group within a country. The survey is completed by the Single Point of Contact (SPoC) for

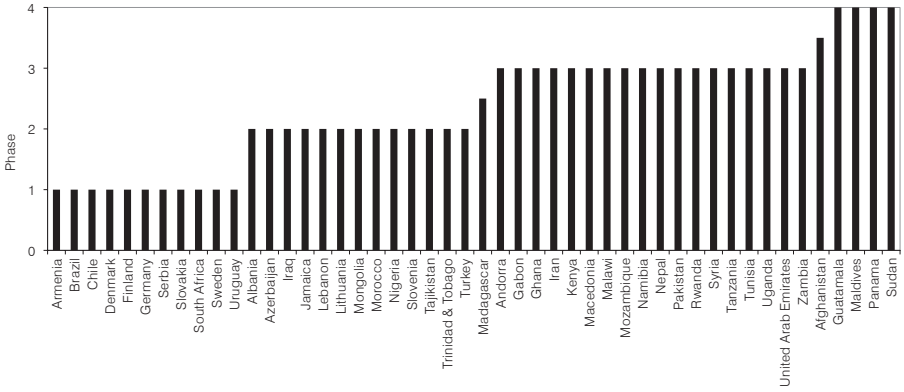


Figure 2. Ranked phases in the area of Professional (Research) Astronomy. Credit: DAG/IYA2009

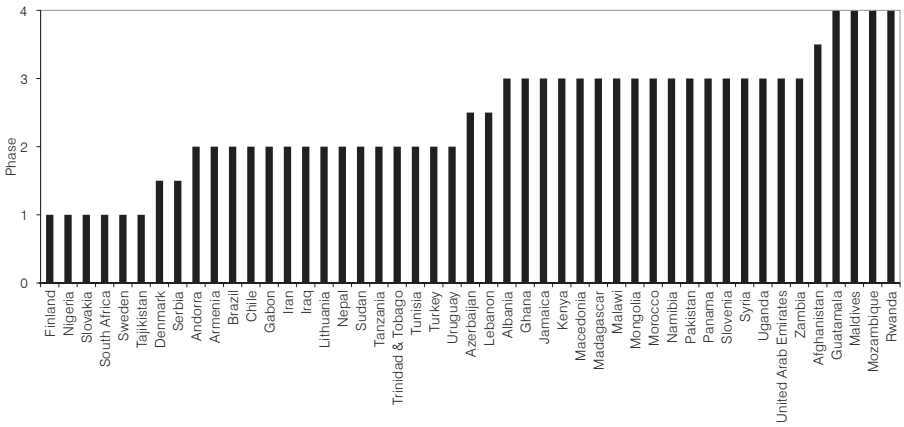


Figure 3. Ranked phases in the area of Public Understanding of Astronomy. Credit: DAG/IYA2009

the International Year of Astronomy 2009 in each country. The SPoC are individuals who have volunteered to be a first point of contact for the International Year of Astronomy in their countries. Although a delegated individual could also assist with the survey, it is the SPoC who is ultimately responsible for content.

Phases of development are based on the detailed answers given in the three areas and are therefore qualitative summary indices that allow a quick global overview. Planning of development activities is based on the details given for the three areas surveyed.

Since DAG focuses on countries in need, an important consideration is what is meant by a developing country. The Human Development Index (HDI) is an index used by the United Nations Development Programme (UNDP) to rank countries by the level of human development[2]. With due regard to criticisms, this may also be used as a means to categorise countries into developed, developing or underdeveloped. A HDI of 0.8 or more is considered to represent high development. A HDI below 0.5 is considered to represent low development. Figures 5, 6 and 7 provide a comparison of phases with HDI[3]. These figures show that it is incorrect to dismiss astronomy development activities in counties that are regarded by the HDI as developed, i.e. developed countries can also show a need for astronomy development. The power of the survey is that it reveals the need for astronomy development, but the route taken to address these needs will depend on the specific country's level of development i.e. the educational, political, and funding structures in place within it.

Improvement

Country surveys do have room for improvement and there is a slow stream of amendments to the existing surveys from independent individuals (other than the SPoC) who are involved in astronomy in that country. According to the survey process, only the SPoC for the country has the authority to approve changes to the official survey. However, it is important to record comments or amendments as they arise in order for country surveys to achieve a more reviewed and objective state. Also, as facts may change over time (e.g., information about the number of astronomy graduates will increase) this information needs to be updated, allowing both a current view of a country's status and a historical view of change.

With this in mind the repository for the GAS has been changed to a multilingual and dynamic Content Management System (CMS) based website able to register and record objections, amendments, corrections, changes by any individual and to allow these to be approved by the SPoC for the country. Ownership of these surveys is essentially handed over to the participating countries. This will allow the GAS to progress towards a more transparent, reviewed and accurate representation of astronomy in these countries and ensure sustainability of the DAG initiative beyond IYA2009.

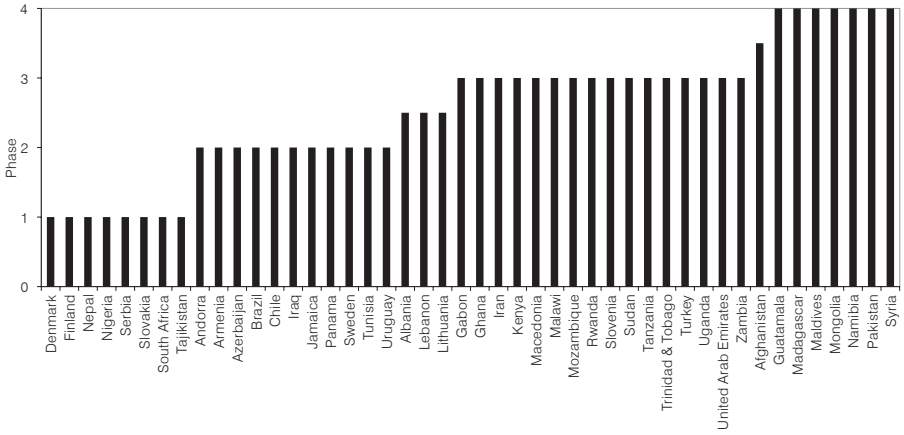


Figure 4. Ranked phases in the area of Astronomy in Schools. Credit: DAG/IYA2009

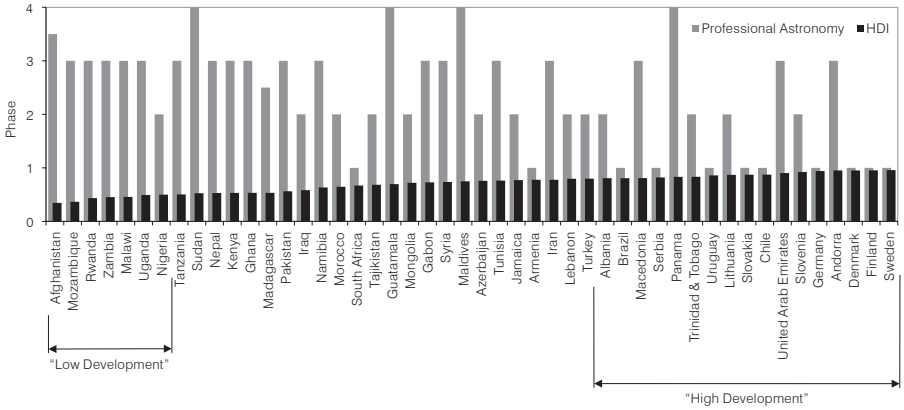


Figure 5. A comparison between Professional (Research) Astronomy and HDI. Credit: DAG/IYA2009

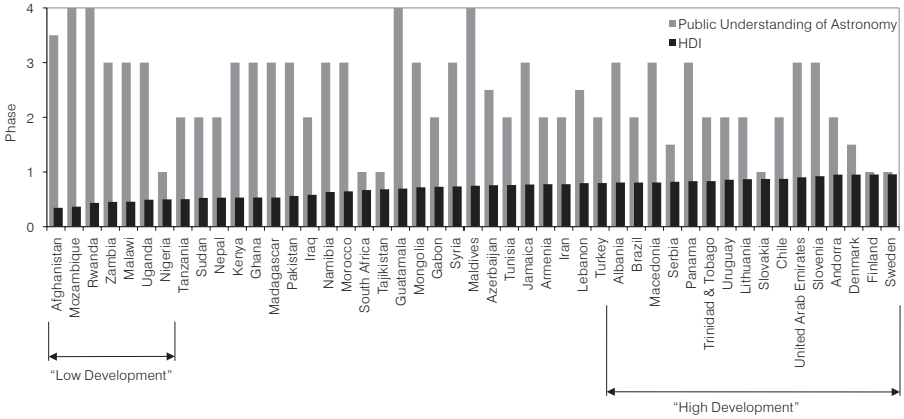


Figure 6. A comparison between Public Understanding of Astronomy and HDI. Credit: DAG/IYA2009

Recommended usage

I. People involved in astronomy are encouraged to read through surveys for their, and neighbouring, countries and

to try to collaborate with each other on: astronomy related projects at university, public and school levels; travelling academics; sharing of equipment; sharing of knowledge and expertise; sharing of educational curricula.

II. Organisations involved in global education and public outreach activities can use the surveys to plan their initiatives more effectively by structuring their overall plan in line with the phase overviews as shown in Table 1.

III. The IAU can use such data to inform future astronomy development projects.

IV. Funders and sponsors of equipment could use this survey to identify where to target their astronomy development efforts.

V. Regional structures could be established from this information such that any efforts within a region are optimised to benefit neighbouring countries.

Conclusion

The Global Astronomy Survey is a "first stop" repository for any individual or organisation interested in astronomy development information for specific countries. It provides a valuable starting point from which to plan development activities.

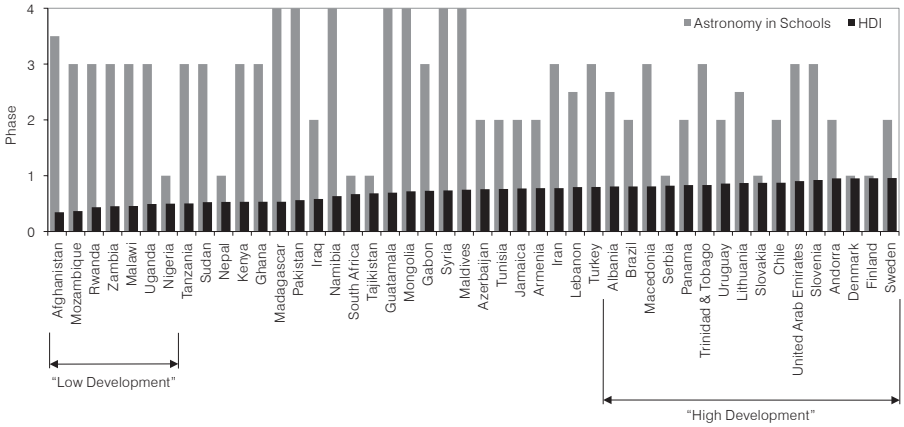


Figure 7. A comparison between Astronomy in Schools and HDI. Credit: DAG/IYA2009

The survey will serve as a sustainable project of the DAG Cornerstone project, beyond IYA2009, hopefully contributing to astronomy development initiatives over the long term and in a meaningful way.

Notes

[1] http://www.developingastronomy.org/index.php/survey

[2] *Human Development Indices: A statistical update 2008*, United Nations Development Programme, 2008, New York.

[3] UNDP HDI 2006 data is used for all countries except Andorra (data unavailable – average of neighbouring country data assumed) and Afghanistan Human Development Report 2007, Center for Policy and Human Development, 2007, Pakistan.

Biographies

Lolan Naicker has an educational background in engineering and in physics. He is a registered Chartered Engineer (Engineering Council United Kingdom) and is interested in interdisciplinary work across science and engineering fields. He is presently taking time out to contribute to education and public outreach initiatives.

Kevin Govender is the manager of the Southern African Large Telescope Collateral Benefits Programme at the South African Astronomical Observatory and also chairs the Developing Astronomy Globally Cornerstone project.

Communicating Astronomy with the Public 2010

Building on IYA 2009

Cape Town, South Africa, 15–19 March 2010

Some programme topics

- Reports from IYA2009 National Nodes, Organisational Nodes, Cornerstone Projects and Special Projects with an emphasis on the IYA2009 legacy
- Challenges and successes: Case studies from around the world
- Crowdsourcing/Citizen science projects
- Communicating in the social networking/Web 2.0 mediascape: twitter/youtube/facebook/vodcasting
- Audiovisual & multimedia communication incuding tools and techniques
- New ways to exploit and visualise astronomical data
- Social impact of astronomy communication
- Alternative ways of communicating astronomy
- EPO Clearinghouses: Portal to the Universe, COMpadre, etc.
- Evaluation of IYA2009 and lessons for the future
- Communicating across national, language, political, social and cultural borders

Scientific Organising Committee

Ian Robson (chair)
Lars Lindberg Christensen
Dennis Crabtree
Susana Deustua
Kevin Govender
Kaz Sekiguchi
Patricia Whitelock
Jin Zhu
Carolina Ödman

Local Organising Committee

Kevin Govender (chair)
Sudhanshu Barway
Encarni Romero Colmenero
Shireen Davis
Cedric Jacobs
Natalie Jones
Veronique Kazie-Ravat
Nicola Loaring
Gordon MacLeod
Thembela Mantungwa
Sivuyile Manxoyi
Enrico Olivier
Ruby van Rooyen
Glenda Snowball
Patricia Whitelock

IAU International Astronomical Union
Commission 55

www.communicatingastronomy.org/cap2010

Ten Commandments for Presentations[1]

Tijana Prodanovic
University of Novi Sad, Serbia
E-mail: prodanvc@df.uns.ac.rs

Key Words

Oral communication
Visual communication
Presentations
Tips

Summary

It always amazes me, unfortunately often in a negative way, how only a few people know how to make and deliver a good presentation. For many scientists it's usually their Achilles' heel. Many get so caught up in their work that when they present it at a scientific meeting or to the general public, their presentation often looks confusing, boring or sometimes even scary. The good news is that there are some general rules that can work magic with presentations.

1. Know your audience

This rule may seem so simple, but it is *the* most crucial point and can make a world of difference. Even before you commit to giving a presentation to a group of people you need to know their demographics. Is your audience young? Are they old? Well-educated? Sometimes you may also want to know their nationality, race or religious background. Of course, you don't need to know all this every time; decide based on your subject matter. For instance, when I give a public scientific lecture in a high school I try to be more hip, use slang, refer to things that the students are interested in. On the other hand when I give the same public lecture in a local city-funded cultural centre attended by mostly senior, well-educated people, I use more subtle language and don't try so hard to make it fun. So, adjust your presentation according to the audience.

Personalising presentations is also a good idea. For instance, when I give a lecture about galaxies and show what the Milky Way looks like, I always show the location of the Earth by writing the appropriate name of the city, or the institution where I'm giving the lecture. You'd be amazed at how a simple thing like that makes a difference.

2. Be yourself

However much you change your presentation to accommodate the audience, whatever you do, still be yourself. That's what makes people trust you. The last thing you want when you give a presentation is for the audience to not believe what you are telling them. When does the audience distrust you? When they smell bad acting. Trying too hard to be something you are not leads to bad acting and to failure. Little things that will help include: being comfortable in what you are saying and wearing, and believing in the content.

3. Be the audience

Make a presentation that you, if you were the audience, would find interesting, engaging, smooth, fun, and whatever else you are trying to achieve. Avoid anything that would put even you to sleep! Remember, if you are not having fun writing it, making it, practising and delivering it, then your presentation probably needs a bit of rewriting.

4. Practice makes perfect

Practise, practise, practise. An absolute "don't" is saying your presentation out loud for the first time in front of the audience. Every time I finish writing a presentation I am happy with how it looks on paper/PowerPoint, but when I go over it out loud

I always run into a few bumps and end up rewriting it to make it smoother and clearer. However, don't overdo it. There is such a thing as too much practice, which results in identical sentences coming out of your mouth each time you run through the presentation. You don't want to learn it by heart because then it starts sounding fake, like bad acting.

However it is a good idea to memorise a few introductory sentences at the beginning of the presentation, especially if you are nervous – knowing a few lines will help you feel more comfortable and ease you into the rest of your presentation.

5. Setup — confrontation — resolution

Right through your presentation you want your audience to know where they are, why they are there and where they are going. This is what a smooth presentation is. Just like a nicely written book, it has a setup, a confrontation or a plot, and a resolution. First tell your audience why they are there. Give them a reason why the topic is important. Then you need to lay out a plan of action and tell them what the goal is and how you plan to get there. Next you need to set some general rules, telling them any important things they need to know in order to understand your presentation, and only then do you lead your audience through the plot, through your method, your procedure, through the vital and most difficult part of your presentation.

After that, the plot needs to reach a resolution, a conclusion, results and the punchline of your presentation. Make sure that when delivering this you make a big deal out of it because after all, that's why both you and the audience are there. Finally, you want your presentation to end smoothly, and not with a season-ending cliffhanger like a TV show — that annoys the audience.

6. Keywords

Be sure to know what the keywords of your presentation are. In every presentation many words are spoken, many PowerPoint slides are shown, many demonstrations are done, and that is just too much information. If you give a good presentation, most of the audience will be able to recount it a day after. A week after and most of them will only remember bits and pieces but will recall what the point of it was. A year after, well… if they can reproduce a three-word summary of your presentation, then you were successful! Those three words are your keywords: something that people will take home with them and sticks in their mind. So break your presentation up into keywords. The easiest way to do that is to summarise your presentation into three or so words. Once you know your keywords, make sure that you repeat them as often as you can (without sounding too strange!) during your presentation, because repetition makes people remember.

7. Not too much

There is no such thing as too much information. Especially when you are presenting your own work, you will want to tell the audience everything and fill them in with all the details, but they don't need all this. They only need to understand the presentation and get the punchline. Anything that is not essential for your talk, but that you want to tell your audience, have as a backup (slides), in case someone asks about it. So try not to clutter your talk with information that people can live without.

If you are giving a PowerPoint presentation or similar, don't have too many slides. A good guide is one slide per minute. Don't have too much text on your slides, because that will make it difficult for your audience to read and listen to you at the same time. If you are a scientist, please try not to use too many equations; show only those that are absolutely essential.

8. *What* is the centre, not how

Sometimes, with all the nice things that software such as PowerPoint can do, it can be that *what* gets hijacked by *how* during your presentation. If you use too many animations, fancy slide transitions, titles and words, this can drive your audience away from what you are saying to how you are presenting it. For instance, using a nice, but dark, image in the background of the text on your slides is a bad idea since the text is then harder to read, and you never want the design of your presentation to get in the way of the topic. Don't overdo it when trying to make your presentation look fancy and shiny. After all, what you are saying is the centre of your presentation, and not the presentation design itself.

9. Eye contact

This is very simple, but makes a world of difference. Establishing regular eye contact with your audience makes you look friendlier, believable and trustworthy, which is essential for a successful presentation. Unless you give them the "Here's Johnny" Jack Nicholson look, of course.

10. Stick to the time

Finally, nothing annoys people more than a presenter who goes over the time limit. You can deliver a brilliant presentation, but if it drags on for too long, eventually some people will be annoyed, and you don't want that to be their last impression.

Conclusion

There you have it: my ten commandments for presentations. They probably look intuitive and obvious, but sticking to them is a different story. Hopefully they will be useful; trust me when I say that they will make a world of difference.

Notes

[1] This article first appeared on the Cosmic Diary (www.cosmicdiary.org), a Cornerstone project of the International Year of Astronomy 2009.

Biography

Tijana Prodanovic is a Serbian astrophysicist. Her interest in astronomy began at the tender age of ten. Since then she has pursued science as a career, obtaining a PhD in astrophysics. Finding new ways of communicating science to the public ranks highly in her list of interests.

Touring the Cosmos through Your Computer: A Guide to Free Desktop Planetarium Software

Matthew McCool
Southern Polytechnic SU
E-mail: mmccool@spsu.edu

Key Words

Open source astronomy
Astronomy software
Digital universes

Summary

This paper reviews ten free software applications for viewing the cosmos through your computer. Although commercial astronomy software such as Starry Night and Slooh make for excellent viewing of the heavens, they come at a price. Fortunately, there is astronomy software that is not only excellent but also free. In this article I provide a brief overview of ten popular free Desktop Planetarium software programs available for your desktop computer.

Astronomy Software

Significant strides have been made in free Desktop Planetarium software for modern commercial computers. Applications range from the simple to the complex. Many of these astronomy applications can run on several computer platforms (Table 1).

Most amateur astronomers can meet their celestial needs using one or more of these applications. While applications such as Stellarium and Celestia provide a more or less comprehensive portal to the heavens, more specialised programs such as Solar System 3D Simulator provide narrow, but focused functionality. Regardless of your astronomy viewing needs, the chances are you can find a free application that rivals for-profit alternatives.

Table 1. Ten free desktop planetarium applications.

Software	Computer Platform	Web Address
Asynx	Windows 2000, XP, NT	www.asynx-planetarium.com
Celestia	Linux x86, Mac OS X, Windows	www.shatters.net/celestia
Deepsky Free	Windows 95/98/Me/XP/2000/NT	www.download.com/Deepsky-Free/3000-2054_4-10407765.html
DeskNite	Windows 95/98/Me/XP/2000/NT	www.download.com/DeskNite/3000-2336_4-10030582.html
Digital Universe	Irix, Linux, Mac OS X, Windows	www.haydenplanetarium.org/universe/download
Google Earth	Linux, Mac OS X, Windows	http://earth.google.com/
MHX Astronomy Helper	Windows Me/XP/98/2000	www.download.com/MHX-Astronomy-Helper/3000-2054_4-10625264.html
Solar System 3D Simulator	Windows Me/XP/98/2000/NT	www.download.com/Solar-System-3D-Simulator/3000-2054_4-10477538.html
Stellarium	Linux source, Mac OS X, Windows	www.stellarium.org
WorldWide Telescope	Windows	www.worldwidetelescope.org

Asynx Planetarium

Asynx Planetarium is a free planetarium and Solar System simulator that provides an ideal format for students and even children. Part of its accessibility to younger users is based on its interface, which is simple and intuitive. As with many astronomy applications, Asynx Planetarium can display the night sky from any location on Earth (between the years of 1760 and 9999). Although it covers over 10 000 stars, Asynx Planetarium is less powerful than applications such as Celestia or Stellarium. Planets, Messier objects, the 88 constellations and the Moon with phase are all incorporated into this tightly built application. Asynx Planetarium is also suitable for users who want fast animations, which can be obtained from geocentric and

heliocentric views. Asynx Planetarium is an excellent choice for users who want a lean and efficient application for learning the basics about our Milky Way, making it suitable for a wide audience.

Celestia

Celestia is one of the best free astronomy programs available, which boasts a similar set of features to Stellarium. Like all good astronomy software, Celestia allows you to tour the Universe by escaping the limits of viewing from Earth. You can travel through the cosmos to observe a wide collection of galaxies, nebulae and stars. In fact, Celestia features a star catalogue in excess of 100 000 stars. Another great feature of Celestia is the smooth transitions from one frame of view to the next, including a nicely articulated zoom feature (Figure 1). Another popular feature of Celestia is its ability to point and go to a specific destination.

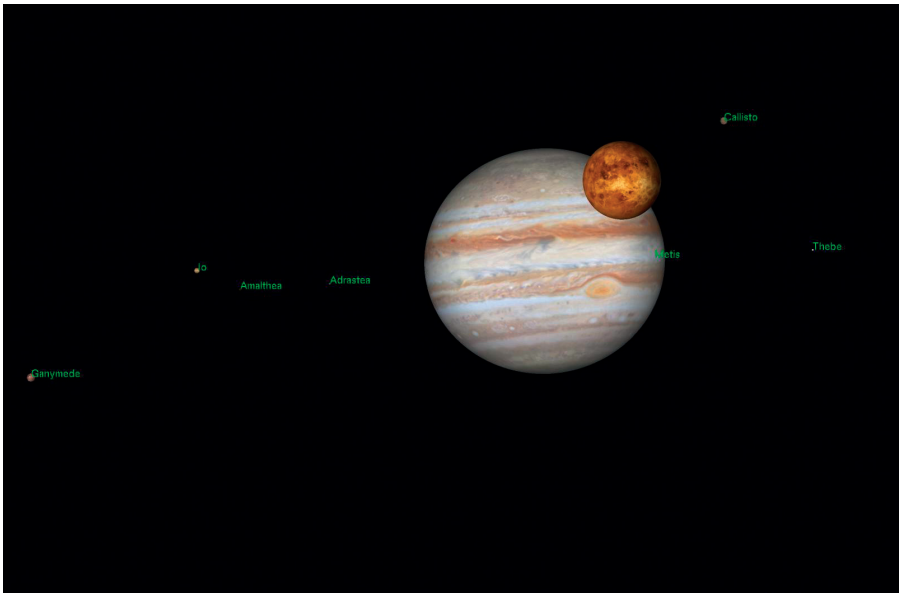


Figure 1. Screenshot of the Celestia astronomy software. Credit: Celestia

If Celestia's wide selection of stars, galaxies, planets and smaller terrestrial treasures is not enough, there are numerous add-ons to the application. Celestia Motherload[1] is an active and well-maintained website that offers a wide range of additions, including typical Solar System objects, spacecraft and extrasolar objects. Celestia Motherload even offers a set of fictional components for users interested in *2001*, *Star Trek* or *Star Wars*.

Deepsky Free

The free version of Deepsky Astronomy Software is known as Deepsky Free. The one benefit of Deepsky Free is its use as an organising and planning tool. Deepsky Free is especially useful for astronomers who want to create observing plans or star charts. Users should note that while Deepsky Free is a simple tool suitable for astronomical viewing, its functionality is limited by a narrow object database. At approximately 11 000 objects, the Deepsky Free database is limited but focused, providing information about planets, stars and the Messier objects.

DeskNite

Unlike the other applications on this list, DeskNite offers a live view of the night sky from your computer's desktop. DeskNite operates as desktop wallpaper that is constantly updated using real-time data, tracking the motion of the Earth. DeskNite relies on a limited catalogue of more than 3000 stars, the planets, Sun and Moon. NGC and Messier objects are also available. DeskNite also features a range of viewing perspectives, which includes equidistant, orthographic and stereographic projections.

Partiview and Digital Universe Atlas

Offered by Hayden Planetarium in New York, the interactive data visualisation tool Partiview, in conjunction with the Digital Universe Atlas database, features a simple interface for views of nearby stars, star clusters, nebulae and nearby galaxy clusters. The software also features content from the Sloan Digital Sky Survey, a New Mexico-based programme that focuses on redshift phenomena (objects moving away). One of the more interesting features of Digital Universe Atlas is the opportunity to view objects in different types of electromagnetic radiation, ranging from radio to infrared radiation, visible light and gamma rays. Digital Universe Atlas is a simple but useful tool for beginner and intermediate astronomers.

Google Earth

Google Earth is the desktop astronomy application made by the famous search engine company. The application originally made a name for itself by providing seamless views of our planet by stitching together satellite photographs. Astronomers now have a chance to test drive the application for space, thanks to a group of ambitious Google developers. Using the feature called "Sky in Google Earth", you can travel throughout the cosmos on a set of images pulled from the Digitized Sky Survey and the Sloan Digital Sky Survey. The Digitized Sky Survey provides a nearly complete picture of the entire night sky from any point on the globe. The Sloan Digital Sky Survey is only partially complete, but provides greater depth and detail. The real benefit of Google Earth is the inclusion of Hubble photographs. Navigating to M31 reveals not only a panoramic portrait of the Andromeda Galaxy, but also a Hubble image. There are also additional details about the image and suggested resources for finding more information on the web. It is this kind of integration between the sky surveys and the Hubble Telescope that make "Sky in Google Earth" a valuable educational tool.

MHX Astronomy Helper

Probably the most limited application in the group, MHX Astronomy Helper is an ideal tool for young students who want to learn the basic principles of local astronomy. Detailed information is available for major objects in our galaxy, which includes planetary orbits, rotation periods, moons and object composition. Although MHX Astronomy Helper lacks the comprehensiveness of other applications, it is an ideal start for young students and novice astronomers.

Solar System 3D Simulator

A more advanced tool than MHX Astronomy Helper, Solar System 3D Simulator accomplishes its title claim by providing a dynamic application for viewing the Solar System from a variety of angles. Solar System 3D Simulator offers views of planetary orbits, their moons, and the Sun. Information about the chemical composition and physical characteristics of each planet can be displayed. One of the nicer features of Solar System 3D Simulator is the variety of angles that can be used for viewing. Even the speed of the simulator can be altered. The target user of Solar System 3D Simulator includes young students and novice astronomers.

Stellarium

Stellarium contains many features that make it a fine addition to your astronomy software collection. Stellarium has a built-in catalogue of over 600 000 stars with the potential to add an additional 210 million stars (Figure 2). It also contains illustrations of constellations and a series of asterisms, which are clusters of stars that appear to be together, but are actually quite far apart.

Stellarium offers constellations for eleven different cultures, making it a globally-conscious application. It also has a multi-lingual interface, a pleasant user experience with keyboard control, zoom features, time controls, spherical mirror projection for use with a personal dome, and even a telescope control system. Visualisation with Stellarium is also very good and includes extra details such as shooting stars, eclipse simulations, a variety of landscapes, twinkling stars and equatorial and azimuth grids. Advanced users can have fun customising Stellarium by adding deep sky objects and constellations.

Figure 2. Screenshot of the Stellarium astronomy software. Credit: Stellarium

WorldWide Telescope

Microsoft's WorldWide Telescope is the last free astronomy application to be examined. Unlike most of the options on this list, the WorldWide Telescope is truly a rich, robust and dynamic tool for exploring the cosmos. One of its nicest features is its ability to view the sky in electromagnetic wavelengths other than visible light, such as X-rays. This versatility provides outstanding views of hydrogen clouds, supernovae and high energy fields emanating from nearby stars and star clusters. You can zoom in and out throughout the Universe, view selected planets, and then move forward or backward in time to see how the night sky looks at another time (Figure 3).

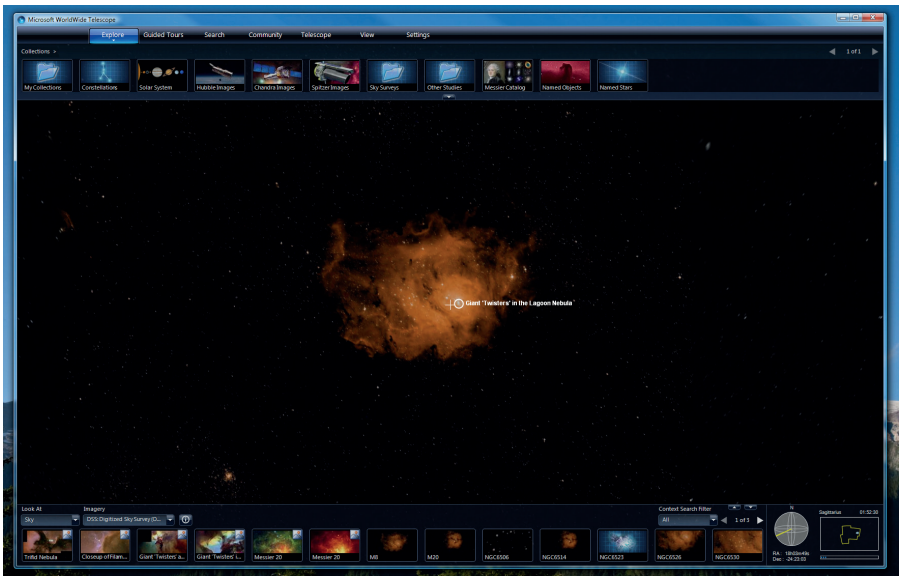


Figure 3. Screenshot of the WorldWide Telescope astronomy software. Credit: Microsoft

One of the best features of the WorldWide Telescope is the set of guided tours, each narrated by world-renowned astronomers. You can take tours that cover topics as diverse as how the planets in our Solar System formed and the state of the Universe two billion years in the past.

The real benefit of Microsoft's WorldWide Telescope is its ability to be used by a wide range of users. Young students and novice astronomers may begin with objects closer to home, learning about the planets and their properties. More advanced users can move out into the stars without the aid of a guided tour. The one downside to the WorldWide Telescope is that it is a large application. Guided tours require specific modules to be downloaded, which can take time on slower connections. But in the end, Microsoft has done an excellent job of delivering an educational and entertaining astronomy application to most computers that use the Windows operating system.

Summary

There is a wide selection of free astronomy software available to an equally wide audience. While several applications provide excellent all-in-one solutions to meet most astronomers' needs, other tools feature narrow but focused functionality. Young students and novice astronomers may want to begin with MHX Astronomy Helper or Solar System 3D Simulator. The next step up from these starter applications includes DeskNite and Deepsky Free, tools aimed at more advanced users. The best overall experience may be found in Celestia, Stellarium and Microsoft's WorldWide Telescope. All three of these astronomy applications provide a robust and rich viewing experience.

Notes

[1] Available at http://www.celestiamotherlode.net

Biography

Matthew McCool teaches technical and science writing at Southern Polytechnic State University in Atlanta, Georgia, USA.

Tafelmusik's *The Galileo Project*: An Out-of-this-World IYA2009 Arts Experience

John R. Percy
University of Toronto, Canada
E-mail: percy@astro.utoronto.ca

Key Words

International Year of Astronomy
2009
Arts
Music

Summary

When the IYA2009 Canada Committee[1], chaired by Jim Hesser, first came together, it established a vision: "*to offer an engaging astronomy experience to every person in Canada, and to cultivate partnerships that sustain public interest in astronomy*". We called the engaging astronomy experience a "Galileo Moment". We knew that a Galileo Moment could be a first look through a telescope at the Moon, Jupiter or Saturn. But we especially wanted to connect with new audiences, not just the same people who always came to astronomy events. So we knew that a Galileo Moment could equally well be the intellectual or emotional effect of an astronomy-inspired piece of art or music. So far in 2009, over 10 000 Canadians have experienced a Galileo Moment of the latter kind, thanks to the Tafelmusik Baroque Orchestra's *The Galileo Project.*

The Toronto-based Tafelmusik Baroque Orchestra[2], or "Tafelmusik" as we familiarly call it, is considered by *Gramophone* magazine as "one of the world's top baroque orchestras". As well as giving over 50 concerts in Toronto each year, it tours more than any other Canadian orchestra to all parts of North America, and to Europe and Asia. It has made over 75 recordings, many of them award-winning. It is also known for its educational programmes, ranging from elementary school to university and professional level. It is the University of Toronto's baroque orchestra in residence, supports graduate-level diplomas in baroque performance, and hosts an annual Baroque Summer Institute. It's the orchestra in residence for the annual *Klang und Raum* festival in Europe, and for the renowned *Opera Atelier* in Toronto. Music Director Jeanne Lamon has won many awards, including two honorary doctorates, the prestigious Molson Prize, and membership in the Order of Canada.

In recent years, Tafelmusik's double-bass player Alison Mackay has created a series of highly effective multimedia concerts which include theatre, dance, and art. These have included *The Four Seasons*: *A Cycle of the Sun*, which was made into a feature documentary, *Sacred Spaces*, *Sacred Circles*, a celebration of art and architecture, and the *Metamorphosis Festival*, a city-wide event co-organised with her husband David Fallis, including a multimedia Tafelmusik concert around the theme of Ovid's *Metamorphoses*.

From the start, the IYA2009 Canada Committee hoped that every amateur and professional astronomer in Canada would develop or join an IYA2009 project that matched their interests and expertise. As an enthusiastic supporter of Tafelmusik for almost 30 years, and as one of my personal IYA2009 projects, I suggested to Tafelmusik that they might want to create

Figure 1. Lutenist Lucas Harris performs work by Michelangelo Galilei. Credit: Donald Lee.

a special programme, honouring Galileo and IYA2009. Alison Mackay and the Tafelmusik team jumped at the opportunity.

On the Tafelmusik webpage, you can find links to Mackay's extensive programme notes[3], and a description of how the programme was put together[4] including my role: as well as being the "instigator", I reviewed the script for the concert, and made minor suggestions; I helped to promote the concerts; I gave pre-concert lectures for Tafelmusik supporters; and I put Mackay in touch with other astronomers who could provide images, arrange star parties etc. It required over a year of planning. A large collection of astronomical images was assembled, including ones from ground-based and space telescopes, and a large set of stunning images by eminent Canadian astrophotographer Alan Dyer. These were projected on a 12-foot-high circular screen, mounted in an ornate frame. For the first time in its history, Tafelmusik's musicians memorised all of their music (no mean feat for an orchestra!) so they would be free to move about the stage, and into the audience. The choreography was arranged by Opera Atelier's Marshall Pynkoski. The musical programme was interspersed with narrative by actor Shaun Smyth, including writings by and about Galileo and his contemporaries. But the heart of the programme was the creatively chosen music pieces by Vivaldi, Lully, Monteverdi (a contemporary of Galileo), Purcell, Rameau, Handel, Telemann, Bach, and others including Galileo's brother Michelangelo (Galileo came from a family of lutenists, and was an amateur lutenist himself.) The choice of music and text, and the overall concept, were the work of Alison Mackay, whose creative genius is rivalled only by her modesty.

Tafelmusik was awarded a nine-day residency at Alberta's Banff Centre for the Arts, a residency that culminated in the premiere performance of *The Galileo Project*, followed by a "star party" for orchestra, staff, and audience, courtesy of University of Calgary astronomers, and the Calgary branch of the Royal Astronomical Society of Canada. The musicians, including the Director, were able to have their own personal Galileo Moments. Another successful star party was held after their Ottawa concert in March, and another was held at their annual fund-raising gala in Toronto (appropriately named "Gala-Leo" for 2009!).

The orchestra then returned to Toronto, where they played a series of five sold-out concerts to 4000 people. The audiences included a goodly number of local professional and amateur astronomers, but mostly music lovers who would not normally be exposed to astronomy, and to its many links to history, art, and culture.

The concert was outstanding; you need only read the review[5] in the *Toronto Star*, Canada's largest-circulation newspaper. It was described as "*out of this world*", and "*simply one of the best, most imaginative shows based on classical music seen here in years*". And given that Toronto is a major centre for the arts, that's saying a lot. The reviewer noted that "*the biggest wonder of all is how integrated the music, words and images are, like a balanced choir, where the individual parts, men and women, are subsumed into a greater whole*". "*In the end*", he noted, "*the audience is left with a true taste of the awe, wonder, and optimism that people felt in the 17th and 18th centuries, as scientists pulled the veils off the myths and mysteries of mediaeval times*".

Mackay also created an outstanding *Galileo Project* concert for school audiences, specifically grade six (age 11 years) level, where the curriculum includes both Baroque music and astronomy, both of which were effectively and engagingly taught in the programme. It included music, images, and choreography, narrated by an actor playing the role of Comet Halley. Through his visits to Earth at 76-year intervals, he could follow the evolution of music and musical instruments. He introduced the audience to his fellow members of the Solar System through models and movements. At the end of the concert, the 600 schoolchildren were rotating and revolving at their seats! The concert also, of course, illustrated the deep connections between astronomy, culture and the arts. This programme has already been presented to over 4400 students in Toronto, Ottawa, Belleville, and Lindsay, Ontario — that's 4400 Galileo Moments!

The public and school concerts toured Ontario in February–March 2009, the public concert was performed in Mexico in October 2009 and will go to the US later in the year. In the past, Tafelmusik has performed, to great acclaim, in science and nature museums in major cities of Asia, and the orchestra hopes to take the programme there in 2010. The public concert was aired on CBC radio (Canada's national broadcast network), and is available online[6], unfortunately without the stunning visuals, of course. We hope that there will eventually be a DVD and/or documentary film. If you get a chance to experience this performance, don't miss it. It's an exemplary fusion of arts and sciences by a great orchestra, and exactly what IYA2009 is about.

For me, this project was a dream come true, a highlight of my long astronomical career. But it was also an illustration of the benefits of partnership — part of IYA2009 Canada's vision, and a key to success in so many aspects of life.

Notes

[1] http://www.astronomy2009.ca

[2] http://www.tafelmusik.org

[3] http://www.tafelmusik.org/concerts/galileo_programmenotes.htm

[4] http://www.tafelmusik.org/concerts/galileo_creative.htm

[5] http://www.thestar.com/article/575299

[6] http://www.cbc.ca/radi02/ media/20090109tafel/all.asx

Acknowledgements

I thank Jim Hesser for his outstanding leadership of the IYA2009 Canada Committee and for his support for *The Galileo Project*. I'm deeply grateful to Alison Mackay and the Tafelmusik team for creating this programme, and enabling me to be part of it.

Biography

John Percy is Professor Emeritus, Astronomy & Astrophysics, and Science Education, University of Toronto, and a member of the IYA2009 Canada Committee. He is a music-lover, but not a musician.

Social Astronomy: Cooperating with Local Community Networks

Salva Bará
Universidade de Santiago de Compostela, Spain
E-mail: salva.bara@usc.es

Key Words

Public outreach
Science communication
Society at large
Local communities

Summary

The public — our public — has *structure*. Addressing outreach astronomy activities to the public through local community groups, associations and networks, may decisively enhance our communication efficiency. And, no less important, it may be a contributing factor in improving the quality of life of our districts and towns.

Introduction

Astronomy is interesting. Stargazing is fun. Whether for cultural, historical, aesthetic or scientific reasons, simple curiosity or a blend of all of them in varying proportions, few people remain indifferent to the latest releases of astonishing images of deep-sky objects or to contemplating the starry night sky with the naked eye. So we do have a public. In comparison with what happens in other fields of knowledge we can be considered fortunate: astronomy-related news finds its way pretty easily into the mass media and tends to reach respectable audience levels. A different issue is, of course, the extent to which excessive sensationalism, overstatements and other factors may jeopardise the credibility of a piece of communication (Nielsen, 2007).

There is a growing awareness of the role that outreach activities play in generating a wider social support for science. Not surprisingly, a great deal of time and resources are presently being invested in reaching "The Public" through different communication programmes. Disseminating the latest scientific discoveries, underscoring their meaning for our understanding of the Universe and their significance for modern thought, and enjoying the aesthetic content of the night sky are key transversal contents present in most of these actions.

This paper deals with astronomy outreach activities addressed to the public at the local community level (town, district, quarter, neighbourhood...), outside the strict limits of the classroom. In practice these actions often tend to adopt what could be called the "individual citizen approach", that is, they address "The Public" as if it were an unstructured set of people. Many open lectures or sidewalk observations of the sky follow this standpoint to some extent, whose main features, in an admittedly oversimplified description, are:

1. The planning and development of the activities is mostly carried out by professional or amateur astronomers independently, perhaps with some organisational help from government and academic bodies (the City Council, universities...), but with little involvement from the local community itself.

2. The activities are generally announced through the media and targeted at the general public.

3. For the purposes of the activity the public is considered to be a set of individuals with little or no previous interaction with one another.

4. No special mechanisms are set up for keeping in touch with the attendees after the activity is over, although further involvement of the participants may reasonably be expected (e.g., acting as informed citizens regarding science

Figure 1. Flyer of the Astronomia na beirarrúa programme. Credit: Astronomia na beirarrúa and ESO.

issues, supporting science budget allocations, volunteering for forthcoming activities or perhaps joining a local astronomy club).

This is a sensible and useful approach and of course there is nothing wrong with it; this kind of activity, addressed to a general public, is very often of central importance for any successful science communication programme. However, if we limit ourselves to addressing people only at the individual level we risk missing out on the additional synergies and multiplicative effects that local community groups and their social networks may contribute to our actions. There is much to be gained if the social structure of "The Public" is taken into account when planning and developing astronomy outreach activities.

People live everyday life within socially structured frameworks. Organisational forms may vary, depending on historical, economic and cultural factors, but grouping and social networking is a constant in all human societies. A particularly interesting subset of these groups and networks are those arising within local communities at the level of city districts, quarters, neighbourhoods, villages and towns. They span a wide range of interests, degree of formalisation, social influence, lobbying capability and permanence in time. In the particular context from which this article is written (Galicia, Spain) people tend to interact relatively strongly with each other at the local community level, and in any town there is generally a wealth of small and medium-sized entities of very different kinds, ranging from friendship groups to more structured neighbourhood associations, consumer groups, gender-oriented groups, local sports teams, cultural commissions, business owners' associations, street party organisers and even gastronomy aficionados, to mention but a few. Despite the seemingly endless variety, all these groups share a common feature: the neighbourhood or quarter are, for them, not only a place to live, but also a territorial and relational reference framework. They make up a part of the local community. Most of them are actively involved in it. And, very often, they are connected to each other, forming the nodes of different social networks.

What do astronomy outreach activities have to do with all that? In short, local community groups and their networks can be a valuable resource to help enlarge and enhance the impact and social significance of our public outreach actions. And, conversely, astronomy activities planned and developed in collaboration with these groups can be useful in strengthening these same communities, allowing for a better overall quality of life. Exploring ways of cooperation between astronomy communicators and local community groups, including their social networks, seems to be a worthwhile effort.

A win-win approach for cooperation

Why should a local group, say a neighbours' association or a small football team, be at all interested in organising astronomy outreach activities with us, such as, for example, a poster session with the latest key discoveries and an open public observation of the night sky with telescopes at a suitable place somewhere in the neighbourhood streets? The answer is straightforward: they can get a valuable return from it. Most of our neighbours enjoy watching the skies and are really grateful if some telescopes are available on the sidewalk, together with some competent advice as to what to observe and how to use them. Astronomy is socially perceived as a prestigious activity, and so are those who are involved in it. Astronomy outreach activities, besides accomplishing their immediate and most obvious goals from a local community group viewpoint (e.g., offering their neighbours a pleasant experience at a street party within the framework of a district's seasonal activities programme), have the additional advantage that they enhance the public image of the local groups associated with their planning and implementation. Astronomy activities are appealing, help to connect people and, given their content, are neither particularly contentious nor conflictive, and so may even help to enhance contacts and relationships between diverse local civic groups, contributing in the medium term to creating a confidence-building environment. All of this returns direct benefits for these groups and for their communities: neighbourhoods with a rich associative life and strong networking tend to be better equipped for coping with new and old social needs; they are more stimulating places to live, and hence have a better overall quality of life.

The benefits that astronomy communicators receive in exchange for the non-negligible effort of contacting local groups and implementing participative processes in cooperation with them are apparent. When local community groups are truly involved in the planning and development of activities, these activities reach significantly more people, the impact is higher and attendance is not limited just to those few neighbours who are already interested in science. In addition, if these activities are perceived by the local community groups and their networks as interesting and useful from a socio-cultural standpoint, they can easily be incorporated into the groups' own agendas (see the case report below) and hence acquire a permanent or semi-permanent status, becoming an expected event at some dates throughout the year. Last, but not least, successful collaborations may also elicit public support for astronomy-related issues by relevant local social agents. An interesting example concerns light-pollution management: neighbourhoods who have become aware through first-hand experience of how much inefficient street-lighting is hindering our view of the night sky may become powerful allies, supporting the actions undertaken by the scientific community and other civic groups to ask local authorities for definite changes in public lighting policies.

Astronomia na beirarrúa: a case report

Astronomía na beirarrúa (AnB), literally Sidewalk Astronomy in Galician, is an established programme of astronomy outreach activities developed by lecturers and students at the Universidade de Santiago de Compostela (USC) and members of the Vega Amateur Astronomers Club. At the time of writing the programme runs under the sponsorship of the Vice-Rectorship for Cultural Affairs of the USC, in the framework of its Social Cooperation Programme. The main feature of AnB is that its actions are planned, organised and carried out as participative processes in joint cooperation with local community groups and associations in the peripheral districts and quarters of the city of Santiago de Compostela, in Galicia.

The programme started in the spring of 2006, and its main goals are:

- contributing to science dissemination in everyday life, through activities developed in streets, squares and other highly frequented public places;
- enjoying the night sky as a source of knowledge and aesthetic pleasure, recovering it as an essential part of our landscape and cultural heritage;
- raising public awareness about light pollution, its causes and consequences;
- helping to strengthen local community associations, and reinforcing their social networks in civic districts, quarters, local communities and neighbourhoods;
- crossing the boundaries between the University and its surrounding social environment; and
- giving institutional support to Galician associations of amateur astronomers, encouraging them to set up cooperation programmes with local civic groups.

From an external viewpoint, the most conspicuous activities of AnB are probably the public sidewalk sky observations (naked eye, as well as with telescopes and binoculars) held at street parties, fairs and other open air popular celebrations organised by the local community associations in the quarters and districts. In the three years that have elapsed since the start of this programme there has been, on average, one such activity per month. Given the prevalent weather conditions in Galicia, a country of Atlantic climate with frequent overcast skies, mild temperatures and high rainfall, open air activities tend naturally to be concentrated in the period March–December.

Figure 2. Poster announcing the 2007 White Night street party with astronomy-related activities. Credit: Comision de Festas do Barrio de San Pedro, Compostela.

There is, however, a great deal of work "behind the scenes" throughout the year, consisting of formal and informal meetings with organisations and people, looking for ways and opportunities to cooperate and set up joint action plans. These contacts help to identify suitable dates and places for public observations and the best ways of implementing them to help to reinforce the social dynamics of the district without unduly interfering with it. A joint public communication strategy is agreed whenever deemed suitable. In practice astronomy activities tend to become one of the most popular events at the night street parties and take a prominent place in the media coverage.

Some results of this programme are beginning to be visible. Among them:

1. Astronomy activities are now an integral part of the yearly planning of the civic associations of several districts of Santiago de Compostela, especially in the San Pedro and Ensanche quarters. These associations appreciate the role that these activities may play in energising the socio-cultural dynamic of their communities and ask the AnB for support. Many neighbours do expect that some public observation of the sky be organised at every district fair or street party and participate actively in them, sometimes contributing with their own telescopes. These activities have won a stable and permanent place in the social life of some neighbourhoods.

2. A consequence of the direct involvement of local associations in the planning and implementation of astronomy-related activities is that their spread and reach has grown noticeably. Local groups have very efficient means of social communication that do not necessarily depend on mass media coverage. Informal communication channels at the neighbourhood level (including word-of-mouth publicity) mean that news and announcements of activities can spread rapidly. These channels are also helpful in finding and

Three practical hints for organising outreach activities with neighbourhood associations and other civic groups

Get active in your local community
Almost everything is easier if proposed and developed in an everyday setting with rich personal interaction, and this also applies to astronomy outreach activities. Being active in your neighbourhood is the best way to get exposure and to help to establish confidence-building relationships. What "to be active" means in practice depends strongly on the cultural and social context where you live. Have a look around and decide for yourself.

Break through the "experts' wall"
Most people think that astronomy is difficult, that setting up a telescope is a complex task, and that some arcane knowledge is needed to enjoy this field. They may tend to look at you as somebody essentially "different" from them, a kind of priest of astronomy... if that does happen, the chance to establish a balanced relationship with your neighbours may be lost. We are experts, of course. But if we are to interact strongly with the people who live around us we should be careful that our expertise does not become a wall distancing us from them.

Adapt your rhythms
Participative processes involving your neighbours and their civic associations have their own rhythms. In some cases they may be much faster than you expect, making you feel dizzy, while in other cases their slowness may be exasperating... Adjusting to different rhythms is perhaps one of the most difficult tasks when organising truly participative activities (Beresford & Croft, 1993). However, the effort is worthwhile: when acting "in phase" with local community groups the results often surpass the best expectations (just as interference can be constructive... at least we were taught something like that in a basic optics course!).

Figure 3. AnB stand at the Spring Fair 2007 organised by the A Xuntanza Neighbours Association and other local community groups in the San Pedro district, Santiago de Compostela. Credit: Salva Bará.

mobilising interested people and material resources.

3. Sidewalk observations with telescopes, binoculars and the naked eye have helped to raise public awareness on light pollution and its consequences. In those districts where the AnB activities take place throughout the year, there is growing popular support for changes in public outdoor lighting policies. An example of this was the claim made by several representative neighbourhood associations of Santiago de Compostela, who asked the City Council to take direct steps to improve and preserve the quality of the night sky. The touchstone of this new policy should be to attain skies dark enough as to allow the Milky Way to be visible every average clear night from the Obradoiro, the main square of Santiago de Compostela Old Town, which is itself a UNESCO World Heritage Site. The Milky Way has been known since the Middle Ages as "The way to Santiago" because of its symbolic relationship to this ancient European pilgrimage route. Not surprisingly, the City Council grasped the potential effect on tourism that such a proposal might have and contacted AnB and the USC to develop a joint programme of night guided tours across the Old Town, with the night sky as a central subject. It may be anticipated that this interest in getting reasonably dark skies will give an additional impetus to the established plans of the local government for a better outdoor lighting approach and for the reduction of the present excessive levels of light pollution in the town.

Besides these encouraging results, the development of the AnB action has also underscored several challenges that should be dealt with in the near future.

One of them concerns the organisational gap existing between the established amateur astronomers' associations and the many individuals who participate in astronomy-related activities as occasional observers. Some of these individuals are keenly interested in astronomy, own small telescopes and would probably like to have more opportunities to have a look at the skies, although they do not want to volunteer as active members of established astronomy clubs, which usually requires a relatively high engagement level. Some kind of intermediate scheme (for example, small amateur groups at the local community level, specific astronomy or science-oriented commissions within the local civic associations, and so on) would seem appropriate to fulfil those small-scale neighbourhood expectations and needs. Despite the great public success of AnB and its close ties with the civic associations of several districts, our action has not yet brought about the formation of groups organised at this intermediate level.

A second relevant challenge deals with the sustainability of AnB. This programme is presently run by fewer than 10 people, all of them students, lecturers or other professionals with a rather busy personal agenda, who work for AnB on a completely voluntary basis during their leisure time. Keeping in pace with the actual number of activities, and extending them to other city districts requires involving more people with some experience not only in astronomy, but also in the fundamentals of participative processes and social work. This in turn means that a suitable training scheme needs to be set up for those who want to volunteer for our programme. Preliminary steps in this direction are being done at the Universidade de Santiago de Compostela.

A third issue deals with keeping the civic orientation of the AnB project. AnB was born as a science outreach programme intended to reinforce and help to empower local community associations and groups, working in cooperation with them from within their local communities. However, local community associations are not alone in the neighbourhood: the local governments and other public administration bodies are often also active agents in the socio-cultural playground. They have an overwhelming weight and a wealth of material and human resources, and tend to generate their own agenda of activities, not always phased and coordinated with those of the local associations. As such, AnB does not preclude working directly for the local City Council or other government bodies, and there have been very successful experiences in activities jointly organised with them. Those instances where local authorities and civil society groups agreed joint action programmes were particularly interesting. However, in practice it is impossible to say "yes" to every institutional demand, since this would jeopardise the main goals of the AnB programme. Keeping an adequate balance between answering the institutional and social calls for cooperation is a demanding challenge.

All in all, cooperation between the scientific community and different kinds of local associations and networks seems to be a promising approach for getting in touch with people and arousing their interest in astronomy. It is, at least, worth trying.

References

- Beresford P. & Croft S. 1993, *Citizen Involvement: A Practical Guide for Change,* (London: MacMillan Press)
- Nielsen L. H. et al. 2007, *An Exploratory Study of Credibility Issues in Astronomy Press Releases*, CAPjournal, 1, 5

Biography

Salva Bará is titular professor and researcher in Optics, at the Faculty of Physics of the Universidade de Santiago de Compostela, Galicia, Spain. His research interests include adaptive optical systems and their applications to high resolution imaging in astronomy and health sciences. He coordinates several astronomy outreach programmes, among them Astronomía na Beirarrúa.

How Can We Make a Friend Out of an Enemy?
How astronomers and journalists can get along better[1]

Opinion

Diane Scherzler
Südwestrundfunk
E-mail: mail@diane-scherzler.de

Key Words

Mass media
Science communication
Science journalism

Summary

Stories about unpleasant experiences when collaborating with journalists circulate among many scientists. Some of them regard journalists as potential enemies against whom they have to be prepared. But is the idea that a journalist must be either friend or foe appropriate at all? This article briefly examines the changing relationship between astronomers, science journalists and the general public over the last few decades. It then gives a view from inside science journalism and finally suggests some ideas on how to establish a better relationship between scientists and journalists.

Introduction

A few years ago a tabloid journalist contacted an astronomer at a Max-Planck Institute. The journalist wanted to know when Venus, Mercury and Saturn would be especially close to each other. I'm not sure whether the astronomer really knew what he was getting into when he gave the information to the journalist – whose interest was not actually in astronomy at all, but in "sex waves from space". The next morning the name of the scientist could be found in a major German tabloid, linked to the best time to have sex, as determined by the alignment of the planets.

This is a true story. Experiences like this circulate amongst scientists and spread as gossip during academic meetings. Several scientists I have met at my media training sessions and as a journalist know somebody who has heard of somebody else who has had a horrible experience with journalists. "*When we communicate with journalists, how can we make a friend out of an enemy?*" is a question I am regularly asked by scientists who want to improve their media strategy. This question sounds obvious, but is the idea that a journalist must be either friend or foe appropriate at all? This article briefly examines the changing relationship between astronomers, science journalists and the general public. It will then give a view from inside science journalism and finally suggest some ideas for a better relationship between scientists and journalists.

Why mess about with journalists?

Astronomers and space scientists have a number of different ideas about how the mass media can serve them. Some hope that journalists might help them to increase the public's awareness of space exploration and their astronomical research. Others want to educate and teach the general public via radio, television and the press. There are some scientists with excellent media skills who use the opportunities the mass media are offering in a masterful way and regard the media as a platform for their personal public appearances. Finally, there are astronomers who refuse to cooperate with editors and journalists as they regard them as mere distributors of superficiality.

No matter which view a scientist takes: most of what people know about astronomy came to them via television, their newspaper, the radio or online media. The German sociologist Niklas Luhmann (1995) even wrote: "*Whatever we know about our society, or indeed about the world in which we live, we know through the mass media.*" Although Luhmann did admit (Hagen, 2004) that he did not need the mass media to know whether he had watered his flowers, he pointed out that we would not know about the wider world without the mass media. The media are the main platform where interaction between science and the

general public takes place. Whether people have positive or negative attitudes about astronomy is often decided by its presence in the media. Therefore ignoring the mass media or not knowing how to cooperate with them mostly results in missing many chances to arouse public interest.

Astronomy and the mass media: how do they relate to each other?

If scientists want to establish a good relationship with journalists, they should know more about what they can and cannot expect from journalists, what separates science from the world of journalism, and what might be a common basis for a dialogue.

The traditional model for popularising science

How is a journalist's work seen by scientists? One view was outlined above: the mass media as science's service providers. This traditional concept of popularisation dates from the 1970s, but is still popular among some scientists. It is based on the conviction that scientific knowledge is categorically superior to lay knowledge. For example, a physician's knowledge of breast cancer is, according to this view, much more significant than the experience of a woman who suffers from the disease. People are perceived as keen to learn from academia and to be trying to understand the wonders of scientific progress. Scientific illiteracy and public ignorance are described as a deficit that has to be corrected, giving the concept its name: the deficit model. Scientists taking this stance consider journalism as a tool for increasing the understanding of science as well as society's acceptance of the researcher's work. Journalists are there to translate and mediate between science and the general public. As a consequence, says the German sociologist Peter Weingart (2005), any popularisation is a simplification at best, and a falsification of scientific results at worst. "Science communication" of this type is very often a one-way dissemination of information.

The failure of this viewpoint has been commonly acknowledged since the mid-nineties (Weingart, 2001; Nowotny, 2004). The deficit model had not succeeded either in increasing public scientific literacy or in improving the public acceptance of science. It had failed to grasp the social context of science production and how the public use scientific knowledge (Kohring, 2005). It regarded highly differentiated audiences as a homogenous, passive mass of people. It also fundamentally misunderstood the role of journalism and tried to assign it the role of science's propagandist (Weingart, 2001; Kohring, 2005)[2].

Science in society today: from monologue to dialogue and debate

In the past few decades the relationship between science and society has changed profoundly. Today, people are discussing the meaning and usefulness of research, and science sometimes comes under fire. The problem of climate change, for example, affects everybody and science and technology are expected to come up with solutions. Other fields of study such as stem cell research or genetically modified organisms, conflict with human religious and moral values or are perceived by the public as carrying risks and hazards. Helga Nowotny (2005), vice-president of the Scientific Council of the European Research Council, hints at the change to a more critical perception of science: "*Science can no longer expect unconditional support on the part of society for whatever it wants to do, nor unconditional acceptance of its authority.*"

Communications theorist Matthias Kohring (2005) emphasises that the changing relationship between science and society is not a crisis, but rather the start of a process of normalisation that includes the questioning of authority. This does, however, not mean that the days of the deficit model are numbered, suggests science communication expert Brian Trench (2008): "*Several models of science communication, including one-way dissemination, and the particular deficit-model application of one-way dissemination, continue to coexist with two-way models that place varying emphasis on interactivity.*"

Two public opinion surveys carried out by the European Commission in 32 European countries show strong public confidence in science, but are also critical of the way researchers handle information: 59% of Europeans believe scientists put too little effort into informing the public about their research. The European Commissioner for science and research, Janez Potočnik (2007), points out the growing requirements of a knowledge society and also the increasing gap between people with access to knowledge and those without. Potočnik says: "*Communicating research […] is more than a priority. It is an obligation.*"

Science communication means — ideally — a respectful dialogue between the different sections of the public and researchers, as well as a public engagement in science, for example, via public debates, citizens' conferences, co-decisions etc. At the same time scientists who promote their findings aggressively instead of carrying out fundamental research are becoming more of a problem for science as well as for the general public and the media. The interaction now works in both directions: the mass media also influence science: the culture of media celebrity impinges on an individual's reputation in the scientific community, so that a scientist who is often in the media and who therefore receives much public attention, might get funding, while a researcher with a higher reputation in the scientific community, but no popular status, could come away empty-handed (Weingart, 2005). Research institutions are also increasingly adjusting to the needs of the mass media: many large museums, scientific institutes and commercial manufacturers such as pharmaceutical companies have well-equipped press departments that distribute perfectly targeted photos, texts and even ready-to-broadcast film footage. To secure their supremacy in the field outside the scientific community, major journals like *Science* and *Nature* offer science journalists specially processed information on the journal's main topics prior to its publication.

The self-image of science journalism

Let me begin with a clarification: science journalism is not a specialised type of journalism that uses scientific methods; it is not journalism that is practised or controlled by scientists. Science journalism is a kind of journalism that follows science and uses it as source of information. Autonomy and distance from the object of observation are essential prerequisites for high quality journalism. The near-legendary German journalist Hanns Joachim Friedrichs said: "*A good journalist can be recognised by the fact that he does not take sides in an issue, even when the cause is good.*" The journalist's duty is to the consumer, the reader or viewer — not to politics, not to the powerful and not to science. The science journalist Gero von Randow (2003) says: "*The science journalist is supposed to write critically about science; about the process that creates theories and, of course, about the theories themselves. The science journalist, in other words, is not someone who creates acceptance. Just as the political reporter is not the mouthpiece of the government, the business writer is not the mouthpiece of business, the restaurant critic the mouthpiece of food industry, the science writer is not the mouthpiece of the scientific community.*" Michel Claessens, a former scientific journalist and currently deputy head of the communication unit in the research directorate at the European Commission (2008), writes: "*Although*

scientists often speak of a 'necessary' cooperation with journalists, a 'distance' between them is essential to my mind. A distance that guarantees the independence of and critical analysis by the media that is necessary if the general public are to be able to form their own opinion."

The mass media are more than mediators. They present their audiences with the broader contexts of a story and embed it into the current public discussion. The mass media do not portray science in an exact manner; they do not even consider this as their task. Journalists use their own criteria to select topics. Peter Weingart (2001) describes the consequence: "*[The media] are constructing their own reality, exactly as science does. But the media are using different approaches to the 'reality' they report on, and different ways to present it. The frequent complaints of science about 'incorrect' or 'distorted' reports or about a seemingly 'wrong' selection of news therefore miss the mark. It is not possible to achieve an 'adequate' media representation of research that will also satisfy the research scientists themselves.*"

Friend or foe?

What does this mean for science's relationship to the mass media? Can the journalist be an ally for the scientist? No, or at best only to a certain extent, as journalism has to be independent of astronomy, its object of study. But does this mean that the journalist is inevitably an opponent who works in a world that is incompatible with the scientist's realm? No, not at all, as many excellent reports, films or radio documentaries have been shown that have reached huge audiences and have had a positive impact on the discipline. Labelling journalists as either friend or foe does not fit reality. But just because an unquestioning alliance is impossible, this does not mean we need to renounce a good and trusting relationship between the two professions.

A view from inside the mass media

A pretty good starting-point for achieving this kind of relationship is to understand that some of the media professional's points of view and needs are different from those of the scientists. The following view from inside the media and from science communication experts cannot completely cover journalism's attitudes and opinions. Despite this limitation it tries to give a basic understanding of several of the most important rules of journalism.

What topics are interesting for the media?

The mass media place a topic in a broader, non-scientific context, which is interesting for its readers, viewers or listeners. So any information that journalists publish has to meet certain criteria, which are fundamentally different from those in science: news has to come from a serious source and also be new, which means that it is not previously known. Journalists speak of news factors if a topic affects many people, if it takes place in their spatial vicinity or social proximity, if it is of consequence, if it is dealing with a conflict, if people hold strong opinions on the topic, rouses emotions, is entertaining or has anything to do with celebrities. The more of these elements that a story has, the more likely it is that it will be covered by the media. Journalists often take one or other of these factors into consideration when they emphasise other aspects of a story than those a scientist would pick out. Scientific significance is a news factor, but far from the only one (and often not the most important one), influencing an editor's decision as to whether to cover a topic or not. Michael Haller (1992), an expert in media studies, emphasises how different the filters of attentiveness and relevance that apply for the mass media are. He suggests that scientists "*should accept that from the perspective of an ordinary way of life the apparently marginal can be of enormous meaning, as well as the reverse case, where the scientifically important can be very marginal*".

This does, however, not mean that only the big stories have a chance of being covered. Science journalist and head of an editorial department Markus Bohn[3] explains how strongly connected to current news topics science can be: "*The unknown and the exceptional always have a good chance, of course; as do topics that are relevant to other current news.*" When, for example, everybody is talking about the Kepler mission, experts on Earth-like planets should seize the opportunity and contact the media. But due to the different criteria for selecting topics, space scientists and astronomers cannot expect everything to be covered. Bohn says: "*Proving things that non-experts already think they know is uninteresting for the general public. For science it may be of importance, but the public wants something new.*"

Precise v. understandable: about different priorities

A common complaint of astronomers is the — in their opinion — lack of precision of the media. As journalists have to think of their audience, precision has a different importance for them. In journalism, only a story that reaches the recipient is a good story. If too many details make a story too difficult to comprehend for the target audience, it may be necessary to omit facts. Of course, this can be a balancing act. Udo Zindel[4] is an author and editor for a daily radio broadcast with half-hour documentaries. He says: "*Comprehensibility ranks above precision, but is important not to falsify the facts. We do not want to broadcast anything false, as we have a reputation to lose as well.*"

How (not) to communicate with the media?

Sometimes journalists might prefer to interview the best communicator rather than talk to the best researcher. This can be irritating for the scientific community. Markus Bohn emphasises how important it is that a scientist can communicate well: "*A scientist, who is not able to convey in a few sentences what his or her research is about, is not suitable for the mass media.*" Surprisingly, quite a number of researchers come across as bored or uninterested when an interviewer asks them a question. But giving an interview is not only about facts, but also about emotions, says Bohn: "*It is important that the scientist can convey a certain enthusiasm. Anyone who talks about his research topic with the attitude: 'Certainly no one will be interested, I do not even care. It is just my job.' has no chance at all of communicating it.*" Uwe Gradwohl[5] manages *Planet Wissen* (*Planet of Knowledge*), a one-hour, daily television broadcast. He describes his ideal interview partner: "*If a guest is a good narrator, if he doesn't use academic language, if he chats a bit about his field of expertise instead of lecturing, this makes it easier for us to cover a topic.*" TV journalist Gregor Delvaux de Fenffe[6] knows that communicating with non-experts requires skill and experience — something scientists regularly underestimate, as he observes: "*Every time, when I speak to a professor and say: 'I am interested in what you are working on, I would like to communicate it to the outside world', they beam at me and say: 'I'm all for leaving my ivory tower and I am capable of communicating this project to the general public.' This is often just wishful thinking as I notice then that there's no practical experience there at all. Only a few of them are actually capable of conveying their knowledge to a school class of 16 and 17 year olds!*"

Some general recommendations

Gregor Delvaux de Fenffe knows the kind of researchers who refuse to leave the world of science very well. He recommends: "*If a scientist wants to establish an issue outside the scientific community, it has to be clear in his or her mind: 'I accept that my topic will be broken down and simplified.' Of course they shouldn't feel that the issue*

hasn't been covered properly; this has to be balanced out. It is not about hyping and distorting a topic. It is about developing a feeling for processing it in such a way that people from outside the profession will be interested." Michael Haller (1992) puts it bluntly: "*The scientist should find it proper that his data and interpretations are not only 'popularised' for lay people but transferred into a comprehension context which is strange to them.*"

Coming back to the beginning of this text: what could the Max-Planck Institute astronomer mentioned earlier have done (assuming that he did not want to appear in an article about sex waves from space)? When a journalist phones a scientist, she or he should find out for which news organisation the journalist is working and what the article will be about. These are completely legitimate questions. If the astronomer does not trust the journalist or is not happy with the direction that the questions are taking then it is better to stop the conversation. It is possible to decline to give an interview.

Of course, there are good and bad journalists — as in any profession. Udo Zindel comments on risk and quality in the communication process: "*Anyone who addresses the general public always takes a risk. A scientist can choose with whom to collaborate, but even then a residual risk remains.*" Zindel gives some precious advice: "*A good conversational atmosphere exists when the journalist and the scientist trust each other. So, as a scientist, I would expend more energy on choosing the media that suit me, than on trying to control everything.*"

Conclusion

I have roughly sketched out the changing relationship between science and the world of journalism. I have tried to explain clearly why the media viewpoint differs from the scientist's and presented views, opinions and recommendations of journalists and science communication experts that might serve as a basis to improve cooperation. For reasons of space I could not present more than a few highlights here — and many aspects had to be omitted.

However, the question is not whether a science journalist is hostile or friendly (although this can happen). A certain professional distance on the part of the journalist is a prerequisite for high quality coverage. Articles, radio documentaries or films could all be improved if astronomers and space scientists were to extend their knowledge about the media so that they can cooperate with them on a basis that is reliable and constructive for both sides.

Notes

[1] This article is a thoroughly revised and expanded version of a paper given at the 3rd Annual Ename International Colloquium, Ghent, March 2007.

[2] The communication difficulties that the scientific community had were declared to be a problem for science journalism: journalism should solve these difficulties, not science. Matthias Kohring (2005) makes the following comparison: "*This is as if organised religion expected journalism to be working for the Christian conversion of a supposedly impious society.*"

[3] Interview with Markus Bohn (Baden-Baden, 10 August 2005)

[4] Interview with Udo Zindel (Stuttgart, 9 August 2005)

[5] Interview with Uwe Gradwohl (Baden-Baden, 29 July 2005)

[6] Interview with Gregor Delvaux de Fenffe (Baden-Baden, 21 November 2005)

References

- Claessens, M. 2008, *Does Science Journalism Exist?* research*eu, 56, 2
- European Commission 2005, Eurobarometer 2005: *Europeans, Science and Technology*, (Luxembourg: Office for Official Publications of the European Communities)
- European Commission 2005, Eurobarometer 2005: *Social Values, Science and Technology*, (Luxembourg: Office for Official Publications of the European Communities)
- Hagen, W. (ed.) 2004, *Warum haben Sie keinen Fernseher, Herr Luhmann? Letzte Gespräche mit Niklas Luhmann*, (Berlin: Kadmos)
- Haller, M. 1992, *Mit großer Pose die tumbe Welt erwecken. Wissenschaft und Journalismus — vom Gegensatz zur Partnerschaft. Die Mittlerrolle des Journalisten*, in *Die Medien zwischen Wissenschaft und Öffentlichkeit. Ein Symposium der Karl-Heinz-Beckurts-Stiftung*, ed. Gerwin, R., (Stuttgart: Hirzel) 39
- Felt, U. & Kröll, J. 1998, *Ecce Homo Xerox?* heureka 1998, 3, http://www.falter.at/web/heureka/archiv/98_3/04.php
- Kohring, M. 2005, *Wissenschaftsjournalismus. Forschungsüberblick und Theorieentwurf*, (Konstanz: UVK)
- Luhmann, N. 1995, *Die Realität der Massenmedien*, (Opladen: Westdeutscher Verlag)
- Nowotny, H. 2004, *Wissenschaft auf der Suche nach ihrem Publikum*, in SciencePop. *Wissenschaftsjournalismus zwischen PR und Forschungskritik*. Ed. Müller, C., (Graz: Nausner&Nausner), 221
- Nowotny, H. 2005, *What we are really doing*. RTD info. Magazine on European Research 11, 4
- Potočnik, J. 2007, *Let's make science the next headline*, In *Communicating European Research* 200, ed. Claessens, M., (Dordrecht: Springer), 15
- Randow, G. von 2003, *Scientific Journalism – A Risky Business*, Speech on the occasion of receiving the European Science Writers Award, 2003. http://www.euroscience.net/article2.html
- Trench, B. 2008, *Towards an Analytical Framework of Science Communication Models*, in *Communicating Science in Social Contexts. New Models, New Practices*, ed. Cheng, D. et al., (Dordrecht: Springer), 119
- Weingart, P. 2001, *Die Stunde der Wahrheit? Das Verhältnis der Wissenschaft zu Politik, Wirtschaft und Medien in der Wissensgesellschaft*, (Weilerswist: Velbrück)

Biography

Diane Scherzler works as an editor and project manager for Südwestrundfunk, a major German Public Broadcasting Company. She regularly teaches Südwestrundfunk's trainees in courses lasting several weeks. Diane regularly gives media training sessions to academics and advises scientific organisations who want to improve their media strategy and collaboration with journalists. As a visiting lecturer at Tübingen University Diane teaches science communication and writing skills. More info: www.diane-scherzler.de.

Visualising Astronomy: Invisible — Impacts and Rings

Ryan Wyatt
California Academy of Sciences
E-mail: rwyatt@calacademy.org

Key Words

Visual communication
Astronomy visualisation

The LCROSS mission may have hit the Moon, but it stood out as an opportunity for public communication. *"Anticlimactic visually,"* as MSNBC commentator Rachel Maddow described it, the coverage from NASA consisted of *"some choppy pictures of the Moon becoming a somewhat different shade of grey."*[1]

Obviously, the mission faced a tremendous challenge by not having great images from the get-go. Imagine for a moment that the predicted fifth-magnitude flash had been captured by amateurs throughout the Americas, populating Flickr and other sites with a multitude of images that complemented the host of impressive releases from major observatories. But that didn't happen. Instead, NASA had a passel of low-resolution images from the trailing spacecraft, one of which showed, in mid-infrared wavelengths, a five-pixel bright blip at the time of impact. *C'est la vie — ou bien, c'est la science.*

A member of our production team attended the press conference at NASA Ames (just down the road from San Francisco, after all), and when she inquired about the availability of images, the official word was to look on the LCROSS website.[2] Yet nearly two hours after the press conference, the only images available on the site were 800-by-600 JPEGs of some of the PowerPoint slides. None of the integrated spectra that principal investigator Anthony Coloprete presented showed up on the website, although one mysteriously appeared later in the day on Emily Lakdawalla's blog for the Planetary Society.[3] As she said in her post, *"I'm hereby performing a public service by posting all the important graphics I could find, and I've added some caption information as far as I know it."* Why should this job fall to an intrepid science journalist and not the NASA team that theoretically wants to promote the good work of the mission?

Adding insult to injury, several of the images (including Figure 1) were mirror reversed! (Something I admit I didn't even notice before supplying images for educators to present as part of a PowerPoint the day of the impact: I thought they were simply rotated 180° and I "fixed" them inappropriately.) And the money shot? The mid-infrared image that showed several bright pixels at the time of impact? It was released with enlargements of itself occluding the full image, so it wasn't even possible to reconstruct the original data (again, see Figure 1).

With the highly active Museum Alliance, NASA seems to have learned to support the informal education community, but perhaps not everyone has gotten the message. I'm truly dismayed by the slip-shod approach to a project with as much potential impact (sorry, couldn't resist) as the LCROSS mission. Science centres and museums can play a small role in helping to mitigate such negative press, but not without the appropriate tools — including, especially, imagery — to do so.

Earlier in the same week as the LCROSS debacle (note that I say that from a public relations perspective, not a science perspective), a much more thorough press release from the Spitzer Space Telescope team announced the discovery of a gargantuan ring around Saturn[4]. Seen only in infrared, the ring was described by many

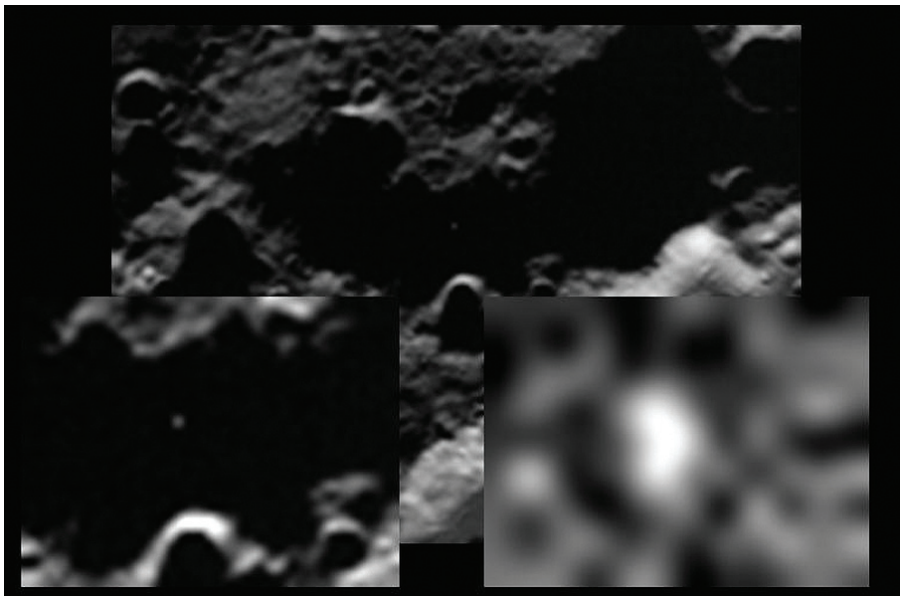


Figure 1. The mid-infrared flash detection images as released by the LCROSS team — mirror reversed and with enlargements overlaid into a single image that prevents users from showing the original image at full resolution. Credit: NASA/LCROSS

news outlets as "invisible", a true statement strictly speaking, but my anecdotal experience suggests that this word can cause confusion.

In the case of the Saturn announcement, a colleague of mine from the Steinhart Aquarium (no intellectual slouch) found himself engaged by a radio story about the discovery but puzzled when the word "invisible" came up. This got me to thinking… Biologists deal with invisible things all the time, although typically in reference to microscopic entities too small for us to see — differently invisible, if you will. And yet, of course, almost all astronomical objects are similarly invisible "to the unaided eye", as planetarians fondly say. So there's something about the word that causes people to stumble.

One can imagine a continuum of invisibility: things made visible by magnification (e.g., microbes or the moons of Jupiter), things made visible by amplification (e.g., zodiacal light or the arms of a spiral galaxy), things made visible by viewing other wavelengths of light (e.g., Saturn's newly discovered ring or the cosmic microwave background), and things inherently unseeable (e.g., magnetic fields and the curvature of space-time). Perhaps the word "invisible" most comfortably applies to this last category. Of course, the LCROSS situation suggests yet another point on the continuum: an event as opposed to an object, invisible in the sense of unwitnessed or not captured by any recording mechanism.

So, I pose this as an anecdotal observation. Added verbiage seems like the only obvious solution, so we may end up using phrases such as "invisible to *the human eye*" or maybe even simply "not visible." (I get the impression that people interpret "not visible" differently from "invisible": the former suggests a class of objects that we cannot see whereas the latter suggests a class of objects that cannot be seen. Does that make any sense? I pity the non-native speakers of English reading this…) The Spitzer press release avoids use of the word "invisible" altogether, actually, but that's only the first link in the chain.

By the bye, as far as the graphics for the Saturn announcement go, I preferred Figure 2 to the faux infrared view[5] more commonly reproduced. The images of Phoebe and Iapetus are nearly to the same scale, even if Saturn is understandably out of whack. But I like seeing wee Saturn in the middle of the gargantuan ring structure—and I appreciate seeing where Phoebe and Iapetus lie in relation to it.

Too bad it's invisible.

Notes

[1] http://www.msnbc.msn.com/id/22425001/vp/33250209

[2] http://www.nasa.gov/lcross

[3] http://planetary.org/blog/article/00002159/

[4] http://www.spitzer.caltech.edu/Media/releases/ssc2009-19/release.shtml

[5] http://www.spitzer.caltech.edu/Media/releases/ssc2009-19/ssc2009-19c.shtml

Biography

Ryan Wyatt is the Director of Morrison Planetarium and Science Visualization at the California Academy of Sciences in San Francisco, California, USA. He writes a somewhat regular blog, Visualizing Science, available online at http://visualizingscience.ryanwyatt.net/

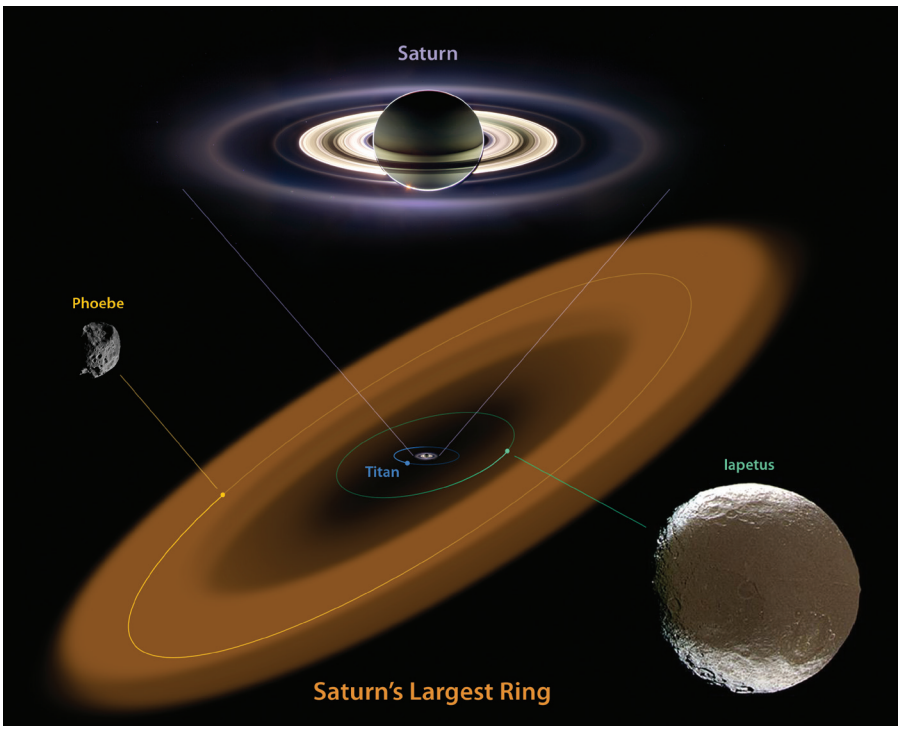


Figure 2. A graphic from the Spitzer Space Telescope team announcing the discovery of Saturn's largest ring, seen only in infrared. Credit: NASA/JPL/Spitzer

Call for Submissions to the IYA2009/Mani Bhaumik Prize for Excellence in Astronomy Education and Public Outreach

The IYA2009/Mani Bhaumik Prize for Excellence in Astronomy Education and Public Outreach celebrates the unsung individuals behind the thousands of IYA2009 events and projects that bring astronomy to the general public.

More information: http://www.astronomy2009.org/resources/prize/

CAPjournal submission guidelines

We are keen to encourage readers to submit their own articles, reviews, etc. Some key points are addressed below.

Technical and esoteric language should be either avoided or used with a footnoted explanation if absolutely required. All contributions will be made to conform to British spelling and punctuation practice. Figures and tables should be referred to 'Figure n' and 'Table n' respectively. Acronyms should be spelt in full once and then parenthesised; henceforth they can then be used as lettered acronyms. Numerals should be used for numbers greater than two words and always for numbers greater than ten.

Manuscripts should be delivered in MS Word or text (.txt) format, with no formatting apart from bold, italics, super- and subscripts. Hard carriage returns after each line should be avoided, as should double spacing between sentences. If the contribution contains figures, these may — just for the sake of overview — be pasted inline in the Word manuscript along with the caption (Word files below 4 MB are encouraged). However, images must also be delivered individually as Tiff, PDFs, vector-files (e.g. .ai, .eps) in as high a resolution as possible (minimum 1000 pixels along the longest edge).

Copyright

Authors are solely responsible for ensuring copyright clearance to reproduce illustrations, text, etc., for which they themselves do not own the copyright. CAPjournal accepts only original submissions and will only reproduce previously published work by special arrangement.

Contact

Submissions should be sent to the Editor:
editor@capjournal.com

Submit articles for one of the following journal sections:

- Announcements
- Reviews
- News
- Resources
- Innovations
- Research & Applications
- Letters to the Editor
- Opinion
- Best Practices
- Interviews

www.capjournal.org

Online issues
Free subscriptions
Article submission

Sponsors

esa

ESO