



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

Newsletter Supplement
National Liaison Triennial Reports 2006-2008
Part 1 of 2 – Armenia to Indonesia
(Part 2 contains Japan to Venezuela)

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

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TRIENNIAL REPORTS FROM NATIONAL LIAISONS

The triennial reports from the C46 National Liaisons have been collected into this supplement, and cover the three years up to the end of 2008, though many reports (including my own for the UK!) were prepared several months into 2009, so might contain information straying into 2009. This is not a problem.

Each report has required more or less editing, at the very least to attain a modest uniformity of style, though I've kept editing to a minimum. Several reports were received in plain text in emails, so modifiers of the basic Roman alphabet characters (e.g. á, ç) will have been absent – I hope that I've put all of these back. If there are any mistakes or obscurities please let me know as soon as possible and I will make amends.

To enquire about specific points in a report please contact the National Liaison directly.

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ARMENIA

Astronomical education in Armenia underwent some crucial changes during last three years. Actually, these changes began earlier when the integration of Armenia into the Bologna educational system started. The consequences are clearly seen in the educational programs of secondary and higher schools. There are both positive and negative changes, and one should try to make negative ones weaker and positive ones – stronger.

School

First of all, astronomy was excluded as an individual subject from the courses of high school and it is not a part of systematic curricula. Unfortunately no more this individual subject will be taught in Armenian schools, and it seems to be one of the worst changes in the country where professional astronomy and astrophysics achieved a rather high level. In the new program adopted by the Ministry of Education astronomy is incorporated into physics. For the ninth grade of secondary school about 30 percent of the subject physics is allotted for astronomical education. Thus the individual subject was substituted by a very limited course within another subject which is certainly not enough for acquiring astronomical knowledge at an acceptable level. It is sufficiently less compared with the previous astronomy course which was elaborated and tested for several decades.

Pupils' first acquaintance with rather limited and modest astronomical information at the Armenian school takes place in the primary classes while acquiring knowledge on the surrounding world. This process starts at the second grade and finds some kind of continuation at the fifth grade when the astronomical knowledge is taught within the subject natural history. This knowledge include elementary ideas on the structure of the Universe, Solar System, planets, etc. and is normally oriented to give pupils a clear view of the world where they live.

A very important class of the educational process is tightly connected with competitions between pupils. Every year such competitions, called Astronomical Olympiads, are organized in Armenia. Usually the first two rounds are held at schools and native towns or districts, and the last all-country round for more gifted pupils takes place at the Byurakan Astrophysical Observatory (BAO) – the only professional astronomical institute in country. As a rule two or three persons from the winners of the National Olympiad participate in international competitions. In 2008 Armenian pupils participated in two such competitions – in Yerevan where the CIS countries Olympiad (27 participants from Armenia, Kazakhstan and Russia) was organized, and in Trieste where the International Olympiad took place. In both Olympiads they won good places. It is

particularly gratifying that an Armenian schoolboy won a first rank prize in the Trieste International Olympiad with 93 participants.

In connection with the International Year of Astronomy some other activities are organized for school pupils jointly by the Ministry of Education and BAO. Usually several thousands of pupils visit the BAO every year. They are offered a tour in the observatory including a visit to the visitors' gallery of the 2.6m telescope where they attend a short (30min) lecture on astronomy. Visitors have the possibility of observing with a 30cm telescope which is re-equipped for amateurs and at present is used only for this purpose. Professional astrophysicists from the BAO give lessons in Astronomy in several secondary schools. The Government of Armenia has adopted a resolution to declare 18 September the Day of Astronomy in Armenia. Therefore on this day the BAO will be open to visitors. A one day seminar will be organized for secondary school teachers at the BAO to train them for conducting Astronomy lessons as efficiently as possible. There is another project to be held jointly with Ministry of Education and the Artists Union. A competition between the school pupils of Armenia for the best picture devoted to Astronomy has been announced. The winners will have a chance to visit the Byurakan Observatory and attend lectures given by astronomers and artists.

University

The only higher institution training professional astronomers in Armenia is the Yerevan State University (YSU). All the third year students of the Faculty of Physics learn general astronomy for one semester. At the YSU a Department of Astrophysics was founded in 1945. It was founded by the famous astronomer V Ambartsumian and existed as an individual department up to the end of last year. Just a few months ago it was joined with the Department of General Physics and at present the joined unit is named the Department of General Physics and Astrophysics. In this Department is organized a one and half year Bachelor Program for primary specialization in astrophysics. Like other specializations in the Faculty of Physics it starts from the second semester of the third year education. Normally 10-12 students attend this program. They participate in the summer practice at the Byurakan Astrophysical Observatory. Every two years a 10 day seminar is held for the first and second year students of the YSU Faculty of Physics. These seminars are aimed at directing the good students to astrophysical specialization.

Several students continue education and join the Master Program for astrophysics after achieving their Bachelor diploma in astrophysics. In 2008 four students graduated from the Astrophysics Master class and one of them was hired for working in the BAO. There are six students doing their second year Master program and four of them already have part-time jobs at the BAO and surely will work in Astrophysics after completing their MD.

Now all the educational processes for Bachelor and Master Programs take place at the YSU, though the majority of lecturers are invited from the BAO. The University and Observatory belong to different governmental agencies and sometimes difficulties arise due to such a diarchy, which impede the efficient organization of this work. A new proposal put forward by the BAO for improving this process is under consideration in the Government of Armenia. It is proposed that the professionals i.e. the Byurakan Observatory staff, organize all the educational processes for the MD program at the observatory. The Observatory should then achieve a new status of a National Educational-Scientific Center. Moreover this Center has all the possibilities for undertaking Regional responsibilities in the same field of activity. This issue is being discussed with some interested parties from the neighboring countries.

It is very important that in 2006 started the project of International Summer Schools for Young Astrophysicists which take place at the BAO every second year. Two such schools have been organized, in 2006 and 2008. Each year more than 40 young astronomers from participating countries have attended (Armenia, Georgia, Germany, Iran, Italy, Jordan, Macedonia, Poland, Ukraine, Romania, Russia, Serbia). On both occasions lecturers have been invited from Armenia, France, Germany, Italy and Russia. There were organized lectures, practical work with astronomical data, and observations. Such an outcome gives confidence that, based on Byurakan Observatory, which possesses of an advanced infrastructure and a rather professional staff. There might be organized a Regional Center for Science and Education. The third Byurakan International Summer School is anticipated to be held in 2010.

PhD program

PhD Programs for astrophysics are available both in the BAO and YSU. BAO is able to grant both PhD and DS (Doctor of Science) degrees in astrophysics. Not many theses have been defended in recent years. Two PhD students (one from the YSU and second one from Jordan) have completed their work and defended their theses in 2007. Four PhD students (two of them from the YSU and others from the BAO) have presented results of their PhD studies and most probably the Committee for Granting Scientific Degrees will consider their work in forthcoming two to three months.

It is noteworthy that many foreign PhD students have completed their doctoral researches at the BAO during several decades of its existence. After the Soviet Union collapsed and Armenia became independent this process was interrupted for a while. The international PhD program is now reopened, and international students have the opportunity for doing their doctoral work at the BAO. Most probably this program will work much more effectively when the Regional Center for Science and Education is in operation.

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AUSTRIA

Overview

Astronomy education in Austria is done by the three university institutes in Vienna, Graz and Innsbruck, together with various amateur astronomer organizations throughout Austria, and the people's education system in Vienna. Almost all of the organizations involved are members of the Austrian Society for Astronomy and Astrophysics (ÖGAA), which among other tasks organizes nationwide events complementing the local activities.

After the retirement of Prof Dr H M Maitzen in autumn 2008, Dr Thomas Lebzelter from the University of Vienna became the new National Liaison for IAU C46 in Austria.

Elementary school

The very successful activities for this age range during the school vacations in summer have been continued. At various places throughout the country events called Kinderuniversität (children's university) were held at which kids both from elementary and secondary school could listen to talks and presentations from university faculty members. Astronomers were highly involved in these activities. Scientists also visited elementary schools during the school year. These visits were often related to several day projects in the visited school classes. While astronomy is only marginally present in the curriculum, we notice a growing interest in this subject at this school level.

The IGAM (Institute for Geophysics, Astrophysics and Meteorology) of the University of Graz made a particular effort to demonstrate how the Sun can be observed with extremely simple methods. To that purpose solar scopes were bought and their functionality was taught to schoolteachers.

Secondary school

Since 2006 the various institutions intensified the promotion of astronomy in Austrian secondary schools. There is no separate subject "astronomy" in Austrian secondary schools, but the topic is partly included in physics and geography. The amount of time actually dedicated to astronomy strongly depends on the interests of the teacher. A few schools established an astronomy course as an optional discipline.

Teacher training courses on various astronomical subjects were offered in Linz, Graz, and Vienna, typically in a combined effort of local amateur groups or the local people's education system and professional astronomers. These courses were well received. Several school classes visit the University observatory in Vienna each year. Austrian astronomers gave talks in schools.

Since 2007 three Austrian educational institutions, among them the Austrian ministry for education and culture, have participated in the European Cosmos initiative, a project aiming to provide e-learning activities in sciences, with a special focus on astronomy. Several e-learning objects have been developed both by professional astronomers and by science teachers in schools, and have been made available through the web. Austrian astronomers participated also in various educational fairs throughout the country to introduce e-learning activities in astronomy to teachers and students.

The ÖGAA runs a highly successful competition for the best Austrian Fachbereichsarbeit on an astronomical topic (an optional written part of the final exams in Austria) each year.

In many schools it is foreseen that the pupils have a two to three day practical experience in a profession they are interested in. A small group of students chose the possibility to learn more about what it is like to be an astronomer and participated in the research work at the Vienna observatory.

University

Astronomy can be studied as a separate subject at the University of Vienna, and it is further offered as part of physics in Graz and Innsbruck. Three kinds of academic degrees, namely bachelor, master and doctor, can be obtained. Restructuring the master and bachelor studies is now widely finished, while a revision of the doctoral studies has just started. At the University of Vienna a doctoral school on the cosmic matter cycle started in autumn 2007 with 9 students from Austria and abroad.

The number of astronomy beginners stayed roughly constant throughout the observed time span. In the winter semester 2008/09 a lecture on astronomy for students of all faculties was read on the occasion of the International Year of Astronomy 2009.

Every year the ÖGAA runs a competition for the best diploma thesis on an astronomical subject.

Education conferences

In 2008 the JENAM conference was jointly organized in Vienna by the ÖGAA, the AG and the European Astronomical Society (EAS). Part of this conference was a half-day meeting on astronomy education with special emphasis on the preparation for IYA09. Another half-day was dedicated to an exchange of ideas between German speaking teachers. The JENAM was accompanied by an exhibition of ESO and other organizations at the main building of Vienna University.

Austrian astronomers actively participated in education conferences focusing on e-learning in Linz, Eisenstadt, and Vienna.

Observatories and planetaria

In 2008 the Department of Astronomy at the University of Vienna celebrated its 125th anniversary with a large festivity attended by the president of Austria. There were talks and an exhibition on the history of the observatory.

Beside the University Observatory, four further institutes are involved in public education activities: the Planetarium Vienna, the Kuffner Observatory, the Urania Observatory, and the Vienna Open Air Planetarium. The network of the Vienna people's education system runs the first three. The Planetarium Vienna offers several shows on various astronomical topics. In 2007 the new show Längengrad was presented the first time. Public talks and workshops on various astronomical topics were offered frequently at all three places. These institutions also participated in the daughter's day in Vienna, a yearly event to motivate girls for scientific and technical professions. In 2007 an exhibition was opened on the occasion of 50 years of the Planetarium Vienna.

The Vienna Open Air Planetarium is run by the Österreichischen Astronomischen Verein through the Astronomische Büro. In 2007 this society celebrated its 100th anniversary. It promotes astronomical observations with the unaided eye, mainly at the Vienna Open Air Planetarium (Sterngarten). Several

publications for amateur astronomers are provided, such as the Austrian sky almanac or the “Sternenbote”, regularly published since 1958.

Professional astronomers from the IGAM made a yearly excursion with the Urania amateur astronomers in Graz to the nearby planetarium in Judenburg and instructed the participants on what they can see there.

Amateur astronomy

There is a vivid scene of amateur astronomy clubs in Austria; most of them are also actively involved in public outreach. Once a year a meeting (Astronomieforum) is jointly organized by local amateur astronomers and the ÖGAA. These meetings aim to improve the dialogue between amateur and professional astronomy.

Astronomers from the IGAM gave lectures to the Urania Steiermark and other amateur astronomy associations.

Public education and outreach

An astronomy day is organized once a year to present the Austrian research and amateur institutions to the public. Typically 20 to 30 events throughout Austria attract several thousand visitors each year. In 2008 a Long Night of Science was organized in various larger cities in Austria with a strong participation of astronomy institutes. The University institute in Vienna won the prize for the best station in Vienna.

Within the programme University Meets Public several talks on astronomical topics were given by astronomers from the universities at various institutes for people’s education, among them the Kuffner and the Urania observatory.

Two conferences on solar physics were held at the University of Graz and at these the Solar Physics prize that was sponsored by a private Austrian company was given for excellent scientific work of young researchers. In total, about 100 applications for that prize were made, people coming from more than 40 countries.

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BRAZIL

Overview

The last three years experienced a considerable growth in education in astronomy, in particular in 2008 when all attention was devoted to preparing observational and scholastic activities for the International Year of Astronomy (IYA 2009). Almost 140 projects have been submitted to the CNPq financial agency, and 50% of them obtained support to develop didactic material and to promote outreach events focused on stimulating scientific vocation among young people.

Several programs in astronomy and astrophysics for graduate students have been created in both public and particular universities, as well as a new undergraduate program that has been approved by the University of Sao Paulo to be started in 2009. Numerous projects have been developed by researchers and teachers respectively from Universities and partner schools, joining efforts to improve educational methods by the use of both modern high-tech devices, such as Telescopes in Schools, and on building simple devices, which need to be both cheap and didactic. Students from secondary schools that are taking part in scientific research supervised by professional astronomers, have been stimulated to present their results during the IAU General Assembly in 2009, which will take place in Rio de Janeiro, a unique opportunity for these young scientists to participate in a such important event. It has been verified, mainly among the students participating in the Astronomy Olympiads, how significant has been their early contact with scientific research.

In October 2008 it was established in Montevideo (Uruguay) the Astronomy and Astronautics Latin-American Olympiads (OLAA) by delegates from Brazil (João Batista Garcia Canalle), Chile (Olga Hernandez de la Fuente), Colombia (Jorge Guevara), Paraguay (Christian Schaerer, Miguel Volpe and Mariano Bordas), and Uruguay (Julio Blanco and Tabare Gallardo), with the presence of the advisor of UNESCO Guillermo Lemarchand, and the online virtual presence of Mexico's delegate Eduardo Mendoza. The actions taken by those delegates were: to establish the Council of Delegates of the Participating Countries; the approval of the general statute for participation; to establish Brazil as the first venue for 2009, and Mexico as the second venue.

College and university

In 2008 the Observatory of Valongo, at the Federal University of Rio de Janeiro, celebrated the 50th anniversary of its undergraduate program on Astronomy. The book *Observatório do Valongo: 50 Anos do Curso de Astronomia* (ISBN 978-85-61648-00-8) has been published to present the history and the development of the courses, as well as the current research activities of the faculty members.

The University of São Paulo (USP) approved in 2008 a new BS degree program in Astronomy (Bacharelado em Astronomia), which is being offered by the Department of Astronomy (IAG/USP). Besides astronomy, the Bacharelado em Astronomia has strengths in physics, mathematics and computing, which prepare students for graduate work in astronomy, space science, or related fields. The program also provides a range of courses for students planning immediate employment, based on different concentrations: Instrumentation and Techniques; Space Sciences; Methods in Computational Astrophysics; Education and Public Outreach, among others. A mini-observatory has been installed at the campus aiming to provide the facilities for observational classes, and experiments for students of the University. These facilities are also offered for sky observations during public events.

IAG/USP has also been planning to offer a Master Degree program to graduated teachers, inspired by a long standing offer of courses for teacher training and successful recent participation in educational projects promoted by the Department of Astronomy. Recently, graduate and undergraduate students formed an amateur group, called Sputnik, aiming to organize sky observations in the USP campus for the University community, reaching almost 200 people per session. The Sputnik team has extended their observational activities to alternative educational projects, which have been successfully used in elementary public schools near to USP.

The Federal University of Itajubá (MG) has offered since 2006 a program on astrophysics for graduate students. According to N Figueredo (UNIFEI), this program focuses on graduate courses and outreach in order to cover all levels of education in astronomy, which have been organized in collaboration with the National Laboratory for Astrophysics (LNA/MCT).

Some theses on astronomy education have been presented, among them two PhD projects developed at the University of São Paulo: *Cosmografia Geográfica: A Astronomia no Ensino de Geografia*, 2006, by P H A Sobreira (FFLCH); and *Ensino de Física Solar no Observatório Astronômico do CDCC/USP*, 2008, by S C Aroca (IF/S. Carlos). Two Master Degrees were obtained at the Federal University of Rio Grande do Sul: *Aplicação da Astronomia ao Ensino de Física com Ênfase em Astrobiologia*, 2006, by C L V Neitzel (UFRGS); *O Uso da Astronomia Como Instrumento para a Introdução ao Estudo das Radiações Eletromagnéticas no Ensino Médio*, 2006, by C E Schmitt (UFRGS); and two others at the Federal University of Rio Grande do Norte: *Cosmoeducação: uma Abordagem Transdisciplinar no Ensino de Astronomia*, (2006), by L A L. De Medeiros (UFRN), and *Saberes de Astronomia no 1º e 2º ano do Ensino Fundamental Numa Perspectiva de Letramento e Inclusão*, 2006, by M L S De Lima (UFRN).

Hypermedia texts have been prepared in several Universities having undergraduate courses on physics and astronomy. R Ortiz made available a set of experiments on Astronomy for Science Teaching, adopted as classroom activities at EACH/USP (<http://www.astro.iag.usp.br/~ortiz/EAEC.htm>). B Santiago reported available material for two undergraduate courses on Observational Astronomy and Geodesy offered by UFRGS, as well as a new course Exploring the Universe: from Earth to Quasars. (<http://www.if.ufrgs.br/~thaisa/FIS2009/fis2009.htm>).

Secondary and elementary schools

Teacher training courses have been occurring all around the country, some of them away from the main towns, like Caranúba dos Dantas (RN), which offered courses in 2007 and 2008 by L C Jafelice, who coordinates the working group Research on Physics and Astronomy Teaching at UFRN. This group has developed two educational and outreach projects supported by the CNPq Brazilian financial agency (MCT/CNPq No. 12/2006, MCT/SECIS/CNPq No. 63/2008), focused on cultural and ethnic aspects of astronomy education.

P H A Sobreira presented the research activities on education at the Federal University of Goiania (GO) by a group composed of two faculty members, one teacher, and seven undergraduate students, which are working on astronomy, physics and geography studies.

Numerous institutions have dedicated efforts to astronomy education at levels 1-8, focused on (i) the learning process and the science curriculum, and (ii) scholastic educational projects for building models and devices. I mention here some of them, whose faculty members have reported their results during the meetings of the Brazilian Astronomical Society (SAB): ON, UNESP, UERJ, UFRJ, UFRN, UNICAMP, UEL, UnB, UFMT, UNICSUL, UNIP, FUNESO.

Attendance at the Brazilian Astronomical and Astronautics Olympiad (Olimpiada Brasileira de Astronomia e Astronautica – OBA), managed by SAB and Brazilian Special Agency with the collaboration of UERJ researchers, increased by more than 60% from 2005 to 2006. The IXth OBA received 306000 students, six were selected to attend the XI International Astronomical, and two of them received the silver and bronze medals. In 2007, the Xth OBA had 349863 participants. Five students attended the first International Olympiad of Astronomy and Astrophysics (I OIAA), and again two students received the silver and bronze medals. It is interesting to note that since 2001, the OBA participants that were selected to attend the International Olympiad have been invited to attend the annual meetings of the SAB. This contact with professional astronomers has motivated the students to continue collaborating in OBA activities, even six years after their participation. B L' Astorina (IF/USP) and F A C. Pereira (UFRJ), now young professionals, testified, during the SAB meeting in 2008, their enthusiasm in teaching astronomy based on their own experience as OBA selected students.

Observatories and planetaria

In Rio de Janeiro (RJ), the Planetarium Foundation and the Museum of the Universe offered in the last three years several courses, and promoted observational events, as reported by J M dos Santos Jr: 24 courses for teachers training (480 people); 33 outreach public courses (919 people); 1231 planetarium sessions for schools (153901 students), without mentioning public sessions; and 253 nights of sky observations (5839 people). N M de Araújo reported the results of the study of the learning process by observing the interaction of visitors with experiments. The comparison of the results obtained with and without the guidance of the museum staff provided insights on how to improve the education methodology adopted by the Museum of the Universe.

The National Center for Spatial Research (INPE) in São José dos Campos (SP) offers different kinds of courses and night sky observations using the mini-observatory of INPE. A Zodi described a new course (Programa Decolar) dedicated to selected students from a public school interested in more advanced topics on astronomy. The traditional winter course for teachers was attended by 196 participants in this period, and 400 people attended the outreach seminars (Ciclo de Palestras) that focused on highlights of the research developed by the Astrophysics group of INPE. A Milone reported that tens of thousand people have visited the Equatorial Sundial recently opened to the public at INPE. The number of visitors to the mini-observatory have been also reported: 900 people (from 40 schools from four States), and the number of remote accesses to their telescope: 2100 students and teachers (from 35 schools from 6 States), one of the groups being from Portugal.

The Observatory of UFRGS celebrated in 2006 its 100th Anniversary. During the XXXIII Annual Meeting of the SAB, C M Bevilacqua and E L D. Bica described the history and the evolution of this Observatory. In the

same University, B Santiago presented the report on activities of Observatório Educativo Itinerante, a travelling observatory for education purposes, which is presented at <http://www.if.ufrgs.br/oei>.

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CANADA

{This was only available as a PDF. I've therefore made each of the four pages into a JPEG, trimmed to remove the title and the page numbers, and copied the result here. Please note that no further editing of the text has been possible. Editor}

Overview:

This report is relatively brief because, as an International Year of Astronomy (IYA) project, we prepared a 16-page booklet *Astronomy for All Canadians: New Initiatives in Canadian Astronomy Education and Outreach*, which is available on-line (1). Since then, our main activities have been in connection with IYA; they are described below, and on our website, especially in the monthly Newsletters (2). The IYA Canada Committee consists of leaders in education and public outreach (EPO) representing professional and amateur astronomy, universities and government, business, science centres and astronomy communicators, and Canada's Aboriginal communities. The three core partners are: the Canadian Astronomical Society (CASCA: professional astronomers and graduate students), la Fédération des Astronomes Amateurs du Québec (FAAQ) and the Royal Astronomical Society of Canada (RASC), the last two being composed mainly of amateur astronomers. This three-way partnership, involving hundreds of volunteers across the country, has been the key to much of our success in IYA.

Unfortunately there are very few funding sources available in Canada for science EPO. One is the *PromoScience* program of the Natural Sciences and Engineering Research Council of Canada. CASCA, the RASC, and some local institutions have obtained support from that source, and the three IYA partner organizations have received a substantial grant from *PromoScience* to support IYA activities. Another generous donation has come from the Trottier Family Foundation, with additional support from the University of Calgary. And CASCA, FAAQ, RASC, National Research Council (NRC), Canadian Space Agency (CSA), universities, and other organizations and clubs, and their members have given much in-kind and financial support.

CASCA maintains an EPO website (3); it, and the websites of the FAAQ (www.faaq.org) and RASC (www.rasc.ca) provide information relevant to these organizations' EPO projects, as well as links to other EPO websites and resources such as those of the CSA and NRC.

Elementary and Secondary School:

Astronomy is typically taught in grades 1 (age 6), 6 (age 11), 9 (age 14) and 12 (age 17), though the curriculum differs somewhat from province to province. Few teachers, especially at the elementary level, have any background in astronomy, or astronomy teaching. CASCA's education website (3) is designed for grade 6 and 9 teachers. *Skyways*, an excellent guide for teachers, was written by Mary Lou Whitehorne, published by the RASC, and professionally translated into French (and updated in the process) in late 2005, with support from *PromoScience*. FAAQ members contribute to that organization's school programs

(described on its website), as well as to programs such as "Les Innovateurs à l'école et à la bibliothèque". Many individual professional and amateur astronomers work closely with teachers in their province or community, providing workshops and other resources – some of them in partnership with organizations such as *Let's Talk Science* (www.letstalkscience.ca). NRC has several programs and resources which support the teaching of astronomy across the country.

Ontario's secondary school science curriculum has been revised for 2009, with enhanced emphasis on science skills, societal applications, and environmental education. It includes a substantial revised astronomy/space unit in grade 9 (4), and an excellent grade 12 Earth and Space Science (SES4U) course (5). Because of the importance of supporting school astronomy education, many IYA activities and projects are intended for this purpose. As an IYA project, in partnership with the Science Teachers Association of Ontario (STAO) and the NRC, the astronomical community is developing a teacher resource to support the teaching of astronomy in grade 9. Another IYA project is the development of an astronomy kit which will likely be targeted to grade 6. It will include such materials as the IYA *GalileoScope*.

The software package *Starry Night*, originally developed in Canada, is widely used in schools (as well as by amateur astronomers). Canadian astronomy educators, especially Mary Lou Whitehorne, have developed many of the excellent educational resources which accompany and support this.

Undergraduate and Graduate Education:

The CASCA education website includes a list of universities that offer programs in astronomy (6), though almost every university, and many colleges – including most of the CEGEP colleges in Quebec – offer introductory astronomy courses, primarily for non-science students. CASCA has a strong Graduate Student Committee, which organizes an annual one-day workshop on topics of interest and importance to graduate students. Astronomy graduate students are also heavily involved in EPO.

Education Conferences:

There have been no specific conferences dealing with astronomy education and outreach, but papers on these topics are regularly presented at the conferences of CASCA, FAAQ, and RASC. Astronomy educators also present at teachers' conferences, such as those of STAO. Articles on astronomy EPO regularly appear in publications and/or websites of CASCA, FAAQ, and RASC. In 2008, the Ontario Science Centre hosted an international conference of the Association of Science-Technology Centers (ASTC), coincident with the opening of its exhibit *Facing Mars*.

Observatories and Planetaria:

There are major planetaria in Vancouver, Calgary, Edmonton, Winnipeg, and Montreal, in addition to several smaller facilities across the country. There are also science centres with substantial astronomy exhibits and programs; the Ontario Science Centre in Toronto is Canada's most popular cultural facility, and the National Museum of Science and Technology, in Ottawa, has extensive astronomy programs. Supported by Heritage Canada, the five

major planetaria have collaborated in producing shows on Origins, on Astrobiology and, for IYA, a multimedia production called *Galileo Live!*. The NRC Herzberg Institute of Astrophysics continues to maintain visitor centres and education programs at its Dominion Astrophysical Observatory in Victoria BC and Dominion Radio Astrophysical Observatory in Penticton BC. Astrolab du Mont Mégantic is a major public science facility in Quebec. The David Dunlap Observatory, University of Toronto, closed in 2008; it had maintained an active education program for many decades; a new Dunlap Institute of Astronomy and Astrophysics at the University of Toronto already has a strong EPO program.

The Tatla Lake Online Observatory (7) is one of the few facilities that can be remotely accessed by students across the country – and beyond.

Amateur Astronomy:

The RASC has 29 Centres across the country, and about 4500 members. The FAAQ has 46 clubs and over 1600 members. Both organizations, and many unaffiliated clubs have strong EPO programs; they plan to present over 2500 public and school programs during IYA 2009. They also organize star parties, both in cities for their members and for the public, and in more remote locations; the largest of these is StarFest in Ontario. The 2009 conference of the RASC will be held in conjunction with the Saskatchewan Summer Star Party. Many Canadian amateurs contribute to research in fields such as variable star observing, asteroid and comet discovery and observation. Canadian amateur astronomers have also been leaders in light pollution abatement, and in establishing dark-sky preserves, most recently in Alberta and Saskatchewan. RASC Vice-President Mary Lou Whitehorne was 2005 recipient of the Astronomical Society of the Pacific's Las Cumbres Award for outstanding EPO by an amateur astronomer.

Public Education and Outreach:

Almost every university astronomy group has programs for the public, including lectures and observatory tours. At the University of Winnipeg, for example, this has included school visits (including First-Nations schools), presentations at school science symposia, presentations about astronomy careers, "open house" at the University and other on-campus programs, programs for home-schooled students, and presentations at the Manitoba Children's Museum. CASCA has continued its CASCA-Westar Visiting Lecturer Program, which sends experienced astronomer-educators to smaller centres which do not have local astronomy resources. Two visits were to First-Nations (aboriginal) communities.

The RASC has an extensive and varied program of public education which reaches over 100,000 Canadians annually, through a wide variety of programs, many of them in partnership with other local organizations. The RASC was the 2003 winner of NSERC's Michael Smith Award for excellence in science outreach. The FAAQ's public education programs are equally extensive and, during IYA, include special "Galileo Lectures", and travelling exhibits about the history of astronomy.

Astronomy continues to be well-represented in the Canadian news media, thanks to journalists such as Terence Dickinson, Dan Falk, Jay Ingram, Bob McDonald (a member of the IYA Canada Committee), and Ivan Semeniuk.

International Year of Astronomy:

As in most other countries, the largest single undertaking in astronomy EPO has been the planning for IYA. As mentioned, that has been done in Canada by a broad-based committee from the astronomical community. Our vision is “to offer an engaging astronomy experience (a “Galileo moment”) to every person in Canada, and to cultivate partnerships that sustain public interest in astronomy”. Additionally, we encourage every amateur and professional astronomer to create or join an IYA activity that reflects their personal interests and expertise. More information can be found on our website <http://www.astronomy2009.ca>.

Among the notable projects are:

- Circulating stamps to be issued in April 2009.
- A national “Galileo’s Legacy” lecture series.
- Astronomy-themed arts programs by groups such as Toronto’s Tafelmusik Baroque Orchestra, and the Toronto and Victoria Symphony Orchestras.
- A curated collection of the very best astronomy images taken by amateur and professional astronomers in Canada.
- Astronomy “trading cards”, planispheres, posters, and a book *Mary Lou’s First Telescope* produced under the leadership of the RASC.
- Special EPO projects and resources produced with and for Canada’s Aboriginal communities.
- An astronomy writing competition for school and university students.
- A legacy of dark sky sites across the country, in cooperation with parks, and with Aboriginal communities.
- In Toronto, engaging astronomy posters were placed in hundreds of buses and subway cars in the public transit system.
- Over 2500 school and public lectures and star parties, displays, and other events across the country.

References:

- (1) <http://www.astro.utoronto.ca/percy/finalastrodoc.pdf>
- (2) <http://www.astronomy2009.ca>
- (3) <http://www.cascaeducation.ca>
- (4) http://www.edu.gov.on.ca/eng/curriculum/secondary/science910_2008.pdf
- (5) http://www.edu.gov.on.ca/eng/curriculum/secondary/2009science11_12.pdf
- (6) http://www.cascaeducation.ca/files/teachers_postres.html
- (7) <http://www.chilcotin.bc.ca/observatory/>

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CARRIBEAN GROUP

Overview

Even as I write this triennial report for the fourth time – the first being in 1999, then 2003, and 2006, I decided to take a holistic view of the development of astronomy in the region over the last decade with the focus of course being the last triennial period 2006-2008. I could now by way of these brief reports, which

captured the most salient points of astronomy activity in this region, see what has been going for the past decade and get a feel for what has worked for us and what has mitigated against progress. After 10 years, our insurmountable problems, and our strengths, begin to glimmer through the passage of time. It is in this spirit, this report is being done. Despite it being for the most recent triennium, it represents a decade of reflection on astronomy in the Caribbean – serendipitously coinciding with it being the International year of Astronomy 2009.

Elementary (primary) school

A decade ago, astronomy was non-existent at the Primary school level and the first mention of its presence appears in the 2006 report. Within the last three years, it is still on the primary school syllabus and the situation has somewhat been on a plateau for some time. There is not a high level of interaction with astronomy with the children at this level from the school perspective. I have been invited to a few schools and CARINA (Caribbean Institute of Astronomy) officials have also sporadically given a few lectures and presentations. There is no organized effort to improve the situation here, and this is a yellow flag in retrospect that more can be done and needs to be done at this level.

Secondary school

Over the decade, the Caribbean region moved from A level physics in high schools to a local equivalent examination CAPE. Astronomy is not present in any format in this new Caribbean syllabus. However, in 2008, due to the efforts of one of the members of the Trinidad and Tobago Astronomical Society (TTAS), Gerry Barrow – an avenue is now available for high school students interested in astronomy. Mr Barrow has instituted a quiz in Astronomy for high school students which is very popular. Out of this effort, an arm of the Astronomical Society, the Astronomy Club has developed that meets monthly. The efforts are driven by the students and simply guided by Mr Barrow. He also helps them in establishing astronomy clubs in schools and organizing training sessions for the students. The Astronomical Society holds an annual summer camp for high school students in astronomy as well.

The National Science Centre in Trinidad has strengthened its outreach efforts in astronomy by going out to remote village areas in Trinidad. They set up an astronomical club about a year ago that meets twice a month and has viewing sessions with their two 12-inch telescopes.

College and university

A decade ago, I wrote morosely that our astronomy course at the University of the West Indies (UWI) typically had about 15 students and said that perhaps it was the lack of applicability of the field in the region that caused students to stay away from the course.

Today I taught the same course with some 80 students in my class. And it has been that way for the current triennium under review. Part of the reason has been the overall increased student intake at our campus. Part of it, I cannot help but believe, is the inherent student interest in this course.

Currently for the first time in several decades, a new course Introduction to Astronomy, a course for students who are non-science majors, is being proposed at the UWI. There is a twinkle in the eye for establishing a minor in astronomy but that may yet be too ambitious in terms of market needs for the degree programme.

What the passing years have shown is that as much as we can dream big and make things happen, we have limitations that spiral us back to our equilibrium based on regional needs and human resources available locally.

Development of astronomy at the other campuses of the University of the West Indies in Jamaica and Barbados has essentially been on a plateau with no new development but maintaining the existing portfolio.

We cannot speak of astronomy at the University without delving into the research being undertaken. Over a decade ago, I had just completed a PhD, and returned home from the University of Virginia, starry-eyed and

thinking that all things are possible once the will was there. A decade of hurdles, the unexpected successes and experiences cause the expectations to be more sobering.

I returned home to establish observational astronomy for the first ever in Trinidad. It was an extremely steep learning curve, one that showed that in a developing world, one's biggest downfall was not always a lack of financial resources but rather lack of human resources. Trinidad with an oil based economy was one of the richer islands in the Caribbean. The lack of adequately trained persons working in the field of Astronomy affected us time and time again and became the deciding factor in successes and failures in our ventures. Perhaps there was merit and virtue in just doing theoretical astronomy as one trudged along alone in this part of the world. Volunteer effort is the hallmark of growth of astronomy in such cases. It was the goodwill of volunteer student Derrick Cornwall that brought the project on monitoring of quasar OJ287 to a level of fruition. For this triennium report, our observatory SATU did record the predicted flares from the binary black hole model for OJ287. Our telescope coughed, sputtered, and wheezed but spit out useful data. This project, led by our colleague Prof Mauri Valtonen from University of Turku, Finland, was listed as one of the top 100 science stories for 2008 in Discover magazine. It did put a pep in our step that we in our tiny corner of the world were a part of that.

The worsening crime situation in the country and the increasing lighting of the campus in a desperate bid to combat it does not auger well for astronomy research on the Physics Department's rooftop.

Serendipity is often the necessary ingredient in development of astronomy where there may be no formal infrastructures in place. Three students attending the ISYA in Mexico in 2005 put us in touch with some of the leading researchers in astrobiology. Here our natural resources were not just the 90% of the sky we always touted we had access to, but mud volcanoes and the pitch lake – only one of 3 natural tar pits in the world. Two students are presently on that project and it has caught the eye of the international community and the BBC did a feature on it in their Science in Action, and the Discovery channel also featured the project in a segment on Life in the Solar System.

Education conferences

There is none to report in this triennium. This is in keeping with the entire decade – only in 2000, a two day workshop for teachers was held in astronomy.

However on a related note, a presentation at the General Assembly of IAU in 2006, was made on Caribbean Astronomy – the View from the Ground Up. It is interesting to note that Trinidad and Tobago was not even listed as countries in the drop down menu for registration, heralding our absence in the world of astronomy in an ironic twist.

Observatories and planetaria

Observatories in the Caribbean region are located in Jamaica, Barbados and Trinidad. The Jamaican observatory as mentioned in the last report has not been revived since the onslaught of hurricanes there. The situation remains the same. The Barbados observatory houses a 14 inch telescope and is operated by the Barbados Astronomical Society. It is used for mostly amateur viewing. In Trinidad, over this triennium, SEAS (Sea, Earth And Sky) observatory has closed down. This was a privately owned facility in Tobago. The SATU observatory at the St Augustine Campus in Trinidad continued to be operational with it being dedicated to monitoring the Quasar OJ287. In order to make the campus safer for students, the University has improved lighting on the campus at St Augustine. Moving the telescope could be an option, but one would still hit a wall, in that dark isolated locations suitable for astronomy also tend to be unsafe. There is also the Barrow-Imbert observatory at the Mt St Benedict on a mountain top near the University. Again, due to the safety issues in the country, it is barely used.

The National Science Centre has now obtained two 12-inch telescopes and a second planetarium. There has been clear growth in astronomy outreach at the Science Centre in Trinidad. However, it is to be noted that the astronomy groups, TTAS, CARINA, and the Science Center – all have their base in Trinidad. The other campus islands, Jamaica and Barbados have societies as well – but where does this leave the dozen or so other islands with no active astronomy in them? At the launch of IYA, it was said with pride that “We in

Trinidad have the only Science Center in the Caribbean”. A deeper reflection on the statement shows that this is actually a tragic situation for the children of the rest of the Caribbean. In the next triennium, this area must be given greater effort. It is the nature of being islands separated by huge expanses of water that leads to our peculiar situation that militates against effective communication and outreach of science.

One way to address this issue has been through the avenue of locally produced documentaries highlighting astronomy which are aired across the Caribbean, reaching large number of viewers in even remote areas, and available to schools and overcoming the limitation of distant islands. However, documentary production is an expensive business and that becomes a major limitation.

Amateur astronomy

Amateur astronomy is mostly facilitated by CARINA, the Caribbean institute of Astronomy, the astronomical societies in Barbados, Jamaica and Trinidad and the National Science Centre in Trinidad. Communication among the different bodies and across the islands is less than desirable. Preparations for the International Year of Astronomy 2009 has definitely helped the situation with all stakeholders having to liaise with the local node CARINA. The activities of the amateur societies have been reported under the different sections above.

Public education and outreach

All stakeholders in astronomy continued to be involved in public education and outreach. The astronomical societies continue to hold their monthly meetings, viewings and lectures. The Science Center has increased its astronomy outreach components and offers the services of an astronomy club for rural schools.

In the last triennium, the UWI at the St Augustine campus continued to host lectures from visiting astronomers and invited Prof Paul Davies for a distinguished lecture series which was very well received.

Star parties by CARINA continued to draw huge crowds and was a sellout event each year with requests for other such similar events. There were over 450 persons attending the last event.

On issues of public interest like eclipses, the media was properly advised and we did interviews on the local television channels. One myth that became necessary to dispel time and time again was that of the folklore associated with eclipses in this part of the world which says that if a pregnant woman walked during the eclipse, her baby would be born with a cleft lip. Despite the assurance that there was no scientific basis in this, many chose to take the “safer” option and stay indoors during eclipses, thus missing a beautiful spectacle but also showing the challenge that astronomy has against deeply embedded cultural roots.

The future

I sit speculating where the next ten years will find the Caribbean region in the development of Astronomy. From two students graduating in over a decade in the region in astronomy, to a situation where there are currently three students registered for astronomy research degree programmes, and another that recently graduated, means we are certainly making strides forward as slow as it might be. With ISYA being held in 2009 in Trinidad and us developing stronger ties to the IAU will auger well for future developments in astronomy. The world has changed in 10 years, and what was not possible in research at small institutions is now possible with development of technology and the explosion of the internet. A colleague who can instantly respond to an email at 2 AM in the night from Finland is closer than one in an office next door. Or when one works on a conference paper across Finland, USA and Trinidad in real time, we have much fewer limitations than we used to. We have fewer excuses but then the same enhanced opportunities that we have, so does the rest of the world.

So, for the Caribbean region, is it always going to be about playing a catch up game? Not necessarily so, as the last decade has shown. What we need to do, is to recognize our situation and circumstances and to pick our astronomy missions, research and otherwise, carefully, given what we have the capacity and capability for, as modest as they may seem. And if not on a global scale, making a difference right here at home in the Caribbean region is the most noble aim and aspiration we can have.

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CROATIA

General information

The school system in Croatia consists of obligatory elementary school (8 years), partially obligatory secondary schools (3-4 years) or gymnasiums (4 years), high schools and universities.

Since 2005 new educational curricula prepared in accordance with the Bologna declaration are used at most Croatian universities. In this European-wide system, there are 3 phases of the study. Undergraduate courses take 3 years and end with a bachelor degree, followed by 2 years of graduate studies ending with the master title, followed by post-graduate studies which last 3 years and end with the doctor title. In primary and secondary schools astronomy can be offered as a non-obligatory course, depending on teachers desire to offer it. There are also new possibilities in studying astronomy at the University of Split. Croatian astronomers and teachers involved in teaching astronomy are gathered around the Croatian Astronomical Society (CAS) which currently has around 100 members, about half of whom are scientists; the rest are mostly school professors and teachers.

Elementary school

Basic astronomical facts are included in courses on life science, geography, physics, and mathematics. The astronomy can be offered as a non-obligatory course from the first school year up to the final 8th year. A curriculum for such courses is prepared by CAS in cooperation with the Croatian ministry of education and sports. A few basic books targeted at pupils of various ages do exist, and new ones appear from time to time. There is also a good base of translations of popular books from all parts of the world.

Secondary school

Again, basic astronomical facts are included in courses of geography and physics. Astronomy can be offered as a non-obligatory course for which the curriculum is produced by CAS. This curriculum is of modular design, starting with basic astronomy and covering celestial mechanics, Solar System, galactic astronomy, and astrophysics. The modules can be freely chosen by the teacher so that he or she can adjust the content and the level of his/her lectures to the students.

Several books targeted at secondary school students are widely used. All schools now have Internet access, so part of the learning can be done with Internet-available material, both in Croatian and in English.

Teacher training

This is organized as courses, each several days long, offered by the Education and Teacher Training Agency (ETTA), which is institution formed and coordinated by the Croatian ministry of education and sports. There are several such courses yearly. The Visnjan Science and Education Center (VSEC), a non-profit organization formed a few years ago by the astronomical observatory of Visnjan, also offers some teacher training in astronomy and other natural sciences.

Gifted children

These children are being cared for by special programs supported and supervised by the ETTA, delivered mostly by CAS staff, and in many cases also by members of several amateur astronomers clubs that exist in Croatia. Astronomy contests for pupils from elementary and secondary schools are organized yearly. The contests have 3 levels (local, regional and state). Children are required to show their knowledge of astronomical facts and to present their own practical work at the regional and state contests. The most

successful pupils at the state contest are invited to participate in one of several summer schools of astronomy that are offered by several different organizations in Croatia. Some are also offered to be a part of team that represents Croatia at the Astronomical Olympiad.

The traditional summer school of astronomy organized by the Zagreb astronomical observatory is now in its 39th year and offers courses in basic practical astronomy to pupils from the 5th class of the primary school upwards. At the VSEC is the traditional Visnjan school of astronomy which is targeted to more advanced participants (secondary school-university age). This school is international in character and hosts participants and lecturers from Croatia and abroad. Students are also given access to the resources of the Visnjan observatory to carry-on their own projects. Former participants of Visnjan activities form a solid mentor base open to the students that need professional advice. VSEC also initiated, and offers active support to the Croatian Meteor Network (CMN), a grid of about a dozen dedicated meteor cameras that are mostly operated by school teams (a teacher as a supervisor and a few pupils as operators). CMN offers teacher and pupil training too.

VSEC also organizes EUREKA, a yearly multidisciplinary science contest for secondary school pupils, at the moment the only croatian science fair. Practical work from all areas of science are accepted including astronomy, and a multidisciplinary approach is highly encouraged. Pupils submit their work directly to EUREKA, thus securing the most open access for all.

University education

At the University of Zagreb a few astronomical courses are offered in the final year of graduate study of physics. The University of Split now offers graduate study in astrophysics, with a strong international base of guest lecturers. The pre-requisite is the BSc in physics, which can be obtained at the same university, or some other university in the country. Geodesic astronomy is an obligatory course at the Geodesic Faculty of the university of Zagreb. Some observational work is also possible at the Hvar observatory. The Observatory of Visnjan offers access to the equipment and professional support free of charge.

Public education

Croatia has two planetariums (Zagreb and Rijeka) and several public observatories (Visnjan, Kutina, Pula, Rijeka and Zagreb). In addition, there are about a dozen amateur astronomical societies scattered all over the country. These societies also offer observing and other astronomy-related activities to the general public from time to time. Croatia also has a long tradition of an Astronomy Day, with many activities organized for the general public by the CAS and amateur societies countrywide.

Internet

All schools and universities can use extensive Internet resources (usage is free of charge for all educational and scientific institutions), and several excellent Croatian Internet sites devoted to the natural sciences, including astronomy, exist and are constantly expanded and updated.

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CUBA

Overview

Cuba is included in the International Astronomical Union as an *interim* member.

There is not a working National Committee, but astronomy is developing by professional and amateur astronomers working in specific directions.

Elementary (primary) school

At primary school level the Pioneer's Palace in the neighborhood of Havana city continues its activities teaching astronomy to visiting schools from Havana city. This is a stable and significant source of astronomical information for primary schools, supported by the Institute of Geophysics and Astronomy.

Secondary school

(Not considered.)

College and university

The Institute for Applied Science and Technology and the Faculty of Physics of the Havana University are the main locations of astronomy professionals. In 2006-2008 at least 3 students have received training in astronomical research. One of these students prepared and successfully defended his diploma work in an astronomical subject.

There are 3 graduate students preparing their doctoral theses in México, Venezuela and Spain, in topics related to astronomy (water masers, long period variable stars and symbiotic stars).

In 2008 there was Cuban participation in the CURCAA (Central American Courses on Astronomy and Astrophysics).

Education conferences

There were conferences related to astronomical topics organized by the Faculty of Physics of the Havana University, the Institute for Cybernetics, Mathematics and Applied Physics, The Institute for Applied Science and Technology, and the National Museum of Natural History.

Observatories and planetaria

The number of observatories does not change. The Astronomical Observatory in Arroyo Naranjo, the Solar Optical Observatory in Cacahual, and the Radio-astronomical Station (CUBA in SGD) are operative, and the Havana University Astronomical Observatory is been considered for general repairs.

The Planetarium in Isla de la Juventud was destroyed by a hurricane in 2008. A new one is under construction in Havana City.

Amateur astronomy

Amateur astronomers work mainly on observing meteors. Sustained work during 2006-2008 in this area allowed use of the data in astronomical research. The groups meet twice a year in different cities in Cuba, providing starfests with great success.

Public education and outreach

Some video materials related to astronomical topics were presented by TV programs during the period.

Other public events

Not considered.

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CZECH REPUBLIC

General information

The astronomy education and particularly the public popular lectures and popular texts have a long tradition in the country, reaching back to the Age of Enlightenment in the 18th century. The following sections bring a short but not complete overview, slightly extending beyond the limits of the triennium 2006-2008.

Primary and secondary schools

Astronomical topics are included in general natural history in the 5-6th class (gravity, motions of Earth and Moon, configuration of the Earth, Moon and Sun, apparent daily motion of the Sun, lunar phases). In class 7-8 it is planetary system, meteors, comets, magnetic fields, and fundamentals of mathematical geography. The study programmes of secondary schools (classes 8-12) incorporate astronomy into physics, and the topics are Kepler laws, magnitudes of stars, spectral classes, thermonuclear reactions in the Sun and stars, stellar evolution, structure of galaxies, Hubble's law and the expanding Universe. Unfortunately most of these topics come shortly before the leaving examination, so that there is usually less time to teach them than had been originally intended.

Universities

Astronomy or Astrophysics as a major degree programme is offered at the BSc level at Silesian University in Opava (<http://nora.fpf.slu.cz/betaweb/>) and at West Bohemia University in Pilsen (<http://www.kof.zcu.cz/>), at the BSc and continuing MSc level in Prague (Charles University of Prague, <http://astro.mff.cuni.cz/en/>), and Brno (Masaryk University in Brno, <http://www.physics.muni.cz/drupal/?q=utfa>). At least one semestral astronomy course is obligatorily incorporated into all the study programmes for intended teachers of physics. About 10 students get the MSc degree in astronomy (major) each year. Astronomy has an important position also in the education of seniors in the University of the 3rd Age (about 300 senior students each year).

Academy of Sciences of the Czech Republic

The Astronomical Institute of the Academy collaborates closely with the Charles University of Prague and the Masaryk University of Brno; practical training in observations is offered to students of the MSc degree, and the education of PhD students is organized by a common University-Academy Council in Theoretical Physics and Astronomy. For public visitors, the Institute develops its own educational programme – annual day/night of open doors, and educational pages on the website (<http://www.asu.cas.cz/>).

Education conferences, meetings, workshops

The highlight of the period 2006-2008 was without any doubts the 26th General Assembly of the IAU in Prague in August 2006, with several of its sessions devoted to education in astronomy, and with an extended spectrum of accompanying activities. The Teachers Day immediately followed the GA. About 80 university and secondary school teachers of mathematics and physics from the Czech Republic, Poland and Hungary met for 2 days in Olomouc, the site of the oldest Moravian university. (The astronomical focus of this town is connected with the Renaissance astronomical clock which was rebuilt in the socialist artistic style after the damage at the end of the WWII.) The main topics were reports about news on the GA, observational evidences of black holes, and the turbulent discussion about the status of Pluto.

The annual plasma and astronomy workshop (PAW) is intended mainly for students of the Technical University of Prague; the 12th PAW took place in March 2009.

Public observatories and planetaria

Thousands of people each year continue to visit the public observatories and planetaria, of which the largest are in Prague (Stefanik observatory <http://www.observatory.cz/>, and Prague planetarium <http://www.planetarium.cz/>, with exhibitions of historical instruments of the 18th and 19th centuries), Brno Observatory and planetarium of M Kopernik (<http://www.hvezdarna.cz/>), Ceske Budejovice (together with

the Observatory Klet, <http://www.hvezcb.cz/>), Hradec Kralove <http://www.astrohk.cz/>, Upice <http://www.obsupice.cz/>, and Valasske Mezirici <http://www.astrovm.cz/>. Their educational programmes are coordinated in the pages of the Association of Public Observatories and Planetaria, a corporation of 19 institutions from the Czech and Slovak Republics. The courses, lectures etc. are available on the corresponding websites.

Educational websites in astronomy

Three other extensive educational websites are to be mentioned: <http://www.astro.cz> (of the Czech Astronomical Society), ALDEBARAN (<http://www.aldebaran.cz>) with plenty of downloadable video records of lectures at the Technical University of Prague, and at the West Bohemia University in Pilsen, <http://astronomia.zcu.cz/>. The Czech Astronomical Society has also a forum on education of astronomy.

Other initiatives

Since 2002, the Czech Astronomical Society has organized Astronomical Olympiada (<http://olympiada.astro.cz>). In the school year 2006-2007 there were about 5000 respondents of ages between 9 and 18 years. This Society maintains its own website <http://www.astro.cz>, and coordinates Czech participation in international activities like the campaigns of Venus and Mercury Transits, the International Heliospheric Year IHY 2007 (<http://ihy2007.astro.cz>), and the International Year of Astronomy IYA 2009 (<http://www.astronomie2009.cz>).

Since 1997, the successful online journal, Instant Astronomical News (<http://www.ian.cz>), with 757 issues already, brings not only news but also educational tools of practical significance (the asteroid 9665 bears the name InAstroNoviny).

In 2004, the Bruno H Bürgel Prize for excellent popular representations of astronomical research results was awarded by the Astronomische Gesellschaft to Ing Antonin Růkl, former director of the Prague planetarium. The Dr Zdenek Kviz Prize of the Czech Astronomical Society, intended for outstanding studies of meteors, variable stars, and for outstanding teachers, was not awarded for merit in education in the period 2006-2008.

We deeply regret the untimely death of Zdenek Pokorny (1947-2007), former director of the Observatory and planetarium of M Kopernik in Brno, who devoted all his time to the educational programmes at his observatory and at the Masaryk University in Brno. He wrote many excellent popular books about solar system bodies and interesting problems in astronomy. In his honour the asteroid No. 10205 bears his name.

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EGYPT

This report is a complementary one in which only changes only since the last report are mentioned.

Primary and secondary school programs, concerning astronomy, are the same as in the previous reports.

Colleges and universities

There are two main changes.

1 The credit hour (ch) system is now applied to graduate studies (MSc and PhD). Concerning astronomy and space science, this system reduces the period of the pre-MSc studies from one academic year (about 40-study weeks) to two terms each of which contains 14 weeks (total 28 study weeks). The result is a shrinking of the scientific material given to students to 70% of the material in the old system. However, the MSc is awarded for 36 ch (18 ch for courses, plus 18 ch for a thesis). For a PhD student, he (or she) should pass an exam for 4 ch each term, for four terms (two terms each year) before submitting his (or her) thesis.

So, the total period for the PhD is at least, two years. A PhD is awarded for 60 ch (16 ch for courses plus 44 ch for the thesis). This is completely different from the old system which is still considered, by most of the staff members, as more convenient for graduate students than the ch system.

2 In the Faculties of Education, a new course, Introduction to Space Mathematics has been added to the program of the mathematics departments (3 ch). This course is given to students in the sixth term. The course contains: spherical trigonometry, geographic and celestial coordinate systems, measure of time and distances, and equations of stellar structure and evolution. This is to prepare teachers to teach astronomical topics attached to the mathematics program in secondary schools, when requested.

Two main events

Two main events, in the period 2006-2008, attracted the interest of astronomers, students and amateurs. The first was the IAU-Symposium 233, which was held in Cairo 31 March to 03 April 2006, on the occasion of the total solar eclipse of that year. This eclipse was been observed from El-Sallume city (west of Egypt, near the Libyan border). This eclipse attracted many astronomers and amateurs, from across the globe. For more details, please visit the web site <http://www.iaus233.cu.edu.eg>. Many of the Symposium participants have observed this eclipse. At the end of this symposium, there was a session for education of astronomy and space science.

The second event was the First Middle East and Africa IAU-Regional Meeting, held in Cairo 05-10 April 2008. The meeting included a session for education of astronomy in Africa and Middle East, and another one for training young astronomers from Africa and the Middle East. For more details, please visit the web site <http://www.mearim.cu.edu.eg>. Many students and amateurs have attended this meeting.

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ETHIOPIA

Basic Astronomy Education and Research in Ethiopia is yet in its infancy compared to what is being done in a lot of other countries. However, in the last couple of years there have been a few promising developments particularly in the higher educational sector.

The Astronomy/Astrophysics Group at Addis Ababa University (AAU) has started training postgraduate students at the PhD level. The training is expected to help bolster the effort being made to disseminate quality astronomy education in the country by well trained Ethiopian nationals. Currently there are two registered students working on theoretical projects. This number is expected to double in a few months' time. Our hope is that these will be joined by a group of Ethiopian students being trained in experimental astronomy in South Africa. The Astronomy/Astrophysics Group at AAU, the only such group in the nation, is developing a new pulsar theory based on a non-conventional source for neutron star magnetic fields.

The Astronomy/Astrophysics Group at AAU has recently received a grant from TWAS for initiating experimental astronomy in Ethiopia. This will be done in close collaboration with The South African Astronomical Observatory (SAAO). Dr David Buckley (SAAO & the South African Large Telescope) has kindly offered to help in site testing experiments to be conducted at selected sites in the country.

For the first time in the country's educational history, the Ministry of Education has agreed to include four core courses in astronomy/astrophysics into its National Undergraduate University Curriculum in physics (at optional level). These courses include two basic astronomy courses to be given to freshmen, and two courses on stellar structure (stellar physics) to be given to 3rd year (graduating) students. This is a good indication that the effort to spread astronomy education in the country is gathering momentum. These courses are only being offered at Addis Ababa University. The other twenty or so universities in the nation are not offering these courses.

The Ethiopian Space Science Society (ESSS), a civic society of Astronomy enthusiasts invited Dr Peter Martinez (SAAO) to visit Ethiopia from 02-05 January 2009. Dr Martinez gave talks at a couple of places in the country on the topic of relations between space science research and technological development. These talks have given a lot of enlightenment to the audience and created excitement amongst students and faculty.



Dr Martinez giving a talk at a lecture hall in the science faculty

Dr Martinez also visited a site on top a mountain on the outskirts of the City of Addis Ababa. ESSS is intending to build a telescope facility on this site for the purpose of public education. The meteorology of the region, mostly cloudy, makes it very difficult to conduct quality research from this site.



Dr Martinez visiting the future telescope site

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FINLAND

General information

In Finland astronomy has for a long time been very popular. The number of members in amateur astronomical societies is still increasing.

Elementary and secondary schools

There are no true astronomy courses, and the subject is only touched on in the geography or physics courses. Although the astronomical material in textbooks is mostly correct, the content may sometimes give false impressions. Also there are some common errors that the writers just seem to copy from previous books. In the secondary level, many schools give special astronomy courses, but that depends on the work of a few enthusiastic teachers. Also some professional astronomers have given many brief courses in astronomy in several schools.

In 2008 the universities of Turku and Helsinki arranged an astronomy contest for school children. The pilot project included only a small number of schools, but there are plans to expand the contest and participate in the international astronomy Olympics.

University education

Astronomy is taught in three universities, in Helsinki, Turku and Oulu. Some courses are taught in half a dozen other universities. Annually a few PhD theses are accepted. The Finnish university textbook has reached its fifth English edition (Fundamental Astronomy), and was recently translated also to Korean.

Public education

The number of amateur astronomers in Finland is exceptionally high, and their organization, Ursa Astronomical Association (<http://www.ursa.fi>) has a very important role in public astronomy education. At the end of 2008 it had 14 600 members. Some 4000 people have visited Ursa's portable planetaria every year. Ursa is also an important science publisher that concentrates on quality while big publishing companies are mainly interested in international bestsellers.

In Finland there are two big planetaria that show mainly foreign movies, the emphasis being more on entertainment than astronomical education. In 2008 two more planetaria were opened, one near Jyväskylä (see <http://www.kallioplanetaario.fi>), managed by a group of very active amateur astronomers, and another one near Turku at the Tuorla Observatory, which belongs to the University of Turku (<http://www.astro.utu.fi/planetarium>). Both have digital Evans & Sutherland Digistar projectors. The Tuorla planetarium is run by professional astronomers, and in addition to movies it shows educational programs produced by the own staff. Both new planetaria have attracted a lot of visitors, particularly school classes. The Tuorla planetarium opened in October, and during the three months in 2008 there were already some 5000 visitors.

In 2004 Tuorla Observatory started to plan a visitor centre with a bigger planetarium and lecture halls. Unfortunately, progress has been slow, but now there is some hope for funding. One reason is the popularity of the current planetarium. The new building would also have space for a new ESO centre that will employ several astronomers.

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FRANCE

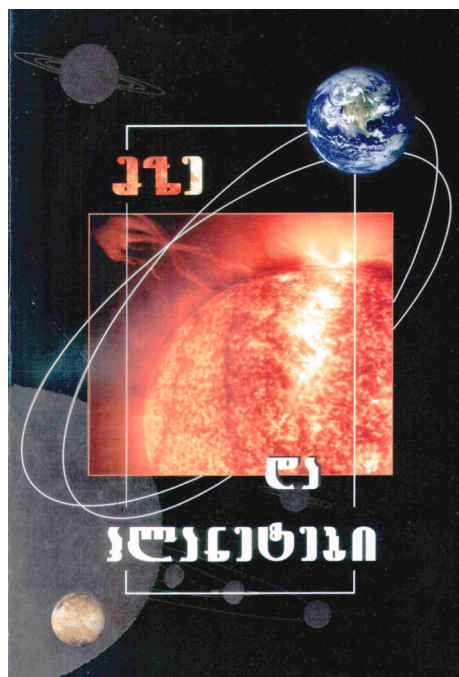
*(There was a change in the National Liaison for France towards the end of the reporting period, and it was not possible for the new Liaison to cover the reporting period 2006-2008 in time for the forthcoming IAU General Assembly in Rio de Janeiro. The next triennial report from France will cover the years 2009 to 2011.
Editor)*

GEORGIA

According to the reform of the system of education in Georgia, astronomy has been withdrawn from the list of required subjects in the secondary schools. At present the curiosity of students about astronomy can be satisfied by public lectures carried out by the GNSF (Georgian National Science Foundation) in various towns of Georgia and particularly during excursions to the Abastumani Observatory.

The Abastumani Observatory annually publishes, in the Georgian language, the Astronomical Calendar. The well-illustrated books *Our Galaxy* and *The Sun and Planets* have been published in Georgian.

The Astronomical Association of Georgia (<http://www.observatory.iliauni.edu.ge>), under the sponsorship of USIDE (United States Agency for International Development), founded a museum in the Abastumani Observatory, where various exhibits are presented, and where the visitors can listen to lectures in astronomy and acquire souvenirs.



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GERMANY

Germany presents a rich and diverse landscape of astronomical activities. This offers chances for advances in many outreach activities, but also occasional problems, often in coordination. In this overview, I report on the structure of German astronomy, as well as formal and informal aspects of astronomy education. I conclude with some remarks on the progress of the ongoing International Year of Astronomy 2009.

General aspects

Astronomy education is part of the educational situation in general. Ongoing changes in this general framework influence astronomy education, not always positively. Germany is characterized by significant demographic changes, most importantly a decline a birth rate and a fairly high rate of immigration. Both trends have profound effects on education in general and astronomy education in particular. Education in Germany is made more diverse by the country's federal structure: the 16 states forming the federal republic are the entities in charge of education. Thus, the conditions for astronomy education differ from state to state.

The situation is still somewhat special in the 5 formerly communist New States that joined the federation after the breakdown of the GDR (German Democratic Republic, East Germany) in 1989.

Professionally, astronomy is taught at 37 research institutes and universities. Usually, it is a part of physics, and many Departments of Physics and Astronomy are found at major universities. Max Planck Institutes and a few state observatories focus more strongly on research, but are still involved in teaching. The Council of German Observatories is a loose association of the professional institutions, while most German astronomers, mostly researchers, but including a number of teachers, amateurs and planetarians, are organized in the Astronomical Society. This dual structure leads to complications and sometimes makes it difficult to say who actually represents astronomy and astronomers in Germany.

Many amateur astronomers are organized in clubs. A probably incomplete count shows 148 astronomy clubs and public observatories all over the country, ranging from large, well equipped observations – two run 1-meter telescopes – to small associations consisting of a few people only. Most amateur organizations, besides pursuing sometimes quite sophisticated observational programs – are involved in outreach at some level. The umbrella organization of German amateur astronomers is the Association of Friends of Astronomy, with about 4000 individual and institutional members. The association has 18 sections, ranging from meteor observations, studies of planets, comets and deep sky objects, to astrophotography and spectroscopy. A journal is published, and the association organizes the annual National Astronomy day. German amateurs have excellent resources for teaching in terms of expertise, knowledge and instrumentation. However, one has to keep in mind that almost all amateur astronomers are working on a voluntary basis and have – sometimes heavy – other obligations.

Similar to most European countries observational astronomy in Germany is plagued by light pollution. Truly dark skies are virtually impossible to find. Clearly, this affects the ways students – and the population in general – relate to the sky. Few students living in a metropolitan region have ever seen the Milky Way. Some kindergarten students do not believe that the stars are real when they see them – often for the first time – in a planetarium program. Many people are missing an important aspect of nature that their grandparents took for granted. Thus, astronomy education includes the very basic goal of making both children and adults aware of the sky and its wonders, sometimes for the first time.

Kindergarten and elementary schools

Awareness is growing that astronomy and science education in general should start early, even in kindergarten, attended by 3 to 5-year olds. This is a new realization in Germany, where, till recently, kindergarten was not a place for any formal education at all, but rather an extended playground. It turns out, however, that even – or may be especially – young children are already intensely curious about their surroundings and sometimes well capable of grasping basic astronomical concepts. However, kindergarten teachers almost completely lack training in any science, let alone astronomy, and often are afraid to touch a subjects they do not know well. The science training of educators of young children is just starting.

Elementary school in Germany is – in most states – attended by 6 to 10-year old children and consists of four grades. The scientific knowledge of the – overwhelmingly female - teachers is only slightly better than that found in kindergarten educators. For example, the author of this report, time and time again, is surprised by the fact that many teachers have no idea of how the seasons come about, and often are convinced that the distance of the Earth to the Sun is the decisive factor. This is even more of a problem since especially 8 to 12-year olds represent a rewarding age range to work with on science. They are old enough to follow complex arguments and stay focused. In some cases, they have already assembled an impressive factual knowledge about astronomy. However, they need guidance to integrate what they know into a coherent picture. The teacher can provide this help only rarely. Thus, visits to planetaria or astronomers coming to the schools and providing a few lessons can be of great benefit to children in this age range.

There are exemplary projects illustrating how astronomy education at an elementary school level can be done. For example, in Astronomy On-site, a professional astronomer visits elementary schools. The initiative was started by a single individual, who found that the demand was enormous. Somewhat reluctantly, he was provided with a few university students as teaching assistants. By now, the team visits more than a 100

classrooms per year. Incidentally, this astronomer was also appointed Single Point of Contact (SPoC) for the International Year of Astronomy 2009.

Children's Universities are growing in popularity all over Germany. In these projects, universities invite 8 to 12-year-olds to visit the campus and attend special lectures once or twice per year. In most cases, the lecture halls are filled to capacity and beyond. Astronomy is a popular subject on these occasions.

As a final example, Universe Awareness for Young Children (UNAWC) is an international project, in fact a cornerstone of the Year of Astronomy, that targets disadvantaged children aged 4 to 10 years and aims to introduce them to the wonders of the universe by games, songs and hands-on activities. The founders of UNAWC may have had mostly third world countries in mind. But of course there are disadvantaged children in a country like Germany, too. In many cases they originate in migrant families, speak poor German and are exposed to few, if any, intellectual stimuli at home. The first German UNAWC project has been launched with great success.

High schools

The German school system is different from almost all others by separating students after fourth grade, based on their perceived academic promise, sorting them into different types of secondary schools. Only one of them, the Gymnasium, allows the students to easily and directly attend university after graduation. While reform of this system has been a hot topic of German politics for decades, and some transparency has been reached, the system remains problematic, especially since it has been shown that social background plays an important role in the choice of secondary school a given student will attend.

Astronomy is not usually a part of the curriculum in any of the various types of secondary schools. It may find its way into the classroom in small bits and pieces as part of geography or philosophy lessons, or – most frequently – through physics. While the integration of astronomy into physics makes excellent sense given that modern astronomy is astrophysics, there is a drawback: polls among students consistently show physics to be among the least popular subjects. Students consider physics to be “dry”, “boring” and “difficult”. Astronomy, by association, faces the danger of being judged the same way. On the other hand, the early fascination of many students with astronomy can be used to gain their interest for physics, especially if hands-on observations and/or visits to a planetarium are included.

In many cases, this chance represented by astronomy is not taken. Teachers often feel that the curriculum does not leave time for a “non-central” topic like astronomy. A few schools offer astronomy as optional subjects, but these are a small minority, at least in the states of (former) West Germany. All too often, the only astronomy the students are exposed to are the law of gravitation and Kepler's laws, presented as a part of regular physics classes. Modern aspects of astronomy play almost no role in many classrooms.

The five new states of (former) East Germany are a somewhat different case: During the rule of communism, astronomy was a compulsory, independent subject in 10th grade. While the motivation of this was ideological, trying to prove that a religious heaven is not found in the sky, the regular presence of astronomy in the curriculum led to a large number of fairly well equipped school observatories and small planetaria. Many of those are struggling for survival after reunification, with fewer resources available. Some of the new states (like Saxony) have abandoned the once-compulsory astronomy classes, some (like Thuringia) are still retaining them. Initiatives supporting the continuing existence of astronomy classes are widely supported, also by the professional astronomical community, but generally do not meet with success, at least at state level. Of course, the reasons are not ideological anymore, but rather argue for astronomy as an important part of general world knowledge and a fascinating way of introducing students to science.

The study of astronomy at high school level is greatly aided by the presence of a school observatory. Beyond the many small observatories in East Germany, a few, sometimes very well equipped, also exist in the West. The existence of most of these observatories critically depends on the tireless efforts of individual teachers and also students. The excellent quality of their work stands witness to their success. In most cases, school observatories are run by both teachers and students in voluntary working groups, outside regular classroom activities.

A special opportunity is starting to arise for – so far – a few students: the chance to use professional quality 1 to 2 meter telescopes remotely, carrying out their own observing programs. The MONET project, based at Göttingen University, is an example. Supported by a private foundation, two 1.2 meter robotic telescopes were erected in Texas and South Africa. 50% of the observing time goes to high schools. The students run the telescope in real time through a simple web interface and are also in charge of data reduction, thus learning basic skills in image processing, and, more importantly, how to plan and carry out a small research project.

Universities

Robotic telescopes are run by universities, which collaborate with high schools. This shows an example for a different, and increasingly important, aspect of German astronomy education: the active role universities are starting to play. The motivation of astronomy (and physics) departments at universities throughout Germany is – at least to some degree – self-interest. The number of physics students is stagnating on a level that is too low to meet the demands of the job market outside academia. This is a consequence of the low popularity of high school physics, and can be partly remedied by allowing the students to do more hands-on work and introduce them to astronomy. Since many high schools do not seem to be up to the job, universities try to do it themselves, by running project weeks for interested students or offering classes, sometimes on astronomy, in dedicated labs located on the campus of a major university or a national research institute like the German Center for Aerospace Research. Sometimes the projects are geared especially toward girls, since the percentage of female students in physics and astronomy is still alarmingly low and rising only slowly.

Another recent and promising aspect concerns the training and exchange of high school teachers in a European context. Most countries that are part of the European Union face similar challenges. Networks of teachers may lead to solutions, and European science fairs like Science on Stage, which include astronomy, are a source of continuing motivation.

At university level, both professional astronomers and high school teachers are trained at 18 locations throughout Germany. European integration also reaches the universities: the German Diploma is being replaced by internationally recognized bachelor and master's degrees. Astronomy is attractive enough to ensure that there is no lack of young astronomers. In fact, there are many more candidates than (permanent) positions in astronomy. This is in sharp contrast to the lack of future physicists and engineers. The expectation is that students are attracted to science by astronomy, but decide to pursue a different, more secure and better paying, career in physics or engineering in their professional life.

Public observatories

A visit to one of the roughly 150 public observatories in Germany can be a memorable and motivating experience for students of all ages. Some German amateur observatories have excellent observational equipment, often bordering on the professional level, as evidenced by excellent pictures of, for example, deep sky objects taken by amateurs. However, almost all amateur associations also offer public observing sessions on a regular basis. Their educational resources are, in principle, excellent. However, organized activities by schools are often hampered by the necessity to be at the observatory late at night, requiring the cooperation of parents and also the willingness of teachers to work at hours well outside their normal schedule.

Planetaria

This late-night problem does not occur when visiting a planetarium. Accordingly, visits by students to one of the 21 professionally run German planetaria are usually scheduled in the morning, when almost all planetaria offer special programs for students.

German planetaria are loosely organized in a council which includes 21 German and 3 Austrian institutions. To become a council member, a planetarium has to have at least 10000 visitors per year and at least one paid employee. In addition to the council planetaria, there is a similar number of very small school planetaria, especially in former East Germany. Many of those are struggling for survival. The council planetaria also vary greatly in size, ranging from those with 60 seats and about 10000 visitors to those with 250 to 300 seats

and more than 100 000 (up to 300 000) visitors per year. Many planetaria are run by cities, others are connected to science museums, universities or even public observatories. All are dependent on public financial support – attempts to run planetaria commercially have failed in the past, and seem to be only – if at all – possible in a few Austrian tourist spots.

Taken together, roughly 2 million people visit a German planetarium each year, and thus planetaria are by far the most visited locations of astronomical education and outreach. While all kinds of people visit planetaria, it can be estimated that more than 500 000 students (K-12) per year are among the audience. For many students, sadly, one visit to a planetarium may well be the only exposure to astronomy they will have during their entire time at school.

All German planetaria are committed to astronomy education. However, the landscape is changing, driven by inevitable changes in technology. A modern planetarium show encompasses much more than just the starry sky – it is augmented by images filling the dome, videos, sound, music and much more. In “classical” planetaria, this is accomplished by (outdated) slide projectors often combined with a few video projectors. However, the vast majority of German planetaria either has changed over to Full Dome Video technology or is in the process of doing so within the next two to four years. This may lead to a tendency toward an increased amount of shows with little educational content. Another trend, apparent in the USA, is the appearance of elaborate but also very costly productions – sometimes astronomical and educational, sometimes less so – presented by large planetaria or commercial content providers, and then distributed. While cooperation between planetaria is certainly needed, it will be very interesting to see whether German planetaria will be able to keep their individual profiles and approaches to astronomy teaching over the coming years.

Bringing it all together: The International Year of Astronomy in Germany

The International Year of Astronomy (IYA), declared by the IAU and UNESCO to celebrate the 400th anniversary of Galileo’s first systematic observations of the sky using a telescope, presents a unique chance to German astronomy and astronomy education. The goal is to bring together the rich and diverse astronomical landscape in Germany, and to create an atmosphere where astronomy becomes visible to the widest possible public on many different levels, from the purely educational to the cultural.

The German committee for the IYA 2009 is led by the astronomer who also initiated the Astronomy On-site project mentioned above. The author is also a member. Of course, the well-known international cornerstones are implemented. In addition, the committee has decided to divide the year into 4 quarters, in order to facilitate work with the media and focus attention on different aspects of astronomy education throughout the year. The first quarter introduces the main focus of the entire IYA: Looking up to the sky. The second quarter concentrates on Astronomy and Culture, while the third quarter presents Astronomical World Views. The last quarter is immediately concerned with students: Astronomy at School is the main topic.

Since the German government has abandoned the concept of specific National Science Years, 2009 is not being officially recognized as the Year of Astronomy by German federal authorities, and, consequently, it is not funded. However, the Ministry of Science and Education supports individual aspects of the IYA, most importantly a major opening event in Berlin, the federal capital, and Highlights of Physics, an annual hands-on event for students that will focus on astronomy in 2009, taking place in September 2009.

Largely, the success of the IYA depends on activities to be organized locally. To coordinate this, several regional nodes have been founded, bringing together professional and amateur astronomers as well as educators and communicators. Planning is advanced in many of the nodes, with diverse programs taking shape. As an example, the node Rhein-Ruhr, which the author coordinates, consists of two universities, three planetaria and almost twenty public observatories and astronomy clubs of various sizes. The events that are coordinated through the node include, of course, active participation in appropriate cornerstone projects like the 100 Hours of Astronomy. But the scope is large: projects range from a performance by a world-class symphonic orchestra to public observations of the Sun and the Moon in the midst of the pedestrian zones of the cities of the region. A special highlight is a major exhibition on the Solar System within the Milky Way, in cooperation with the German Aerospace Research Center, that takes place in a gasometer built in 1929, 117 meters high, that has become one of the most unusual exhibition centers in Europe, visited by several

100 000 people per year. In the first 5 weeks after opening, this exhibition drew a significant crowd of 70 000 visitors.

Also, almost all German language planetaria show a planetarium program commissioned by the European Space Agency ESA. Under the Title, Eyes in the Sky: Touching the Invisible Universe, it presents cosmic discoveries from Galileo onward, with a focus on the European space missions Planck and Herschel, as well as on the still somewhat speculative Exomars lander. The show is intended to convey the spirit of discovery to an audience of all ages, but especially to students. It is accompanied by extensive teaching material and a traveling exhibition.

Despite the common activities, a successful IYA 2009 in Germany can only be realized by hundreds of local projects, making the rich and diverse landscape of astronomy visible to a wide public. Hopefully, a lasting strengthening of astronomy education and outreach will be the legacy of IYA 2009.

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GREECE

Overview

Astronomy education in Greece is the result of the effort of institutions, organisations and people, both in professional and in voluntary basis. This report summarises the general trends and the efforts that have been undertaken through 2006-2009, including the special actions for IYA09.

Elementary and secondary school

Elements of astronomy are taught in elementary school (6 years obligatory learning) to when students are 11 and 12 years old, through specific topics like the Solar System and the stars, in environmental education classes. In secondary education, astronomy is an option for the 2nd year of Lyceum, when students are 17 years old. Around 450 classes all over Greece attend the lesson, with about 15 students each.

The whole Greek system centralizes to the final exams, and is leading to less freedom in the choice of topics. Thus Greek teachers feel under considerable pressure to stick to core curricula, which do not include astronomy besides the optional lesson. Some teachers find ways to include some astronomy into physics classes, or find connections to the humanities – history and sociology – through various projects that are offered by the European Union especially for secondary education e.g. the Comenius ones. An example is Astrourbis: an Astronomical and Monumental Trip, a collaboration between schools from Greece, Spain, Italy, Portugal, Poland, and Turkey, where students and teachers studied their local monuments concerning their astronomical orientation etc.

Other possibilities for creating educational material on astronomy for secondary education are again given by the European Union. One of the most serious efforts was the program EU-Hands on Universe, Bringing Frontline Interactive Astronomy to the Classroom. EU-HOU (2006-2008), a MINERVA funded program, had as a general goal the renewing of teaching of science, through various hands-on exercises on astronomy ready to be used in the classroom. A re-awakening of interest in science in the young generation is foreseen through astronomy and the use of new technologies, which should challenge middle and high schools pupils. The primary target group was the school teachers, who were involved through a pilot school scheme widely advertised. The Greek partner was Filekpaideutiki Etaireia, an educational organisation since 1836, leading in Greece astronomy education for secondary schools. In total 40 Greek schools and 20 students participated in the implementation, showing the great interest for such initiatives. The co-ordinator was the Pierre & Marie Curie University in France. For more information see <http://www.euhou.net>

Undergraduate and graduate education

Every Greek university offers a course in Introductory Astronomy, designed for physics students (obligatory) and mathematics students (optional). At a more advanced level, astronomy lessons are offered optionally, as a part of physics. All the universities having dedicated professorships and research groups in astronomy, and have joint departments of physics and astronomy offering integrated courses allowing students to focus on astronomy while obtaining a masters or PhD degree in Astronomy. In addition, the National Observatory of Athens and the Academy of Athens are focusing on basic research which also trains students, at the graduate level.

Each Department of Astrophysics and Astronomy, has laboratories, and their infrastructure is used for educational and research purposes at a graduate and undergraduate level. The students are educated by conducting specially selected laboratory exercises, on the basic topics of optics, astrophysics, and familiarize themselves with all astronomical objects, and the methods of study applied to astronomical phenomena.

Also, most of the universities have an observatory within their campus and they use it as a tool for high-standard astronomical education, at both undergraduate and graduate level. The telescope is also used for basic acquaintance with astronomy for pupils and lay persons, since the Faculty offers guided visits to the observatory including night-time observation, seminars, and talks during special open nights. For more information see <http://www.uoa.gr/uoauk/uoaindex.htm>, <http://www.astro.auth.gr>, <http://www.physics.uoc.gr/en/menu/astro.php> <http://www.physics.uoi.gr/seci/astronomy1.html>

National Observatory of Athens

The Institute of Astronomy and Astrophysics of the National Observatory of Athens, effectively performs a number of educational activities. These activities are oriented to young astronomers, and to students from high schools, as well as to lower level schools. There is also a visitor centre at the Observatory of Athens which organises open days for schools/general public to visit the facilities of the Institute. More information can be found at http://www.astro.noa.gr/iaa_main.htm. It attracts almost 1500 visitors a year. It has presentations, and night-time observation.

Since 1996 the National Observatory of Athens has organised a summer school for high school students which has a duration of 3 days including night observation. More than 800 students have attended until now. The aim of these weeks is to foster an awareness of the fascination of physics and astronomy that the classroom with its traditional physics lessons often fails to communicate. More information on http://www.astro.noa.gr/SumSchool/iaa_school.htm

Planetaria

In Greece, we have two planetaria, one in Athens, the Eugenides Foundation <http://www.eugenfound.edu.gr>, and the other in Thessaloniki as part of the Thessaloniki Science Centre and Technology Museum <http://www.noesis.edu.gr/en/index.html>.

They produce their own shows, have astronomy exhibits and programs for school students and the public, and publish books. The Eugenides Foundation co-operates with the Academy of Athens, the Hellenic Physical Society, the Physical Society of Cyprus, The National Observatory of Athens, the British Council, and many other scientific and educational organisations. More than 800 000 people visit Greek planetariums each year.

Amateur astronomers

In Greece during the last 7 years more than 10 clubs of amateur astronomers have been created and offer educational programmes for the general public, ranging from star parties to classes on how to use a telescopes, public lectures, and shows in co-operation with planetaria.

Public events

Almost all the above institutions had a scientific presence at the total solar eclipse that happened at the Kastelorizo island on 29th of March 2006, and publicised the event to the public all over Greece via the web.

A lot of students with their teachers, mainly from the nearby islands, went at Kastelorizo and experienced this unique phenomenon. Two students from Philekpaideutiki Etaireia, with their teacher joined Professor Passachof's research team for the eclipse, and it was a really unique experience for the students.

Actions for IYA09

All the above mentioned institutes, organisations, and clubs jointly organised activities for the International Year of Astronomy.

Under the coordination and auspice of the Hellenic Astronomical Society the following activities were scheduled

- 1 a photography contest for the problem of light pollution for school students, amateur and professional photographers
- 2 a series of plenary lectures open to the public at the historical building of the Athens University
- 3 lectures by professional astronomers to be given at schools on their request, in the period October-December 2009
- 4 one-day conferences in collaboration with amateur astronomers' clubs
- 5 publications in newspapers, radio programs, TV series
- 6 participation in the 100 hours of Astronomy program of all Greek Universities.

More information on the address: <http://www.helas.gr/iya2009.php>

Additionally the 9th Astronomical Conference will be held in Athens, in September 2009, and besides the usual various scientific sessions, a workshop for school teachers will be organised, with lectures aimed to help the teachers in their everyday physics lessons in connection with astronomy. As well, electronic material will be distributed to them. Also, night time observation after the workshop will be offered with specific practical proposals to be implemented using existing school telescopes.

The Eugenides Planetarium co-operated with the Academy of Athens, the Hellenic Physical Society, the Physical Society of Cyprus, The National Observatory of Athens, the British Council, and many other scientific and educational organisations for the IYA09, to present public lectures from well known scientists. As well, there was produced 7 planetarium programs, and 8 book publications, offers to the amateur astronomer's clubs of astronomical presentations, organised exhibitions that connect astronomy with art, special workshops for young children concerning the constellations and the myths beyond them, 12 public lectures all over Greece, special programs presented on TV and the radio, 70 articles published in newspapers and magazines with large circulations.

The amateur clubs took part in these activities, with star parties, public lectures, and astronomical presentations.

By the end of IYA09, I will be able to give you numbers.

In general the examples listed above show that single events have the potential to draw large crowds, and fascinate about science and astronomy. The main question, is what do we really want to accomplish and what is our target in science/astronomy education.

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GUATEMALA

Overview

Guatemala is making efforts to improve the dissemination and development of astronomy in the curriculum, but much remains to be done. There are now some small observatories, and this year, the celebration of the

the International Year of Astronomy has helped to raise interest in astronomy across the country, and, starting for the first time, communication between professionals and amateur astronomers.

Elementary (primary) school

There are some topics in the astronomy programs, but very scattered. The Ministry of Education has not shown great interest in providing financial and human resources to improve information about astronomical topics at this level nor at the secondary level, that are under his direction.

Secondary and high school

After the inauguration of the IYA, a training program aimed to a small group of secondary school teachers has begun. We hope to grow this program, and gain a larger coverage in the future, involving more teachers, thus improving the knowledge of astronomy in the teachers.

College and University

Two universities, Universidad del Valle de Guatemala and Universidad de San Carlos de Guatemala, offer programs in physics, but only The University of San Carlos provides a proper introductory course in astronomy. There have been small workshops in both universities held by visiting professors on topics related to astronomy/astrophysics.

Education conferences

There are two major activities in this area.

National Week of Science, Technology and Innovation

For one week the national council of Science and Technology organizes a series of conferences of popular science aimed at all audiences, with special emphasis on middle school students. The lectures are taught by professionals living in Guatemala and also by guest professors from the region. During this week there are topics of astronomy, mainly thanks to its importance given by the celebration IYA.

CONVERCIENCI

This is another activity organized by the National Council of Science and Technology where Guatemalan scientists working abroad are invited to give lectures to university students, and the general public. These activities have involved the participation of at least two Guatemalan astronomers.

Observatories and planetaria

At the university Rafael Landivar, there is now a small observatory with a 14-inch telescope, operated by a group of students from the school of engineering who belong to the astronomy club of the university. The telescope is used to organize star gazing observations and to popularize astronomy. Furthermore there is a pair of observatories owned by amateur astronomers. Unfortunately, although there are were to be plans to build a Planetarium, they have not materialized. We do believe that this is a good moment to take advantage of the momentum created by the IYA in order to promote the construction of an observatory and a planetarium for the community.

Amateur astronomy

There are four clubs of amateur astronomers but unfortunately there is only one with activities related to the celebration of the IYA in Guatemala. The other three, including the largest one in the country, have shown interest in the activities, but none of their intentions have materialized in any collaboration.

Public education and outreach

Some newspapers have included some subjects related to outreach activities related to astronomy, mainly focused on students at the primary level. The media have also published some of the activities that have been

implemented as part of the IYA celebrations by our National Node, aiming to improve the disclosure of astronomical topics. But that coverage was only prominent during the month of January, mainly due to the worldwide coverage of IYA activities in other parts of the world; not surprisingly the interest created has faded away as the year goes by.

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HUNGARY

Overview

Astronomical discoveries as well as spectacular heavenly happenings always attract the interest of many people. Unfortunately this interest is not accompanied with the financial power necessary to run a serious astronomical magazine or journal profitably. As a consequence in our country one cannot find on news-stands scientifically reliable papers which concentrate on astronomical topics. The colorful items which seem to be astro-magazines are most frequently esoteric or astrological rubbish. The only really serious monthly (METEOR) published 11 times a year (one summer issue is double) is only circulated amongst the members of the Hungarian Astronomical Association and is sold to other individuals by standing order or on request. It is worth mentioning that this society (HAA) has a quite vast membership exceeding many thousands, in a country of less than ten million inhabitants. On the website of the HAA (<http://www.mcse.hu>) a lot of information is given in English.

Elementary school

In the Hungarian elementary schools astronomy is not a separate discipline but is incorporated into other subjects, first of all into geography or in some cases into the basics of natural science. The mathematically more challenging parts of spherical astronomy, Solar System astronomy, and astrophysics, are taught in the framework of physics at senior classes, if anywhere.

Secondary school

Although secondary schools are definitely less numerous in Hungary than elementary or primary ones, they offer a much wider choice concerning the practice of astronomy education. It is well known that in some secondary schools in Budapest and in many of the countryside it is the teacher of physics, of geography or even of information technology who is the heart the head and final mover of astronomical activities. Schools at this level may have considerable independence when creating their own curricula, and the fortune of astronomy teaching is set by the directorate and the school's staff.

In those schools where an astronomy maniac has had the chance to work for many years, some kind of astronomical telescopes, sometimes even real observatories can be found. It is a pity that with the frequent changing of personnel, the level of observing activity may fall quickly. The pupils' interest is maintained by these excellent colleagues who often prepare their students for national competitions. The most successful groups of this kind have been awarded international prizes, and the teacher and his pupils given a sponsored visit to the observing site of the European Southern Observatory.

College and university

In Hungary astronomy is only taught at universities since colleges were founded to educate those people who intend to gain competence in more business related or practical areas. Actually the universities of Budapest, Debrecen, Pécs and Szeged, plus the so called University of Western Hungary, offer astronomy courses (with a strong background in physics). These are recommended first of all to would be teachers; for all others it is optional. Only two of the five institutions (the Eötvös University of Budapest and the Szeged University) are involved in complete training of astronomers who (until now and for the next two years) receive their diploma having accomplished five years of studies. It was a relatively new modification in this system in

2006 when the overwhelming majority of Hungarian universities was forced to accept and introduce the Bologna scheme of higher education of the European Union. According to this scheme a BSc degree can be earned after three years of studies, i.e. the very first time in summer 2009. There are about two dozen students near to this level in this country. Those who received their BSc degree or have had their classical diploma will be allowed to apply this summer to enter the higher level (MSc) courses. Although the science of the cosmos is definitely popular amongst physicists, it is impossible to give a reliable guess concerning the number of prospective applicants these days. There are PhD courses in astronomy and astrophysics too at the above mentioned universities.

The Astronomy Department of the Eötvös University of Budapest participates in the international Lifelong Learning Programme: Higher Education (ERASMUS) and often receives foreign PhD students or postdocs.

Observatories and planetaria

Astronomical research observatories which belong to the respective universities are in the following cities: Baja (University of Pécs), Budapest (Imre Izsák Astrophysical Observatory of the Eötvös University), Debrecen, Szeged, Szombathely (Gothard Astrophysical Observatory of the Eötvös University), while national observatories operated by the Hungarian Academy of Sciences are based at Budapest and the Mátra Mountain, at the Peak of Piskéstető (stellar studies), and at Debrecen (solar physics). These institutes regularly organize programmes for the public called The Day of Open Gates.

There is also a quite extended network of public observatories in the country.

The two public planetaria which employ astronomers are the larger Budapest Planetarium and the smaller one at Kecskemét not far from the geographical centre of Hungary.

Public education and outreach

Public lectures on new findings in astronomy, and more or less systematic courses of astrophysics or cosmology, are often organized by amateur societies. These mushroom in the country. Their activities and work is coordinated by the HAA and many colleagues help them in order to maintain the scientific standard of their efforts. The Hungarian Branch of the International Year of Astronomy 2009 has been set up too in the frame of this professional-amateur cooperation (<http://www.csillagaszat2009.hu>).

Space research, and the various results of it, are continuously in the limelight here, and the space excursions of a Hungarian-born private astronaut Charles Simonyi – who was the second man from this country in space – resulted in a high-tide of interest. This guy who paid eight billion HUF for his second flight to the International Space Station, participates in biological research, and during his next voyage is expected to test exhaustively the internationally known dosimeter, made in Hungary, PILLE. In the meantime the enthusiasts and Simonyi's supporters are to follow the sky track of the ISS and the Space Shuttle, weather permitting of course. Another topic which is the centre of great interest is the work of a Hungarian research group that has found eleven exoplanets by the automatic photometry of telescopic (not naked-eye) stars. These colleagues collect the necessary observational material by using automatic telescopes (HATs) distributed on Earth in order to be able to reach wide regions of our heavens.

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INDIA

Overview

Announcement of the International Heliophysical Year 2007 (IHY 2007) and the International Year of Astronomy 2009 (IYA 2009) saw increased activities connected with astronomy education and public

outreach across India. Added to this was the Definition of a Planet in the Solar System adopted by the IAU in 2006, leading to an eight planet Solar System and thus amendment to the text books.

India hosts more than a thousand scientists who are pursuing front-line research in astronomy and astrophysics in several research institutes and universities. The Astronomical Society of India (ASI) has more than 900 members making it one of the largest such organizations in the world. These academic centres and organizations regularly conduct astronomy popularization programs such as Workshops, lecture series, sky watch demonstrations etc. The Indian Space Research Organisation (ISRO) has actively encouraged astronomy. Astronomers from different institutions are working on instrumentation and the scientific programme of ISRO's astronomy dedicated satellite ASTROSAT.

However, reaching out to different parts of the country is a daunting task, considering the vastness of the country and the varied linguistic and socio-economic situations. There are many languages and for science popularization to be effective, it needs to be often undertaken in the local language. Moreover a majority of the population lives in wide spread rural and semi-urban regions.

There are organizations like the National Council of Science Museums (NCSM) which administers 27 science centres/museums/planetaria spread all over India, and Vigyan Prasara which undertakes national level science popularization like publishing books and making documentaries. Several other state and private funded science centres exist which promote science at a local level. There are also several amateur astronomy clubs (mostly in the main cities) which play an important part in bringing astronomy to the general public.

Education

The National Council of Educational Research and Training (NCERT) advises and assists the Government of India in formulating and implementing policies and programmes in the field of education, particularly school education. To that end, it has been preparing a national curriculum framework for school education and giving broad guidelines about how to address the major concerns and issues before the nation. The states have been, subsequently, adopting or adapting these curricular guidelines to develop their own detailed curricula, syllabi and curricular materials. In this regard, whenever state boards revise or update their text books the local/nearest astronomical institution is consulted.

The Homi Bhabha Centre for Science Education (HBCSE), a National Centre of the Tata Institute of Fundamental Research in Mumbai, has broad goals of promoting equity and excellence in science and mathematics education from primary school to undergraduate college level, and encourages the growth of scientific literacy in the country. HBCSE is also a nodal centre for the Olympiad programmes in mathematics, physics, chemistry, biology and astronomy. Most of the students participating in International Astronomy Olympiads have bagged medals. The XI International Astronomy Olympiad was held in Mumbai, India 10-19 November 2006.

HBCSE runs a Graduate School in Science Education. Students admitted to HBCSE's Graduate School work for the degree of PhD in Science Education, which is a degree of TIFR (Deemed University).

There are two universities with astronomy departments, namely, Osmania University at Hyderabad, and Punjabi University at Patiala. Both have MSc Astronomy as a major subject.

The Inter-University Centre for Astronomy and Astrophysics (IUCAA) is an autonomous institution set up by the University Grants Commission (UGC) of India to promote the nucleation and growth of active groups in astronomy and astrophysics at Indian universities. There are now 49 universities that offer astronomy and astrophysics as an optional subject in their MSc (Physics). IUCAA has been a catalyst in the initiation of astronomy and astrophysics as an optional subject in the majority of universities.

Other institutions also closely associate themselves with the universities where astronomy and astrophysics is taught as an optional subject.

Planetaria

There are 27 planetaria open to the public. Some of these planetaria come directly under the NCSM, mentioned above. The planetaria have their own programmes and also support amateur astronomer activities. In addition to their regular activities, planetaria at Bangalore, Chennai, Delhi, Hyderabad, Jaipur, Kolkata, Kozhikode, Mumbai, Nasik, and Thiruvananthapuram have active outreach programmes such as star parties, telescope making, etc. involving amateur astronomers.

Mobile planetaria

The National Council for Science Museums has developed a mobile planetarium along the line of StarLab. Many regular planetaria and science centers have been provided with these mobile planetaria. These touring planetaria have been excellent tools for giving “edutainment”.

Amateur astronomy

Amateur astronomers of India like most amateurs elsewhere in the world involve themselves in outreach (public lectures, exhibitions, star parties). In the recent past they have been arming themselves with much better equipment (telescopes and cameras) for their observations, either purchased or made.

Public education, outreach, observatories, EduSat

Most of the astronomy institutions in India have a regular cell for public outreach. These cells cater for public requests from general visits to the institutions or observatories, to doing scientific projects by college students. These institutions also support amateur astronomers by making the observatories (and at times facilities) available.

A two-element radio interferometer for observations of the Sun and other strong sidereal radio sources was developed at the Indian Institute of Astrophysics (IIA) as a part of the International Heliophysical Year (IHY) and the institute’s Public Outreach Programme. IIA also developed a simple hand held spectroscope box that uses CD or DVD as the diffracting element. Many of these have been distributed to high schools and colleges.

Tata Institute of Fundamental Research (TIFR) in Mumbai has initiated a Teacher-Research Interaction Programme (TRIP) for secondary school to undergraduate teachers. The programme addresses all fields of physical sciences and possibly, education related issues. Five to six teachers are invited to participate in this programme. It also conducts field trip away from the light polluted city of Mumbai.

The IUCAA has had a dedicated Public Outreach Programme from the time of its inception about 20 years ago. The POP cell has on going programme for students at different levels. With inauguration of its 2 meter telescope in 2006, IUCAA extended its outreach to the rural region near the observatory. Members of the outreach cell pay regular (about 4 times a month) visits to schools in the area and carry out activities such as sky shows to interactive sessions with students and teachers. It initiated astronomy clubs in 9 schools and with the help of a charity organization has provided a 5 inch class telescope to each of these schools.

Vigyan Prasar (VP), an autonomous organisation set up by the Government of India's Department of Science and Technology in 1989, undertakes large scale science popularisation in the country. VP has developed an Astronomy Kit with 25 activities, priced at less than US\$1.5. Some of the activities are, Star Dial, measuring the altitude of a star etc. It also includes a poster of sky views. VP also has published a few astronomy books. VP produced two films on Prof A K Raychaudhury and Prof P C Vaidya, eminent astrophysicist of India, in association with IUCAA.

EduSat (Education Satellite), fully dedicated for educational purposes, was launched in space by ISRO (Indian Space Research Organization) in 2004. In 2007, with the IUCAA, VP organized the Eratosthenes project in which 10 stations from different part of India participated in measuring the shadow of a gnomon.

National Science Day

The 28 February is celebrated as National Science Day (NSD) across the country. On this day all the scientific institutions invite the general public to visit their premises and get acquainted with on going research. Astronomical institutions rank at the top of the list of most popular institutions visited by the general public. This enables members of the public to get first hand information about the activities of the organizations. Competitions such as quiz, essay, drawing etc. are conducted for the students. The institutions also showcase their research and achievements and conduct sky watches.

The Astronomical Society of India

The Astronomical Society of India is the prime association of professional astronomers in India with more than 900 members. The objective of the society is the promotion of astronomy and related branches of science in India. The Society organises scientific meetings, publishes a quarterly bulletin, and supports the popularisation of astronomy and other similar activities.

Astronomy institutions

The list of astronomy institutions in India, and links to their web pages, are available from the Astronomical Society of India web page, <http://www.iucaa.ernet.in/~asi/>

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INDONESIA

Overview

The total population in Indonesia is about 240 million (precise data at February 2009, 239240336 persons) and about 80% are Moslem. Formal astronomy education is located in Bandung, West Java, close to Bosscha Observatory (optical observatory plus a small radio telescope for education purpose). Generally speaking during the last two or three years astronomy became more popular for students and the public, with more people from various background to provide astronomy lecture. The indications are

- more participants for solar or lunar eclipses observation (for example the partial eclipse 17 August 2008, and the annular eclipse 26 January 2009)
- more visitors to Bosscha Observatory (eclipse observation, astrocamps for teachers and students to introduce how astronomers work in the night)
- more visitors to the planetarium in Jakarta (teacher-training in astronomy, but this year (2009) it will not happen due to the new policy of the new director).

The Pusat Peragaan IPTEKS (Centre for Science and Technology Exhibition) located in Jakarta, in conjunction with the IYA, provided solar eclipse observation and discussion for the annular eclipse 26 January 2009. There are many astronomy programs for fun generated by amateur astronomy clubs, such as Southern Sky, RHI (Rukyatul Hilal Indonesia or Indonesian Moon Crescent Patrol), HAAJ (Himpunan Astronomi Amatir Jakarta or Jakarta Astronomical Amateur Society). Continuation of the program of the International Year of Astronomy (IYA) included the launching of an astronomical stamp to celebrate IYA 2009, and Universe Awareness (UNAWA) for 2009 activities. More time to introduce astronomy to the public is still needed.

At the moment there are no special and regular programs on astronomy on TV or on radio, or articles in newspapers. Talking about astronomy or giving news on astronomy is still a sporadic event. However there is a trend that the number of astronomy articles is increasing.

The government has paid more attention to astronomy or science competitions in general, enabling some students who are interested in Astronomy to participate in the International Astronomy Olympiad (IAO) XI (10-19 November 2006, in the Tata Institute for Fundamental Research, India), IAO XII (29 September to 07

October 2007, in Simeiz, Ukraine), IAO XIII (13-21 October 2008 in Trieste, Italy). After full team participation in IAO XII, the first *national* astronomy Olympiad for 33 junior high school students was held for the first time in Makassar (8-14 August 2008), organized by a team from the Institute of Teacher Training and Education in Yogyakarta (UNY, Universitas Negeri Yogyakarta), UPI (Universitas Pendidikan Indonesia), and UNM (Universitas Negeri Malang). The three universities each received one small telescope and training on how to operate the telescope in Bosscha Observatory. The second IOAA (International Olympiad on Astronomy and Astrophysics) was held successfully in Bandung and Lembang Indonesia 19-28 August 2008, fully sponsored by the minister of education of Indonesia. 89 senior high school students from 20 countries participated in the program. We do hope that the impact is more bright student learning astronomy and studying astronomy more seriously; it will help the future development of astronomy in Indonesia.

The astronomy Olympiad activity encourages some students and teachers in senior and junior high schools to learn more astronomy, because when the students get a gold or silver medals, then the government provides a scholarship to continue to higher education up to a PhD program. More training activities on astronomy held in schools or in other organizations is needed.

The main problem in teaching astronomy is the lack of astronomy teachers. No one is responsible or politically strong enough to insist on astronomy as a serious subject. Some physics teachers (25 teachers) studied in the Bandung Institute of Technology for the master program in physics, in order to learn some astronomy because one duty is to train their students for national or international astronomy Olympiads. The teachers are usually reluctant to teach astronomy because it requires more time, more work, and more effort, with little incentive.

Generally, astronomy is considered to be only a part of natural science, and comprises an introduction to the Solar System (the planets, the Sun, lunar phases, and comets). This material on astronomy is not enough to prepare for competition in national or international astronomy Olympiads. In 2007 and 2008, there were programs to search junior high school students which were motivated and above average academic level, through a competition (a test arranged by a national committee composed from all universities). In the Institute of Technology Bandung about 150 schools participated in the program. The program in other regions was conducted by the University of Hasanuddin in Makassar, Surabaya Institute of Technology in Surabaya, University of Indonesia in Jakarta, Institute of Agriculture of Bogor, Gajah Mada University, Diponegoro University in Semarang, Universitas Padang, and Brawijaya University. Each university mentioned, selected 75 students (25 mathematics, 25 biology and 25 physics), and 48 teachers (16 mathematics, 16 biology and 16 physics). The selected physics students received astronomy lectures during training in a science camp for a couple of months. Then, all students are expected to join in the science competition in National Olympiad.

(There follows information under various headings. There is inevitably some repetition of material in the Overview. Editor.)

Curriculum and teachers

The curriculum changed from a competency based curriculum to an active student learning based curriculum. The main problem is that the duty of teaching astronomy that lay with physics teacher is now the duty of teachers of geography

College and university

Formal astronomy and astrophysics education is conducted in the Department of Astronomy (now the Research Group on Astronomy) in the Faculty of Mathematics and Natural Sciences at the Bandung Institute of Technology. The Astronomy Program is one among 4 major programs (Mathematics, Physics, Chemistry and Astronomy) in the Faculty of Mathematics and natural Sciences. In the last three years there has been about 30-40 new students per year, but usually the average is about 20 new students per year study in astronomy, and on average about 15 students graduate from undergraduate courses, about 5 students from master courses (four year undergraduate program, two year master program, as well the three year PhD program).

In the new astronomy curriculum (2008) in Bandung Institute of Technology (the curriculum is evaluated and replaced every five years), the curriculum for undergraduate programs changed to more astronomy courses with stronger basic physics and mathematics. In the new curriculum there are two lectures about Integrated science for a common first year program, the first semester consists of general basic science and the second semester consists almost entirely of astronomy. For the final research project there are some joint ones with LAPAN (Indonesia Institute of Aeronautic and Space Science) and with other research groups in astronomy, physics etc.

Outside of Bandung Institute of Technology, special purpose courses at IAIN (Institut Agama Islam Negeri, Institute of Islamic Studies) in Semarang, about 40 students study practical astronomy. In UAD (Universitas Ahmad Dahlan, Ahmad Dahlan University) in Yogya, a special lecture on astronomy concerning practical astronomy is provided.

Study of Islamic astronomy is under discussion and will commence shortly in UIN Yogya (Universitas Islam Negeri, Islamic University of Yogya). A small telescope to study the lunar crescent has been bought for educational purposes in several places, such as in UIN RIAU, IAIN Lampung, and IAIN ACEH. UPI (Institute of Teachers Training and Education) provides also a special lecture on astronomy and IPBA.

Education conferences

Discussion of the new curriculum, with more astronomy than physics or mathematics but with the content of physics and mathematics more focused on astronomy purpose, was held.

Observatories and planetaria

Total visitors to Bosscha Observatory is about 55 000 per year in 2006 and 2007 and up to 60 000 per year in 2008. About 80% out of the total is students and 50% is junior and senior high school students. Some programs are for daytime visitors, others for night time visitors (public night, 3 or 4 times per month). Special events such eclipse observation, astrocamp for teachers and students, are provided – the purpose is to introduce how the astronomers work in the night.

Some observer coordination of observations of the first visibility of a very thin crescent Moon spans several parts of Indonesia and is organized by the Minister of Communication and Informatics with the cooperation of the Bandung Institute of Technology. There is also a campaign for astronomy observation involving the public to determine the first Ramadan, fasting month for Moslems.

Discussion to find a site for the Indonesian New Generation Telescope in east Indonesia close to Timor involves the team leader Dr Taufiq Hidayat. There are many sporadic plans to construct local observatories or space science museum in several provinces, such as Riau and Pontianak.

Planetarium Jakarta provides training in astronomy for teachers of the Olympiad team, but this year (2009), as noted earlier, this will not occur. Astronomy observation is one of the programs at Pusat Peragaan IPTEKS Planetarium in Tenggarong (east Kalimantan) operated since 2000.

Amateur astronomy

There are more astronomy programs generated by amateur astronomy clubs, such as Southern Sky, RHI (Rukyatul Hilal Indonesia or Indonesian Moon Crescent Patrol), HAAJ (Himpunan Astronomi Amatir Jakarta or Jakarta Astronomical Amateur Society).

Public education and outreach

As part of the International Year of Astronomy (IYA) an astronomical stamp to celebrate IYA 2009 was released in May 2009. The Universe Awareness (UNAWA) works with alumni and students of astronomy under the direction of Dr Premana Premadi, to campaign for astronomy for the younger generation; one activity is to observe the annular eclipses in 2009 in Banten province.

Other public events

These include discussion on the philosophy of science, science versus religion, the creation of Universe in science and in the Qur'an etc.

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