

## **DIVISION XII / COMMISSION 46 / PROGRAM GROUP WORLD-WIDE DEVELOPMENT OF ASTRONOMY**

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### **TRIENNIAL REPORT 2006 - 2009**

#### **1. Introduction**

The Program Group for *World-wide Development of Astronomy* (PG-WWDA) is one of nine Commission 46 program groups engaged with various aspects of astronomical education or development of astronomy education and research in the developing world. In the case of PG-WWDA, its goals are to promote astronomy education and research in the developing world through a variety of activities, including visiting astronomers in developing countries and interacting with them by way of giving encouragement and support.

The principal aims and objectives of PG-WWDA are: (*i*) to visit developing countries (often IAU non-member states) with some limited astronomical expertise, and which would welcome some development of their capabilities in astronomy; (*ii*) to give encouragement, and to explore the possible assistance of the IAU in developing astronomy in these countries; (*iii*) to discuss with astronomers in developing countries the available resources for astronomical teaching or research, and to promote international contacts and exchanges between astronomers in these countries and those elsewhere; (*iv*) to write reports on the state of astronomy in developing countries for the Commission 46 president and to send these reports to the IAU Executive Committee; and (*v*) if the conditions were deemed favourable, then to follow-up any report with involvement by TAD or other program groups of Commission 46, as may be appropriate.

#### **2. Visit to Thailand and Laos**

John Hearnshaw undertook an astronomical tour to Thailand and Laos, 14-31 January 2007, as part of the activities of the PG-WWDA.

Thailand joined the IAU as a national member in 2006. It is a strongly developing country, both economically and astronomically. The recent decision by the Thai government to establish the National Astronomical Research Institute of Thailand (NARIT) means that in the coming 5 to 10 years, Thailand can be expected to become a strong

regional centre for astronomical research and education. By the end of 2009 a 2.4 m optical telescope should be installed on Doi Inthanon (2550 m), Thailand's highest mountain, near Chiang Mai in the north of the country. This will be equal to the largest optical telescope in Asia when it is completed. The new institute in Chiang Mai is directed by Professor Boonruksar Soonthornthum, who hosted the visit to Chiang Mai.

Hearnshaw visited four universities in Thailand and gave a series of lectures. These were the universities of Chiang Mai, Naresuan (in Phitsanulok), Khon Kaen and Mahidol (in Bangkok). All of these employ astronomers in physics departments, and research interests are in optical stellar astronomy, cosmology and solar physics. Chiang Mai has the strongest involvement in terms of numbers, with several astronomers and a small observatory (Sirindhorn Observatory) which is operated just out of the city. Mahidol University has an active research group in solar physics and cosmic rays, headed by expatriate American, Prof. David Ruffolo.

Hearnshaw also visited the Physics Department at the National University of Laos in Vientiane, which is sited on a spacious campus in the north-east part of the city. His visit there was hosted by Dr Khamphouth Phomassone, a geophysicist and Assistant Dean of Science. Two Laotian astronomers with MSc degrees from Chiang Mai University in Thailand are employed to teach astronomy to physics students as part of the bachelors' program in physics at NUL. At this stage no graduate program in physics or astronomy exists, though one is planned in the next few years. The university would benefit from many more computers, and a small telescope would do wonders for the teaching of astronomy. Laos and Thailand share very similar languages, culture and ethnicity. But economically they are a long way apart. In spite of that, the biggest asset is, as in many developing countries, the students, who had a tremendous enthusiasm for astronomy and learning.

### 3. Visit to Bangladesh

Jayant Narlikar made a visit to Bangladesh, 12-20 March 2007. He visited Chittagong 13-19 March and Dhaka 19-20 March. In Chittagong, he attended meetings organized by Professor J.N. Islam, Director Emeritus, Research Centre for Mathematical and Physical Sciences (RCMPS), Chittagong University. He gave two lectures, the first being the Abdus Salam Memorial Lecture on 'The interaction between particle physics and cosmology'. The second was entitled 'Research, teaching and development programmes of the International Astronomical Union'. This presentation described the important role played by the IAU in encouraging teaching, research and development in astronomy all over the world, with a special emphasis on the developing countries. The advantages of becoming a member of the IAU, both nationally as well as individually, were outlined. In this context, a brief presentation about the Inter-University Centre for Astronomy and Astrophysics (IUCAA) at Pune, India was made.

A similar lecture was given in Dhaka to physicists and mathematicians from Dhaka University, with a similar response from the academic community there. There were present young students interested in astronomy and they were running a magazine on behalf of the Bangladeshi Astronomical Association. Narlikar had, in addition, extensive discussions with Professor M. Shamsher Ali, the President of the Bangladesh Academy of Sciences, which would be the adhering organization to the IAU, if Bangladesh decides to join. Professor Ali was already keen that Bangladesh should become a part of the IAU member nations. All in all, the mission was successful in the first instance of introducing

the IAU to Bangladesh and secondly, by generating an interest amongst Bangladeshi scientists in the IAU.

#### 4. Visit to Uruguay

Hugo Levato made a visit to the Department of Physics of the Universidad de la República in Uruguay, 16–21 April 2007. He gave one lecture there to students and scientists, and one lecture at the Planetarium in Montevideo City. He also visited the Los Molinos Astronomical Observatory. Uruguay is an IAU member country since August 1970. It has four individual members of the Union.

At the Universidad de la República (founded in 1849) he visited the Institute of Physics, where three astronomers with PhD degrees are working in astronomy. They are Dr. Julio Fernandez, Dr. Tabaré Gallardo and Dr. Gonzalo Tancredi. The University of the Republic is Uruguay's only public university. The number of university students is today around 75 000.

The Institute of Physics is part of the Science Faculty and is divided into three departments, one of which is Astronomy. Around ten people work in the Department of Astronomy. The Physics Institute has a PhD program in Physics that includes astronomy as a specialization.

The Los Molinos Observatory, belonging to the university, operates a 35 cm telescope used for astrometric studies of minor planets and NEOs and a Centurion Telescope, of 46 cm aperture (operational since 2002), used in the search for supernovae, and for observations of asteroids and comets. An SBIG camera (ST9) is on this telescope.

It is recommended that: (i) the IAU support the visit of visiting professors to Uruguay to help with the ongoing PhD programs; (ii) a small amount of money should help in improving the instrumentation at Los Molinos Astronomical Observatory; (iii) IAU Commission 46 should consider supporting the three astronomers with PhDs and some of the students for observing trips to the nearest major observing facility, Complejo Astronómico El Leoncito, in Argentina, to gather data for their programs; (iv) the IAU should help in providing access to the astronomical literature through the facilities available in Argentina (SECYT) or Brasil (CAPES). Access to the astronomical literature is a problem at present.

Uruguay has no site with the proper astronomical climate to develop a medium size astronomical facility, but internet connectivity is well developed and the usage of the Virtual Observatory concept should be encouraged as well as the usage of other international facilities located in South America.

#### 5. Visit to Mozambique

Peter Martinez visited Mozambique for PG-WWDA 3–5 June 2008. On arrival he met with Mr. Claudio Moises Paulo of the University Eduardo Mondlane (UEM) and Mr. Faustino Armando Nhanombe of the Instituto Nacional de Meteorología (INAM) to discuss the programme of visits for the following two days.

On 4 June, Martinez visited the Department of Physics at UEM, and presented a two-part lecture on 'Astronomy and Space Science' and 'Space science and technology for sustainable development'. The first lecture provided an overview of our knowledge of the astronomy, from Earth outwards to the Hubble Deep Field. The second lecture was about the practical applications and benefits of space technology, drawing connections

with astronomy where appropriate. The *International Year of Astronomy* was also briefly discussed. The audience comprised faculty and students from various departments at UEM. Afterwards, there was a comprehensive discussion in the faculty room in which Martinez had the chance to interact with senior staff members at UEM. He was then shown the satellite tracking telescope facility on the roof of the mathematics building.

The meetings at the University focussed on the Departments plans to introduce an astronomy stream in the undergraduate Physics programme. The Department established a meteorology stream in collaboration with INAM and would like to repeat this in the area of astronomy also. The Department has for a long time intended to introduce astronomy, but lacked the staff with experience to teach it. Mr. Claudio Moises Paulo, a junior lecturer in the Department, had been given leave of absence to pursue an astronomy MSc degree in South Africa. The intention was that, on his return to Mozambique, he would develop the undergraduate astronomy course. The Department aims to position itself as the focal point for astronomy in Mozambique.

Martinez also discussed the acquisition of a small telescope to act as a facility for student training and also for public outreach. The satellite tracking telescope is dated and in a very poor condition and would probably not be worth trying to refurbish for use as a general astronomy instrument. Acquisition of a modern computer-controlled telescope and some accessories, like a CCD camera, is recommended.

On the afternoon of 4 June, Martinez visited the Ministry of Science and Technology (MCT in Portuguese). He met there with Dr. Leon. The purpose was to pay a courtesy call to the government ministry responsible for funding science and technology activities in the country, to inform MCT about the IAU and its capacity building activities in astronomy, as well as to inform about the IYA in 2009.

The discussions at MCT focussed on the role of MCT in supporting activities at UEM and INAM. Dr. Leon emphasized that MCT is very interested to promote astronomy in Mozambique. In particular, the MCT looks to the University to provide experts to popularize astronomy; to support Mozambique's participation in the SKA bid, and to support the development of space applications in general. The MCT sees the IYA as a huge opportunity to raise awareness about astronomy and space science in the country and was fully prepared to incorporate astronomy in the calendar of outreach activities supported by the MCT.

On the morning of 5 June, Martinez visited the Instituto Nacional de Meteorología (INAM). He made two presentations to the staff on 'The South African Astronomical Observatory' and on 'The International Astronomical Union'. The latter presentation provided an overview of the IAU, but went into more depth on the activities of Commission 46.

## 6. Visit to Uzbekistan

John Hearnshaw visited the Ulugh Begh Astronomical Institute (UBAI) in Tashkent, Uzbekistan, 7-14 August 2008. Uzbekistan is not currently an IAU member, but with 11 individual IAU members and a well-established observatory at Mt Maidanak (belonging to the Ulugh Begh Institute) it is a non-member country with substantial astronomical infrastructure. His visit was hosted by Prof. Shuhrat Ehgamberdiev, the director of the Ulugh Beg Institute.

During his time in Uzbekistan, he gave three seminars at UBAI, (one of them was on IAU Commission 46 programs to support astronomical development and two were

research seminars) and he visited the Samarkand State University where a 50-cm student telescope was recently installed. Further student telescopes are planned for Andijan (in the Fergana Valley) and Parkent (about one hour north-east of Tashkent).

Hearnshaw also visited the Mt Maidanak Observatory (2700 m) in the Pamir Mountains, where 1.5 m and 1.0 m telescopes are the principal instruments. Mt Maidanak is one of the world's best sites for image quality (0".6 median seeing) and clear nights (over 2000 photometric hours annually). It is located some four hours drive south-east of Samarkand. The main need for Maidanak in the future is international collaboration in order to develop the site with modern instrumentation and a larger telescope. This need is especially acute since the departure of Russian astronomers in 1991; a recently signed collaboration agreement with Russian astronomers may see the return of Russian support for the Maidanak site in the future. Collaborations are already in place with Taiwan and the USA, and a future collaboration with South Korea is likely to take place.

Hearnshaw returned from Uzbekistan with an updated list of individuals who are interested in being nominated for IAU membership, most of them working at UBAI in Tashkent. In addition, there is a strong interest in Uzbekistan in IAU national membership, and the hope is that this can be negotiated in the near future. This is especially relevant, given the fact that about 50 professional astronomers work in Uzbekistan, mostly at UBAI, but also in at least five universities, and also because of the outstanding climatic conditions for optical and infrared astronomy in the country.

## 7. Visit to Peru and Ecuador

Hugo Levato made visits to both Peru and Ecuador in September 2008 on behalf of IAU Commission 46. In Peru (an IAU member country) he met with scientists and professors from the Universidad Mayor de San Marcos, the Instituto de Geofísica del Peru and the Comisión Nacional de Investigación y Desarrollo Aeroespacial (CONIDA), all of these being groups with astronomical activities.

He lectured at the Instituto Geofísico del Peru to students and scientists, and also gave a public lecture at the Biblioteca Nacional in Lima, where all the interested scientists were also invited. He was hosted in Lima by Mara Luisa Aguilar Hurtado one of the IAU members from Peru.

The Universidad Nacional Mayor de San Marcos (UNMSM) is the oldest university in Peru, originally founded in 1551. Today UNMSM has twenty faculties, among them the Faculty of Physics. The program for Physics studies may involve the selection of astronomy subjects, but there is no formal program of a PhD in astronomy. SPACE is a program inside the Faculty of Physics which gathers professionals working in astronomy and in outreach. They have the help and contribution of some researchers from abroad.

Levato met with Rafael Carlos Reyes who was the first PhD in Astronomy in Peru. He studied in Brazil and he is working part time at UNMSM and at the Universidad del Callao where there is also interest in developing some astronomy program.

In 1984 there was a program for visiting professors in Peru sponsored by the IAU and carried out at the San Marcos University. The heads and some of the staff members of the groups and institutions which have astronomy programs in Peru today were the products of that visiting professors' program.

The Comisión Nacional de Investigaciones y Desarrollo Aeroespacial (CONIDA) is the Space Agency of Peru and has a group working in Solar Physics under the leadership of Walter Guevara. He graduated in Physics and is a product of the former Program of

Visiting Professors sponsored by the IAU in the 1980s. CONIDA has a project under development for an astronomical observatory devoted to solar studies.

The Instituto Geofísico del Peru (IGP) has a good infrastructure for several areas like seismology and volcanism. It also has a group working in astronomy under the leadership of Dr Jose Ishitsuka. Hugo Trigo is the other astronomer of the group. They have some instrumentation for solar observations in Huancayo and some dipolar antennas in Jicamarca and also several others facilities in different locations in Peru.

The main project is to convert an old antenna for satellite tracking and communication for centimeter radio-astronomy. Also they have some ambitious projects for outreach. They operate the most modern planetarium of Lima, a recent donation from Japan.

It seems clear that Peru has the conditions to boost its overall astronomical activity. The problems are the lack of human resources in astronomy, no coordinated program to train PhD students in astronomy, and a lack of coordination between the different groups existing in Peruvian astronomy. Support from IAU Commission 46 could help overcome some of these issues, though 5 to 10 years are probably required before there is a viable program to train students to PhD level.

In Ecuador, Levato visited the Escuela Politécnica Nacional (EPN) and the Observatorio Astronómico de Quito. It is noted that Ecuador is not a national member of the IAU. He gave one lecture at EPN. He was hosted by Ericson López, who is the Director of the Observatorio Astronómico and also a member of the staff of EPN. There are no additional PhDs in Ecuador with a training in astronomy.

EPN is one of twelve national universities in Ecuador. It has nine faculties, one in Science where courses of Physics and Mathematics are provided. It is not possible at present to study astronomy at a scientific level, but there is an astronomical facility at EPN with a Meade 16-inch telescope which was recently purchased and which can be accessed through the internet and used by students of high schools in an outreach program managed by EPN.

The Observatorio Astronómico de Quito was dedicated in 1873 and typical instruments from that time are still kept at the Observatory, like a Repsold meridian circle. Today the observatory is used practically only for outreach, and presently is being completely refurbished with money coming from the city of Quito. A good museum of old instruments, not only for astronomy, will be finished probably by the end of this year.

It is clear that poor human resources are the main problem in astronomy in Ecuador. The immediate need is to establish some courses on astronomical subjects so that students of physics can take these courses and be trained in astronomical research. This should be done at the beginning with the help of visitors from abroad.

## **8. PG-WWDA participation at Paris brainstorm meeting of Commission 46**

John Hearnshaw, as the representative of PG-WWDA, took part in the IAU Commission 46 brainstorm meeting, which took place at the Institut d'Astrophysique in Paris 27-29 January 2008. This was the first step in the development of an IAU decadal strategic plan for global astronomy development from 2010 - 2020. The goal of the meeting was to exchange ideas and views about future IAU activities and strategies, with a focus on astronomy in developing countries. The meeting was called on the initiative of the IAU Executive Committee, and was chaired by Vice-President George K. Miley.

## 9. Closing remarks

PG-WWDA continues to have a successful program in a number of key developing countries. The strong development of astronomy in Thailand since it joined the IAU in 2006 is one positive story; the interest expressed in Bangladesh to progress to IAU membership in 2009 is also encouraging.

We will continue to focus on countries that are not IAU members but which have professional astronomers or some astronomical infrastructure (for example Uzbekistan), or on developing countries that need guidance in establishing core programs in astronomy education at tertiary level (such as Mozambique and Laos). In addition it is important not to overlook a number of IAU member countries that still need continuing support from the Union for their existing astronomical programs; Uruguay is a case in point.

Beyond the IAU XXVII General Assembly, 2009, much work still remains for PG-WWDA. There are many opportunities in Central Asia (for example Kazakhstan, Tajikistan), in Africa and in Latin America for closer involvement of astronomers and educators with the IAU. It is noted that our activities are constrained at present by the time that can be devoted to these activities by PG-WWDA members on a largely voluntary basis, more so than by financial constraints.

John B. Hearnshaw  
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