Global Astronomy Survey: South Africa

First Submission: Kevin Govender [see human resources section] 23 March 2008

1. Professional (Research) Astronomy:

(input provided by Patricia Whitelock for this section)

(i) Number of universities offering Astronomy (and their names)

"undergraduate astronomy" :

1. University of Cape Town, which offers astronomy combined with physics or mathematics

(and possibly in future combined with engineering).

2. University of South Africa (UNISA by correspondence only)

If you mean "postgraduate" the the following universities contribute to the National Astrophysics and Space Science

Programme (NASSP - www.star.ac.za), based at UCT, which takes students through honours and masters, and they

subsequently take PhD students:

University of Cape Town (UCT)

UNISA

University of Western Cape (UWC)

University of North West (UNW)

University of KwaZulu Natal.(UKZN)

Rhodes University (Rhodes)

University of Freestate (UFS)

University of Witwatersrand (Wits)

University of Johannesburg (UJ)

(ii) Number of universities offering Physics (and their names)

As I understand it all SA Universities offer physics (possibly some of the new ones don't), but several of them have small numbers of poorly qualified staff, so are unable to offer a credible course - although that doesn't stop them awarding BSc degrees.

The best of them are of a very high standard.

Universities offering physics include the 16 below:

Nelson Mandela Metro University

North West University

Rhodes University

Stellenbosch University

University of Cape Town

University of Fort Hare

University of Johannesburg

University of KwaZulu-Natal

University of Limpopo

University of Pretoria

University of South Africa

University of the Free State

University of the Western Cape

University of the Witwatersrand

University of Venda

Walter Sisulu University

(iii) Number of academics who have been trained in Astronomy (ideally with their names and levels of qualification)

There are about 65 PhD astronomers working in SA, distributed roughly as follows:

South African Astronomical Observatory 25

UCT 15

UWC 2

Karoo Array Telescope 3

Rhodes 3

UNW 4

UKZN 2

Wits 3

UJ 1

UFS 2

Hartebesthoek Radio Observatory (HartRAO) 5

I will provide names if you really want them. Some of the staff of SAAO and HartRAO also teach at universities, but not all of them.

(iv) Number of astronomical facilities (observatories, telescopes, etc) and as much detail about each as possible (websites/contact details)

5 main research observatories:

* South African Astronomical Observatory (www.saao.ac.za)

* Hartebeethoek Radio Astronomy Observatory (www.hartrao.ac.za)

* Hermanus Magnetic Observatory (www.hmo.ac.za)

* MeerKAT / Square Kilometre Array Project (www.ska.ac.za)

* Boyden Observatory

(http://www.assabfn.co.za/friendsofboyden/boyden.htm) linked to

the University of the Free State (www.ufs.ac.za)

UNW contributes to running the HESS telescope in Namibia.

... and there are a number of private amateur observatories including one that I know of at Cederburg

(v) Self evaluation (according to the different phases above, how would you rate your country in terms of Professional Astronomy? Please include any other relevant information to motivate your choice.)

SAAO and UCT (and two or three individuals at other places) produce high quality research published in international journals. However, most of the people they employ are not South Africans although this situation is changing gradually. SAAO, UCT astronomy is probably comparable to upper-middle ranking research institutes in N America and Europe.

The quality of the University degrees is erratic even from the best

universities, some are first rate, others would not qualify in more competitive environments. In brief - the poor school system qualifies only a few people to go to university, but the pressures

on the academics to graduate students is huge. The consequences are obvious. Possible solutions are multifaceted, but improving school maths and science would be on the critical path.

South Africa could therefore be classified as a "Phase 1" country in terms of professional astronomy i.e. well established, but there certainly is room for improvement.

2. Public Understanding of Astronomy:

(i) What governmental astronomy/science outreach programmes for the public take place (co-ordinated either by government departments or national facilities)

We have under our National Research Foundation the South African Agency for Science and Technology Advancement (SAASTA - www.saasta.ac.za) who run a number of programmes, some on behalf of our Department of Science and Technology. These include:

* National Science Week

* Space Week

* Platform Months (including Astronomy, Antarctica, Biosciences,

  African Origins)

* SA Science Lens Competition

* Young Science Writers

* Public Understanding of Biotechnology

* Women in Physics

There are two Planetaria (one in Johannesburg and one in Cape Town) as well as an astronomy visitor centre at Sutherland.

(ii) What non-governmental astronomy/science outreach programmes for the public take place (NGO activities or international programmes that your country is involved in)

* Scifest Africa

* Science Unlimited

* Sasol TechnoX

* InsiteX

There are a number of Science Centres across the country promoting Science and Technology (www.saastec.co.za) and involved in a variety of outreach programmes.

There are also commercial companies taking astronomy out there such as "Astronomy Africa" which deals with the tourism sector - they also train game rangers on stargazing in our National Parks.

(iii) Comment on the presence of astronomy in the media (TV, radio, newspapers). Is it very prominent? Are there specific programmes on astronomy? Is the media generally willing to publish news on astronomy?

Currently there is a media presence which is slowly increasing (currently regular shows on 3 radio stations as well as coverage now and then of the big projects like SALT and SKA).

Media is generally very willing to run stories related to astronomy - we simply need to keep them informed, especially with interesting discoveries or big events. IYA2009 announcement was very big as a news item but the Lunar eclipse was even bigger - the eclipse was on TV news, newspapers and radio.

(iv) Comment on the presence of astronomy/science in the general culture of the people. Are there any specific challenges or setbacks? Is astronomy a welcome subject of conversation?

In the metropolitan areas there is a general interest in astronomy - this can be attributed to the presence of Planetaria and Observatories. In rural areas there is a general indigenous knowledge of astronomy that helps to start a conversation about modern astronomy. It is very much a part of local culture in various forms (be it counting years of manhood to monitoring seasons). The dominant opinion relating to the stars though remain in the form of astrology. Most of the general public relate the stars more to astrology than to astronomy. However, with all the publicity that SALT and SKA have been getting, this is slowly changing.

In terms of the public understanding of science we still generally acknowledge it as a challenge

and we continue to strive to get science and technology to the public.

(v) Self evaluation (according to the different phases above, how would you rate your country in terms of Public Understanding of Astronomy? Please include any other relevant information to motivate your choice.)

Once again I think South Africa can be considered a "Phase 1" country in terms of public engagement in science. However, it must be noted that although all these structures are in place, the public understanding of science is still far from satisfactory. We therefore continue to work at it.

3. Astronomy in Schools:

(i) What governmental astronomy/science education and outreach programmes for schools take place (co-ordinated either by government departments or national facilities)

The prjoects of the South African Agency for Science and Technology Advancement (SAASTA - www.saasta.ac.za) which deal with schools include:

* National Science Week

* Space Week

* Platform Months (including Astronomy, Antarctica, Biosciences,

  African Origins)

* Young Science Writers

* Public Understanding of Biotechnology

* Women in Physics

* Take a child to work

* Astronomy Quiz

* Primary Science Day

* National Science Olympiad

There are also a number of school programmes run by the various science academic institutions such as universities and research facilities.

(ii) What non-governmental astronomy/science education and outreach programmes for schools take place (NGO activities or international programmes that your country is involved in)

* SABC Careers Fair

* Shuttleworth's Hip2b2

* SABC Learning Channel

* Eskom Expo for Young Scientists

Various activities run by science centres across the country and also many NGOs such as Ort-Tech and PSP who do science outreach.

(iii) Comment on the presence of astronomy in the school curriculum. Is it part of the school curriculum? Is it very prominent? What age groups?

Astronomy is part of the school curriculum for all ages. Although this is the case, it seems that the astronomy knowledge amongst the teachers remains unsatisfactory - which leads to many requests for more resources and information in order to teach astronomy in the classroom.

(iv) Comment on the status of astronomy/science in schools. Are there any specific challenges or setbacks? Sufficient number of students studying maths and science? General interest in maths/science/astronomy in schools?

Although we have many outreach programmes there still remains a challenge with the number of quality maths and science graduates from high schools who enrol for further study in science careers. There is a constant appeal for more students to take up careers in science and engineering and the numbers are currently simply insufficient. There have also been various comments about the quality of students with maths and science not being adequate. Most people in the education and outreach fields acknowledge a shortage of good maths and science teachers. Maths and science teachers are proabably the key to generating interest in the subjects and need to be appropriately remunerated, trained and motivated. Although we have many "out of classroom" outreach programmes, the learner still has to go back to the classroom at the end of it and that is where the bulk of their learning is taking place.

(v) Self evaluation (according to the different phases above, how would you rate your country in terms of Astronomy in Schools? Please include any other relevant information to motivate your choice.)

With the sheer number of interventions into science in the education system I think that we again have to be classified as a "Phase 1" country. This does not mean that there is not a lot of work to be done. However, according to the definitions, we do have astronomy rather well established as it is a part of our school curriculum. We simply need greater interventions in terms of making it happen even more.

Any other general comments or information that you feel would be useful for this survey?

South Africa is relatively well established on all fronts in terms of astronomy. However, there is much that is yet to be done in order to ensure that it reaches everyone. The experience, facilities and resources that South Africa has can be shared with fellow African countries who may not be as equipped in the respective areas. The focus I believe will have to be in terms of human resource development. We need to train people. I believe the biggest thing that South Africa has to offer comes in the form of training - this would be the training of outreach personnel, students, researchers, science communication officers, stargazers, amateur astronomers, etc. There is much that can be done if organised in a structured and systematic implementation plan. In South Africa we are currently trying to prepare ourselves for such collaborations by consolidating all our astronomy resources and expertise and thus be able to train more people in whatever way possible. Being at the SAAO I can offer collaborators a tour of our observatory including the Southern African Large Telescope. Although we do not have a large budget for this we could cover your accommodation for a visit to South Africa if you cover your travel and food. During this visit delegates would be introduced to all our resources and activities as well as have a detailed tour of the observatory and possibly other facilities. This was done already for a group from Lesotho. This invitation remains open as we try to develop astronomy in Africa - you may contact me personally to discuss such, and other possibilities.