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Enhancing Astronomical Research and Education in Developing Countries

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ASTRONOMY TEACHING AND RESEARCH IN NIGERIA

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Astronomy research and teaching has been actively carried out in the Department of Physics and Astronomy at the University of Nigeria, Nsukka for the past 20 years and before that, in the Department of Mathematics. Economic problems, lack of recent journals, text books and computing facilities, and very poor communications have made it increasingly difficult for these programmes to continue. Added to these problems there is often unrest in the Universities resulting in frequent closures and almost constant uncertainty about payment of the already poor salaries. It is a wonder that anyone could be even thinking of astronomy.

The question could therefore be asked 'Why should astronomy be carried out in Nigeria anyway?' It is extremely difficult to convince both the Government and public that Nigeria has a need for astronomy education. The often quoted reason that astronomy is an attractive science and therefore a good way of interesting people in pure science does not carry much weight since not enough funding is given to pure science either. To the majority of people, job prospects are the key factor. There is no welfare system at all in Nigeria so good students are encouraged to take a professional course such as medicine or law where it is felt that they have some hope of being able to provide for their families. Science is believed only to lead to teaching, which is notoriously poorly paid. Despite this, it is a fundamental right that all people should be able to have access to any discipline, and none more so than astronomy, which explores the universe that we all live in and encourages the spirit of enquiry. It is very important that the few isolated astronomers in developing countries around the world should be given support and encouragement to continue their struggle. There are some lone astronomers in other African countries who are in an even worse position than those in Nigeria.

One recent development which has lifted the spirits of the astronomers at Nsukka has been co-operation with astronomers in South Africa at the South African Astronomical Observatory (SAAO) and the Hartebeesthoek Radio Astronomy Observatory (Hartrao). Not only have two Nigerian astronomers already visited South Africa to carry out observational work, but they were also able to take back to Nigeria a lot of material which can be used both for research students and to revamp their lecture courses. One of the Nigerians carried out observational work on cataclysmic variables and pulsating stars at SAAO and the other learned radio observation techniques at Hartrao. A Nigerian PhD student is currently in South Africa and it is hoped that he will spend about a year at Hartrao working on an observational project, probably on millisecond pulsars. It is this type of collaboration, which can provide the opportunity to carry out observations as well as to keep up to date, that is so badly needed by astronomers in developing countries. Previous attempts to set up observational projects within Nigeria have failed mainly from lack of funding. Funding is still needed for collaborative efforts and is still a non trivial problem, but it is a more cost effective option, avoiding some of the problems such as security and maintenance of equipment. It is very much hoped that further co-operation in astronomy between African countries will develop.

Since the early 1980's higher degrees (both MSc and PhD) have been awarded in astrophysics at the University of Nigeria. Currently there are 4 master's and 4 doctoral students. Astronomy is also taught in the undergraduate physics programme, with one compulsory introductory course and a further 4 optional courses. Some other universities in Nigeria are now beginning to set up astronomy programmes, largely through the initiative of former students of the University of Nigeria who are now staff in these universities.

Poor communication facilities are a major problem in Nigeria, particularly in a place like Nsukka which is in a rural area. The lack of e-mail and poor telephone and postal systems are almost

incomprehensible to astronomers in developed countries, who expect to be able to communicate instantly with each other. There are two universities in the West of Nigeria that do have e-mail, but in practice this does not function reliably, largely because the telephone system needs revamping. The implications of having no access to the world wide web are also becoming alarming for scientists in countries like Nigeria. The increasing trend for electronic publication of scientific material, and the accessibility on the internet to scientific papers several months before publication in hard copy, means that scientists in Nigeria are becoming more and more out of touch with recent research and are falling further and further behind their colleagues in developed countries. This is likely to remain the situation for the foreseeable future because even if the internet were available, it is not likely that there would be sufficient funding for access to be freely available to students and staff. It would be available only to the elite who could provide their own funding, either personally or in a very few cases from an external research grant. This is at present the situation with computing facilities. A minority of staff (or research groups) have personal computers and the majority (staff or students) do not have access to any computing facilities at all unless they 'buy' time on a computer. A few CD-Rom readers, provided by the World Bank, are available in the Library at the University of Nigeria, but have only very limited access. It is therefore clear that materials in print form are far more accessible for the generality of people. However only a few journals are being subscribed to, again through a World Bank programme, but none are in astronomy. In order to keep up to date astronomers in Nigeria rely on preprints from observatories, donations (mostly arranged through the IAU) and materials photocopied by any colleague managing to travel out of Nigeria. This provides a very haphazard and possibly distorted view of current research. The situation regarding text books is no better. Most of the astronomy books available in the Library are at least 20 years old. Students are therefore largely dependent on the view of astronomy taught by their lecturers. It is therefore vital that the lecturers keep up to date by attending Workshops, conferences etc. This is only possible if external sponsorship is obtained.

The poor communications and underfunding of universities has another effect on research. Publication of research work is limited more and more to local journals, which is far from ideal for a subject like astronomy. This not only increases the isolation from the international community, but also means that there will be little feedback on the research since only a handful of people are likely to read the paper. However the prohibitive costs of submitting the manuscript reliably (e.g. by courier service) to an international journal, which would have to be met by the researcher personally, have ruled this out in general.

Scientists in developing countries are sometimes criticised for depending too heavily on aid and not making enough effort themselves to put their case to their governments. This is often unfair as it must be realised that some governments do not respond to pressure. Considerable efforts are made, these efforts not just involving sending faxes, making phone calls etc, but requiring difficult travel around the country to try to meet Ministers and government officials, often at personal expense. Proof that such efforts are made is the fact that the 3rd United Nations/European Space Agency Workshop on Basic Space Science took place in Lagos in 1993 with Government backing. These Workshops provide unique opportunities for astronomers from developing countries to meet established astronomers, present their own research work in an international forum, and to express views and discuss problems. Astronomers in developing countries who are working under such difficult conditions need the sensitive and sympathetic support of the developed world.