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**PROGRESS REPORT ON THE AFRICAN SKA**  
**(SQUARE KILOMETRE ARRAY)**  
*(Item proposed by the United Republic of South Africa)*

## 1. INTRODUCTION

1.1. The concept of the Square Kilometre Array telescope (SKA) was developed over many years, beginning in the early 1990s. Astronomers recognized that the next great discoveries in astronomy required a significantly larger facility than previously constructed. Hence, they suggested a telescope with a collecting area of 1 million square meters of 1 square kilometre. Such a telescope would be 50 to 100 times more powerful than any other ever built, and will be able to answer many of the fundamental questions remaining for our understanding of the universe.

1.2. The SKA will be the most powerful and most sophisticated telescope ever built. It will utilize cutting edge technology in electronics, computing, network connectivity, material sciences, and engineering. If such a facility is constructed in Africa, it will catapult the continent to the forefront of astronomy for years to come.

1.3. In light of this, and with the support of South Africa's National Cabinet, the National Research Foundation (NRF) of South Africa submitted in May 2003 an initial bid to the International SKA steering Committee (ISSC) to provide a core SKA site in the Northern Cape. The remote sites will be in eight other African countries (Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia, and Zambia) for the African SKA layout. A supplementary bid document was sent to the ISSC in December 2003.

1.4. In August 2004, the ISSC sent out a formal Request for Proposals for sites. Four other countries (Argentina, Australia, China, and the USA) also indicated their intentions to bid, but the USA subsequently withdrew. The bid documents were scrutinized by an Independent Site Selection Advisory Committee, consisting of prominent astronomers from countries that were not involved in the bids and who had not personally been involved in the SKA project. Their report was submitted to the ISSC at its meeting in Dresden, Germany, in August 2006, where the decision was made to shortlist South Africa and Australia.

1.5. The African SKA bid has partner countries and associate countries. The former will host the SKA infrastructure, while the associate countries are either already involved or encouraged to participate in engineering and astronomy training of postgraduate students in South Africa.

1.6. Both Africa and Australia-New Zealand are building pathfinder telescopes: the Karoo Array Telescope (referred to as MeerKAT) in South Africa, and the Australian SKA Pathfinder (ASKAP) in Western Australia. These facilities are being constructed to test possible technologies to be used in the ultimate design of the SKA itself.

1.7. In late 2011, a group of international astronomers will assess the final SKA configurations and costs for both the Australian and African pathfinder telescopes, and make a recommendation on the host country. Thereafter, in 2012, a decision by governments and funding agencies will be made as to where the SKA will be built.

## **2. DISCUSSION**

2.1 In order to secure the bid for the SKA, South Africa has begun building the MeerKAT in the Northern Cape Province. South Africa began with the construction of a single fibre glass 15m radio telescope at Hartebeesthoek Radio Astronomy Observatory in Gauteng Province. South Africa has completed KAT-7, a seven dish Karoo Array Telescope, at the future site of MeerKAT. This telescope is Phase 1 of MeerKAT and is comprised of 7 fibre glass, 12m radio telescopes linked to operate as a single radio telescope.

2.2 The full 80 dish MeerKAT is expected to be completed by late 2013 or early 2014. No facility – neither MeerKAT nor any other telescope – is of value unless there are people to utilize it. In this regard, South Africa has launched the SKA Human Capital Development programme, which has been very successful. As of January 2010, 216 students at undergraduate, honours, masters, doctoral and post-doctoral level have been through or are currently in the programme. Over 40 of the African students are from countries outside South Africa.

2.3 Several African countries are developing the following initiatives in astronomy:

- Egypt is refurbishing its 1.9m optical telescope, and has expressed interest in erecting a single MeerKAT dish;
- Mauritius has raised funds to install a single MeerKAT dish to replace its now non-operational low-frequency interferometer, the Mauritius Radio Telescope;
- Burkina Faso is installing a 1m optical telescope;
- Ethiopia is considering installing a 2m robotic optical/infrared telescope; and increasing the number of universities to support astronomy;
- As a result of the African bid for the SKA, Kenya and Mozambique have started an astronomy programme at the University of Nairobi and the University of Eduardo Mondlane, respectively;

- Nigeria is erecting a 25m radio telescope and has expressed an interest in taking part in the African VLBI network; and
- Each of the African countries in partnership with the African SKA bid has expressed an interest in developing an African astronomy network to carry out research in both astronomy and geodesy.

2.4 The economic impact of the SKA on the African partner countries will be as follows:

- The construction of the SKA Project will amount to US\$1 – 1.5 billion foreign direct investment in nine African countries;
- The annual operating budget of the SKA will be about \$200 million (or \$10 billion over the 50 year lifetime of the telescope);
- The SKA will attract 500 of the world's best scientists and engineers to Africa;
- Operating the SKA will require ultra-high speed internet, in excess of 100 Gigabytes per second. The backbone networks in the African partner countries will have to be upgraded to accommodate the broadband width required for the SKA, thus providing all members of each country higher speed internet connectivity;
- All African countries will have access to the training programmes at this African SKA telescope, including technical and research-oriented training programmes.

## **2.5 SKA Africa Partnership**

The Africa SKA Bid Project consist of a Working Group, comprised of technical and political decision-makers from Botswana, Ghana, Kenya, Madagascar, Mauritius, Mozambique, Namibia, South Africa and Zambia, and a Steering Committee, consisting of Permanent Secretaries of the partner countries. The Working Group meets twice a year and the Steering Committee meets annually. The Ministerial meeting of the SKA African partners met on 10 March 2010 during the Fourth Session of the African Ministerial Conference on Science and Technology (AMCOST IV) in Cairo, Egypt. The ministers agreed to strengthen cooperation in the project in order to ensure that all

necessary project requirements are met. The next SKA Working Group and Steering Committee meeting will take place in Ghana in September 2010.

The July 2010 AU Assembly Decision (Assembly/AU/Dec.303 (XV) endorsed the African bid to host the SKA on the African continent and called upon Member States, the Commission and Regional Economic Communities (REC's) to fully cooperate with the Republic of South Africa on the project by providing the necessary support to this bid.

South Africa continues to use its strategic bilateral relations with the various partner countries to strengthen the SKA Bid. The Department of Science and Technology is also working closely with the Department of International Relations and Cooperation to ensure that the SKA project is a key area of cooperation at bilateral level (such as BNC, JBC, JPCC etc.) with various partner countries.

2012-01-29

# Progress report on the African SKA (square kilometre array) (Item proposed by the United Republic of South Africa)

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