

South Africa signed the convention establishing the Square Kilometre Array (SKA) observatory in March 2019, concluding four years of negotiations. The treaty establishes the SKA Observatory as the second intergovernmental organization dedicated to astronomy after the European Southern Observatory; it will come into force once it has been ratified by the legislatures of at least five signatory countries, which must include the three SKA hosts, South Africa, Australia and the UK. As of September 2020, only the UK's signature is pending.

The core stations of the SKA are already under construction, however, in South Africa. Remote outer stations are spread across eight African countries: Botswana, Ghana (see Box 18.3), Kenya, Namibia, Madagascar, Mozambique, Mauritius and Zambia.

Meanwhile, the MeerKAT will retain the title of the world's most powerful radio telescope until the SKA is completed. The MeerKAT's first 64 dishes were inaugurated in July 2018. An additional 133 dishes are being added to the MeerKAT from 2020 onwards. Scientific papers using data from the MeerKAT have already been published and cited in well-known publications.

Although the South African Radio Astronomy Observatory is responsible for building the MeerKAT, the radio telescope is managed by the National

Research Foundation, itself co-ordinated by the Department of Science and Innovation.

An investment boom for the African space industry

About 75% of the components used in the construction of the MeerKAT have been sourced locally. Several inventions are being commercialized and more than ZAR 110 million (*ca* US\$ 6.5 million) has been awarded to 16 domestic small and medium-sized enterprises through a financial assistance programme.

The Centre for High Performance Computing has been extensively upgraded to meet the data demands of the MeerKAT and its staff have been trained in data science, in partnership with universities.

Some 7 284 employment opportunities have been created by the construction of the MeerKAT and the KAT-7, a radio telescope in the Northern Cape commissioned in 2012, counting related projects.

About 300 people are employed full-time on the SKA at three sites: Cape Town, Johannesburg and Carnarvon. Employees have helped schools in Carnarvon to enhance their teaching of maths and science; 14 pupils have also been awarded university bursaries and another 72 have been granted scholarships to study at further education and training colleges from 2020 onwards.

In addition, a training centre has been built to give youth the artisanal skills that

will be in heavy demand for the SKA and other industries in the Northern Cape.

At the national level, more than 1 160 SKA bursaries have been granted, as of 2020, at undergraduate, PhD and postdoctoral levels; the target is to double this number by 2030. This should include awarding 133 bursaries to recipients from other SKA partner countries in Africa.

The number of South African astronomers with a PhD has already tripled from 60 in 2015 to over 200.

The long game

The African Very Long Baseline Interferometry Network project aims to build a network of radio telescopes on the African continent (see Box 18.3). The SKA is assisting with this project by providing training and institutional support.

The Centre for High Performance Computing is also rolling out a Big Data Africa Programme to build capabilities at universities in partner countries.

The SKA project has attracted foreign direct investment of over ZAR 500 million (*ca* US\$ 30 million) by hosting guest telescopes and instruments. It has also attracted leading astronomers from around the globe, who have relocated to South Africa and are assisting in skills transfer and technology exchange.

Source: compiled by authors