

Transcontinental: with thousands of antennae, the Square Kilometre Array Observatory will soon be able to simulate a giant radio telescope with extremely high sensitivity and angular resolution. The collage combines the plans for parabolic mirrors in South Africa (left) and antenna fields in Western Australia.



# MADAGASCAR REACHES FOR THE STARS

*TEXT: JEANNETTE GODDAR*



IMAGE: SKAO

Astronomical observatories mostly require remote locations where human disruption is not a factor. That is why many are located in African countries. However, most of the research takes place in the global north. For a country like Madagascar, the prospect of hosting an observatory can nonetheless set education and science into motion, according to findings by Hanna Nieber of the Max Planck Institute for Social Anthropology.

It is a project full of superlatives. Over the past year, hundreds of parabolic mirrors and more than 100,000 antennas have been installed in remote regions of South Africa and Australia, far from cities and human radio emissions. The goal is to build a superlative radio telescope, one almost as big as the globe itself and so multifaceted and sensitive as to enable us not only to chart the Milky Way, but also to gain a view of developments after the Big Bang. The Square Kilometre Array Observatory (SKAO) is supported by an organization with 13 members; one of them is the Max Planck Society. If all goes well and the SKAO goes into operation in 2028, it will be a dream come true for researchers in radio astronomy – one they have nurtured since the 1990s and have been working on ever since.

This is clearly illustrated in a story studied by social anthropologist Hanna Nieber in her research project “Constellations for Astronomy in Madagascar.” Three years before the SKAO received funding, astronomers were already making the trip from South Africa to Madagascar, which would become one of the eight partner countries. The mission of the researchers was to meet with Mino son Rakotomalala, a professor of particle physics at the University of Antananarivo. Could he imagine setting up an astronomy degree program in the capital of Madagascar? One can only guess how unlikely the South African visitors considered their mission’s chances of success in a country with a student admission rate of under five percent and one of the lowest GDPs in the world. And yet, it succeeded. “Every year since 2014, six students with bachelor’s degrees in physics have started a master’s program in astrophysics,” says Nieber. Those interested in a scientific career often move to Cape Town, where the SKAO receives significant support on the scientific front.

A postdoc at the Max Planck Institute for Social Anthropology in Halle, Nieber headed to Madagascar and South Africa for field research in 2022. She arrived at social anthropology after completing a master’s degree in African studies. Her interest in the continent is partly biographical; she graduated from high school in Eswatini. After earning her doctorate with a thesis on Islamic practices in Zanzibar, she discovered astronomy. She sums up her current research project in a single sentence: “I wanted to find out what happens in anticipation of such a massive science project.” Especially in

Madagascar, a country where the conditions are sobering even by African standards. Two out of three people live below the poverty line. Even before Tropical Cyclone Freddy ravaged the island several times early this year, the United Nations had already identified Madagascar as one of the ten countries in the world most heavily affected by natural catastrophes. In rural regions, most families live on what the soil yields under these conditions. According to data from UNICEF, the United Nations Children’s Fund, three out of ten children never attend grade school, while another three never finish.

However, Nieber warns against drawing the wrong conclusions about the population as a whole from statistical data. “Madagascar has a college-educated middle class, too.” And an increasing number of people in a country of 30 million are pursuing a college education. According to an overview from Madagascar’s Ministry of Higher Education and Scientific Research, there are six state universities and almost 150 private institutions of higher education. Nearly all of them

are located in the capital city of Antananarivo, nicknamed “Tana” by locals. “As a rule, everyone who makes more money than average lives in Tana,” reports Nieber.

In the first few years since the introduction of the astronomy degree program, Tana’s middle class contributed to the founding of two associations committed to supporting this subject. The roots of the larger of the two, Malagasy Astronomy and Space Science (Mass), go back as far as 2009. Nieber tells of more than a hundred members, including both astronomy graduate students and undergraduates from a variety of disciplines, who

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## SUMMARY

Interest in astronomy has grown in Madagascar since the country was nominated as a location for the large-scale SKAO telescope project.

The people hope this enthusiasm will advance the development of their country in other areas as well.

Cooperating on the project with other African countries has caused Malagasy to start feeling they belong to the African continent.

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**“The SKAO offers a future that people in Madagascar could not imagine before.”**

HANNA NIEBER



PHOTO: ANNA SCHROLL FOR MPG

Colleagues confer: Hanna Nieber (center) talks with Lukas Ley and Julia Vorhölter at the Max Planck Institute for Social Anthropology.

regularly discuss current research findings. Many young Malagasy astronomers currently undertaking their doctoral or postdoctoral research in Cape Town are actively involved in Mass as well. They frequently return to their homeland with new findings in their luggage, Nieber observed. “It really surprised me how close the collaboration is,” she says.

The other association, Haikintana, is much smaller and dedicates itself to what could be described as educational outreach. “Its members go to villages and visit schools to make astronomy accessible to the people,”

Nieber relates. And when they are not on the road, they take every opportunity to share their passion for astronomy on an exceptionally active Facebook page. Partial lunar eclipses are announced alongside rocket launches by Nasa and Esa and international conferences for junior astronomers. Short films are another way through which Haikintana arouses interest. In one of the videos, a young woman sits outside under a palm tree as the background fills with a series of images of the temperature gun used throughout Madagascar during the pandemic and of people reading off temperatures from the device. In about two minutes, the young woman explains the principles of infrared technology, the basis for non-contact temperature measurement. What does that have to do with astronomy? Infrared radiation was discovered by German-British astronomer William Herschel in the early 19th century.

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## The goal: more interest in the sciences

Both associations are financed by their members and regularly apply for and receive support from organizations such as the International Astronomical Union. “And are many women involved?” people often ask Nieber. “Yes, there’s no observable difference in their participation compared to men,” she says, adding, “My impression is that anyone who deals with global academic discourses and structures can no longer ignore the question of gender equity.”

Both associations are deeply committed not in spite of, but rather because of the situation in the homeland, which is precarious in many ways. “With climate change, corruption, and an unstable political landscape, the people I talk to also ask themselves, how can we afford to look away from Earth?” she reports. The answer, which they provide, is: “They assume an inherent enthusiasm for the starry sky, which they want to use to arouse greater interest in the sciences, and ideally in engineering as well. If this succeeds, runs the argument, it will make a major contribution to Madagascar’s development. And everyone I talk to really cares about that.” This concern is clearly shared by the organization sponsoring the SKAO.



## No one was proud to be part of Africa

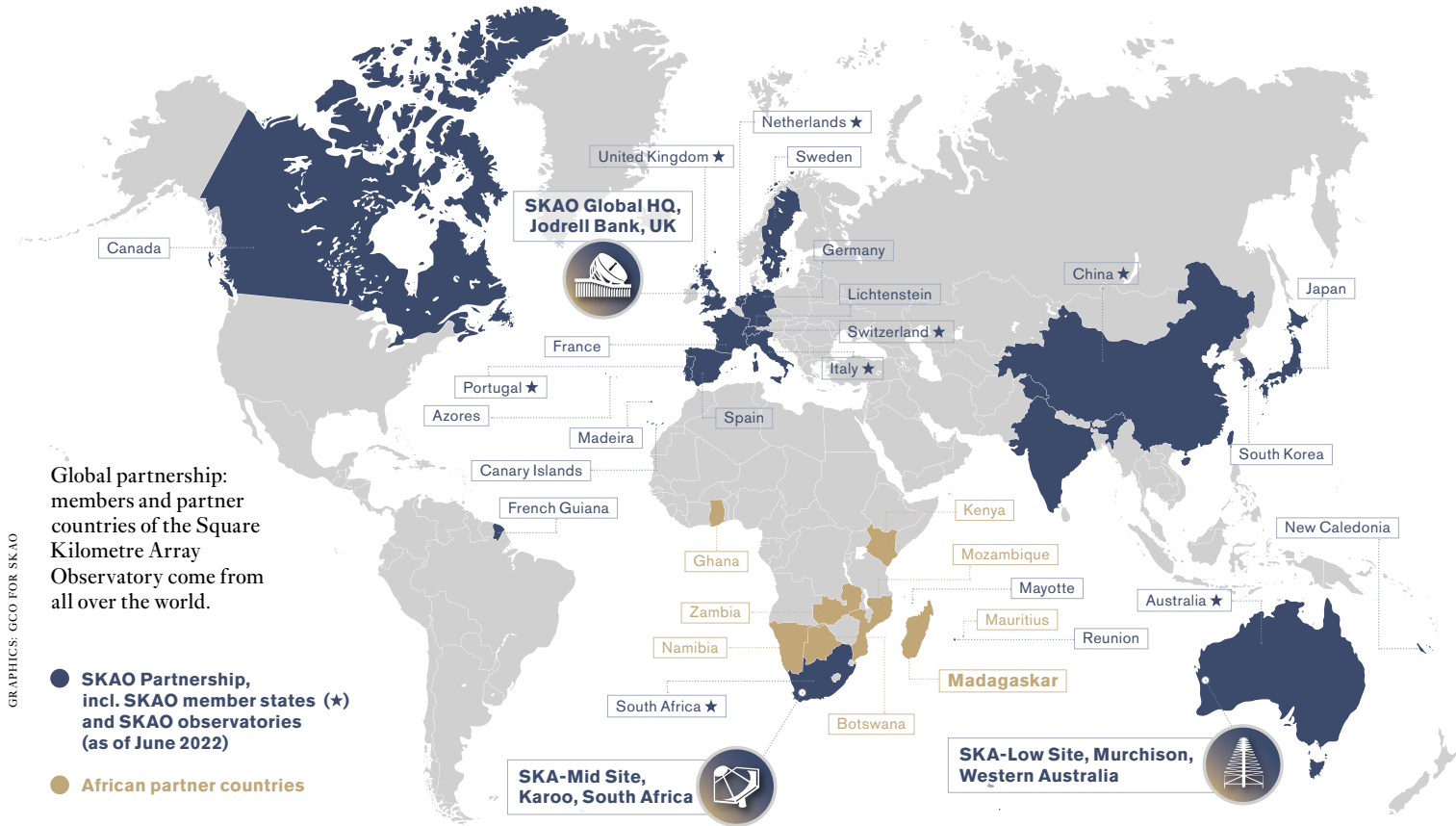
However, this plan can only succeed if such an “inherent enthusiasm” really exists. Does it help that for thousands of years people have read their fates in the constellations and heavenly bodies? “The astronomers I talk to distance themselves from any connection to astrology,” says Nieber. “In every other conversation, though, mythological concepts actually get brought up immediately.” Nieber has heard of villages in the highlands whose construction methods are determined by the stars and can be traced back to the palaces of the precolonial kingdom of Merina. “Typically, the entrance and exit face west. In the northeast, by contrast, a space is left for the ancestors even today in some regions.” These types of findings are not yet part of her research, however. “It is good to know these stories, and I listen to them with interest,” she says. “But I lack the language skills to research them. Doing so would require more collaboration, which would obviously be great.”

To be sure, Nieber speaks fluent Swahili, the most widespread lingua franca in East Africa. Malagasy is not related to this language, however, nor to others of the Bantu family. It is closer to Malay, which is spoken in Malaysia and Indonesia. The Malagasy set themselves apart from Africa on the cultural front as well; they see their island almost as its own continent. On the one hand, this is hardly surprising given that it is 400 kilometers from the coast of Mozambique and has a surface area 1.6 times the size of Germany. On the other hand, Madagascar is an African nation and a member of the African Union. “No one there was proud to be African, though,” Nieber reports from experience. “The SKAO is changing that. Now something hip, cool, and dope is coming from Africa, something offering a future that people in Madagascar could not imagine before,” she relates. The scientific exchange also advances a discourse that has already gained momentum in many countries of the global south. After centuries of foreign rule, has the time not come to clear away bodies of knowledge accumulated from white perspectives, in a word, to “decolonize” knowledge? Within Africa, a leading role in this context is played by South

Excursion with a vision: the Haikintana association aims to promote interest in astronomy in Madagascar. In this photo, a member of the association explains the solar system to a class.



PHOTO: HANNA NIEBER/MPI FOR SOCIAL ANTHROPOLOGY



GRAPHICS: GCO FOR SKAO

Africa, a country shaped by apartheid until 1994. As students in Cape Town protested in 2015 against a statue of British imperialist Cecil Rhodes on the university campus, the story made headlines in German media. As Nieber relates, “Rhodes Must Fall” demonstrations led to a movement in the academic world that even today questions what should be taught at institutions of higher education and how to deal with traditional bodies of knowledge. Are these ideas gaining traction in Madagascar, a French colony from 1896 to

1958? “No,” she replies, “but they discuss them, and so far with a different conclusion than was reached in South Africa, interestingly. Science is treated as something that should endure beyond decolonization and particularization.”

And so, it is surprising to find that it is possible to gain a multitude of anthropological knowledge from a subject as far removed as astronomy. Nieber does not find this so surprising. She has to laugh a bit. “The interplay between concepts from the hard sciences and the humanities and social sciences is my favorite research subject.” At the moment, she is thinking primarily of the concept of universality, which is viewed very differently depending on the discipline. While most astronomers assume that science is bound to neither people nor places, and is therefore universal, social scientists generally see things differently. “For us, science is contextual. It is contingent on factors such as location, culture, and class,” she explains. Her position can be readily applied to the SKAO, which is being built in both Australia and Africa. “A person with a singular telescope sees only part of the sky.” But universal astronomy requires many telescopes – and many people to participate, in places all over the planet.”

**“A universal astronomy requires many people to participate, in places all over the planet.”**

HANNA NIEBER

[www.mpg.de/podcasts/universum](http://www.mpg.de/podcasts/universum) (in German)