



science, technology
& innovation

Department:
Science, Technology and Innovation
REPUBLIC OF SOUTH AFRICA



SARAO
South African Radio
Astronomy Observatory

Reduce the noise

Listen to the Stars

SARAO-RFI TEAM

Radio Astronomy, Radio Telescopes and Radio Frequency Interference

There is a story told of an European explorer who was met with disbelief when he told local tribes that he could not hear the stars. The local tribes were astonished that he could not hear the songs sung by the stars.

Welcome to the Karoo, and welcome to the site that is home to the MeerKAT radio telescope, soon to be part of the SKA-Mid radio telescope. This site was handpicked because of how quiet it is. Not just normal quiet, but radio quiet. Think radio silence or, perhaps, radio telescopes. The entire radio astronomy endeavour hinges on how radio frequency (RF) quiet your environment is.

Reduce the noise. **SARAO-RFI TEAM** Listen to the stars.



The use of electronic equipment is prohibited and only select critical equipment are permitted, and especially in the core of the radio telescopes.



As far as possible, electronic equipment should not be taken to site. Prohibited items include: Smartwatches, Tablets, Earpods, Bluetooth/Wireless Headphones and Mice, etc.



Any electronic equipment on site should remain switched-off and stored in lockers provided.



Flight-mode, etc, is not sufficient and many modern devices still transmit signals* even when disabled.

** These are usually faint enough to use on a flight, but unfortunately not at a radio telescope.*

Thank you for your contribution to this remarkable achievement and for your consideration of necessary precautionary measures.



What is Radio Frequency Interference (RFI) and why is it important to manage?

Radio Frequency Interference (RFI) is an important risk that should be managed and mitigated at all times. This interference is caused by radio waves (or signals) which obscure the radio waves the radio telescopes are trying to detect from the outer reaches of space. To detect these radio waves from many, many lightyears away some of the most advanced and sensitive detection systems are needed. These sensitive systems are the radio telescopes, with MeerKAT (and soon SKA) being some of the most sensitive in the world. These systems need to be protected. Their sensitivity can also be their downfall and the systems themselves can be damaged by uncontrolled radio emissions.

This state-of-the-art facility is dependent on the quietness of the radio environment and unwanted radio waves or signals can not only ruin valuable scientific data, but can also cause irrevocable damage to the instruments.

Please help us to protect this unique environment and be aware of the impact that any electronic devices you bring to site might have.



How is this site protected?

Due to the magnitude of this endeavour in the Karoo all possible precautions have been taken to protect the sensitive equipment housed on site.

- All equipment used or installed on site is carefully tested and only permitted if found to pose minimum risk. Mobile phones and petrol vehicles are always prohibited.
- Dedicated, state-of-the-art monitoring systems are deployed on site to detect any harmful signals or emissions.
- Essential engineering and construction activities are limited & scheduled to minimise impact on science measurements
- All antennas are stowed in safe positions during when high risk activities to the telescope and science take place, including flights to and from site, as well as lightning.

However, even with all these precautions, the sensitivity of the telescope still exposes it to possible damage even when all the protections are in place. To this end, the use of electronic equipment on site should remain limited to the equipment that have been permitted for a specific use.

The site, and especially the core of the radio telescope, will be actively monitored to detect any potential harmful waves or signals that could damage any of the telescopes.



High tech monitoring vehicle and handheld Bluetooth scanners (inlay) deployed on site.