sansa
space science

How do we know what the weather is like in Space?

Scientists use a network of observatories on Earth combined with instruments onboard satellites in space to monitor solar activity, measure magnetic fields and detect space weather storms.

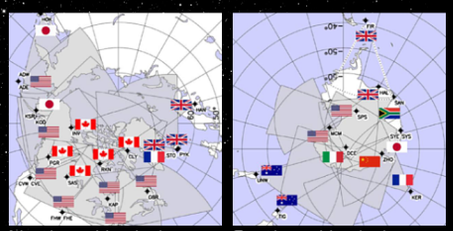
South Africa is the only African country with a scientific base located in Antarctica, an ideal location for conducting space science research. This is due to the Earth's magnetic field lines converging at the pole, allowing scientists to probe deep into the space environment.

To take advantage of this, SANSA operates a wide variety of space weather monitoring instruments in Antarctica. One of the main instruments is a High Frequency (HF) digital radar. The radar system is part of the Super Dual Auroral Radar Network (SuperDARN), which is an international network of over 30 radars involving scientists and funding agencies across 16 countries.

Did you know?

FACT

There are currently 22 SuperDARN radars in the northern hemisphere and 11 in the southern hemisphere. SANSA uses SuperDARN to develop information and services that help to grow the space industry for the benefit of the nation.



Northern Hemisphere Southern Hemisphere

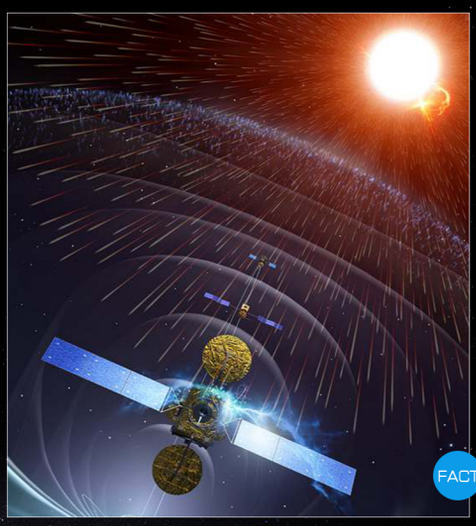
Why do we need a SuperDARN Radar?

Scientists use SuperDARN data for information regarding the Earth's interaction with the space environment, providing insight into the dynamics of space weather.

Measuring weather in space is much more difficult than measuring weather on Earth because the region of space weather starts about 100 km above the ground and ranges all the way to the Sun. The use of radar technology is very effective and much less expensive than using instruments on satellites for measuring space weather.

The SuperDARN radars are particularly effective for space weather measurements as they can monitor an extremely large target area over the poles. A single pair of radar can measure the space weather conditions in an area of approximately 4 million square kilometres.

Radar beams are directed up into the space weather region where they are reflected by patches of plasma (charged particles). Just like police radars that send out beams which reflect from vehicles, the SuperDARN radars measure the position and speed of plasma in the Earth's ionosphere, the ionized layer of the Earth's atmosphere.



FACT

Space weather can damage satellites and impact our communication and navigation systems.

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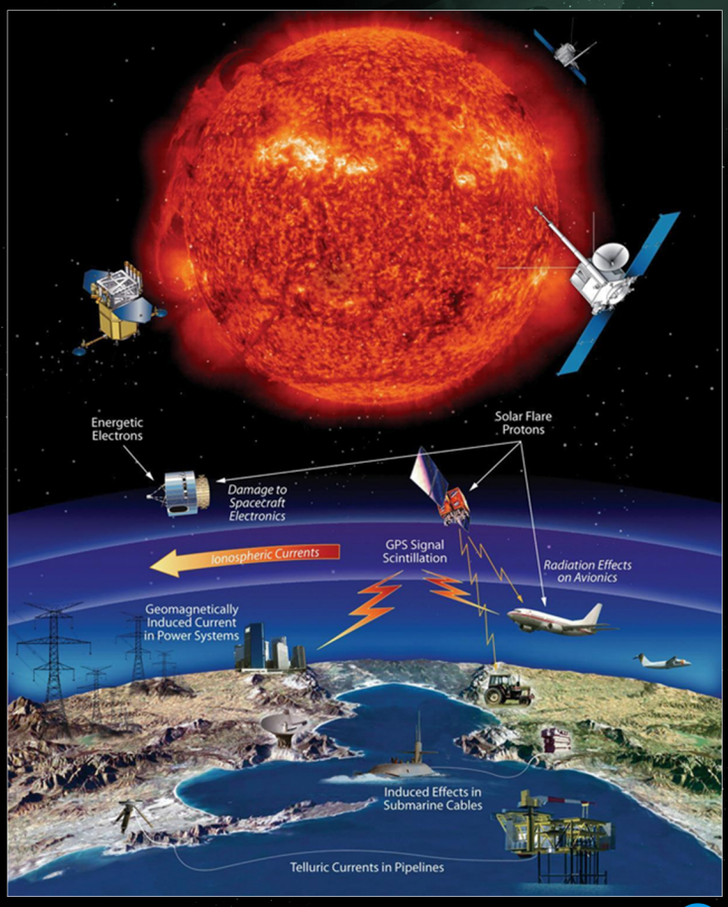
Why is space weather research important?

The main reason for this research is our increasing dependency on satellite communication and other forms of technology. Satellites operating within the space environment are often damaged by space weather storms which can also disable electric power grids and disrupt communication systems.

Satellites are becoming critically important as business tools and one of the fastest growing businesses on Earth is satellite telecommunications. Satellite signals are transmitted around the globe all the time. You benefit from this every day whenever you use a cell phone, GPS, internet or watch satellite TV.

Apart from providing useful information to mitigate the impact of space weather on these amazing technological innovations, space science and space technology provides us with valuable images and other information to better plan our housing and infrastructure, manage our natural resources and natural disasters as well as monitoring the safety and security of our country.



SuperDARN Radar Quick Facts

The SuperDARN Radar project:

Is funded through grants from the National Research Foundation and the South African National Antarctic Programme

Is part of an international network of over 30 radars involving scientists and funding agencies across 16 countries

Was assembled and tested at SANSA enhancing our knowledge economy for South Africa in radar engineering and operations

Is one of the most advanced, state-of-the-art SuperDARN radars in the world

Processes data at great speed, providing scientists with a superior platform to study space weather anomalies

Provides national and international science collaboration with partner universities and the SuperDARN network making South Africa a global space player

Right now there are over 3,000 operating satellites orbiting Earth FACT

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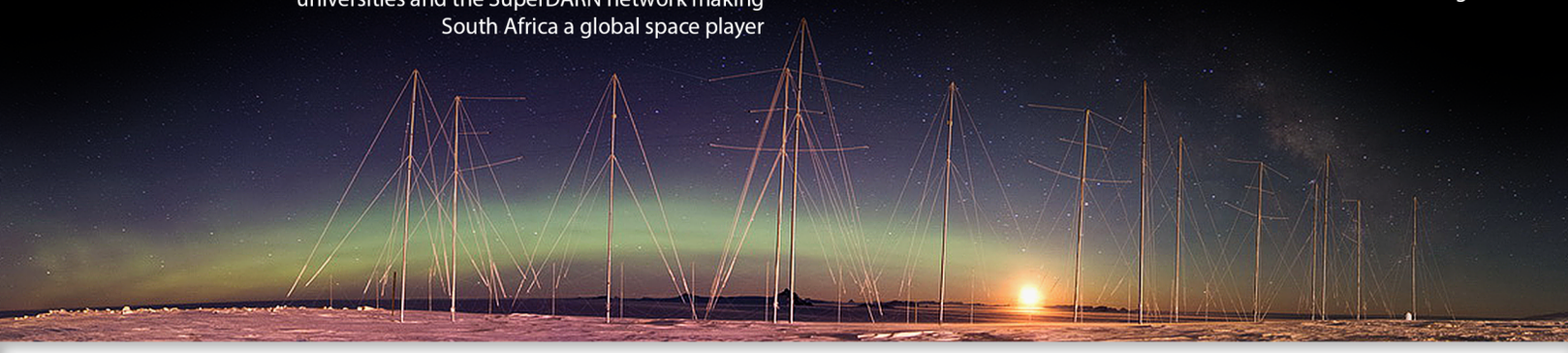

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