

SANSA

MAGNETIC TECHNOLOGY

Products & Services

Working closely with players in the local space industry, SANSA sources and calibrates magnetic sensors for integration on-board dynamic platforms such as ships, satellites and UAV's.

SANSA's facilities in Hermanus are well suited for characterising and calibrating magnetic sensors, as well as identifying the magnetic signature of dynamic platforms prior to sensor integration. SANSA is recognised as a national expert in various magnetic technology applications.

SANSA is host to a wide range of state-of-the-art equipment and infrastructure to provide specialised magnetic technology related services.

What We Offer

- Calibration and maintenance of landing compasses.
- Presentation of training courses regarding magnetism and compass swing procedures for aircraft and marine vessels.
- Magnetic navigation ground support.
- Geomagnetic data and field modelling.
- Calibration and evaluation of systems containing magnetometers.
- Acquisition, evaluation and calibration of magnetometers for space and other navigation applications.
- Magnetic and electrical field measurements and management.
- Execution of magnetic tests (e.g. RTCA DO-160G, IEC 945) according to international standards.

Equipment and Infrastructure

Our state-of-the-art equipment and infrastructure includes:

- Large 2.4 m tri-axial Helmholtz Coil system used to evaluate and calibrate various magnetic sensors and systems.
- Zero-field (≤ 10 nT) magnetic shielding chamber for magnetic evaluation of sensors.
- Non-magnetic temperature chamber (-50°C to + 70°C) for functional temperature evaluation of magnetic sensors and systems.
- High temperature Superconducting Quantum Interference Device (SQUID) for the recording of very faint geomagnetic signals. Various high sensitive scalar and vector research-grade magnetometers for measurement and evaluation of magnetic environments.



To find out more about SANSA's products and services or to discuss your specific requirements please contact us.

SANSA Space Science, Hospital Road, Hermanus

T. 028 312 1196 | spacesci-info@sansa.org.za | www.sansa.org.za | F. 028 312 2039

SANSA

PRODUCTS & SERVICES

The South African National Space Agency (SANSA) is South Africa's government body for the promotion and peaceful use of space, while fostering co-operation in space-related activities and research in space science, communications, navigation and space physics.

On earth we experience extreme weather like hurricanes, tornadoes and floods. In space there is another kind of extreme weather taking place on a much larger scale known as space weather.

Our life giving star, the Sun, is constantly active and every now and then it erupts, spewing out charged particles that travel through space at speeds of 800 km per second. These eruptions or solar storms can damage technology on earth and in space which we rely on daily such as satellites, avionics, internet, DSTV, electricity supply, GPS, mobile phones and High Frequency (HF) radio communication.

Due to the increasingly interconnected and interdependent technological systems of modern society space weather storms can negatively impact numerous sectors, leading to a cascade of operational failures. Research has shown that the defence, communications, navigation, aviation, and energy sectors are most vulnerable to space weather effects. Space weather storms have consequently been identified as a risk to the world economy and society.

The impact of space weather socially and economically requires that we are aware of and ideally able to pre-empt the consequences of space weather events, by means of efficient warning and prediction systems.



Did you know - Space weather can damage satellites and impact our communication and navigation systems

Protecting Technology On Earth And In Space



Space Weather Center - What We Do

The South African National Space Agency (SANSA) operates the only Space Weather Regional Warning Centre for Africa and forms part of the International Space Environment Service (ISES). SANSA's Space Weather Centre is one of two regional and three global warning centres selected by the International Civil Aviation Organization (ICAO) to provide space weather information to the global aviation sector. The Centre provides an important service to the nation by monitoring the Sun and its activity, providing space weather forecasts, warnings, alerts, and environmental data on space weather conditions to the global aviation sector, defence force, government and private-industry users in Africa.



SANSA operates the only Space Weather Regional Warning Centre for Africa

- Real-time forecasting and monitoring of space weather to reduce and mitigate the risk of the impact of space weather on technology, critical infrastructure and human activities.
- Provide tailored information/data for space weather-related requirements, such as HF propagation forecasts, to clients.
- Facilitate communication and service co-ordination regarding space weather, particularly during periods of enhanced solar activity and in the event of extreme space weather activity.
- Promote understanding of space weather and its effects among users, researchers, the media and the general public

SANSA

PRODUCTS & SERVICES

Client Support

SANSA provides support by means of the provision of space weather information and training. Clients use this information to protect a wide range of systems and technologies that may be affected by space weather. These include but are not limited to:

- HF radio systems, such as communication and surveillance systems
- Geophysical exploration, power systems and long pipelines
- Satellite, spacecraft and airline operations
- GPS and other navigation systems

Space Weather Training Courses

SANSA offers training courses in space weather, its impact on technological systems and HF radio propagation as well as on how to generate your own frequency predictions. Courses are tailored to suit client requirements and are hosted at SANSA in Hermanus or at a venue convenient to the client. The training provides a basic understanding of space weather, its importance and how to mitigate space weather effects.

Activity Indices

SANSA produces daily and weekly Smoothed Sunspot Numbers (SSN) and Effective Geomagnetic Activity Index (Qe) data for a period of 103-days. SSN and Qe are indices required as inputs to HF propagation software. These indices are required to generate their own frequency predictions.

- 3-day prediction of SSN and Qe
- 103-day and 7-day average predictions

Daily Space Weather Bulletin

SANSA space weather forecasters generate a daily forecast of space weather conditions every working day.



SANSA IS THE LEADING EXPERT IN SPACE WEATHER
IN AFRICA AND PROVIDES TAILORED SOLUTIONS
FOR SPECIFIC SPACE WEATHER REQUIREMENTS.

High Frequency Predictions

The Space Weather Centre provides daily and weekly High Frequency (HF) prediction graphs for different signal paths. Special frequency predictions are also available on request up to two months in advance.

Plots of Signal-to Noise Ratio (SNR), Take-off Angle and Maximum Usable Frequency (MUF) vs. Time are available.

- Weekly and daily predictions for general paths
- Specific daily predictions
- Special frequency predictions

T-Index Predictions

SANSA produces daily T-indices and weekly averages for a period of 55-days. The T-index is the ionospheric index that indicates the highest frequencies that will be reflected from regions in the ionosphere. This index is an input parameter of HF propagation software.

- 3-day T-Indices
- 55-day T-Indices and weekly averages

Space Weather Warnings and Alerts

SANSA Space Weather Centre provides alerts and warnings about the impact of space weather events such as:

- Coronal hole high-speed solar wind streams
- Coronal Mass Ejections (CMEs)
- X-ray solar flares
- Geomagnetic storms
- Ionospheric storms
- HF fadeout



Space Weather Communication Services

- Publicly available on the SANSA Space Weather Website
- Available on the SANSA Space Weather Website to clients only
- Available via Email to clients only
- Available via SMS to clients only

Ionospheric Characterisation Analysis and Prediction (IOCAP) Tool

IOCAP is an innovative new HF prediction tool with an exceptionally user-friendly interface to create frequency predictions using intuitive graphs and tables to present the results as ready-made operational solutions. IOCAP replaces older HF prediction systems that were difficult to create and even more difficult to interpret the results.

The tool includes a facility to consider the difference between the technical specification of radios and antennas used at either end of the communication. IOCAP considers both sides and calculates the best possible frequency at any given time to facilitate two-way communication. This is of upmost importance in military and disaster relief communications, as shown recently during the Mozambique hurricane disaster, when cell phone communication systems became overloaded and satellite phones did not operate due to the heavy cloud cover.



In civil aviation many long-distance carriers keep contact with their base using HF radio. IOCAP can be used to calculate which frequency at any given point during the flight will provide the best communications.

In contrast to conventional frequency prediction applications that can only produce point-point predictions, IOCAP will do three types of prediction:

A regular point-to-point prediction.

A reciprocal prediction where the path between transmitter and receiver is calculated as an outbound and inbound prediction, taking into account the asymmetric characteristics of the two stations, and presenting the results side-by-side to the user.

A roaming receiver prediction where a static base station communicates with a roving receiver, such as a vehicle or ship, via an unlimited number of waypoints. A frequency prediction solution is provided for every circuit between base station and waypoint.

Other features include:

An innovative Triangle of Prediction which uses a colour chart to display the quality of the prediction frequency for every hour of the day, showing the three most critical parameters of a prediction as 'go/no-go' segments: Frequency, Signal-to-noise ratio and Circuit Reliability.

A valuable training tool in the form of a comprehensive, embedded help system, augmented by a series of instructional software simulation videos, to help new recruits in making sense of the scientific theories behind frequency predictions.



Superimposing frequency predictions on a zoomable map that can be toggled between two types of road maps, a satellite map and a map/satellite hybrid map.

An active internet connection is not required for IOCAP to function, but when such a connection is detected, IOCAP will fetch real-time prediction parameters from the appropriate world-wide sources and insert them into the prediction on behalf of the user, ensuring the maximum prediction accuracy possible.

In addition, features such as three-day geomagnetic activity forecasts become available, while an automatic update of smoothed sunspot numbers (SSNs) occurs without any requirement for user-intervention.