

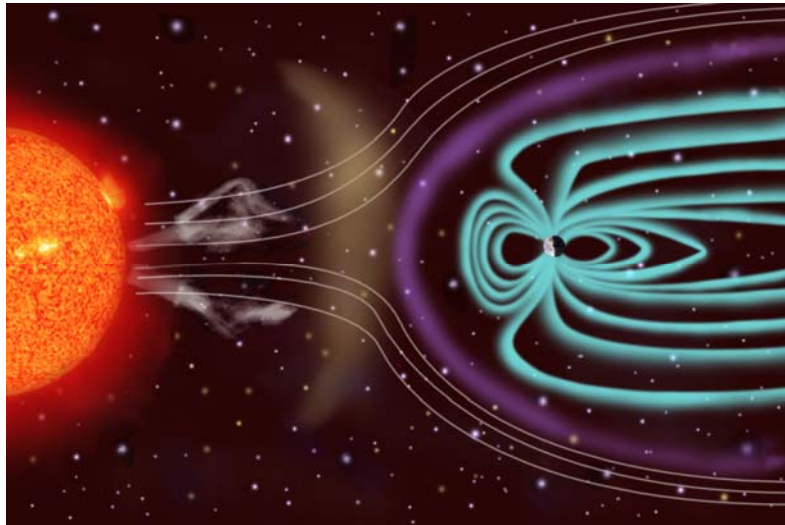


# South Africa – Space Weather Activities

*Dr Lee-Anne McKinnell*

*Managing Director: SANSa Space Science*

# SANSA: RWC FOR AFRICA



# AFRICAN RWC ACTIVITIES

SW Forecast  
HF predictions  
Warning/Alert  
Bulletins

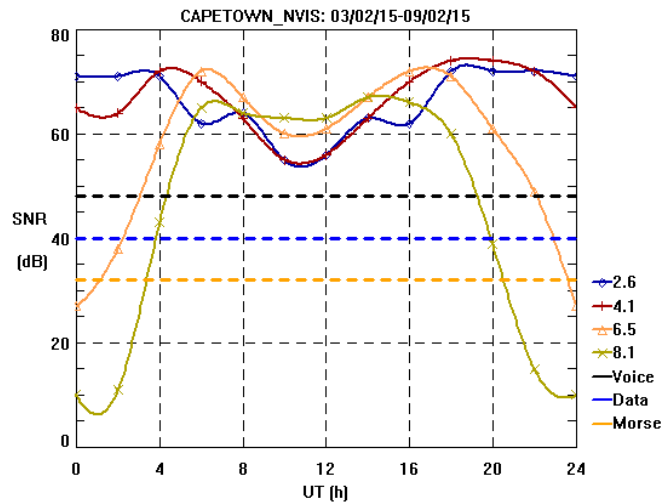
Space weather  
research  
Model  
developments

Expansion  
and usage of  
data network

Weekly tours  
Information days  
Training

# SERVICES PROVIDED BY RWC FOR AFRICA

## HF frequency predictions

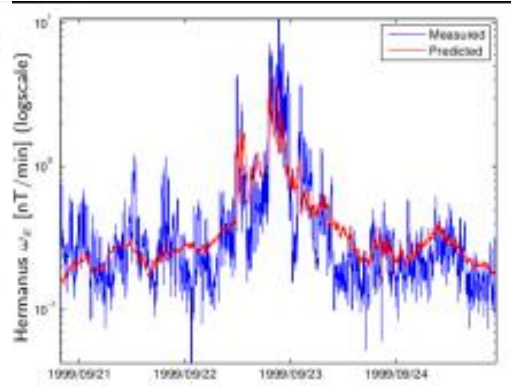
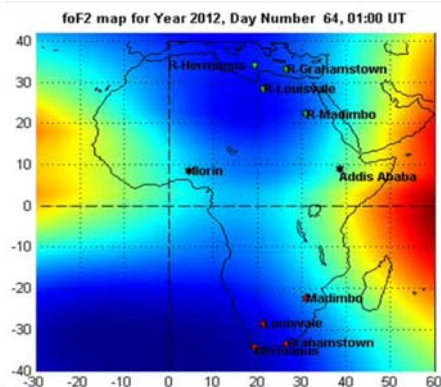


Space Weather Website

Daily Space Weather bulletins

Space Weather Warnings

Space Weather Information to  
Defence, Energy, and Aviation  
sectors.



From: SANSa Space Weather Centre  
To: Mpho Tshisaphungo  
Cc:  
Subject: SANSa Space Weather Centre Information  
Sent: Mon 10/12/01 0

### Space Weather Bulletin

04 Nov 2014, composed at 10:35 SAST

WARNING/ALERT;

An M-class X-ray solar flare is in progress. Degraded frequency up to 16 MHz. Estimate recovery time is 20 minutes. Signal absorption is expected.

SYSTEMS THAT MAY BE AFFECTED;

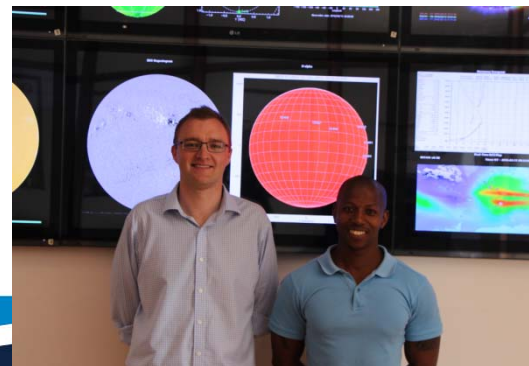
HF communications.

Prepared by M. Tshisaphungo

# Space Weather Centre

- Provide forecasts, alerts and warnings to government, defence and the public
- Global partnerships strengthened through for example UKSA IPSP project
- Delivery of training courses to defence users
- Provision of space weather information to Navy Control Centre
- Provision of applicable tools to assist users
- Building capacity through internships, bursaries etc
- Developing additional products/services in collaboration with research group

- Partnership with the UK Met Office to share knowledge and develop operational capabilities:
  - Participation in UKSA IPSP project
  - SANSA visits to MO in August to October 2015
  - Daily teleconference between MOSWOC and SANSA since December 2015
  - Met Office Space Weather Advisors seconded to SANSA during January through to March 2016
  - Increased access to Space Weather models run at the Met Office including WSA-ENLIL



# Space Weather Capacity Development

- Partnership with the DLR to develop capacity and interest in Space Weather
  - 2016 Joint Space Weather Camp



## Two space agencies, two beautiful countries and a fascinating space weather camp!

This is a once in a lifetime opportunity for students to learn all about space science and technology with a focus on space weather, a relatively new and exciting field involving the study of the Sun and its influence on space and the Earth's upper atmosphere. Understanding space weather has become vital due to its impact on space and ground based technological systems that modern society relies on daily.

*The International Space Weather Camp will kick off at SANSa In Hermanus, South Africa, from 22 June – 02 July and then on to DLR In Neustrelitz, Germany, from 03 – 14 July 2016.*

Successful applicants will be fully funded (including flights, accommodation, meals and visa) to participate in both the South African and German Camp.

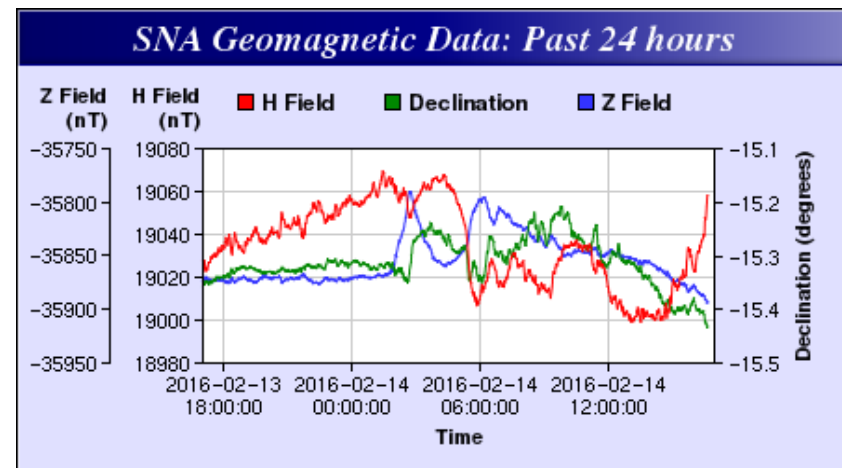
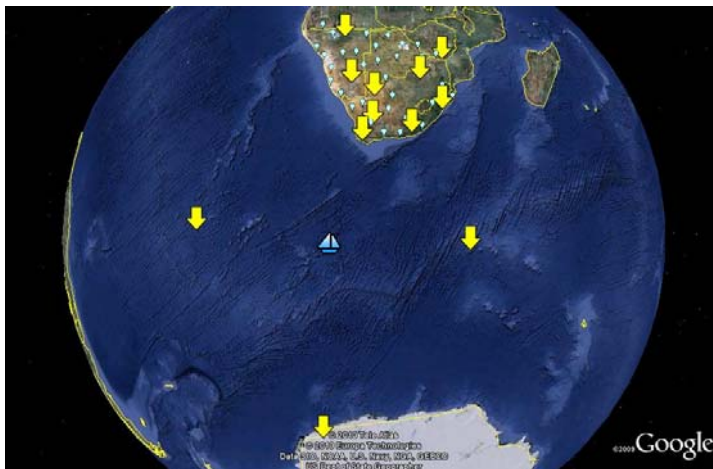
Applicants must be final year BSc/BEng/Honours students in Physics, Mathematics, Computer Science or Electronics and must be South African citizens or permanent residents.

Get more information and apply online now at  
<https://events.sansa.org.za/iswc>

Measuring space from the ground in support of space weather research and applications

SANSA operates an extensive geophysical instrumentation network across Southern Africa, Antarctica and the Atlantic Islands

This is complimented with available satellite data



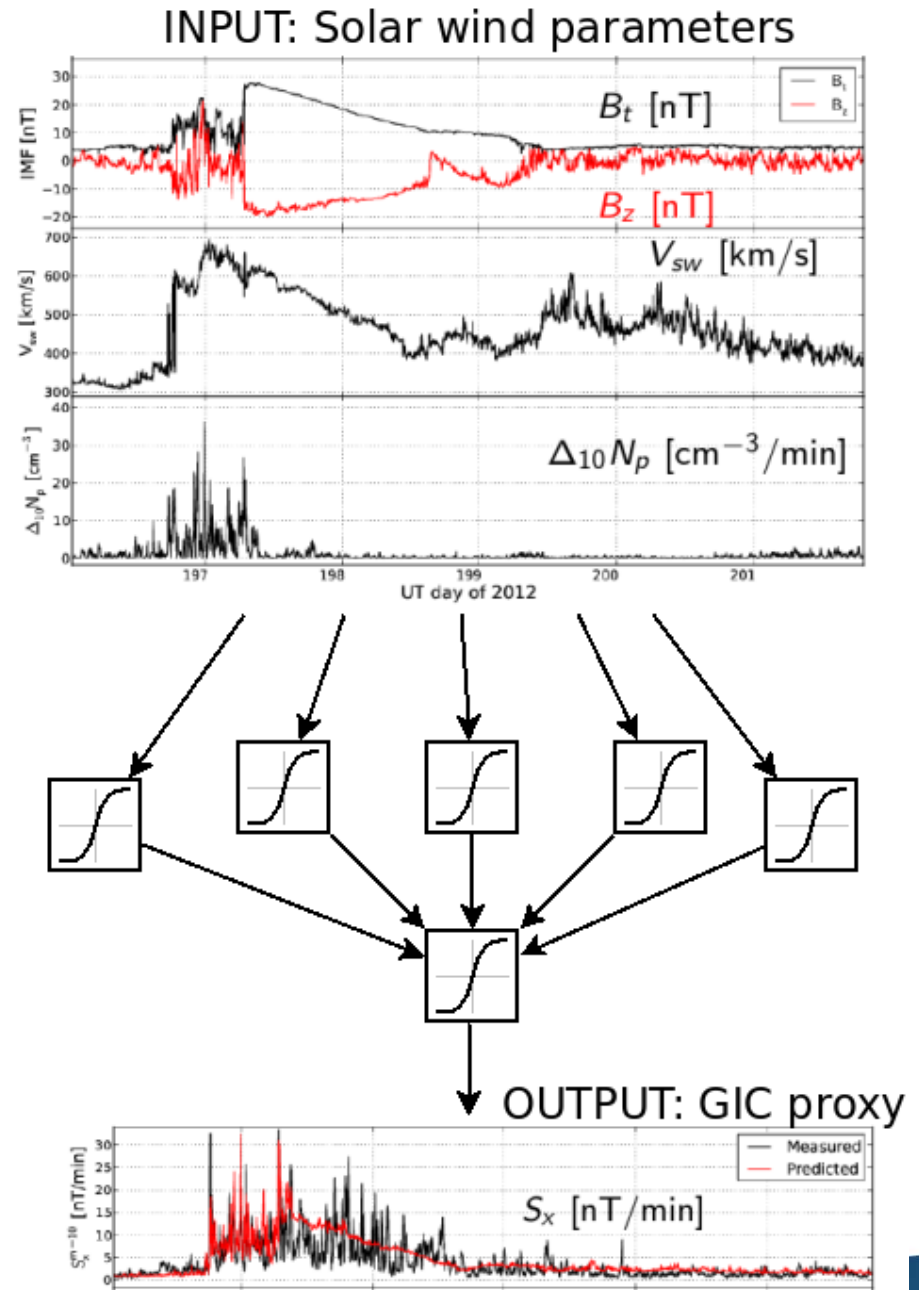


## Current Space Weather Research Projects

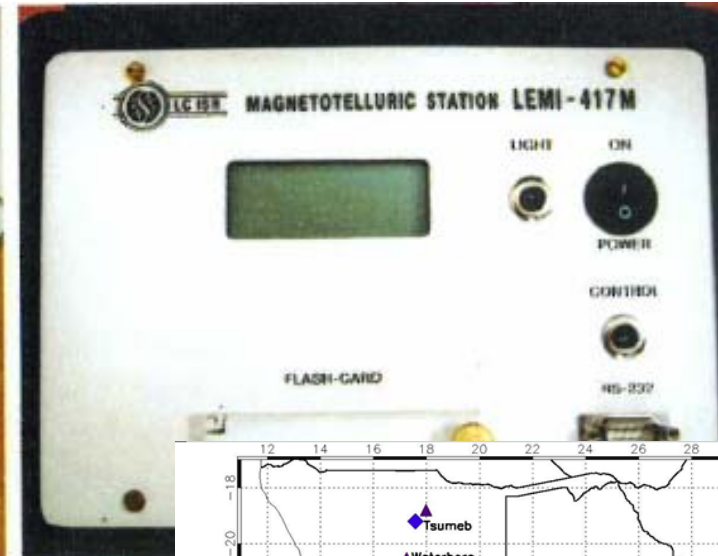
- Geomagnetically Induced Currents (GICs) - measuring and modelling
- High Frequency (HF) propagation paths frequency sensitivity analysis
- Ionospheric modelling and characterisation
- Thermospheric neutral density – using EISCAT radar
- Space Weather impacts on Aviation – understanding, service level development
- Economic benefits of space weather – IPSP project

# GIC PROXY MODELLING

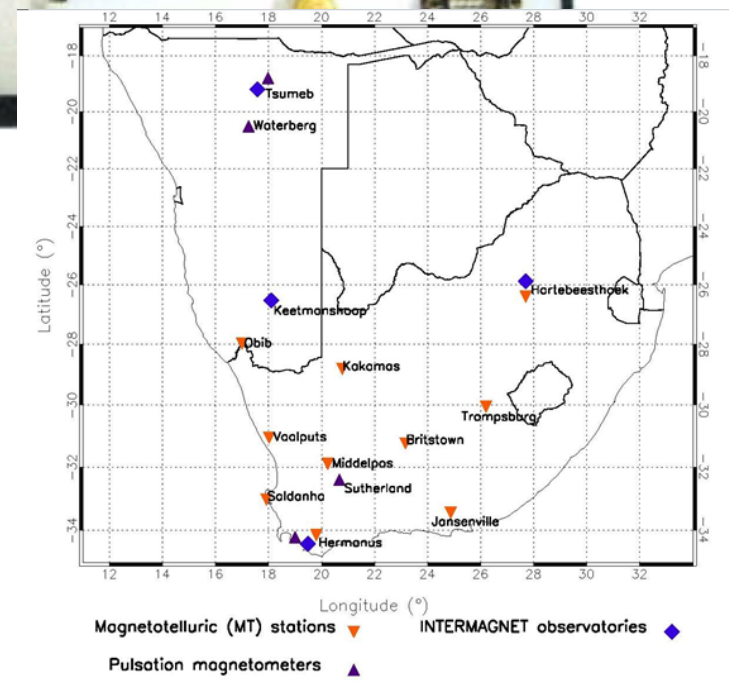
- Solar wind-based model performs well for initial storm phase
- During recovery magnetospheric reconfiguration drives the disturbance
- Such a model (SW-only inputs) cannot work for entire storm
- Magnetospheric, ionospheric input parameters are needed in real time



# MT DATA ANALYSIS

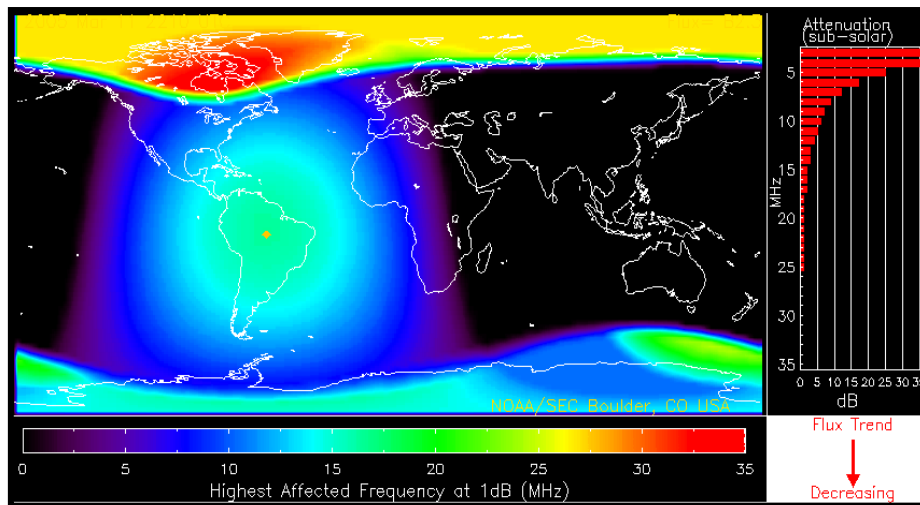


- Utilising MT stations to provide surface impedance for GIC modelling
- 13 Stations deployed, 9 currently operational
- Data from 7 stations retrieved and results are being processed



# IMPACT ON AVIATION

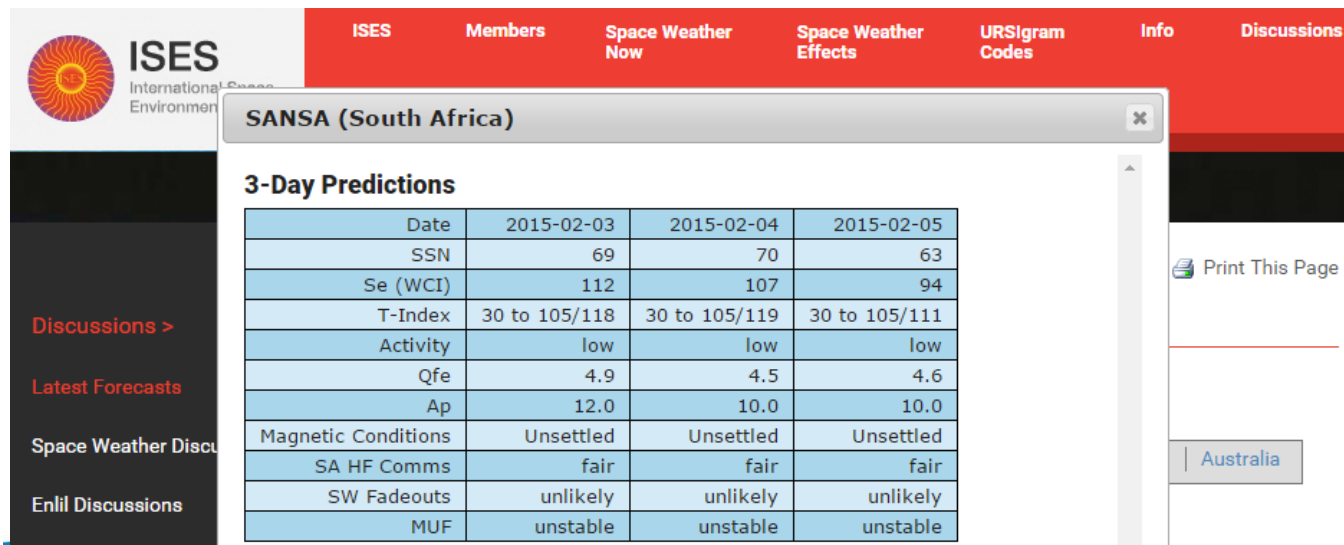
- New area for South Africa
- Create awareness and needs analysis within SA Aviation Sector
- Primarily focus on Airline communication; Navigation & Avionics



# HIGHEST PRIORITY AREAS

## Priority areas are:

- Expand on client services (e.g. in aviation)
- Solar flare and eruption prediction models
- Development of Regional Space Weather Models
- Establish Forecast Verification Methods
- Space weather data networks
- Economic benefit study



ISES International Space Environment Service

ISES Members Space Weather Now Space Weather Effects URSIgram Codes Info Discussions

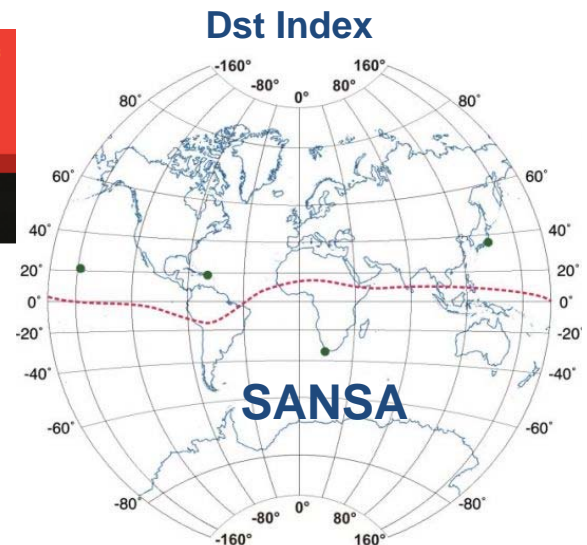
**SANSa (South Africa)**

### 3-Day Predictions

Date	2015-02-03	2015-02-04	2015-02-05
SSN	69	70	63
Se (WCI)	112	107	94
T-Index	30 to 105/118	30 to 105/119	30 to 105/111
Activity	low	low	low
Qfe	4.9	4.5	4.6
Ap	12.0	10.0	10.0
Magnetic Conditions	Unsettled	Unsettled	Unsettled
SA HF Comms	fair	fair	fair
SW Fadeouts	unlikely	unlikely	unlikely
MUF	unstable	unstable	unstable

Print This Page

Australia



# BENEFIT TO OTHERS

## Benefits of working together:

Forecaster exchange for skills development

Sharing ideas for outreach activities around SW

Forecast verification comparisons

Providing data to international databases (INTERMAGNET, DIDBASE)

Access to industry





Thank you

<http://www.sansa.org.za>

<http://spaceweather.sansa.org.za>

*in service of humanity*