SuperDARN HF radar at SANAE

Instrument infrastructure for space weather research

Michael Kosch

South African National Space Agency (SANSA)

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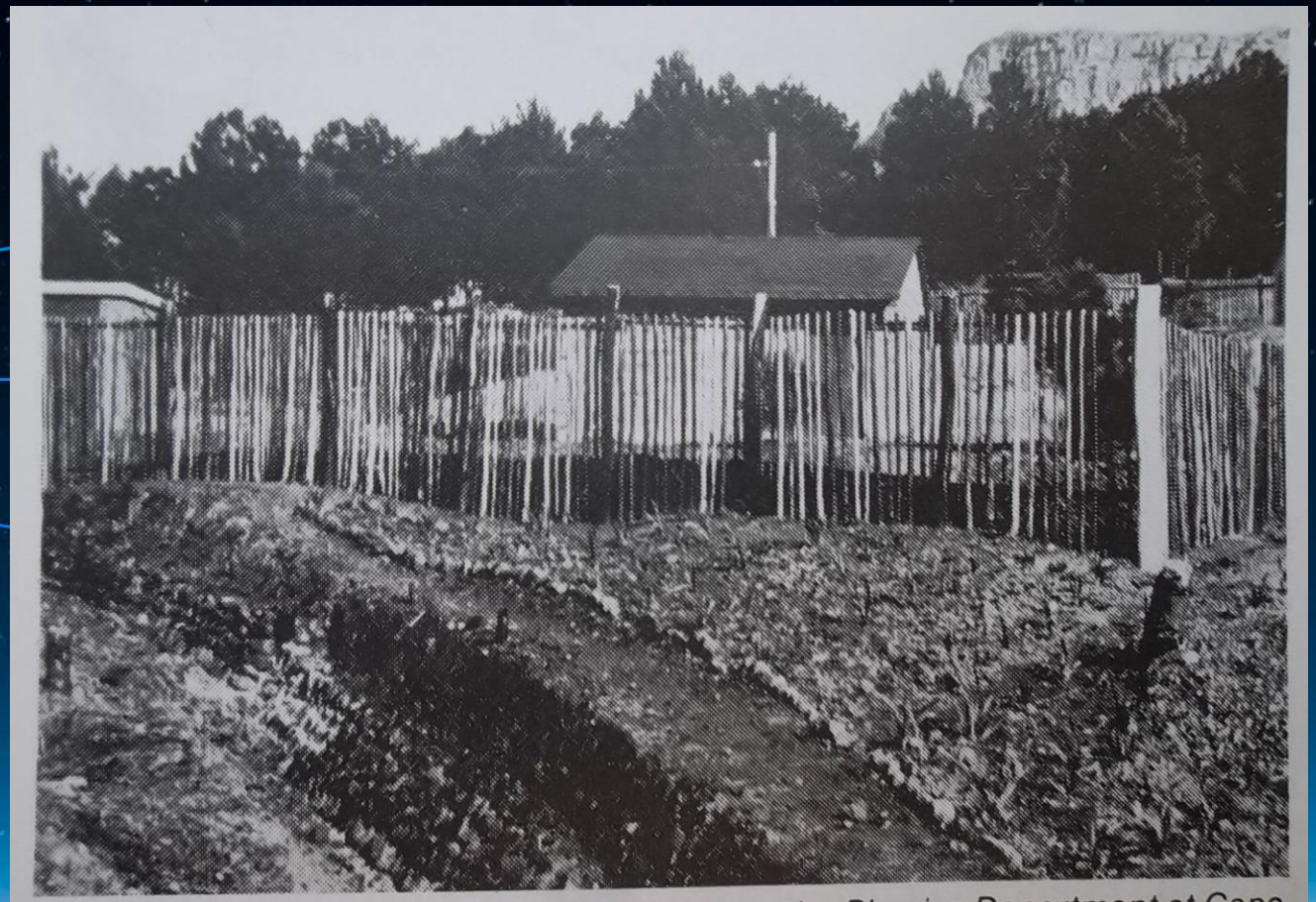
History 1932 - 1940



The Magnetic Observatory established near the Physics Department at Cape Town University in 1932

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UCT magnetic Observatory – Cape Town

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History 1941 – 2010

Hermanus magnetic Observatory

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History 2011 – 2024

SANSA

THE VILLAGE NEWS

NSA opens state-of-the-art facility

& Photographer
ette Yell

The design of the brand-new SANSA Space Weather Station in Hermanus is a reflection of the fascinating and interesting spaces SANSA studies between the sun and the earth. The new building features curved lines throughout to emulate space.

This state-of the art regional Space Weather Centre was launched on Thursday 3 November by Minister of Higher Education, Science and Innovation, Blade Nzimande, who aid the space weather station will ovide space weather services, ding solar storm forecasts and gs to the global aviation

ce Weather Warning nment, it will work and its activ- space

Nzimande she values his commitment to research as she's a research junkie herself. "If there's no research, we won't go places." Rabie thanked the minister for choosing Hermanus. hen highlighted the fact that ed in this project of the

and their current and potential customer base was one of the questions put forward during a media briefing shortly before lunch. Dr Lee-Anne McKinnell, Managing Director at SANSA explained they compiled a business case study which included a cost recovery model and revenue gen-

International Civil Aviation Organisation said they would work with the regional and global centres to develop a cost recovery model so we can provide them with the customised service they want."

Dr McKinnell

The initial concept for the Hermanus Space Weather Station was yet another plain square building. The new building is anything but, with hanging circular acoustic discs inside and curved lines outside. The team that worked tirelessly to finish on budget and on time are Dean Harris, Associate Contractor: Edge To Edge; Keenan Janneker, SANSA Project Lead for Space Weather; Christopher Denny, Owner-Director: Edge-to-Edge; Deputy Mayor Lindile Ntsabo; Wesley Dingley, Principal Contractor: Edge-to-Edge; Heidi McAllister, Associate Architect: AVNA Architects; Mayor Annelie Rabie; Dr Lee-Anne McKinnell, SANSA Hermanus Managing Director; Gideon Schoonraad, Architect and Principal Agent; and Sakki Franken, Mayor of the Overb District Municipality.

also to create awaren low in terms of

Dr Mc

African Regional Space Weather Warning Centre
SANSA Space Science Research Facility

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SANSA's IONOSPHERIC INSTRUMENTATION IN ANTARCTICA

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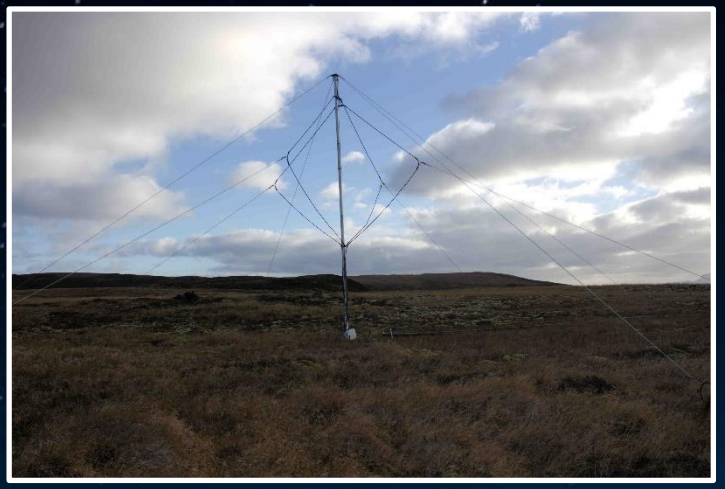
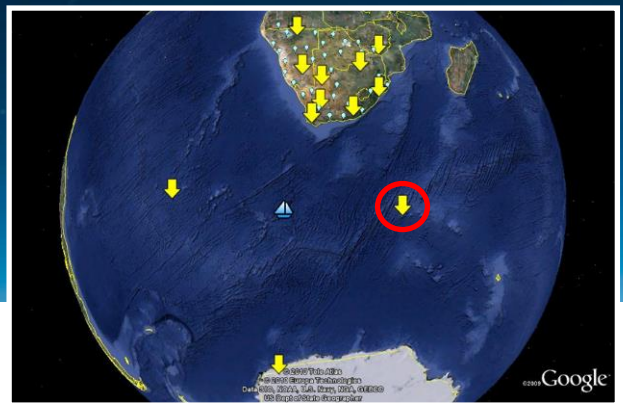
Marion island – since 1948

- GNSS receivers (dual frequency & scintillation)
- VLF receivers
- Magnetometers (variation & pulsation)





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Gough island – since 1956

- GNSS receivers (dual frequency & scintillation)

SA Agulhas-2 since 2012

- GNSS receiver
- Neutron monitor

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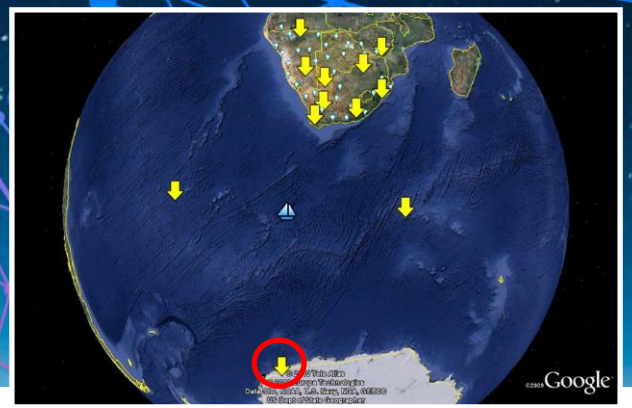
SANAE Antarctica – since 1960

- SuperDARN HF radar (since 1997)
- GNSS receivers
- VLF receivers
- Magnetometers
- 2x Riometers
- Neutron Monitor (since 1964)



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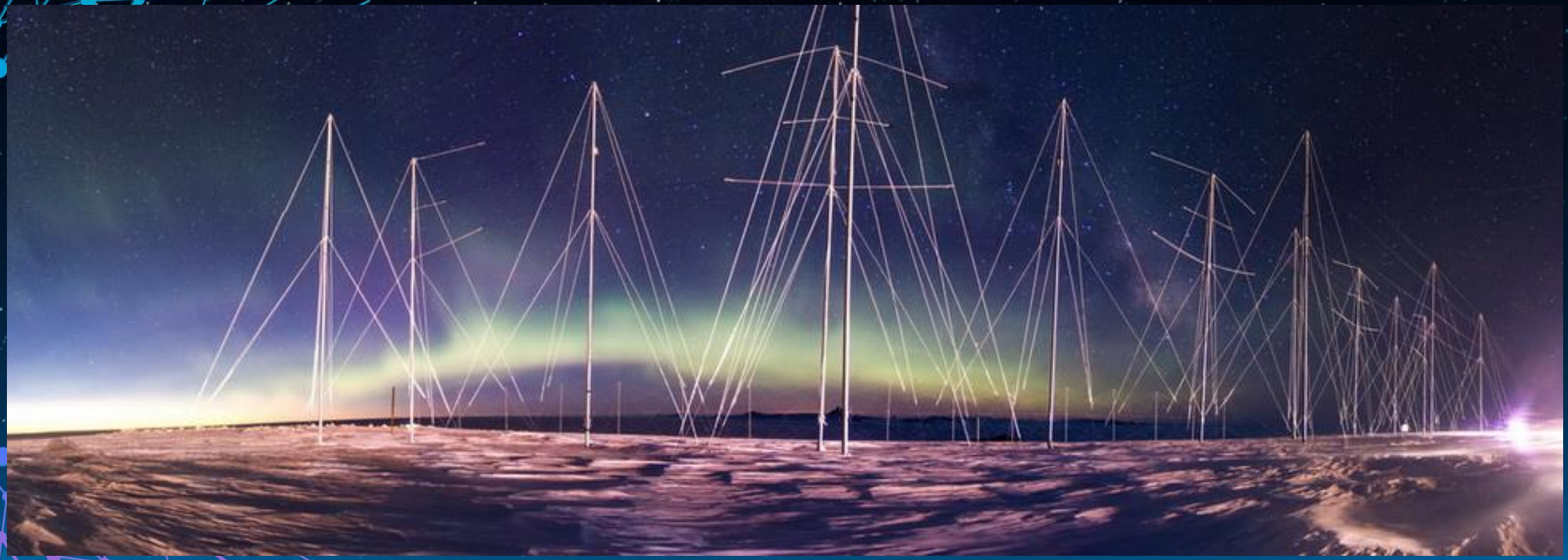
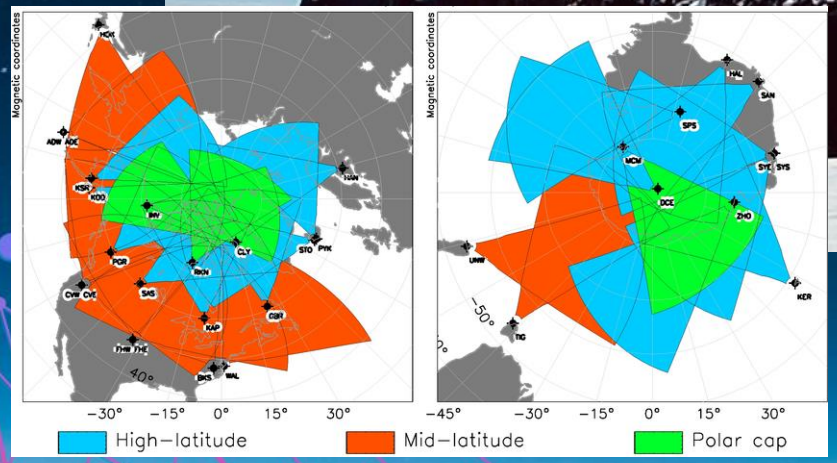
SuperDARN – since 1997

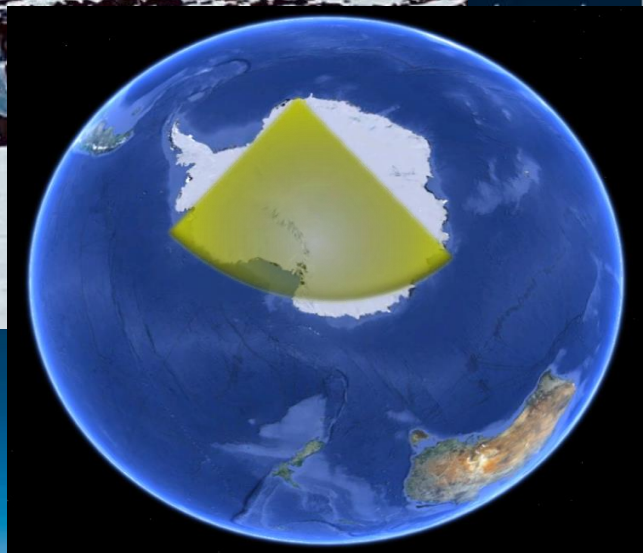


Operating on 9.95, 10.5, 11.0, 11.5, 12.2, **12.6**, 13.5, 13.9, 14.5, 14.9, & 15.5 MHz

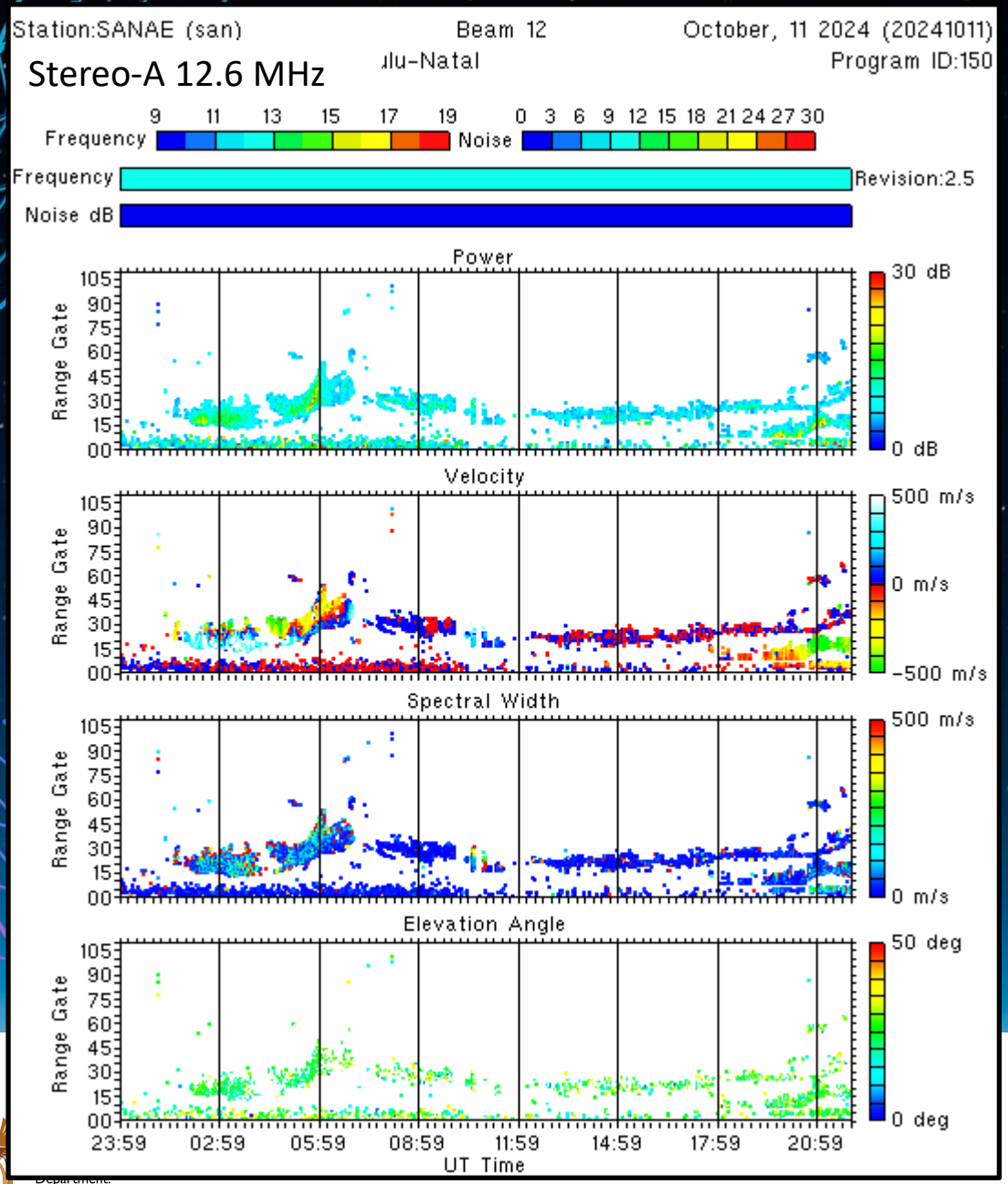
SuperDARN at SANAE



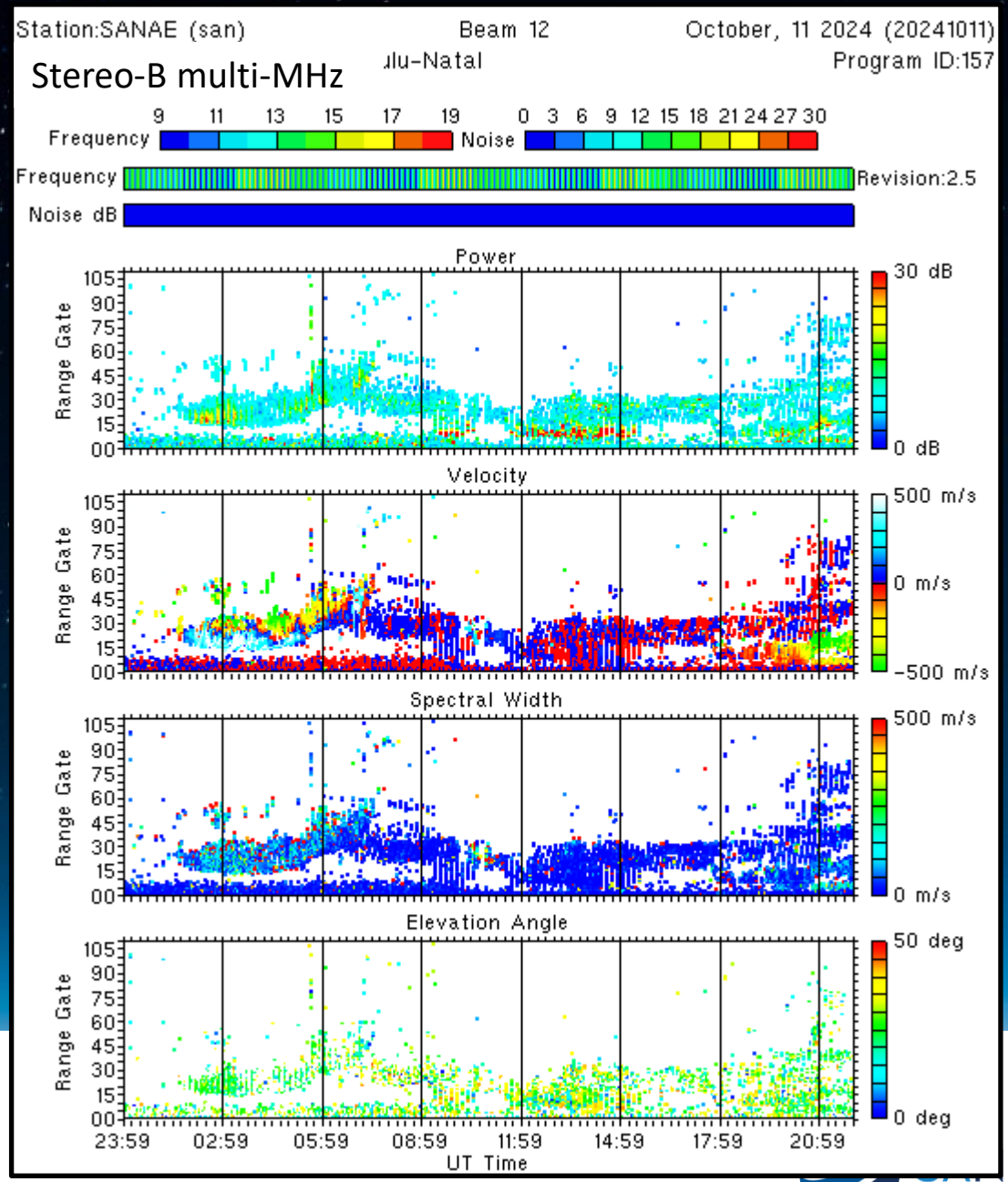
- Stereo beam
- Angle of arrival interferometer
- Fully digital FPGA



Stereo-A 12.6 MHz



Stereo-B multi-MHz



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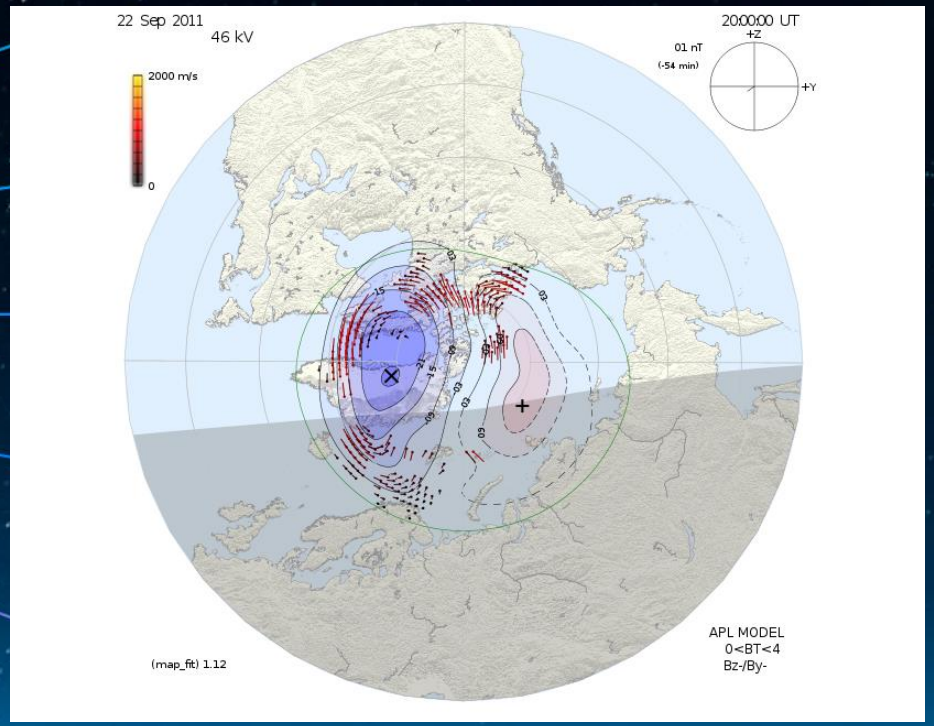
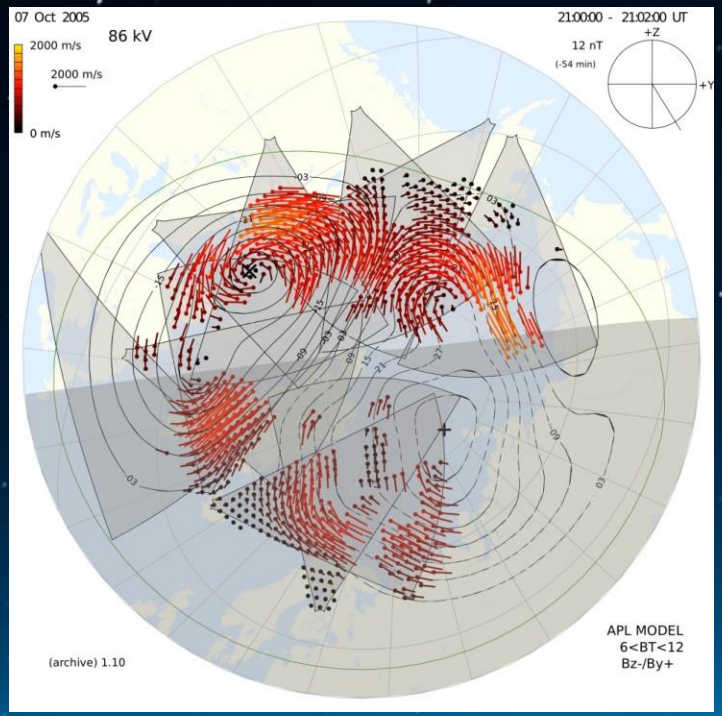
SANSA research with SuperDARN Convection maps





http://superdarn.org/tiki-index.php

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SANSA research with SuperDARN Ultra Low Frequency (ULF) waves

Ann. Geophys., 27, 3287–3296, 2009
www.ann-geophys.net/27/3287/2009/

Annales Geophysicae

Characterization of ultra low frequency (ULF) pulsations and the investigation of their possible source

S. H. Mthembu[1,2], S. B. Malinga[2], A. D. M. Walker[1], and L. Magnus[2]

Radio Science

RESEARCH ARTICLE
10.1029/2023RS007833

Observations of ULF Pulsations During TRINNI Events

B. Mmame[1], J. A. E. Stephenson[2], A. D. M. Walker[2,†], Z. Mtumela[3], and J. P. S. Rash[4]

SANSA research with SuperDARN Polar Mesospheric Summer Echoes (PMSE)

Terr. Atmos. Ocean. Sci., Vol. 26, No. 4, 431-440, August 2015 doi: 10.3319/TAO.2015.03.06.01(AA)

Evidence of Polar Mesosphere Summer Echoes Observed by SuperDARN SANAE HF Radar in Antarctica

Olakunle Ogunjobi[1,*], Venkataraman Sivakumar[1], Judy Ann Elizabeth Stephenson[1], and William Tafon Sivla[2]

Terr. Atmos. Ocean. Sci., Vol. 28, No. 3, 371-383, June 2017 doi: 10.3319/TAO.2016.09.19.01

PMSE long term observations using SuperDARN SANAE HF radar measurements

Olakunle Ogunjobi[1,2,*], Venkataraman Sivakumar[2], Judy Ann Elizabeth Stephenson[2], and Zolile Mtumela[2]

SANSA research with SuperDARN Travelling Ionospheric Disturbances (TIDs)

JGR Space Physics

RESEARCH ARTICLE
10.1029/2021JA030157

Key Points:

- Traveling Ionospheric Disturbances partially modulate SuperDARN Near Range Echoes

First Observations of *E*-Region Near Range Echoes Partially Modulated by *F*-Region Traveling Ionospheric Disturbances Observed by the Same SuperDARN HF Radar

Alicreance Hiyadutuje[1,2], Michael J. Kosch[1,2,3,4], and Judy A. E. Stephenson[2]

JGR Space Physics

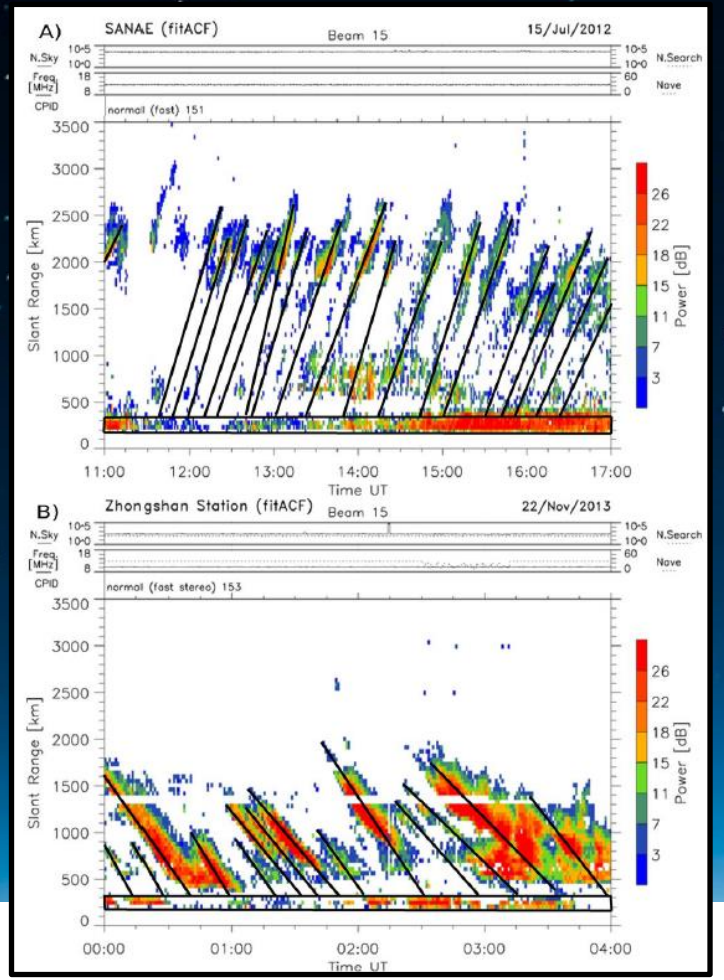
RESEARCH ARTICLE
10.1029/2023JA031367

Key Points:

- First demonstration of TIDs partially modulating Farley Buneman (FB) and Gradient Drift (GD) waves
- Farley Buneman and Gradient Drift Instabilities generate NREs

Simultaneous Occurrence of Traveling Ionospheric Disturbances, Farley Buneman and Gradient Drift Instabilities Observed by the Zhongshan SuperDARN HF Radar

Alicreance Hiyadutuje[1], John Bosco Habarulema[1,2], Michael J. Kosch[1,3,4], Xiangcai Chen[5,6], Judy A. E. Stephenson[3], and Tshimangadzo Merline Matamba[1]



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