VT-Nigerian Bowen Equatorial Aeronomy RADAR

VT-NigerBEAR

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VT - Nigerian Bowen Equatorial Aeronomy RADAR
VT-NigerBEAR

Scientific Cooperation

- Bowen University, Iwo, Nigeria
- Virginia Tech, VA, United States
- National Space Research & Development Agency, FMIST

NigerBEAR: Global Ionospheric Research infrastructure

Prospects of Superdarn-Like Radar System in Equatorial Region

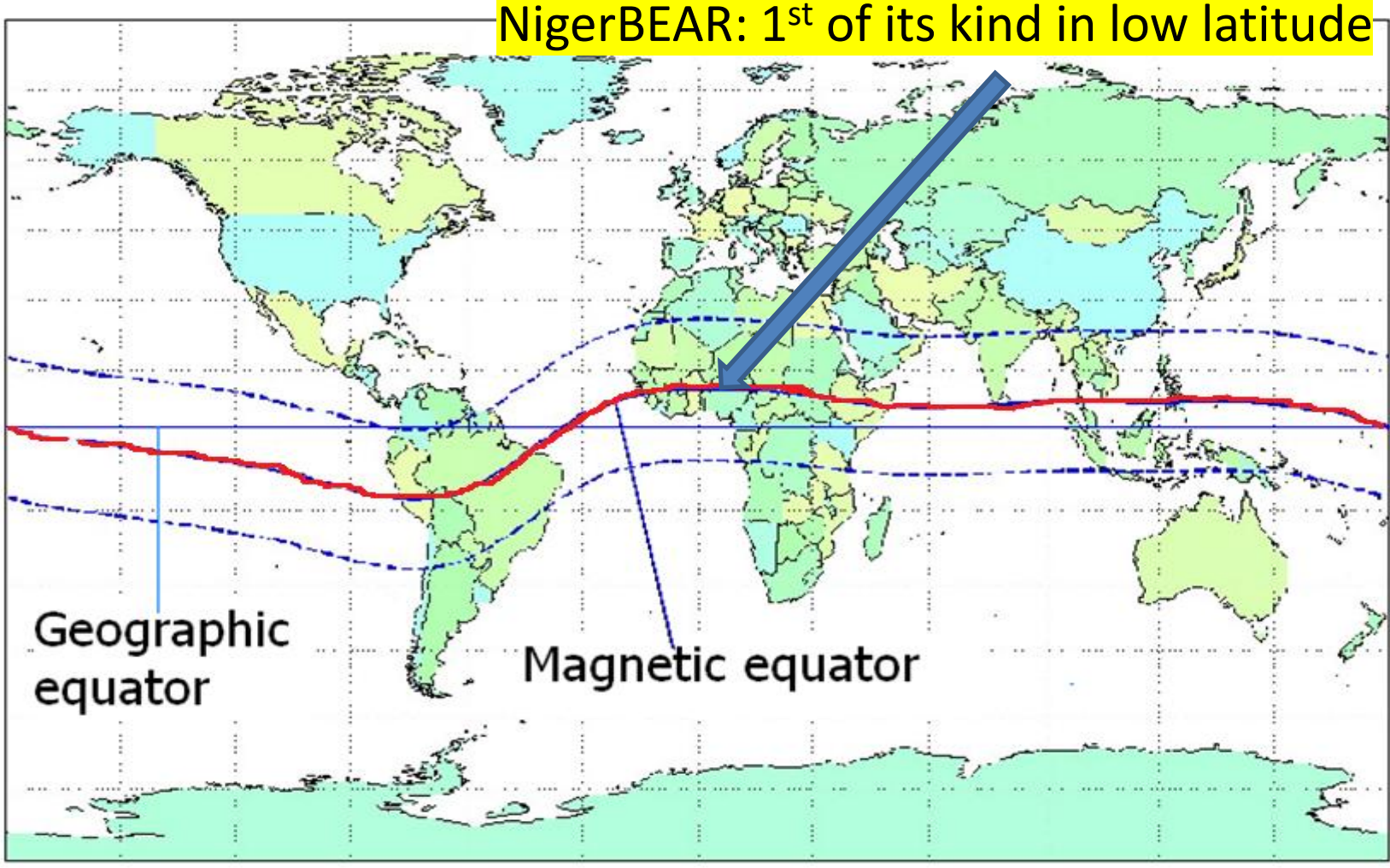
Super Dual Auroral Radar Network (SuperDARN) is an international consortium of ground-based high frequency (HF) radar observations

The analysis of observations made using SuperDARN has improved our understanding of:

- ✓ ionospheric irregularities and space weather hazards including radiation exposure for high-altitude travelers and
- ✓ disruptions to communication networks, navigation systems (GPS), and electrical power grids; etc

SuperDARN site Holmwood SDA, Saskatoon

NigerBEAR: 1st of its kind in low latitude



- Quasi horizontal magnetic equator
- Broadest range of magnetic equator inland
- Distinct equatorial dynamics

NigerBEAR: Global Ionospheric Research infrastructure

Nigeria: Heart of Africa

- 237 million people
- Over 15% of African Population
- 923,768 km^2 (356,669 sq mi)
- About 300 Universities & several R &D agencies

JOURNEY SO FAR ON VT-NIGERBEAR SYSTEM

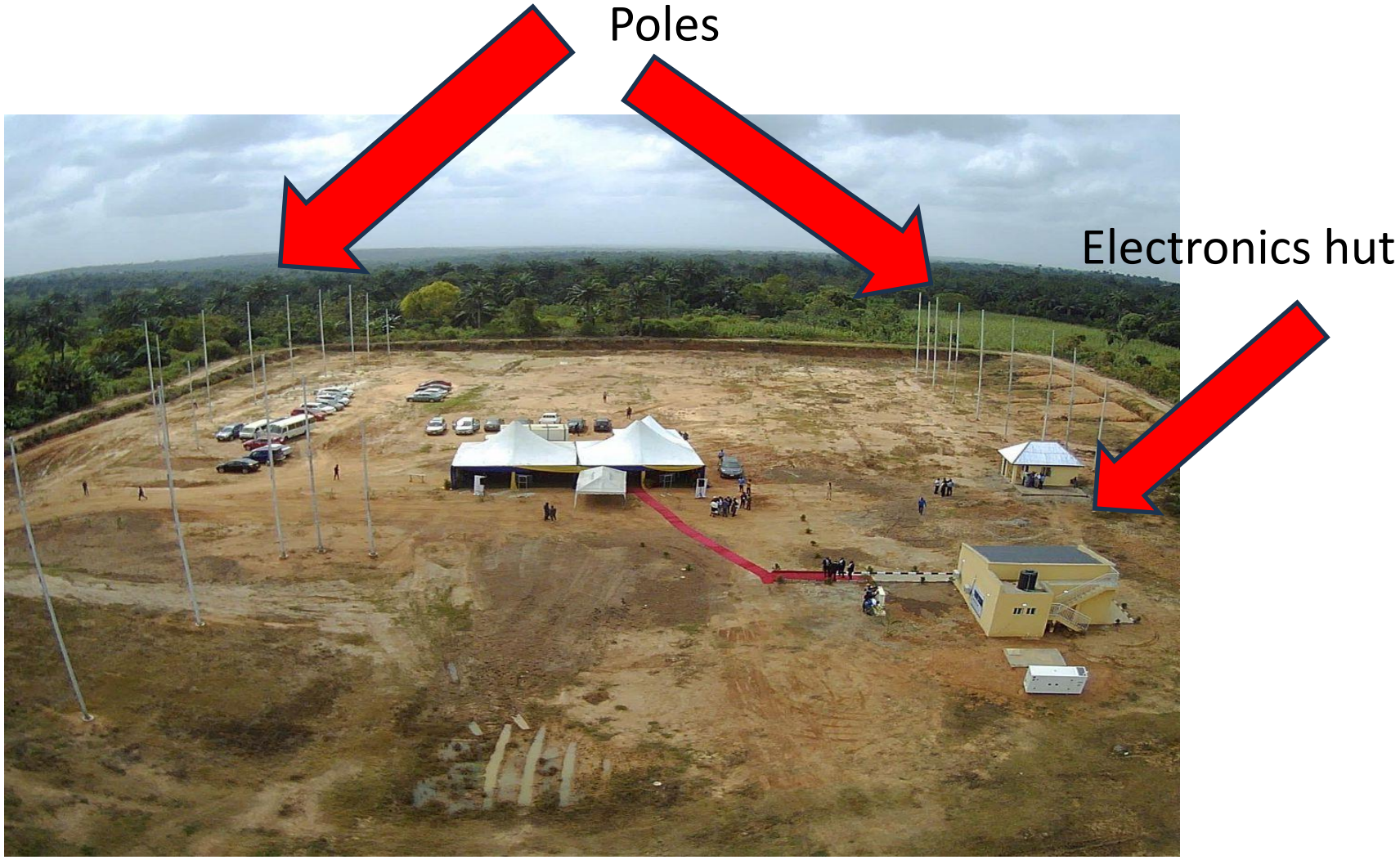
Planning and Site Selection

- The terrain of the site was carefully selected (flat, open and free of obstructions).
- The regulatory body of the Nigeria government has approved the license for radio frequency through the help of NASDRA (National Space Research and Development Agency).
- NASDRA is an Institution under the supervision of the Federal Ministry of Innovation, Science and Technology.
- Environmental permit and construction permissions have been approved by the regulatory bodies.

Infrastructure and Civil Works

- The site of the radar was cleared and levelled .
- Access roads were created around the site
- The Antenna foundations and piers have been molded
- Construction of a building to house the radar electronics, power system and communication equipment has been completed.

- All the 56’ poles has been erected and earthed.


Poles
Electronics hut

ON-GOING WORK

Hardware Installation

- Currently, we are about to install the ground planes (radial wire systems).
- Tensioning the guy wires and aligning the antennas.
- Afterward, we proceed to cabling and connectors such as:
  - Laying RF transmission lines between the antennas and the radar hut
  - Installing grounding and lightning protection systems.

Timeline

- We are aiming for completion by the end of August
- However, the rainy season is slowing down the work

Workshops & Equipment @ Bowen University

- International Workshop On Equatorial Radar June 2019
- GNSS receiver

Periodical virtual meetings of all partners

- International Colloquium on Equatorial and Low-Latitude Ionosphere ICELLI Sept 2021
- Technical visit by scientists to the site, July 2022
- Country's Vice President visit to the site November 2022
- Technical Visit on 8th Sept 2023 by some Resource persons and participants at ICELLI 2023

Technical Visit on 8th Sept 2023 @ ICELLI 2023

Global awareness of the potential global Infrastructure….

- Beacon Satellite Symposium, Boston College, USA, August 2022
- UN ISWI Workshop, Baku, Azerbaijan, Nov 2022,
- AGU, Fall meeting, Chicago, December 2022
- ICTP workshop, Trieste, Italy, May/June 2023
- Influence of Sun on Everything, Primorsko, Bulgaria June 2023
- ICELLI, Univ of Ilorin, Nigeria, September 2023
- African Geophysical Society Conference, Lusaka, Zambia, Zambia
- African Workshop on GNSS and Space Weather, Malindi, Kenya, October 2023
- European Space Weather Week, 23 November 2023
- UN/Germany ISWI Workshop, June 2024, Neustrelitz, Germany

5-YEAR STRATEGIC PLAN – a summary

2026 – 2030

Year 1

- Capacity building workshops at sites - science, engineering & research
- Initiating MSc/PhD programs around VT-NigerBEAR
- Attracting international studentship
- Setting up a global consortium of partners for VT-NigerBEAR

Year 2

- Seeking International Grants for research and infrastructure maintenance
- Seeking fellowships that can clear tuition fees for Graduate programs
- Fellowship for visiting scientists
- Data policy

5-YEAR STRATEGIC PLAN – a summary

Year 3

- Dedicated Infrastructural Development
- Hosting of International Capacity Workshops (1) at VT-NigerBEAR site
- International Conference (1)

Year 4

- International Workshops (2) in collaboration with global partners
- Setting up a funded annual summer school with major international partnership

5-YEAR STRATEGIC PLAN – a summary

Year 5

- International Capacity Workshops (1) at VT-NigerBEAR site
- International Conference (1)
- Comprehensive report on 1st five years of VT-NigerBEAR

Annual events

- Annual report
- summer school
- Equatorial Radar Conference

Benefits at Fruition

- Global Ionospheric Research infrastructure
- Bowen University: Global Centre of Excellence in Space Science Engineering and Technology
- International Grants for teaching, research and infrastructure
- League of global universities and institutions with ground radar
- International Students
- Visiting Researchers from all over the world
- Joint/Double degree programs in Sciences and Engineering

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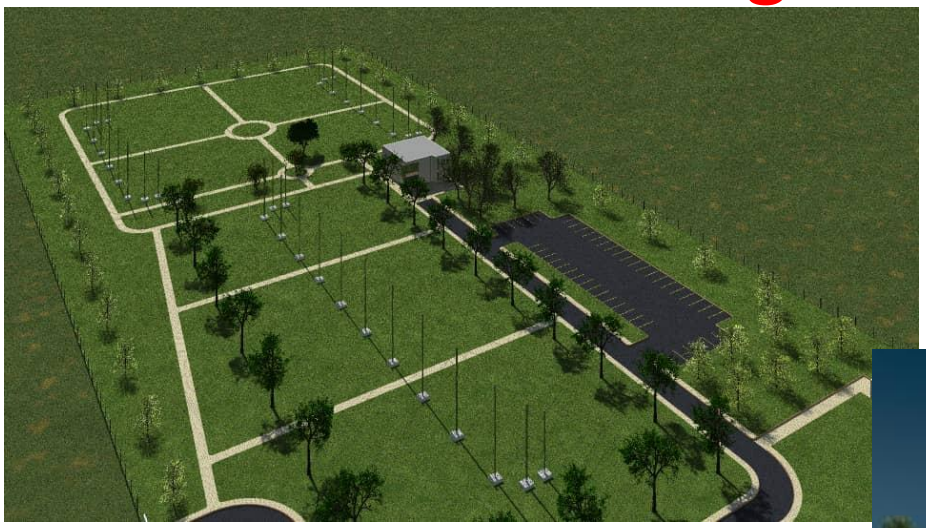
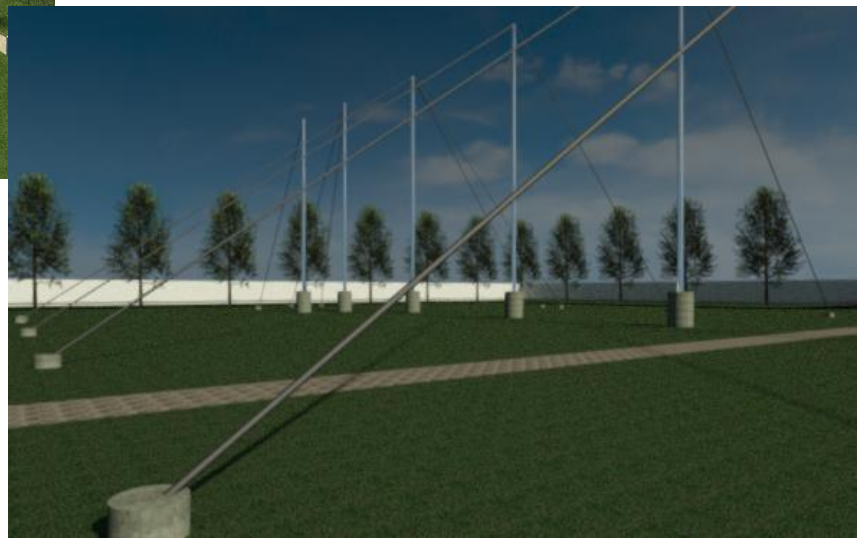


Equivalent of SuperDARN in low latitude



- **Bowen University, Iwo Nigeria**
- **1st of its kind in low latitude**
- **enhancement of research capability**
- **new science results that could improve our understanding of the equatorial ionosphere and space weather**
- **multi-technique approach to study the ionosphere**

UNOOSA

NASRDA

United Nations/Nigeria Workshop

on the

International Space Weather Initiative:

Space Weather During A Moderate Solar Cycle #25

6th - 10th October 2025

Abuja, Nigeria

Apply now:

click here to apply

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https://www.unoosa.org/oosa/en/ourwork/psa/schedule/2025/united-nations-nigeria-workshop-on-the-international-space-weather-initiative-2025.html

Co-organized by:

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The National Space Research and Development Agency (NASRDA)

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The International Committee on Global Navigation Satellite Systems (ICG)

Special Appreciation

VT-team

- Mike Ruohoniemi
- Wayne Scales
- Joseph Baker
- Kelvin Sterne
- And their entire team

THANK YOU