e-infrastructure for collaborative research in atmospheric physics

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TANDEM
TRANSAFRICAN NETWORK DEVELOPMENT

Obafemi Awolowo University (OAU)

Established in 1962.

Faculties – **Science**, Soc. Sci., Admin, Pharmacy, Agriculture, Education, EDM, Arts & Technology

Health Sciences & Postgraduate College

Centres & Institutes - 19

Student Population – 30,000 approx.

ACE in Software Engineering & ICT (2013)

Website: http://oauife.edu.ng

Webometric Rankings in Nigeria - 3 (2).

Atmospheric Physics Research Group @ OAU

Personnel: Prof. Jegede, Drs. Ayoola, Sunmonu & Abiye, Messers Ajao & Akinola. Technologists/Technicians.

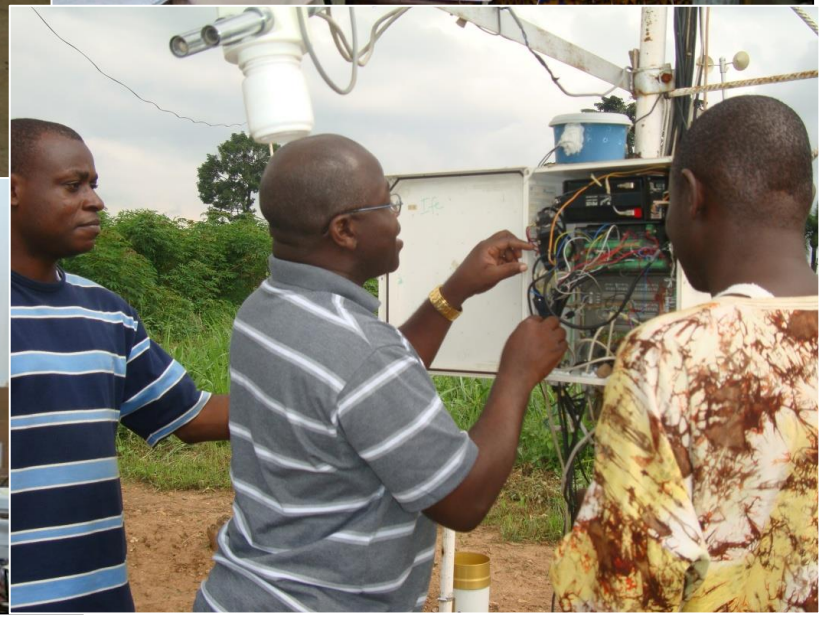
Guiding Philosophy: High-quality research through deployment of research-grade instrumentation.

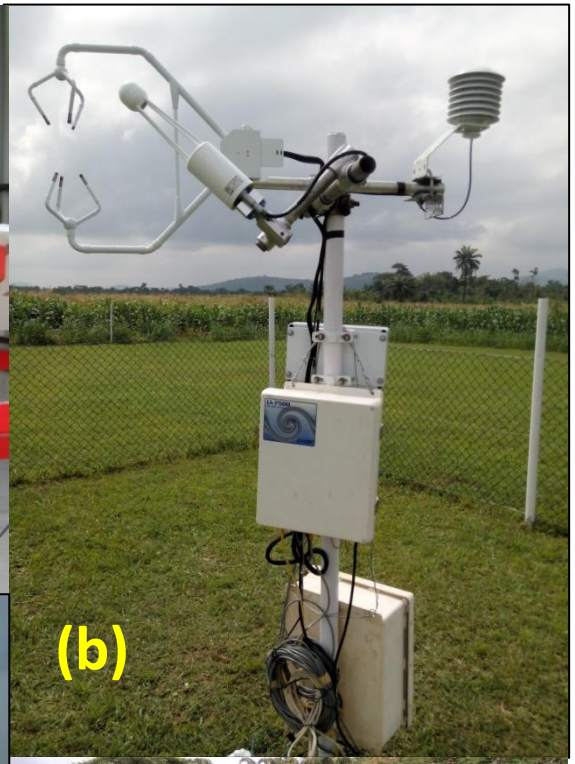
Local/International Support: – OAU, ARCSSTEE/NARSDA & TETFUND,

IPPS (Sweden), AvH (Germany), UBT (Germany) & the EU.

Atmospheric Physics Research @ OAU

Specializations: Micrometeorology, Radiation & Boundary Layer





Available Research Facilities

(a) Tethered sonde
(b) Eddy covariance
(c) Acoustic sounder
(d) Project vehicle

On-going Research Projects

- Nigeria Micrometeorological Experiments (NIMEX) – 2004 to date.
- Dynamics of Aerosol Chemistry Clouds Interactions in West Africa (DACCIWA) - EU-funded (2013-2018).
- Surface Energy Balance (SEB) studies.
- Turbulence characteristics in the SL.
- Nocturnal Low-level Jets in the Boundary Layer.
- Aerosols and atmospheric radiation
- Air Pollution Meteorology.

Postgraduate Students: M.Sc (15), Ph.D (8)

OAU-Met Station @ T&R Farm

A major facility for teaching, research & extension services in Meteorology/Env. Sci.

Site: 7.5°N, 4.5°E (Southwest, Nigeria)

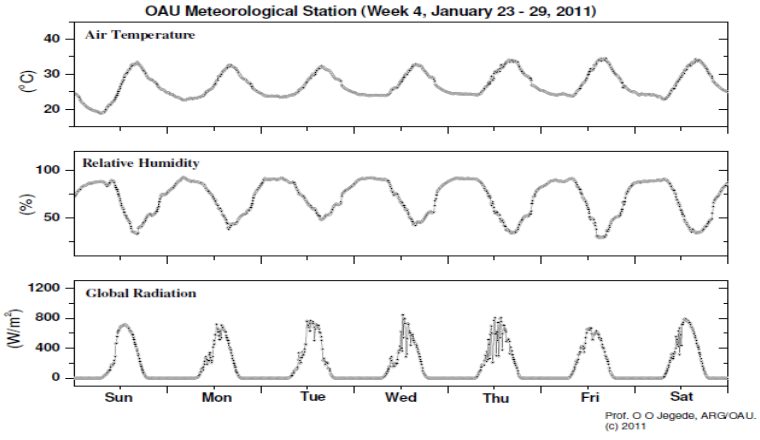
Measurement area: 50 m x 60 m

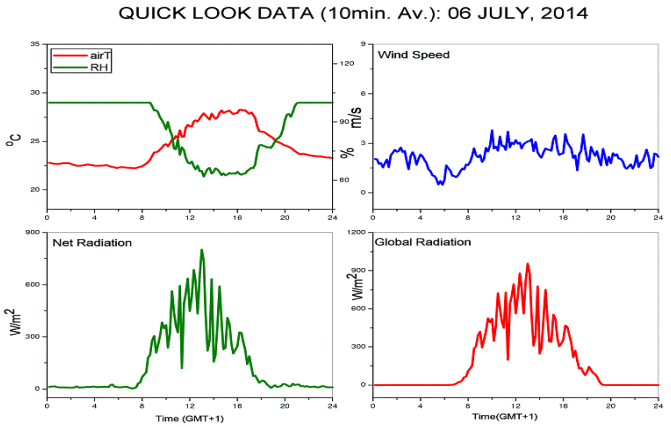
Tropical wet and dry climate

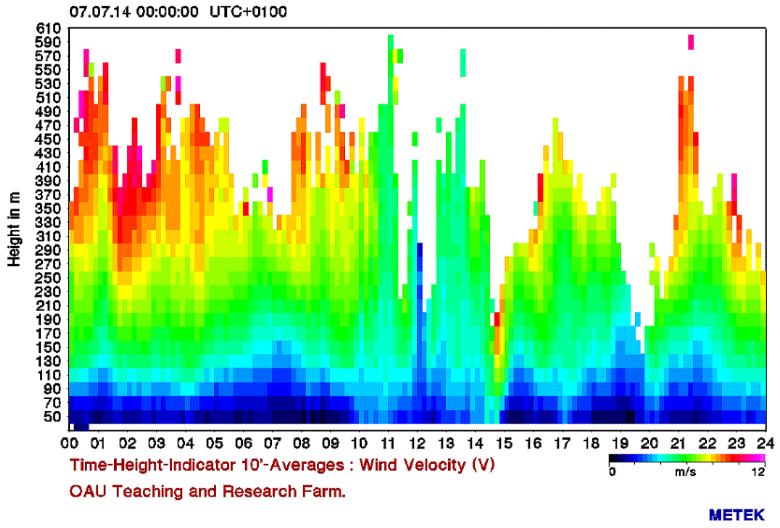
Wet season: April – October

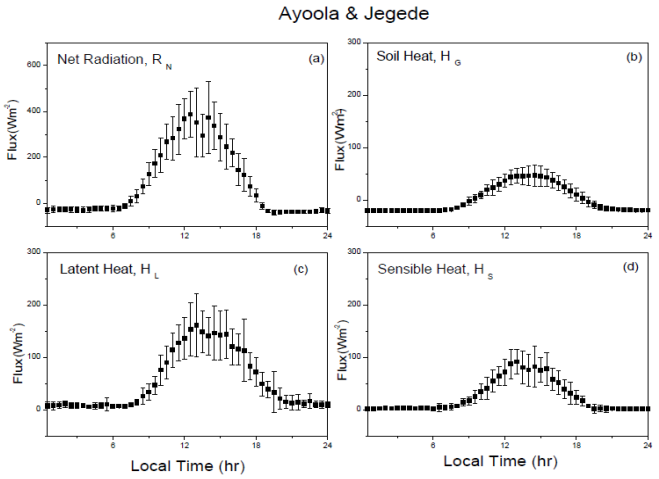
Dry season: November - March

Observational Data @ OAU-Met Station

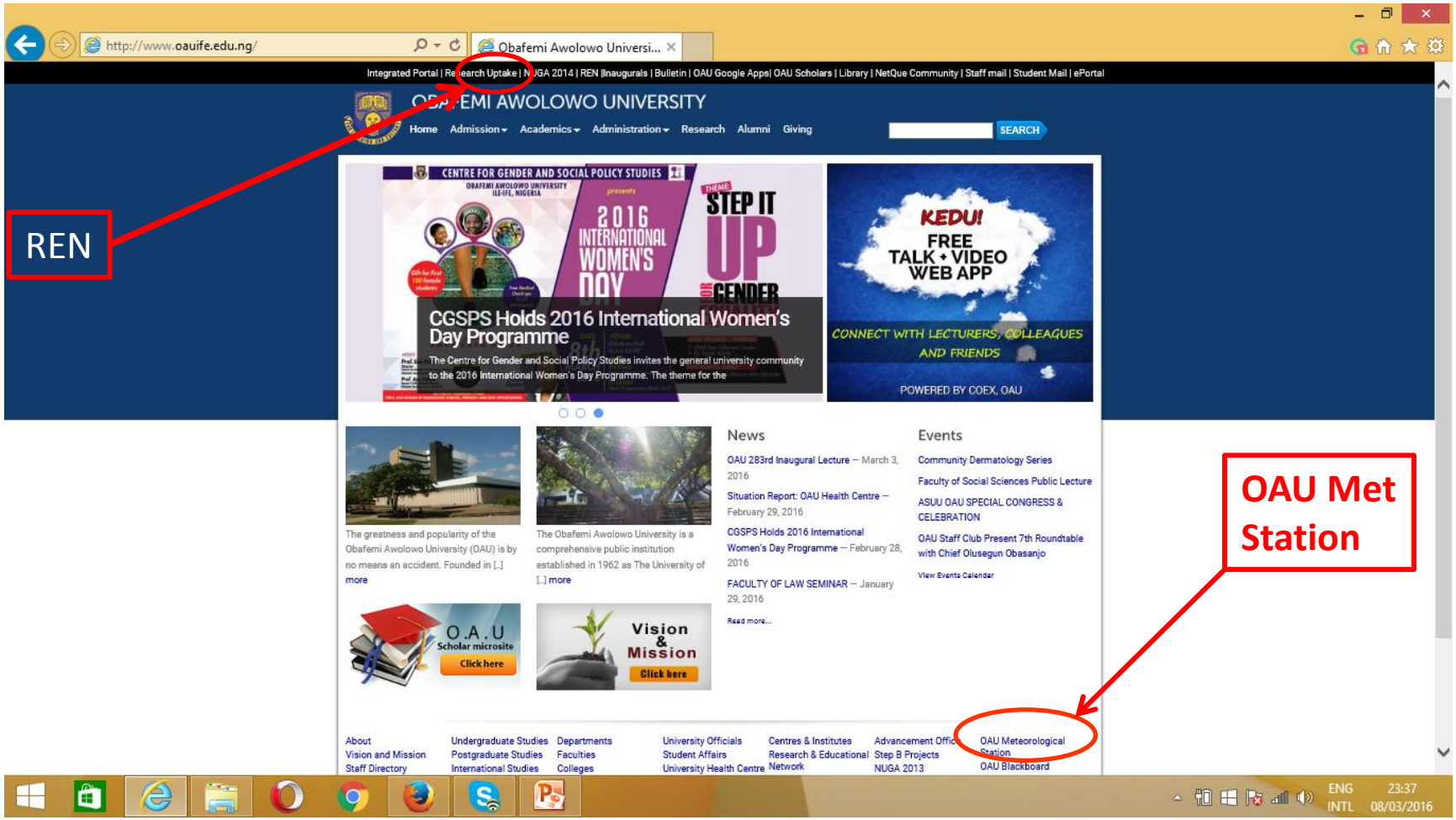






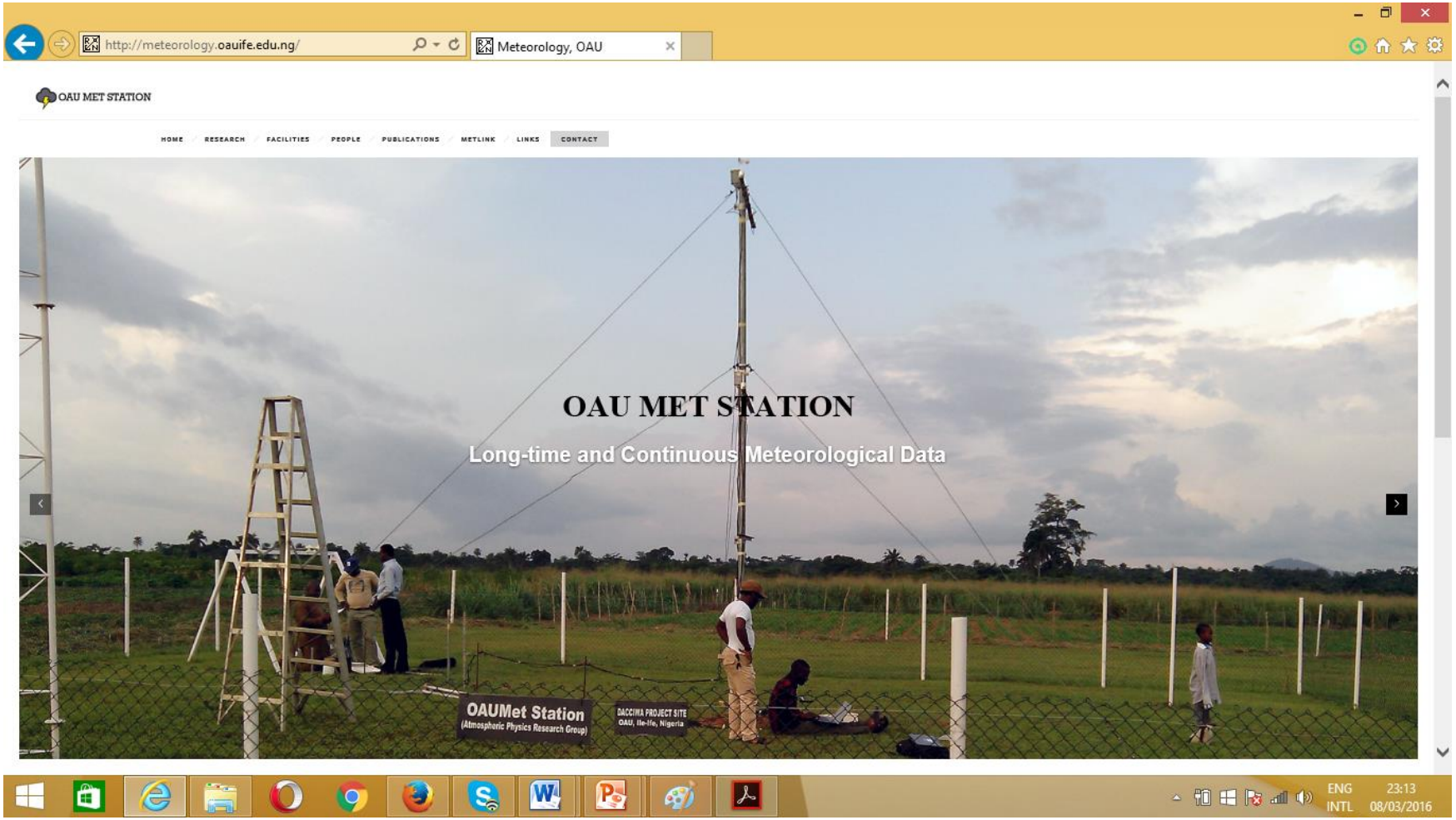


OAU homepage - http://oauife.edu.ng



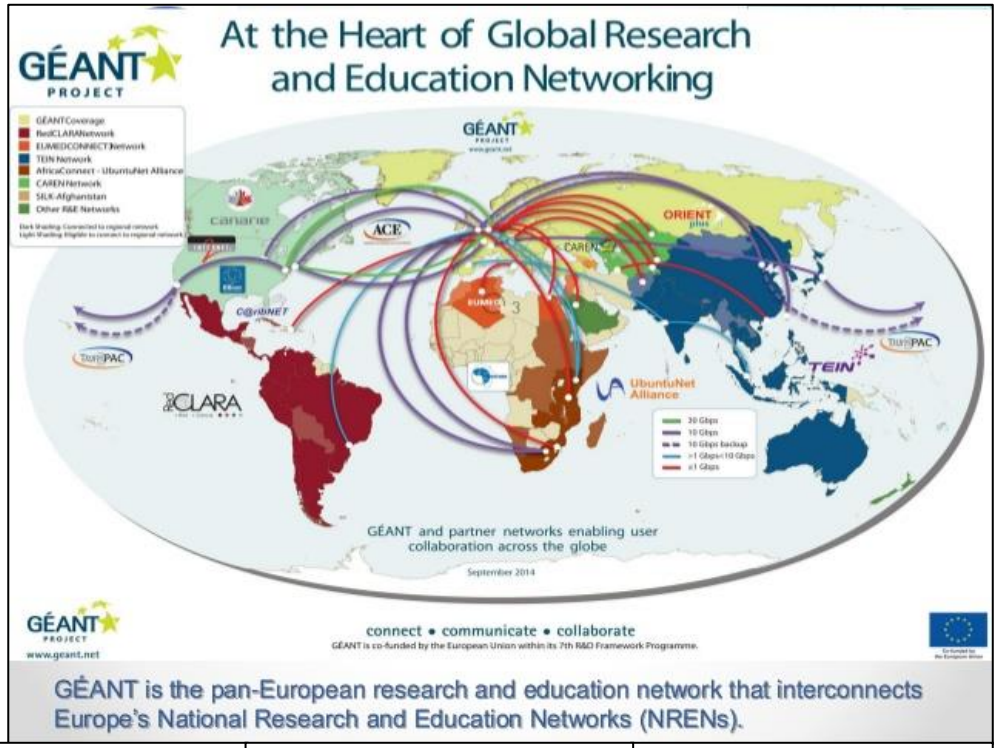
OAU-Met Station website

http://meteorology.oauife.edu.ng



Benefits of Belonging to an REN

- Enables e-education and e-science such as virtual meetings and teaching facilities.
- Community services VoIP, video conferencing services, web based collaboration.
- Inter-institutional collaboration, sharing of large databases and research results



GÉANT is the pan-European research and education network that interconnects Europe's National Research and Education Networks (NRENs).

eKONNECT

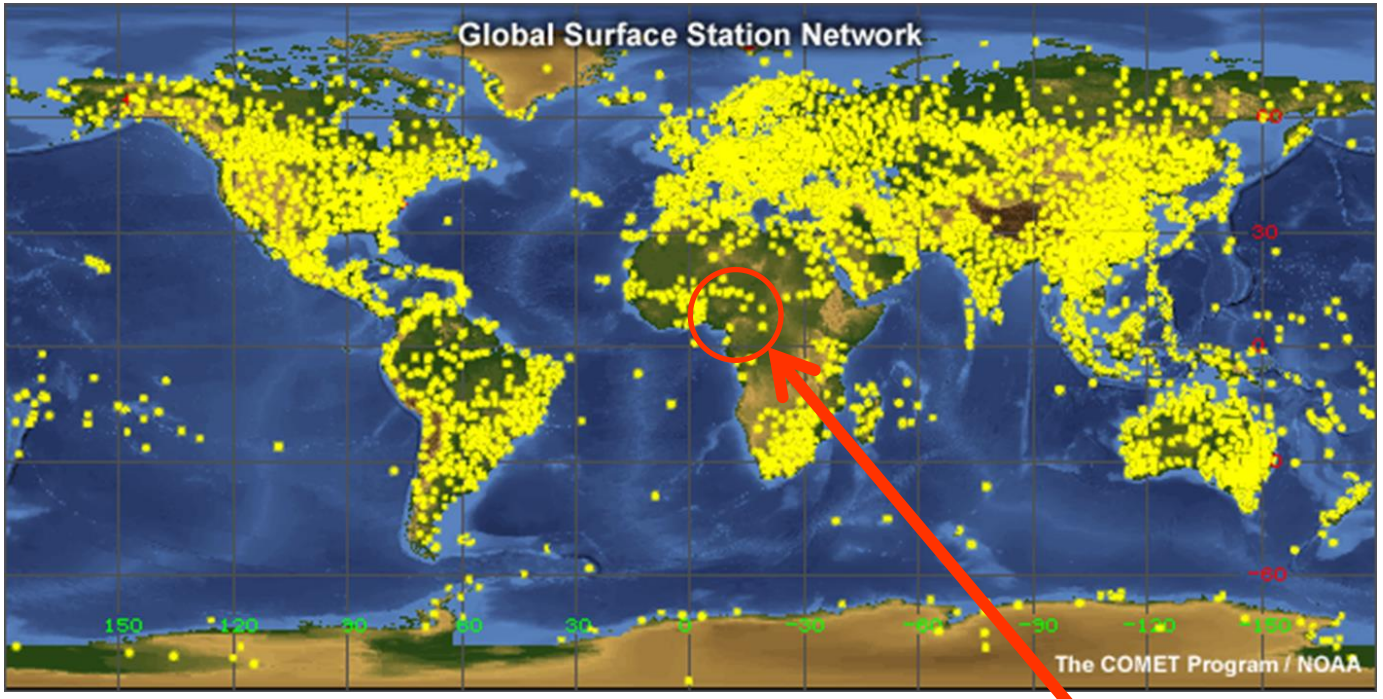
UbuntuNet Alliance

WACREN

NgREN
The Nigerian Research and Education Network

Impact of collaborative research

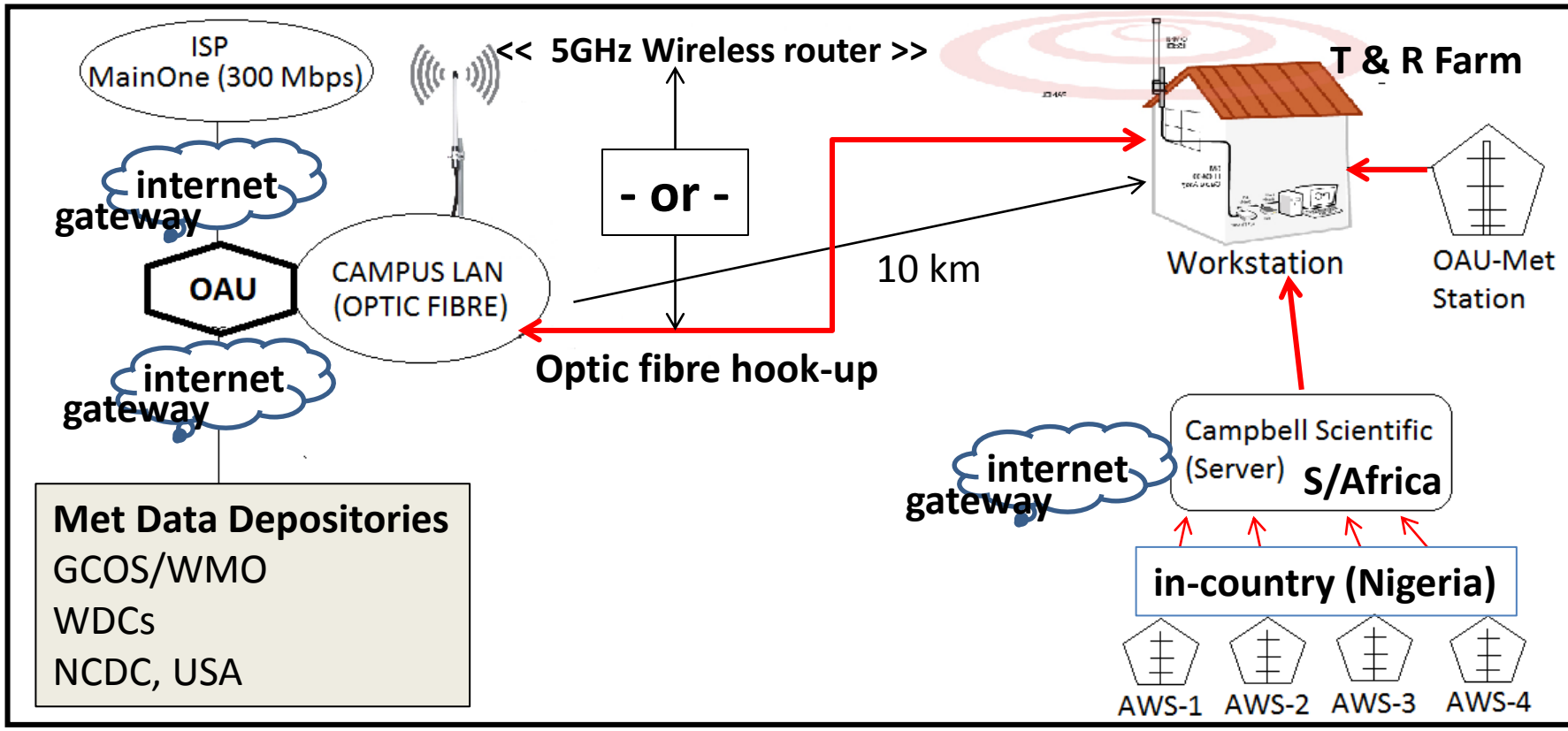
- Provision of additional observing stations – AWS & smart sensors
- Contribution to the GCOS programme of WMO
- Near-real time data capture suggesting better weather forecasts (NIMET)
- Creating a digital database that can be accessed for Reg. GCMs and GCMs modelling



Source: GCOS (Nov., 2015)

Note paucity of reporting stations over Nigeria!

OAU-Met Station Measurement Network (Proposed)



AWS – Automatic Weather Station network

Major Challenges

- Power (electricity) related problems
- Inadequate funding for Met instrumentation
- Lack of technical manpower
- Poor collaboration among African researchers in atmospheric sciences
- Fast and reliable access to Met databases
- NIMET is not meeting some research needs

E-infrastructure required

- Digital Meteorological Sensors – AWS (envisaged collaboration with WIMEA-ICT project)
- Fibre optic cabling to OAU-Met Station
- Dedicated IP address (Affordable internet connectivity)
- 5 GHz Router (wireless)
- GSM modems and antennae
- Workstations

Promoting Open Science: APRG Initiative

- The OAU-Met station is comprised of combination of meteorological sensors (slow and fast response).
- Continuous atmospheric turbulence measurements (sampling < 0.1 s) generate large data files ~ 2GB/day. Problems for transfer to use processing software.
- AWS data collected via the 2G/3G GSM cellular network on a dedicated server. The data is transferred to workstation for further reduction using QA/QC procedures.
- Demand/exchange of station data (available on request). Collaboration for scientific research is welcomed (e.g., DACCIWA Project).

OAU-Met Station/NgREN/WACREN

Why are we collaborating? -

- How do we fit in?
- Handshaking (Equipment support)
- Networking (Value added)

Data -

- Who owns the datasets?
- Data exchange protocols
- Commercialization

http://meteorology.oauife.edu.ng

Postscript

"e-infrastructure is a veritable resource that can be deployed to engender productive collaborative academic research in the atmospheric sciences (especially for the underfunded universities in developing countries) – possibly, as a rescue!"

….. Remember, the Stone soup story …..