

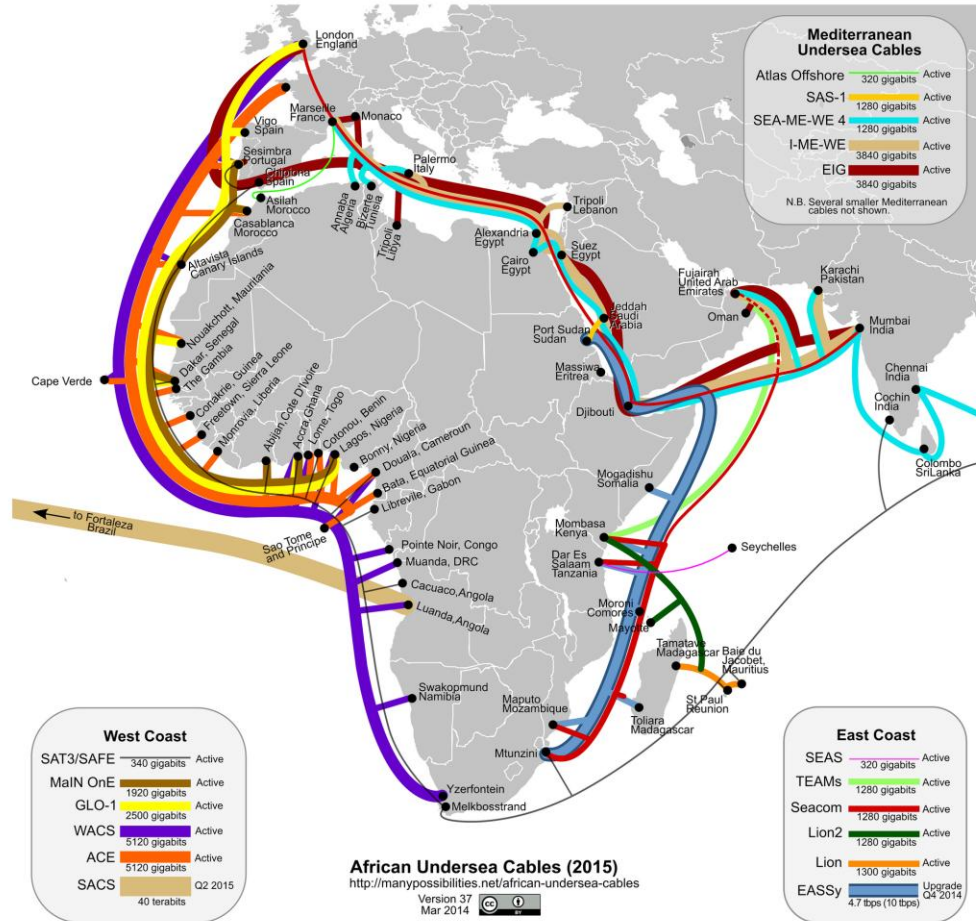


# Emerging Infrastructures for African NRENs

Future Internet Summit  
Seoul, Korea 15 October 2014

Omo OAIYA  
CTO

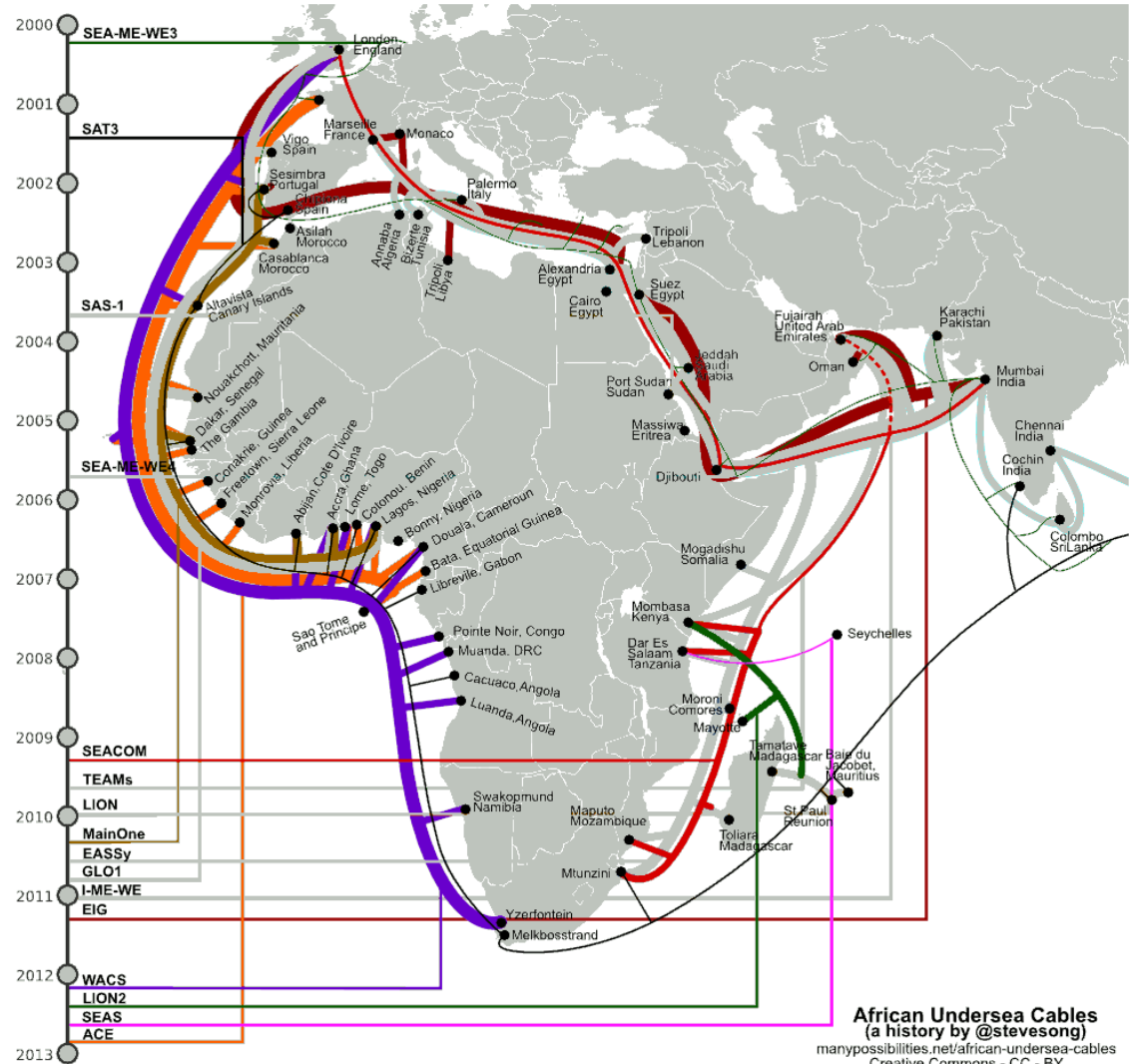
# Undersea Cables



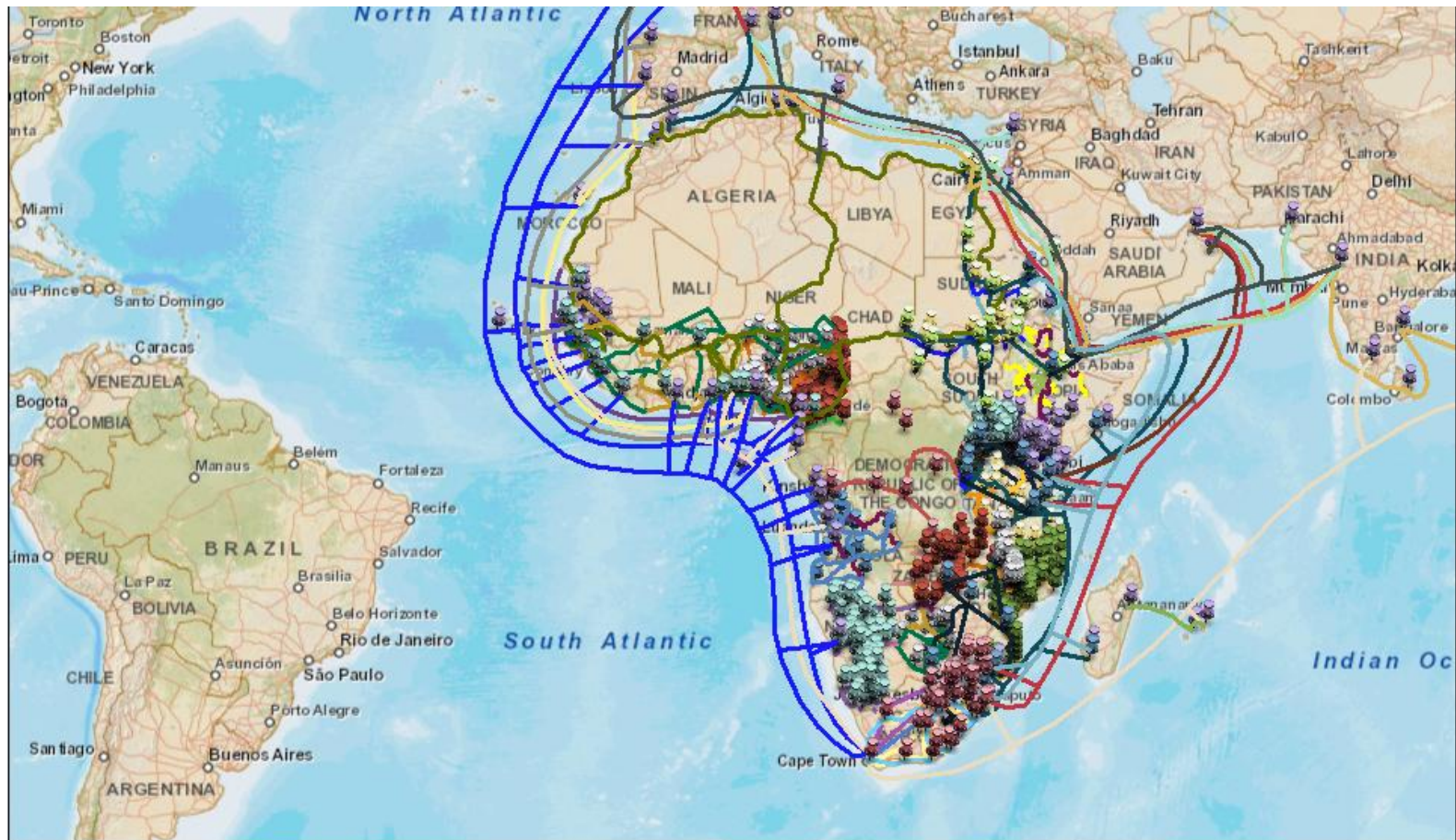
# Cable History



- 34.74Tbs of capacity at the moment, 87.54 Tbs by end of 2014
- Mostly since 2009 and driving interconnectivity within Africa.



# Intra-Africa Fiber



October 8, 2014

1:73,957,191

# AfricaConnect

[www.africaconnect.eu](http://www.africaconnect.eu)

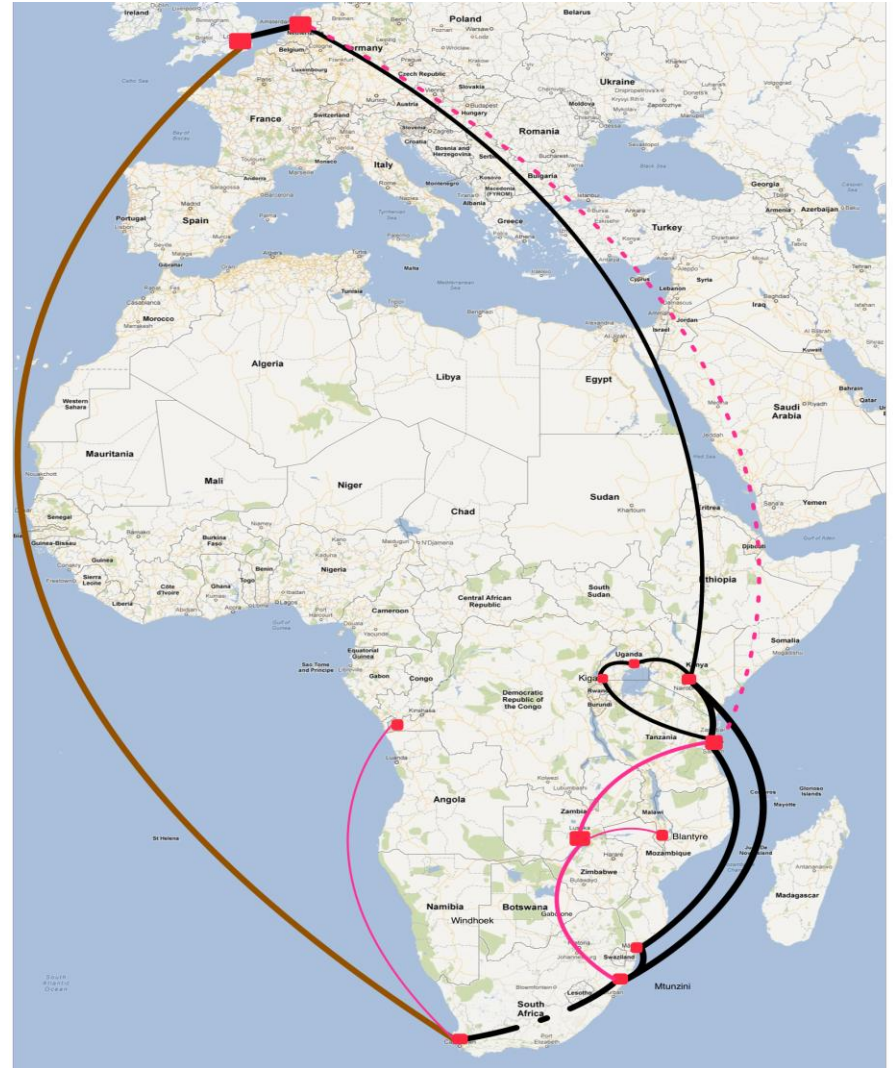


- Collaboration between 20 African and European NREN partners
- Total budget is €14.75m for a period of four years, 80% from EU and 20% provided by African partners
- Ubutunet Alliance and members– representing South and Eastern NRENs.
- WACREN – representing West and Central African NRENs
- AAU - The Association of African Universities
- 6 European NRENs – from Germany, Ireland, Italy, the Netherlands and Portugal
- Coordinated by DANTE (Delivery of Advanced Network Technology to Europe)

# AfricaConnect - today



- Phase 1: 2011 – 2015
  - Ubuntunet - South and Eastern Africa
  - Mostly completed
- Phase 2: From June '15
  - focus on WACREN - West and Central Africa
  - Interconnect with Ubuntunet
  - Interconnect ASREN



# e-I4Africa

[www.ei4africa.eu](http://www.ei4africa.eu)



- e-Infrastructures for Africa – FP7 project
- Raise awareness and build build cooperation between Euro-African NRENs & user communities
- Promote and strengthen Euro-African collaborative research on e- Infrastructures and their applications
- Produce a state-of-the-art study of e-Infrastructure application uptake in Africa
- Develop the first Africa Grid Science Gateway
- Flagship demonstrations of applications to illustrate relevance.

# PKI - Certification Authorities



- Certification Authorities (CAs) compliant with the requirements of the International Grid Trust Federation deployed in five countries: Kenya, Malawi, Nigeria, South Africa and Tanzania by their respective NRENs;
- Kenya and South Africa CAs have completed the writing of their Certificate Policy and Certification Practice Statement (CP/CPS) documents and following procedure to be fully accredited by EUGridPMA and become members of the International Grid Trust Federation (IGTF);





# Identity Federations

- The first Identity Federations (IdFs) based on the SAML 2.0 standard have been successfully deployed in five countries: Kenya, Nigeria, South Africa, Tanzania and Zambia by their respective NRENs. All Identity Providers (IdPs) have their own websites that include the service of user registration;
- More NRENs in process – Ghana, Senegal, etc

# Communities of Practice



- 34 current or planned regional applications of e-Infrastructures and 15 CoPs have been identified in Africa
- A roadmap for supporting e-Infrastructure and virtual research community (VRC) development.
- 44 research priorities and recommendations have been identified, accompanied by two specific thematic areas.

# Africa Grid Science Gateway



- The Africa Grid Science Gateway
  - The African Pharmacology and Pharmaceutical Science Gateway (APSG)
  - The TRODAN Data Repository
  - The Community Health Portal.
- NRENs have integrated IdPs with the Africa Grid Science Gateway
- Hosted in Dar es Salaam (Tanzania);

# The Africa Grid Science Gateway

(sgw.africa-grid.org)



- 13 Applications, of which 3 for digital repositories
- 6 different Scientific Domains

# Africa Grid SG Applications



## SOME OF THE APPLICATIONS ALREADY AVAILABLE

		The ASTRA project aims at reconstructing the sound instruments (not existing anymore) using archaeological excavations, written descriptions, pictures, etc. ( <a href="http://www.astraproject.org">www.astraproject.org</a> )
		ClustalW is a program for multiple alignment of nucleotide sequences. ( <a href="http://www.clustal.org">www.clustal.org</a> )
		De ROBERTO DR is an example of data repository based on storage resources that contains digital cultural heritage.
		GROMACS is a versatile package to perform molecular dynamics simulations of the Newtonian equations of motion for systems with flexible molecules. ( <a href="http://www.gromacs.org">www.gromacs.org</a> )
		MERIS is an example of data repository built on top of existing sources that contains various kind of atmospheric data from a spectrometer installed on board of the ESA satellite ENVISAT.
		GNU Octave is a high-level interpreted language, primarily for numerical computations. ( <a href="http://www.gnu.org/software/octave/">www.gnu.org/software/octave/</a> )
		R is a language and environment for statistical computing and graphics. ( <a href="http://www.r-project.org">www.r-project.org</a> )
		Sonification is the use of non-speech audio to convey information. Auditory perception has advantages in terms of frequency resolution that open possibilities as an alternative visualization techniques.
		The Weather Research and Forecasting (WRF) Model is a state-of-the-art numerical weather prediction system designed for both research and operational forecasting needs. ( <a href="http://www.wrf-model.org">www.wrf-model.org</a> )

## Navigation

- "Hello World!"
- Computer Sciences and Mathematics
- Cultural Heritage
- Earth Sciences
  - o MERIS Data Repository
  - o **TRODAN Data Repository**
    - o Browse
    - o View
- High Energy Physics
- Life Sciences
- Other
- Full list

## TRODAN Data Repository



### About TRODAN

The [Center for Atmospheric Research](#) (CAR) is an activity Centre of the [Nigerian National Space Research and Development Agency](#), NASRDA, committed to research and capacity building in the atmospheric and related sciences. CAR is dedicated to understanding the atmosphere—the air around us—and the interconnected processes that make up the Earth system, from the ocean floor through the ionosphere to the Sun's core. The NASRDA Center for Atmospheric Research provides research facilities and services for the atmospheric and Earth sciences community. Tropospheric Data Acquisition Network, TRODAN.

TRODAN, is a project that was designed to monitor the lower atmosphere which covers region from the surface of the Earth to the altitude of about 11 km. This project is designed to collect and provide real-time meteorological data from different locations across Nigeria using for the purpose of research and development. At moment TRODAN equipment include atmospheric monitoring facilities such as Automatic Weather Stations, Micro Rain Radar facilities and Vantage Pro. This present data is obtained using Campbell Scientific Automatic Weather Station.

### Conditions of Use of TRODAN Data

The data made available by CAR are provided for research use and are not for commercial use or sale or distribution to third parties without the written permission of the Centre. Publications including these making use of the data should include an acknowledgment statement of the form given below. A citation reference should be sent to the TRODAN Project Manager ([trodan@carsnrda.com](mailto:trodan@carsnrda.com)) for inclusion in a publications list on the TRODAN website.

### The TRODAN Data Structure

In all files, the header text lines contain thirteen rows which begin with date/time in the same cell with the format ddmmyyyhhmm. The second row is CR 1000 record which is the datalogger type used for data collection in this equipment, the third row is the CR 1000 Battery Volt, the fourth row begins the meteorological parameters starting with Rain Rate in mm, Solar Radiation SLrW in W/m2, Air Temperature AirTC in Degree Celsius (°C), Relative Humidity RH in Percentage (%), Soil Temperature T107 in °C, Wind Speed WS in m/sec, Wind Direction in Degrees, Barometric Pressure Barpress in mbar, Volumetric Water Content VW \*100 and lastly PA\_us conversion for unified soil which concern only Volumetric water content. The column contains the serial number of the data. The header contains metadata on product name, creation time, units, source, missing data, end of record identifier, time range. The product filename includes the begin date/time (Local time) of each product run in the format of ddmmyyyhhmm Where dd = 2-digit day, MM = 2-digit month hh = 2-digit hour, yyyy = 4-digit year, hh= 2-digit hour and mm = 2-digit minute. The product run interval is 5 minutes and is indicated by the Time Range field in the header. NAN=Missing Data Note that: There is unavailable data from 24th/05/2010 20:25 to 30th/09/2010 20:30.

### Disclaimer

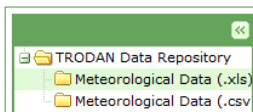
CAR-NASRDA accepts no liability for the use or transmission of this data.



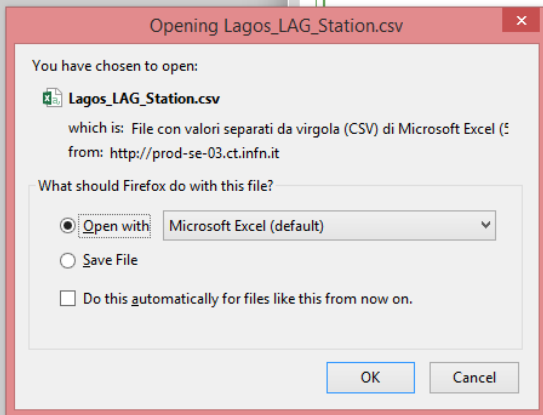
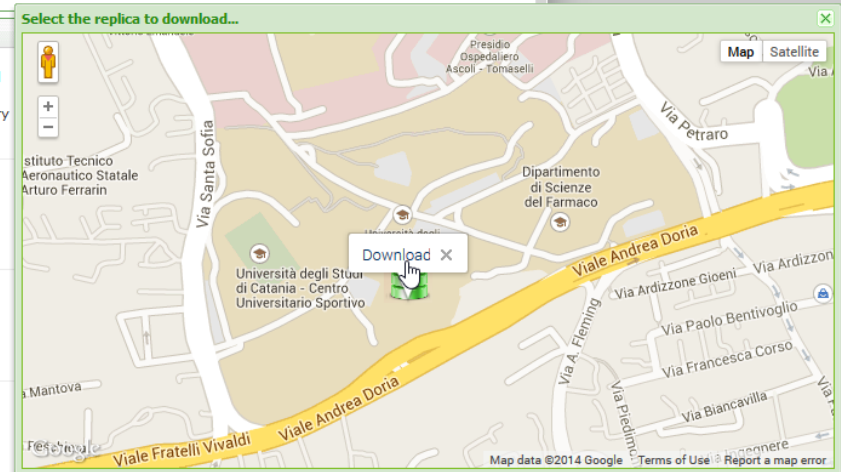
# TRODAN DR “Browser”



## TRODAN Data Repository Browser



Thumb	FileName	Country	State
	Abuja_ABJ_Station.	Nigeria	Federal Capital Territory Aubja
	Akure_AKR_Station	Nigeria	Ondo State
	Anyigba_ANY_Static	Nigeria	Kogi State
	Eburumili_Agu_EBA	Nigeria	Enugu State
	Lagos_LAG_Station.	Nigeria	Lagos State South-We LAG
	Akungba_AKB_Stati	Nigeria	Ondo State South-We AKB
	Lapai_LAP_Station.>	Nigeria	Niger State North-Central LAP



# TRODAN DR "Viewer"



### Navigation

"Hello World!"  
Computer Sciences and Mathematics  
Cultural Heritage  
Earth Sciences

- MERIS Data Repository
- TRODAN Data Repository
  - Browse
  - View
- High Energy Physics
- Life Sciences
- Other
- Full list

## TRODAN Data Repository Viewer

Trodan Input Form

1
Portlet Settings

2
The Computing e-Infrastructure

3
Specify your Input Settings

\* These fields are required

A.) Specify the Meteorological Station(s) you want to analyze \*

- Abuja
- Akungba
- Akure
- Anyigba
- Eburumili
- Lagos
- Lapai
- Makurdi
- Minna
- Nsukka
- Ogbomoso
- Porthacourt
- Redeemers
- Yola
- Toggle Station(s)

B.) Specify the Meteorological Pattern(s) you want to analyze \*

<input type="checkbox"/> Rain Rate (mm)	<input type="checkbox"/> Solar Radiation (W/mv)
<input type="checkbox"/> Air Temperature (°C)	<input type="checkbox"/> Relative Humidity (%)
<input type="checkbox"/> Soil Temperature (°C)	<input type="checkbox"/> Wind Speed (m/s)
<input type="checkbox"/> Wind Direction (°)	<input type="checkbox"/> Barometric Pressure (mbar)
<input type="checkbox"/> Volumetric Water	<input type="checkbox"/> PA_uS (µs)
<input type="checkbox"/> Toggle Meteorological Pattern(s)	

❧

C.) Specify some additional settings before to start

Date range may vary from [ 31/07/2007 to 21/05/2013 ]

Plot Style \* lines (Default) ▾

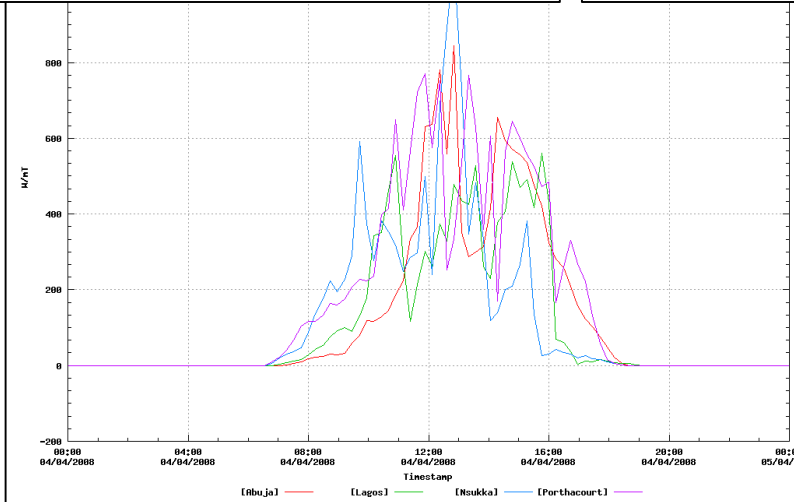
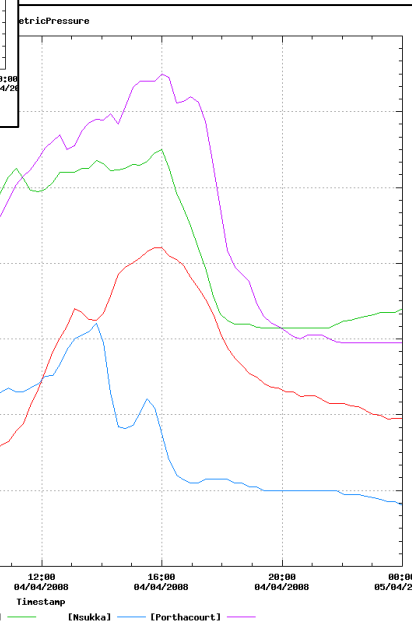
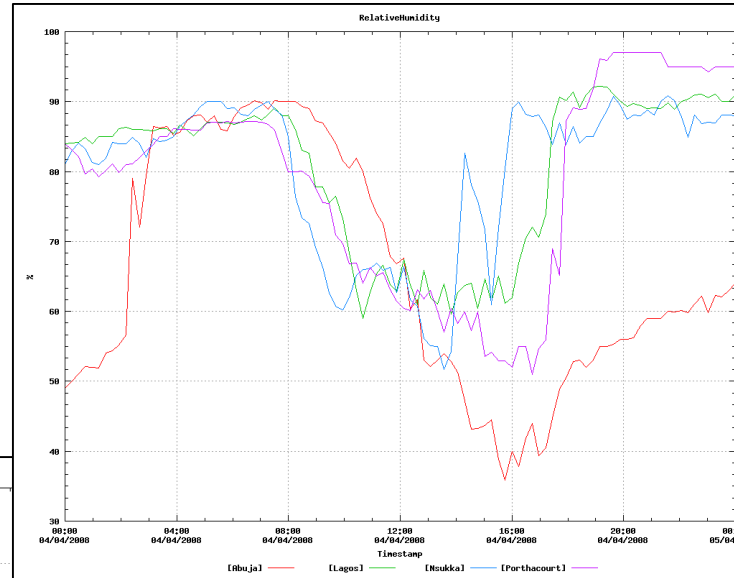
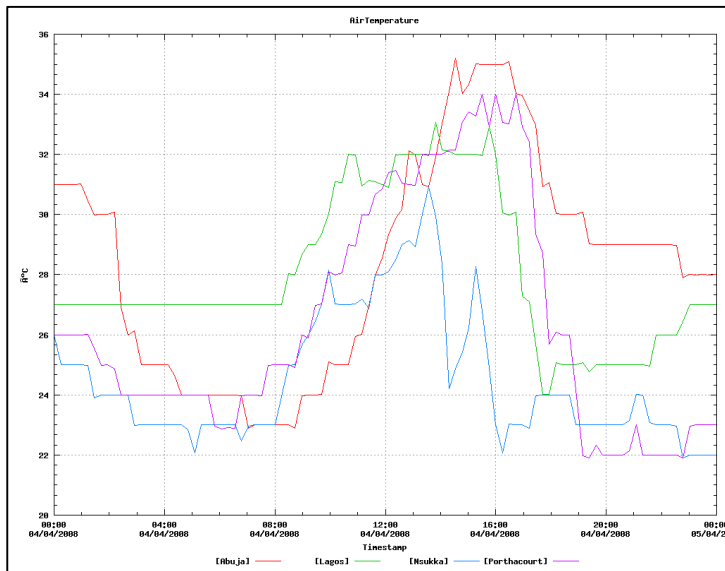
Date \* From  To

Description Insert here your description

Notification

This work has been partially supported by **eif africa eu**  
e-infrastructure for Africa

# TRODAN DR "Viewer"





# Infrastructure Guiding Principles



- Leverage lack of legacy infrastructure everywhere possible and leapfrog
- Increase focus on user-centric and easy to use e-Infrastructures that are accessible via web and mobile
- Emphasis on standards for sustainability and interoperability.
- Collaboration with other world regions – Exploit opportunities with KR – Africa



감사합니다

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