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AFRIGIST Capacity Development Activities

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African Regional Institute for Geospatial Information Science and Technology (AFRIGIST)

Under the Auspices of United Nations Economic Commission for Africa) (UNECA)

Obafemi Awolowo University (OAU) Campus, Ile-Ife, Nigeria

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Presented @ the 'UN-GGCE Geodesy Capacity Development Workshop for Africa on Transitioning to a Modern Geospatial Reference System, Date: 19–23 May 2025 @ Conference Room 9, UN Complex, Nairobi, Kenya.



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Presentation Outline

- ① **About AFRIGIST**
- ① **AFRIGIST Capacity Development Activities**
- ① **Capacity Development Partnerships & Collaborations**
- ① **Regional Advisory Roles/Support Services**
- ① **New Capacity Development Agenda**
- ① **Concluding Remark**

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About AFRIGIST

The Institute:

- 🌀 The **African Regional Institute for Geospatial Information Science and Technology (AFRIGIST)** was formerly known as **Regional Centre for Training in Aerospace Surveys (RECTAS)**.
- 🌀 Established in 1972 under the auspices of the United Nations Economic Commission for Africa (UNECA)
- 🌀 A Centre of Excellence for *specialised and quality training, education and research in aerospace surveys/geospatial information science and technology, as well as the strengthening of essential national mapping capacities for the sustainable development of Africa.*

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About AFRIGIST (cont..)

The Institute:

- 🌀 A bilingual (**English and French**) intergovernmental institution for Africa, with full diplomatic accreditation in the Federal Republic of Nigeria, and membership is open to all African countries.
- 🌀 It is located on the campus of Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria;
- 🌀 The current member States are Benin, Burkina Faso, Cameroon, Ghana and Mali, Niger, Nigeria (the host country) and Senegal.

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About AFRIGIST (cont..)

Membership Status:

Current Members:

- Benin⁽¹⁾,
- Burkina⁽²⁾,
- Cameroon⁽³⁾,
- Ghana⁽⁴⁾,
- Mali⁽⁵⁾,
- Niger⁽⁶⁾,
- Nigeria⁽⁷⁾ (Host)
- Senegal⁽⁸⁾

Prospective Members:

- Cote-d'Ivoire⁹,
- Guinea-Bissau¹⁰,
- Liberia¹¹, &
- South Africa¹²

○ **Potential Member:**
The membership is open to all other African Countries

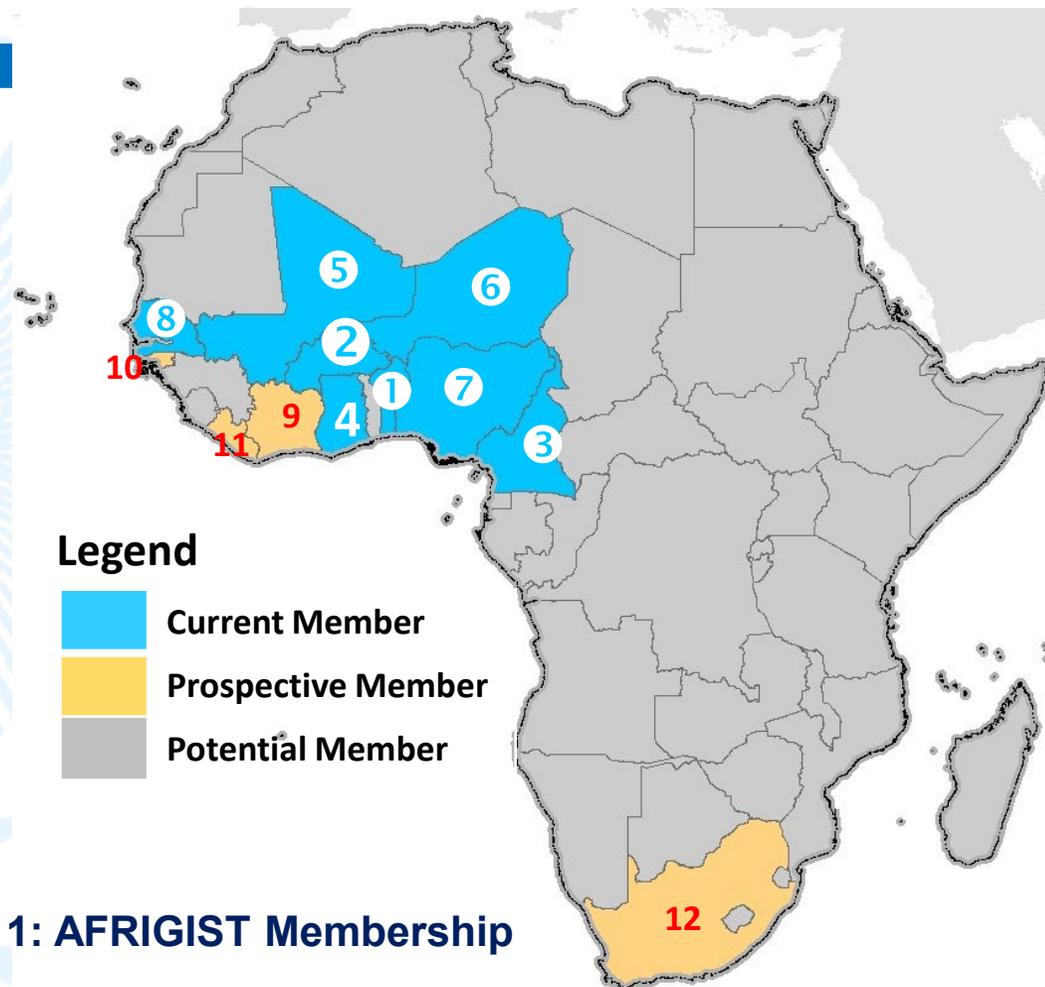


Fig. 1: AFRIGIST Membership



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About AFRIGIST (cont..)

The Mandate:

- 🌀 To contribute to the rapid and sustainable development of its Member States and Africa in general through the development of essential capabilities for the timely provision and responsible use of appropriate geospatial information.

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About AFRIGIST (cont..)

Objectives:

- i. Provide **theoretical** and **practical education, research, and training** in the fields of Geospatial Information Science and Technology, including:

👉 **Photogrammetry & Remote Sensing;**

👉 **Cartography & Geovisualisation**

👉 **Geographic Information Science;**

👉 **Geodetic Science;**

👉 **Hydrography and Marine Science, &**

Applications in:

- ◇ *geodetic mapping,*
- ◇ *land administration,*
- ◇ *geophysical surveys,*
- ◇ *Health and epidemiology,*
- ◇ *agriculture and water*
- ◇ *population and settlement,*
- ◇ *environmental monitoring*
- ◇ *climate change,*
- ◇ *natural resources management,*
- ◇ *infrastructure mapping,*
- ◇ *security and safety*
- ◇ *geohazard & disaster management,*
- ◇ *transport, navigation, etc.*



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About AFRIGIST (cont..)

Objectives (cont..)

- ii. Conduct seminars and courses to provide an opportunity for government officials, and researchers in the region to exchange information and experiences in the field of Geospatial Information Science and Technology (GIST).
- iii. Conduct research and carry out studies in GIST
- iv. Provide consultancy and advisory services in geospatial data and information production, management, and dissemination to member states, other African Countries, and relevant stakeholders.

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About AFRIGIST (cont.)



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Fig.2: AFRIGIST Campus and Boundary



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About AFRIGIST (cont..)



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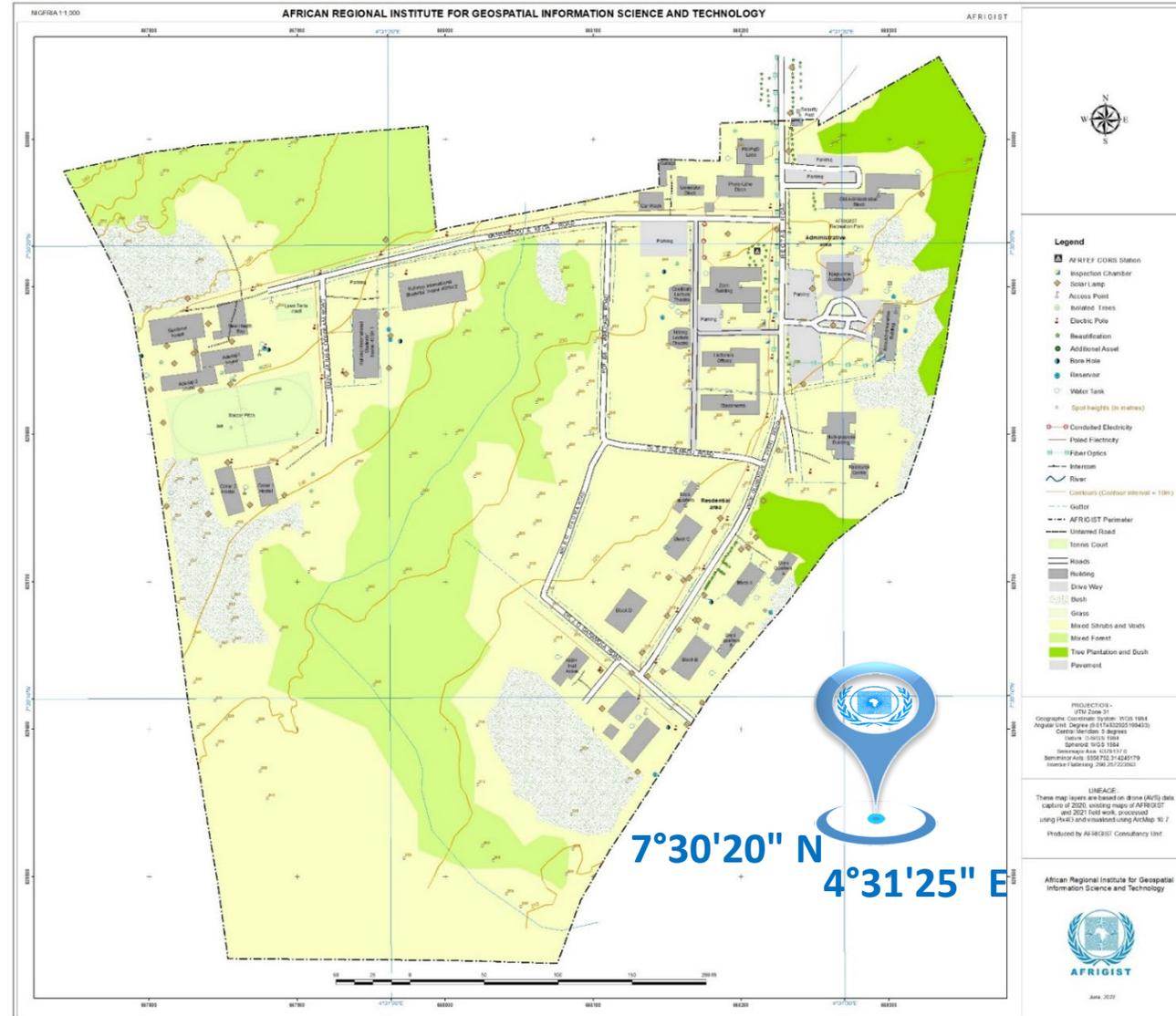


Fig. 3:
Physiographic Map of AFRIGIST

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About AFRIGIST (cont..)

Major Strengths:

- Ω African and Madagascar Council for Higher Education (CAMES) Accreditation
- Ω Bilingual Institute (English & French)
- Ω Collaboration with Universities
- Ω Participation in Global Collaborative Initiatives and Programmes
- Ω African wide Institute with support from Governments of Member States & UNECA
- Ω Availability of Expertise (*Geomatics/Geospatial Professionals/Academics, Technologist/Analysts*)
- Ω Adequate Training Facilities
- Ω SDI Country Support Capabilities

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AFRIGIST Capacity Development Activities

To achieve its mandate, AFRIGIST runs/provides:

- i. academic/professional postgraduate diploma, Masters & PhD degrees*
- ii. short training courses,*
- iii. customised courses to meet the specific needs of individuals, organisations and countries.*
- iv. advisory support services to African countries (member states in particular) in all areas of application and use of Geospatial Information Science and Technology.*

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Academic/Research Training Programmes.

S/n.	Programme	Title	In Collaboration with:	Duration
1	Technologist Diploma (TD)	Geospatial information Production and Management (French and English)	None	18 months
2	Postgraduate Diploma (PGD)	Geospatial information Production and Management [Specialisation: Remote Sensing, Photogrammetry, Geographic Information Science] (French & English)	None	12 months
3	Professional Masters (PM)	Geospatial information Production and Management, [Specialization: Remote Sensing, Photogrammetry, Geographic Information Systems] (French and English)	None	12 months
4	Professional Masters (PM)	Geospatial Information Science and Land Administration (French and English)	None	12 months
5	Master of Science(M.Sc.)	Geospatial information Production and Management (French and English)	None	24 months
6	Masters (MGIT)	Geo-information Technology (English)	Federal University of Technology Akure, Nigeria	24 months

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Academic/Research Training Programmes (cont.):

S/no	Programme	Title	In Collaboration with:	Duration
7	Master of Science (M.Sc.)	Geo-information Science (French)	University of Abomey Calavi, Benin Republic	24 months
8	Masters of Science (M Sc.)	Geospatial Information Production and Management (English)	Obafemi Awolowo University (OAU), Ile-Ife, Nigeria	24 months
9	Masters of Science (M Sc.)	Geospatial Information Science and Land Administration (English)	Obafemi Awolowo University (OAU), Ile-Ife, Nigeria	24 months
10	PhD	Geospatial Information Science and Technology, and Sustainable Development (French and English)	University of Abomey Calavi, Benin Republic	3 – 4 years

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Academic/Research Training Programmes (cont.):



Some Graduates from AFRIGIST Programmes

No. of Trained Personnel to-Date:

👉 **AFRIGIST has trained over 3800 persons** (made up of **civil/public servants, military, para-military, etc.**) **across Africa, since inception.**

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Academic/Research Training Programmes (cont.):

New Academic Programmes

- MSc/PhD in Geodetic Science
- MSc/PhD in Hydrography & Marine Science
- The collaboration arrangements for these programmes are being discussed with **Department of Surveying & Geoinformatics, Faculty of Engineering, University of Lagos, Nigeria.**



Some Geodetic Mapping Equipment Required for the New collaboration

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Academic/Research Training Programmes (cont.):



Field Exercise (dry season) on the AFRIGIST Campus with V200 Hi-Target GNSS Receivers

Space Geodesy/GNSS

Presented @ the 'UN-GGCE Geodesy Capacity Development Workshop for Africa on Transitioning to a Modern Geospatial Reference System, Date: 19–23 May 2025 @ Conference Room 9, UN Complex, Nairobi, Kenya.



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Academic/Research Training Programmes (cont.):



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Field Exercise (wet season)
on the AFRIGIST Campus
with V200 Hi-Target GNSS
Receivers

Space Geodesy/GNSS

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Academic/Research Training Programmes (cont.):



Training Laboratory (M.GIT Lab)

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Academic/Research Training Programmes (cont.):



Geospatial Data Processing and Storage System

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Academic/Research Training Programmes (cont..):



Sokkia GNSS Receivers (Base & Rover)

DJI Phantom 4 RTK



**AFREP
GNSS CORS**



Ebee Fixed Wing



**High Precision Hi Target V200
GNSS RTK System**

Some of the Available Mapping Equipment

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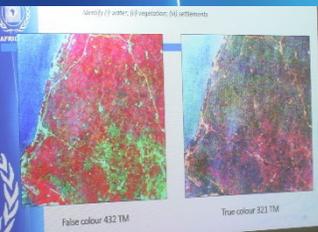


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Geospatial Training (Technical)



Short-term Specialised Technical Training Programmes

Duration

- **Global Navigation Satellite Systems and Applications**
- Cadastral Information System (CIS) and Land Info. Management
- **Reference Frame and Datum Transformation**
- Basic training in Digital Cartography and Production
- Fundamentals of Geospatial Information Science (GIS)
- GIS in Geohazard and Disaster Management
- GI in Border Management
- GI in e-Marketing, Trade and Commerce
- Election Administration and Management
- Geospatially Enabled Government
- Digital Image Processing and Analysis
- Security, Defence and Peace-keeping
- Topographic Mapping and Analysis
- Geospatial Applications in Civil & Environmental Engineering
- GIS in Transport and Logistics

**2 - 6
weeks**

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Geospatial Training (Technical)



Short-term Specialised Technical Training Programmes

Duration

- Remote Sensing and Digital Mapping
- Internet GIS and Web Mapping
- **Geospatial Information Technology Applications in:**
 - ◇ *Health Care and Epidemiology*
 - ◇ *Agriculture and Livestock Management,*
 - ◇ *Coastal and Marine Resources/Oceanography*
 - ◇ *Land Use and Forest Resources Inventory*
 - ◇ *Demography/Population Census*
 - ◇ *Planning and Physical Development*
 - ◇ *Geology, Mining and Mineral Resources Mapping*
 - ◇ *Land Administration, **etc.***
- Geospatial Data Science, AI/Machine Learning/Deep Learning
- UAS/Hyperspectral Sensing, & LiDAR Mapping
- Sea Level Change/Sea State Monitoring and Mapping with Satellite Radar Altimetry
- Surveying, Physical Geodesy and Geoid Development

2 - 6 weeks

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Geospatial Training (Technical)

Infrastructural Capacity Development:

This include physical and training facilities development, and logistics required for the Institute to deliver on her objectives:

- **ICT/Data Infrastructure (Soft/Hard)**
- Lecture Halls and Laboratories
- Geodetic/Geospatial Equipment and Electronics
- Furniture and fittings
- Utilities (*Power, Water & Communication*)
- Transport and Logistics,
- Health and Recreational Facilities
- Security Infrastructure, etc.



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Capacity Development Partnerships & Collaborations

Existing/New Regional & Global Initiatives:

(a) Digital Earth Africa Programme

- AFRIGIST is active partner in the Digital Earth Africa Programme, funded by **Geoscience Australia (GA)**, and assisting to deliver EO data-based decision-ready products to *policy makers, scientists, private sector, & civil society* for addressing *social, environmental* and *economic changes* on the continent of Africa, and develop an ecosystem for innovation across sectors.
- AFRIGIST is playing a leadership role as an **Implementing Partner (IP)** and Member of the **Technical Advisory Committee (TAC)** for Capacity Building on the use of EOs using the DE Africa platforms.



Capacity Development Partnerships & Collaborations (cont..)

AFRIGIST has been able to support the DE-Africa **EO Capacity Building Activities** through the following trainings and activities:

- i. Water Resources Management 'face-to-face' training workshop (2 days training Cotonou, Benin republic) 12th and 13th May 2024
- ii. Spatial Agricultural Intelligence 'face-to-face' training workshop Abuja, 4-5 December 2024 at the Ministry of Agriculture.
- iii. DE Africa Platforms Interoperability with GIS Applications online training course (English and French) 20th to 21st June 2024
- iv. Training in Land degradation in English + development of online module
- v. Training in Land degradation in French + development of online module
- vi. Training in Urbanization in French + development of online module
- vii. Training in Urbanization in English + development of online module



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Capacity Development Partnerships & Collaborations (cont..)

Existing/New Regional & Global Initiatives:

(b) SERVIR West Africa/Global Network

- ◇ AFRIGIST is involved in the **EO capacity building component** of the SERVIR West Africa Services, which has immensely supported and promoted the concept of **“FROM SPACE TO VILLAGE”** in West Africa and beyond.
- ◇ SERVIR WA programme is sponsored by the joint development initiative of NASA & United States Agency for International Development (USAID), aimed at empowering practitioners and decision-makers with tools, products, and services from **EO** for managing **disasters, agriculture, water resources, ecosystems, & Land use**.



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Capacity Development Partnerships & Collaborations (cont..)

(c) Other Existing/New Regional & Global Initiatives

❑ Other **existing/new** capacity development partners of AFRIGIST (*for trainings, research, collaborations/joint activities, and shared opportunities*) include the following, amongst others:

- Federal University of Technology Akure (FUTA), Nigeria
- University of Abomey Calavi (UAC), Benin Republic,
- Obafemi Awolowo University (OAU). Ile-Ife, Nigeria
- AFRIGIST Alumni International Network
- SatNav-Africa JPO Dakar, Senegal,
- The ITC, University of Twente, Netherlands
- Liberia Institute of Statistics and Geoinformation Services (LISGIS)
- Border GENUIS with RCMRD, GIZ (*AUC is being added to the collabo*)
- University of Benin, Benin-City, Nigeria, & others
- UN-Global Geodetic Centre of Excellence (GGCE), Bonn, Germany
- University of Lagos, Lagos, Nigeria
- Centre for Geodesy and Geodynamics, Toro, Bauchi, Nigeria

Capacity Development Partnerships & Collaborations (cont..)

(d) Global and Continental/Regional Development Initiatives

AFRIGIST actively participates in:

- United Nations Global Geospatial Information Management (UN-GGIM) programmes;
- The Global Monitoring for Environment and Security (GMES) and Africa;
- The Bill and Melinda Gates Foundation supported projects;
- etc.





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Regional Advisory Roles/Support Services

- ❑ AFRIGIST provides /**geospatial mapping, land administration and specialised capacity building** consultancy and advisory/support services to:
 - government organisations, institutions, states/local governments and relevant geospatial stakeholders in Nigeria;
 - ministries, department and agencies/commissions in member countries in relevant areas of geodetic and geospatial needs (***mainly advisory/support services***)

- ❑ The Institute also offer:
 - ◇ Geodetic and GNSS training/support services for enhanced, integrated and sustainable implementation of the **AFREF programme**.
 - ◇ Specific **Spatial Data Infrastructure (SDI) support services** in the development of **country action & risk management plans** for SDI and Integrated Geospatial Information Framework (IGIF) implementations in Africa.
 - ◇ Consultancy services/Execution of mapping and related projects

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Regional Advisory Roles/Support Services (cont..)

(a) The AFREF Programme:

- △ The African Geodetic Reference Frame (AFREF) initiative was conceived/established since 1997 for the purpose of unifying the geodetic reference systems in Africa and be consistent and homogeneous with the ITRF.
- △ In 2007, a Leica GNSS CORS was installed in AFRIGIST (RECTAS) to support the initiative, and the Institute to serve as the Secretariat for West Africa (WAREF).
- △ The CORS established on AFRIGIST premises is currently not operational due to hardware (**Leica GRX System 1200 CORS**) and software outages, and related logistic/technical challenges



Leica GRX System 1200 PRO/CORS

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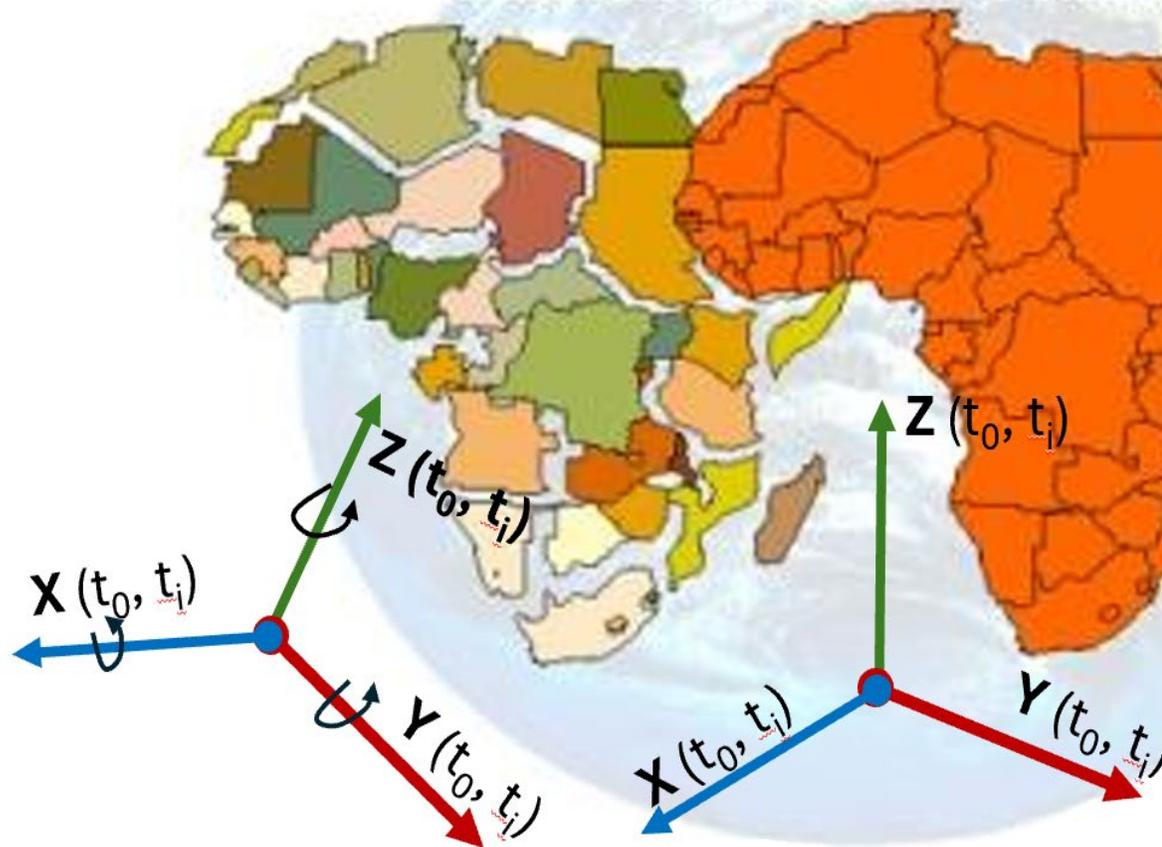


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Regional Advisory Roles/Support Services (cont..)

The AFREF Programme:

African Reference Frame



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Regional Advisory Roles/Support Services (cont..)

- ◇ *In 2016 the Ordnance Survey donated some units of GNSS CORS equipment through UNECA, to boost relevant capacity and support the sub-regional AFREF initiative (WAREF).*
- ◇ *Due to shipment/logistic challenges AFRIGIST received 20 units of the equipment in 2019 meant for the West African sub-region.*



12 No. of the 20 No. Leica GRX System 1200 PRO/CORS Antenna donated by the Ordnance Survey through UNECA

Regional Advisory Roles/Support Services (cont..)

(b) SDI Country Support Initiatives

- Efforts have been made in recent years to advance the development of integrated SDI implementation in Nigeria.

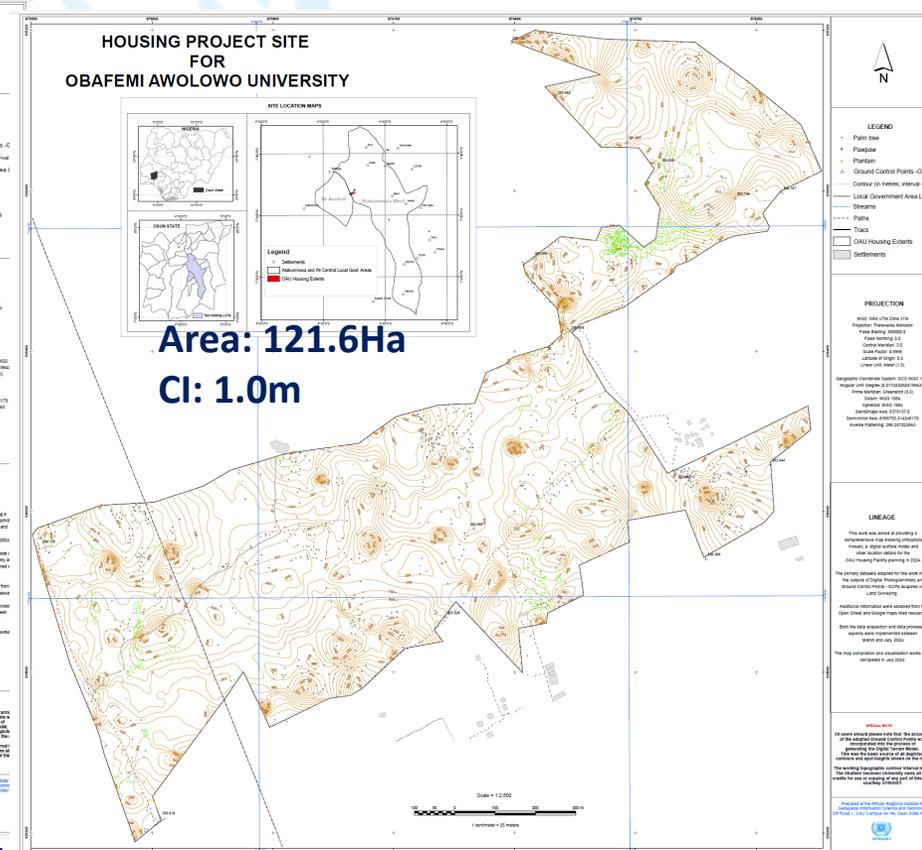
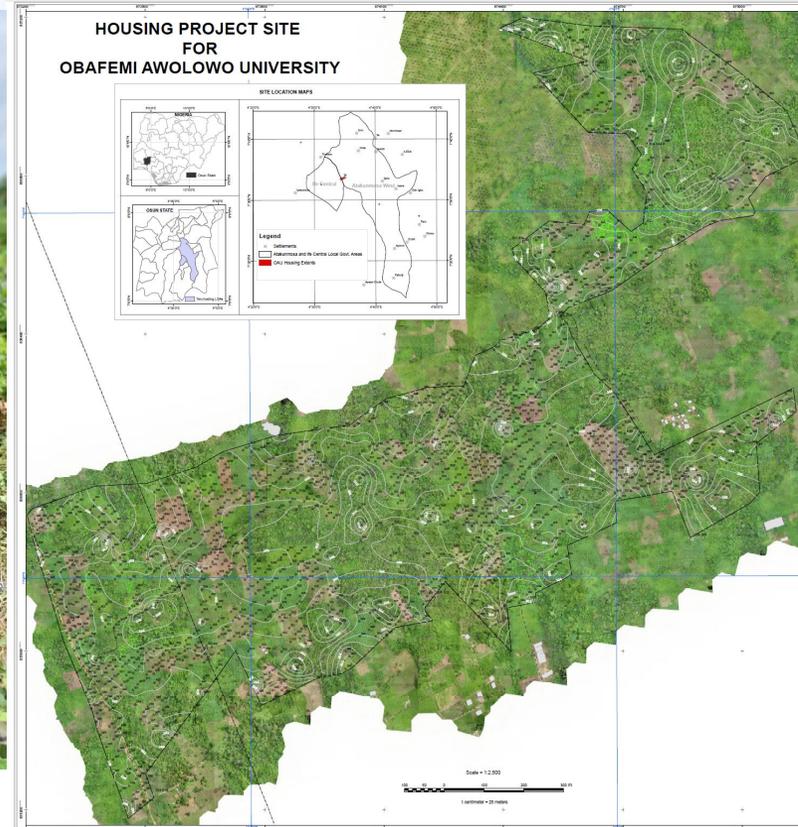
- In attempt to support the Mapping Agencies of AFRIGIST Member Countries (*Country SDI Focal Points*), the following strategies were initiated to advance SDI development in Nigeria (AFRIGIST's Host Country):
 - ***SWOT Analysis of SDI in Nigeria***
 - ***Appraisal of SDI Data Matrix for Nigeria***
 - ***Prepared a draft of the SDI (NGDI) Country Action Plan for Nigeria***

- The above initiatives are planned to be used as templates for supporting other AFRIGIST member countries (***Benin, Burkina Faso, Cameroon, Ghana, Mali, Niger & Senegal***).

Regional Advisory Roles/Support Services (cont..)



(c) Consultancy Services/Execution of Mapping and related projects OAU Staff Housing Project Topographic Survey and Mapping (GNSS/Drone Surveys)-2024



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New Capacity Development Agenda

- Establishment of **advanced geospatial data centre (AGDC)** for regional capacity building and e-learning, and *artificial intelligence/machine learning*.
- Digital equipping/upgrades of the laboratories and classes for enhanced trainings (teaching and learning) and research.
- Solar/renewable energy development for steady power supply.
- Training and retraining of staff for enhanced performance.
- Expansion of operational frontiers (International and local consultancies and collaborations).
- Appointment of high quality and competent academic and administrative personnel.
- Additional 60-room International Hostel, and campus roads infrastructure construction/maintenance

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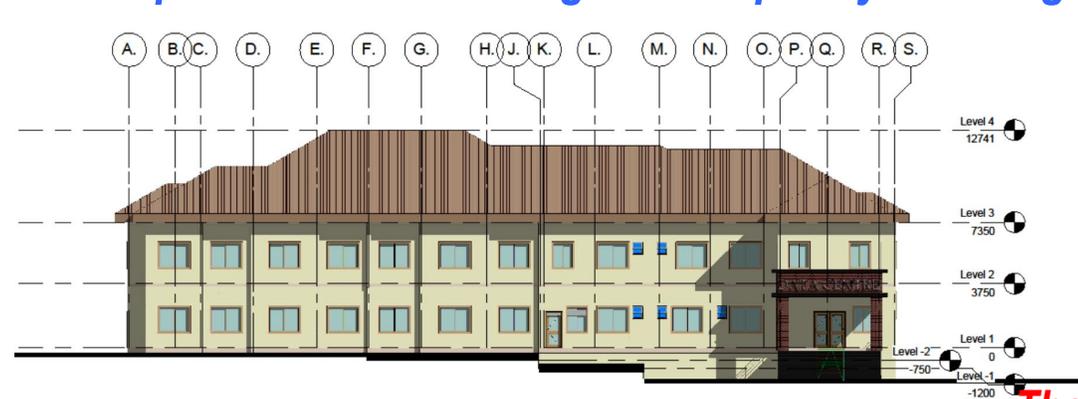
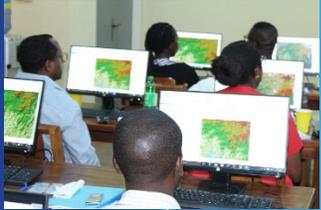
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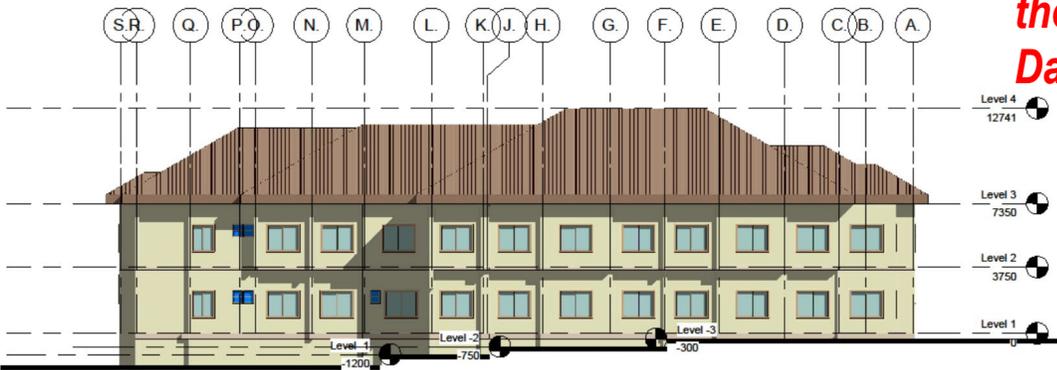
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New Capacity Development Agenda (cont..)

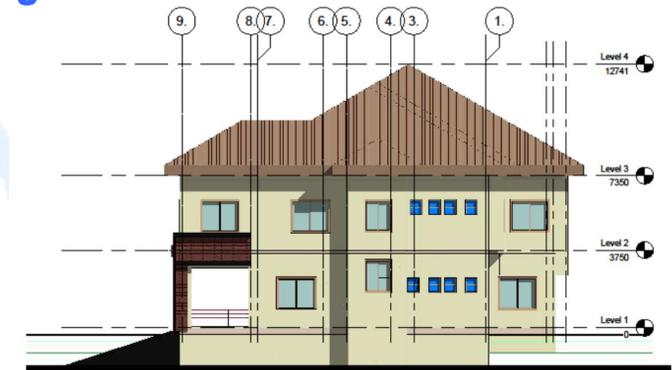
The Proposed AGDC for Regional Capacity Building and e-Learning/AI/ML



APPROACH ELEVATION



REAR ELEVATION



RIGHT SIDE ELEVATION



LEFT SIDE ELEVATION

The Proposed Building for the Advanced Geospatial Data Centre (AGDC)





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New Capacity Development Agenda (cont..)

The Proposed AGDC for (cont..)

Proposed Activities at the Centre:

- data acquisition, processing and storage;
- Training and capacity building in geospatial data science, AI/ML, including e-learning services.
- Building of databases and IT infrastructure development;
- Collaborative research & development, and decision support with member countries;
- Data sharing and communication, simulation for sustainable resource and socio-economic management value chain in Africa;
- Technical support on SDI and infrastructure resilience for stakeholders.



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New Capacity Development Agenda (cont..) **The Proposed AGDC for (cont..)**



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Concept of Server Rack/Array & Data Centre Setup



**Atecs All-in-one Inverter
Hybrid Solar Inverter (150kVA)**



**3x50kVA Boom
Solar System
Lithium Battery
(150kVA
Energy)**

**Planned 150KVA Power Bank:
Solar Inverters & Batteries (Required for AGDC)**

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New Capacity Development Agenda (cont..)

The Proposed AGDC for (cont..)



Automatic Weather Station



Pyranometer

Support Equipment at the AGDC



HydroBoat (SATLAB USV)



1 no. Trimble R750 CORS Antenna (Modular GNSS Receiver)

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Concluding Remark

- AFRIGIST,
 - plans to deploy emerging innovative approaches for capacity building and utilization in geospatial science and technology applications in order to enhance the quality and speed of trainings at the Institute;
 - welcomes more partnerships and collaborations for cost effective and collective geospatial capacity development and utilization efforts towards the sustainable socio-economic development of Africa.

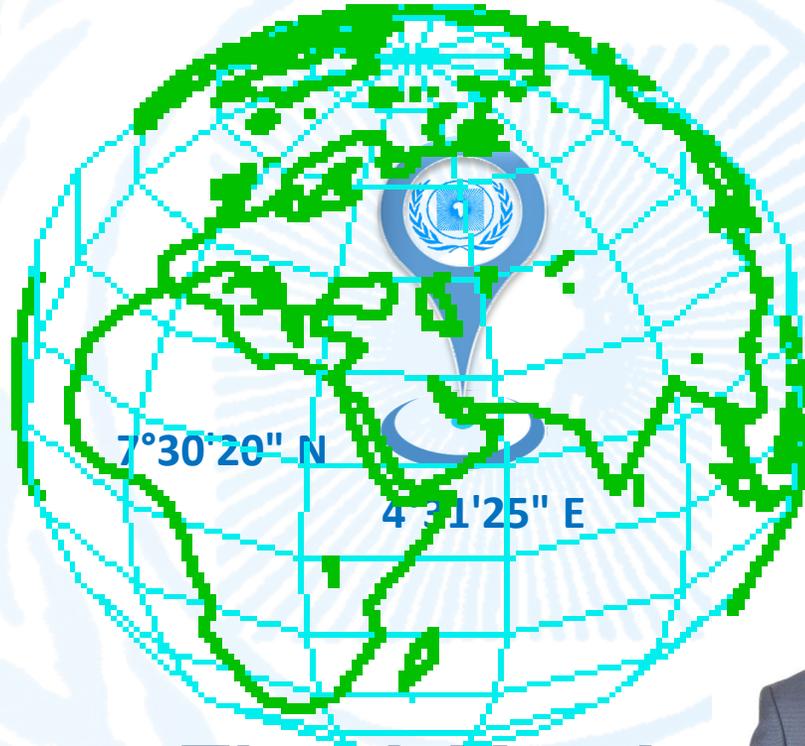
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***Thank You !
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