Affiliated to

UNITED NATIONS
Office for Outer Space Affairs

ARCSSTEE Capacity Building Programmes

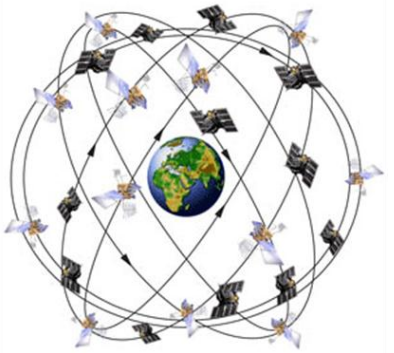
Nigeria

China

ARCSSTE-E Activities Update and the Joint Africa/Asia-Pacific UNOOSA-Regional Centres Collaborative Training Efforts on Global Navigation Satellite Systems [GNSS]

Ganiy I. Agbaje, PhD, fnis
Executive Director
ARCSSTE-E

gagbaje@arcsstee.org.ng



GNSS Constellation

UN- Committee on the Peaceful Uses of Outer Space
54th Session of the Scientific and Technical Subcommittee
30th January – 10th February 2017 Vienna, Austria

Affiliated to

UNITED NATIONS
Office for Outer Space Affairs

ARCSSTE-E
- Established 15 September 1998

AFRICAN REGIONAL CENTRE FOR SPACE SCIENCE & TECHNOLOGY EDUCATION
ARCSSTE-E
ENGLISH

ARCSSTE-E also serves as NASRDA's Centre for Space Science and Technology Education (CSSTE)

Affiliated to

UNITED NATIONS
Office for Outer Space Affairs

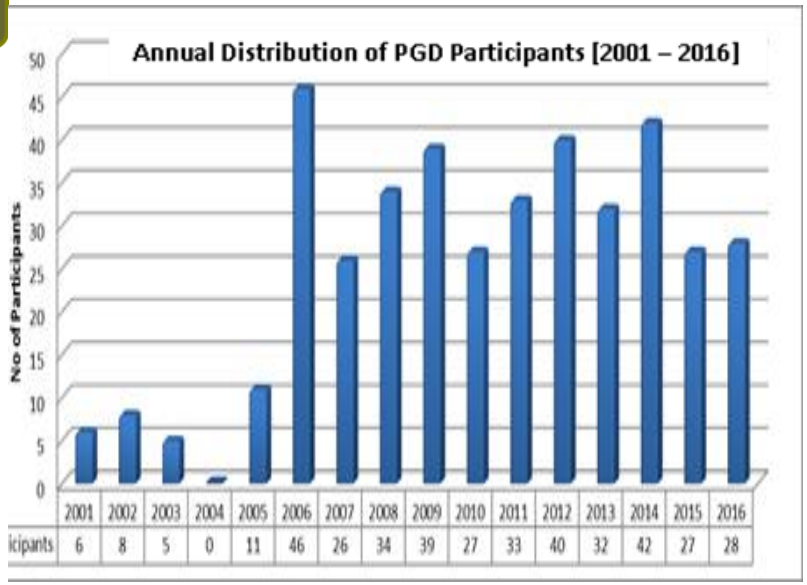
ARCSSTEE Capacity Building Programmes

ARCSSTE-E Core Activities

Post Graduate Diploma Programme

- **Duration**: 9-month Post-graduate Diploma Programme in five key areas of Space Science and Technology (SST) Education

- **International Participants** are offered full scholarship covering: - Tuition Fee, Accommodation, Medical Services, Travel Ticket, etc.



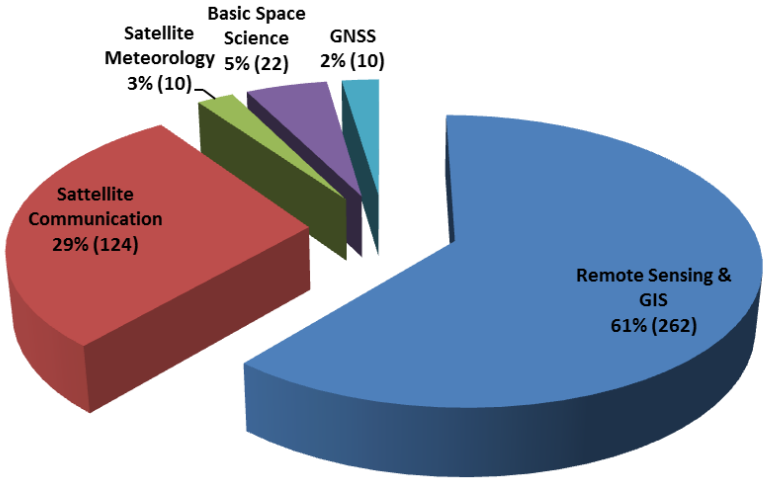
*** 17 of the 24 Countries have participated in the PGD Programme to date**

Botswana	2
Cameroon	33
Congo DRC	1
Ethiopia	4
Gambia	1
Ghana	9
Kenya	15
Liberia	12
Malawi	7
Nigeria	334
Sierra Leone	1
Sudan	15
South Africa	1
Tanzania	5
Uganda	11
Zambia	3
Zimbabwe	7
Total	473

Post Graduate Diploma Programme Contd.

ARCSSTEE Capacity Building Programmes

Distribution of PGD Participants by Course Options [2001-2016]




2016 Graduation Ceremony

- ARCSSTE-E Regional Biennial Alumni Conference

Affiliated to

UNITED NATIONS
Office for Outer Space Affairs

ARCSSTEE Capacity Building Programmes

ARCSSTE-E Core Activities II

AFRICAN REGIONAL CENTRE FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION - ENGLISH, O A U CAMPUS, ILE-IFE

&

THE FEDERAL UNIVERSITY OF TECHNOLOGY AKURE

- **Duration**: 18-month MTech. (SSTA) in five key areas of Space Science and Technology (SST) Education
- **Collaborating University:** Federal University of Technology, Akure (FUTA)

Commenced: 2013 with 18 Students
2014: 15 Students
2015: 20 Students
2016: 27 Students

MTech. (Space Science & Technology)

ARCSSTE-E Core Activities III

- Space Education Outreach Programme

The Founder/CEO of SLOOH addressing the participants during the 'Twinkle Twinkle Little Star' Workshop - 2015

UNITED NATIONS
Office for Outer Space Affairs

Human Space Technology Initiative (HSTI)

Zero-Gravity Instrument Project (ZGIP) promotes space education and research in microgravity.

http://www.unoosa.org/oosa/en/sapidx.html

The United Nations Office for Outer Space Affairs launched the ZGIP on 1 February 2013, and distributed the microgravity simulation instruments to qualified schools, universities, research centres and institutes

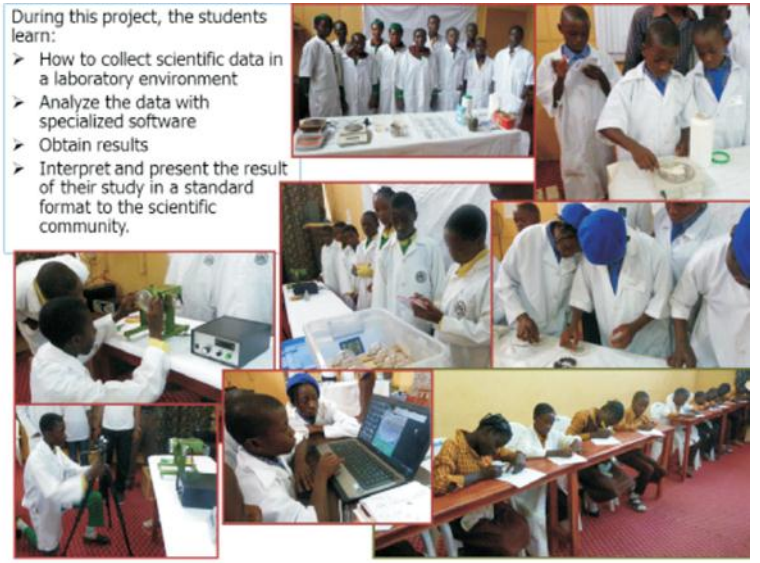
CLINOSTAT: A one-axis clinostat was selected for distribution because of the ease of use and potential scientific benefits.

ARCSSTE-E received, on a competitive basis, one of the 20 Clinostats distributed in 2013

ARCSSTE-E has developed Curricula for space science education in primary and secondary schools in Nigeria

During this project, the students learn:

- How to collect scientific data in a laboratory environment
- Analyze the data with specialized software
- Obtain results
- Interpret and present the result of their study in a standard format to the scientific community.



Affiliated to

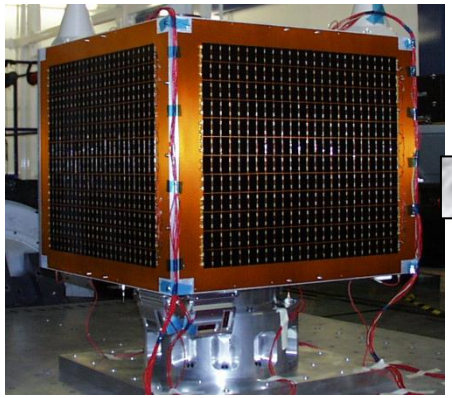
UNITED NATIONS
Office for Outer Space Affairs

ARCSSTEE Capacity Building Programmes

ARCSSTE-E's Permanent site

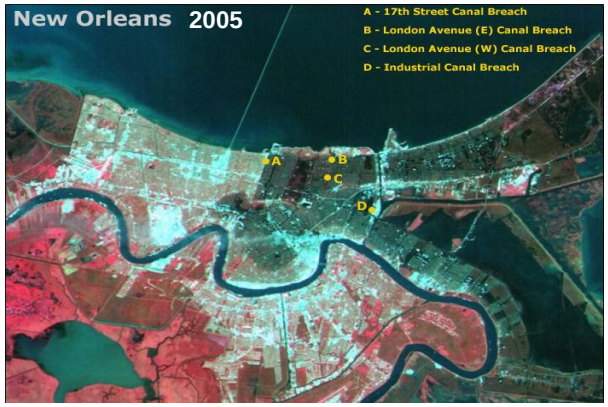
Affiliated to
UNITED NATIONS
Office for Outer Space Affairs

NIGERIA's EO Space Infrastructure Supporting ARCSSTEE Activities



32m

NIGERIASAT- 1



2.5m; 5m

NIGERIASAT- 2

22m

NIGERIASAT- X

International Collaborations

ARCSSTE-E Capacity Building Programmes

1. **GEO,** Geneva, Switzerland

   - Participating Organisation (PO) status

2. **International Committee on GNSS**, UN-OOSA, Vienna

3. **RCSSTEAP**, China

Planned Collaborations

- **EUMETSAT** on GEONetCast
  - establishment of - ongoing

- **China-Brazil Earth Resources Satellite (CBERS)**
  - Ground Receiving Station (educational)
- **ESRI Educational licensed products** e.g. ArcGIS

- **Samara State Aerospace University , Russia**

- **Others welcome!**

Affiliated to

UNITED NATIONS
Office for Outer Space Affairs

Joint Africa/Asia-Pacific UNOOSA-Regional Centres Collaborative Training Efforts on Global Navigation Satellite Systems [GNSS]

1 Background

2 Training Efforts

3 Challenges

1 Background

UNITED NATIONS
Office for Outer Space Affairs → **Recommendation**

Developing countries to seek partnership with other developing/developed countries to implement and oversee common programmes in space related science

ICG International Committee on Global Navigation Satellite Systems

… To promote the introduction and utilization of these [GNSS] services and their future enhancements, including in developing countries, through assistance, if necessary, with integration into their infrastructure (http://www.unoosa.org/oosa/en/ourwork/icg/icg.html)

UNOOSA/ARCSSTE-E 2011 GNSS Workshop

Build upon the experiences of the previous workshop on GNSS, supported by the United Nations Office for Outer Space Affairs, held at ARCSSTE-E, Ile-Ife, Nigeria in 2011

1 Background Contd.

In consonance with the foregoing -

- The United Nations African Regional Centre for Space Science and Technology Education (ARCSSTE-E) located in Nigeria, partnered with
- The United Nations Regional Centre in China (RCSSTEAP)

To develop human capacity in Global Navigation Satellite Systems [GNSS] for the African community.

- **ARCSSTE-E**, Nigeria is hosted by the **Obafemi Awolowo University**, Ile-Ife, Nigeria
- **RCSSTEAP**, China is hosted by **Beihang University**, China

2 Training Efforts

The Collaborative Training Efforts on GNSS between ARCSSTE-E, Nigeria and RCSSTEAP, China is dual fold:

- **Technical Staff Training in GNSS**
- **International Training Workshop on GNSS**

Technical Staff Training in GNSS

- RCSSTEAP, China offered full scholarship to Two (2) Technical staff of ARCSSTE-E for Masters Degree Program in GNSS at Beihang University, China in 2014

- Due to the brilliant performance of the two technical staff of ARCSSTE-E, and to further promote the collaboration between ARCSSTE-E and RCSSTEAP, they were admitted as Doctoral candidates in the Programme of Space Technology Application at Beihang University, China. The admission was supported with the full Chinese Government Scholarship, offered by the China Scholarship Council.

- In 2016 One (1) Master Scholarship each was further offered to the Centre in Space Law, and GNSS at Beihang University

Workshop Objectives

- To present updates on the status and plans for future developments of GNSS in Africa with particular reference to the Beidou Navigation Satellite Systems;
- To present the roles of Beidou in Augmentation Systems;
- To present GNSS technology and its applications
- To provide "hands on" experience on GNSS data to specific applications;
- To increase the knowledge and skills of professionals on the use of GNSS data; and
- To strengthen regional information and data exchange networks on the use of GNSS technology.

International Training Workshop on Global Navigation Satellite Systems

Opening Ceremony

- Workshop was declared opened by the representative of the Hon. Minister of Science and Technology, Dr Ogbonnaya Onuh with the presence of the representative of Ag. Vice Chancellor, Prof Anthony Elujoba of the Obafemi Awolowo University.

From Left to Right: Prof. Yang Dongkai; Dr. Ganiy Agbaje; Professor Weng Jingnong; The Representative of the Honorable Minister of Science and Technology, Dr. Halilu Shaba; the Representative of the Ag. Vice Chancellor of Obafemi Awolowo University, Professor Segun Fatusi; Prof. Yin Ping, Prof. Jide Kufoniyi

International Training Workshop on Global Navigation Satellite Systems

Workshop Participants

- 85 participants (15 females and 70 males) drawn from Seven countries including six African nations (Cameroon, Ghana, Kenya, Liberia, Nigeria and Sudan) and China.
- These participants were from the Federal, State and Local Government agencies and institutions; non-governmental organizations, and private industries; and Service Personnel (Air Force, Army and Navy).
- About 50% of the participants were students enrolled for the Graduate Programmes of ARCSSTE-E.

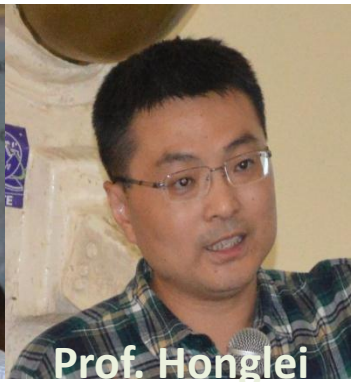
Technical Sessions

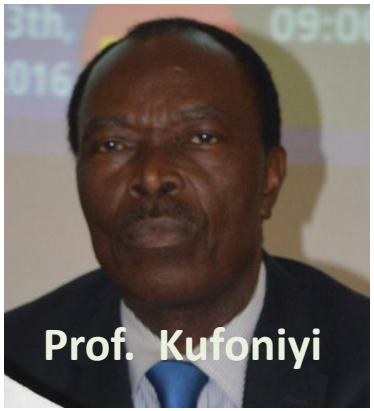
11 Sessions over five (5) days facilitated by Six (6) Chinese and five (5) Nigerian experts:

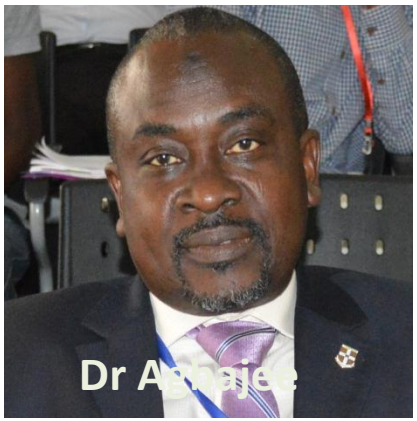
- **Prof. Wu Falin** - "GNSS Principle and High Precision Positioning"
- **Prof. Yang Dongkai** - "GNSS Reflection Applications"
- **Prof. Qin Honglei** - "GNSS Attitude Determination"
- **Prof. Yin Ping** - "GNSS Applications in Civil Aviation"
- **Prof. Wu Falin** - "GNSS Applications – Case Study"
- **Prof. Weng Jingnong** "International Space Education, Opportunities and Challenges"
- **Dr Ganiy Agbaje** – "ARCSSTEE Capacity Building Programme"
- **Dr. Muhammed Alkali** - "Nigerian Satellite Augmentation System"
- **Prof. Babatunde Rabiu** - "Status of Ground GNSS Infrastructure in Africa"
- **Surv. AbuduGaniyu Adebomehin** - "The State and Utilization of the Nigeria CORS Network"
- **Dr. Joseph Dodo** – "GNSS Applications in Nigeria"

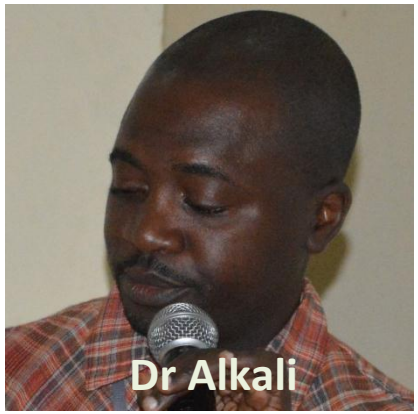
International Training Workshop on Global Navigation Satellite Systems

Technical Sessions - Facilitators









Recreational Activities

- Cocktail Reception and Gala Night

Workshop Evaluation – through Questionnaires

- All the participants found the Workshop informative and educative and would recommend the Programme to other people.
- Furthermore, 100% of the participants specified that the Workshop stimulated their interest in GNSS, and also improved their knowledge about GNSS
- Participants considered it to be very successful

The following concerns were expressed by the participants:

- Lack of Practical Sessions
- For future Workshops, the organizers are encouraged to seek partnership from national/international organizations to improve on the financial support for the programme.

3 Challenges

- Inadequate funding to Support the Practical Sessions
- Inability to enlist the participation of GNSS equipment vendors
- Need to Establishment of Ground Receiving Station facilities for teaching and research
- Need for Regional Institutions to collaborate in the delivery of E-Education
- Need for Collaboration in Research and Development and support for teaching facilities

3 Conclusion

- This Collaboration among the Regional Centres fulfilled one of the major goals of UNOOSA on capacity building through collaborations
- The Workshop was largely adjudged successful
- We hereby acknowledge the Chinese Government scholarship support under this collaboration.
- Collaboration from other organisations/institutions are welcome.

Affiliated to

UNITED NATIONS
Office for Outer Space Affairs

ARCSSTEE Capacity Building Programmes

Thank you

Ganiy I. Agbaje, PhD, fnis

gagbaje@arcsstee.org.ng
director@arcsstee.org.ng

www.arcsstee.org.ng