Nigerian GNSS Reference Network (NIGNET) Status Report

Presented by:

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Presented at: The International Seminar on Geodetic Reference Frame and Location Based Service, Nanning, China on 24th November 2015..
OUTLINE OF THE PRESENTATION

- Introduction
- Aims and Objectives
- Site Selection
- NIGNET Site Information
- Progress made in Areas of Research and Training
- Projects and Research work, using CORS
- Challenges emanating from Current NIGNET Status
- NIGNET Future Road Map
- CONCLUSION
INTRODUCTION

This presentation is on the current Status and some of the research work carried out since 2009 in the implementation of Nigerian GNSS Reference Network (NIGNET), in pursuant of the African Geodetic reference Frame (AFREF) project, by the Office of the Surveyor General of the Federation (OSGoF).
AIMS AND OBJECTIVES

- The aims and objectives of this presentation is to appraise the status of the NIGNET COR Station project in Nigeria since its inception.

- To present some of the efforts OSGoF has made in the sustenance of the project and some of the challenges being faced.

- In addition, to seek for collaboration and support from the International Community in the area of capacity building, as this would help us to meet up with several United Nation’s programmes geared towards sustainable development for developing countries.
PROBLEMS OF THE OLD SYSTEM

Consequences of using reference systems that are not consistent!
WHY NIIGNET/AFREF CORS?

Unify to achieve AFREF through ITRF
SITE SELECTION CRITERION USED

- Some of the criteria considered are as follows:
  - Monumenting, Mounting and Marking Antenna Reference Point were according to IGS Specifications.
  - Stability: a stable base site was considered.
  - Clear sky visibility and locations free from interferences due to Radio Frequency (RF) from other sources.
  - Ground based mounting were executed in accordance to the specifications for a ground based mounting.
  - For the roof-based monument, all the stations were built on buildings that are at least 5 years old.
### NIGNET SITE INFORMATION

- **OSGF**

**Abuja**

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### NIGNET SITE INFORMATION

- **CGGT**

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NIGNET SITES INFORMATION CONT...
NIGNET SITES INFORMATION CONT...
EFFORT MADE BY THE OSGOF

- The following trainings/Workshops were supported by OSGOF:
  - GNSS Base station installation and data processing in Regional Centre for Mapping of Resources for Development (RCMRD) Nairobi, Kenya.
  - Training on the use of Trimble Business Centre (TBC) Commercial software. Held in Abuja Nigeria.
  - In addition, few staff of the Office were sent for Masters Programme in relevant fields to enhance the management of the NIGNET Network.
The following Programmes were supported by OSGOF:

- **UN-ITALY**, Masters in Navigation and Related applications at Politecnico di Torino, Italy.

- Masters in Computer Science and Engineering, in the University of Beira Interior Covilha, Portugal.
PROJECTS AND RESEARCH WORKS USING NIGNET NETWORK

- The establishment of the National Geodetic Controls for the transformation parameter.

- Establishment of control network for the Cross River State Geographic Information System.

- Establishment of control network for the Plateau State Geographic Information System.

- On-going research work on the determination of Nigerian Geocentric Datum.

- On-going research work on the analysis of the stability of the NIGNET using Precise Point Positioning technique.
The establishment of the National Geodetic Controls for the transformation parameter
Analysis of the Stability of the NIGNET using Precise Point Positioning Technique
Deductions from the Analysis of the Stability of the NIGNET

- There is stability in the vertical movement.

- There is uniform movement in both North and East components: The movements as it can be seen from the figure above, been represented by a vector resolution is of the magnitude of 7cm.

- The Displacements of 7cm is in the same direction for all the stations and at 45 degrees, which is positive for all, and indicates uniform movements of the plates.
Deductions from the Analysis of the Stability of the NIGNET cont...

- From the uniform movement, it can be deduced that there is no any anomaly with any of the stations in terms of displacement.

- From the results it means there is a plate movement of around **2cm per year**, which seems to be in harmony with the Information obtained from: https://en.wikipedia.org/wiki/African_Plate
Investigation on the Accuracy of the Rover Positions Determined from the NIGNET CORS Network

![Chart showing discrepancies in Lat., Long. (sec) and Height (m) wrt. AUSPUS](chart)

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Challenges Emanating from the Current NIGNET Status

- Nigeria is a very big country in terms of land mass and in population, hence the present number of CORS are highly insufficient for implementation of several GNSS applications within the country.

- Data streaming from the remote stations to the data control Centre has been a serious issue due to non-availability of stable Internet communication services.

- The technical support will need to be more than it is at the moment looking at the prospects in the near future.
NIGNET Future Road map

- Developing a policy that mandates unification of Reference Frame based on NIGNET Network for the entire country that is consistent with AFREF and ITRF.

- Installation of at least four (4) new CORS Stations per annum.

Seeking collaboration and support from other developed countries and Stakeholders in GNSS in area of capacity building.

Creation of awareness for the end users especially the surveying and Mapping community.
CONCLUSION

- The Federal Government of Nigeria has embraced the GNSS Technology (especially its application in Surveying and Mapping).

- OSGoF is poised on developing a new reference frame for Nigeria that is consistent with AFREF and ITRF.

- We are open to collaboration with international stakeholders that can accelerate the realization of our mission.
THANK YOU