



**NOTICE OF
UNIVERSITY ORAL**
GEODESY AND GEOMATICS ENGINEERING

Master of Science in Engineering

Anthony Omeiza Mayaki

Monday, April 1st, 2019 @ 10:30 am
Head Hall – ADI Studio (Room HC-25)

Board of Examiners:

Supervisors: Marcelo Santos, Geodesy & Geomatics Eng.
Examining Board: Peter Dare, Geodesy & Geomatics Eng.
William Ward, Faculty of Science – Physics
Chair: Monica Wachowicz, Geodesy & Geomatics Eng.

**EVALUATION OF PRECISE POINT POSITIONING DERIVED ZENITH TOTAL
DELAYS FROM THE NIGERIAN GNSS REFERENCE NETWORK**

ABSTRACT

Zenith Total Delay (ZTD) from ground-based Global Navigational Satellite System (GNSS) observations are valuable information sources for studying the Earth's troposphere. Since almost all weather is formed in the troposphere, an analysis of a collection of ZTD time series can provide insight about the behavior of the weather of a place. Several institutions around the world involved in meteorological operations assimilate the ZTD from networks of GNSS continuously operating reference stations (CORS) into Numerical Weather Models (NWM) for better weather forecasting and now-casting. In Nigeria however, there are no operational GNSS networks used for meteorological purposes. The focus of this thesis is to determine the suitability of the Nigerian GNSS Reference Network (NIGNET) stations for meteorological applications by evaluating the ZTDs obtained from it through precise point positioning (PPP). PPP derived ZTDs from surrounding International GNSS Service (IGS) stations are also included for comparison. These PPP derived ZTDs, spanning from 2011 to 2016, are compared with ZTDs computed from the National Centre for Environmental Prediction reanalysis II (NCEP II) global NWM and from the IGS. A comprehensive time series analysis (least-squares spectral analysis) is performed to determine the spatio-temporal variations of the ZTDs of stations across Nigeria and to evaluate the level of agreement between the three (3) ZTD sources. The comparisons generally show good agreement between the 3 sources with the mean differences lower than 24.2 mm and root mean square errors lower than 45.8 mm. The spectral analyses reveal the various periodic oscillations in the ZTD and how they are influenced by pressure and temperature through the component hydrostatic and wet delays of the ZTD. This research contributes to the characterization of the nature of the troposphere over Nigeria and affirms the relevance of the NIGNET as a tool for meteorology in Nigeria.

Faculty Members and Graduate Students are invited to attend this presentation.