

Comparison of the Processing of GNSS Data using Fixed Ground Stations (Triangulation Stations) and the NIGNET: A Case Study of the South-South Zone of Nigeria

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SUMMARY

In Nigeria, prior to the introduction of continuously operating reference stations (CORS) most survey were tied to fixed ground stations or triangulation stations in fulfillment of the process of working from whole to part. These stations have coordinates derived on the local datum (Minna). In 2008, OSGOF (Office of the Surveyor General of the Federation), which is the National Mapping Agency of Nigeria, initiated a project to establish NIGNET (NIGERian GNSS Reference NETwork) This network, formed by state-of-the-art CORS (Continuously Operating Reference Stations) GNSS (Global Navigation Satellite Systems) equipments, intends to implement the new fiducial geodetic network of Nigeria. NIGNET will serve many different applications at national and continental levels. In fact, the first motivation to implement NIGNET was to contribute to the AFREF (African Reference Frame) project in line with the recommendation of the United Nation Economic commission of Africa (UNECA) through its Committee on Development, Information Science and Technology (CODIST). At national level, NIGNET will serve primarily as the fiducial network that will define and materialize a new reference frame based on space-geodetic techniques and linked to AFREF. Currently, NIGNET is formed by sixteen CORS stations covering the entire country. The selection of the locations was carried out considering different theoretical and practical criteria. This paper attempts to use the data obtained from recent GNSS campaign covering the entire South-south zone of Nigeria to do a comparison of processing by the traditional method of controlling survey using fixed ground stations and CORS, which network is referred to as the NIGNET. Of particular note is the fact that with the use of the Trimble Business Software local (Minna) and global (WGS84) values of the points were derived. The coordinates being Geodetic, both the ellipsoidal height (h) and the orthometric heights (H) were displayed. This gave an opportunity to determine the Geoid heights (N) for the stations ($N = [H-h]$). This paper attempts to do a comparison between the two computations using NIGNET data and Minna (local) data. Hence we shall look at the Global Geodetic values in Latitudes and Longitudes, ellipsoidal heights (h), orthometric heights (H) and the Geoid Heights (N).