

Modeling Atmospheric Correction for Global Navigation Satellite System Signal to Improve Urban Cadastre 3D Positional Accuracy Case of: TANA and ADIS IGS Stations

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Abstract : The name "TANA" is one of International Geodetic Service (IGS) Global Positioning System (GPS) station which is found in Bahir Dar University in Institute of Land Administration. The station name taken from one of big Lakes in Africa ,Lake Tana. The Institute of Land Administration (ILA) is part of Bahir Dar University, located in the capital of the Amhara National Regional State, Bahir Dar. The institute is the first of its kind in East Africa. The station is installed by cooperation of ILA and Sweden International Development Agency (SIDA) fund support. The Continues Operating Reference Station (CORS) is a network of stations that provide global satellite system navigation data to help three dimensional positioning, meteorology, space, weather, and geophysical applications throughout the globe. TANA station was as CORS since 2013 and sites are independently owned and operated by governments, research and education facilities and others. The data collected by the reference station is downloadable through Internet for post processing purpose by interested parties who carry out GNSS measurements and want to achieve a higher accuracy. We made a first observation on TANA, monitor stations on May 29th 2013. We used Leica 1200 receivers and AX1202GG antennas and made observations from 11:30 until 15:20 for about 3h 50minutes. Processing of data was done in an automatic post processing service CSRS-PPP by Natural Resources Canada (NRCan) . Post processing was done June 27th 2013 so precise ephemeris was used 30 days after observation. We found Latitude (ITRF08): 11 34 08.6573 (dms) / 0.008 (m), Longitude (ITRF08): 37 19 44.7811 (dms) / 0.018 (m) and Ellipsoidal Height (ITRF08): 1850.958 (m) / 0.037 (m). We were compared this result with GAMIT/GLOBK processed data and it was very closed and accurate. TANA station is one of the second IGS station for Ethiopia since 2015 up to now. It provides data for any civilian users, researchers, governmental and nongovernmental users. TANA station is installed with very advanced choke ring antenna and GR25 Leica receiver and also the site is very good for satellite accessibility. In order to test hydrostatic and wet zenith delay for positional data quality, we used GAMIT/GLOBK and we found that TANA station is the most accurate IGS station in East Africa. Due to lower tropospheric zenith and ionospheric delay, TANA and ADIS IGS stations has 2 and 1.9 meters 3D positional accuracy respectively.

Keywords : atmosphere, GNSS, neutral atmosphere, precipitable water vapour

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