Geoid Determination for Effective Integration of GPS-Derived Data into Ghana National Coordinate System

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SUMMARY

The use of GPS technology as a cost-effective tool for acquiring positional data is on the ascendancy in Ghana. However, GPS-derived coordinates are based on World Geodetic System 1984 (WGS84) reference ellipsoid while Ghana's National Coordinate System is a transverse Mercator projection based on the War Office Ellipsoid (1920). Therefore, to integrate GPS positional data into Ghana's National Coordinate System requires the computation of seven transformation parameters to convert GPS-derived Cartesian coordinates by translation, rotation, and scaling to Cartesian coordinates centred on Ghana's War Office ellipsoid. In order to compute accurate and reliable transformation parameters, this paper proposes the determination of a precise local geoid undulation with respect to the War Office ellipsoid as a pre-requisite that must first be modelled so that the much-needed geodetic heights with respect to the War Office ellipsoid, required for the computation of the transformation parameters, could be derived.

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