

To the soul of my mother

ABSTRACT

The atmosphere (ionosphere and troposphere) is the largest source of error in GPS positioning and navigation. The ionosphere is a dispersive medium with respect to the GPS radio signal and its effect on GPS observable causes a code delay and phase advances. The magnitude of these errors is affected by the local time of the day, season, solar cycle, geographical location of the receiver and earth magnetic field.

When using single frequency receivers the ionosphere becomes the main drawback for high accuracy positioning. For data collected during a period of minimum solar activity, dual frequency GPS receivers allow correction of the ionospheric refraction.

The effects of the ionosphere and the troposphere are investigated in point positioning and relative positioning modes using single frequency and dual frequency data. Two ionospheric and three tropospheric models represented by Leica Geo Office (LGO) software are implemented. Experiments were carried out during GPS observation sessions in central Sudan. Test data collected using dual frequency receivers, for different baselines of 4.5km, 8.62km, 12.2km, 30.4km, 181.6km, and 423.3km. It is found out that the effect of the atmospheric refractions depends also on the type of mode used (single point positioning or relative positioning), length of the baselines, the models and the parameters adopted.

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