

Offset of zenith tropospheric delays and tropospheric delay gradients in GEONET F3 solution

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According to 'A Correction Method to Artificial Displacements on GEONET Coordinate Time Series' (Iwashita et al., 2009), GEONET (GNSS Earth Observation Network System), the dense GPS observation network in Japan, they showed there are jumps (offset) of the coordinate value which arises by artificial factors, such as a maintenance of a GPS observation apparatuses.

Although similarly offset is seen in tropospheric delays, and according to 'Calibration of error in solutions of baselines observed with mixed GPS receiver types' (Ochi, and Hatanaka, 2010), the difference of horizontal direction between L1 solution and L2 solution is less than a few mm. However, there are the systematic errors in vertical direction, and they showed offset amounts especially vary bigger when the estimate of tropospheric delays. It was checked that it is the important cause by which a gap of a phase center and the difference in the phase pattern of an antenna produce offset by a simulation.

In this research, we show offsets not only the systematic errors of tropospheric delays originate in the different model antenna exchange but the same model antenna exchange, radome, mount adjustment, and also in other maintenances.

The amount of offset presumed the time series of the tropospheric delays contained in F3 solution by the least-squares method with seasonal variation and a long-term change.

Moreover, there are offsets in time series of tropospheric delay gradients estimated with the coordinate values and tropospheric delays in F3 solution.

We estimated offsets of tropospheric delays and tropospheric delay gradients and studied about their causes.

Keywords: offset, tropospheric delay, tropospheric delay gradient