

Evaluation of multipath and azimuth-dependent antenna phase center variation in GEONET

Tetsuya Iwabuchi[1], Shin'ichi Miyazaki[2]

[1] JSPS (MRI), [2] ERI

In GPS analysis, multipath is one of the biggest error sources to determine unknown variables with intervals less than one day. The error is site dependent because condition of environment around GPS antenna is different in each site. Also, it may be season and weather dependent due to changes of vegetation, satellite orbit, and permittivity in the surface of reflection sources with rainfall.

The antenna/monument phase center variation (PCV) is also one of the biggest error sources in GPS estimates. Because it depends on antenna/monument types, they can be removed if precise PCV model is given in GPS analysis. Thanks to Hatanaka et al. [2000]'s antenna/monument PCV model for GEONET, the elevation dependency of the PCV pattern have been pre-absorbed in GPS analysis. The next step is modeling the azimuth dependency of GEONET PCV pattern to get precise slant delay and kinematic coordinate solution. Also, some individual pattern of PCV would appear if antennas lean due to unstableness of ground or monument.

We thus study both multipath and azimuth-dependent antenna/monument PCV pattern for GEONET site using carrier phase residuals in GPS analysis. The dataset used is GEONET data from January to December, 1999. GIPSY-OASIS II software is used because the solution do not have correlation with those in other sites except global parameter errors. We stacked carrier phase residuals (post-fit residuals) for various period.

The stacking maps show antenna/monument type dependent pattern of azimuthal PCV. Some sites show significant multipath errors which have almost same pattern explained by simulation of multiupath [Iwabuchi et al., this sissue]. Those results suggest that evaluation of carrier phase residual in GPS observation and correction these biases are required in real-time millimeter-precision positioning and atmospheric sensing.

