

Technical development for expanding availability of GNSS precise positioning in urban environment

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Accuracy of GNSS positioning is easily degraded under severe conditions such as urban streets surroundings due to the blockage of the signals from GNSS satellites by tall buildings. Multipath effect, which is one of the causes of GNSS positioning accuracy degradation, is a known phenomenon that occurs in the urban area.

Geospatial Information Authority of Japan (GSI) has been developing new software-based techniques mitigating multipath effects in order to expand availability of GNSS precise positioning in urban environment.

By FY 2016, at first, we have selected some promising techniques from previous studies related to mitigating multipath effects. Secondly, we developed validation programs, then, we conducted GNSS observations for verification at the observation site and verified the multipath mitigation method under various observation conditions.

Consequently, two techniques using for selecting line-of-sight satellites with cutoff masks, “generated by fish-eye lens photos taken at observation stations” and “generated from 3D maps” , showed highly mitigating multipath effects. But the former needs some work other than GNSS observation, and the latter needs techniques to estimate initial coordinate value which is essential for using 3D maps.

In FY 2017, we developed techniques to estimate initial coordinate value, and verified how much accuracy it needed. In this presentation, we report the result of FY 2017.

Keywords: Multipath, GNSS, 3D maps