Development of New GEONET Analysis Strategy

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Geospatial Information Authority of Japan (GSI) has been operating CORS network involving over 1,300 GNSS stations, called GEONET (GNSS Earth Observation Network System), since 1996. Daily coordinates for each station are estimated by Bernese GNSS software to monitor the crustal deformation in Japan. The analysis strategy has been updated four times. Current version is called F3, which was established in 2009. We are now developing a new strategy (F4) because the software, reference frame, and other physical models used in F3 have been obsolete. Major topics of F4 development are (1) update of reference frame; (2) GPS and GLONASS integration; (3) improvement of the troposphere model; (4) improvement of the stability of the daily coordinate of the reference station (TSUKUBA-1) for analysis. We show the result of the F4 prototype developed in 2017.

F4 prototype estimates the station coordinates in two steps. Firstly, a coordinate of the reference station "TSUKUBA-1" is estimated based on ITRF2014 coordinates. Secondly, all other stations are estimated using GPS and GLONASS data respectively. As the result of this calculation, we obtain 3 types of F4 results, i.e. GPS, GLONASS, and GPS+GLONASS solutions. We found the GLONASS solutions show the apparent fluctuation with the period of 8 days that was not found on the GPS result. Therefore, we try to suppress the apparent fluctuation for combining GPS and GLONASS data by following procedure. Firstly, we eliminate tropospheric parameters from GLONASS normal equation. Secondly, Helmert transformation parameters between GPS and GLONASS solutions are estimated. Finally, normal equations for GPS and GLONASS are combined using the Helmert transformation parameters, and solved.
We will show primary results and discuss differences between F3 and F4.

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