[EJ] Evening Poster | S (Solid Earth Sciences) | S-GD Geodesy

[S-GD02]Geodesy General Contributions &Global Geodetic Observing System

convener:Koji Matsuo(Geospatial Information Authority of Japan), Yusuke Yokota(Japan Coast Guard, Hydrographic and oceanographic department), Takahiro Wakasugi(国土交通省国土地理院)
Wed. May 23, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
In this session, general contributions from all areas of geodesy are welcomed. Topics of interest will include but not limited to recent advances in measurement techniques, reference frame realization, earth rotation or earth tide. In addition, this session also provides a forum for discussing GGOS (Global Geodetic Observing System) related observation programs, advancements of geodetic techniques, collaboration among various organizations in the world. Topics will include improvements of observing system and data analysis, participations in global programs, global reference frames and geodesy's contributions to society.

[SGD02-P01]Research on the development of rapid and accurate GNSS routine analysis system (1)

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The Geospatial Information Authority of Japan (GSI) routinely analyzes GNSS data obtained by GEONET and monitoring crustal deformation all over Japan. When earthquake occurs, the results, such as crustal deformation data of main shock or postseismic movement and seismic fault models constructed using them, are provided to associated organizations and used to evaluate earthquake activity. Also, the crustal deformation data associated with volcanic activities are used as fundamental data for monitoring deformation of the mountain body and, when eruption occurred, monitoring eruptive activity.

However, depending on the timing of earthquake occurrence or speed of deformation of mountain body, even up-to-date GEONET routine analysis do not always have enough rapidness or time resolution. Therefore, new analysis method that is more rapid and with higher time resolution are required.

What we focused on is the GNSS analysis method called Precise Point Positioning (PPP). The principle of PPP is that using precise orbit and clock information of GNSS satellites, GNSS point positioning is performed on each station, resulting in the solution with much higher accuracy than usual point positioning. A key feature of PPP is that the accurate position of the stations in every epoch can be calculated with small calculation load. This means time series of position in high time resolution can be obtained rapidly. Moreover, adding corrective information called Fractional Cycle Bias (FCB) for each satellite, the ambiguity of carrier phase frequencies can be resolved in PPP analysis (called PPP-AR), which is more likely to obtain the accuracy almost same as GNSS interferometric analysis. In addition, PPP-AR does not need fixed reference station. That has advantage when crustal deformation occurs over wide area by large earthquake and it is difficult to find the point that is not subjected to the deformation.

Thus, GSI has started a three-year research project “Research on the development of rapid and accurate GNSS routine analysis system” since the April of 2017. In this project, we will develop more rapid and accurate GNSS analysis method based on PPP-AR and make prototype system implementing this method envisioning future GEONET routine analysis. The goal of this research is developing analysis method that can routinely and stably obtain the solution of one-second interval with typical repeatability of about

1cm in horizontal component within about two hours after data acquisition.
In 2017, we perform 30-day test analysis from end of July until end of August. In this analysis, for about 1300 GEONET station, 24-hour span time series data of position with 1 second interval is calculated twice a day. In this presentation, I will introduce the result of the statistics of respectabilities of time series solution, characteristics of outliers and so on.