Precision of Routine Solutions of the New GEONET System

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Three types of routine analyses are caried out in the new GEONET system: Final (F2), Rapid(R2) and Quick(Q2) analyses. F2 and R2 are run once per day with 24 hour session, and Q2 eight times per day with sliding 6 hour session by 3 hours. The IGS Ultra Rapid products (IGU ephemerides) are applied for R2 and Q2. In this prsentation, we evaluate the precision of these solutions based on results of test routine analyses.

To compare the precision of F2 solutions with the final solution of the previous system (F1), we evaluate the rms residuals of the baseline components after removing linear and seasonal trends for the solutions during 1996-1999. While there are little difference between the two solution sets for the baselines between stations within the same subnetwork, significant improvement of repeatability are observed for the baseline between stations which belong to different subnetwotk due to tha fact that the noise characteristics became common-mode for those baselines by abolition of sub-network division in the new system.

We evaluated the precision of Q2 solutions and compared it with that of F2 solutions using the solutions after November, 2003 when the post- seismic deformation of the 2003 Off-Tokachi earthquake become small. The rms residuals of linear fitting of Q2 baselines clearly depend on baseline length, while those of F2 solutions show only a little dependency on baseline length. This is probably due to errors in IGU orbit. The ratio rms(Q2)/rms(F2) is about 2 at the baseline length shorter than 200-300km. This value is comparable to that is expected from difference in amount of data, i.e. session length. In other word, if we take into acccount the difference of data quantity, the quality of Q2 solutions is no means inferior to that of F2 at distance less than 200-300km.

The above comparison of Q2 and F2 implies that weighted averages of Q2 solutions of 1 day will give a solution of the same quality as 24-hour solutions. By taking moving average of 24-hour time window, we can have such solutions every 3 hours, while 24-hour solutions are produced once per day in the current scheme. This proposed scheme is useful for quick monitoring of cruster deformation associated with sesmic events or volcanic activities as well as Q2 solutions.