

## **Development of PPP processing system of Japan and its evaluation by comparison with GEONET routine analysis system**

Basara Miyahara, Hiroyuki Nakagawa, Satoshi Abe, Hiroki Muramatsu,  
Hiroshi Munekane, Geospatial Information Authority of Japan

Precise Point Positioning (PPP) is outstanding technique for GNSS real-time processing as same as RTK positioning, which enables us to monitor crustal deformation in real-time. PPP is also extremely useful for variety of fields, not only for surveying but also for navigations including several emerging fields like autonomous ICT construction, vehicle driving, smart agriculture, etc. Geospatial Information Authority of Japan (GSI) has been developed accurate PPP processing system which can handle over 1,300 GNSS CORS's in Japan (GEONET) both in real-time and post processing. For monitoring crustal deformation in Japan, GSI has developed and operated GEONET post processing routine analysis by static relative positioning technique with BERNESE 5.2. The system has been operational for more than twenty years with a few major upgrades of analysis strategy and is already fundamental infrastructure utilized for providing accurate positions, monitoring earthquakes, volcanic activities, etc. However, we still have challenges on redundancy of the system. The system adopts hierarchal clustered network of GEONET stations and the whole network refers a single station as a fixed reference station. This means the network strongly depends on the single reference and the results will change in case of failure of the station. On the other hand, PPP can process each CORS data individually, and thus do not depend on reference station. GSI has developed PPP processing system as an alternative for the routine system for several years. Three different strategies, real-time, semi real-time and post processing has developed and the real-time and post processing systems are already under test operation. GSI has also developed prototype of semi real-time system, which enable us to provide accurate and prompt information on crustal deformation just after disasters. We will report the performance of the prototype through comparison with operational GEONET routine analysis system and the PPP post processing system.