Improvement of Real-time GEONET Analysis System for Rapid Deformation Monitoring, REGARD

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Geospatial Information Authority of Japan (GSI) has been operating a continuous GNSS observation network system since 1994. This system is known as GEONET (GNSS Earth Observation Network) and consists of approximately 1300 nationwide GNSS stations (GEONET stations) and the analysis center. Most stations collect GNSS data with 1-Hz sampling and transfer them to the analysis center in real time. Those data are available for surveying or research using real-time kinematic positioning technique. This technique is expected for describing cataclysmic earthquake from crustal displacement in short time especially after the 2011 off the Pacific Coast of Tohoku Earthquake in March 2011.
GSI and Tohoku University have developed the Real-time GEONET Analysis System for Rapid Deformation Monitoring (REGARD) since September 2011 to estimate moment magnitudes (Mw) soon after large earthquakes struck. This system consists of three subsystems. First subsystem does real-time kinematic positioning using RTKLIB (Takasu, 2013) and GSILIB (GSI, 2015). Second one detects seismogenic behavior using the RAPiD algorithm (Ohta et al., 2012) or the Earthquake Early Warning (Kamigaichi et al., 2009) and immediately run the third subsystem. This subsystem estimates Mw within three minutes using displacement vectors of GEONET stations (Kawamoto et al., 2014). Finally, results are mailed to persons involved.
Last year, we expanded its function of real-time kinematic positioning by using multi-GNSS and enhanced its redundancy by carrying out independent processing in parallel. We introduced three fixed points in Hokkaido, Hokuriku and Kyushu districts to monitor kinematic baseline solutions, respectively. We also improved the browser used in the agency to search for previous results and visually recognize results of the real-time kinematic positioning.
In this presentation, we report the overview and the current situation of REGARD, including the operational results.

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