GFZ prototype for GPS-based real time deformation monitoring

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Being one of the IGS pilot projects since October 2007, real time GPS forms a new milestone in GPS applications. Many GPS groups are working on real time data streaming. Presently, observations of about 100 globally distributed stations can be accessed in real time via different streaming clients, e.g. the BKG Ntrip Client (BNC). Using this real time data streaming technique, real time deformation monitoring can be realized, which is a very important contribution to natural hazards early warning systems.

To realize real time deformation monitoring in a global GPS network, Geo-ForschungsZentrum Potsdam (GFZ) works on the development of a new and auto-mated GPS/GNSS software system within the project "GPS - SurfacE Deformations withIn Seconds (G-SEIS)", which will allow real time data analysis and automatic-detection of surface deformations. The prototype software is able to receive various GPS data streams via the Ntrip technique and estimates satellite clocks, zenith tropo-spheric delays and station coordinates using the Square Root Information Filter (SRIF) algorithm and the Precise Point Positioning (PPP) technique.

To validate the performance of the prototype software for real time deformation mon-itoring of natural hazards, we developed a real time data processing procedure and applied it to GPS data obtained from global and regional networks during the M_w 9.2 Sumatra earthquake on December 26, 2004, and the M_w 7.7 Chile earthquake on November 14, 2007. Using this approach, real time satellite clocks with an RMS of around 0.1 ns compared to IGS Final clocks, zenith tropospheric delays with an av-

erage RMS of around 1 cm compared to GFZ Final results, and a precision of a few millimeters for kinematic station coordinates, can be determined.