Japan Geoscience Union Meeting 2010
(May 23-28 2010 at Makuhari, Chiba, Japan)

SGD001-10 Room: 201A Time: May 28 16:15-16:30

Development of the near real-time precipitable water vapor estimation system applying the analysis of GEONET data

Seiichi Shimada[1*], Shingo Shimizu[1], Atsushi Kato[1], Masayuki Maki[1]

[1]NIED

For the purpose of the study of the heavy rainfall forecasting in the Kanto District, in NIED the fine-mesh numerical weather model with 1 km grid (CReSS model) is running routinely since 200 6. In the CReSS model area are about 150 GEONET GPS network sites. In the CReSS model GPS precipitable water vapor (PWV) are not assimilated. Thus we develop the near real-time GPS PWV estimation system for the CReSS model to assimilate routinely the GEONET PWV.
GSI provides the RINEX GPS observation files every three hour with one hour delay after the last observation using ftp server. Thus it is possible to estimate the latest PWV data every three hour. However the usual analyzing procedure in NIED is not applicable because the procedure requires the IGS fiducial sites observations, and IGS provides every daily observation data only once per day. Therefore we adopt the GPS analyzing procedure fixing the coordinates of the GEONET sites of which PWV data are estimated to assimilate in the CReSS model in the near real-time manner. In the system there are three sub-systems; 1) The automated analyzing procedure that estimates the daily GEONET site coordinates solutions using the daily observation data of the GEONET and the IGS fiducial sites, and estimates the updated coordinates of the GEONET sites using the latest 30 days daily solutions of the GEONET site coordinates. 2) The automated analyzing procedure that estimates the near real-time GPS total zenith total delays (ZTD) of the GEONET sites in the CReSS model area every three hour fixing the GEONET sites coordinates obtained by the former sub-system. 3) The automated analyzing procedure which translates the GPS ZTD to PWV using the ground temperature and atmospheric pressure at the GEONET sites forecasting by the CReSS model. In this paper we introduce the former two sub-systems.
With about 17 hours delay IGS provides the rapid precise ephemeris. In the first sub-system, we adopt the IGS rapid orbits, and analyze automatically the daily GEONET observation data as well as about 20 IGS fiducial sites observation data in and around the eastern Asia and western Pacific region, applying GAMIT/GLOBK program. The procedure starts 3:00 AM (JST), about one hour after the release of the IGS rapid orbit, downloads the updated RINEX observation files of the GEONET sites in the CReSS model area from the GSI ftp server, estimates daily GEONET site coordinates, obtains the updated GEONET sites coordinates using the latest 30 days daily coordinates solutions. For the days when IGS final precise ephemeris is available, we re-analyze the data using the IGS final orbits, and the daily GEONET sites coordinates solutions are revised. All the procedure are finished within three hours, and the updated GEONET sites coordinates using the latest 30 days daily solutions are created before 6:00 AM (JST).
GSI uploads the latest RINEX observation files of the GEONET sites just one hour after the last observations every three hour (i.e. the data up to 0:00, 3:00, 6:00, 9:00, 12:00, 15:00, 18:00, 21:0 0) to the GSI ftp site. The near real-time GPS ZTD estimation procedure starts three minutes after every three hour on the hour (i.e. 1:03, 4:03, 7:03, 10:03, 13:03, 16:03, 19:03, 22:03), downloads the latest RINEX observation files of the GEONET sites in the CReSS model area from GSI ftp server, merges RINEX files of one site into one RINEX file that contains the latest 24 hour data, estimates every hourly ZTD of the GEONET sites using the 24 hour data applying the GAMIT program. The estimation finishes about 14 minutes after the starting of the procedure, thus the

latest ZTD are estimated within 80 minutes after the last observations every three hour.

Keywords: GPS precipitable water vapor, near real-time estimation, GEONET, Kanto district