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Quality assessment of near real-time GPS-based troposphere data in Poland since 2012

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The Institute of Geodesy and Geoinformatics of Wroclaw University of Environmental and Life Sciences (WUELS) established the near real-time service estimating the zenith troposphere delay (ZTD) from GPS data for GNSS stations belonging to the EUREF Permanent Network (EPN) and ASG-EUPOS network stations (total 120 stations) in Poland, since December 2012. ZTD product is updated hourly with interval of 30 minutes. Processing scheme was based on Bernese GPS Software v. 5.0 and a priori hydrostatic Saastamoinen model of troposphere delay with dry NIell mapping functions (MFs). The non-hydrostatic part was estimated using wet Niell MFs. Output troposphere data in COST-716 format have been continuously uploaded to the E-GVAP (The EUMETNET EIG GNSS water vapour programme) repository http://egvap.dmi.dk/ and visible as WUEL sub-network. Since September 2015 WUEL network was densified by the 139 Leica Geosystems Poland SmartNet stations and the processing engine was upgraded to utilize the latest Bernese GNSS Software v. 5.2. The a priori troposphere model was also changed to Saastamoinen with GMF MFs – dry for a priori hydrostatic delay and wet for estimated non-hydrostatic delay. In parallel there was established a database and the near real-time engine gathering the SYNOP and METAR data from the area covered by the WUEL network. The gathered meteorological parameters are spatially and temporarily interpolated and used to compute the near real-time Integrated Water Vapour (IWV) content over the GNSS stations.
Paper presents the hourly, daily and monthly quality assessment of ZTD and IWV since the beginning of WUEL service with respect to: EPN final ZTD product, ZTD derived from SYNOP, METAR and radiosonde data with different estimation and interpolation models. WUEL IWV data is validated with IWV derived from SYNOP, METAR data as well as with daily mean EUMETNET CM-SAF HTW (CM-122) product from the ATOVS instruments flying onboard the NOAA (-15 to -19) and Metop-A satellites. All comparisons indicate the good quality of WUEL data, qualifying it for meteorological purpose according to the EIG EUMETNET GNSS Water Vapour Programme (E-GVAP-II) Product Requirements Document.