



From GNSS and meteorological data to NRT 4D water vapour distribution - GNSS meteorology activities at WUELS

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The GNSS and Meteo group at Wroclaw University of Environmental and Life Sciences (WUELS), Poland is continuously working on GNSS meteorology since 2010. Currently group maintain real-time (RT) service collecting GNSS and meteorological data and near real-time (NRT) services for estimation of Zenith Troposphere Delay (ZTD), Zenith Hydrostatic Delay (ZHD), Integrated Water Vapour (IWV) and GNSS tomography over the territory of Poland.

Data are obtained with high resolution from EUREF Permanent Network (EPN) stations and Ground Base Augmentation System (GBAS) called ASG-EUPOS (www.asgeupos.pl). The GNSS data are available from 124 reference stations located in Poland and neighbour countries, with the average 70km distance between stations. The ground meteorological observations in the area of Poland and neighbour countries are available from: ASG-EUPOS stations included in EUREF Permanent Network (EPN), airport meteorological stations (METAR messages stations) and stations managed by national Institute of Meteorology and Water Management (SYNOP messages stations).

The first part of the paper presents the methodology of ASG-EUPOS GNSS data processing for NRT ZTD and ZTD horizontal gradients estimation in double-differenced mode (under Bernese GNSS Software V5.0) as well as new results from PPP mode (under Bernese GNSS Software V5.2) and their validation with respect to Rapid and Final troposphere products. The second part is describing the quality assessment of meteorological parameters interpolation methods for determination of ZHD at GNSS sites performed on GNSS stations equipped with meteorological sensors. The third part concerns on the comparisons of ZTD from GNSS data and meteorological parameters from SYNOP stations with data from COAMPS numerical weather prediction system (NWP) and IWV calculation. The fourth part presents the development of GNSS tomography model TOMO₂. The last part describes methods of above products validation and visualization over the area of Poland.

The GNSS and Meteo group at WUELS carries out research in the frame of COST Action ES1206 - Advanced Global Navigation Satellite Systems tropospheric products for monitoring severe weather events and climate (GNSS4SWEC) and Working Groups 4.3.2 Inter-comparison and cross-validation of tomography models and 4.3.3 Integration of GNSS atmosphere models with NWP models of Sub-Commission 4.3: Remote Sensing and Modelling of the Atmosphere in COMMISSION 4: Positioning and Applications of International Association of Geodesy.