



Atmospheric sensing by GNSS signal in GNSS&Meteo group investigations

Paweł Hordyniec, Witold Rohm, Jarosław Bosy, Tomasz Hadaś, Krzysztof Sośnica, Karina Wilgan, Jan Kaplon, Jan Sierny, and Kamil Kaźmierski

University of Environmental and Life Sciences, Institute of Geodesy and Geoinformatics, Wrocław, Poland
(pawel.hordyniec@igig.up.wroc.pl)

The study presents most up to date GNSS&Meteo working group activities of Wrocław University of Environmental and Life Sciences (WUELS) focused on both, positioning and meteorology aspects of GNSS signal applications. Satellite observations processed under Bernese GNSS Software v5.2 provide Zenith Total Delay together with its horizontal gradients in near-real time mode using double-differences. A GNSS-WARP software designed for Precise Point Positioning approach is capable to improve the accuracy and precision of “up” component even by 40% in severe weather conditions. However, recently updated to estimate real-time troposphere delay, the software can also derive ZTD with formal error of 2 mm achieved during experimental campaign. The information about water vapor content over GNSS sites is expressed by IWV parameter, directly from estimated wet delay. GNSS data combined with ground meteorological observations and radiosoundings serve as an input to integrated troposphere model to correct numerical weather prediction outputs. By using a ETH Zurich software package COMEDIE, it will be possible to determine refractivity profiles at arbitrary locations, together with other parameters. An effort put into development of tomography TOMO₂ model succeeded in identifying hazardous weather with a future potential to become a commercial product, now used within the frame of COST ES1206 Action. In ionosphere studies, we applied laser ranging to determine complementary data source to microwave observations. The space-based GNSS is also amongs interests of the working group as satellite signal excess phases are processed to derive radio occultation atmospheric products from COSMIC mission, with a emphasis on refractivity and bending angle profiles. The validation for meteorological profiles is routinely performed based on radiosonde reports at three Polish stations.