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Improvement of GPS Height Estimates by Integration of WVR Measurements

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Tropospheric delay still is one of the most delicate components in GPS positioning. Due to the strong correlation of troposphere and station height parameters, the latter can be deteriorated significantly if both are estimated simultaneously. Additionally, other error sources, which are not properly modelled in the estimation, are partly absorbed in tropospheric parameters. Examples are imperfect correction of antenna phase centre variations and multipath effects, which also influence the station height estimation to an unknown amount.

The first part of the presentation concentrates on the validation of a time series of GPS derived tropospheric delays from a regional permanent network solution for the site Oberschleißheim as well as for the fundamental station Wettzell. Validation studies are accomplished using about one year of water vapour radiometer (WVR) measurements obtained by Radiometrics WVR1100 instruments at each site. At the Radiosonde launch site of the German Weather Service DWD in Oberschleißheim additionally radiosonde results are used for the analyses. The co-location of the different techniques allows a long term comparison and accuracy assessment.

The second part of the presentation focuses on precise GPS height determination. In comparing different processing strategies for the GPS height estimation, the achievement of integrating WVR measurements in the GPS processing will be shown. Different a-priori information is applied, i.e. introduction of meteorological observations and WVR wet delays, and the results are compared to the common processing strategy which does not apply WVR or other additional data in general.