



GNSS-derived Tropospheric Products for Weather Forecast and Climate Research

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Aside from main geodetic applications, the Global Navigation Satellite System (GNSS) is now an established atmospheric observing system for water vapour with high spatiotemporal resolution. Water vapour is under-sampled in the current meteorological and climate-observing systems, so obtaining and exploiting more high-quality humidity observations is essential to weather forecasting and climate monitoring.

Operational GNSS data processing at GFZ provides all tropospheric products: zenith total delays (ZTD), precipitable water vapour (PWV), slant total delays (STD) and tropospheric gradients in the frameworks of different meteorological projects like E-GVAP ("The EUMETNET EIG GNSS Water Vapour Programme", <http://egvap.dmi>). E-GVAP is in charge of the collection and quality control of operational GNSS tropospheric products for numerical weather prediction. GFZ is one of the E-GVAP Analysis Centres and processes about 600 GNSS stations in near real-time. The tropospheric products provided by GFZ are used by European weather services for operational forecasts.

GFZ contributes to climate research within the Global Climate Observing System (GCOS) Reference Upper Air Network (GRUAN) with its expertise in processing of ground-based GNSS network data to generate precise PWV products. Since 2013, GFZ hosts a GRUAN central processing facility for the GNSS-PWV. GFZ is responsible for the installation of GNSS hardware, data transfer, processing and archiving, derivation of GNSS-PWV products according to GRUAN requirements including PWV uncertainty estimation. GNSS-PWV products and results of selected validation studies will be presented.