



GPS tomography utilising the German GPS network

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The GPS water vapour tomography is a new remote sensing technique which provides temporally and spatially resolved humidity information for all weather conditions. Such data are not only required by high resolution numerical weather models but also by many meteorological applications such as nowcasting, hazard mitigation or water management.

The results of the GPS tomography based on approx. 250 German GPS stations will be presented. The GFZ Potsdam analyses nearly 1 million GPS slant delays per day. Humidity fields reconstructed from these data will be shown with different spatial and temporal resolutions. The spatial resolution of the reconstructed humidity fields depends basically on the number of GPS satellites and GPS ground stations. The spatial coverage of the GPS data will therefore be discussed with respect to the satellite constellation, and the information content of the GPS data will be estimated prior to the tomographic reconstruction.

After a short description of the tomography system used at the GFZ the reconstructed fields will be validated with different independent data, e.g., analysis fields of a numerical weather model and radiosonde profiles.

The spatial coverage of the atmosphere depends considerably on the number of available GNSS satellites. The new Galileo system and the renewed GLONASS will therefore provide much more detailed GNSS data sets. The improvement expected due to the new satellites will be discussed using precise simulations of the satellite orbits and the corresponding slant delay data.