



GPS water vapour tomography for different weather situations

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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 GeoForschungsZentrum analyses operationally more than 200 German GPS stations delivering about 1 million of slant delays per day. These slant data provide valuable information about the atmospheric state and can be combined to a spatial representation of the water vapour distribution using tomographic techniques. The quality of the slant data and the reconstructed humidity fields as well depends on the weather situation.

Reconstructed humidity fields obtained for some typical weather situations will be presented. The horizontal and vertical humidity distribution will be discussed and compared with independent observations, such as the integrated water vapour (IWV) from GPS zenith path delay (ZPD) measurements, analyses of numerical weather models (COSMO-DE) and radiosonde profiles. The quality of the tomographic reconstructions will be estimated with respect to the atmospheric state, i. e. the total amount of humidity in the atmosphere, its gradients and the wind velocity. Some internal parameters of the tomography, e. g. the spatial and temporal resolution of the humidity field or the inter-voxel constraints, which affect the quality of the results will also be taken into account.