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Retrieval of water vapour slant delays from the German GPS network

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Precise knowledge about the distribution of the tropospheric water vapour in space and time is one precondition for the monitoring of climatic variations of the atmosphere as well as for precise numerical weather forecasts. GPS-based techniques for atmospheric remote sensing came up in the recent years and improved the data base for a precise monitoring of the temporal and spatial variations of water vapour.

One example is the operational monitoring of vertical integrated water vapour in near real-time demonstrated since 2000 using a GPS network of more than 200 sites in Germany with an accuracy of about +-1-2 mm.

We also retrieve the integrated amount of water vapour in the line of sight to each GPS satellite (slant IWV) from the German network (extended to about 280 sites). The results can be used as input for tomographic reconstructions of the tropospheric humidity but also for direct assimilation in numerical weather prediction models.

The results of water vapour slant delay estimation using the GFZ EPOS software are presented, including the analysis of multipath effects. The GPS-derived slant delays are validated using measurements of a water vapor radiometer.