



GPS-Tomography: Results and Analyses of the Operational Determination of Humidity Profiles over Switzerland

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GPS-tomography is a promising technique to determine the spatial water vapor distribution in the troposphere as well as its temporal variation. Several approaches have been realized so far. We developed the software package AWATOS (Atmospheric Water vapor TOMography Software) which is based on the assimilation of GPS double difference observations. Applying a least-squares adjustment, the inhomogeneous distribution of water vapor is determined.

The main limitation of the accuracy is given by the fact that the adjustment is partly ill-posed in the sense that only a part of the inhomogeneous water vapor distribution can be determined. Usually, geometric constraints and/or additional data, such as ground meteorological measurements are used to achieve a solution. Several short-term investigations and campaign analysis have been treated so far. Overall, the results demonstrate the feasibility of the method but also its limitation. The accuracy varies in the different investigations. Therefore, a long-term investigation will be pursued to analyze the quality of GPS-tomography in different weather situations.

In January 2006, we have set up an operational GPS-tomography procedure based on the permanent GPS network AGNES of swisstopo. 40 humidity profiles over Switzerland are determined in an hourly resolution. So far, a large data set of more than one year is now available for assessing its quality. In this presentation the comparisons with independent humidity observations from radiosondes and the Swiss NWP model analyses are shown. The accuracy and reliability in relation to the prevailing weather

situation as well as the ground meteorological parameters are assessed. Furthermore, different spatial and temporal resolutions of the water vapor retrieval are discussed.