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GPS atmosphere sounding: Validation of GPS integrated water vapour with microwave radiometer measurements

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Reliable and precise water vapour measurements are important for both, numerical weather prediction and climatological studies. Due to the high spatial and temporal variability of water vapour, the conventional observing systems (e.g., radiosondes or meteorological satellites) have to be complemented by new observation techniques in order to enable adequate water vapour monitoring. In this context, ground-based observations from the Global Positioning System (GPS) provide a valuable source of integrated water vapour (IWV) information in both, slant and vertical direction. Beside the standard zenith IWV product, slant IWV data from a dense German network (about 350 stations) are operationally processed at GFZ for application in water vapour tomography. For validation of these IWV data, GFZ started to operate a microwave radiometer in 2012 (HATPRO, Radiometer Physics GmbH) in vicinity of the Potsdam GPS station. It measures the absorption lines of atmospheric water vapour and oxygen at 14 frequency channels in the 22-58 GHz range and provides among others integrated water vapour measurements along the respective line of sight. In this study we present initial validation results of GPS zenith and slant IWV data with the collocated radiometer observations.