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Atmospheric water vapour trends in Switzerland based on data from ground-based microwave radiometry and GNSS ground stations

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Atmospheric water vapour plays a crucial role in the climate system. It is not only a strong greenhouse gas, but also affects many atmospheric processes such as the formation of clouds and precipitation. Analysing how atmospheric water vapour changes in time is therefore important to monitor ongoing climate change. We asses changes in integrated water vapour (IWV) over Bern, Switzerland by analysing data from a tropospheric water radiometer (TROWARA). We compared TROWARA data to data from surrounding ground stations of the Global Navigation Satellite System (GNSS) and identified a break point in the TROWARA time series in 2014. We determined IWV trends of around 20 years of data and considered the detected break point in the trend estimates. Trend differences depending on seasonal and diurnal cycle are also presented. Most datasets show positive IWV trends between 0 and 0.7 mm per decade, but the trends are generally not significantly different from zero at 95% confidence interval. Our results are consistent with the positive temperature–water vapour feedback in a warming climate. At the same time, the insignificance of the trends emphasizes the need to continue to measure water vapour, with the aim to obtain stable long-term time series and to better understand water vapour feedbacks in a changing climate.