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## Technical note: Water vapour concentration and flux measurements with PTR-MS

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**Abstract.** The most direct approach for measuring the exchange of biogenic volatile organic compounds between terrestrial ecosystems and the atmosphere is the eddy covariance technique. It has been applied several times in the last few years using fast response proton-transfer-reaction mass spectrometry (PTR-MS). We present an independent validation of this technique by applying it to measure the water vapour flux in comparison to a common reference system comprising an infra-red gas analyser (IRGA). Water vapour was detected in the PTR-MS at mass 37 (atomic mass units) corresponding to the cluster ion  $\text{H}_3\text{O}^+\cdot\text{H}_2\text{O}$ . During a five-week field campaign at a grassland site, we obtained a non-linear but stable calibration function between the mass 37 signal and the reference water vapour concentration. With a correction of the high-frequency damping loss based on empirical ogive analysis, the eddy covariance water vapour flux obtained with the PTR-MS showed a very good agreement with the flux of the reference system. The application of the empirical ogive method for high-frequency correction led to significantly better results than using a correction based on theoretical spectral transfer functions. This finding is attributed to adsorption effects on the tube walls that are presently not included in the theoretical correction approach. The proposed high-frequency correction method can also be used for other trace gases with different adsorption characteristics.

[Final Revised Paper](#) (PDF, 537 KB) [Discussion Paper](#) (ACPD)

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