



Evaluation of 4 years of continuous $\delta^{13}\text{CH}_4$ measurements in Heidelberg, Germany

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Between the years 2014 and 2018, a Cavity Ring-Down Spectroscopy (CRDS) G2201-i analyser has been used to continuously measure CH_4 and its $^{13}\text{C}/^{12}\text{C}$ ratio in ambient air in Heidelberg, South-West Germany. Different methods such as individual peak selection or moving Keeling/Miller Tans methods has been used to calculate the isotopic source signature ($\delta^{13}\text{CH}_4$) in ambient air. In addition, limits based on the number of data points, the height of the methane peak and the fit error were imposed on the data to ensure precise results. The isotopic methane source signature of the air in Heidelberg was found to be between -75‰ and -35‰ , with an average of $(-53.7 \pm 2.6)\text{‰}$. This result agreed well with the source signature estimated using emission estimates of the Heidelberg and Rhein-Neckar-Kreis area ($\delta^{13}\text{CH}_4 = (-54.0 \pm 1.1)\text{‰}$). The source signature was largely influenced by a mixture of both biogenic (e.g. dairy farms, biogas plants) and thermogenic methane (e.g. natural gas leakages), but biogenic methane was seen to have a larger influence.