



## High temporal resolution measurements of the isotopic composition of CH<sub>4</sub> at the Lutjewad station, The Netherlands

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Isotope measurements can help constraining the atmospheric budget of the greenhouse gas methane (CH<sub>4</sub>) because different sources emit CH<sub>4</sub> with slightly different isotopic composition. In the past, high precision isotope measurements have primarily been carried out by isotope ratio mass spectrometry on flask samples that are usually collected at relatively low temporal resolution. We have recently developed a fully automated gas chromatography - isotope ratio mass spectrometry system (GC-IRMS) for autonomous and unattended CH<sub>4</sub> isotope measurements ( $\delta$ D and  $\delta^{13}$ C) in the field. The first deployment at the Cabauw Experimental Site for Atmospheric Research (CESAR) indicated that CH<sub>4</sub> emissions from fossil fuel sources are overestimated in this region [1]. To further exploit the potential of this approach, the in situ system has been installed in November 2016 at the Lutjewad atmospheric monitoring and sampling site in the North of the Netherlands. This site is expected to sample also emissions from the large Groningen gas fields. The isotope measurements are expected to allow distinguishing these emissions from the agricultural emissions, which are also strong in this region. We will present the results from these ongoing measurements of  $\delta$ D and  $\delta^{13}$ C in CH<sub>4</sub>.

1. Röckmann, T., et al., In situ observations of the isotopic composition of methane at the Cabauw tall tower site, *Atmos. Chem. Phys.*, 2016. **16**: 10469-10487.