

Evaluation of methane sources by isotopic analysis in central London

Giulia Zazzeri¹, David Lowry², R.E. Fisher², M. Lanoisellé², E.G. Nisbet² and H. D. Graven¹

¹ Imperial College London, London SW7 2AZ

² Royal Holloway University of London, Egham Hill, Egham, Surrey TW20 0EX 6

Identifying urban methane sources in urban environments such as London and estimating their relative importance is necessary to accomplish methane reduction targets, but still an unresolved issue. High precision stable isotope analysis of atmospheric methane has been used to provide a better understanding of urban sources and demonstrate how relative proportions by source type of methane emissions, given by national inventories (NAEI), are not well constrained (Zazzeri et al., 2017).

A Picarro G2301 analyser was installed on the roof of King's College London (KCL), located in the city centre, and connected to an air inlet located 7 metres above roof height. An auto-sampler was connected to the same air inlet and launched remotely when a high nocturnal build up was expected, allowing up to twenty air bags to be collected for methane isotopic analysis over a 24 hour period.

High precision isotopic measurements enabled assessment of the isotopic signal of the source mix in central London (Zazzeri et al., 2017). However, a continuous isotopic record would definitely provide insight into the interpretation of methane emissions and their seasonal trend. A Picarro G2201 analyser for CH₄ and CO₂ mole fractions and isotopic ratios measurements, has been installed at the Physics Department of Imperial College London, with an air inlet located on the departmental roof at ~24 metres height.

The isotopic signature of the source mix measured at KCL was -45.7 ± 0.5 ‰, a value that confirmed the primacy of fossil methane emissions in the overall methane budget in central London. The new measurements carried out at Imperial College will be compared with the KCL record, allowing further investigation of urban methane sources.

References

National Atmospheric Emissions Inventory (NAEI), <http://naei.defra.gov.uk/>

Zazzeri G. et al., Evaluating methane inventories by isotopic analysis in the London region. Scientific Reports (2017) (Accepted Preprint)