Geophysical Research Abstracts
Vol. 21, EGU2019-14139, 2019
EGU General Assembly 2019

Using multiple tracers to identify sources of atmospheric methane during baseline surveying prior to unconventional gas recovery.

James L. France (1,2), Rebecca Fisher (1), Dave Lowry (1), Euan Nisbet (1), Max Coleman (1), Bryce Kelly (3), Xinyi Lu (3), Stephen Harris (3), Charlotte Iverach (3), Safdar Bashir (3,5), Elisa Ginty (3), Mathias Lanoiselle (1), and Giulia Zazzeri (4)

(1) Royal Holloway, University of London, Egham Hill, Egham, Surrey TW20 0EX, United Kingdom , (2) British Antarctic Survey, High Cross, Madingley Rd, Cambridge CB3 0ET, (3) School of Biological, Earth and Environmental Sciences, UNSW Sydney, 2052, NSW, Australia , (4) Imperial College, Kensington, London SW7 2AZ, (5) University of Agriculture, Agriculture University Road, Faisalabad, Pakistan.

Baseline surveys provide essential information to ascertain the “a priori” conditions before major exploration (or other works) which could result in a significant release of methane to the atmosphere. However, it is not often as easy as simply measuring the methane mixing ratios downwind of a prospective site as many sources of methane may be contributing to the local atmospheric mix. We need to find a way of being able to definitively co-locate elevated methane to sources during the baseline survey so that any post exploration increases can be correctly attributed. Multiple campaigns have been undertaken around the UK and Australia in order to ascertain baseline atmospheric methane prior to and in the early stages of unconventional gas exploration and production.

Work in Northern England has focused on two sites, near to Blackpool which has subsequently become an active shale gas fracking site, and the Vale of Pickering which is still at the site preparation stage. The Australian component is centred on the Surat Basin, Queensland. All three sites pose an interesting mix of methane sources, with influences ranging from agriculture, coal mines, landfill and gas infrastructure leaks. Here, we demonstrate the value in using mobile surveys along with ethane:methane ratios, $\delta^{13}C_{CH4}$ or both to allow source identification, and also consider whether the addition of δD_{CH4} is also necessary in certain circumstances. Complexity is increased where there are overlapping plumes.

For baseline surveys to be useful in determining the impact of later emissions, they must be able to differentiate between both surveyed sources and the potential future sources of methane, as well as being thorough enough to identify current fugitive emissions. Variability of meteorological conditions can cause significant changes to where emissions can be sampled and we investigate whether a single survey can accurately capture all the major influencing sources of methane for a region?