Geophysical Research Abstracts
Vol. 16, EGU2014-7294, 2014
EGU General Assembly 2014

Volatile organic compound fluxes and concentrations in London (ClearfLo)

Amy Valach (1), Ben Langford (2), Eiko Nemitz (2), Rob MacKenzie (3), and Nick Hewitt (1)

(1) Lancaster Environment Centre, Lancaster University, Lancaster, LA1 4YQ, UK (a.valach@lancaster.ac.uk), (2) Centre for Ecology & Hydrology, Bush Estate, Penicuik, Midlothian, EH26 0QB, UK (benngf@ceh.ac.uk), (3) School of Geography, Earth and Environmental Sciences, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK (a.r.mackenzie@bham.ac.uk)

Volatile organic compounds (VOCs) from anthropogenic sources such as fuel combustion or evaporative emissions can directly and indirectly affect human health. Some VOCs, such as benzene and 1,3- butadiene are carcinogens. These and other VOCs contribute to the formation of ozone (O_3) and aerosol particles, which have effects on human health and the radiative balance of the atmosphere. Although in the UK VOC emissions are subject to control under European Commission Directive 2008/50/EC and emission reducing technologies have been implemented, urban air pollution remains a concern. Urban air quality is likely to remain a priority since currently >50% of the global population live in urban areas with trends in urbanization and population migration predicted to increase.

The ClearfLo project is a large multi-institutional consortium funded by the UK Natural Environment Research Council (NERC) and provides integrated measurements of meteorology, gas phase and particulate composition of the atmosphere over London. Both long term and IOP measurements were made at street and elevated locations at a range of sites across London and its surroundings during 2011 and 2012.

Mixing ratios of a selection of nine VOCs were measured using a high sensitivity proton transfer reaction-mass spectrometer (PTR-MS) at a ground level urban background (North Kensington) and kerbside (Marylebone Road) site during the winter IOP. VOC fluxes were measured by virtually disjunct eddy covariance (vDEC) at an elevated urban site (King's College Strand) in Aug-Dec 2012. Our results for the first IOP showed that most of the selected compound concentrations depended on traffic emissions, although there was a marked difference between the urban background and kerbside sites. We identified some temperature effects on VOC concentrations. We also present the first analyses of VOC flux measurements over London. Preliminary analyses indicate most compounds associated with vehicle emissions closely followed diurnal traffic counts. Fluxes of isoprene and methanol appear to be controlled by light intensity and temperature, consistent with a predominantly biogenic source of these compounds.