



Sources and contributions of wood smoke during winter in London

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Determining the contribution of wood smoke in large urban centres such as London is becoming increasingly important with the changing nature of domestic heating partly due to the installation of biomass burning heaters to meet renewable energy targets imposed by the EU and also a rise in so-called recreational burning for aesthetic reasons (Fuller et al., 2013). Recent work in large urban centres (London, Paris and Berlin) has demonstrated an increase in the contribution of wood smoke to ambient particles during winter that can at times exceed traffic emissions. In Europe, biomass burning has been identified as a major cause of exceedances of European air quality limits during winter (Fuller et al., 2013). In light of the changing nature of emissions in urban areas there is a need for on-going measurements to assess the impact of biomass burning in cities like London. Therefore we aimed to determine quantitatively the contribution of biomass burning in London and surrounding rural areas. We also aimed to determine whether local emissions or regional sources were the main source of biomass burning in London.

Sources of wood smoke during winter in London were investigated at an urban background site (North Kensington) and two surrounding rural sites (Harwell and Detling) by analysing selected wood smoke chemical tracers. Concentrations of levoglucosan, elemental carbon (EC), organic carbon (OC) and K^+ were generally well correlated, indicating a similar source of these species at the three sites. Based on the conversion factor for levoglucosan, mean wood smoke mass at Detling, North Kensington and Harwell was 0.78, 0.87 and $1.0 \mu\text{g m}^{-3}$, respectively. At all the sites, biomass burning was found to be a source of OC and EC, with the largest source of OC and EC found to be secondary organic aerosols and traffic emissions, respectively. Peaks in levoglucosan concentrations at the sites were observed to coincide with low ambient temperature, suggesting domestic heating as a contributing source in London. Overall, the source of biomass burning in London was likely a background regional source from mainland Europe overlaid by high contributions from local domestic burning emissions. This could have implications when considering future control strategies during winter.

References

Fuller, G.W., Sciare, J., Lutz, M., Moukhtar, S., Wagener, S., 2013. New Directions: Time to tackle urban wood burning? *Atmospheric Environment* 68, 295-296.