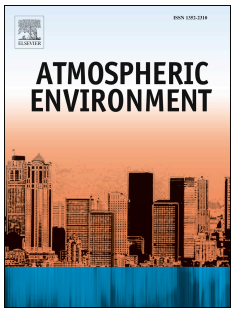
Accepted Manuscript



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PII: S1352-2310(18)30624-1

DOI: 10.1016/j.atmosenv.2018.09.030

Reference: AEA 16263

To appear in: *Atmospheric Environment*

Received Date: 1 February 2018

Revised Date: 12 September 2018

Accepted Date: 17 September 2018

Please cite this article as: Popoola, O., Carruthers, D., Lad, C., Bright, V., Mead, I., Stettler, M., Saffell, J., Jones, R., Use of networks of low cost air quality sensors to quantify air quality in urban settings, *Atmospheric Environment* (2018), doi: https://doi.org/10.1016/j.atmosenv.2018.09.030.

Use of networks of low cost air quality sensors to quantify air quality in urban settings

Olalekan Popoola[a], David Carruthers[b], Chetan Lad[b], Vivien Bright[a], Iqbal Mead[a], Marc Stettler[c], John Saffell[d], and Roderic Jones[a]

[a]Department of Chemistry, University of Cambridge, Lensfield Road, Cambridge, CB2 1EW, UK
[b]Cambridge Environmental Research Consultants Ltd, 3 Kings Parade, Cambridge, CB2 1SJ, UK
[c]Faculty of Engineering, Department of Civil and Environmental Engineering, 614 Skempton Building, South Kensington Campus, Imperial College London, London, SW7 2AZ, UK.
[d]Alphasense Ltd., Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley, Essex, CM77 7AA, UK.

Abstract

Low cost sensors are becoming increasingly available for studying urban air quality. Here we show how such sensors, deployed as a network, provide unprecedented insights into the patterns of pollutant emissions, in this case at London Heathrow Airport (LHR). Measurements from the sensor network were used to unequivocally distinguish airport emissions from long range transport, and then to infer emission indices from the various airport activities. These were used to constrain an air quality model (ADMS-Airport), creating a powerful predictive tool for modelling pollutant concentrations. For nitrogen dioxide (NO_2), the results show that the non-airport component is the dominant fraction (~75%) of annual NO_2 around the airport and that despite a predicted increase in airport related NO_2 with an additional runway, improvements in road traffic fleet emissions are likely to more than offset this increase. This work focusses on London Heathrow Airport, but the sensor network approach we demonstrate has general applicability for a wide range of environmental monitoring studies and air pollution interventions.

Highlights

- Network of low cost sensors for high spatio-temporal pollution measurements at LHR.
- Unprecedented source apportionment information at LHR, including emission factors.
- Show that majority of the local pollution was not from airport activities.
- Network data used to constrain an air quality model.
- Using the refined model prediction to show future impacts of developments at LHR.