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Olalekan Popoola, David Carruthers, Chetan Lad, Vivien Bright, Iqbal Mead, Marc Stettler, John Saffell, Roderic Jones



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1 Use of networks of low cost air quality sensors to quantify air 2 quality in urban settings

3 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

4 ^aDepartment of Chemistry, University of Cambridge, Lensfield Road, Cambridge, CB2 1EW, UK

5 ^bCambridge Environmental Research Consultants Ltd, 3 Kings Parade, Cambridge, CB2 1SJ, UK

6 ^cFaculty of Engineering, Department of Civil and Environmental Engineering, 614 Skempton Building, South Kensington Campus, Imperial
7 College London, London, SW7 2AZ, UK.

8 ^dAlphasense Ltd., Sensor Technology House, 300 Avenue West, Skyline 120, Great Notley, Essex, CM77 7AA, UK.

9

10 Abstract

11 Low cost sensors are becoming increasingly available for studying urban air quality. Here we
12 show how such sensors, deployed as a network, provide unprecedented insights into the
13 patterns of pollutant emissions, in this case at London Heathrow Airport (LHR).
14 Measurements from the sensor network were used to unequivocally distinguish airport
15 emissions from long range transport, and then to infer emission indices from the various
16 airport activities. These were used to constrain an air quality model (ADMS-Airport),
17 creating a powerful predictive tool for modelling pollutant concentrations. For nitrogen
18 dioxide (NO₂), the results show that the non-airport component is the dominant fraction
19 (~75%) of annual NO₂ around the airport and that despite a predicted increase in airport
20 related NO₂ with an additional runway, improvements in road traffic fleet emissions are
21 likely to more than offset this increase. This work focusses on London Heathrow Airport, but
22 the sensor network approach we demonstrate has general applicability for a wide range of
23 environmental monitoring studies and air pollution interventions.

24 Highlights

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

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