1. SNAQ HEATHROW PROJECT

(a) Objective
- Deployment of state-of-the-art network of pollution sensors (SNAQ sensor nodes) in and around LHR airport.
- Establishing pollution data for science and policy studies.
- Comparing data with emission inventories and pollution models.
- Source attribution for LHR airport.
- Creation of novel tools for data mining, network calibration, data visualisations and interpretation.

(b) Instrumentation
- Gas phase species: CO, NO, O₃, SO₂, PM₁, PM₂.₅, PM₁₀, aerosol chemical (EC) at 2 s.
- CO and total VOCs (optical at 10 s).
- Size-specific particulates (0.38 to 17.4 µm, optical (OPC) at 20 s).

(c) Sensor network and data capture
- 32 sensor nodes deployed starting mid-2012.
- 31 nodes located within LHR covering all terminals, close to two runways and in proximity of the major roads within LHR.
- 5 nodes are co-located with local monitoring stations outside LHR (at 2 km from LHR).
- ~2 s data recordings (CO, NO, NO₂, O₃, SO₂, Hydrocarbons, CO, O₃, PM₁, PM₂.₅, PM₁₀, aerosol chemical (EC) at 2 s).
- Wind speed and directions (sonic anemometer) and meteorology.
- Temperature and relative humidity (IR).

2. CHARACTERISATION

(a) Laboratory tests of gas sensors
- Field measurements of particulates

(b) Data capture in real-time
- Excellent laboratory response at ppb mixing ratios (Fig. 2 (a)).
- Good instrumental performance against reference techniques under ambient conditions (Fig. 2 (b)).

3. PRELIMINARY RESULTS AND DISCUSSION

Source attribution: northern and southern runways

- High CO & NO mixing ratios (red circles) at low WS (Fig. 5): SNAQ17 (in the SE quadrant) suggests a pollution source to the north of the sensors (northern perimeter runway).
- High NO mixing ratios (black circles) at high WS (>15ms⁻¹) in the SW quadrant are suggested as a pollution source to the southwest of the sensors (aircraft landings take-offs on the northern runway).

4. CONCLUSIONS AND FUTURE WORK

- High-temporal and spatial, long-term deployment of pollution sensor networks in LHR airport measuring multiple gas species and particulates as well as meteorology.
- Exciting findings from preliminary results:
  1. Large temporal variations in mixing ratios of pollutants observed across the network.
  2. Anticyclone effect of pollution well captured.
  3. Pollution source attribution and source apportion within the airport.
- Future work includes deploying the remaining sensor nodes, comparing measurement data with dispersion models and emission inventories.
- Detailed analysis of data using information on airport operations to apportion pollution sources.
- Calibration of sensor network (baseline approach).