1   **Table S1. Research grade instrumentation used for this study.**

Analyte	Manchester			York
NO$_2$	*Teledyne T500U (CAPS)	**Teledyne T200U (Chemiluminescence)	**Teledyne T200U (Chemiluminescence)	--------------------
O$_3$	*Thermo 49i (UV photometry)	**Thermo 49i (UV photometry)	**2B (UV photometry)	--------------------
PM$_{2.5}$	--------------------	--------------------	--------------------	*Met One BAM 1020 (Beta attenuation)

2   *Instruments permanently deployed at the site.

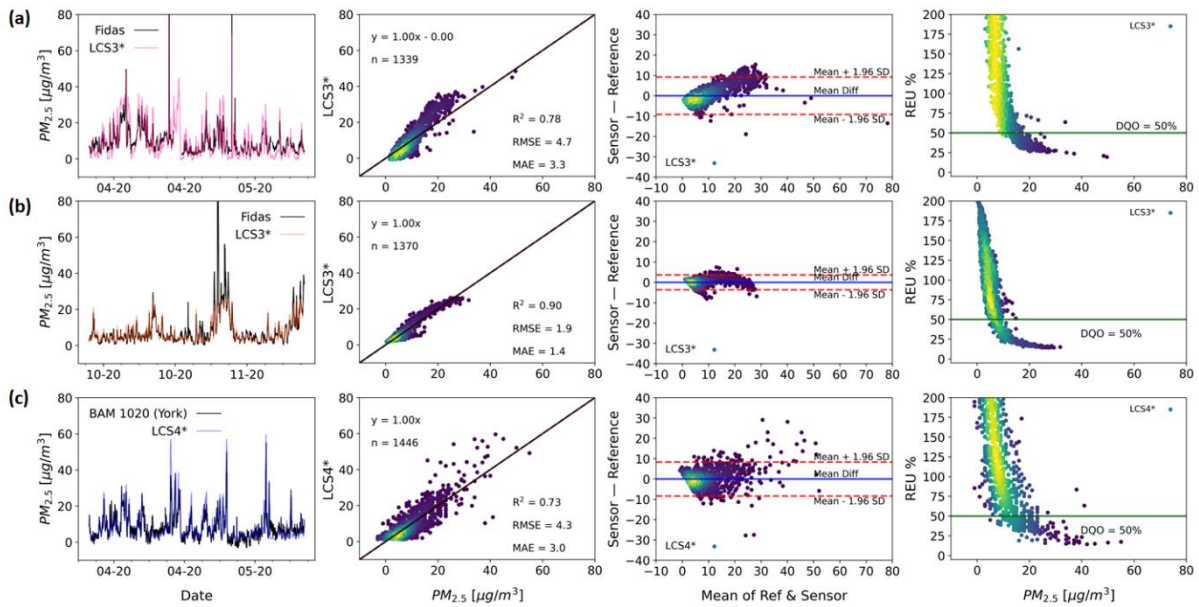3   **Instruments temporarily deployed as part of the QUANT study.
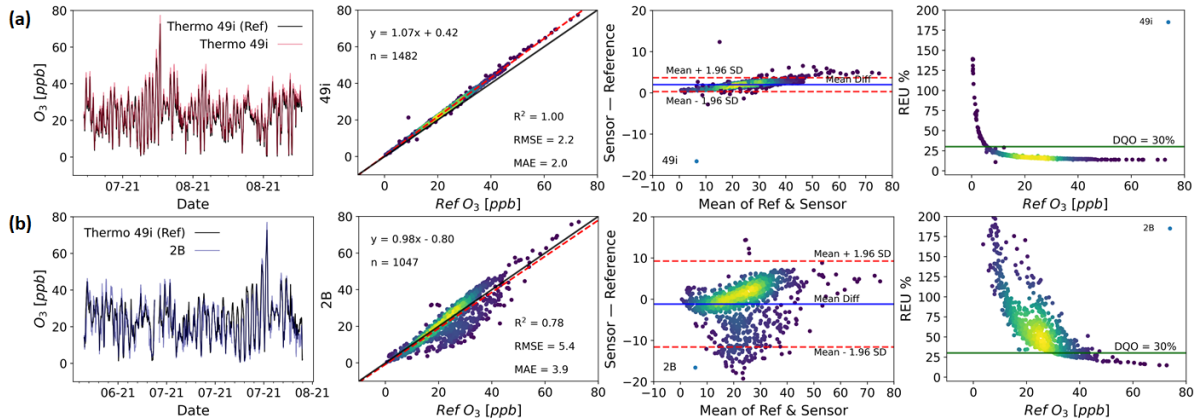
4
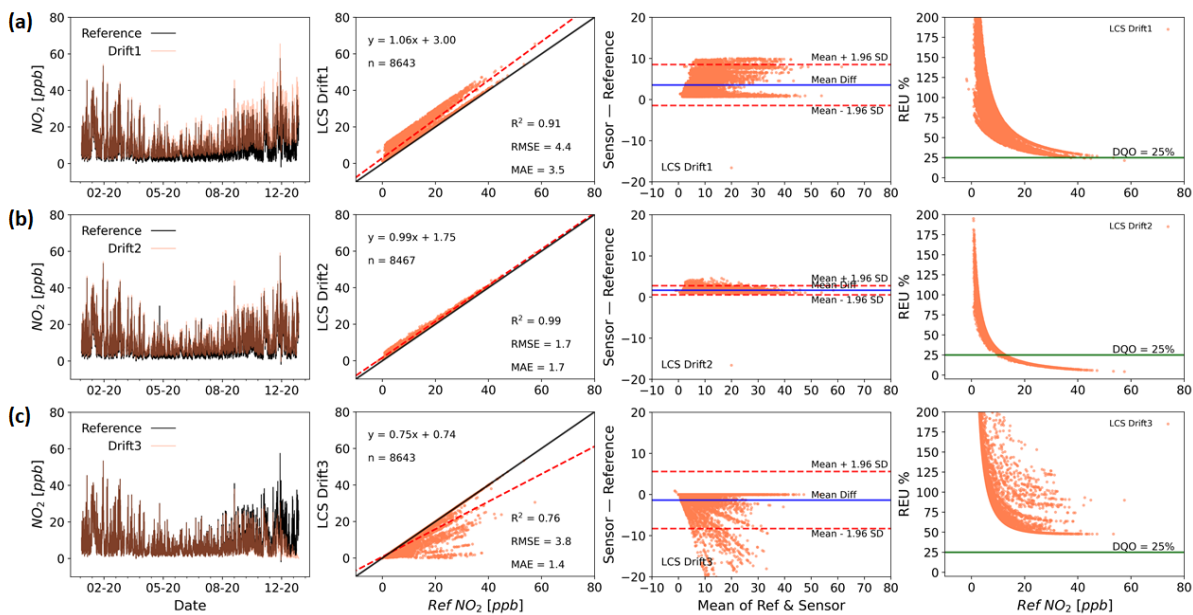
5

6   **Figure S1. Time series (left panels), regression plots (middle-left panels), Bland-Altman plots (middle-right panels) and**

7   **REU (right panels, DQO for NO$_2$ = 25%) for baseline drift (a-panels), temperature interference drift (b-panels), and**

8   **instrument sensitivity drift (c-panels) simulated errors.**

9

Figure S2. Two bias corrected LCS systems (LCS3 & LCS4, same brand) measuring PM2.5 (Time res 1 h). While LCS3 is shown for the same location (Manchester) but unfolded in two different seasons (a-panels: Apr to May 2020; b-panels: Oct to Nov 2020), LCS4 is at a different location (c-panels: York, Apr to May 2020). Time series (left panels), regression plots (middle-left panels), Bland-Altman plots (middle-right panels) and REU (right panels; $DQO_{PM2.5}$ = 50%) are used to characterise the device's error structure. All but the time-series plots have been coloured by data density.

Figure S3. Time series (left panels), regression plots (middle-left panels), Bland-Altman plots (middle-right panels) and REU (right panels, DQO for O_3 = 30%) for two ozone research grade instruments (1hr time res): a Thermo 49i (a-panels, July & August 2021) and a 2B (b-panels, June and July 2021). All but the time-series plots have been coloured by data density.