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
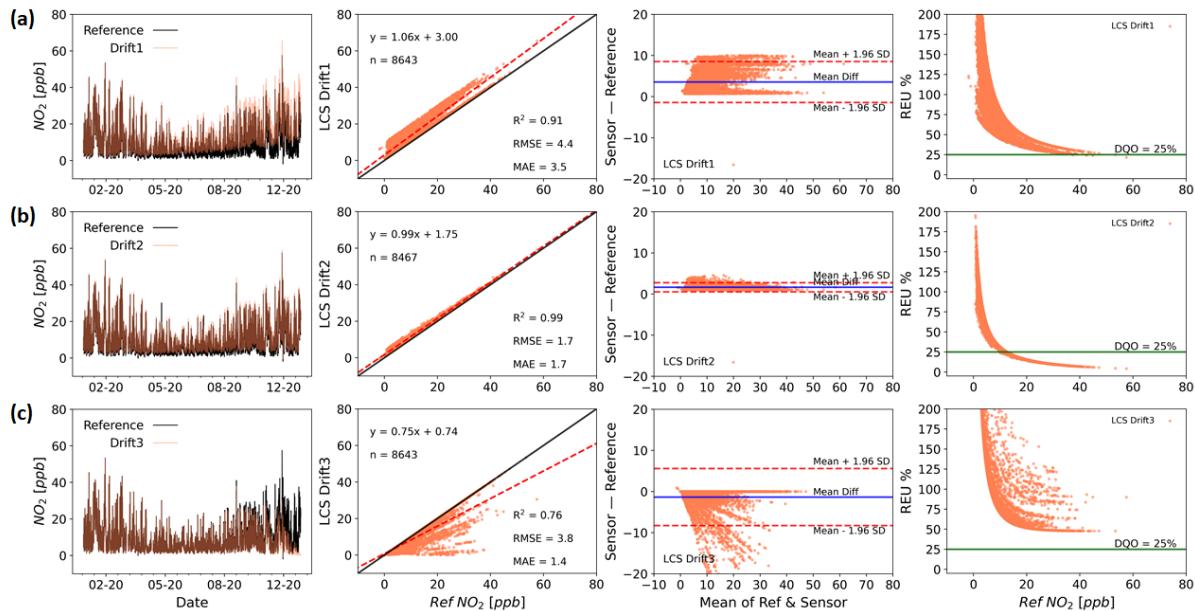
5

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

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

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

9
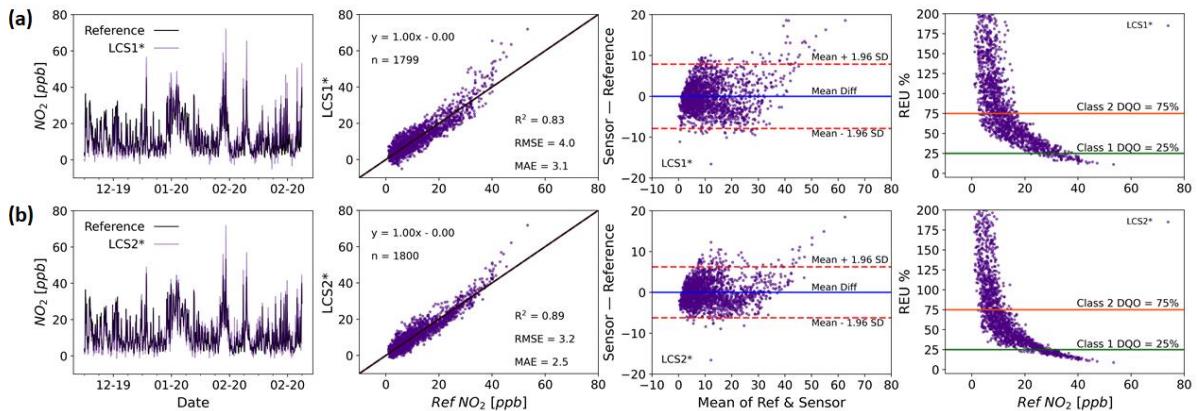
Figure S2. Time series (left panels), regression plots (middle-left panels), Bland-Altman plots (middle-right panels) and REU (right panels; NO₂ Class 1 DQO = 25% & Class 2 DQO = 75%) for NO2 measurements by two LCS bias-corrected systems of different brands (panels a and b) in the same location (Manchester Supersite, December 2019 to February 2020. 1hr time res).
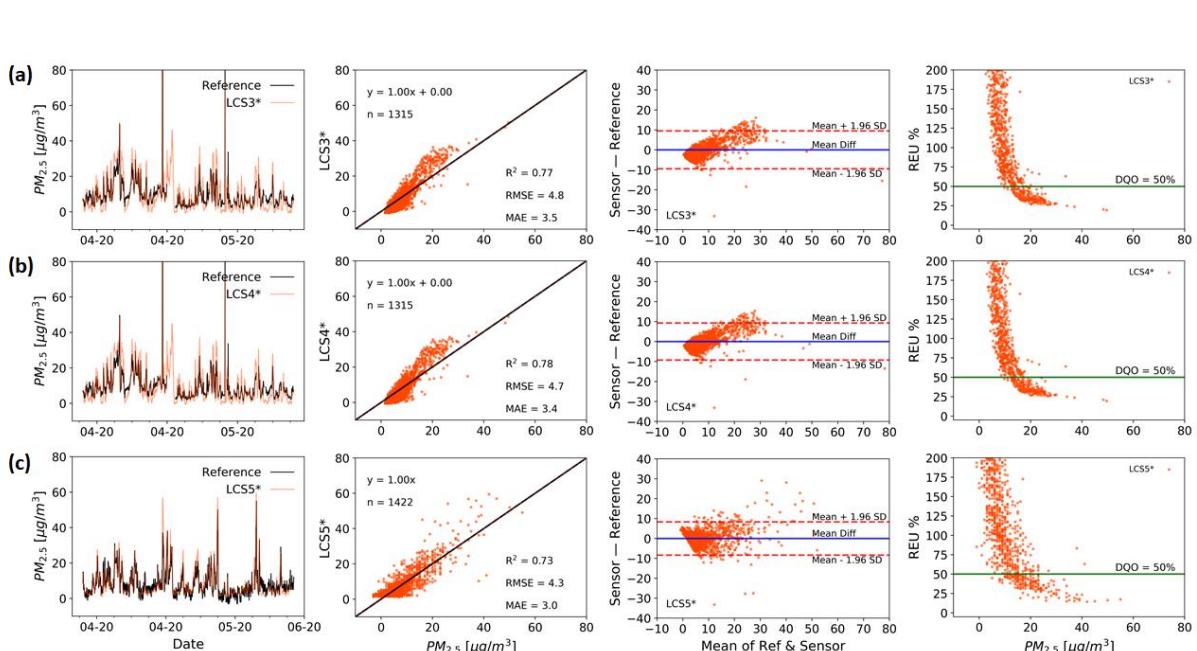

Figure S3.Time series (left panels), regression plots (middle-left panels), Bland-Altman plots (middle-right panels) and REU (right panels, DQO for PM2.5 = 50%) for PM2.5 measurements by three LCS bias-corrected systems of the same brand (panels a, b and c) in different locations (April & May 2020,1hr time res): an urban background (Manchester Supersite, a and b panels) and a roadside site (York, c panels).

23
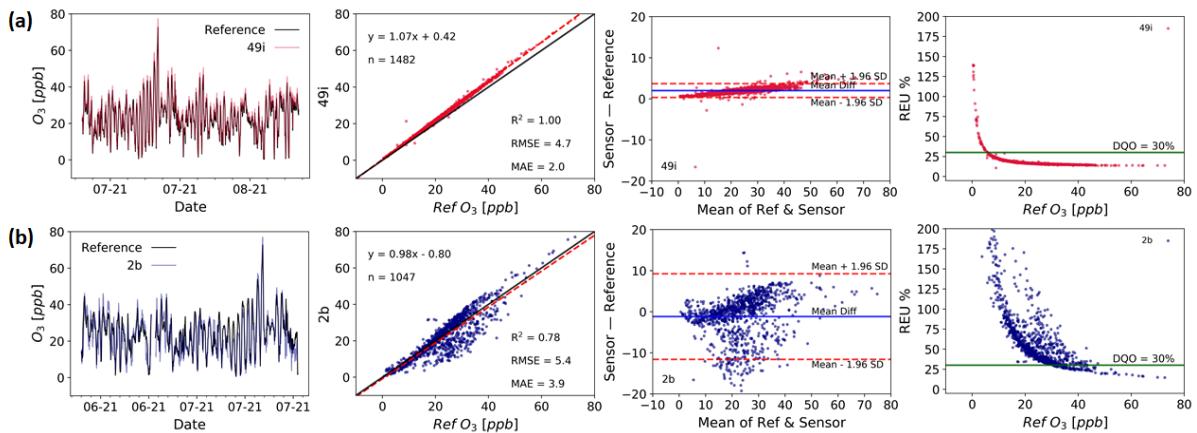
Figure S4. Time series (left panels), regression plots (middle-left panels), Bland-Altman plots (middle-right panels)
and REU (right panels, DQO for O₃ = 30%) for two ozone research grade instruments (1hr time res): a Thermo 49i
(a- panels, July & August 2021) and a 2B (b-panels, June and July 2021).