Certificate of calibration

For:	Dr Joss Kent UK Met Office Jupiter Mezzanine Fitzroy Road Exeter Devon EX1 3PB United Kingdom
Date:	23rd June 2020
Instrument:	UK Meteorological Office CAPS instrument for the measurement of NO2, CAES0363 ISS A S/N 001
Results:	UKMO NO2 ppb = 1.1738 NCAS Standard ppb + 0.7444 ppb Calibration range between 0-200ppbV.
Carried out and authorised by:	Dr Katie Read NCAS Scientist University of York York, UK
Signed:	

Description of calibration:

A multi-gas calibrator (Environics, model 6100) was used to dilute high concentration NO standard into PAG 001 zero air at varying levels. Ozone was added such that NO concentration was in excess. The amount of NO2 is verified from the added Ozone assuming 1 molecule of O3 gives one molecule of NO2. The concentration of NO2 was further verified by the COZI CAPS instrument. Seven concentration levels were performed, 10 minutes at each level with the last 7 minutes of data used for calibration.

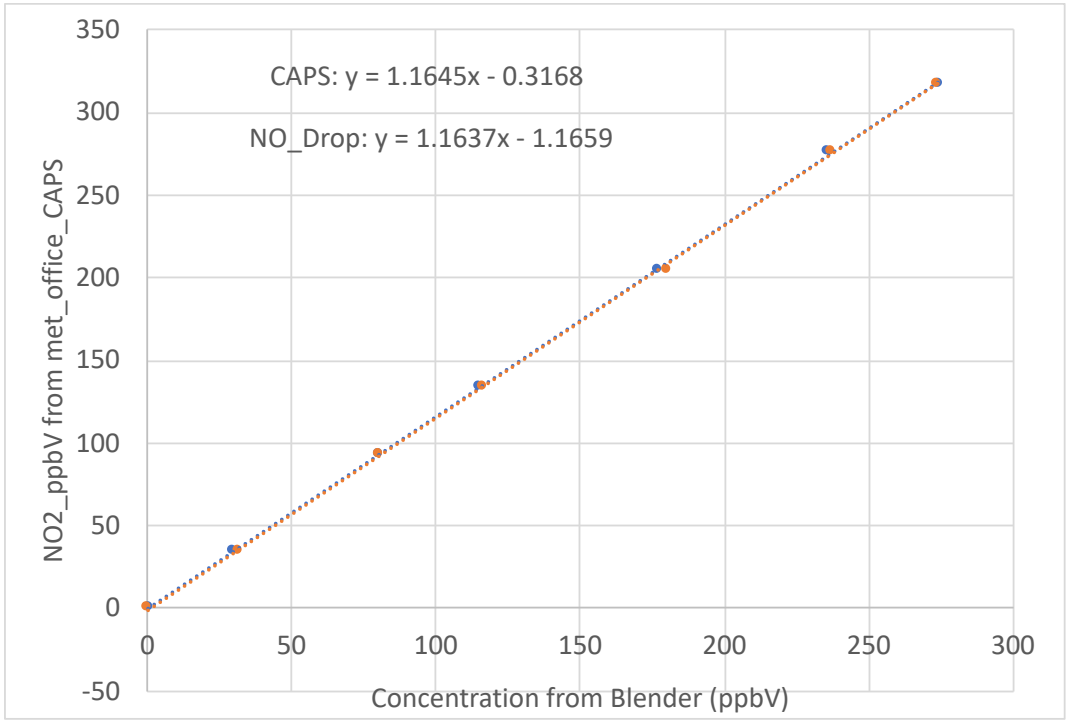
A zero check was carried out using both PAG zero air and also BTCA. A baseline adjustment was made to the visiting CAPS before the calibration.

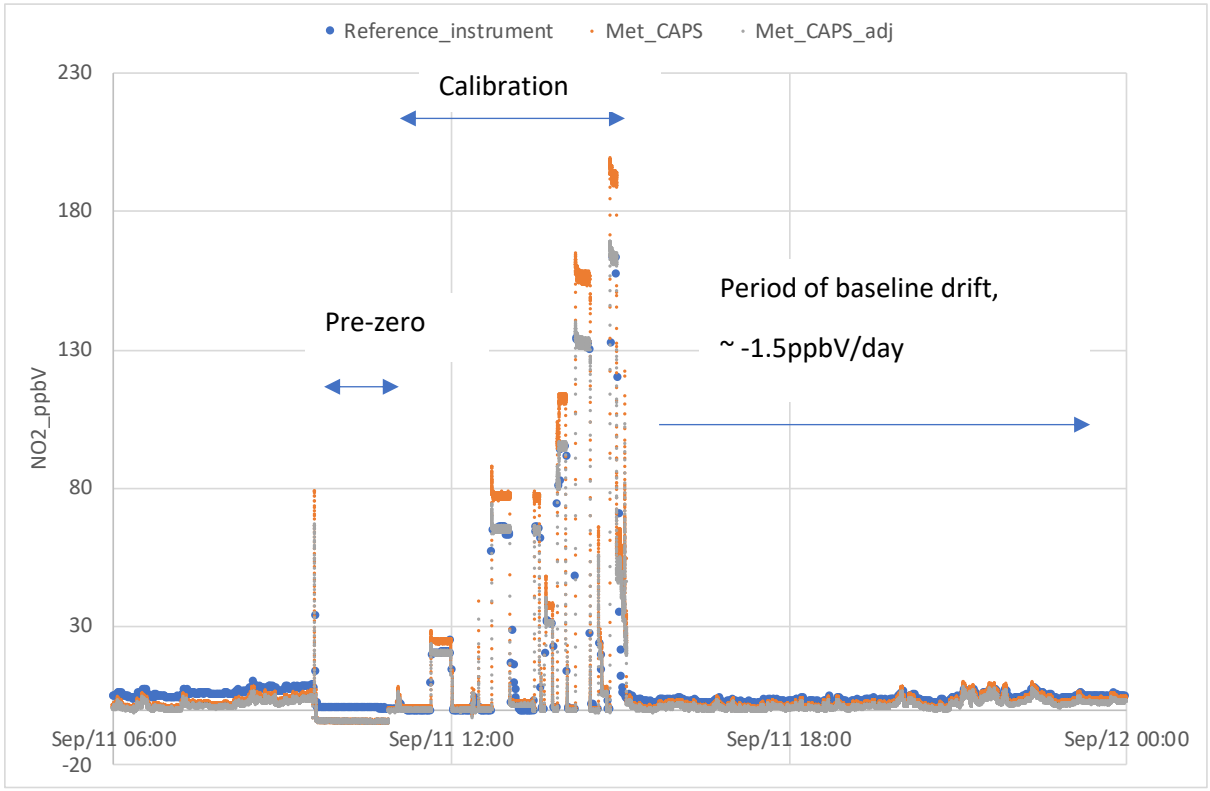
Cylinder Information

Gas	**Concentration**	**Cylinder #**
NO in Nitrogen (BOC)	24.9 ppm	**243369SG (6/11/20)**
NO in Nitrogen (NPL)	1.002ppm	**11288 (12/3/23)**

Calibration data

NO2 concentration, as calculated from drop in NO/CAPS measurement (ppbV)	**Measured concentration (ppbV)**	**Standard deviation**
0.5	-0.005	0.034
110.2	133.8	0.63
79.3	93.1	0.45
179.2	205.0	0.89
30.9	34.5	0.25
235.9	276.9	0.52
273.0	317.1	0.89
0	0.036	0.


CAPS: y = 1.1645x - 0.3168
NO_Drop: y = 1.1637x - 1.1659
NO2_ppbV from met_office_CAPS
Concentration from Blender (ppbV)
350
300
250
200
150
100
50
0
-50
0
50
100
150
200
250
300


Reference_instrument
Met_CAPS
Met_CAPS_adj
Calibration
Pre-zero
Period of baseline drift,
~ -1.5ppbV/day
NO2_ppbV
230
180
130
80
30
-20
Sep/11 06:00
Sep/11 12:00
Sep/11 18:00
Sep/12 00:00

The analyser was also found to drift downwards at a rate of 1.5ppbV/day. Based on these results we recommend at least an adjustment to the baseline/zero followed by a span adjustment according to the equation above.

We recommend that you carry out baseline/zeros daily and calibrations at least annually to verify the stability of your analyser.

Other Notes

The blender will be returned to the company for its annual check at the end of October 2019. It is very unlikely these results will change but we will let you know of any correction that is needed to these results by the end of November 2019.

This work was carried out in the COZI-Lab in the Wolfson Atmospheric Chemistry laboratories (WACL) at the University of York. The COZI-Lab is principally funded through the National Centre for Atmospheric Science (NCAS).