

Post-RONOCO calibration tests (updated 06/01/2011)

Dates: 25-28 January 2011

Location: FAAM Building 125 lab

Participants:

FAAM NO_x group: Stéphane Bauguitte, James Lee, Grant Forster, Sarah Moller

LIF group: Piero DiCarlo et al

BBCEAS group 1: Bin Ouyang and Oliver Kennedy

BBCEAS group 2: Steve Ball and Mark Daniels

CIMS group: Carl Percival, Jennifer Muller, Michael le Breton

Visitors: Markus Frey and Neil Brough (BAS)

Tue 25/01/2011

am: aircraft lands (last RONOCO mission). Packup / travel back to Cranfield.

pm: Avalon removes LIF, FAAM NO_x, BBCEAS and CIMS racks following EMA-Cranfield transit flight. All teams involved must supervise inlets/racks disconnection. If time / staff availability allows, set up racks in building 125 lab.

Wed 26/01/2011

am: Complete racks setup in lab 125

Start 4 hour warm-up for FAAM NO_x and LIF

Setup York gas blender calibration plumbing (shared inlet, NO_x-free zero air, NO₂ cal standard)

pm: NO₂ detectors accuracy/linearity checks

First calibrate individual detectors using their own internal calibration systems and gases.

Perform full independent NO₂ spans as per tables below.

Low NO₂ concs using UK-NPL certified 1 ppmv NO₂/N₂ standard

NO ₂ span ppbv	Diluent flow sccm	NO ₂ /N ₂ cal flow sccm
0.000	10000	0
0.999	10000	10
1.996	10000	20
4.975	10000	50
7.444	10000	75
9.901	10000	100

Sub-ppbv NO₂ spans are NOT possible with this standard mix and gas blender.

High NO2 concs using Italian SIDIA/SIT 8.33 ppmv NO2/Air standard

NO2 span ppbv	Diluent flow sccm	NO2/Air cal flow sccm
0.000	10000	0
8.322	10000	10
16.627	10000	20
41.443	10000	50
62.010	10000	75
82.475	10000	100

NO2 spans overall uncertainty from gas blender (1:1000 max allowable dilution rate) is $\pm 5\%$, comprised of $2 \times \pm 1\%$ for standard and diluent MFCs, plus $\pm 3\%$ for either NPL or SIDIA/SIT NO2 standard. Note that gas blender MFCs have a $\pm 1\%$ accuracy of setpoint, not of full scale, hence the overall $\pm 5\%$ uncertainty. James is organising the York gas blender MFCs recalibration prior to the exercise.

If the 10 slpm max flow from the gas blender is insufficient for all three NO2 instruments to sample simultaneously with good accuracy, it may be necessary to stagger the instruments sampling from the gas blender; this will slow down the exercise.

Depending on progress with NO2 linearity checks, either shutdown systems overnight, or keep sampling ambient air NOx overnight.

Thurs 27/01/2011

am: if systems have been shutdown overnight, 4 hr warm-up is required for LIF and FAAM NOx

Otherwise complete unfinished NO2 linearity checks

pm: if not already done during RONOCO missions pre-flights at EMA, perform N2O5/NO3 photolytic interference test on FAAM Blue LED Converter (BLC), and thermal interference for long FAAM NOx PFA inlet.

More overnight ambient NOx measurements?

Fri 28/01/2011

Contingency day for any slippage

Packup and tidy lab

Staff travel home

Comments:

Any other tests required?