Highlights of the GSFC NO$_2$ fitting algorithm

GSFC NO2 WORKING GROUP

TEMPO STM-2, 05/21-22/2014
NO2, H2O and CHOCHO slant columns

1. Input: monthly means of the original OMI irradiances; x-sections convolved with the parameterized (KNMI) OMI slit; multi-scattering Ring spectrum (an appropriate mix of the air and water-leaving RSS).

2. Iterative wavelength adjustment: irradiances are brought in line with radiances. Simultaneous estimate and removal of the Ring spectrum. ‘Micro-window’ approach: the 400-465nm NO2 fitting window is split into multiple ~8-12 nm overlapping regions; preliminary [iterative] baselining with n=2 polynomials.

3. Preliminary, **sequential** estimate of the NO2, H2O and CHOCHO slant columns.

4. Iterative de-spiking and final baselining.

5. Final SCD estimate and calculation of the under-sampling patterns.

6. Second-pass SCD calculations: repeating all the above. However, now removing all trace-gas components and then adjusting the wavelengths and estimating the RSS amplitudes. Plus, removing the under-sampling patterns from radiances.
Lessons learned: polynomial base-lining

Green: micro-windows, n=2 order
Red: full-range, n=3
Blue: full-range, n=4
NO$_2$ SCD comparisons
March 20, 2005, orbit 03610
NO$_2$ SCD comparisons
March 20, 2005, orbit 03610
SCD(NO2), orbit 03610, March 20, 2005

SAO vs. GSFC

KNMI vs. GSFC

N = 72000

r = 0.95

intercept = -0.18 +/- 0.003

slope = 0.82 +/- 0.000

N = 72000

r = 0.94

intercept = -0.46 +/- 0.003

slope = 0.87 +/- 0.001
Fitting residuals: orbit 03610

iTime = 1127
Row#9
Beijing

iTime = 1127
Row#54
open water