



Linearisation of the effects of spectral shift and stretch in DOAS analysis or: How to fit one OMI orbit in a second

Steffen Beirle (1), Holger Sihler (1,2), and Thomas Wagner (1)

(1) MPI Chemie Mainz, Satellite remote sensing, Mainz, Germany (steffen.beirle@mpic.de), (2) IUP Heidelberg, Germany

Differential Optical Absorption Spectroscopy (DOAS) is a standard method to quantify atmospheric trace gases from spectroscopic measurements, e.g. from satellite instruments like GOME1/2, SCIAMACHY or OMI.

While DOAS can in principal be described by a linear equation system, usually non-linearities occur, in particular as a consequence of spectral misalignments.

Here we propose to linearise the effects of a spectral shift by including a "shift spectrum", which is the first term of a Taylor expansion, as pseudo-absorber in the DOAS fit. The effects of a spectral stretch are considered as additional wavelength-dependent shifts.

Solving the DOAS equation system linearly has several advantages: the solution is unique, the algorithm is robust, and it is very fast. The latter might be particularly important for satellite instruments with high data rates, like TROPOMI.

This study is currently under discussion on AMTD:

<http://www.atmos-meas-tech-discuss.net/5/8369/2012/amtd-5-8369-2012.html>