# An improved retrieval of $NO_2$ column for GOME-2 instrument

Song Liu (1)*, Pieter Valks (1), Gaia Pinardi (2), Isabelle De Smedt (2), Huan Yu (2), Steffen Beirle(3)

(1) Deutsches Zentrum für Luft- und Raumfahrt (DLR), Institut für Methodik der Fernerkundung (IMF), Oberpfaffenhofen, Germany
(2) Belgian Institute for Space Aeronomy (BIRA-IASB), Brussels, Belgium
(3) Max-Planck-Institut für Chemie (MPI-C), Mainz, Germany

*presenting author: Song.Liu@dlr.de +498153284271

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Nitrogen dioxide ($NO_2$) plays a key role in both stratospheric and tropospheric chemistry. This contribution focuses on the algorithm development and refinement for the retrieval of $NO_2$ columns for the GOME-2 satellite instrument.
A larger 425-497 nm wavelength fitting window is used in the differential optical absorption spectroscopy (DOAS) retrieval of the $NO_2$ slant column density. The reference spectra are updated, and the GOME-2 slit function variations over time and along orbit are taken into account. In addition, the effect of the new level-1b data PPF6.1 and the latest GOME-2 degradation model v1.0.D on the retrieved $NO_2$ slant column is analyzed respectively. For the determination of the $NO_2$ stratospheric column density, the STRatospheric Estimation Algorithm from Mainz (STREAM) is optimized for the GOME-2 measurements and tested against truth by applying it to synthetic data. To calculate the tropospheric AMF, a new surface albedo climatology based on GOME-2 observations for 2007-2013 is used. Furthermore, a priori $NO_2$ profiles obtained from the chemical transport model TM5 as well as the C-IFS system (model version CB05-BASCOE) are applied and the effect on the tropospheric AMF calculation is analysed.
We present the improvements in the $NO_2$ retrieval algorithm and we show validations of the GOME-2 $NO_2$ data using ground-based MAX-DOAS measurements.