

Transfer of GOME Data Processor (GDP) version 4.0 to SCIAMACHY Off-line (OL) processor version 3.0: Pole-to-pole delta-validation of NO₂ column data with the NDACC/UV-visible network

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Until recently, operational versions of the SCIAMACHY level-1-to-2 data processor for nitrogen dioxide (NO₂) column retrieval were based on version 2 of the GOME Data Processor (GDP). Ground-based validation of SCIAMACHY NO₂ data records generated with these operational processors confirmed the presence of problems inherent to GDP 2. Additionally, they revealed issues peculiar to SCIAMACHY, like a significant cloud-dependent offset occurring every year from October to December at some latitudes. In 2006, the SCIAMACHY Off-line level-1-to-2 data processor was upgraded to its version 3.0, based on the version 4.0 of GDP. The calibration of SCIAMACHY level-1 data was also upgraded. GDP 4.0 has been operational for GOME NO₂ data processing since November 2004 and it includes a list of major improvements: a better treatment of both Fraunhoffer and telluric line filling-in by rotational Raman scattering; on-the-fly radiative transfer air mass factor simulations with the LIDORT code, using a global NO₂ profile climatology built upon measurement data records; cloud property information derived from GOME data using state-of-the-art algorithms; and the use of improved surface properties databases.

Before public release and operational switch-on of the new SCIAMACHY OL 3.0 NO₂ column processor, we have investigated its potential improvements with respect to version IPF 5.04, its consistency with GOME GDP 4.0 processing despite some implementation differences, and its overall geophysical consistency. The investigation relies on pole-to-pole correlative studies integrating ground-based NO₂ column measurements provided by the GAW/NDACC network of DOAS UV-visible spectrometers. Although based on a limited subset of SCIAMACHY states reprocessed for this delta-validation exercise, our study shows that OL 3.0 has improved significantly with respect to IPF 5.04.