



Satellite retrieval of cloud properties from the O2 A-band for air quality and climate applications

P. Wang, P. Stammes, and R. van der A

KNMI, Climate Observations, De Bilt, Netherlands (stammes@knmi.nl, +31 30-2210407)

The FRESCO (Fast Retrieval Scheme for Clouds from the Oxygen A-band) algorithm has been used to retrieve cloud information from measurements of the O2 A-band around 760 nm by GOME, SCIAMACHY and GOME-2. The cloud parameters retrieved by FRESCO are the effective cloud fraction and cloud pressure, which are used for cloud correction in the retrieval of trace gases like O3 and NO2. To improve the cloud pressure retrieval for partly cloudy scenes, single Rayleigh scattering has been included in an improved version of the algorithm, called FRESCO+. FRESCO+ gives more reliable cloud pressures over partly cloudy pixels. Simulations and comparisons with ground-based radar measurements of clouds shows that the FRESCO+ cloud pressure is about the optical midlevel of the cloud. Globally averaged, the FRESCO+ cloud pressure is about 50 hPa higher than the FRESCO cloud pressure, while the FRESCO+ effective cloud fraction is about 0.01 larger.

From ground-based validation (P. Wang et al., *Atmos. Chem. Phys.*, 8, 6565-6576, 2008) it appears that the FRESCO+ cloud retrievals improve the retrieval of tropospheric NO2 as compared to FRESCO. So FRESCO+ contributes to better monitoring of air quality from space.

The FRESCO+ cloud algorithm has been applied to GOME and SCIAMACHY measurements since the beginning of the missions. Monthly averaged SCIAMACHY FRESCO+ effective cloud fraction and cloud pressure maps show similar patterns as the ISCCP cloud maps, although there are some differences, due to the different meaning of the cloud products and due to the fact that photons in the O2 A-band penetrate into clouds. The 6-year averaged seasonal cloud maps from SCIAMACHY data have good agreement with the global circulation patterns. Therefore, the FRESCO+ products are not only efficient for cloud correction of trace gas retrievals but also contribute additional information for climate research.