Geophysical Research Abstracts
Vol. 20, EGU2018-12078, 2018
EGU General Assembly 2018

A sharper view of clouds and aerosols with TROPOMI

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The unprecedented spatial resolution of the TROPOMI instrument on Sentinel-5P (3.5 x 7 km2 across x along-track) offers a much sharper view of clouds and aerosols than was possible previously with UV-VIS-NIR-SWIR spectrometer data. The properties of clouds and aerosols that are retrieved from data of TROPOMI's predecessors, like GOME (320x40 km2), SCIAMACHY (30x60 km2), OMI (13x24 km2), and GOME-2 (40x80 km2) often hold for a mixture of cloudy and clear sky. Now with TROPOMI one can better separate cloudy and clear sky. The retrieval algorithms used for TROPOMI are the same as used for the earlier instruments. However, with TROPOMI one can resolve cloud and aerosol spatial structures, so one can much better attribute the retrieved cloud and aerosol properties to physical cloud and aerosol properties.

Using the first-light data of TROPOMI taken during the commissioning phase, we focus on the cloud properties retrieved from oxygen absorption bands (O_2 A-band, O_2-O_2 band), namely the FRESCO and OMICLD products, and the aerosol properties from the UV wavelength pair 340 nm/380 nm, namely the Absorbing Aerosol Index (AAI) product. First results indicate that at high spatial resolution, BRDF effects of clouds and surfaces are becoming more apparent than at lower spatial resolution. We find that algorithm improvements are possible for TROPOMI. This analysis may also lead to improvement in algorithms for the lower-resolution instruments.