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Science verification of operational aerosol and cloud products for TROPOMI on Sentinel-5 precursor

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With the approaching launch of the Sentinel-5 precursor (S-5P) satellite, scheduled by mid 2016, one preparatory task of the L2 working group (composed by the Institute of Environmental Physics IUP Bremen, the Royal Netherlands Meteorological Institute KNMI De Bilt, and the German Aerospace Center DLR Oberpfaffenhofen) has been the assessment of biases among aerosol and cloud products, that are going to be inferred by the respective algorithms from measurements of the platform's payload TROPOspheric Monitoring Instrument (TROPOMI).
The instrument will measure terrestrial radiance with varying moderate spectral resolutions from the ultraviolet throughout the shortwave infrared. Specifically, all the operational and verification algorithms involved in this comparison exploit the sensitivity of molecular oxygen absorption (the A-band, 755–775 nm, with a resolution of 0.54 nm) to changes in optical and geometrical parameters of tropospheric scattering layers. Therefore, aerosol layer height (ALH) and thickness (AOT), cloud top height (CTH), thickness (COT) and albedo (CA) are the targeted properties. First, the verification of these properties has been accomplished upon synchronisation of the respective forward radiative transfer models for a variety of atmospheric scenarios. Then, biases against independent techniques have been evaluated with real measurements of selected GOME-2 orbits. Global seasonal bias assessment has been carried out for CTH, CA and COT, whereas the verification of ALH and AOT is based on the analysis of the ash plume emitted by the icelandic volcanic eruption Eyjafjallajökull in May 2010 and selected dust scenes off the Saharan west coast sensed by SCIAMACHY in year 2009.