

Satellite UV products at Finnish Meteorological Institute: GOME-2, OMI and Tropomi

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Finnish Meteorological Institute develops and processes satellite-based surface UV products based on GOME-2/Metop, OMI/Aura and Tropomi/Sentinel 5P observations. The offline surface UV product (OUV) of the Satellite Application Facility on Ozone and Atmospheric Chemistry Monitoring (O_3M SAF) is produced operationally during the 15-year EUMETSAT Polar System (EPS) programme using the measurements of the three consecutive MetOp satellites. The OUV product is based on the O_3M SAF near real time total column ozone product (NTO) derived from MetOp/GOME-2 measurements. The diurnal cloud cycle, which is needed in calculating the daily UV doses, is sampled using MetOp/AVHRR level 1b products in the morning side and NOAA/AVHRR level 1b products in the afternoon side, thus exploiting the synergy between these two satellites in the Initial Joint Polar-Orbiting Operational Satellite System. The OUV product contains the most important quantities of the Sun's radiation that can be harmful to life and materials on the Earth, including daily doses and maximum dose rates of integrated UV-B and UV-A radiation together with values obtained by different biological weighting functions. These quantities are provided in a 0.5- degree gridded level-3 file stored as HDF5.

The Ozone Monitoring Instrument (OMI) onboard the Aura satellite launched in 2004 continues the TOMS UV record to present date. The OMI UV algorithm is very similar to one used in TOMS. A recent update of the OMI UV algorithm added climatological aerosol information in order to account for the effect of absorbing aerosols. The OMUVB product contains erythemally weighted daily dose and dose rates at local noon and satellite overpass time, and spectral irradiances at 305, 310, 324, and 380 nm. OMUVB is provided as one-orbit swath level-2 (OMUVB), daily global 0.25 deg lat/lon gridded level-2 (OMUVBG) and daily level-3 global 1.0x1.0 deg gridded (OMUVBd) products.

The TROPOMI UV Product will provide near-global daily information on the amount of UV radiation reaching Earth's surface. These data will serve studies on UV climate and trends, as well as on the various effects of UV radiation. The approach chosen for estimating surface UV irradiances based on TROPOMI measurements builds on the TOMS-OMI heritage, while also utilizing parts of the O_3M SAF OUV algorithm. In practice, this means that the surface UV is estimated using radiative transfer calculations implemented in a LUT to keep computational demands at a reasonable level. The inputs for these radiative transfer calculations are the TROPOMI-retrieved total ozone column and reflectance at 354 nm together with climatological information on the surface albedo and the atmospheric aerosol load.