



ILMATIETEEN LAITOS

OMI Level 3 Surface UV Irradiance (OMUVBd) PGE

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Readme file

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1 Introduction

The OMUVBd PGE creates an Ozone Monitoring Instrument (OMI) daily Level 3 (L3) gridded data product file from three OMUVBG Level 2G (L2G) daily gridded data product files. Each OMI L3 product file contains daily weighted means of corresponding L2 quantities in a longitude-latitude grid.

In order to ensure complete coverage of Earth, mean is calculated from all L2 ground pixels that have same local calendar (rather than UTC) date on the ground. Consequently, data from three consecutive OMI L2G files are required to fully populate the L3 grid at all longitudes for any given L3 day. For variables available in OMUVBd L3 product, please see OMUVBd Format Specification Document.

The grid and data format of the OMUVBd product files are consistent with NASA document number NASA/TM-2000-209896 entitled "Total Ozone Mapping Spectrometer (TOMS) Level-3 Data Products User's Guide" by R. McPeters, P.K. Bhartia, A. Krueger, J. Herman, C. Wellemeyer, C. Seftor, W. Byerly and E.A. Celarier.

2 OMUVBd algorithm

2.1 Screening

The scenes from OMUVBG L2G files are used for averaging if they have

- GroundPixelQualityFlags bit 5 (6th bit) = 0 (solar eclipse possibility check)
- OMUVBQualityFlag bit 15 (16th bit) = 0 (missing data check)
- No quantities that are equal to MissingValue (double-check missing data)
- decimal value of OMTO3QualityFlags bits 0-3 (1st to 4th bits) = 0 or 1 (general OMTO3 quality check)
- XTrackQualityFlags = 0 (Row anomaly check)
- UTC date within solar day in question
- 380 nm irradiance below 1.2×99 th percentile of 2005 monthly distribution for the grid cell in question. (Climatological outlier screening)
- Irradiances and UV index below limits specified in table 1. (additional outlier screening for "unphysical" values)

Table 1: Maximum values for irradiances

Quantity	max. value
Irradiance305	150.0 mW/m ² nm
Irradiance310	250.0 mW/m ² nm
Irradiance324	800.0 mW/m ² nm
Irradiance380	1500 mW/m ² nm
UVindex	45.0

2.2 Weighting and averaging

Values in L3 product are weighted averages of quantities in L2G scenes that at least partially overlap the L3 grid cell in question. Weighting function of each L2G-scene in averaging is the fraction of the footprint of the scene that overlaps with the L3 grid cell in question. ie. L2G scene that lies completely within L3 grid cell has a weight of 1, while scenes only partially within L3 grid cell have lower weights. To ensure that averages represent the grid cell adequately, sum of all weights in grid cell has to be at least $1/e$ (ca. 0.368). If this is not the case, average is not used in L3 product. Figure 1. shows an example of weighting.

3 Adopted L3 grid

The adopted L3 grid is a 1-degree by 1-degree grid in longitude and latitude. The dimensions of this grid are 360 by 180. The origin of the grid is at lower left. That is, the grid cell at coordinates (1, 1) is centered at (longitude = -179.5 , latitude = -89.5), and the grid cell at coordinates (360, 180) is centered at (longitude = 179.5 , latitude = 89.5).

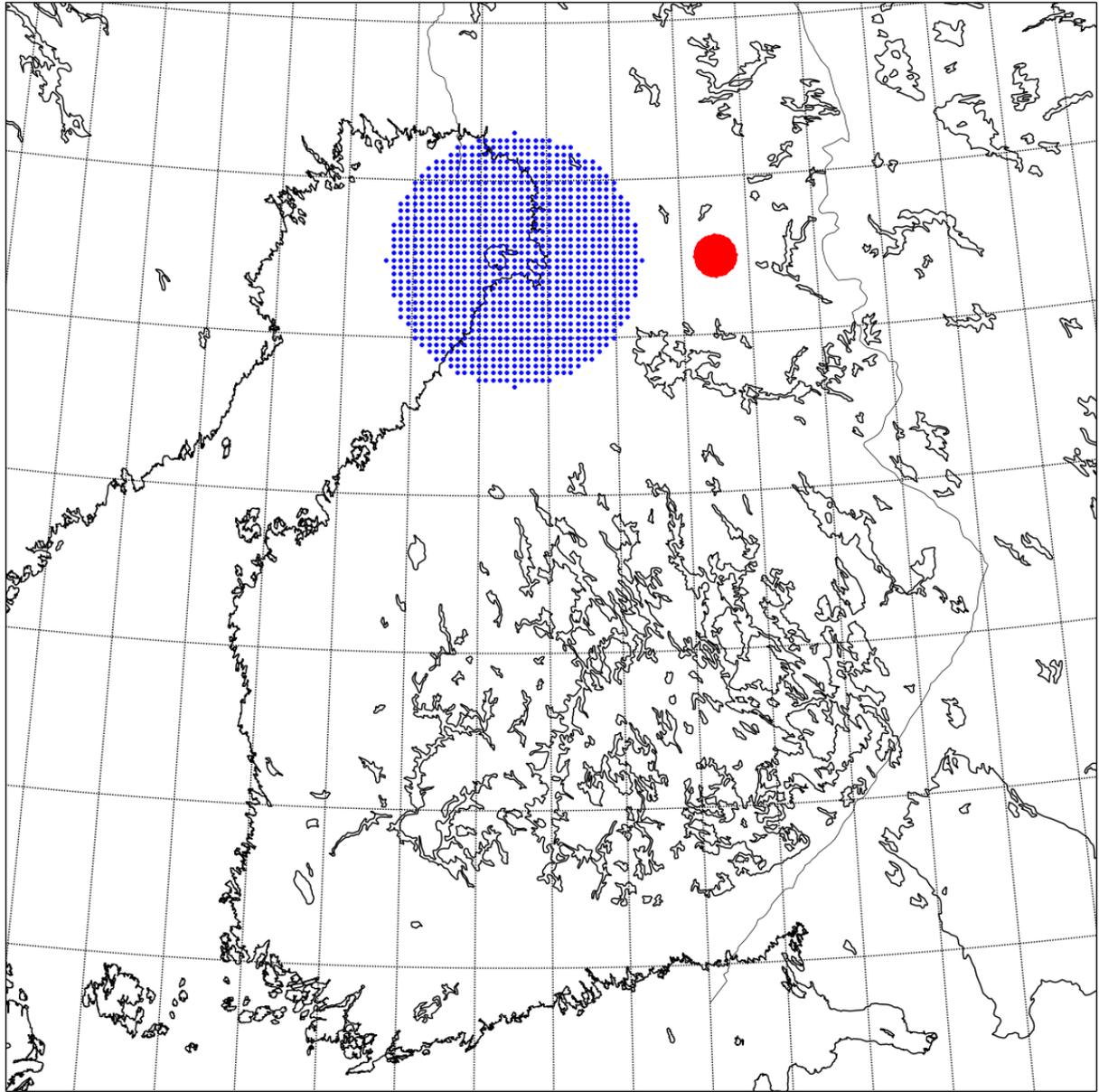


Figure 1: Example of weighting by L2 footprint. Each L2 footprint is represented by number (ca. 1000) regularly spaced points, covering circular area with radius that depends on satellite viewing angle (14 - 89.5 km). Number of points within L3 grid cell divided by total number of points in footprint gives the weight of the L2 observation for grid cell in question. Red dots in figure represent minimum size (nadir) footprint, while blue dots represent maximum sized footprint (edge of the swath). In this example, red footprint is completely within one grid cell and the L2 scene gets weight 1 for that grid cell. Blue footprint overlaps with several L3 grid cells. This scene gets weight between 0.03 and 0.23 for these grid cells.