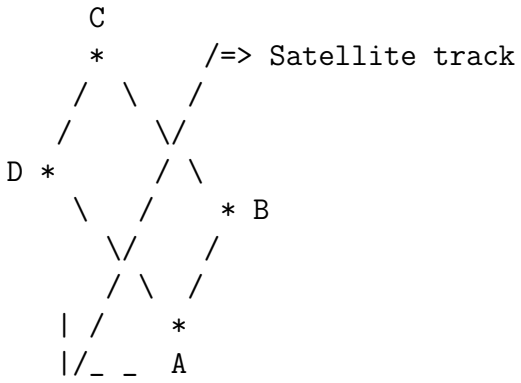
Ozone-CCI L3 description

1 Introduction

This document give a short description of the algorithm that calculates averaged ozone fields on a regular latitude-longitude grid and gives a description of its output files. Input that should be provided are L2 satellite measurements, output is in NetCDF format complying with the CF 1.6 metadata conventions.

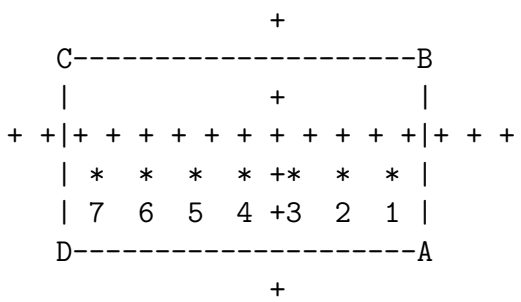
2 Algorithm

Pixels in the satellite data are assumed to be ordered like this:



If this is not the case, the reading routine should provide the appropriate transformation. A is the first corner in the longitude and latitude arrays, B the second etc. The across track direction is given by the lines the lines A-D and B-C, while the along track direction is given by the lines A-B and D-C. Note that corners C and D are reversed with respect to the GOME/GOME-2/OPERA convention.

The along track pixel edges AB and DC and cross track pixel edges AD and BC (see picture above) are divided into a number of points. The first point on AB and the first on DC form a line which is divided into into the same number of points as AD. Each of these points is assigned to a gridcell:



Suppose that ABCD above is the pixel of interest and that horizontal line with asterisks are the subpixels (numbered 1 to 7). Furthermore, the two lines with plusses denote the gridcell boundaries which are numbered the same way as the pixel corners (i.e. gridcell A is the lower right cell). In this case, subpixels $1 \sim 3$ are added to gridcell A, and the counter for gridcell A is increased by 3. Subpixels $4 \sim 7$ are added to gridcell D and the

counter for gridcell D is increased by 4. The pixel values are weighted by $1/\sigma^2$ before adding, so the weighted mean gridcell value and the corresponding standard deviation are given by:

$$\text{mean} = \frac{\sum_i \frac{x_i}{\sigma_i^2}}{\sum_i \frac{1}{\sigma_i^2}} \quad (1)$$

$$\text{sdev} = \sqrt{\frac{1}{\sum_i \frac{1}{\sigma_i^2}}} \quad (2)$$

where i iterates over all subpixels that fall into the gridcell. These equations are valid for all layers of the L3 grid.

3 NetCDF Output

Common datasets for all NetCDF output files are time, lat, lon, surface_pressure and air_pressure. Missing values in the dataset are indicated with the IEEE 'NaN' values.

Time is given in seconds since some reference time. Since the L3 fields are monthly averages, the time is equal to the reference time, which has been set to the first day of the month. The fields lat and lon give the latitude and longitude of the L3 gridcell centers. Latitude varies between -90 and +90 and longitude between -180 and +180. The surface_pressure and air_pressure fields are given in hPa and to obtain the full 3D pressure field, one should extend the surface pressure field in the third dimension with the air pressure field. The first entry from the air pressure field should not be used, since it is only a dummy entry for the surface pressure.

The NetCDF (partial) column datasets are O3_du, O3e_du, O3_du_tot and O3e_du_tot, which are the profile in partial columns and its associated error (both in DU/layer) and the total column and its associated error (both in DU). If the original L2 data was given in number density, the weigthed mean number density and its error and the volume mixing ratio and its error are also given as O3_ndens, O3e_ndens, O3_vmr and O3e_vmr. The partial column datasets have been calculated for the layers between the number density levels.