MOPITT V3 Level 3 Data Quality Summary

The following information applies to MOPITT level 3 (L3) data, Version 3 (V3; L2V5.5.1 or higher)
April 5, 2005

Gridded CO Retrievals

The MOPITT L3 files contain daily and monthly mean gridded versions of the daily L2 CO profile and total column retrievals. The averaging kernels associated with each retrieval are also gridded and included in the L3 files. For a description of the file contents, refer to the File Specification page. Please see the MOPITT L2 Data Quality Statement for additional information about the quality and the limitations of the retrievals.

The Gridding Process

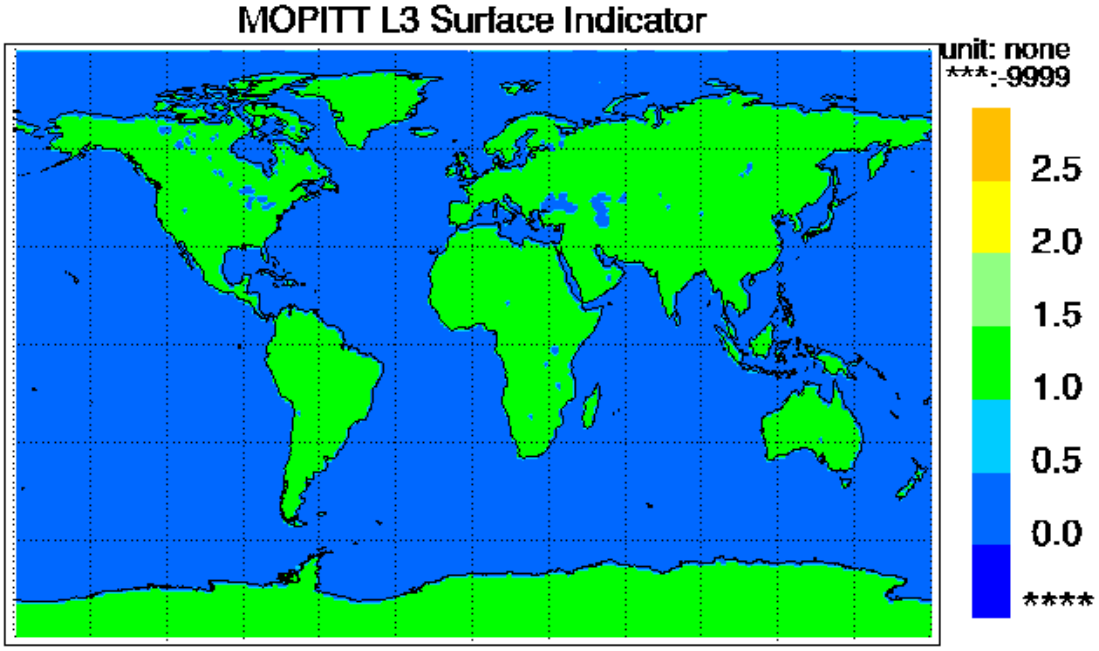
The gridding algorithm is described in sufficient detail to identify the composition of each L3 data value. The process is designed to promote the averaging of similar measurements.

Gridding

Each L2 file contains a series of pixels with specified latitude and longitude coordinates. The file is read and each pixel is binned into a fixed global 1x1 degree grid. If no data falls into a grid box its value is set at -9999.

Land/Ocean Filter

Since the MOPITT retrievals can vary significantly depending on the surface type, the gridding procedure separates pixels over land from those over water. Each gridbox is identified as either "Land" or "Water", based on the which type comprises the majority of the area. This is the "Surface Indicator" data field. Some gridboxes contain pixels for both land and water (e.g. spanning a coastline), In those cases, pixels that do not match the gridbox "surface indicator" field are discarded. Thus, if a gridbox is identified as Land, only land pixels are included in its reported mean and vice versa. This maintains consistency of the averaging process, both in terms of surface temperature and surface pressure.



Surface Indicator Map

Day/Night Filter

Because the vertical resolution of each observation is affected by the surface temperature which in turn is often different between day and night, separate day and night averages are created. Night is defined to be when the solar zenith angle is greater the 80 degrees.

Number of Pixels

The number of each pixels for the day and night averages are reported in the data file. Some of the main reasons for variations in these numbers include:

- Geographical location. It generally takes three days for almost complete global coverage, but because of the orbit configuration, the satellite overflies high latitude gridboxes far more frequently then equatorial gridboxes.
- MOPITT does not process pixels where clouds are present.
- The data collection is briefly interupted for calibrations every few minutes.

Averaging Kernels

The Averaging Kernels give an indication of the vertical resolution of the retrievals, as well as providing quantitative information about the sensitivity of the retrievals to the true CO profile. Averaging kernels are required for the detailed comparison of retrieved CO profiles and columns to in situ measurements or model results, as described in Calculation and Application of MOPITT Averaging Kernels (PDF). In the L3 product, the averaging kernels of each contributing pixel are averaged. The filtering by day/night and land/ocean avoids large variations in the set of averaging kernels being averaged.

Information Content

Users should be aware that, in both the L2 and L3 products, no filters are applied with regard to information content. In polar regions, for example, MOPITT CO retrievals are weighted by the *a priori* profile much more heavily than in other regions, and therefore contain less information. Similarly, nighttime MOPITT retrievals often contain less information than daytime retrievals (especially over land). To assist users in filtering the data based on information content, both the L2 and L3 products include a diagnostic ('Percent Apriori'), which describes the uncertainty of the retrieved CO (at each level in the profile) as a percentage of the *a priori* variability.

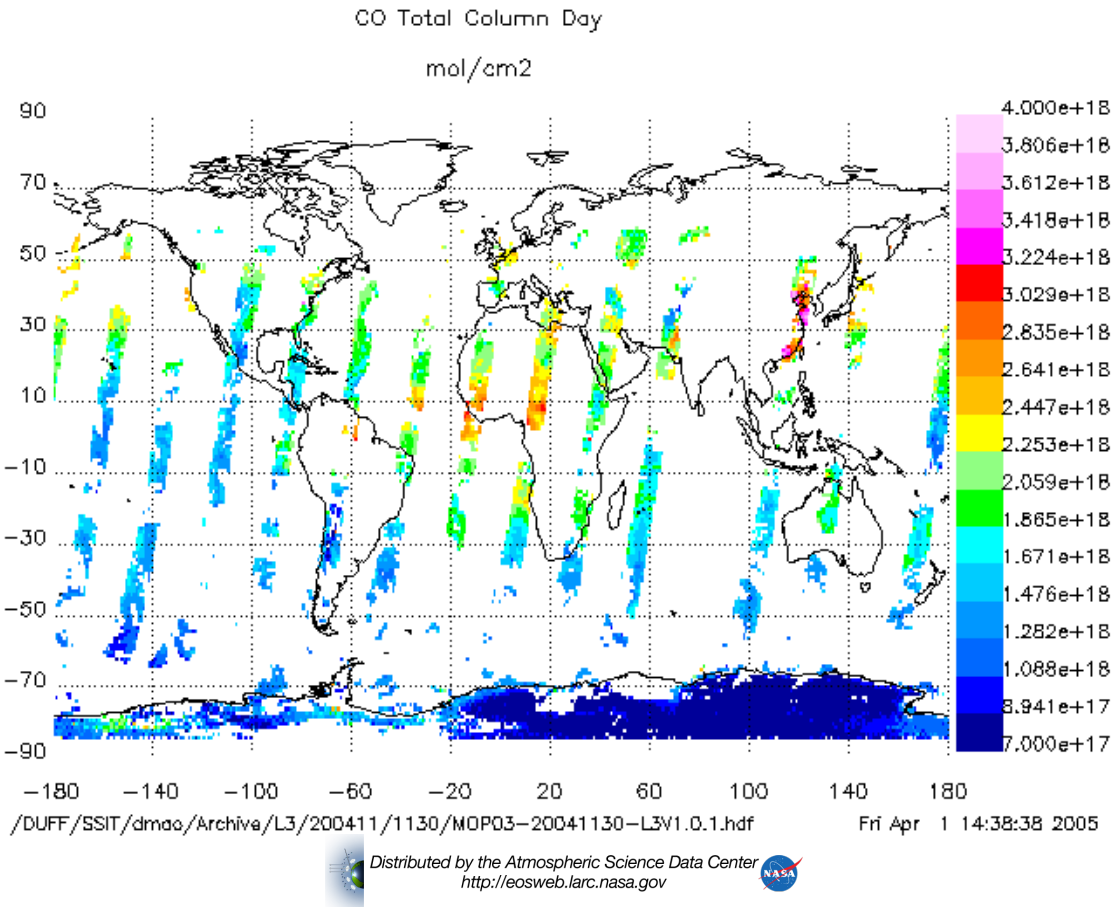
Cloud Mask Effects

MOPITT cannot perform retrievals over cloudy regions. To avoid clouds a combination of MODIS data and MOPITT radiance tests are performed. However, at high latitudes (above +/- 65 degrees), MOPITT cannot distinguish the cold surface from the clouds, so the algorithm is based only on MODIS observations. (For more details see the Level 2 Data Quality Statement.) This discontinuity at 65 degrees latitude is sometimes discernable (especially in the monthly night products). Equatorward of 65 degrees our cloud detection module allows for the inclusion of low altitude clouds which do not affect retrievals. Poleward of this boundary, these pixels cannot be included with confidence. Any uncertainty in the retrievals is reflected in the reported percent a priori.

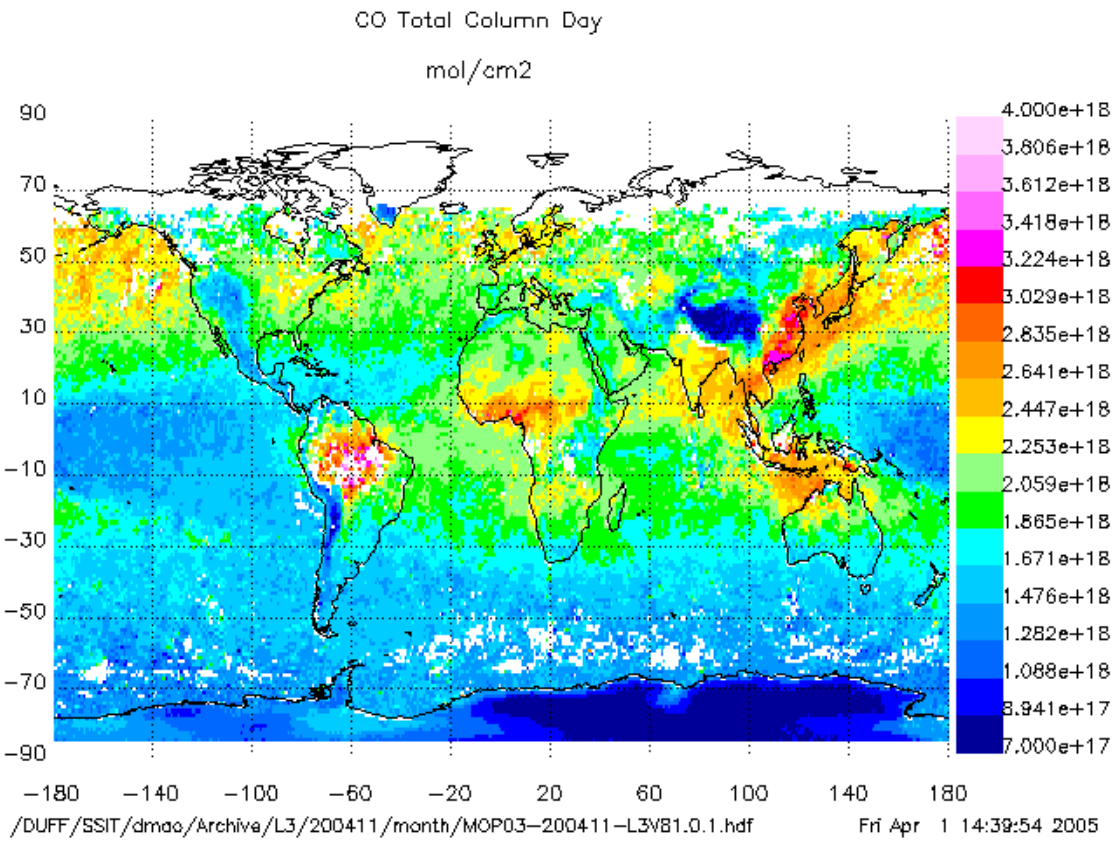
Monthly Means

The identical procedure for creating daily values is applied to all the L2 files in a given month. Monthly means tend to have significantly better spatial coverage than daily files.

Daily and Monthly Examples



Daily Example



Monthly Example

Additional Information

- Data Interpretation and Use of Averaging Kernels
- File Description
- Data Access