

Summary of MISR Aerosol Parameter Available from GES-DISC GIOVANNI MOVAS Interface

MISR Aerosol Parameters from multiple swaths are combined to make complete Level-3 global maps at Daily, Monthly, Quarterly and Yearly time scales.

GIOVANNI MOVAS is currently supporting only the “Optical Depth Average” parameter from the MISR Monthly Level-3 Product called MIL3MAE. For Level-3 Product this parameter is reported at “Green: 557.5 nm Band of the MISR camera”.

MIL3MAE is called the Component Global Aerosol Product and is originally available at 0.5 X 0.5 degree resolution.

Note: For the MOVAS interface the “Optical Depth Average” Parameter has been re-sampled to 1.0 X 1.0 degree resolution. The Fill Values have been changed from -9999.0 to -999.0.

MISR Experiment Overview:

For details on the MISR instrument aboard the Terra Satellite, please see:

(http://eospsoc.gsfc.nasa.gov/eos_homepage/for_scientists/atbd/docs/MISR/EXPER-MISR.pdf).

MISR Data Access:

See: <http://www-misr.jpl.nasa.gov/mission/data/getdata.html>

Useful MISR Links:

LaRC DAAC User Services: larc@eos.nasa.gov

Langley Atmospheric Sciences Data Center DAAC: <http://eosweb.larc.nasa.gov>

MISR home page: <http://www-misr.jpl.nasa.gov>

MISR Workshop Presentations: <http://eosweb.larc.nasa.gov/PRODOCS/misr/workshop/>

Product Maturity:

Component Global Aerosol Product (a.k.a. CGAS, MIL3DAE, **MIL3MAE**, MIL3QAE, MIL3YAE) (from MISR PGE 12c) are considered to be “**Stage 2 Validated**”. All component global aerosol parameters now have a "Stage 2 Validated" status. This means Product Uncertainties are estimated from more widely distributed independent measurements. They are well defined and suitable for systematic studies.

The Level 3 Aerosol product is a summary of the Level 2 Aerosol product, therefore all of the [Level 2 aerosol quality statements](http://eosweb.larc.nasa.gov/PRODOCS/misr/Quality_Summaries/L2_AS_Products.html) (http://eosweb.larc.nasa.gov/PRODOCS/misr/Quality_Summaries/L2_AS_Products.html) apply.

Issues with MISR Level 3 Aerosol Data:

1. Users are urged to read and take into account the [Quality Statement](http://eosweb.larc.nasa.gov/PRODOCS/misr/Quality_Summaries/L2_AS_Products.html) (http://eosweb.larc.nasa.gov/PRODOCS/misr/Quality_Summaries/L2_AS_Products.html) for the MISR AOT products. In particular, it takes about a year to reprocess the entire MISR data set with the [current version](http://eosweb.larc.nasa.gov/PRODOCS/misr/Version/) (<http://eosweb.larc.nasa.gov/PRODOCS/misr/Version/>) of the algorithm, so the currently available Level 3 products may include a mix of validated and unvalidated versions. Regional and global studies using the Level 3 product should include only the available validated versions of the AOT products.
2. Note in particular from the [Level 2 Quality Statements](#), that **optical depth blunders** in the Level 2 product can frequently occur **over snow/ice fields** due to low spatial contrast and also as a consequence of inadequate cloud screening. Many such blunders have been observed over Greenland and Antarctica. Therefore, these two geographic areas are **currently being excluded** in the Level 3 Global Aerosol Product but with the expectation that they will be included at a later date.
3. MISR **sampling** must be taken into account when using the Level 3 Aerosol products, as they are aggregates of numerous observations. The number of counts in a space-time bin is included in the Level 3 data files. Note also that MISR and MODIS sampling are quite different, and over water, they are rarely coincident, since MODIS is in sun-glint over the narrower MISR swath much of the time, whereas MISR can use the off-nadir cameras for aerosol retrievals where the nadir view is glint-contaminated. Conversely, MISR observes the entire Earth about once per week, whereas MODIS sees it about once in two days; cloud contamination eliminates many of the observations, preferentially in cloud-prone regions. On a global, monthly or seasonal basis, short-lived, severe aerosol events, such as dust storms and wildfires, often dominate the signal. So a careful analysis must take account of the number of observations available in each space-time sampling bin, and the study also needs to account for the sampling of severe aerosol events.
4. Published MISR-AERONET Level 2 aerosol validation studies use coincident events for which both satellite and surface instruments report cloud-free, good quality results. **BOTH cloud masks** must say it is cloud-free for a case to be included in such studies. The MISR data set overall of course uses only the satellite cloud-screening algorithm; these are known to have some problems, and are as yet being refined and validated as of the current Version (0021) of the MISR Level 3 Aerosol product.

Key issues currently being addressed by the MISR team and associates that bear upon the use of the Level 3 aerosol products for regional and global scale studies:

1. The **absolute calibration scales** for MISR and MODIS differ by 3% over much of the brightness range. This has been traced to the difference between the on-board calibrator used to set the MODIS absolute radiometric scale, and the vicarious calibration experiments (*Bruegge et al., TGARS 2004; Thome et al., SPIE 2004; Abdou et al., TGARS 2002*) used for the MISR absolute scale. The scale difference is in the sense that MISR is higher than MODIS, so any convergence would reduce current differences between the MISR and MODIS AOT products over water.

A paper looking deeply into a possible resolution of this calibration difference is in preparation:

Lyapustin, A., Y. Wang, R. Kahn, R. Wolfe, J. Xiong, K. Thome, A. Smirnov, C. Bruegge, A. Ignatov, O. Dubovik, 2006. Analysis of MODIS-MISR Calibration Difference: Implications for Data Fusion, Remt. Sens. Environ., in preparation. Note that the absolute calibration stability, as well as the band-to-band and camera-to-camera relative calibration for MISR itself, are within a few percent or better.

2. **Cloud masking** is under study by the MISR team, as well as several other groups. For aerosol retrievals, the MISR cloud mask has eight separate tests to draw upon, and the logic that defines their use is being optimized with the help of numerous cloud validation cases, distributed globally. Some work has already appeared regarding MISR cloud detection (e.g., *DiGirolamo and Wilson, TGARS 2003; Zhao and DiGirolamo, JAM 2004*), but current tasks need to be completed before that aspect of the product will be validated.
3. The MISR Level 2 aerosol microphysical property values are currently being validated. Level 3 aggregates will be released once these quantities are at least Provisionally Validated. Improvements in the Aerosol Retrieval Algorithm based on the validation studies may also result in incremental improvements in the optical depth values for the more challenging cases.

Algorithm Updates

The aerosol retrieval algorithms described in the [MISR Level 2 Aerosol Retrieval ATBD](http://eospsso.gsfc.nasa.gov/eos_homepage/for_scientists/atbd/docs/MISR/atbd-misr-09.pdf) (http://eospsso.gsfc.nasa.gov/eos_homepage/for_scientists/atbd/docs/MISR/atbd-misr-09.pdf) (Revision E, April 2001) have been modified and improved, based on initial analyses of the data. The next release of this document will include an updated description of these algorithms.