MISR Aerosol Climatology Product Quality Statement December 1, 2007

Authors: Ralph Kahn, Michael Bull

This statement applies to the MISR Aerosol Climatology Product (ACP), **Version F05_0014 of the Aerosol Physical and Optical Properties** (APOP) file, and **Version F05_0021 of the Aerosol Mixture** file. Quality statements covering earlier time periods may be accessed through links at the bottom of this page. The primary reference for this product is the MISR Level 2 Ancillary Products and Databases ATBD, though updates are documented in published work referenced below.

The MISR aerosol retrieval algorithm relies on comparing observed radiances with those calculated from a forward radiative transfer code, input with an assumed aerosol climatology (the ACP) and a range of column optical depths [*Martonchik et al*, 2002; 1998; MISR Level 2 Aerosol Retrieval ATBD]. The ACP ***describes mixtures of up to three component aerosol types from a list of eight components***, in varying proportions. ACP component aerosol particle data quality depends on the ACP input data, which are based on aerosol particles described in the literature, and take into account MISR-specific sensitivity to particle size, single-scattering albedo, and shape - ***roughly: small, medium and large; dirty and clean; spherical and nonspherical*** [*Kahn et al.*, 1998; 2001]. Also reported in the ACP are the mixtures of these components used by the retrieval algorithm. The assumed aerosol components and mixtures have been updated for this release, based on validation study results [*Kahn et al.*, 2005a; *Kalashnikova et al.*, 2005b]. These are expected to be refined further as a result of validation studies currently underway.

For reference, component aerosol particle size and shape fractional amount parameters have been added to APOP product version F04_0005 and to Mixture product version F04_0007 and subsequent versions. Note that the ACP product consists of **three parts**: the ***Aerosol Physical and Optical Properties (APOP) file***, which describes the aerosol components, the ***Aerosol Mixture file***, which gives the mixtures of components, and the ***Aerosol Clim-Likely file***, which contains a climatology of aerosol amount and type obtained from aerosol transport models [*Kahn et al.*, 2001].

The list below highlights major changes, known problems, or limitations in the product.

Aerosol Physical and Optical Properties (a.k.a. APOP, MIANACP)

Limited Set of Aerosol Component Particle Dust Models

The aerosol component particles include a ***new Saharan dust analog*** model [*Kalashnikova et al.*, 2005]. In the future, an Asian dust analog model may be added to the list.

Particle Size Thresholds Changed

The particle size thresholds are changed to:

small (< 0.35 micron radius)
medium (0.35 to 0.70 micron radius)
large (> 0.70 micron radius)

These are used to determine the retrieved fractional optical depth for each size category, given in the aerosol product itself.

Deleted Fields Related to Particle Hydration State

The aerosol component particles are no longer reported in states of hydration, since ***the instrument is sensitive only to ambient optical properties***, and any information about hydration state would require additional assumptions or external data. Therefore, the following fields have been removed: vdata field 'Relative humidity' in 'Summary Table' vdata; vdata fields 'Relative humidity', 'Hygroscopic', and 'Water activity model' in 'Input Component Particle Types' vdata; vdata fields 'Reference relative humidity model number', 'Water activity model', 'Hygroscopic', and 'Relative humidity' in 'Data Table' vdata; vdata field 'Relative humidity' in 'Hydrated Relative Humidities' vdata; and file global attributes 'Number of hydrated relative humidities', 'Number of water activity models', 'Reference relative humidity'.

Aerosol Mixture File (a.k.a. MIANACP)

Deleted Fields Related to Particle Hydration State

The aerosol component particles are no longer reported in states of hydration. Therefore, the following fields have been removed: vdata field

'Relative humidity' in 'Mixture Data' vdata; and file global attribute 'Reference relative humidity'.

Aerosol Clim-Likely File

Information regarding the climatological-likelihood of aerosol column amount and mixture-type occurrence, globally, is given as monthly, 1x1 degree fields in the Aerosol Climatology Product (ACP). The Clim-Likely file is ***provided for reference only***. It is not used in the MISR retrieval itself, which tests ***all*** mixtures in the ACP for all locations and times, and reports all mixtures that meet the success criteria as "successful". The mixture having the smallest residual is called out separately as the "best fit" or "lowest residual" mixture, but ***all successful mixtures are used in calculating "best estimate" aerosol retrieval quantities***.

References

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