



# High Mountain Asia MODIS Aerosol Optical Depth, Version 1

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## USER GUIDE

### How to Cite These Data

As a condition of using these data, you must include a citation:

Tsay, S. and W. V. Kim. 2019. *High Mountain Asia MODIS Aerosol Optical Depth, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/D0SO1YA0B9EY>. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT [NSIDC@NSIDC.ORG](mailto:NSIDC@NSIDC.ORG)

FOR CURRENT INFORMATION, VISIT [https://nsidc.org/data/HMA\\_OptDepth](https://nsidc.org/data/HMA_OptDepth)



National Snow and Ice Data Center

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# 1 DATA DESCRIPTION

## 1.1 Parameters

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The main parameters featured in this data set are aerosol optical depth (AOD) and Angstrom exponent (AE). All the parameters provided in the data files are described in Table 1.

Table 1. Parameter Information

Parameter	Description	Units
Longitude	Longitude	° E
Latitude	Latitude	° N
AOD	Aerosol optical depth	-
Angstrom_Exponent	Angstrom exponent	-

## 1.2 File Information

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### 1.2.1 Format

The data files are provided in ASCII text (.txt) format.

### 1.2.2 Naming Convention

Example file names:

HMA\_OptDepth\_AQUA\_2019\_03.txt

HMA\_OptDepth\_TERRA\_2000\_02.txt

The files are named according to the following convention, which is described in Table 2:

HMA\_OptDepth\_[satellite]\_[yyyy]\_[mm].[ext]

Table 2. File Naming Convention

Variable	Description
HMA_OptDepth	Data set ID
satellite	Indicates one of two satellites carrying the MODIS instrument: AQUA TERRA
YYYY	4-digit year
mm	2-digit month
.ext	Indicates file type: .txt = ASCII text data file

## 1.3 Spatial Information

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### 1.3.1 Coverage

Spatial coverage includes parts of the Himalayas, as noted by the spatial extents below:

Northernmost latitude: 48.5° N

Southernmost latitude 9.5° N

Easternmost longitude: 99.5° E

Westernmost longitude: 55.5° E

### 1.3.2 Resolution

The spatial resolution of the data is 1° by 1°.

### 1.3.3 Geolocation

Table 3 provides geolocation information for this data set.

Table 3. Geolocation Details

<b>Geographic coordinate system</b>	WGS 84
<b>EPSG code</b>	4326
<b>PROJ4 string</b>	+proj=longlat +datum=WGS84 +no_defs
<b>Reference</b>	<a href="https://epsg.io/4326">https://epsg.io/4326</a>

## 1.4 Temporal Information

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### 1.4.1 Coverage

01 February 2000 to 31 March 2019

**Note:** the Aqua data start on 01 July 2002.

### 1.4.2 Resolution

Monthly

## 2 DATA ACQUISITION AND PROCESSING

### 2.1 Background and Instrumentation

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The Moderate Resolution Imaging Spectroradiometer (MODIS) is a key instrument aboard the Terra (EOS AM) and Aqua (EOS PM) satellites. Terra's sun-synchronous, near-polar circular orbit is timed to cross the equator from north to south (descending node) at approximately 10:30 A.M. local time. Aqua's sun-synchronous, near-polar circular orbit is timed to cross the equator from south to north (ascending node) at approximately 1:30 P.M. local time. Terra MODIS and Aqua MODIS thus view Earth's entire surface every 1 to 2 days, acquiring data in 36 spectral bands, or groups, of wavelengths. Text goes here

### 2.2 Acquisition and Processing

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The MODIS AOD/AE data sets were extracted from MODIS Aqua/Terra Collection 6.1 monthly data. In the case of AOD, combined Deep Blue and Dark Target AOD data were used (AOD\_550\_Dark\_Target\_Deep\_Blue\_Combined\_Mean\_Mean). For the AE data, Deep Blue AE data over land (Deep\_Blue\_Angstrom\_Exponent\_Land\_Mean\_Mean) and Dark Target AE data over ocean (Aerosol\_AE1\_Ocean\_JHisto\_vs\_Opt\_Depth) were combined.

For more details on the acquisition and processing steps, see Hsu et al. (2013) and Sayer et al. (2013). For more information on the Deep Blue/Dark Target algorithms, visit NASA's [Deep Blue](#) and [Dark Target](#) web pages, respectively. To read more about AOD, see the [NASA Earth Observatory AOD web page](#).

### 2.3 Quality, Errors, and Limitations

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See Hsu et al. (2013) and Sayer et al. (2013).

## 3 SOFTWARE AND TOOLS

The data files can be opened by any software that reads ASCII text files.

## 4 RELATED DATA SETS

[High Mountain Asia at NSIDC | Data Sets](#)

## 5 RELATED WEBSITES

[High Mountain Asia at NSIDC | Overview](#)

[NASA High Mountain Asia Project](#)

[NASA Research Announcement: Understanding Changes in High Mountain Asia](#)

## 6 CONTACTS

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## 7 ACKNOWLEDGMENTS

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## 8 REFERENCES

Hsu, N. C., Jeong, M.-J., Bettenhausen, C., Sayer, A. M., Hansell, R., Seftor, C. S., ... Tsay, S.-C. (2013). Enhanced Deep Blue aerosol retrieval algorithm: The second generation. *Journal of Geophysical Research: Atmospheres*, 118(16), 9296–9315. <https://doi.org/10.1002/jgrd.50712>

Sayer, A. M., Hsu, N. C., Bettenhausen, C., & Jeong, M.-J. (2013). Validation and uncertainty estimates for MODIS Collection 6 “Deep Blue” aerosol data. *Journal of Geophysical Research: Atmospheres*, 118(14), 7864–7872. <https://doi.org/10.1002/jgrd.50600>

## 9 DOCUMENT INFORMATION

### 9.1 Publication Date

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16 January 2019

### 9.2 Date Last Updated

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