Modis Technical Guide

This guide provides users the details they need to employ imagery downloaded from the GLCF. This is not intended as a seminal instruction on this topic, but rather a first step toward practical utilization.

MODIS is an important sensor onboard NASA's Terra (EOS AM) and Aqua (EOS PM) satellites. The land imaging component of the MODIS sensor combines characteristics of AVHRR and Landsat sensors to provide improved monitoring of the Earth's surface at global scales. It is important to note that while the MODIS sensor is onboard both the Terra and Aqua satellites, MODIS data available at GLCF are exclusively derived from the sensor on the Terra platform. Please visit one of the MODIS web pages at left for more information.

1. Orbit and Acquisition Characteristics
The Terra satellite began collecting data of the Earth's surface in February of 2000. It is a polar orbiting spacecraft that obtains complete Earth coverage every one to two days and is designed to cross the equator at a time when cloud cover is at its daily minimum (10:30AM, descending). The following table describes the orbit and acquisition characteristics of the MODIS sensor onboard the Terra satellite.

Swath (km)	Scene Size (km)	Altitude (km)	Revisit (days)
2330km	~10 x ~10	705km	16

2. Radiometric Characteristics Unlike other satellite imagery and products, MODIS data is systematically converted into derived atmospheric, oceanic, and terrestrial products. The MODIS surface reflectance product is part of the latter. All seven land bands are corrected for atmospheric effects with an algorithm that uses aerosol and water vapor information collected by the sensor. The algorithm corrects for thin cirrus clouds, aerosols, and atmospheric gasses. The result is an estimation of surface reflectance as if it had been measured on the surface, without the effects of atmospheric absorption or scattering. The table below describes wavelengths represented by the 7 bands included here:

Band	Wavelength (nm)	Description
1	620-670	Red
2	841-876	Near-infrared
3	459-479	Blue
4	545-565	Green
5	1230-1250	Short wave infrared
6	1628-1652	Short wave infrared (similar to Landsat band 5)
7	2105-2155	Short wave infrared (similar to Landsat band 7)

3. Data Format Properties

*This material concerns the 32-day composites, from Collection 3.*The 500m 32-day composites available from the GLCF were derived from the MODIS level 3 surface reflectance product called MOD09A1 (8-day Surface Reflectance Composites). These monthly composites were a necessary precursor to the MODIS Vegetation Continuous Fields product. See the table below for the days included in the monthly composites:

Julian Days	**Calendar Days**
361-032	Dec 27 - Feb.1
033-064	Feb.2-Mar.5
065-096	Mar.6-Apr.6
097-128	Apr.7-May 8
129-160	May 9-Jun.9
161-192	Jun.10-Jul.11
193-224	Jul.12-Aug.12
225-256	Aug.13-Sep.13
257-288	Sep.14-Oct.15
289-330	Oct.16-Nov.16
321-360	Nov.17-Dec.26

Note that 365 (days in the year) is not evenly divisible by 32 (days in our compositing period). This is why the December and January composites have 40 and 37 days in their compositing period (Julian days 321-360 and 361-032).

The 8-day composites are received in 294 individual tiles that make up the land surface area of the earth (excludes any unnecessary ocean data or otherwise non-land containing areas). Our 32-day composites are done in these same 294 tiles then stitched together and reprojected using Nearest Neighbor resampling into the Goode's Homolosine projection with continental subsets. The data cannot easily be stitched into a single global file because the resultant file would be approximately 7GB in size per band. This would be cumbersome to download and is relatively unsupported in most file systems. All files are available in GeoTIFF format.

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