



[DAAC Home](#) > [Get Data](#) > [Regional/Global](#) > [North American Carbon Program \(NACP\)](#) > [User guide](#)

MODIS-derived Vegetation and Albedo Parameters for Agroecosystem-Climate Modeling

Get Data

Documentation Revision Date: 2018-04-12

Data Set Version: 1

Summary

This dataset provides MODIS-derived leaf area index (LAI), stem area index (SAI), vegetation area fraction, dominant landcover category, and albedo parameters for the continental US (CONUS), parts of southern Canada, and Mexico at 30 km resolution. The data cover the period 2003-2010 and were developed to be used as surface input data for regional agroecosystem-climate models. MODIS Collection 5 products used to derive these parameters included the Terra yearly water mask, vegetation continuous field products, the combined Terra and Aqua yearly land-cover category (LCC) (MCD12Q1), 8-day composites for LAI (MCD15A2), and albedo parameter (MCD43B1) products. Please note that the MODIS Version 5 land data products used in this dataset have been superseded by Version 6 data products.

There are three data files in NetCDF (.nc4) format with this dataset.

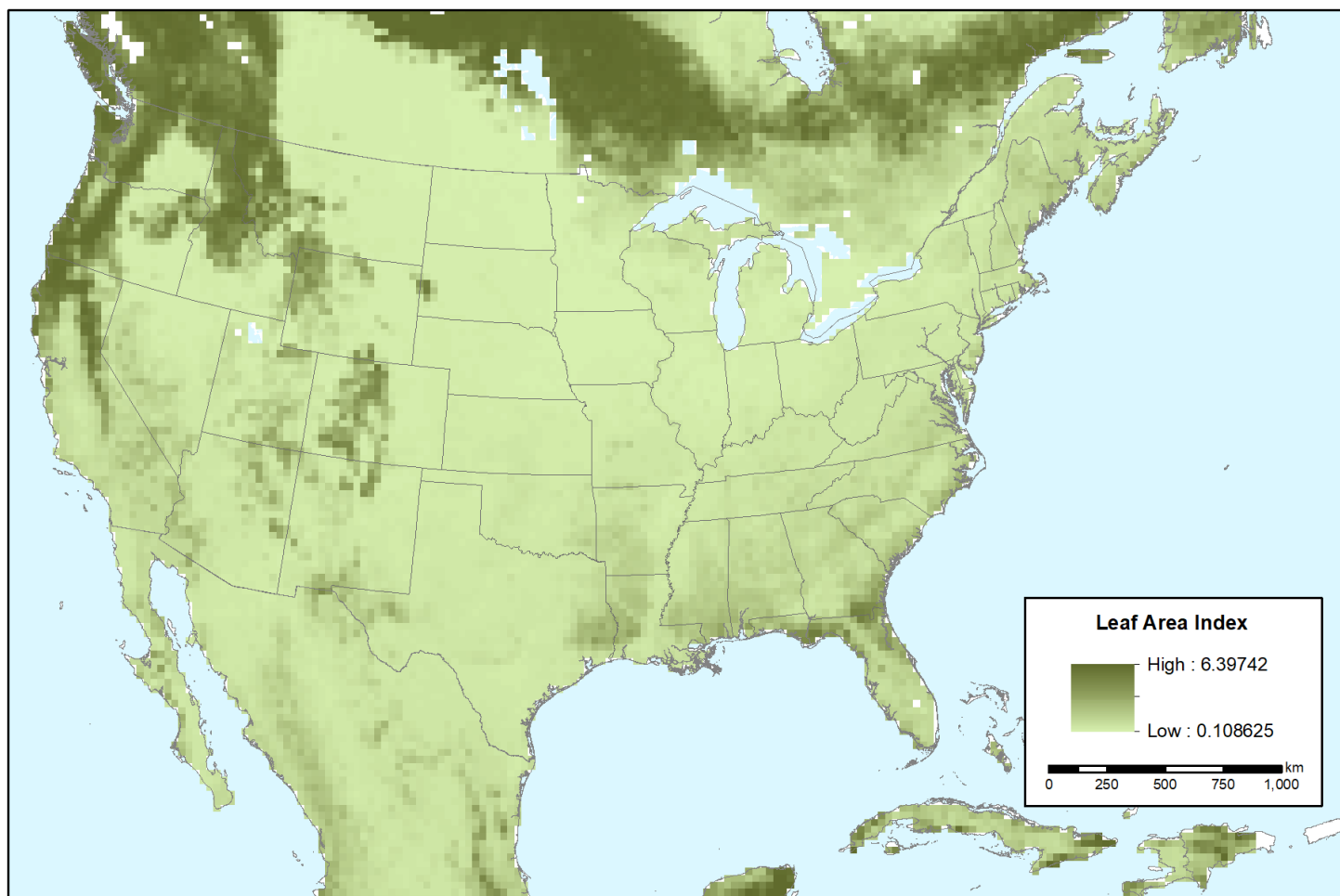


Figure 1. Leaf area index at 30 km resolution for the month of January. This figure was created from the data file leaf_stem_area_index_monthly_climatology_2003-2010.nc4.

Citation

Xu, M., X. Zhang, and X.Z. Liang. 2018. MODIS-derived Vegetation and Albedo Parameters for Agroecosystem-Climate Modeling. ORNL DAAC, Oak Ridge, Tennessee, USA. <https://doi.org/10.3334/ORNLDAAC/1539>

Table of Contents

1. [Data Set Overview](#)
2. [Data Characteristics](#)
3. [Application and Derivation](#)
4. [Quality Assessment](#)
5. [Data Acquisition, Materials, and Methods](#)
6. [Data Access](#)
7. [References](#)
8. [Data Set Revisions](#)

1. Data Set Overview

This dataset provides MODIS-derived leaf area index (LAI), stem area index (SAI), vegetation area fraction, dominant landcover category, and albedo parameters for the continental US (CONUS), parts of southern Canada, and Mexico at 30 km resolution. The data cover the period 2003-2010 and were developed to be used as surface input data for regional agroecosystem-climate models. MODIS Collection 5 products used to derive these parameters included the Terra yearly water mask, vegetation continuous field products, the combined Terra and Aqua yearly land-cover category (LCC) (MCD12Q1), 8-day composites (i.e., January 1-8, January 9-16, etc.) for LAI (MCD15A2), and albedo parameter (MCD43B1) products

Project: [North American Carbon Program](#)

The North American Carbon Program (NACP) is a multidisciplinary research program to obtain scientific understanding of North America's carbon sources and sinks and of changes in carbon stocks needed to meet societal concerns and to provide tools for decision makers. The NACP is supported by a

number of different federal agencies. The central objective is to measure and understand the sources and sinks of Carbon Dioxide (CO₂), Methane (CH₄), and Carbon Monoxide (CO) in North America and in adjacent ocean regions.

Related Publication:

Xu, M., X-Z. Liang, A.N. Samel, and W. Gao. 2014. MODIS consistent vegetation parameter specifications and their impacts on regional climate simulations. *J Clim* 27:8578–8596. <https://doi.org/10.1175/JCLI-D-14-00082.1>

Acknowledgements:

The datasets are generated with support from NASA Terrestrial Ecology (TE NNH12AU03I) and New Investigator Program (NIP) (NNH13ZDA001N).

2. Data Characteristics

Spatial Coverage: Entire continental United States and partial regions of Canada and Mexico

Spatial resolution: 30 km x 30 km resolution

Temporal resolution: Climatology is average values for each month (12 time steps) representing data between 2003-01-01 to 2010-12-31. The “*_8day” data retain the original 8-day MODIS composite resolution.

Study Areas (All latitude and longitude given in decimal degrees)

Site	Westernmost Longitude	Easternmost Longitude	Northernmost Latitude	Southernmost Latitude
USA and partial regions of Canada and Mexico	-139.0508333	-51.94888889	49.1525	15.1525

Data File Information

There are three files in netCDF (.nc4) format with this data set: one file with albedo parameters (data every 8 days), one file with stem and leaf area index (data every 8 days), and one file with monthly leaf area and stem area index, dominant land cover, and vegetation area fraction data. The data are provided at 30-km resolution that is generally useful for most RCMs.

Table 1. File names and descriptions

File name	Descriptions
infrared_visible_bands_8day_2003-2010.nc4	Provides 8-day albedo parameters -- the LiSparseR, Isotropic, and Rossthick parameters for near-infrared band (0.3-5um) and for visible band (0.3-0.7um). Temporal extent: Every 8 days from 2003-01-01 to 2010-12-31.
leaf_stem_area_index_8day_2003-2010.nc4	Provides 8-day leaf area index and stem area index. Temporal extent: Every 8 days from 2003-01-01 to 2010-12-31.
leaf_stem_area_index_monthly_climatology_2003-2010.nc4	Provides monthly average over years 2003 to 2010 of leaf area and stem area index, dominant land cover, and vegetation area fraction data

Data Variables

Table 2. Variables in the file **infrared_visible_bands_8day_2003-2010.nc4**.

Variable	Units	Description*
fgeo	none	LiSparseR parameter for near-infrared band (0.3-5um)
fniso	none	Isotropic parameter for near-infrared band (0.3-5um)
fnvol	none	Rossthick parameter for near-infrared band (0.3-5um)
fvgeo	none	LiSparseR parameter for visible band (0.3-0.7um)
fviso	none	Isotropic parameter for visible band (0.3-0.7um)
fvvol	none	Rossthick parameter for visible band (0.3-0.7um)

*These albedo parameters are discussed in Schaaf et al. 2002.

Table 3. Variables in the file **leaf_stem_area_index_8day_2003-2010.nc4**.

Variable	Units	Description
lai	none	Leaf area index
sai	none	Stem area index

Table 4. Variables in the file **leaf_stem_area_index_monthly_climatology_2003-2010.nc4**

Variable	Units	Description
XFVEG	none	Vegetation area fraction
XLAI	none	Leaf area index
XLCC	none	Dominant land cover category: USGS 24-category Land Use Categories. See Table 5 below.
XSAI	none	Stem area index

Table 5. USGS 24-category Land Use Categories.

Land Use Category	Land Use Description*
1	Urban and Built-up Land
2	Dryland Cropland and Pasture
3	Irrigated Cropland and Pasture
4	Mixed Dryland/Irrigated Cropland and Pasture
5	Cropland/Grassland Mosaic
6	Cropland/Woodland Mosaic
7	Grassland
8	Shrubland
9	Mixed Shrubland/Grassland
10	Savanna
11	Deciduous Broadleaf Forest
12	Deciduous Needleleaf Forest
13	Evergreen Broadleaf
14	Evergreen Needleleaf
15	Mixed Forest
16	Water Bodies
17	Herbaceous Wetland
18	Wooden Wetland
19	Barren or Sparsely Vegetated
20	Herbaceous Tundra

21	Wooded Tundra
22	Mixed Tundra
23	Bare Ground Tundra
24	Snow or Ice

*Source: WRF user's guide: http://www2.mmm.ucar.edu/wrf/users/docs/user_guide_V3/users_guide_chap3.htm

Data file projection

These files use a custom projection:

PROJCS["custom",
GEOGCS["WGS 84",
DATUM["WGS_1984",
SPHEROID["WGS 84",6378137,298.257223563,
AUTHORITY["EPSG","7030"],
AUTHORITY["EPSG","6326"],
PRIMEM["Greenwich",0],
UNIT["degree",0.0174532925199433],
AUTHORITY["EPSG","4326"],
PROJECTION["Lambert_Conformal_Conic_2SP"],
PARAMETER["standard_parallel_1",30],
PARAMETER["standard_parallel_2",60],
PARAMETER["latitude_of_origin",37.5],
PARAMETER["central_meridian",-95.5],
PARAMETER["false_easting",0],
PARAMETER["false_northing",0],
UNIT["metre",1,
AUTHORITY["EPSG","9001"]]]
Proj4 string:
+proj=lcc +lat_1=30 +lat_2=60 +lat_0=37.5 +lon_0=-95.5 +x_0=0 +y_0=0 +datum=WGS84 +units=m +no_defs

3. Application and Derivation

These data were developed to replace the AVHRR-derived vegetation parameters for use as surface input data for regional climate models (Xu et al., 2014).

4. Quality Assessment

Use these data with caution: No quality assessment is provided. The uncertainties are expected to partially inherit from the original MODIS data products.

Please note that the MODIS Version 5 land data products used in this dataset have been superseded by [Version 6 data products](#).

Known Issues: The albedo parameter (V005 MCD43B1) product used here only represents the average of the underlying MCD43A product (with the majority QA) and thus is considered a poorer quality product. MCD43B was discontinued in V006. In V006, [MCD43A*](#) represents the primary retrieval for this product and is recommended for all users. The [MCD43D*](#) products are provided on a 30arc second Climate Modeling Grid (CMG) and are

recommended for use in climate simulation models. As with all MODIS products, we recommend you use these data only with a complete understanding of the associated QA flags.

5. Data Acquisition, Materials, and Methods

Overview:

This dataset provides vegetation parameters (LAI, SAI, FVC, and LCC) and albedo parameters derived from MODIS Collection 5 data products for use in regional agroecosystem-climate models. The MODIS Collection 5 data used to derive the vegetation parameters were the Terra yearly water mask and vegetation continuous field products, and the combined Terra and Aqua yearly LCC (MCD12Q1), 8-day composites for LAI (MCD15A2), and albedo parameter (MCD43B1) products.

The products were first aggregated from their original spatial resolutions to a 1-km sinusoidal projection and then remapped using a nearest-neighbor interpolation to a 1-km map projection within a computation domain defined by users. Pixels were processed only where the embedded quality control (QC) flag indicates best quality. The remaining pixels were assigned a missing value. To remove the missing value pixels and minimize cloud and snow contamination, multiyear data were used to construct a monthly climatology of yearly data and the 8-day composites. The processing of the MODIS products are described in detail in Xu et al. (2014).

Important User Notes:

Date Range: The detailed processing described in Xu et al. (2014) refer to MODIS data products over the date range of 2000-2010. The data provided in this dataset are a subset from 2003-2010. The data prior to 2003 are generally of poor quality and have many missing values and were excluded.

Spatial Resolution: The detailed processing in Xu et al. (2014) describe various conversions and reprojections of the data for comparisons with other products and to accommodate specific regional agroecosystem-climate models. The data provided in this dataset are an aggregation of the 1-km products to a 30-km resolution that is generally useful for most regional agroecosystem-climate models.

Detailed Processing Descriptions:

The data user is referred to Xu et al. (2014) for complete processing details for the land-cover category (LCC), fractional vegetation cover (FVC), leaf and stem area indices (LAI and SAI), and land surface albedo parameters.

6. Data Access

These data are available through the Oak Ridge National Laboratory (ORNL) Distributed Active Archive Center (DAAC).

[MODIS-derived Vegetation and Albedo Parameters for Agroecosystem-Climate Modeling](#)

Contact for Data Center Access Information:

- E-mail: uso@daac.ornl.gov
- Telephone: +1 (865) 241-3952

7. References

Schaaf, C. B., Gao, F., Strahler, A. H., Lucht, W., Li, X., Tsang, T., et al. (2002). First operational BRDF, albedo nadir reflectance products from MODIS. *Remote Sensing of Environment*, 83(1–2), 135–148. [https://doi.org/10.1016/S0034-4257\(02\)00091-3](https://doi.org/10.1016/S0034-4257(02)00091-3)

Xu, M., X-Z. Liang, A.N. Samel, and W. Gao. 2014. MODIS consistent vegetation parameter specifications and their impacts on regional climate simulations. *J Clim* 27:8578–8596. <https://doi.org/10.1175/JCLI-D-14-00082.1>

8. Data Set Revisions

This dataset documentation was revised on 2018-04-10 to indicate known data quality issues with the MODIS Version 5 MCD43B data product.



[Privacy Policy](#) | [Feedback](#) | [Help](#)



[Home](#)

About Us

Who We Are
Partners
User Working Group
Data Citation Policy
Workshops
News

Get Data

Complete Dataset List
Search for Data
Field Campaigns
Land Validation
Regional/Global
Model Archive

Submit Data

Submit Data Form
Data Scope and Acceptance
Data Authorship Policy
Data Publication Timeline
Detailed Submission Guidelines

Data Management

Best Practices
Data Management Plan
How-to's

Tools

MODIS
THREDDS
SDAT
Daymet
CARVE Data Viewer
Soil Moisture Visualizer

Help

FAQs

[Contact Us](#)

