



Sadashiva Devadiga (SSAI)  
MODIS LDOPE  
January 17, 2007

*devadiga@ltpmail.gsfc.nasa.gov*

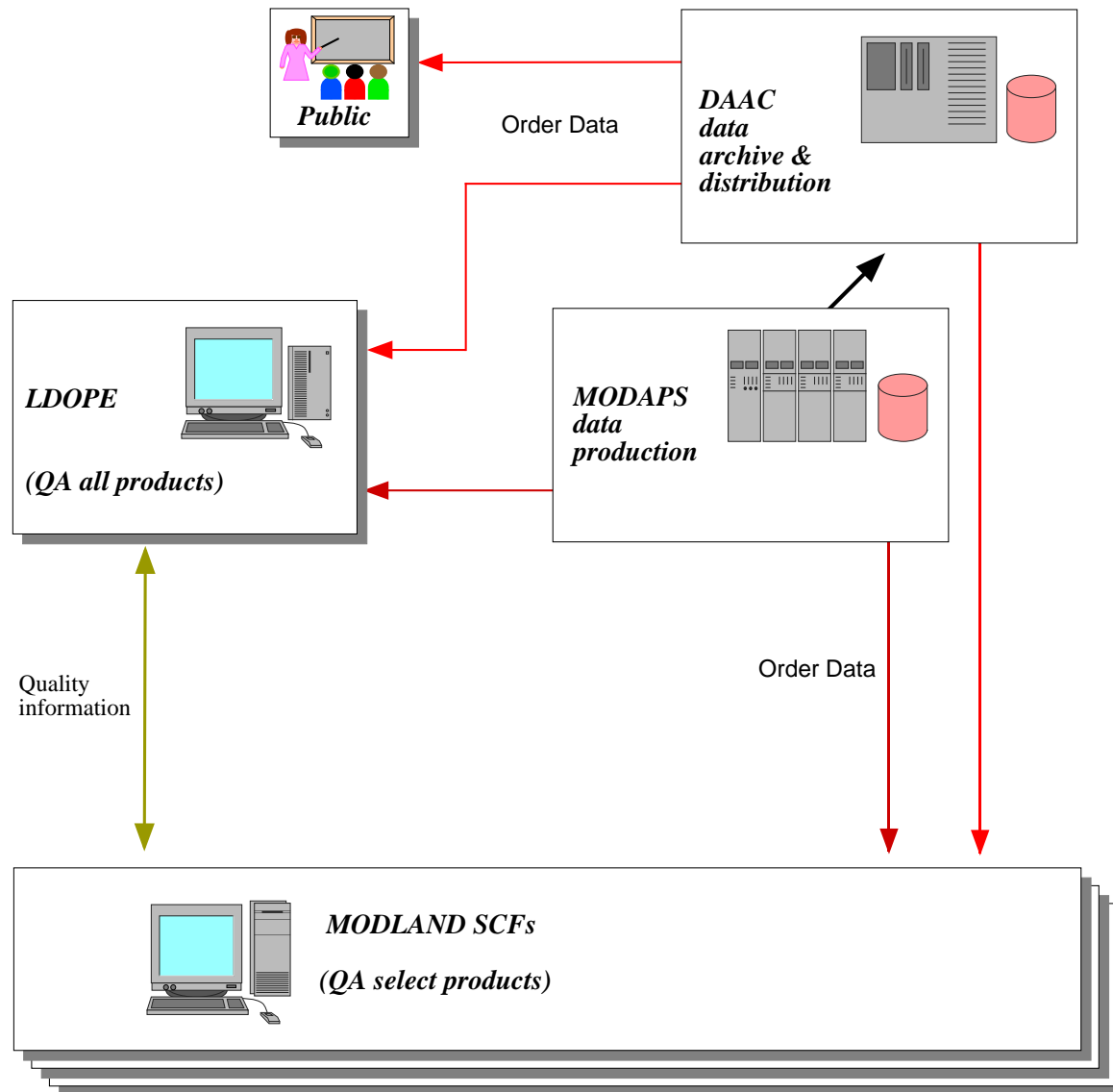
# Product Performance

- Although every attempt is made to ensure that the products are generated without error, product distribution is not delayed until products are proven error-free or until known errors have been removed by product reprocessing.
- Products are evaluated with respect to their intended performance and are labeled with appropriate quality flag –  
**Quality Assessment**
  - Performed by examination of products, usually without inter-comparison with other data
  - Results are stored in the product as per-pixel flags and metadata at the product file level
  - **C4 data was used as baseline for evaluating the performance of C5 algorithm change**
- Using the QA results
  - **users** to consider products in their appropriate scientific context
  - **the science team** to identify products that are performing poorly so that improvements may be implemented

# MODIS Land QA – Role Overview

- **SCF** - *responsible for QA of their product*
  - Science Teams perform selective science QA
  - Communicate QA issues to LDOPE
- **LDOPE** - *is a centralized facility providing a coordination mechanism for MODLAND's QA activities*
  - Performs routine and coordinated QA of all MODIS land products
  - testing & dependencies
  - MODLAND QA services – on LDOPE web site
    - Global & Golden tile Browse, Animations, Time series
    - Tools
    - FAQ
    - Science Quality Flag & Science Quality Flag Explanation
    - Known issues
- **MODAPS and DAAC** - *responsible for ensuring the non-scientific quality of the products, they ensure that:*
  - production codes are correctly configured
  - products are made using the correct input data
  - products are not corrupted in the production, transfer, archival, or retrieval processes.

# MODIS Land QA - Role Overview



# MODIS Land QA Storage

- Formal QA results are descriptive statements concerning product quality, stored within each product as
  - per-pixel QA bits
  - science QA metadata
- Informal results
  - product issues posted on a **public web** site with examples, algorithm version and occurrence information
  - science QA metadata also posted on web site

# QA Result Storage - pixel level QA

- Generated by the production code for specific science datasets in each granule/tile. Differs between MODIS products & levels e.g.
  - The QA sds “QC\_Day” provides the pixel level QA for sds “LST\_Day\_1km” in MOD11A2.
  - The QA sds “1 km 16 days VI Quality SDS” provides the pixel level QA for sds “1 km 16 days NDVI” and “1 km 16 days EVI” in MOD13A2.
  - The QA sds “500m Surface Reflectance Band Quality” and “500m Data State Quality” together provide the pixel level QA for all reflectance sds such as “500m Surface Reflectance Band 1”, “500m Surface Reflectance Band 2” etc. in MOD09A1.
  - **Exception:** BRDF product provides pixel level QA as another product. MCD43A2 contains only QA SDS for MCD43A1, MCD43A3 and MCD43A4.
- Pixel Level QA contains
  - Modland wide QA bits (1 or 2 bits)
  - Product specific QA bits

# QA Result Storage - pixel level QA

- Two MODLAND wide QA bits (in all MODLAND products)
  - The 2 least significant bits (0-1) of the QA SDS
  - Bit definition
    - 00: good quality, no need to check other QA information
    - 01: other quality, check other qa information
    - 10: produced, most probably cloudy
    - 11: not produced for reasons other than cloud
  - In C5 many products use only 1 bit
    - 0: good quality
    - 1: other quality

# QA Result Storage - pixel level QA

- Product specific pixel level QA are used to indicate
  - uncertainty estimates and/or ranges (e.g., land surface temperature emissivity and temperature uncertainties)
  - external factors known to affect product quality and consistency e.g.
    - atmospheric conditions (e.g., cloud cover)
    - surface type (e.g., ocean, coast, wetland, inland water)
    - scan, solar and viewing geometry
  - whether dynamic ancillary data or backup estimates have been used as input (e.g., aerosol climatology estimates used instead of retrieved aerosols)
  - logical criteria used by the algorithm
  - results of different algorithm tests
  - whether the input data were useful



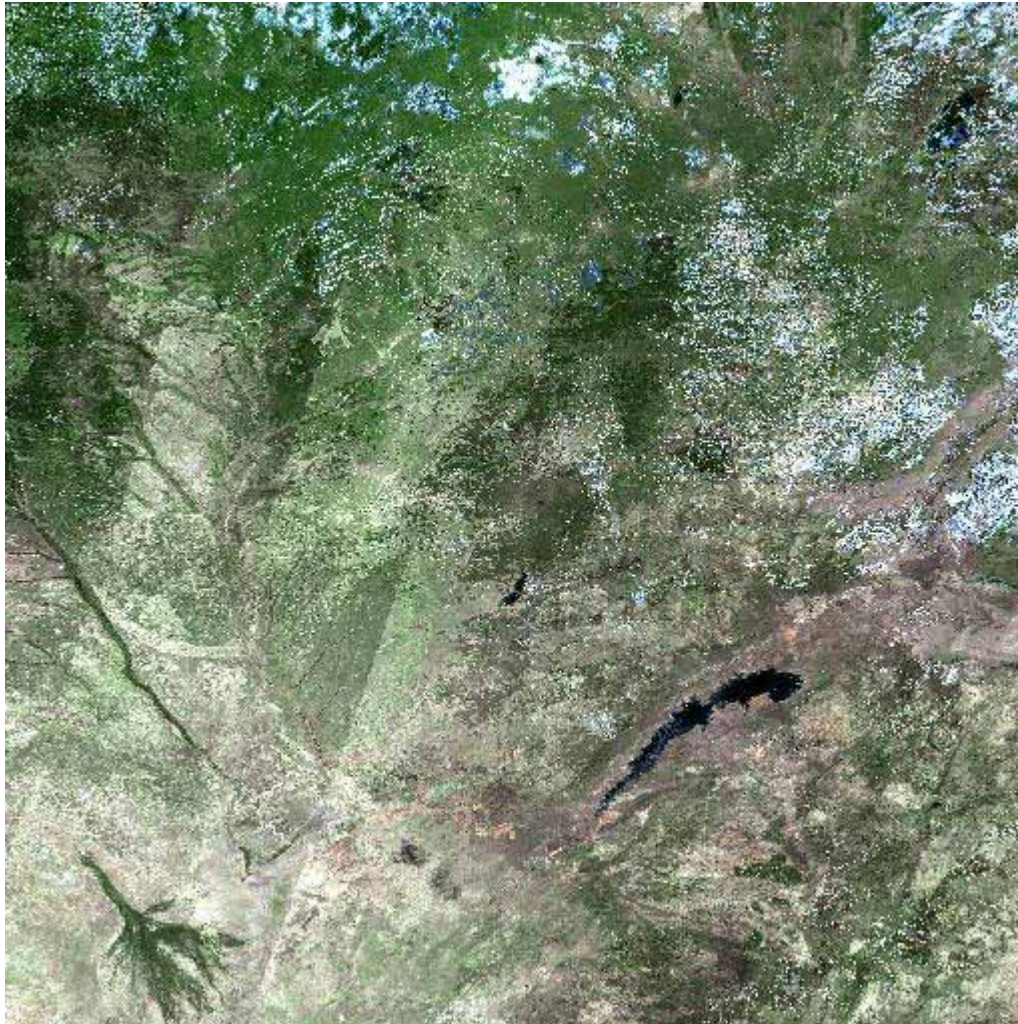
MODIS Product QA bit-packed into 16 bit words,  
enabling the storage of most information in the least space

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>Possible shadow</b>															
0 – No															
1 – Yes															
<b>Possible snow/ice</b>															
0 – No															
1 – Yes															
<b>Land /Water flag</b>															
000 – shallow ocean															
001 – Land only															
010 – Ocean coastlines and lake shorelines															
011 – Shallow inland water															
100 – Ephemeral water															
101 – Deep inland water															
110 – Moderate or continental ocean															
111 – Deep ocean															
<b>Mixed cloud present</b>															
0 – No															
1 – Yes															
<b>Atmospheric BRDF Correction performed</b>															
0 – No															
1 – Yes															
<b>Adjacent cloud detected</b>															
0 – No															
1 – Yes															
<b>Aerosol Quantity</b>															
00 – Climatology															
01 – Low															
10 – Average															
11 – High															
<b>VI Usefulness</b>															
0000 – Highest quality															
0001 – lower quality															
1100 – Lowest quality															
1101 – Quality so low that it is not useful															
1110 – LIB data faulty															
1111 – Not useful/not processed															
<b>Modland QA</b>															
00 – VI produced good quality															
01 – VI produced, but check other quality															
10 – Pixel produced, but most probably cloudy															
11 – Pixel not produced due to other reasons than cloud															

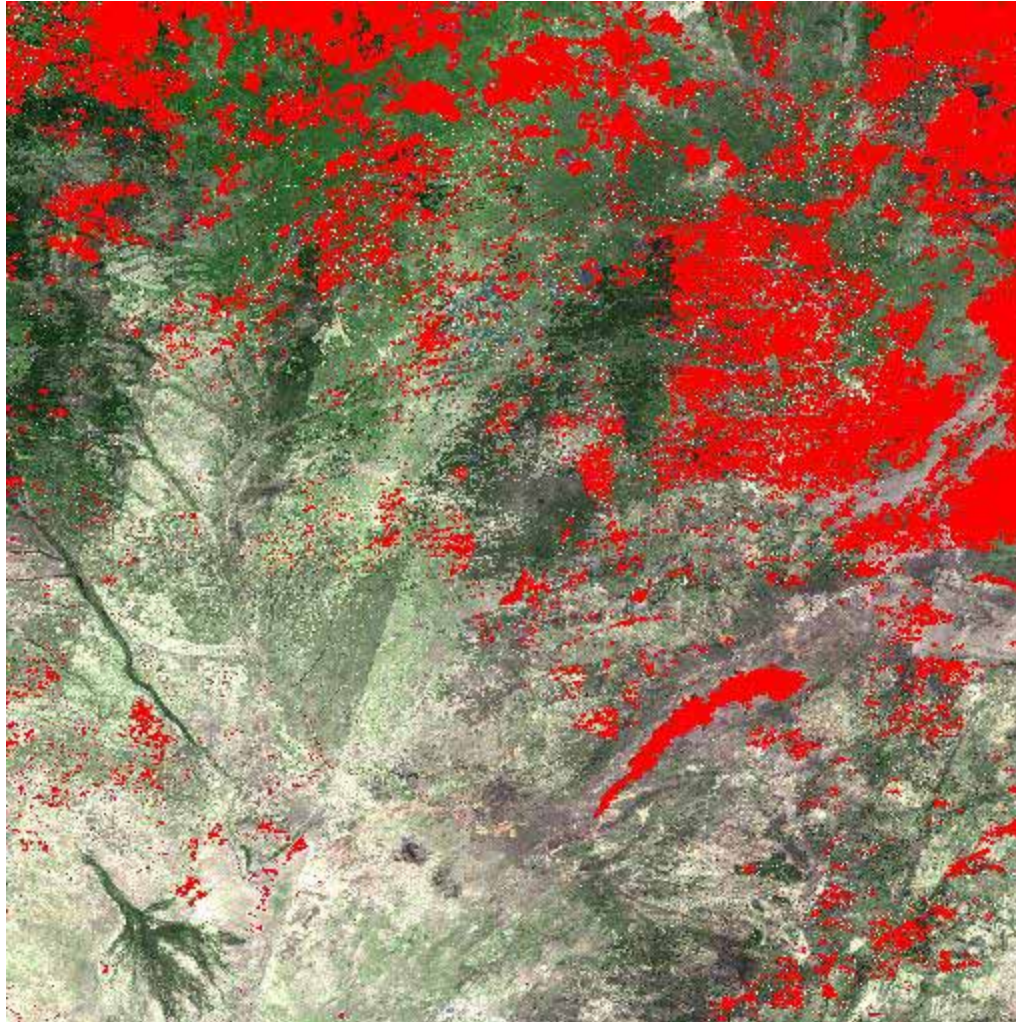
## C5 MODIS VI Product Example

Tomorrow on QA Tools . . . Decoding QA words and using QA to filtering science data for research and other applications

RGB Composite of Surface Reflectance Bands 1, 3 and 4  
C5 MOD09A1, Day 2000 305, South Africa, h20v10

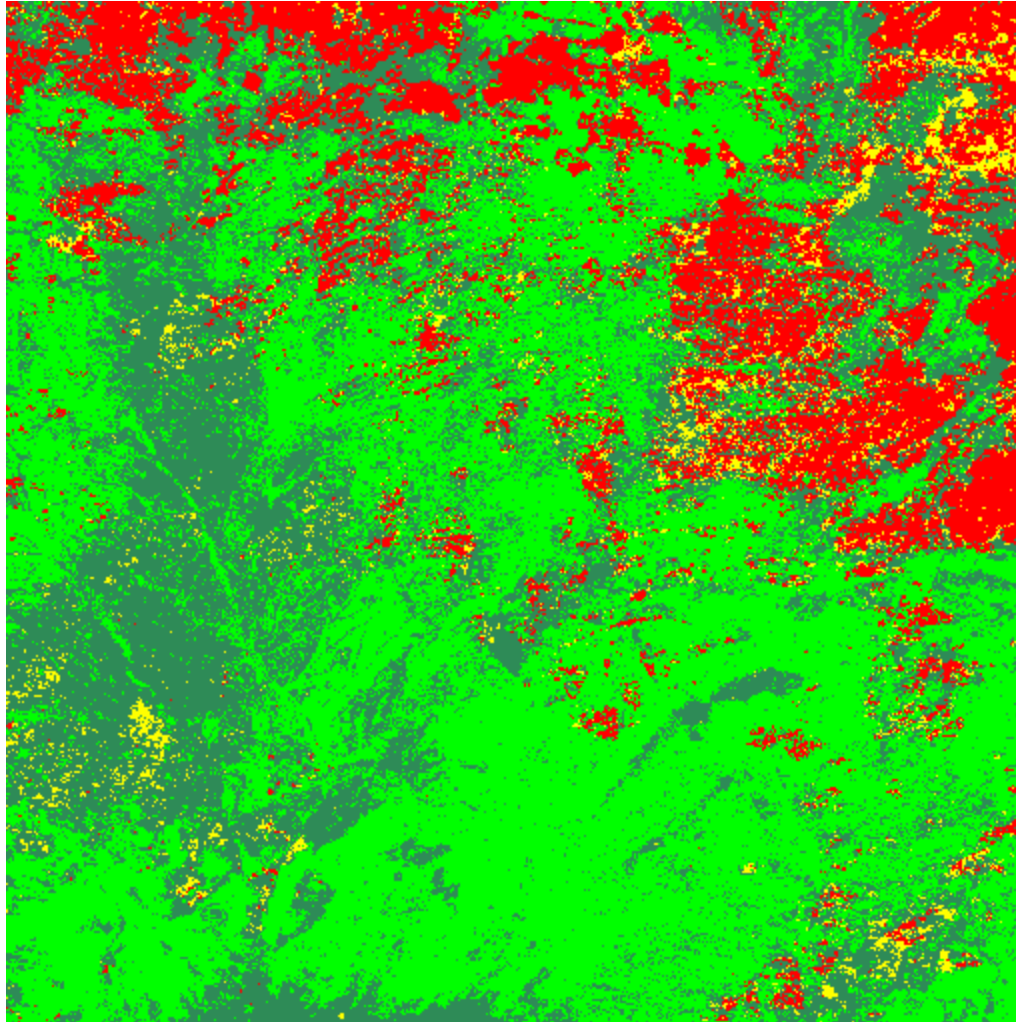


RGB Composite of Filtered Surface Reflectance Bands 1, 3 and 4  
C5 MOD09A1, Day 2000 305, South Africa, h20v10



Red: Fill value – based on the constraints low and average aerosol, cloud clear land and band quality is good

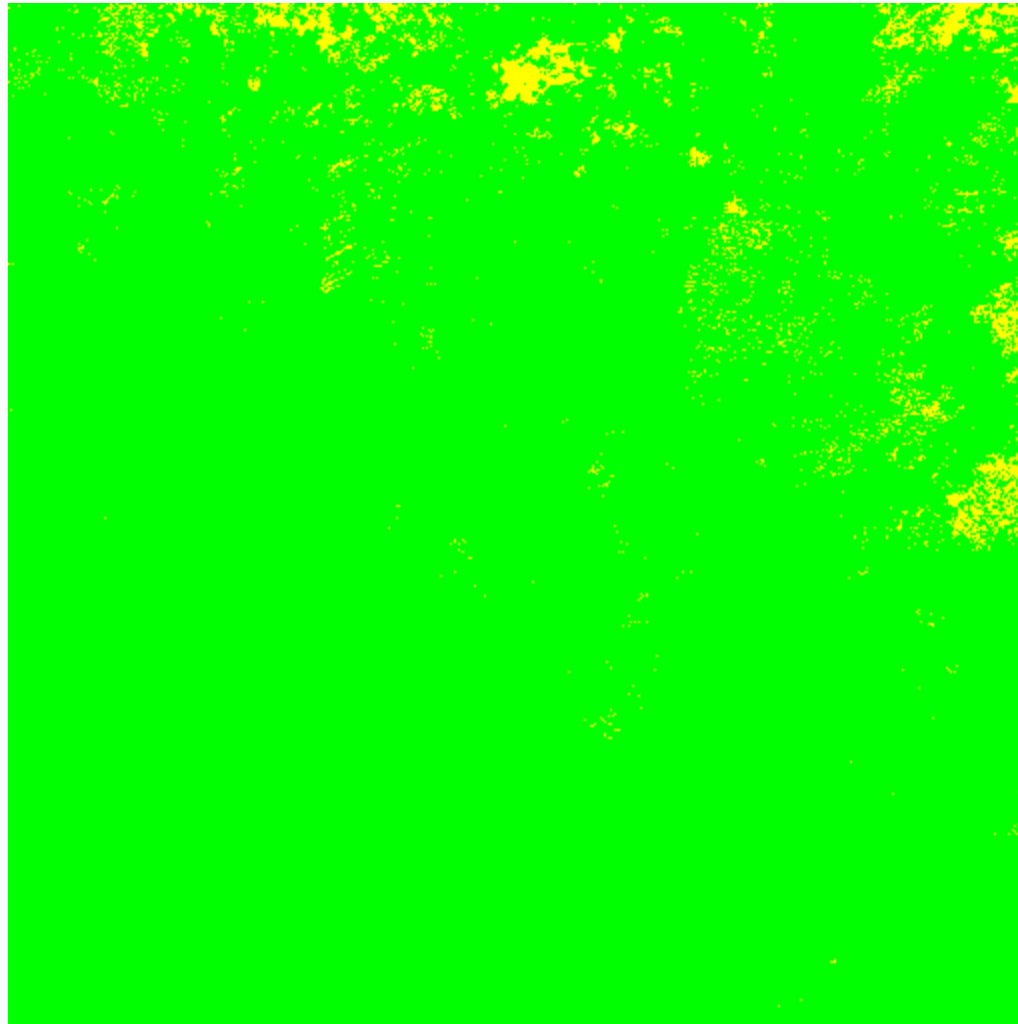
Aerosol Flag from SDS: Surface Reflectance 500m State Flag  
C5 MOD09A1, 2000 305, South Africa, h20v10



Red: Climatology, Green: low, Seagreen: average, yellow: High

Internal Cloud Mask from SDS: Surface Reflectance 500m State Flag

C5 MOD09A1, 2000 305, South Africa, h20v10



Green: clear, yellow: Cloud

# QA Result Storage - metadata

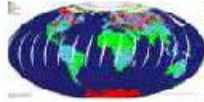
QA Metadata Name	Valid values	Populated
<b>Automatic Quality Flag</b>	Passed, Failed, Suspect	during production by science software
<b>Automatic Quality Flag Explanation</b>	Explanatory text (255 Characters)	during production by science software
<b>Science Quality Flag</b>  (*caution, do you want to order this ?)	Passed, <b>Failed*</b> , <b>Suspect*</b> , Inferred Passed, <b>Inferred Failed*</b> , Being Investigated, Not Being Investigated	after production by the Science Team / LDOPE
<b>Science Quality Flag Explanation</b>	Explanatory text (255 Characters)	after production by the Science Team / LDOPE

# LDOPE'S QA Resources

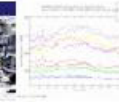
# LDOPE Routine QA

- Data Sampling
  - Global browse, Golden Tiles
- Data Analysis
  - Spatial data analysis using QA tools
  - Time series analysis
- Dissemination of Results
  - Browsers, time series results, animations, known issues . . . all posted on the web





# MODIS Land Quality Assessment



## Product Quality:

- ◆ [Product Quality Documentation](#)
- [Terra C4 C5](#)
- ◆ [Known Product Issues - Terra](#)
- ◆ [Product Quality Documentation](#)
- [Aqua](#)
- ◆ [Known Product Issues - Aqua](#)
- ◆

## Product Definitions:

- ◆ [Product User Guides](#)
- ◆ [Algorithm Theoretical Basis Documents](#)
- ◆ [Product Interdependencies](#)
- ◆ [Product File Specifications](#)

## Science Team Links:

- ◆ [QA Tools](#)
- ◆ [Land Science Test](#)
- ◆ [Collection 5 Changes](#)
- ◆ [MODAPS Production and Data Ordering](#)
- ◆ [Platform and Calibration](#)

## Help/FAQ

[Global Browse](#)

[Golden Tile Browse](#)

[Time Series](#)

[Animation](#)

[QA Personnel](#)

## Web Navigation:

- ◆ [QA Home Page](#)
- ◆ [MODIS Organigram](#)

## Welcome to the MODIS Land Quality Assessment Site

Quality assessment (QA) is an integral part of the MODIS Land production chain. The objective of MODLAND QA is to evaluate and document the scientific quality of the MODLAND products with respect to their intended performance. The results of MODLAND QA are made available on a routine basis and are formally stored as product metadata and as per-pixel information. MODLAND QA results are also placed on the **Product Quality** web pages located at this site. Users are encouraged to check these QA results when they order and use individual products to ensure that they were generated without error or artifacts.

### What is New!

- ◆ Collection 5 data will be available at DAAC soon.
- ◆ Land data can now be ordered through global browse web site.
- ◆ New inter-comparison time series plots for year 2005 are available now.



# Summary of C5 Changes (Science)

- Land Surface Reflectance (MOD09)
  - Use of improved atmospheric correction LUT
  - Improved internal cloud mask
  - Use of dynamic aerosol model to improve the aerosol retrieval and correction over land
- Snow Cover (MOD10)
  - Added fractional snow algorithm for Terra
  - Introduced limits based on surface temperature to reduce false detection
  - Add shadowed land screening under low illumination condition to avoid false detection
- Land Surface Temperature (MOD11)
  - The coarse resolution grid size is now 6kmx6km
  - Removes the cloud-contaminated LSTs using constraints from 32-days of data
  - Implement an empirical optical leak correction for band 32

# Summary of C5 Changes (Science)

- LAI/FPAR (MOD15)
  - Refined Algorithm - Retrieved LAI/FPAR values are now more consistent with the field measurement
  - Use of new stochastic RT model was utilized, which allows a better representation of canopy structure and spatial heterogeneity intrinsic to woody biomes.
- GPP/PSN (MOD17)
  - Parameters in the Biome Property Look-Up Table (BPLUT) are modified to agree with GPP derived from measurements at eddy flux towers and synthesized NPP
  - Spatially non-linear interpolation of coarse resolution meteorological data into 1-km MODIS pixel level is used instead of nearest neighbor sampling, to increase the accuracy of meteorological data input at pixel level.
- BRDF/Albedo (MCD43)
  - Product produced both at 500m and 1km
  - A change in product format improved the usability of product
  - Better observations screening is used in C5
  - Snow albedo is produced in C5

# Summary of C5 changes (QA)

- Change in MODLand wide QA bits
  - 1 bit in LAI/FPAR, BRDF/Albedo, Snow, Sea\_Ice
  - 2 bits in LSR, LST and VI
- Change in other Pixel level QA
  - BRDF/Albedo - Separate QA product (MCD43A2)
  - LSR
    - Noisy detector flag
    - adjacent cloud flag
  - VI
    - One QA SDS for both NDVI and EVI
    - 3 bit land water flag
    - adjacent cloud flag
    - new sds “composite day of year” and “pixel reliability SDS”

Please refer to the File spec at  
[ftp://modular.nascom.nasa.gov/pub/LatestFilespecs/collecti  
on5/](ftp://modular.nascom.nasa.gov/pub/LatestFilespecs/collecti<br/>on5/)



# MODIS Land Global Browse Images

The MODIS Land Science Team has developed coarse 5km versions of selected products to enable synoptic [quality assessment](#) via the internet. The coarse spatial resolution products are projected into a global coordinate system defined with pixel sizes corresponding to 20km in the **Hammer-Aitoff** projection (except for the SeaIce products that have 14.15km pixels defined in the **Lambert Azimuthal** projection). These global browse images are generated with fixed contrast stretching and color look-up tables to enable consistent temporal comparison. This web interface has been developed to support interactive selection of browse products and zooming and panning at 5km resolution. [The global browse images available on this web site should not be used for scientific analyses.](#) Full spatial resolution [global tile browse images](#) are also available at select locations.

**Note:** Global browse images are not available for all MODIS Land products or all [collections](#), please [click here](#) for the current browse availability information.

**CS Sea\_Ice (work in progress):** Image of "Ice Surface Temperature" will be displayed in place of Sea\_Ice for night time since Sea\_Ice is not retrieved for night time granules.

### Select a satellite/collection:

- Terra, Collection 4
- Aqua, Collection 4
- Terra, Collection 5
- Aqua, Terra, Collection 5

### Last - Input the date:

##### Start date  
##### End date  
(Format: YYYYDD)



[Click Here for the Calendar](#)

### Select a product:

- Daily:**
  - Top-of-the-atmosphere Radiance:  MOD02MYD02
  - Surface Reflectance:  MOD09MYD09  MOD09CMYD09CM0
  - Snow Cover:  MOD10\_L2MYD10\_L2  MOD10C1MYD10C1
  - Surface Temperature:  MOD11MYD11  MOD11C1MYD11C1
  - Active Fire:  MOD14MYD14
  - Active Fire on Surface Reflectance:  MOD14M0D09MYD14MYD09
  - LAI/FPAR:  MOD15A1MYD15A1
  - Sea Ice:  MOD29MYD29  MOD29E1D/MYD29E1D
- 8-days:**
  - Surface Reflectance:  MOD09A1MYD09A1  MOD10C2MYD10C2
  - Snow Cover:  MOD11A2MYD11A2  MOD11C2MYD11C2
  - Surface Temperature:  MOD14A2MYD14A2
  - Fire:  MOD15A2MYD15A2
  - LAI/FPAR:  MOD17A2MYD17A2
  - PSN:  MOD17A2MYD17A2

## Terra, Collection 005

Julian Day	Daily Land Surface Reflectance Bands L43 (MOD09)	Daily Snow Cover (MOD10_L2)	Daily Daytime Land Surface Temperature (MOD11B)	Daily Nighttime Land Surface Temperature (MOD11B)	Daily Daytime Active Fire Detection (MOD14)	Daily Land Area Index (MOD15A)
2000 302						
11:07						
2000 311						
11:08						
2000 310						
11:03						
2000 309						
11:04						
2000 318						
11:03						
2000 317						
11:02						
2000 316						
11:01						
2000 323						
11:08						
2000 324						
11:19						
2000 323						
11:19						

# Global Browse

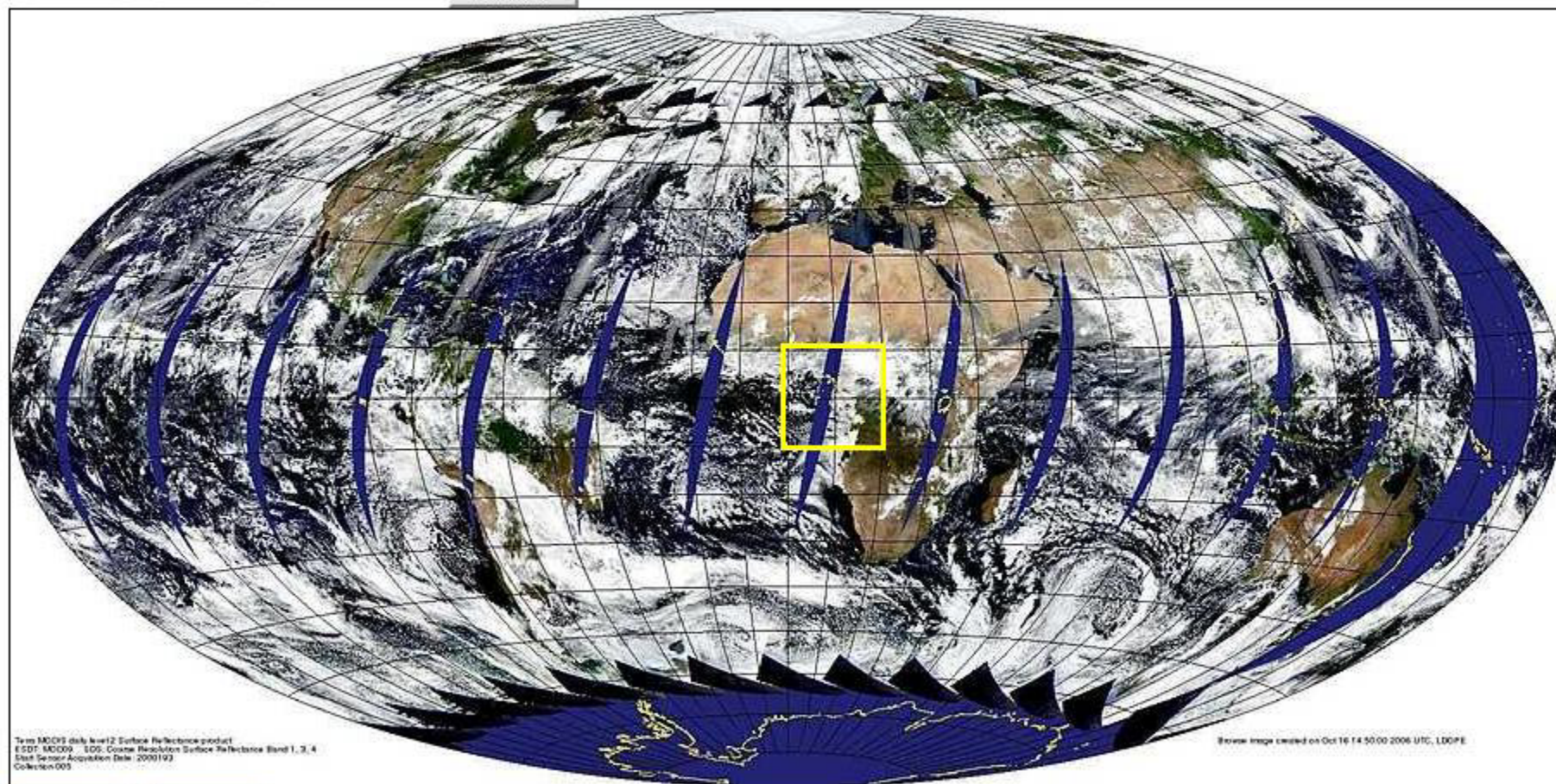
Terra, MOD09, day 2000193 (07/11/2000), Collection 005

Select a region you want zoom in:

**Note:** If you can not drag a box on the image, please enter the coordinates in the text boxes. The image size is 900x450 (upper left: 0,0; lower right: 900,450).

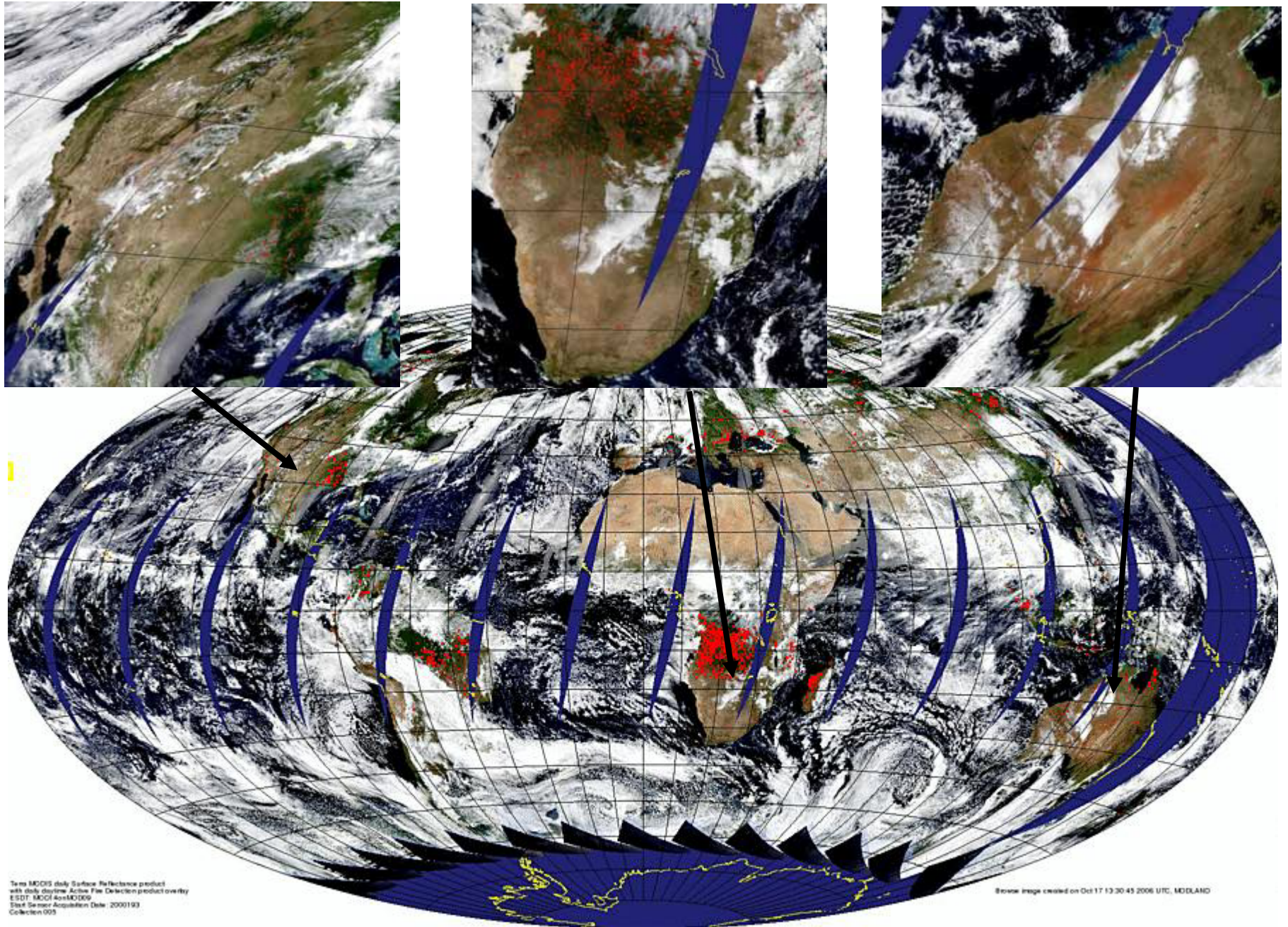
◀ 1 day    1 day ▶

Zoom In

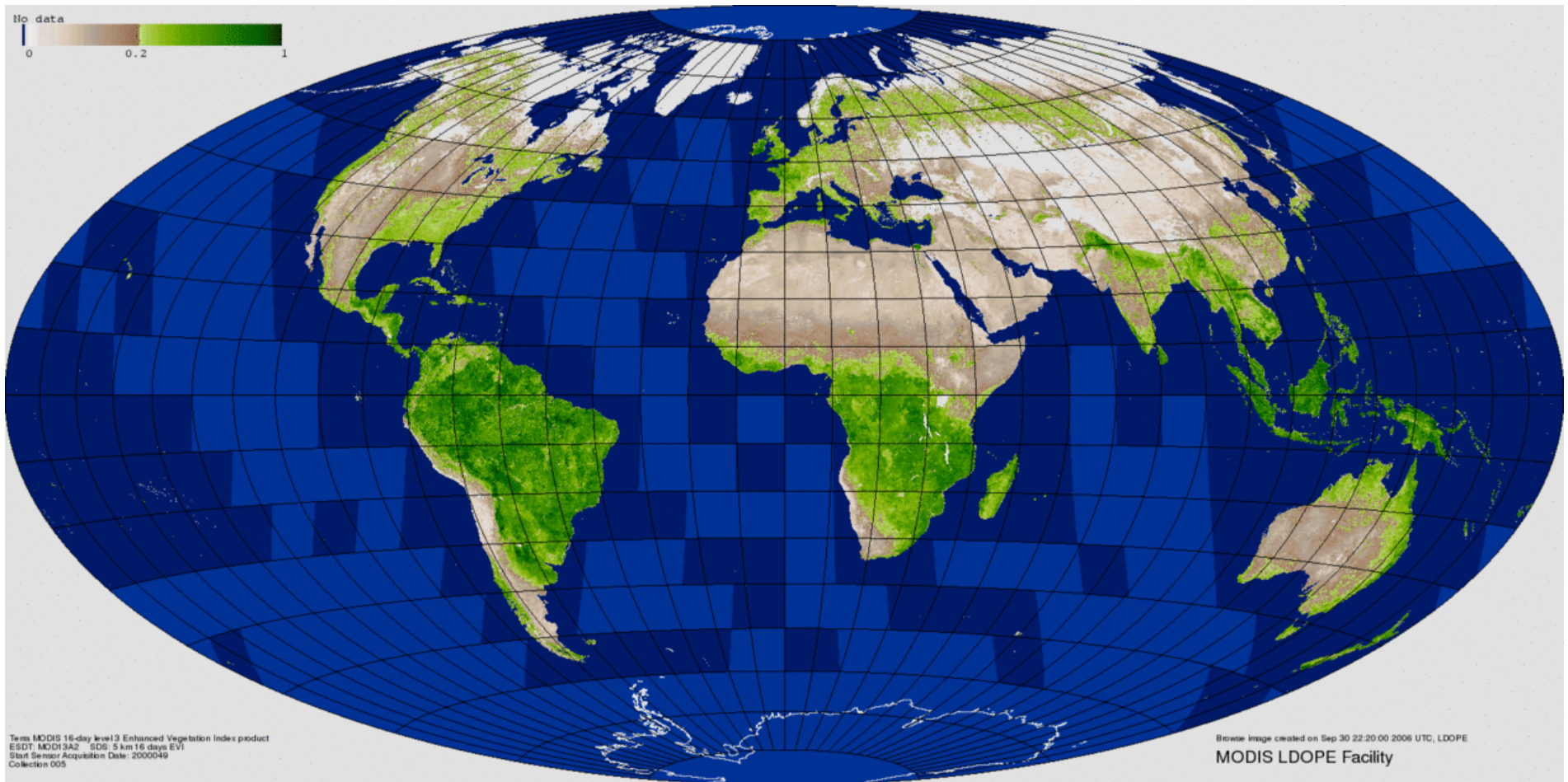


◀ 1 day    1 day ▶

## Global Browse – Pan & Zoom (5km) supported

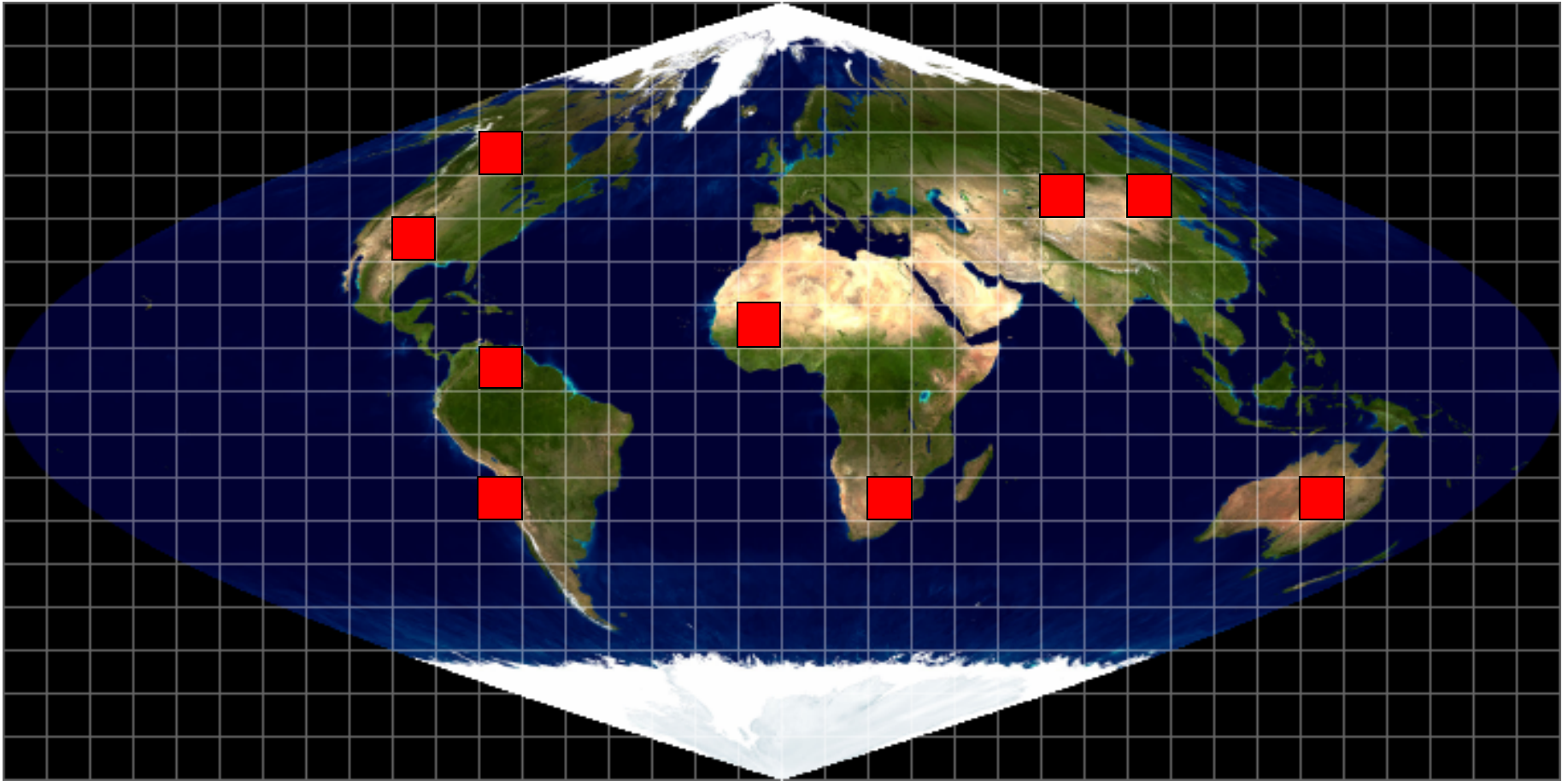


# Animation of Global Browse C5 VI, Year 2000, animated at 4 frames/sec





# Golden Tiles



Nine tiles located in both hemispheres encompassing all major biomes

~ representative sample of MODLAND products

# Golden Tile Browse

NASA GODDARD SPACE FLIGHT CENTER © NASA Home Page

## MODIS Land Golden Tile Browse Images

Full resolution browse images are made for all the gridded MODIS L and products in order to enable synoptic [quality assessment](#) via the internet. The images are made at nine MODIS L and golden tiles selected over areas that are expected to be representative of the variability of the majority of the MODIS L and products. These tiles are also used to generate [time series plots](#) on a systematic basis. The golden tile browse images are generated with fixed contrast stretching and color look-up tables to enable consistent temporal comparison. Only images for the most recent swath of production are available. The golden tile browse images available on this web site should not be used for scientific analyses. Coarse spatial resolution [global browse images](#) are also available.

---



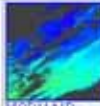
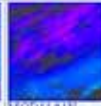
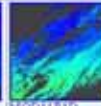


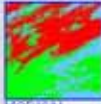
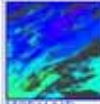
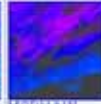
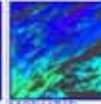



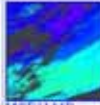
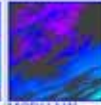
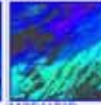


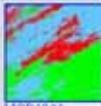
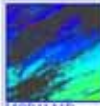
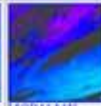
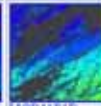
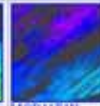
Select a Satellite:  Terra Daily  Aqua Daily  Terra n-day  Aqua n-day

Select a Collection:  Collection 5  Collection 4

Select a Tile: h09v05 (Southwestern China)

Collectio 005, h09v05, A2001026 - A2007008


Date	MOD09GHE	MOD10A1	MOD11A1D	MOD11A1N	MOD11B1D	MOD11B1N	MOD14A1
2007008	 <a href="#">MOD09GHE A2007008</a>	MOD10A1 A2007008 Not Available	MOD11A1D A2007008 Not Available	MOD11A1N A2007008 Not Available	MOD11B1D A2007008 Not Available	MOD11B1N A2007008 Not Available	MOD14A1 A2007008 Not Available
2007007	 <a href="#">MOD09GHE A2007007</a>		MOD11A1D A2007007 Not Available	MOD11A1N A2007007 Not Available	MOD11B1D A2007007 Not Available	MOD11B1N A2007007 Not Available	MOD14A1 A2007007 Not Available

2001033	 <a href="#">MOD09GHE A2001033</a>	 <a href="#">MOD10A1 A2001033</a>	 <a href="#">MOD11A1D A2001033</a>	 <a href="#">MOD11A1N A2001033</a>	 <a href="#">MOD11B1D A2001033</a>	 <a href="#">MOD11B1N A2001033</a>	MOD14A1 A2001033 Not Available
2001032	 <a href="#">MOD09GHE A2001032</a>	 <a href="#">MOD10A1 A2001032</a>	 <a href="#">MOD11A1D A2001032</a>	 <a href="#">MOD11A1N A2001032</a>	 <a href="#">MOD11B1D A2001032</a>	 <a href="#">MOD11B1N A2001032</a>	MOD14A1 A2001032 Not Available
2001031	 <a href="#">MOD09GHE A2001031</a>	 <a href="#">MOD10A1 A2001031</a>	 <a href="#">MOD11A1D A2001031</a>	 <a href="#">MOD11A1N A2001031</a>	 <a href="#">MOD11B1D A2001031</a>	 <a href="#">MOD11B1N A2001031</a>	MOD14A1 A2001031 Not Available
2001030	 <a href="#">MOD09GHE A2001030</a>	 <a href="#">MOD10A1 A2001030</a>	 <a href="#">MOD11A1D A2001030</a>	 <a href="#">MOD11A1N A2001030</a>	 <a href="#">MOD11B1D A2001030</a>	 <a href="#">MOD11B1N A2001030</a>	MOD14A1 A2001030 Not Available

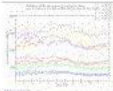
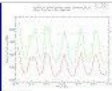
# Time Series

- In many cases, issues that affect product performance are seen only through examination of long-term product series
- Product time series analyses are important because they
  - monitor changes in the instrument characteristics and calibration
  - capture algorithm sensitivity to surface (e.g., vegetation phenology), atmospheric (e.g., aerosol loading) and remote sensing (e.g., sun-surface-sensor geometry) conditions that change temporally
  - enable comparison between reprocessed products and between different years
- Time series of summary statistics derived from all the gridded (L2G, L3, L4) MODLAND products at the Golden Tiles
- **Results** indicate that temporal product inter-comparisons at different spatial and temporal scales allow both problem identification and simple inferences to be developed to explain their causes.
- **Note: Uses good observations (based on pixel QA) only.**

# Golden Tile Time Series


GODDARD SPACE FLIGHT CENTER
[+ NASA Homepage](#)

## MODIS Land Product Time Series

A time series of summary statistics derived from all the gridded MODIS Land products at a number of fixed globally distributed locations is maintained and monitored by LDOPE personnel in order to enable synoptic [quality assessment](#) via the internet. Product time series analyses are important because they capture algorithm sensitivity to surface (e.g., vegetation phenology), atmospheric (e.g., aerosol loading) and remote sensing (e.g., sun-surface-sensor geometry) conditions that change temporally, and because they allow changes in the instrument characteristics and calibration to be examined. Time series statistics are extracted at nine MODIS Land golden tiles selected over areas that are expected to be representative of the variability of the majority of the MODIS Land products. [Golden tile browse images](#) are also available for the most recent month of production. Follow steps 1-4 to examine time series plots. Click [here](#) for more information.

---

**Step 1:** Select a tile and an ESDT

**Tiles:**

- h09v05 (Southwestern U.S.)
- h11v03 (Northwestern Canada)
- h11v08 (Northern Amazon)
- h11v11 (Northern Chile)
- h17v07 (Sahel)
- h20v11 (Southern Africa)
- h24v04 (Northwestern China)
- h26v04 (Northeastern China)
- h30v11 (Central Australia)

**ESDTs:**

- MOD09A1, RGB Bands
- MOD09A1, All Bands
- MOD09GHK, RGB Bands
- MOD09GHK, All Bands
- MOD10A1
- MOD10A2
- MOD11A1
- MOD11A2
- MOD11B1
- MOD13A1

**Step 2:** Select "Most recent production" OR "Inter-comparison" plots then select Satellite/[Year]/Collection options

**Most recent production plots**

- Aqua Collection 4
- Terra Collection 4
- Terra Collection 4 vs Aqua Collection 4

**Inter-comparison plots**

- Aqua, year 2003, V003 vs V004
- Aqua, year 2002 vs 2003, V004
- Aqua, year 2003 vs 2004, V004
- Aqua, year 2004 vs 2005, V004
- Aqua, year 2002-2005, V004 (n-days only)
- Terra, year 2000, V001 vs V004
- Terra, year 2001, V003 vs V004
- Terra, year 2002, V003 vs V004

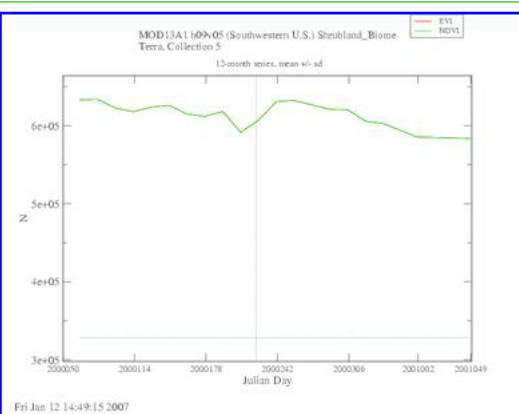
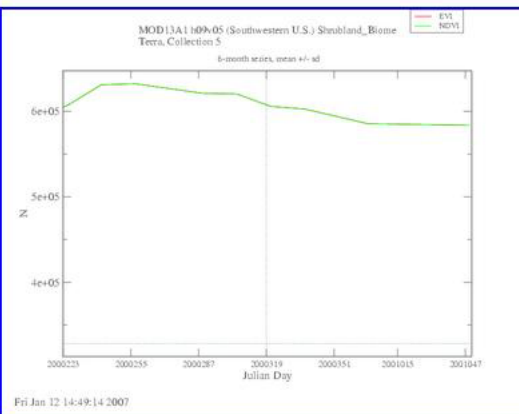
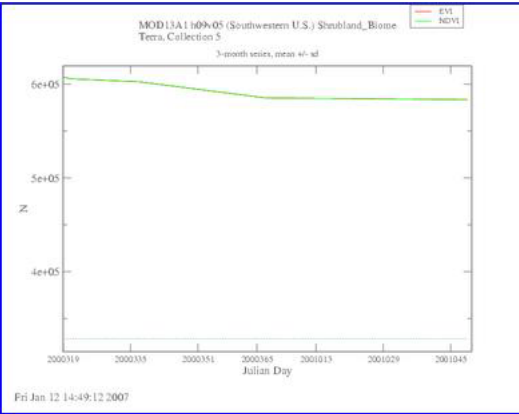
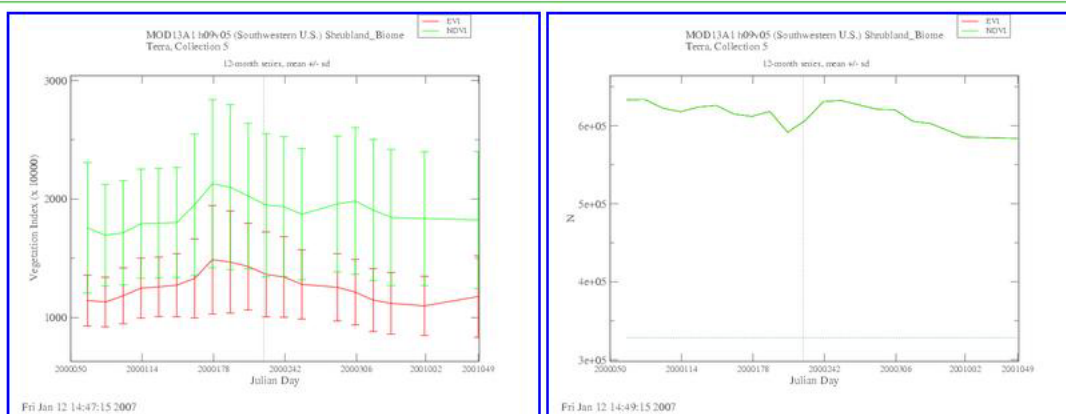
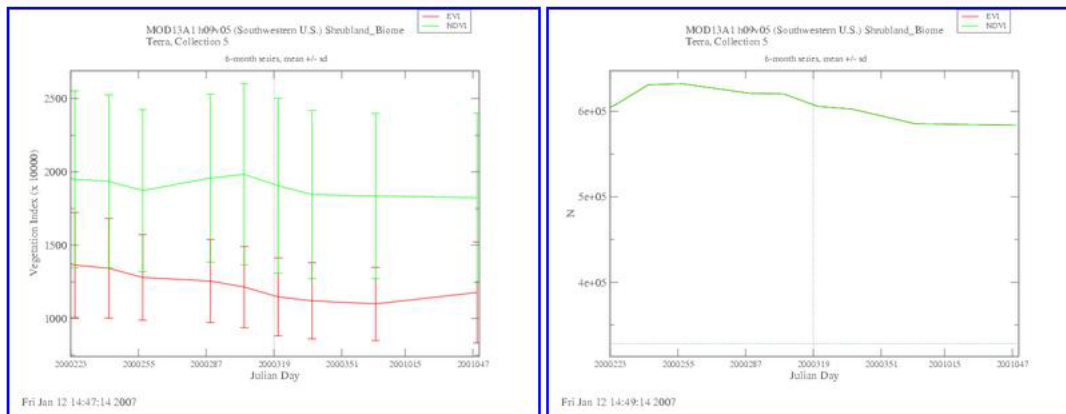
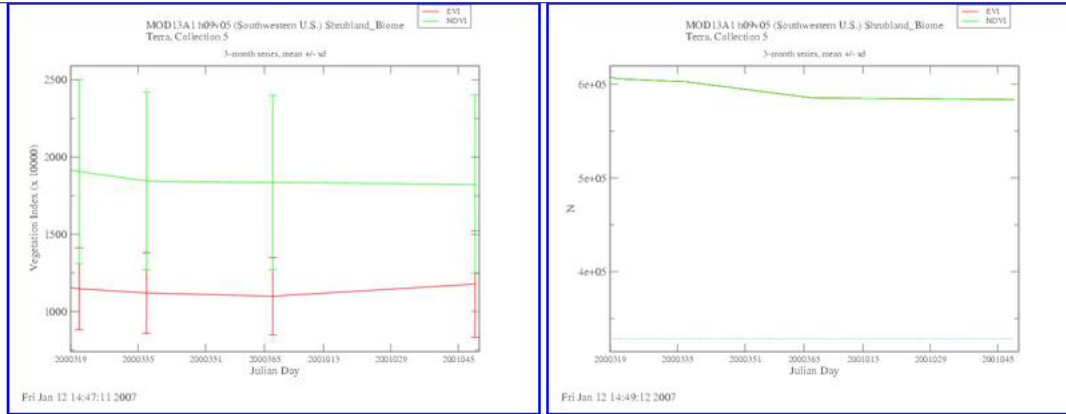
**Step 3:** Select plot display size, the default size is "large"

**Plot Display Size:**  Small Image  Large Image

**Step 4:** Click on "Generate Plot Options"

Biome	LandCover	Site
<a href="#">biome_1</a>	<a href="#">land_cover_10</a>	<a href="#">site_19</a> <a href="#">site_23</a>

Time Series Plots  
 h09v05, C5 MOD13A1, biome\_2 (shrubland), EVI and NDVI  
 Latest 96 days, 192 days and 365 days

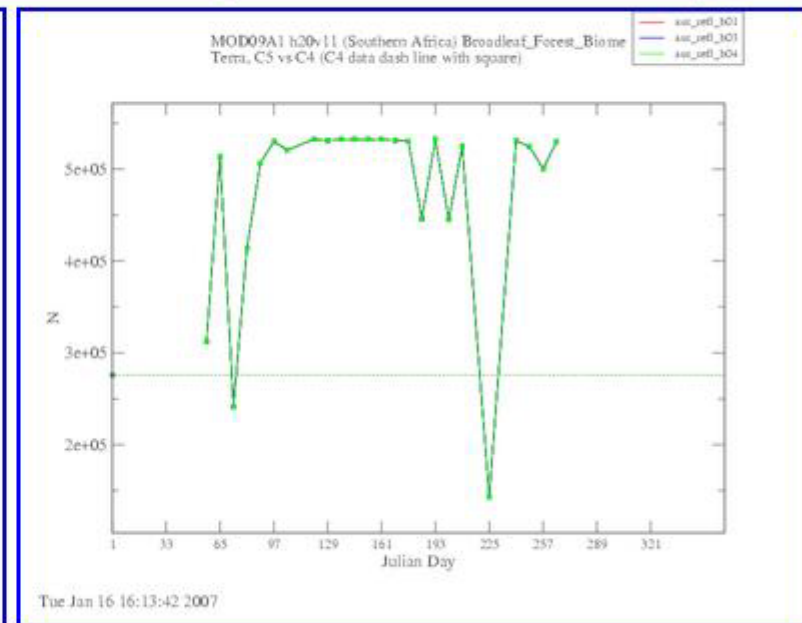
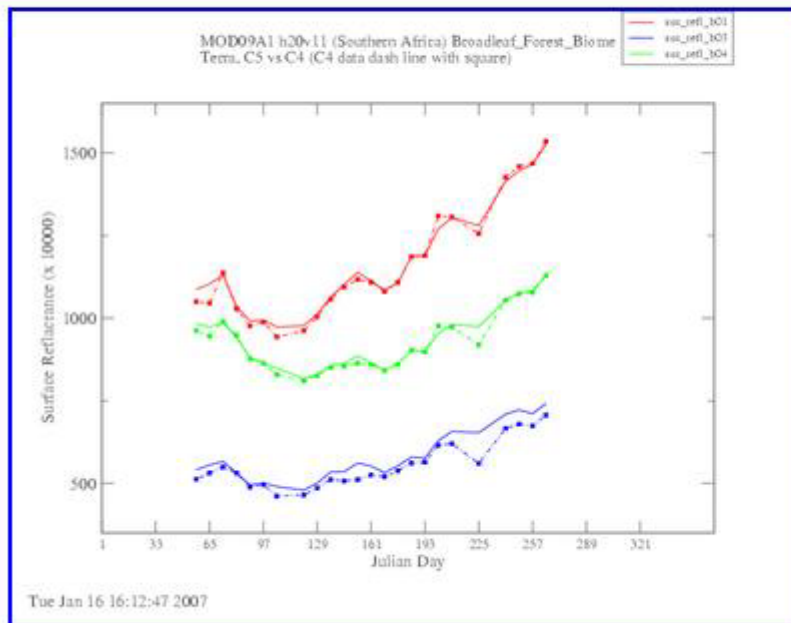


# Time Series C4-C5 comparison

h20v11, MOD09A1, biome\_5(Broadleaf Forest Biome), RGB Bands, Surface Reflectance

Latest 32 days, 96 days and 365 days

[Large Image](#)

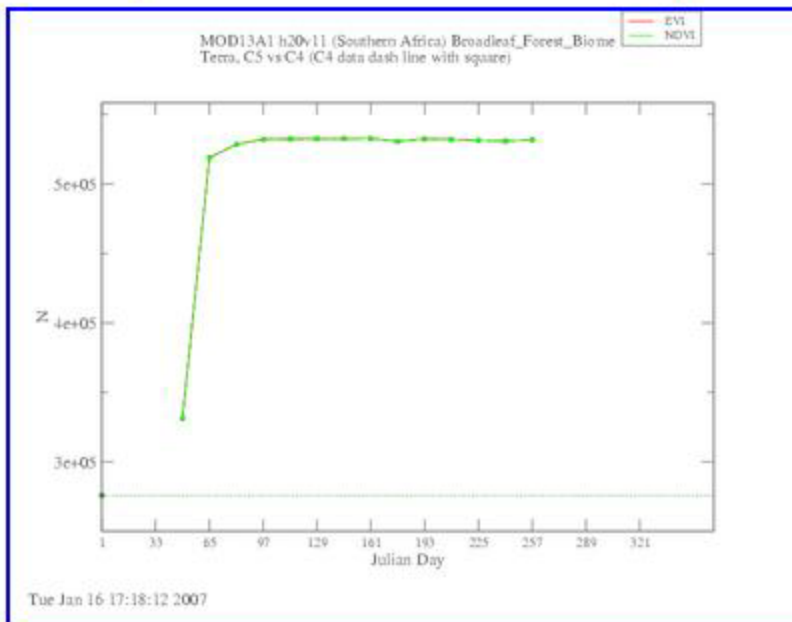
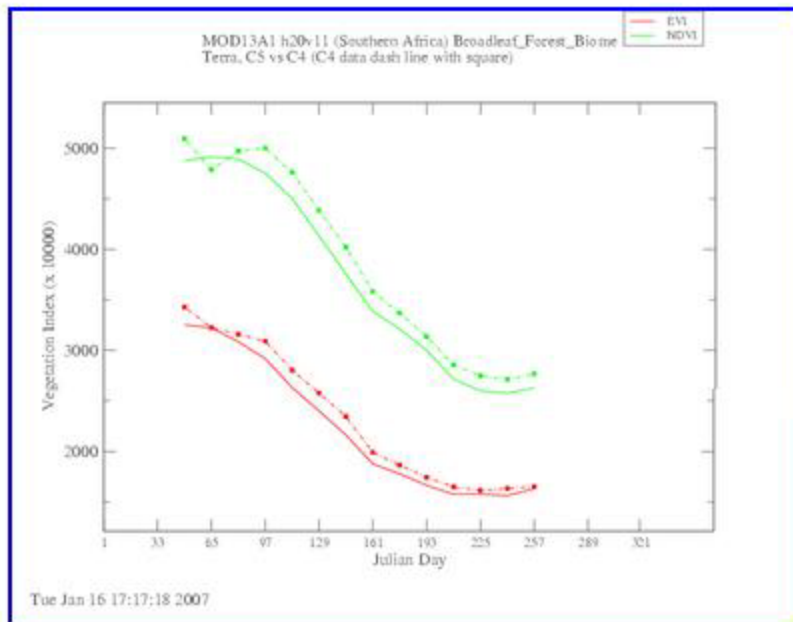


# Time Series C4-C5 comparison

h20v11, MOD13A1, biome\_5(Broadleaf Forest Biome), EVI and NDVI

Latest 96 days, 192 days and 365 days

[Large Image](#)



# QA results posted on Known Issues Site

## Known issues in MOD09 product (Surface reflectance)

Related PGEs: PGE11 (MOD09\_L2), PGE13 (MOD09GQK, MOD09GHK, MOD09GST), PGE21 (MOD09A1)

Product information is also found at the [PI website](#).

## Summary

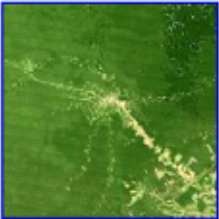
Case number	Opening Date	Last Update (Sort)	Status	Description
<a href="#">SD_MOD09_06313</a>	10/03/06	10/03/06	Pending	Use of wrong granules in MOD09CMG
<a href="#">SD_MOD09_06312</a>	10/02/06	10/02/06	Pending	Reflectance values retrived over water
<a href="#">SD_MOD09_06005</a>	01/06/05	01/06/05	Pending	Incorrect MODLAND QA bits in MOD
<a href="#">SD_MOD09_04260</a>	09/16/04	08/16/04	Note	Artefact in MOD09 due to high aerosol
<a href="#">SD_MOD09_04105</a>	05/24/04	08/16/04	Note	data corruption due to geolocation probl
<a href="#">SD_MOD09_04104</a>	05/24/04	08/16/04	Note	data corruption due to geolocation probl
<a href="#">SD_MOD09_03289</a>	10/16/03	08/16/04	Note	Striping in MOD09 products associated
<a href="#">DR_MOD09_03163</a>	06/12/03	08/16/04	Closed	Production issue corrupted some L2G b
<a href="#">SD_MOD09_03148</a>	05/29/03	08/16/04	Note	MOD09A1 made with incomplete set o
<a href="#">SD_MOD09_03129</a>	03/05/04	08/16/04	Note	Artefact in MOD09 composite product
<a href="#">SD_MOD09_03041</a>	02/10/03	08/16/04	Closed	Aerosol retrieval in collection 4 proces
<a href="#">SD_MOD09_02213</a>	08/01/02	08/16/04	Closed	MOD09A1 made with incomplete set o
<a href="#">JB_MOD09_02070</a>	03/11/02	08/16/04	Closed	Aerosol retrieval artifact over bright su
<a href="#">SD_MOD09_01358</a>	12/24/01	08/16/04	Note	Inaccuracies in MOD03 land water ma:
<a href="#">JB_MOD09_01332</a>	11/28/01	01/07/02	Closed	Geolocation bug in MOD09
<a href="#">JB_MOD09_01331</a>	11/27/01	08/16/04	Closed	Corrupt geolocation data affect MOD05
<a href="#">JB_MOD09_01317</a>	11/13/01	08/16/04	Note	Overlap between end-of-year and begin
<a href="#">JB_MOD09_01305</a>	11/01/01	08/16/04	Closed	Probable corrupt band 5 data for day 20
<a href="#">JB_MOD09_01304</a>	10/31/01	02/26/02	Closed	Incorrect interpretation of L1B TOA ref
<a href="#">JB_MOD09_01302</a>	10/29/01	08/16/04	Note	Aerosol interpolation artifact
<a href="#">SD_MOD09_01295</a>	10/22/01	08/16/04	Closed	Blocky artefacts found in certain cloudy
<a href="#">JB_MOD09_01283</a>	10/10/01	08/16/04	Note	Dropped packet artifact from L1B in ag
<a href="#">JB_MOD09_01282</a>	10/09/01	10/09/01	Note	Odd-even effect in MOD02 affects MC
<a href="#">JB_MOD09_01278</a>	10/05/01	08/16/04	Note	Striping in band 5
<a href="#">DR_MOD09_01278</a>	10/05/01	08/17/04	Note	Low amplitude striping in areas with hi
<a href="#">JB_MOD09_01277</a>	10/04/01	08/16/04	Note	Striping in areas with high atmospheric
<a href="#">JB_MOD09_01215</a>	08/03/01	08/17/04	Closed	Corrupted data may be present

## Description Detailed Description


Color Key Case pending Case closed Case reopened QA note [Large Image](#)

Case #:SD\_MOD09\_03289 Opening date: 10/16/03 Last update: 08/16/04  
Status: Note

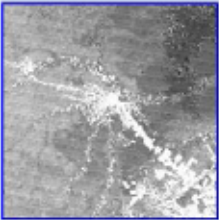
Striping is observed in some of the surface reflectance products associated with noise in band 7. Band 7 is used by the surface reflectance algorithm for aerosol optical depth retrieval. The problem is severe in products made using the Terra MODIS data and is mainly observed over regions with high vegetation cover such as the Amazon. The striping is less evident at the longer wavelength bands (2,5,6) that are not band 7. This problem is not observed in the AQUA surface reflectance (MYD09) products. The following example shows a spatial subset of an 8-day surface reflectance tile made using Terra (MOD09A1) and Aqua (MYD09A1) MODIS data.



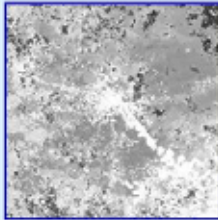
MOD09A1.A2003257.h11v09.004.2003275023809.hdf  
SDS: RGB composite of surface reflectance band 1, 3, and 4.



MYD09A1.A2003257.h11v09.003.2003278172916.hdf  
SDS: RGB composite of surface reflectance band 1, 3, and 4.



MOD09A1.A2003257.h11v09.004.2003275023809.hdf  
SDS: Surface Reflectance Band 7.



MYD09A1.A2003257.h11v09.003.2003278172916.hdf  
SDS: Surface Reflectance Band 7.

Note: This striping is propagated into dependent products such as the VI (MOD13) products, LAI/FPAR (MOD15) products, and BRDF/Albedo (MOD43, MCD43) products.

Occurrence: Collection 4 and collection 3 Terra L2, L2G and L3 MOD09 products  
PGE:



# Detailed Description

**Color Key** Case pending Case closed Case reopened QA note

[Large Image](#)

Case #:SD\_MOD09\_03289 Opening date: 10/16/03 Last update: 08/16/04

Status: Note

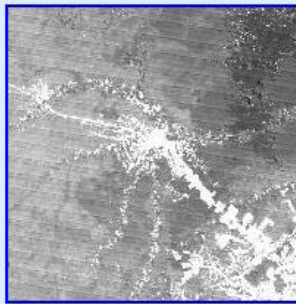
Striping is observed in some of the surface reflectance products associated with noise in band 7. Band 7 is used by the surface reflectance algorithm for aerosol optical depth retrieval. The problem is severe in products made using the Terra MODIS data and is mainly observed over regions with high vegetation cover such as the Amazon. The striping is less evident at the longer wavelength bands (2,5,6) that are not band 7. This problem is not observed in the AQUA surface reflectance (MYD09) products. The following example shows a spatial subset of an 8-day surface reflectance tile made using Terra (MOD09A1) and Aqua (MYD09A1) MODIS data.



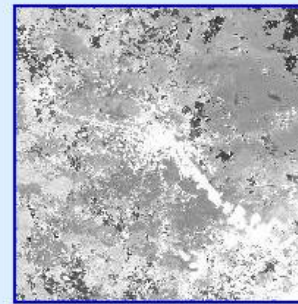
MOD09A1.A2003257.h11v09.004.2003275023809.hdf  
SDS: RGB composite of surface reflectance band 1, 3, and 4.



MYD09A1.A2003257.h11v09.003.2003278172916.hdf  
SDS: RGB composite of surface reflectance band 1, 3, and 4.



MOD09A1.A2003257.h11v09.004.2003275023809.hdf  
SDS: Surface Reflectance Band 7.



MYD09A1.A2003257.h11v09.003.2003278172916.hdf  
SDS: Surface Reflectance Band 7.

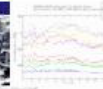
**Note:** This striping is propagated into dependent products such as the [VI \(MOD13\) products](#), [LAI/FPAR \(MOD15\) products](#), and [BRDF/Albedo \(MOD43, MCD43\) products](#).

**Occurrence:** Collection 4 and collection 3 Terra L2, L2G and L3 MOD09 products

**PGE:**



# MODIS Land Quality Assessment



### Product Quality:

- [Product Quality Documentation](#)
- [Terra C4 C5](#)
- [Known Product Issues - Terra](#)
- [Product Quality Documentation - Aqua](#)
- [Known Product Issues - Aqua](#)
- [On use of C5 with C4](#)

### Product Definitions:

- [Product User Guides](#)
- [Algorithm Theoretical Basis](#)

### Documents

- [Product Interdependencies](#)
- [Product File Specifications](#)

### Science Team Links:

- [QA Tools](#)
- [Land Science Test](#)
- [Collection 5 Changes](#)
- [MODAPS Production and Data](#)
- [Ordering](#)
- [Platform and Calibration](#)

### Help/FAQ

- [Global Browse](#)
- [Golden Tile Browse](#)
- [Time Series](#)
- [Animation](#)
- [QA Personnel](#)

### Web Navigation:

- [QA Home Page](#)
- [MODIS Organigram](#)

## MODLAND QA - Product Quality Documentation - Terra, C5

Although every attempt is made to ensure that the MODLAND products are generated without error, it is generally neither desirable nor practical to delay their distribution until products are thought to be error-free or until known errors have been removed by product reprocessing. Product quality information found as a result of QA performed by the MODLAND Science Team are documented in the Science Quality flag metadata. Science Quality metadata values are provided below. Users are encouraged to examine these metadata when they order products to decide on product utility in the context of their applications.

- [MOD09A1](#) MODIS/Terra Surface Reflectance 8-Day L3 Global 500m
- [MOD09GA](#) MODIS/Terra Surface Reflectance Daily L2G Global 1km and 500m
- [MOD09GQ](#) MODIS/Terra Surface Reflectance Daily L2G Global 250m
- [MOD09Q1](#) MODIS/Terra Surface Reflectance 8-Day L3 Global 250m

- [MOD10A1](#) MODIS/Terra Snow Cover Daily L3 Global 500m
- [MOD10A2](#) MODIS/Terra Snow Cover 8-Day L3 Global 500m
- [MOD10C1](#) MODIS/Terra Snow Cover Daily L3 Global 0.05Deg CMG
- [MOD10C2](#) MODIS/Terra Snow Cover 8-Day L3 Global 0.05Deg CMG
- [MOD10\\_L2](#) MODIS/Terra Snow Cover 5-Min L2 Swath 500m

- [MOD11A1](#) MODIS/Terra L and Surface Temperature/Emissivity Daily L3 Global 1km
- [MOD11A2](#) MODIS/Terra L and Surface Temperature/Emissivity 8 Day Global 1km
- [MOD11B1](#) MODIS/Terra L and Surface Temperature/Emissivity Daily L3 Global 6km
- [MOD11\\_L2](#) MODIS/Terra L and Surface Temperature/Emissivity L2 Swath 1km 5-Min

- [MOD12C1](#) MODIS/Terra L and Cover Type 96-Day Global 0.05Deg CMG
- [MOD12Q1](#) MODIS/Terra L and Cover Type 96-Day L3 Global 1km
- [MOD12Q2](#) MODIS/Terra L and Cover Change 96-Day L3 Global 1km

## Product Quality Documentation for MOD09A1, C5

### Collection C5

ParameterName: All					
BeginDate	EndDate	ScienceQualityFlag	ScienceQualityFlagExplanation	Comments	Maturity
2000 049 (02/18/00)	2000 056 (02/25/00)	Suspect	Product is degraded due to use of only two days of input data in the composite. Instrument data was available for days 2000 055 and 2000 056 only.		Validated stage 1
2000 057 (02/26/00)	2000 112 (04/21/00)	Inferred Passed	Colleciton 5 changes include use of dynamic aerosol model and new atmospheric correction LUT. Retrieved Reflectance over water may be incorrect due to use of wrong aerosol model. Discretion should be exercised in use of this product.		Validated stage 1
2000 113 (04/22/00)	2000 120 (04/29/00)	Suspect	MODIS nadir aperture door was closed part time on 2000116 and 2000119, all time on 2000117 and 2000118.		Validated stage 1
2000 121 (04/30/00)	2000 153 (06/01/00)	Inferred Passed	Colleciton 5 changes include use of dynamic aerosol model and new atmospheric correction LUT. Retrieved Reflectance over water may be incorrect due to use of wrong aerosol model. Discretion should be exercised in use of this product.		Validated stage 1
2000 153 (06/01/00)	2000 216 (08/03/00)	Inferred Passed	Colleciton 5 changes include use of dynamic aerosol model and new atmospheric correction LUT.		Validated stage 1
2000 217 (08/04/00)	2000 232 (08/19/00)	Suspect	MODIS-L1B data was not available for days 2000219 - 2000230 due to L1B formatter anomaly.		Validated stage 1
2000 233 (08/20/00)	• • •	Inferred Passed	Colleciton 5 changes include use of dynamic aerosol model and new atmospheric correction LUT.		Validated stage 1
2007 001 (01/01/07)	• • •	Being Investigated			Validated stage 1

Updated on 01-16-2007

# Summary

- QA information stored in the product
  - Pixel level (QA SDS)
  - Granule/Tile level (Quality metadata)
- Result of LDOPE's routine QA are posted on the web
  - Product quality metadata are documented
  - Product quality issues are posted at the known issue page
  - Additional resources: global browse, golden tile browses, animation, time series results
- Users are required to check the QA result
  - Check the QA metadata while ordering data
  - Use the pixel level QA in the context of application
- Under development
  - New browses – BA, LCC etc
  - Anomaly detection using time series
  - Tool to search known issues
  - Animation using google earth
    - <http://landweb.nascom.nasa.gov/GoogleEarth/test.html>