



Near Real-Time Automatic Environment and Disaster Monitoring in South and Southeast Asian Regions using MODIS Data



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February 19, 2013

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Outlines

Lecture:

1. OVERVIEW OF MODIS DATA AND APPLICATIONS

- Near Real Time Global Environment and Disaster Monitoring using MODIS Data

2. UNDERSTAND MODIS DATA FORMAT

- MODIS Band Specifications
- HDF data format
- Scientific Data Sets (SDS)

3. ANALYSIS OF MODIS DATA LEVEL1B & LEVEL2

- MODIS Images **Subsets** from **Land Atmosphere Near real-time Capability for EOS (LANCE)** at Goddard Space Flight Center, NASA (GSFC/NASA) Greenbelt, Maryland, USA – **How to download MODIS Level 1B data**
- MODIS Images **Subsets** from **Level 1 and Atmosphere Archive and Distribution System (LAADS)**, NASA (GSFC/NASA) Greenbelt, Maryland, USA – **How to download MODIS Level 1B & Level 2 data**
- Geometric Correction of MODIS Level 1b and Level2

Practical Session:

To learn how to work with MODIS data of Level 1B and Level 2 using ENVI 4.x software

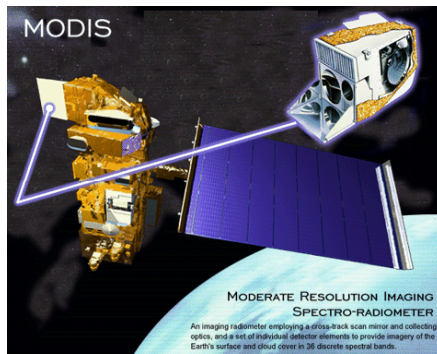
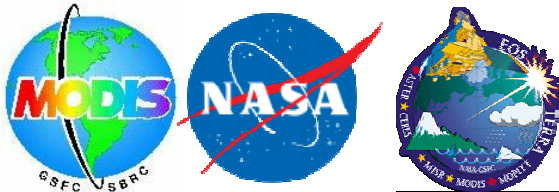
Materials (software, hardware and data) to be used @ practical session:

- Computer with hard disk of at least **10 GB free space**.
- Web browser** (Firefox, Google Chrome, etc.) and **ENVI 4.x** software
- Sample MODIS Data are provided
- Good and stable internet connection** is necessary.

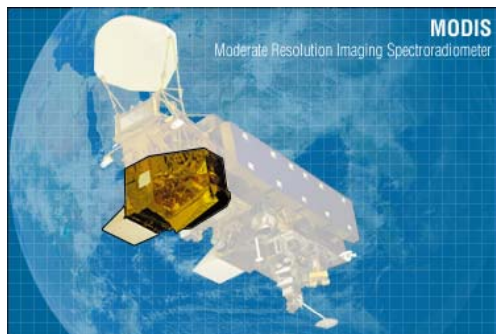
OVERVIEW OF MODIS DATA & APPLICATIONS

MODIS – Earth Observation System (EOS) Flagship for Global/Regional Environment and Disaster Monitoring since 1999

<http://modis.gsfc.nasa.gov/>



Terra (EOS-AM1) – Dec 1999 until present



Aqua (EOS-PM1) - May 2002 until present

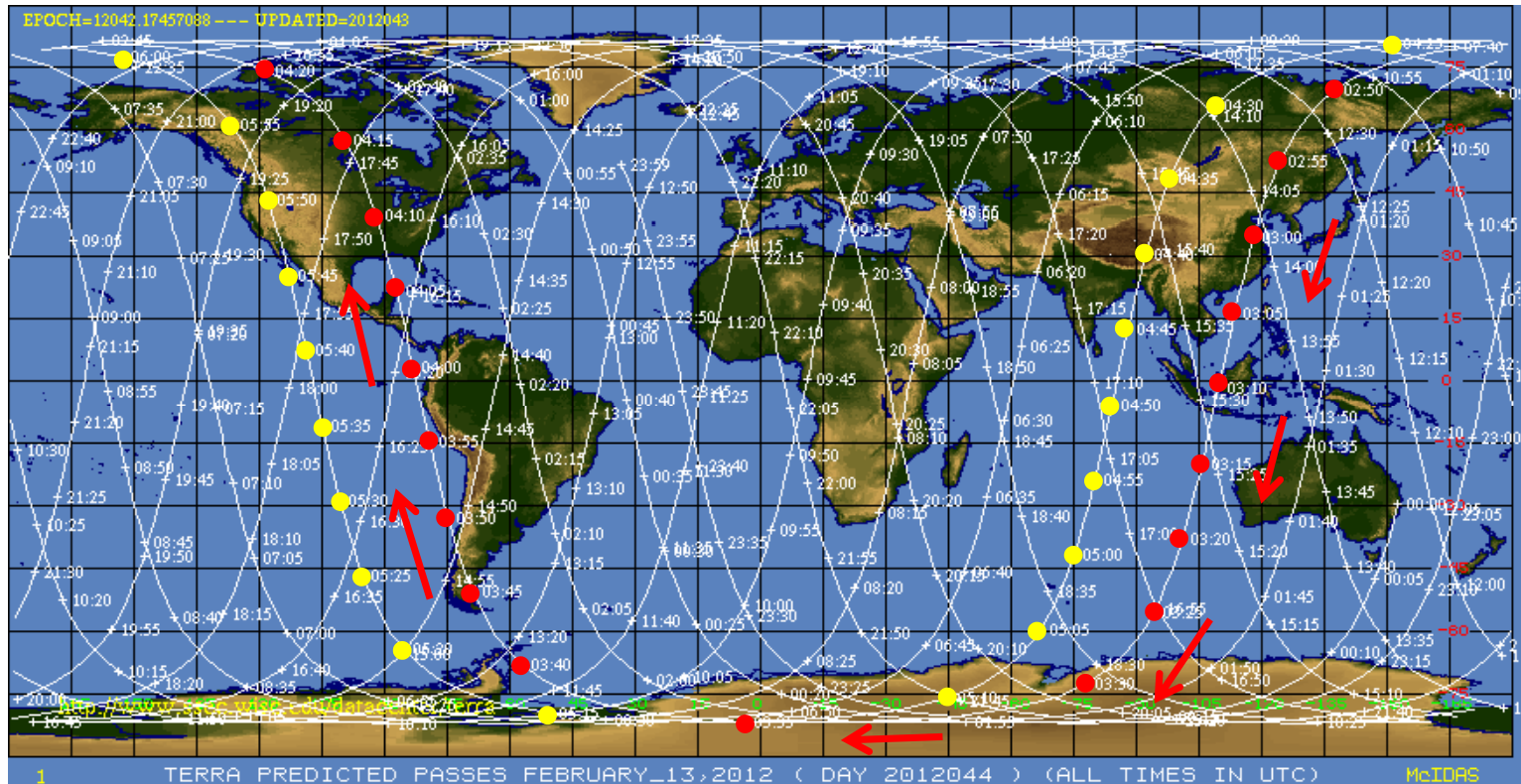
Design Concepts that make up MODIS

Curator: Brandon Maccherone
NASA Official: Shannell Cardwell

<http://terra.nasa.gov/>

MODIS Rapid Response System

MODIS Image Subsets – Terra Satellite Passes on Feb 13, 2012

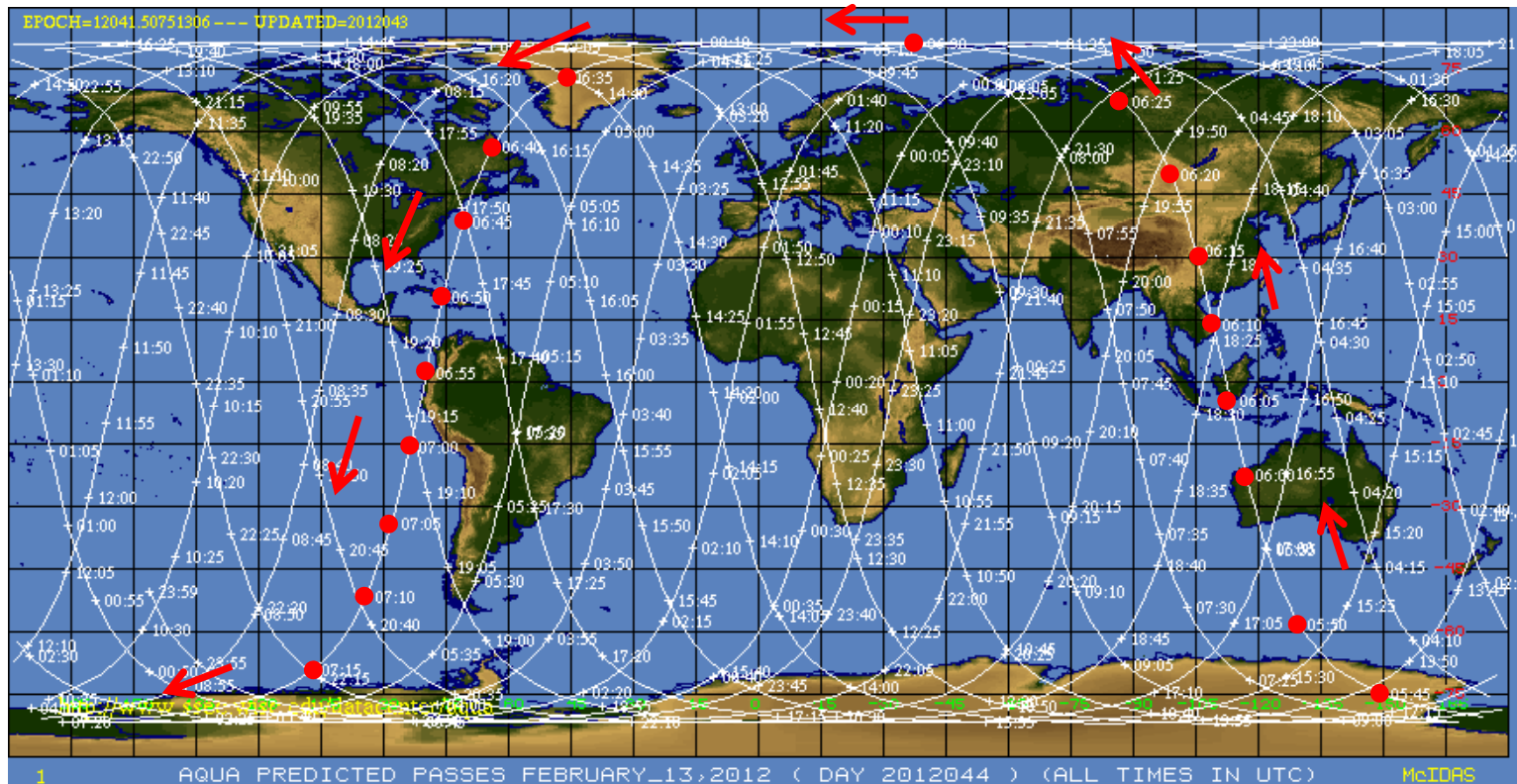


Source: MODIS Rapid Response – LANCE (Feb 23, 2012)

Terra Satellite flight direction is shown by **red arrow**. The red dots show the overpass time of each 5-min granule. Similarly as the yellow dots.

MODIS Rapid Response System

MODIS Image Subsets – Aqua Satellite Passes on Feb 13, 2012



Source: MODIS Rapid Response – LANCE (Feb 23, 2012)

Terra Satellite flight direction is shown by **red arrow**. The red dots show the overpass time of each 5-min granule. Similarly as the yellow dots.

MODIS Rapid Response System

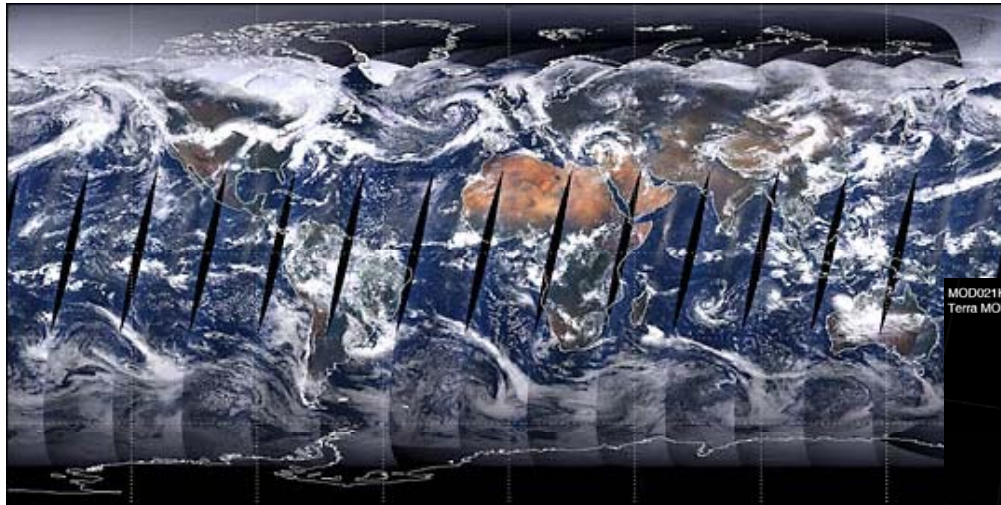
MODIS Image Subsets – Day and Night World Map – Day and night MODIS 5-min granules (subsets)



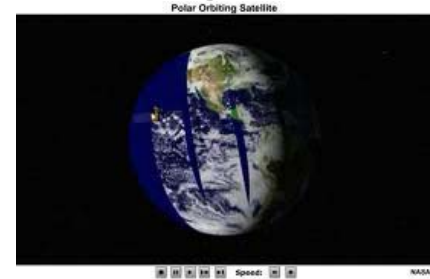
Source: <http://www.timeanddate.com/worldclock/sunearth.html> (Feb 23, 2012)

MODIS Rapid Response System

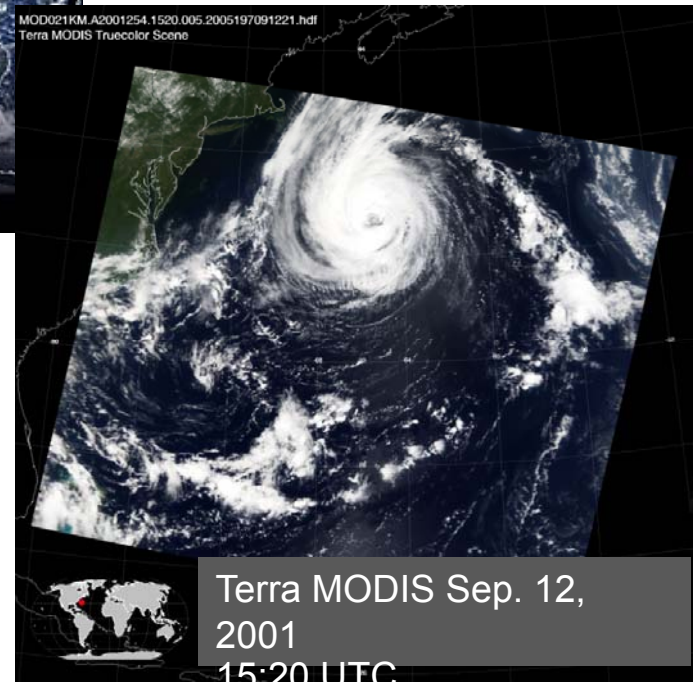
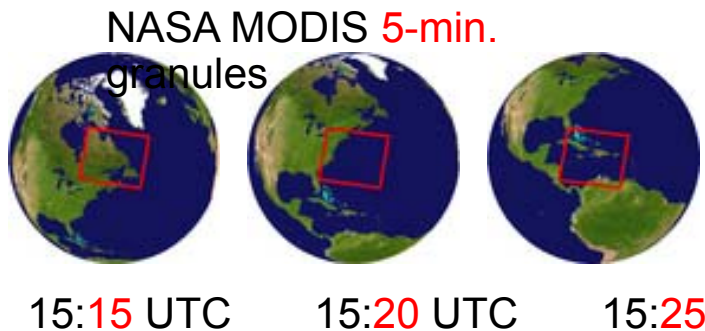
Terra Orbit – Terra Passes – Terra MODIS Image Subsets



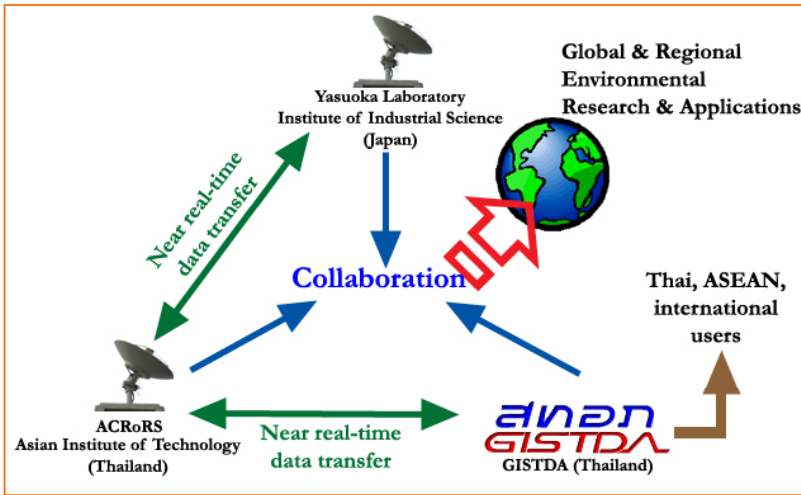
Terra Passes



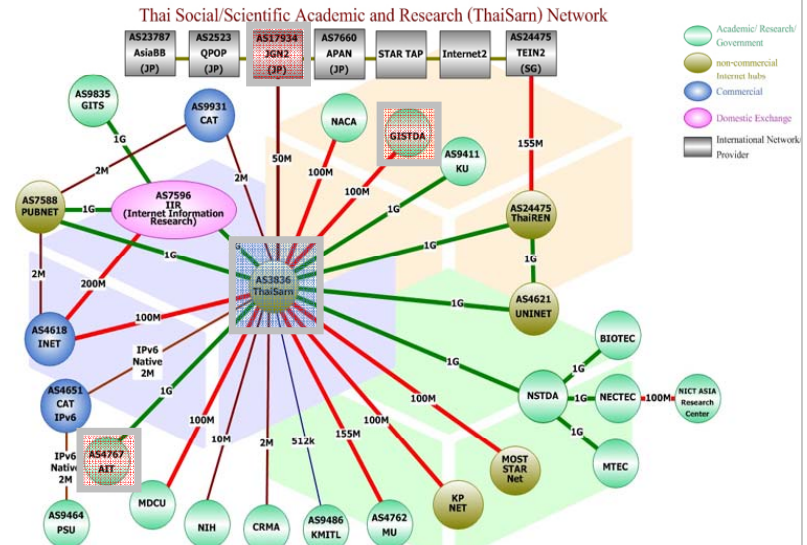
Terra Orbit



MODIS Program in AIT since 2001

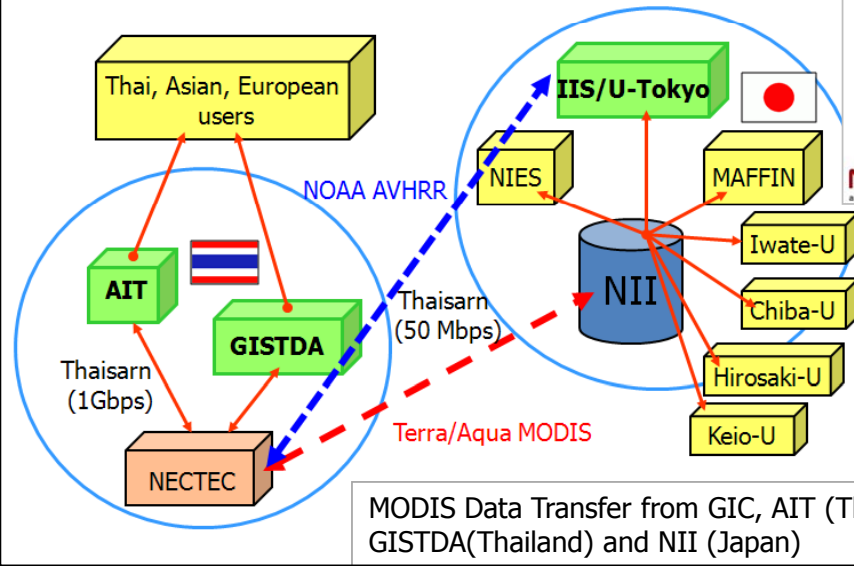


ThaiSarn Network Data Sharing



NECTEC This chart is designed, maintained copyrighted by Chatchai Chan-In ThaiSarn, NECTEC. All rights reserved. The information contained in this chart is based actual measurements and estimation. We welcome update information, but reserve the rights to verify the accuracy of the given information. Please contact us at noc@nectec.or.th

ไทยสาร 3 ThaiSarn3 Thailand's Next Generation Internet



MODIS Data Transfer from GIC, AIT (Thailand) to GISTDA(Thailand) and NII (Japan)

MODIS Program at Geoinformatics Center, AIT since May 2001:

- Sawada Lab @ University of Tokyo, Japan
- GISTDA , Thailand
- Geoinformatics Center, AIT, Thailand

Terra/Aqua MODIS Spectral Bands Specifications

TERRA/MODIS Sensor Characteristics							
Primary Use	Band Groups	Band Color	Band	Bandwidth ¹	Spectral Radiance ²	Required SNR ³	Purpose (Example)
Land/Cloud/Aerosols Boundaries	①	Yellow - Red	1	620 - 670	21.8	128	Veg. Chlorophyll Absorption
		NIR	2	841 - 876	24.7	201	Cloud and Veg. Land Cover Transformation
Blue		3	459 - 479	35.3	243	Soil, Vegetation Differences	
Green		4	545 - 565	29.0	228	Green Vegetation	
NIR		5	1230 - 1250	5.4	74	Leaf/Canopy Differences	
SWIR		6	1628 - 1652	7.3	275	Snow/Cloud Differences	
SWIR		7	2105 - 2155	1.0	110	Land and Cloud Properties	
Ocean Color/Phytoplankton/Biogeochemistry	②	UV	8	405 - 420	44.9	880	Chlorophyll
		Blue	9	438 - 448	41.9	838	Chlorophyll
		Blue	10	483 - 493	32.1	802	Chlorophyll
		Green	11	526 - 536	27.9	754	Chlorophyll
		Green	12	546 - 556	21.0	750	Sediments
		Yellow	13	662 - 672	9.5	910	Sediments, Atmosphere
		Red	14	673 - 683	8.7	1087	Chlorophyll Fluorescence
		NIR	15	743 - 753	10.2	586	Aerosol Properties
		NIR	16	862 - 877	6.2	516	Aerosol / Atmospheric Properties
Atmospheric Water Vapor	③	NIR	17	890 - 920	10.0	167	Cloud / Atmospheric Properties
		NIR	18	931 - 941	3.6	57	Cloud / Atmospheric Properties
		NIR	19	915 - 965	15.0	250	Cloud / Atmospheric Properties

Note:

①	Land and Cloud Boundaries/Properties Bands
②	Ocean Color Bands
③	Atmosphere / Ocean Bands

Primary Use	Band	Bandwidth ¹	Spectral Radiance ²	Required NE(delta)T(K) ⁴
Surface/Cloud Temperature	IIR 20	3.660 - 3.840	0.45(300K)	0.05
	IIR 21	3.929 - 3.989	2.38(335K)	2.00
	IIR 22	3.929 - 3.989	0.67(300K)	0.07
	IIR 23	4.020 - 4.080	0.79(300K)	0.07
Atmospheric Temperature	IIR 24	4.433 - 4.498	0.17(250K)	0.25
	IIR 25	4.482 - 4.549	0.59(275K)	0.25
Cirrus Clouds Water Vapor	SWIR 26	1.360 - 1.390	6.00	150(SNR)
	IR 27	6.535 - 6.895	1.16(240K)	0.25
Cloud Properties	IR 28	7.175 - 7.475	2.18(250K)	0.25
	TIR 29	8.400 - 8.700	9.58(300K)	0.05
Ozone	TIR 30	9.580 - 9.880	3.69(250K)	0.25
Surface/Cloud Temperature	TIR 31	10.780 - 11.280	9.55(300K)	0.05
	TIR 32	11.770 - 12.270	8.94(300K)	0.05
Cloud Top Altitude	TIR 33	13.185 - 13.485	4.52(260K)	0.25
	TIR 34	13.485 - 13.785	3.76(250K)	0.25
	TIR 35	13.785 - 14.085	3.11(240K)	0.25
	FIR 36	14.085 - 14.385	2.08(220K)	0.35

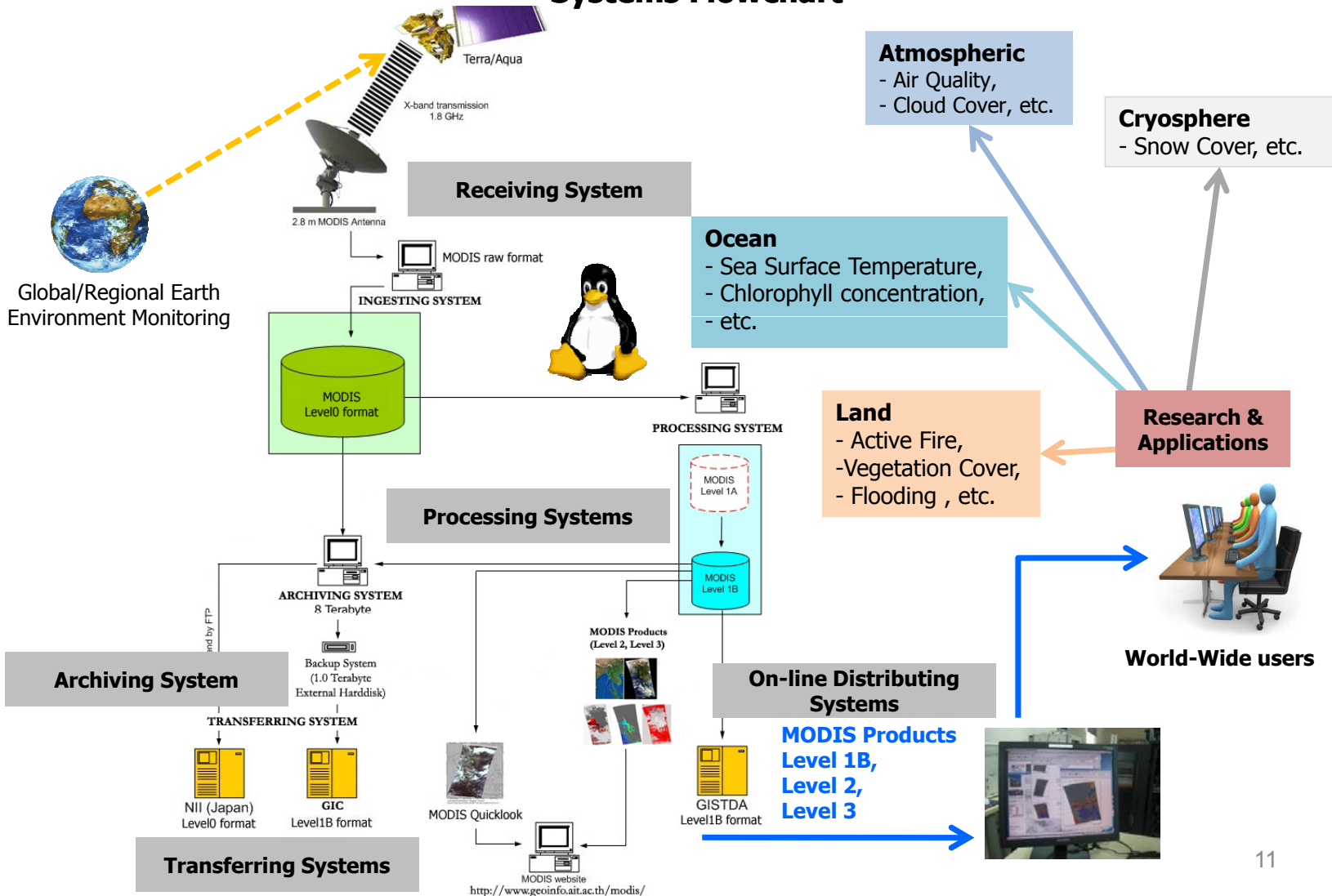
Footnotes:

- ¹ Bands 1 to 19 are in nm; Bands 20 to 36 are in μm
 - ² Spectral Radiance values are $(\text{W}/\text{m}^2\text{-}\mu\text{m}\text{-sr})$
 - ³ SNR = Signal-to-noise ratio
 - ⁴ NE(delta)T = Noise-equivalent temperature difference
- Note: Performance goal is 30-40% better than required

Spatial Resolution (in meter)		
		
250	500	1000

0.4 - 3.0 μm : Reflective band
3.0 - 15 μm : Emissive Bands (Thermal bands)

GIC/AIT Near Real time Automatic MODIS Receiving, Processing, Archiving, Transferring and Distributing Systems Flowchart



Terra/Aqua MODIS Receiving, Archiving and Processing Systems in Geoinformatics Center (GIC), AIT

- Operational since May 2001 – present
- More than 20,000 Scenes for Terra/Aqua(day and night)
- Covering 19 countries (South and Southeast Asia)
- Products include:
 - Land, Ocean, Atmosphere and Cryosphere disciplines
- Most products are Standard NASA Products
- Mostly use NASA ATBD (Algorithm Theoretical Basic Documents) for data processing
- Operating System : Linux (only!)

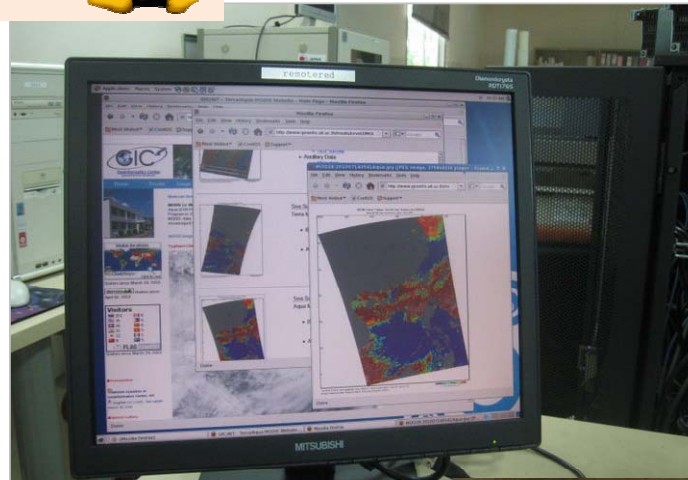


Concept of Processing System:

- Automatic
- Near Real-time
- Daily (6-8 image scenes/day)
- Online Product Access for 24 hours
- Easy-to-use Data format Products



Receiving System



Automatic Near Real-Time Processing Systems



Backup Storage:

- External USB Hard disks (2.0 TB)
- DLT Tapes (40 Gigabytes)

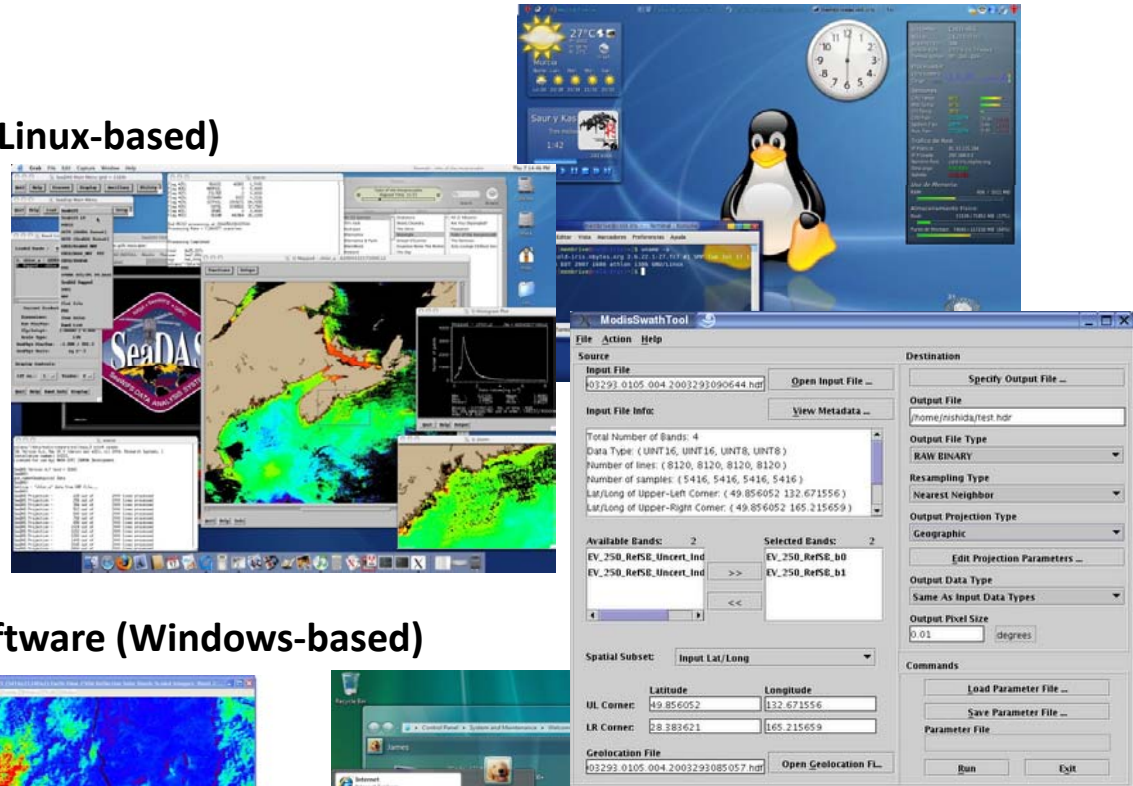
Terra/Aqua MODIS Processing System - Software

<http://www.geoinfo.ait.ac.th/modis/modsoftware.php>



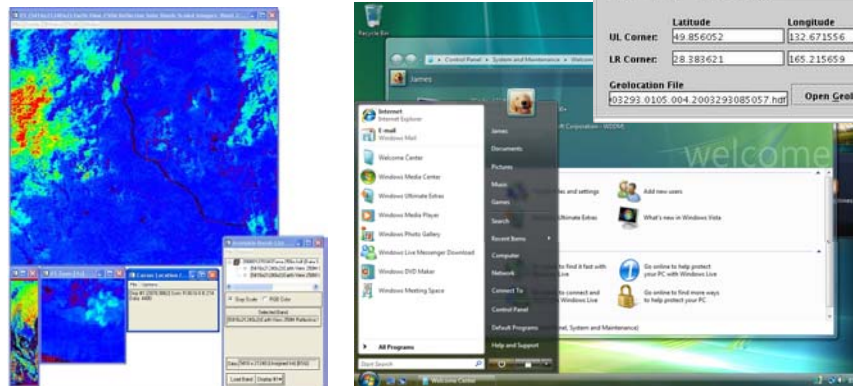
1. Free Software (Linux-based)

- IMAPP 2.1
- MODISL1DB 1.7
- SIMAP 4.0
- MRTSwath
- HDFLook 8.x
- SeaDAS 5.0
- ScanView
- Hdfview 2.7
- HEG Tools, etc



2. Commercial Software (Windows-based)

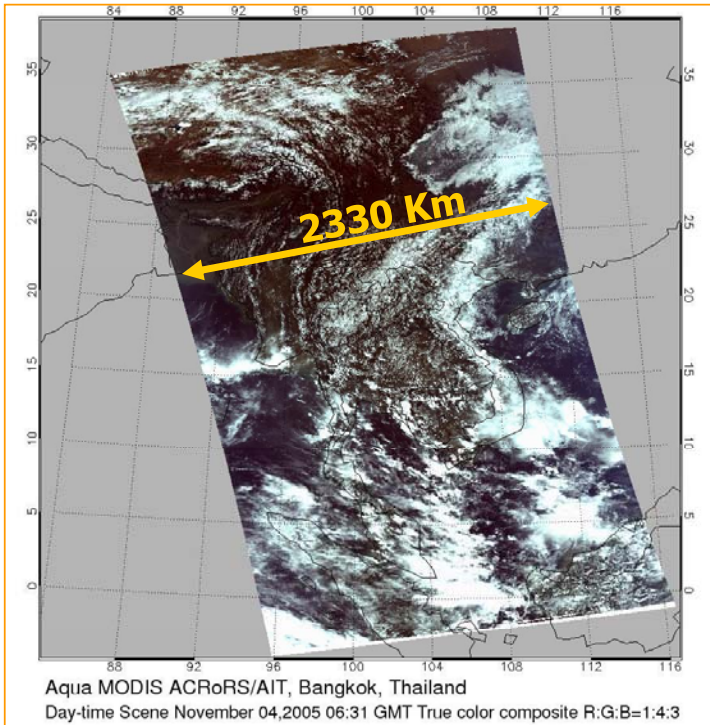
- ENVI 4.x
- ER-Mapper
- ERDAS, etc.



Terra/Aqua MODIS Receiving Coverage in AIT

The Philippines, Taiwan, Indonesia (Kalimantan, Sumatra and Java), Timor Leste, Malaysia (Malaya and Sarawak), Brunei, Singapore, Vietnam, Laos, Thailand, Cambodia, Myanmar, Southern half of China (including Tibet), Easter part of Pakistan, Bangladesh, Nepal, Bhutan, India and Sri Lanka

- Southern China and Andaman Seas
- Gulfs of Tonkin, Thailand and Bengal



NASA Standard MODIS Products

Calibration

- MOD 01 - Level-1A Radiance Counts
- MOD 02 - Level-1B Calibrated Geolocated Radiances
- MOD 03 - Geolocation Data Set

Atmosphere

- MOD 04 - Aerosol Product
- MOD 05 - Total Precipitable Water (Water Vapor)
- MOD 06 - Cloud Product
- MOD 07 - Atmospheric Profiles
- MOD 08 - Gridded Atmospheric Product
- MOD 35 - Cloud Mask

Land

- MOD 09 - Surface Reflectance
- MOD 11 - Land Surface Temperature & Emissivity
- MOD 12 - Land Cover/Land Cover Change
- MOD 13 - Gridded Vegetation Indices (Max NDVI & Integrated MVI)
- MOD 14 - Thermal Anomalies, Fires & Biomass Burning
- MOD 15 - Leaf Area Index & FPAR
- MOD 16 - Evapotranspiration
- MOD 17 - Net Photosynthesis and Primary Productivity
- MOD 43 - Surface Reflectance
- MOD 44 - Vegetation Cover Conversion

Cryosphere

- MOD 10 - Snow Cover
- MOD 29 - Sea Ice Cover

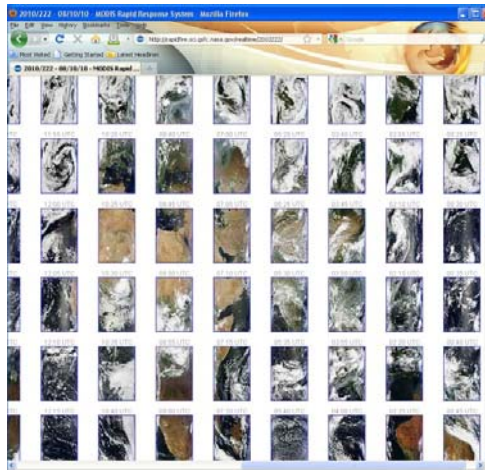
Ocean

- Angstrom Exponent
- Aerosol Optical Thickness
- Chlorophyll a
- Downwelling diffuse attenuation coefficient at 490 nm
- Level 2 Flags
- Photosynthetically Available Radiation
- Particulate Inorganic Carbon
- Particulate Organic Carbon
- Sea Surface Temperature Quality
- Sea Surface Temperature Quality - 4um
- Remote Sensing Reflectance
- Sea Surface Temperature
- Sea Surface Temperature 4um

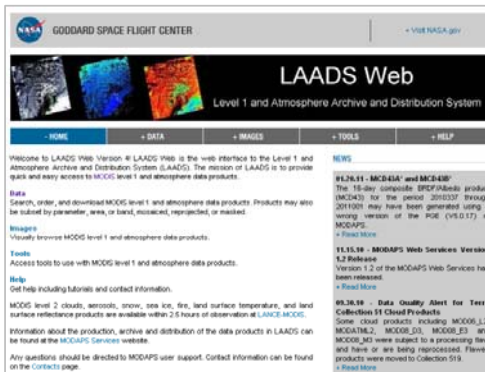
MODIS Science Team

- **Calibration Discipline Group**
 - MODIS Characterization Support Team (MCST)
 - <http://www.mcst.ssaai.biz/mcstweb/index.html>
- **Land Discipline Group (including Snow/Ice Group)**
 - MODLAND
 - <http://modis-land.gsfc.nasa.gov/>
- **Oceans Discipline Group**
 - Ocean Color
 - <http://oceancolor.gsfc.nasa.gov/>
- **Atmosphere Discipline Group**
 - <http://modis-atmos.gsfc.nasa.gov/>

MODIS Data Product on the Internet

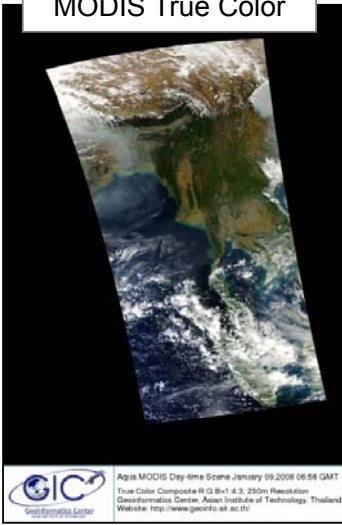


- **Geoinformatics Center, AIT**
 - <http://www.geoinfo.ait.ac.th/modis/>
- **Sawada Laboratory, Institute of Industrial Sciences (IIS), University of Tokyo**
 - <http://webmodis.iis.u-tokyo.ac.jp/>
- **MODIS Rapid Response System**
 - <http://rapidfire.sci.gsfc.nasa.gov/>
- **Level 1 and Atmospheric Archive and Distribution System (LAADS) Web**
 - <ftp://ladsweb.nascom.nasa.gov/>
 - <http://ladsweb.nascom.nasa.gov/>

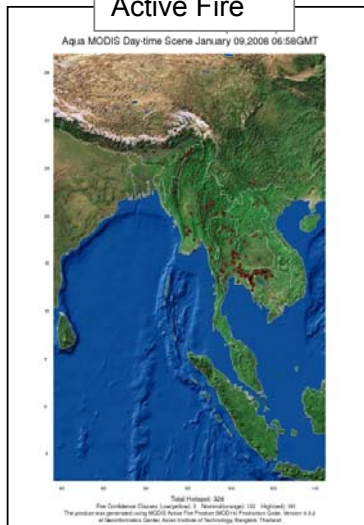


MODIS Products available in Geoinformatics Center, AIT

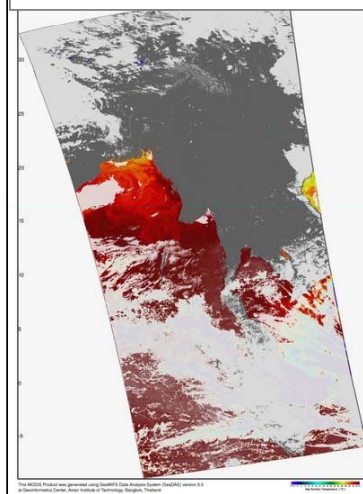
MODIS True Color



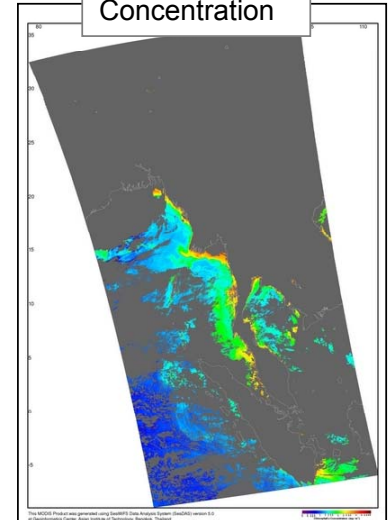
Active Fire



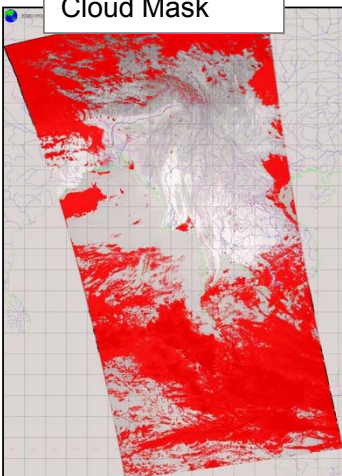
Sea Surface Temperature



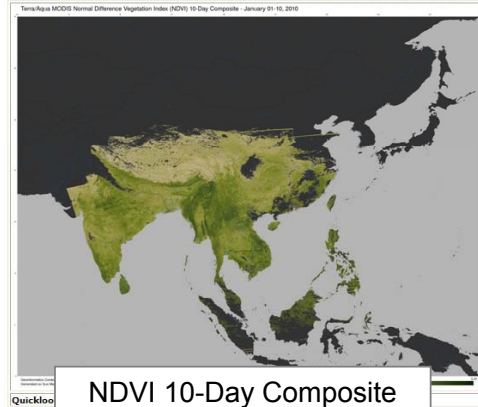
Chlorophyll-a Concentration



Cloud Mask



Terra/Aqua MODIS NDVI 10-Day Composite Product of January 01-10, 2010



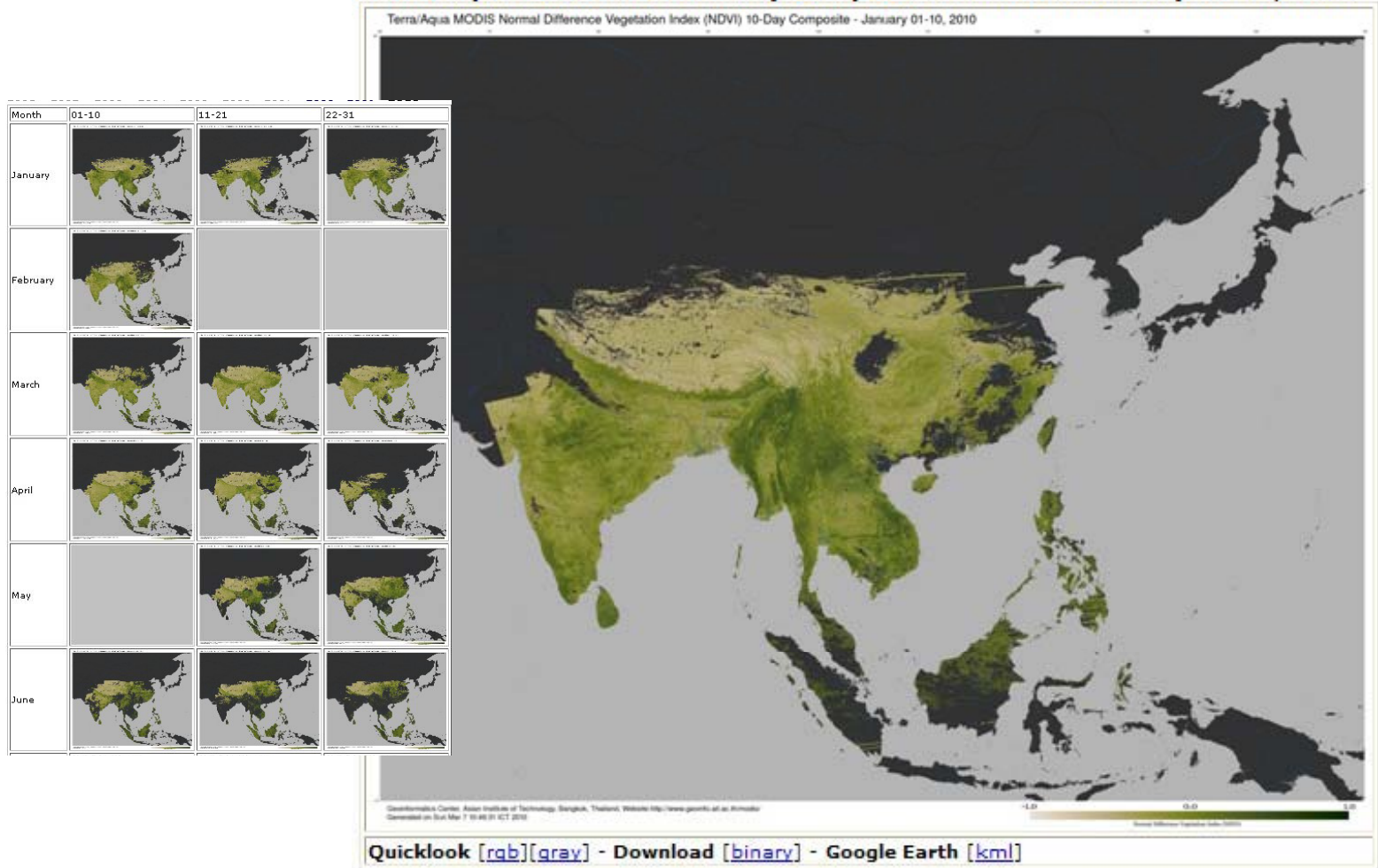
NDVI 10-Day Composite

Last update : Sun Mar 7 10:53:05 ICT 2010 (Bangkok Time)

1. MODIS True Color 250m resolution
2. Active Fire and Thermal Anomalies (MOD14)
3. Cloud Masking (MOD35)
4. Ocean Color Products :
 - 3.1 Sea Surface Temperature (MOD28)
 - 3.2 Chlorophyll-a Concentration (MOD21)
5. NDVI 10-Day Composite

10-Day Composite MODIS Imagery

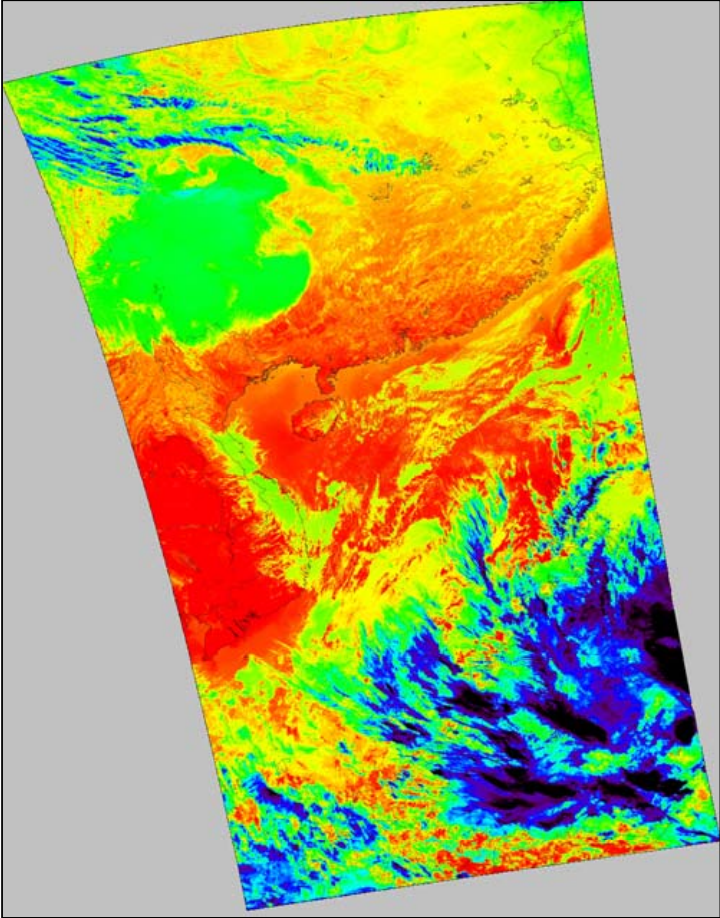
Terra/Aqua MODIS NDVI 10-Day Composite Product of January 01-10, 2010



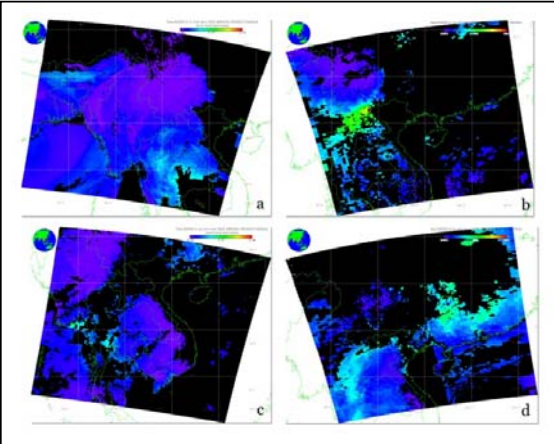
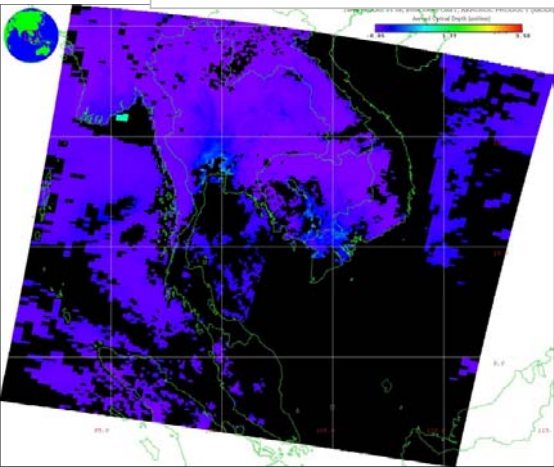
Last update : Sun Mar 7 10:53:05 ICT 2010 (Bangkok Time)

MODIS Products under development in Geoinformatics Center, AIT

- 1. Land Surface Temperature (MOD11)
- 2. Surface Reflectance (MOD09)
- 3. Aerosol Optical Thickness (MOD04)
- 4. Burning Area



Land Surface Temperature (MOD11)

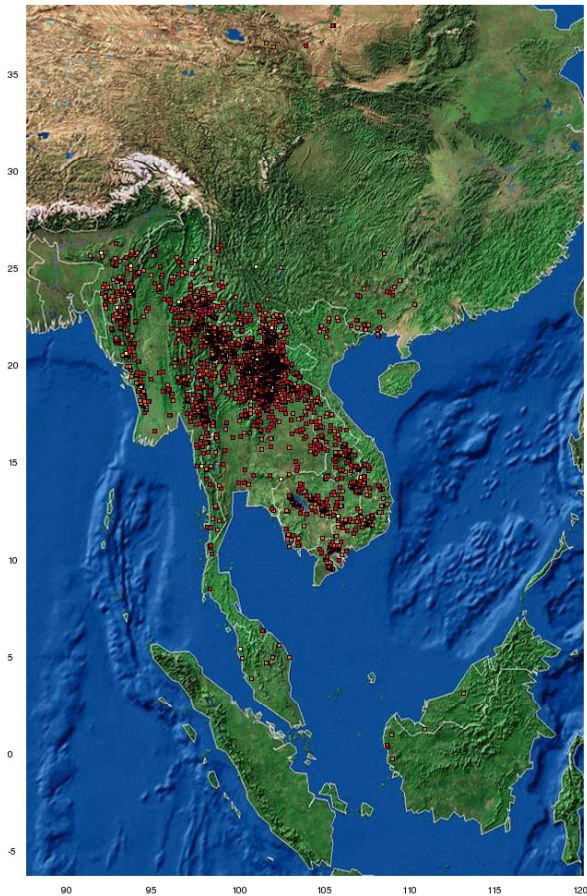


Aerosol Optical Thickness (MOD04)

Application of MODIS Active Fires and Aerosol Products for Biomass Burning and Air Quality Monitoring in SE Asia

MODIS Fire Product(MOD14)

Aqua MODIS Day-time Scene March 25, 2010 06:24GMT



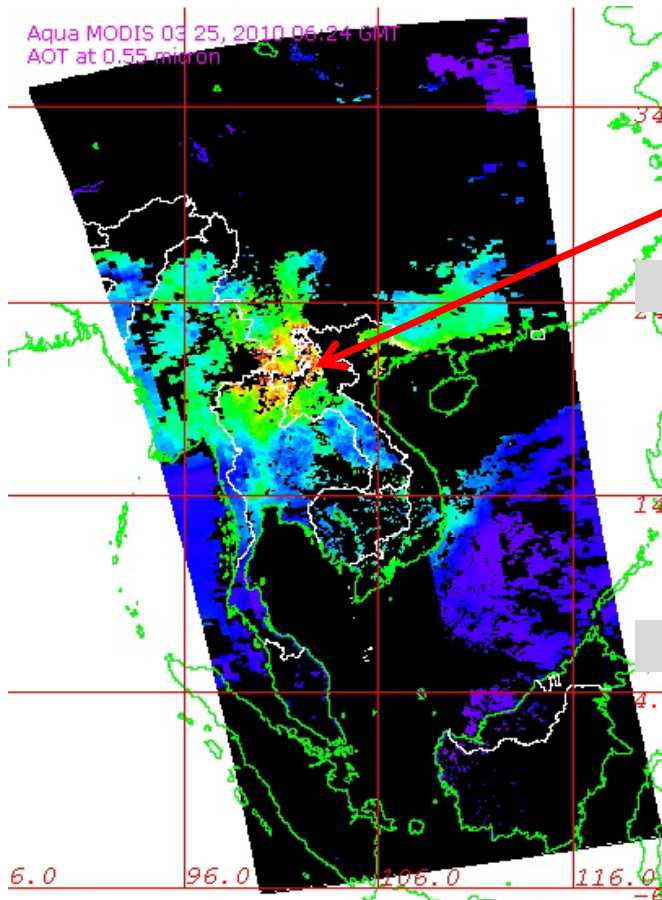
Total Hotspot: 5160

Fire Confidence Classes: Low(yellow): 93 Nominal(orange): 1320 High(red): 3747

The product was generated using MODIS Active Fire Product (MOD14) Production Code, Version 4.3.2 at Geoinformatics Center, Asian Institute of Technology, Bangkok, Thailand

Aerosol Optical Thickness (MOD04)

Aqua MODIS 03 25, 2010 06:24 GMT
AOT at 0.55 micron



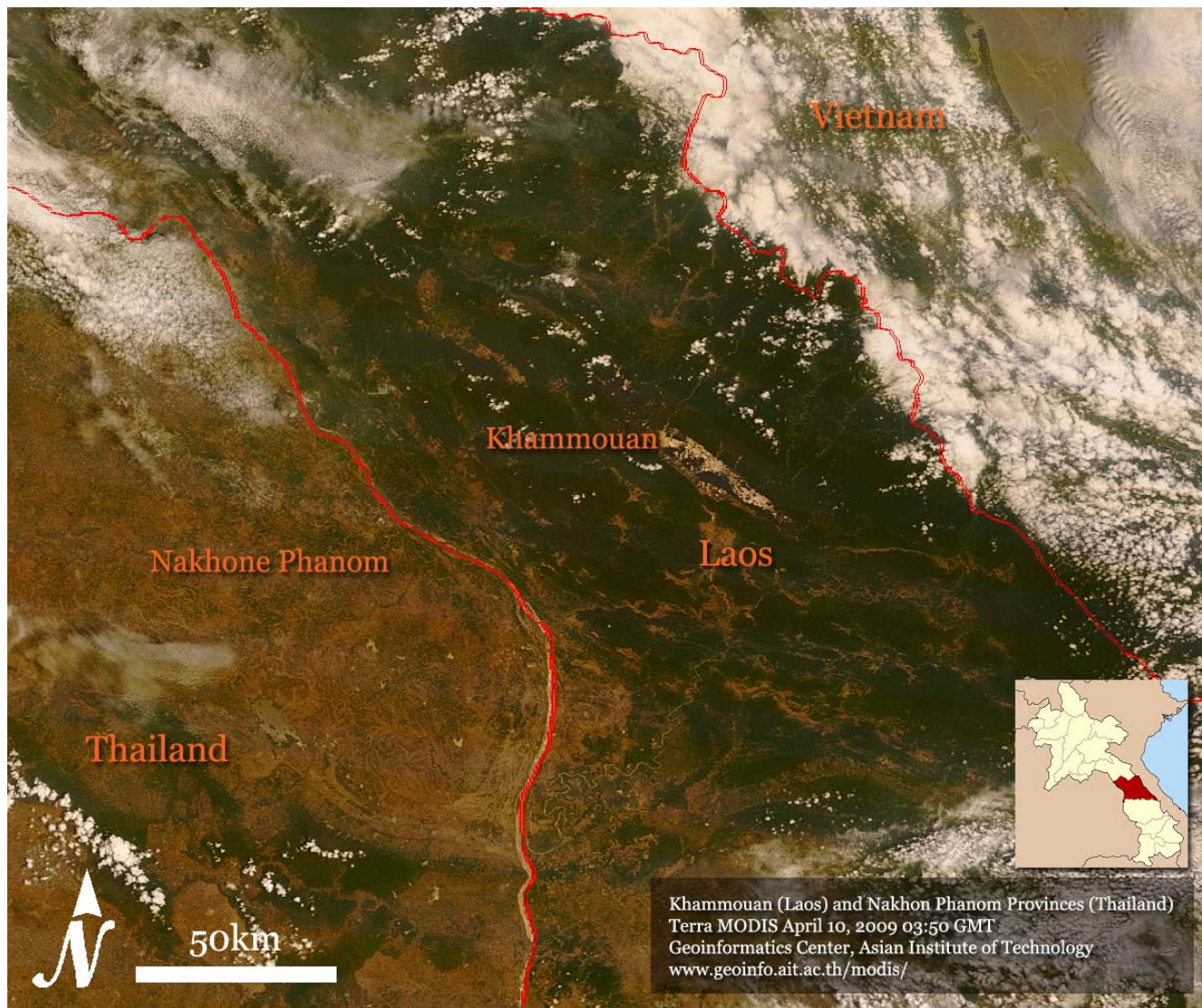
March 25, 2010, Luang Prabang



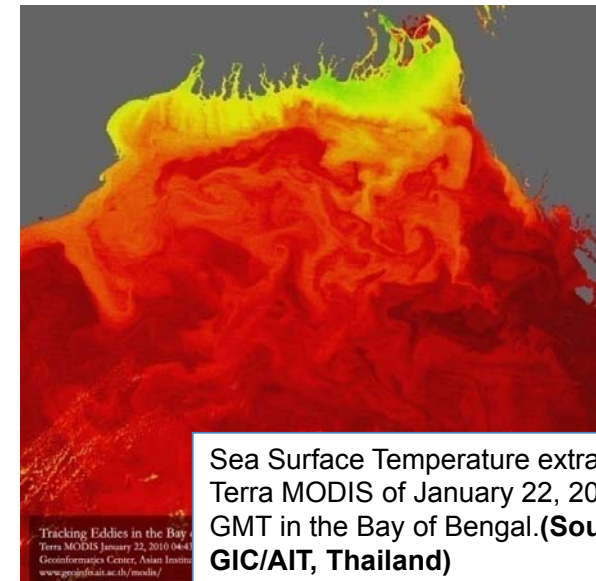
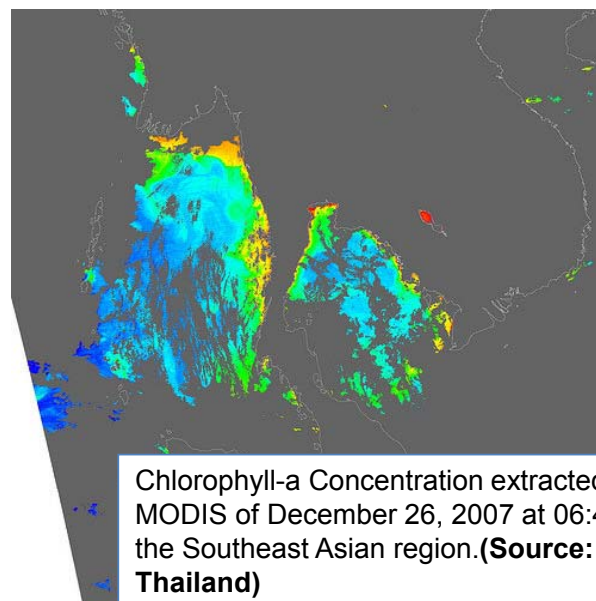
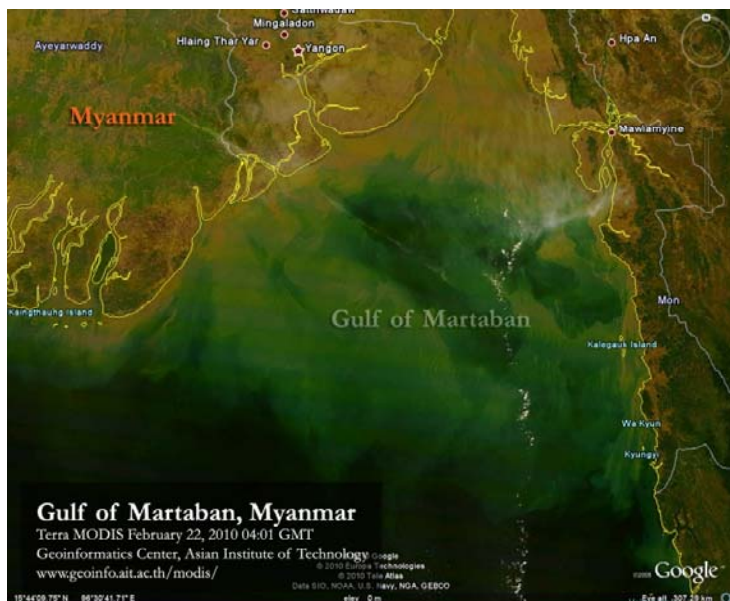
March 26, 2010, Luang Prabang

Aqua MODIS March 25, 2010 06:24 GMT

Monitoring of Land Cover using MODIS imagery



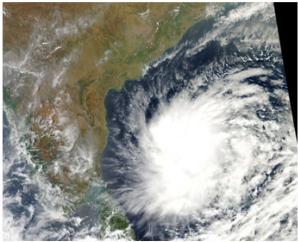
Monitoring of Ocean Color using MODIS imagery



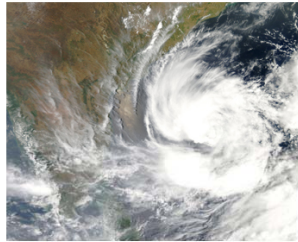
Typhoon/Tropical Cyclone Monitoring using MODIS

TROPICAL CYCLONE NARGIS

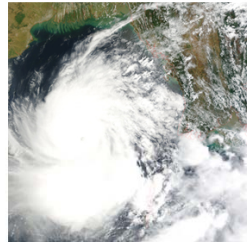
Terra/Aqua MODIS Time-Series (April 27- May 03, 2008)



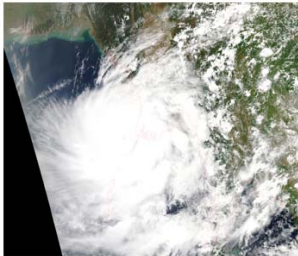
Aqua MODIS April 27, 2008, 08:06 GMT



Aqua MODIS April 29, 2008 07:54 GMT



Terra MODIS May 01, 2008 04:35 GMT



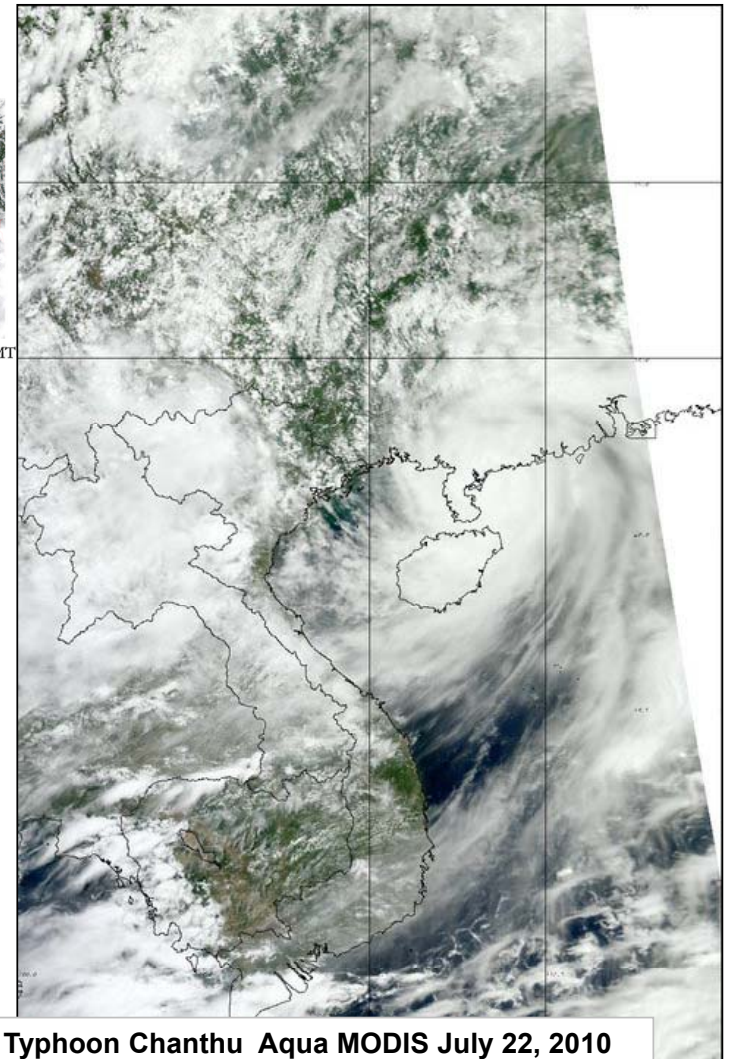
Aqua MODIS May 02, 2008 06:46 GMT



Terra MODIS May 03, 2008 04:25 GMT



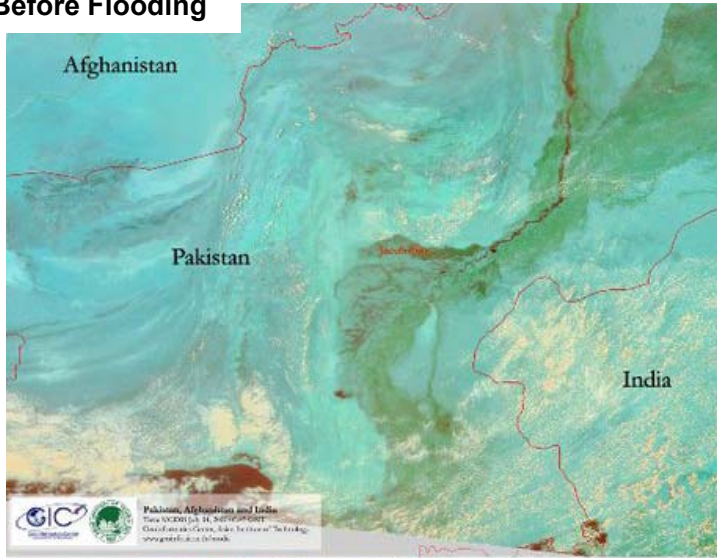
Geoinformatics Center, Asian Institute of Technology, Bangkok, Thailand



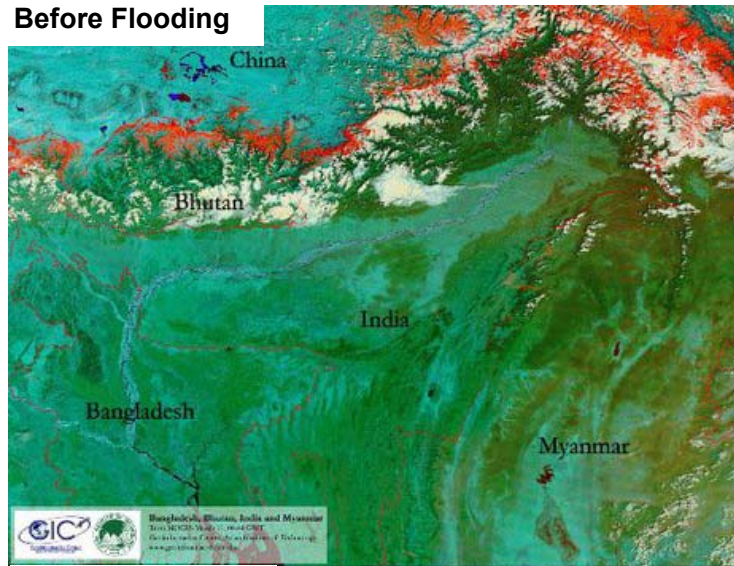
**Typhoon Chanthu Aqua MODIS July 22, 2010
06:29 GMT (Source: GIC/AIT, Thailand)**

Regional Flood Monitoring using MODIS

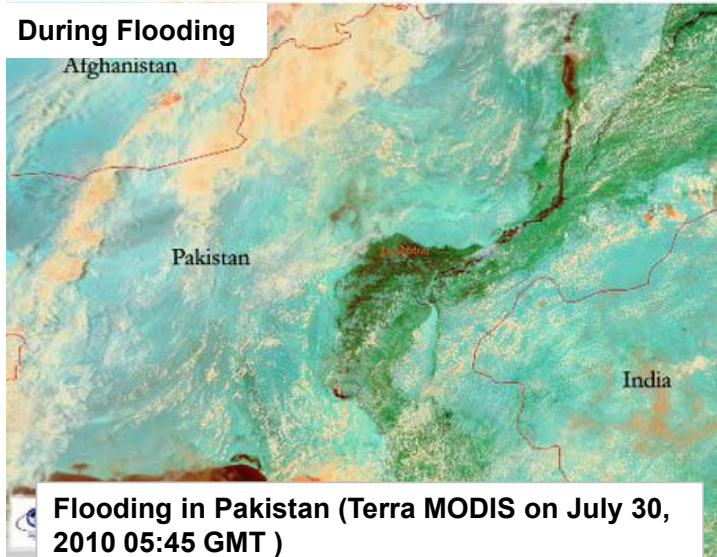
Before Flooding



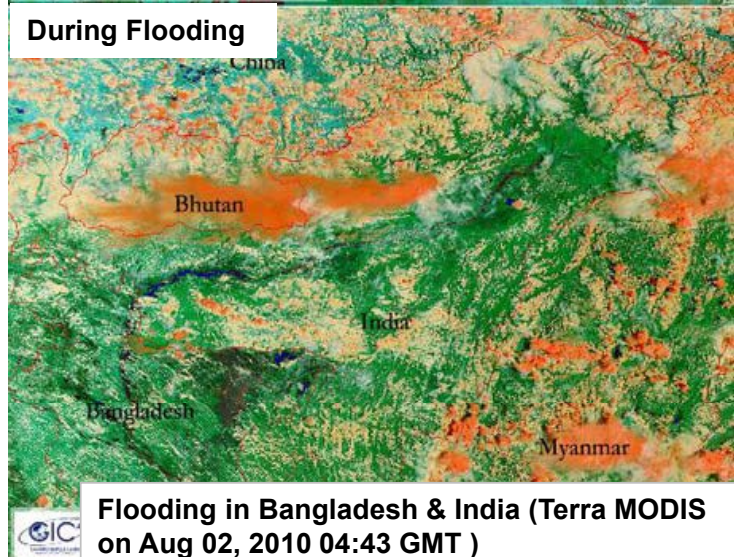
Before Flooding



During Flooding

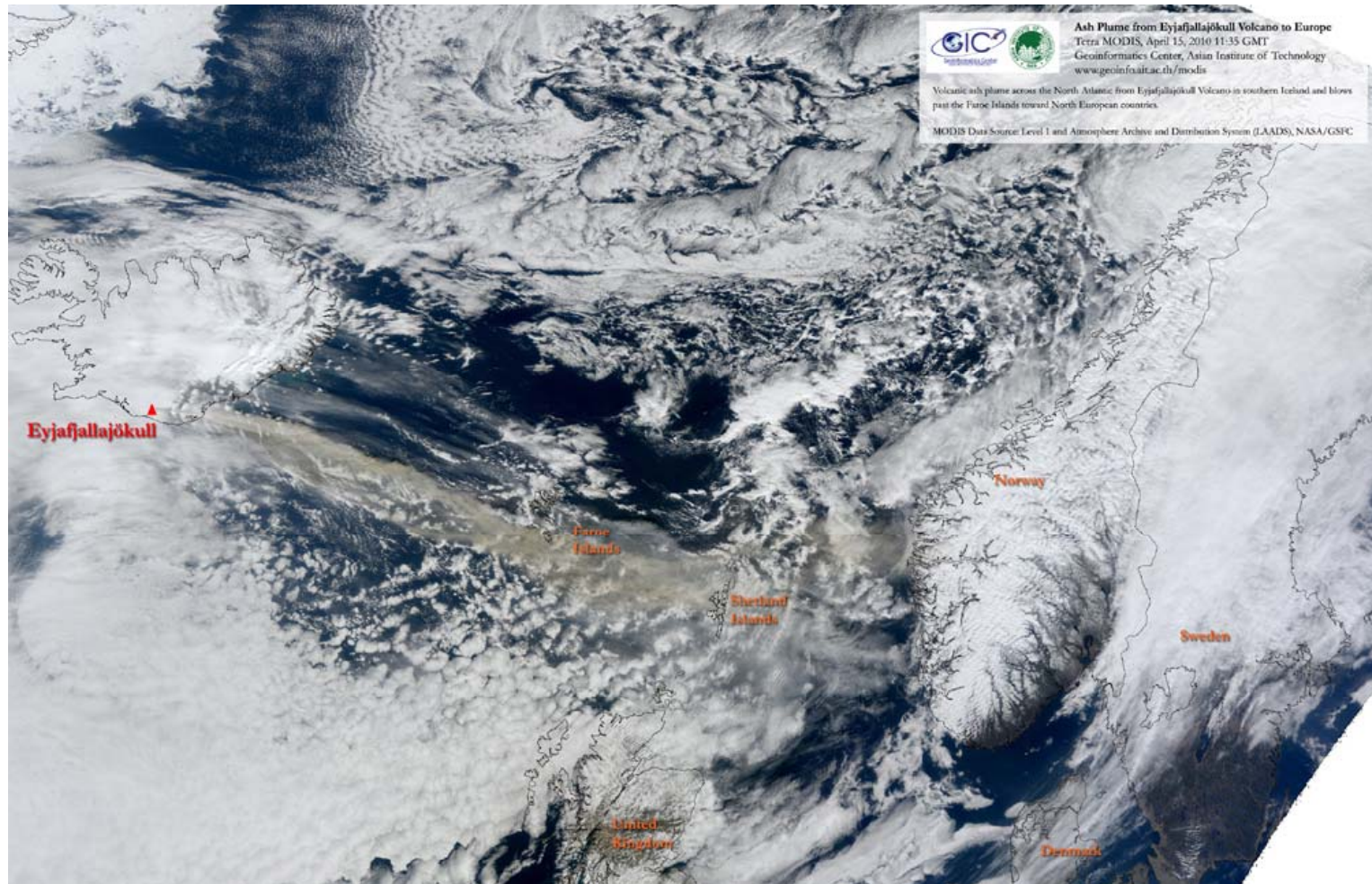


During Flooding



Monitoring of Volcano Eruption using MODIS imagery

Ash Plume from Eyjafjallajökull Volcano to Europe



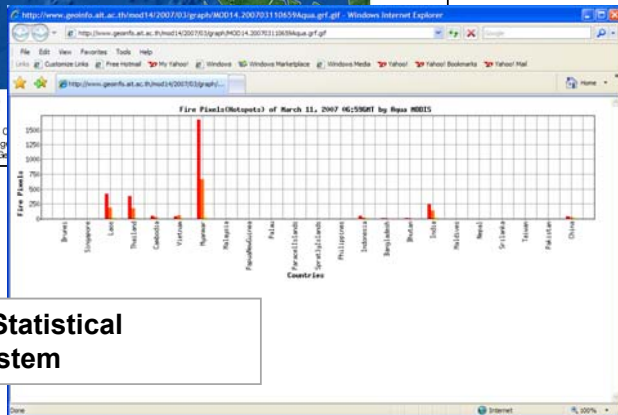
Eyjafjallajökull Volcano seen by Terra MODIS April 15, 2010 11:35 GMT (Source: GIC/AIT, Thailand)

MODIS Active Fire Monitoring System in Regional Level – South and Southeast Asia

MODIS Fire Product(MOD14)
Aqua MODIS Day-time Scene January 09,2008 06:58GMT



Daily Active Fire Distribution Maps



Active Fire Statistical Analysis System

User data query for MODIS Fire Information - Windows Internet Explorer

MODIS Fire Product (MOD14) Information System for Southeast Asia
Released on Tue Jul 25 09:58:53 ICT 2006 - Update: Oct 28,2006 12:23:42 ICT

Enter your interested values to the following parameters for querying MODIS Fire Information.
(*) denotes required fields.

01. Select a Single or Group of Countries*

02. Geographic Coordinates of interested area

03. Period of Query

04. Satellite Overhead Time

05. Day/Night Passes

06. Fire Reflectance Band2

07. Fire Brightness Temperature Band 21

On-line Active Fire Distribution Database System

User Query Result - Windows Internet Explorer

RESULT PAGE 10 of 11

id	date	time	day/night	satellite	lat	lon	ref2	T21	T31	Fo	Fc	country
186548	2007-03-11	06:59:00	Day	Aqua	20.46	101.24	0.25	388.8	393.83	196.95	100	Laos
186563	2007-03-11	06:59:00	Day	Aqua	20.45	101.25	0.26	339.86	299.71	47.59	99	Laos
186564	2007-03-11	06:59:00	Day	Aqua	20.45	101.34	0.25	340.06	300.71	47.82	100	Laos
186568	2007-03-11	06:59:00	Day	Aqua	20.47	101.28	0.25	343.73	308.13	52.47	100	Laos
186569	2007-03-11	06:59:00	Day	Aqua	20.46	101.33	0.26	354.54	300.17	79.02	100	Laos
186583	2007-03-11	06:59:00	Day	Aqua	20.38	102.09	0.24	332.56	303.97	32.42	94	Laos
186585	2007-03-11	06:59:00	Day	Aqua	20.47	101.04	0.25	333.28	300.93	35.86	95	Laos
186593	2007-03-11	06:59:00	Day	Aqua	20.58	102.08	0.24	330.83	300.63	29.85	92	Laos
186597	2007-03-11	06:59:00	Day	Aqua	20.59	102.02	0.24	336.43	301.35	40.39	97	Laos
186598	2007-03-11	06:59:00	Day	Aqua	20.48	101.04	0.25	328.25	300.73	27.74	90	Laos
186603	2007-03-11	06:59:00	Day	Aqua	20.49	101.04	0.24	330.26	303.41	86.97	100	Laos
186604	2007-03-11	06:59:00	Day	Aqua	20.49	101.02	0.24	342.09	303.09	49.37	100	Laos
186607	2007-03-11	06:59:00	Day	Aqua	20.5	101.04	0.25	341.03	303.33	45.92	100	Laos
186608	2007-03-11	06:59:00	Day	Aqua	20.51	101.02	0.24	377.12	309.38	143.69	100	Laos
186621	2007-03-11	06:59:00	Day	Aqua	20.51	101.02	0.25	335.16	301.61	34.44	96	Laos
186632	2007-03-11	06:59:00	Day	Aqua	20.53	101.07	0.25	345.01	300.61	55.58	100	Laos
186646	2007-03-11	06:59:00	Day	Aqua	20.51	101.03	0.24	355.36	305.23	77.69	100	Laos
186647	2007-03-11	06:59:00	Day	Aqua	20.51	101.01	0.25	335.56	304.59	37.32	96	Laos
186665	2007-03-11	06:59:00	Day	Aqua	20.53	101.06	0.25	335.51	300.77	38.14	96	Laos
186684	2007-03-11	06:59:00	Day	Aqua	20.56	101.11	0.25	388.44	407.41	183.38	100	Laos

MODIS Active Fire Monitoring & Visualization System in Regional Level South and Southeast Asia



Active Fire and Smoke-Haze Distribution Visualization Systems



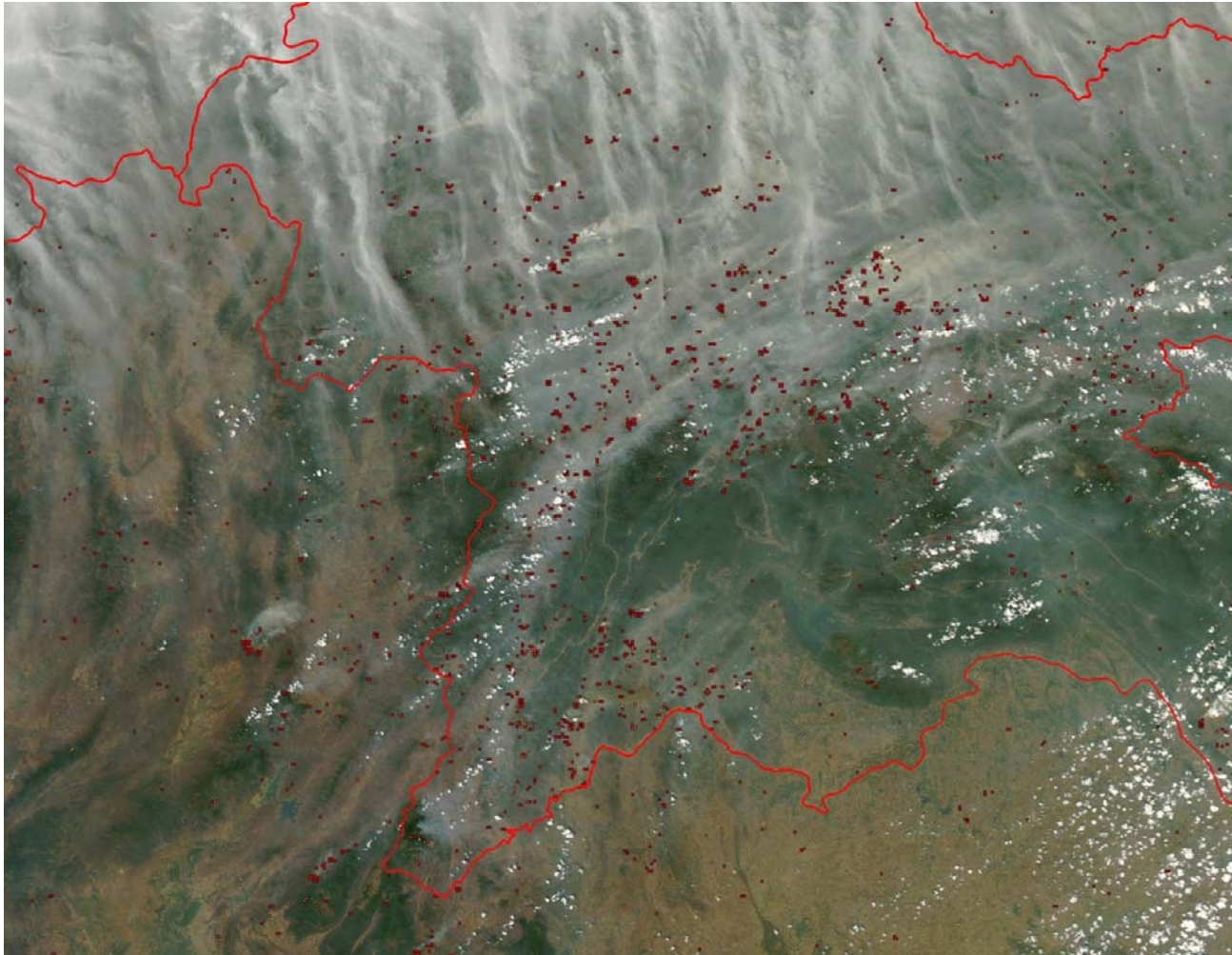
Active Fire Distribution Visualization



Smoke-Haze Distribution Visualization

MODIS Active Fire Monitoring System in Regional Level – South and Southeast Asia

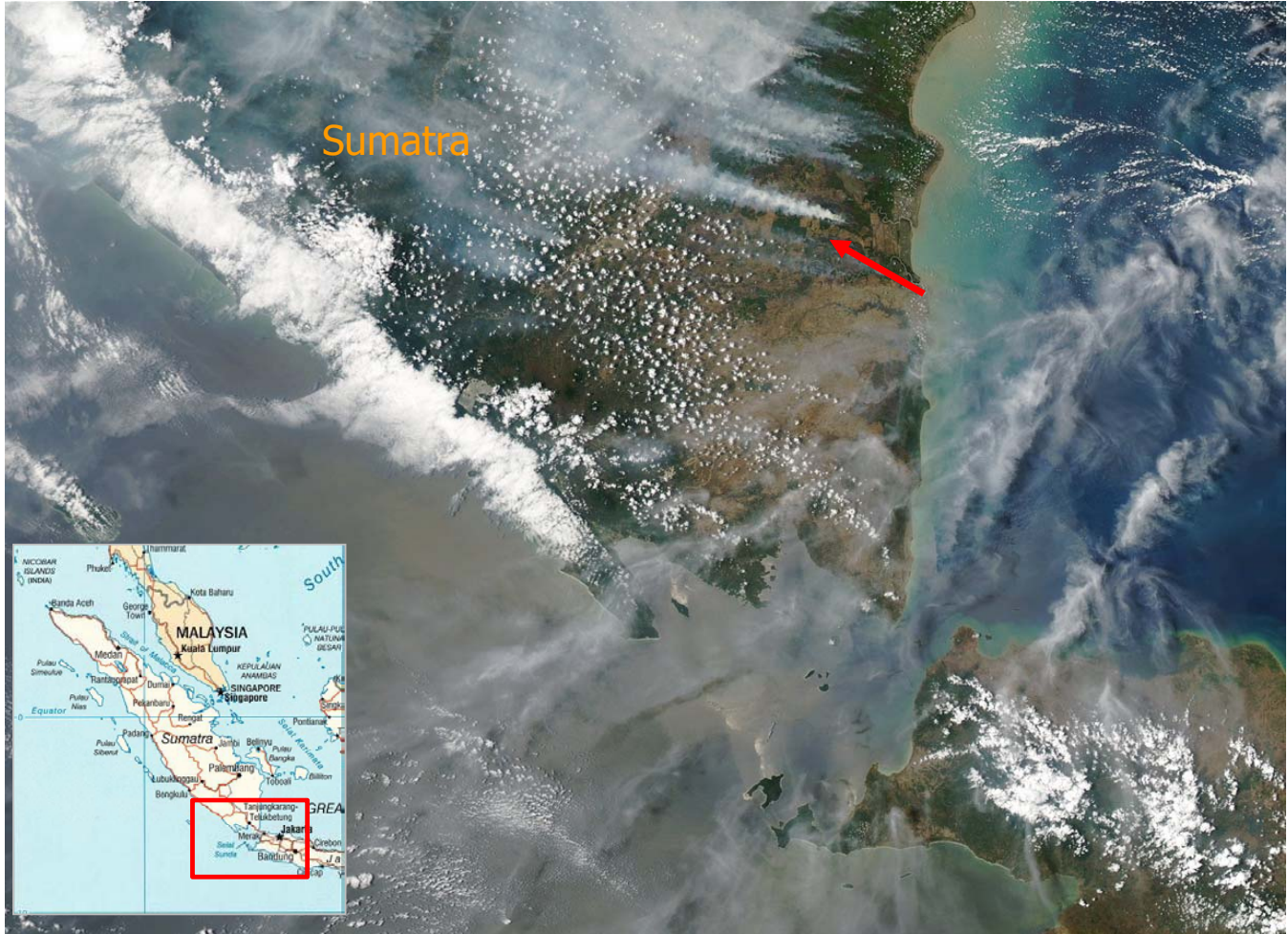
Laos & Thailand - Aqua MODIS March 14, 2009 06:43 GMT



MODIS Active Fire Monitoring System in Regional Level – South and Southeast Asia

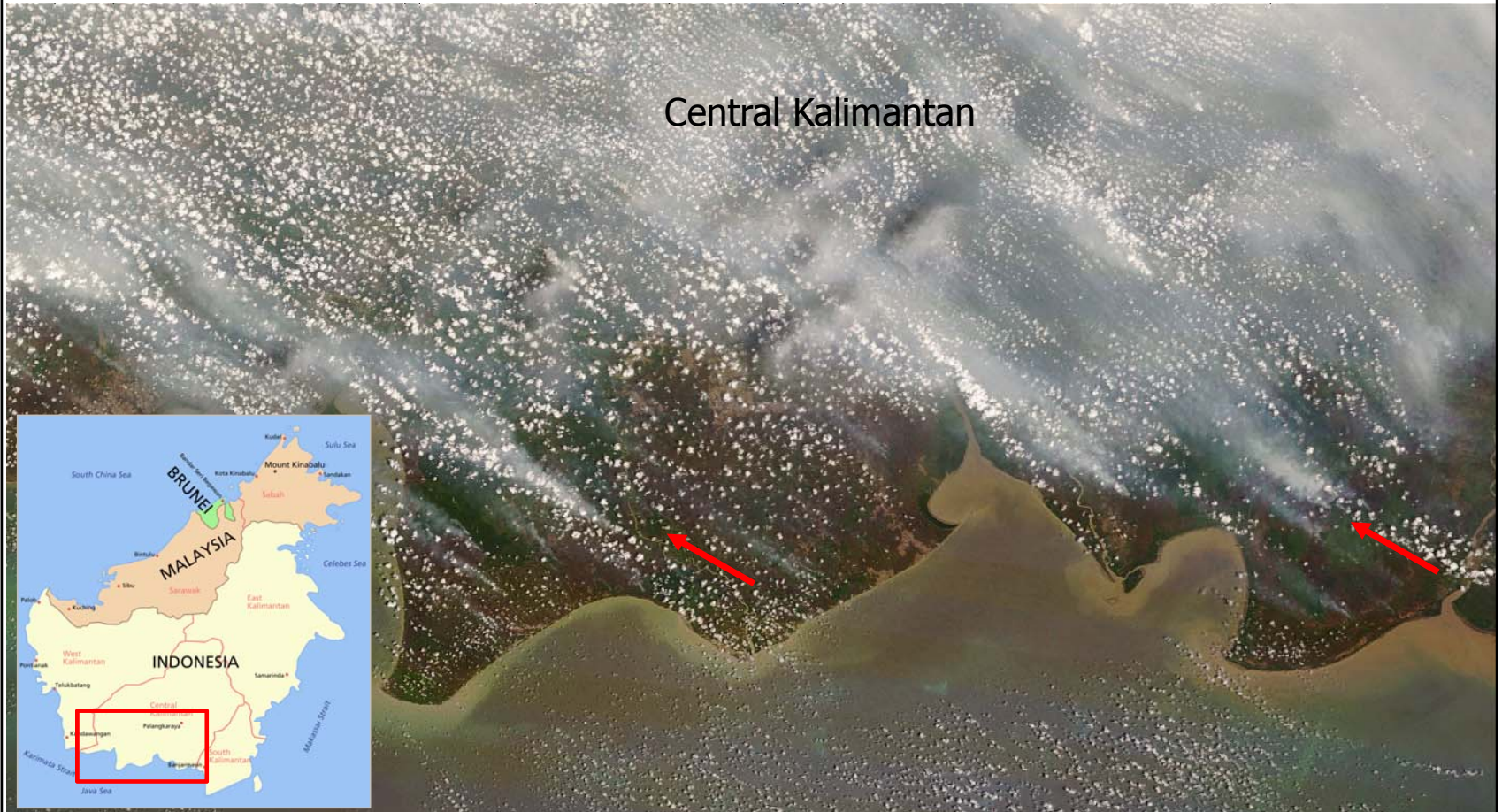
Sumatra (Indonesia) Aqua MODIS Oct. 06, 2006 06:34 GMT

Strong smoke from the wild fire location (shown by red arrow) are clearly visible



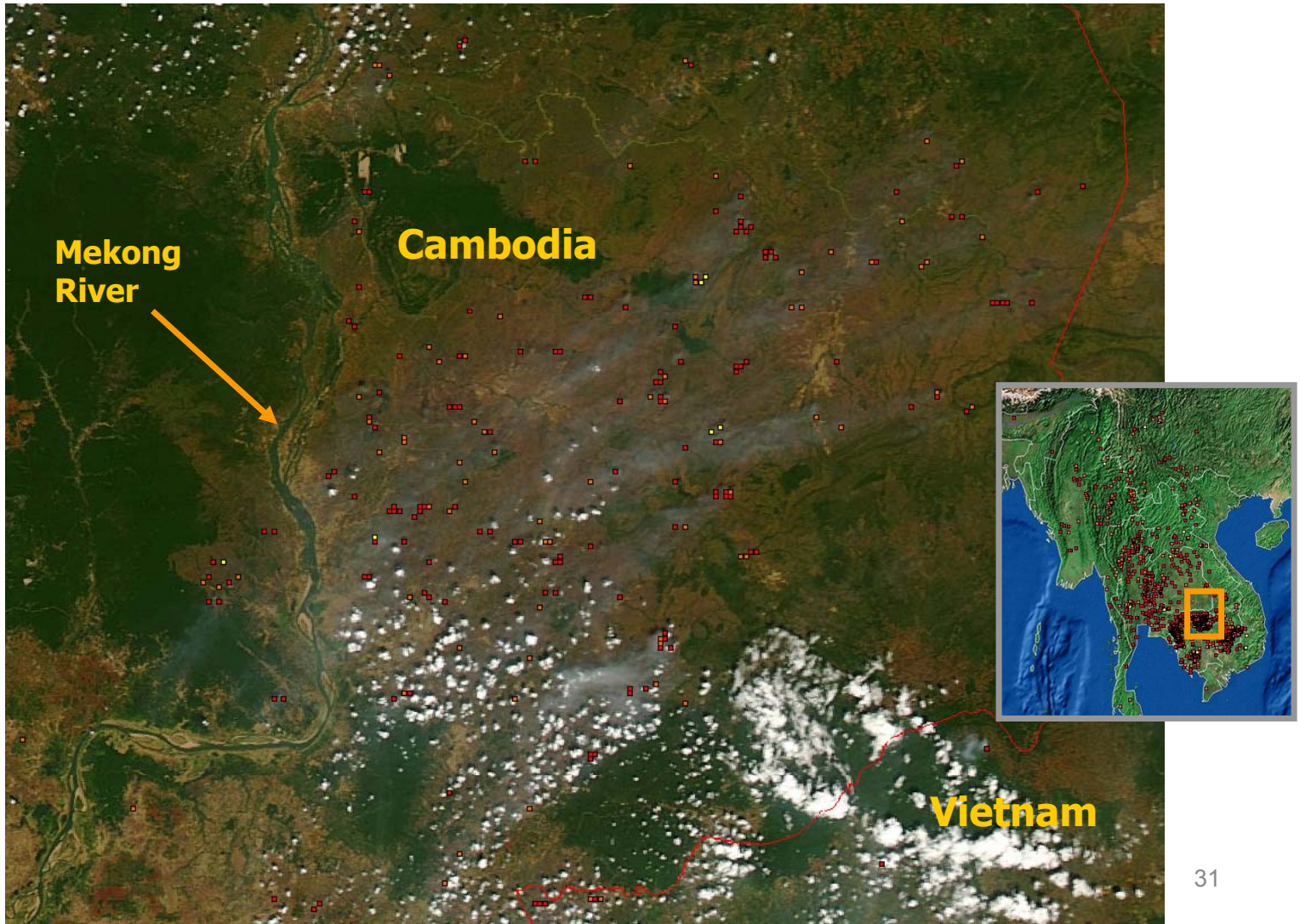
MODIS Active Fire Monitoring System in Regional Level – South and Southeast Asia

Kalimantan (Indonesia) Terra MODIS Nov. 04, 2006 02:59



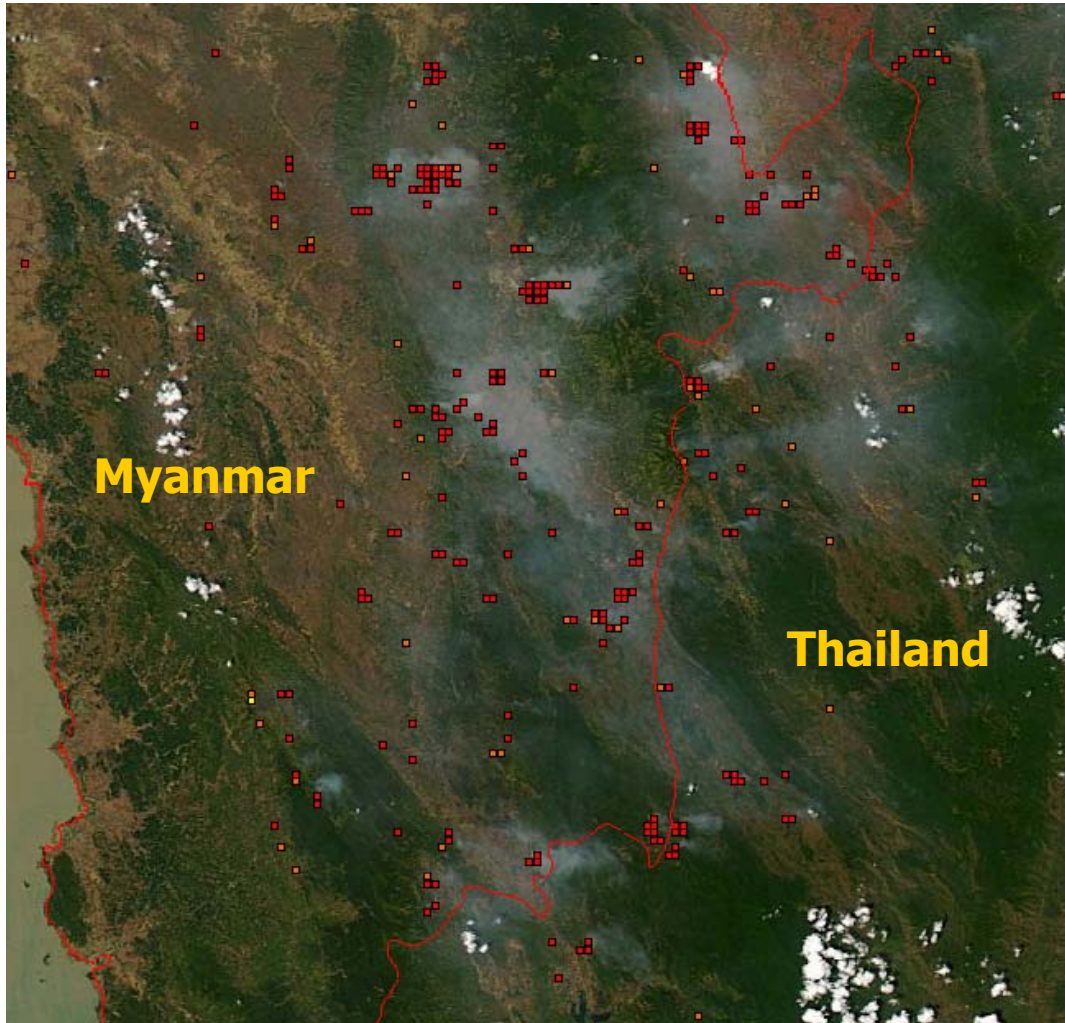
MODIS Active Fire Monitoring System in Regional Level – South and Southeast Asia

Cambodia - Aqua MODIS January 20, 2008 06:40 GMT



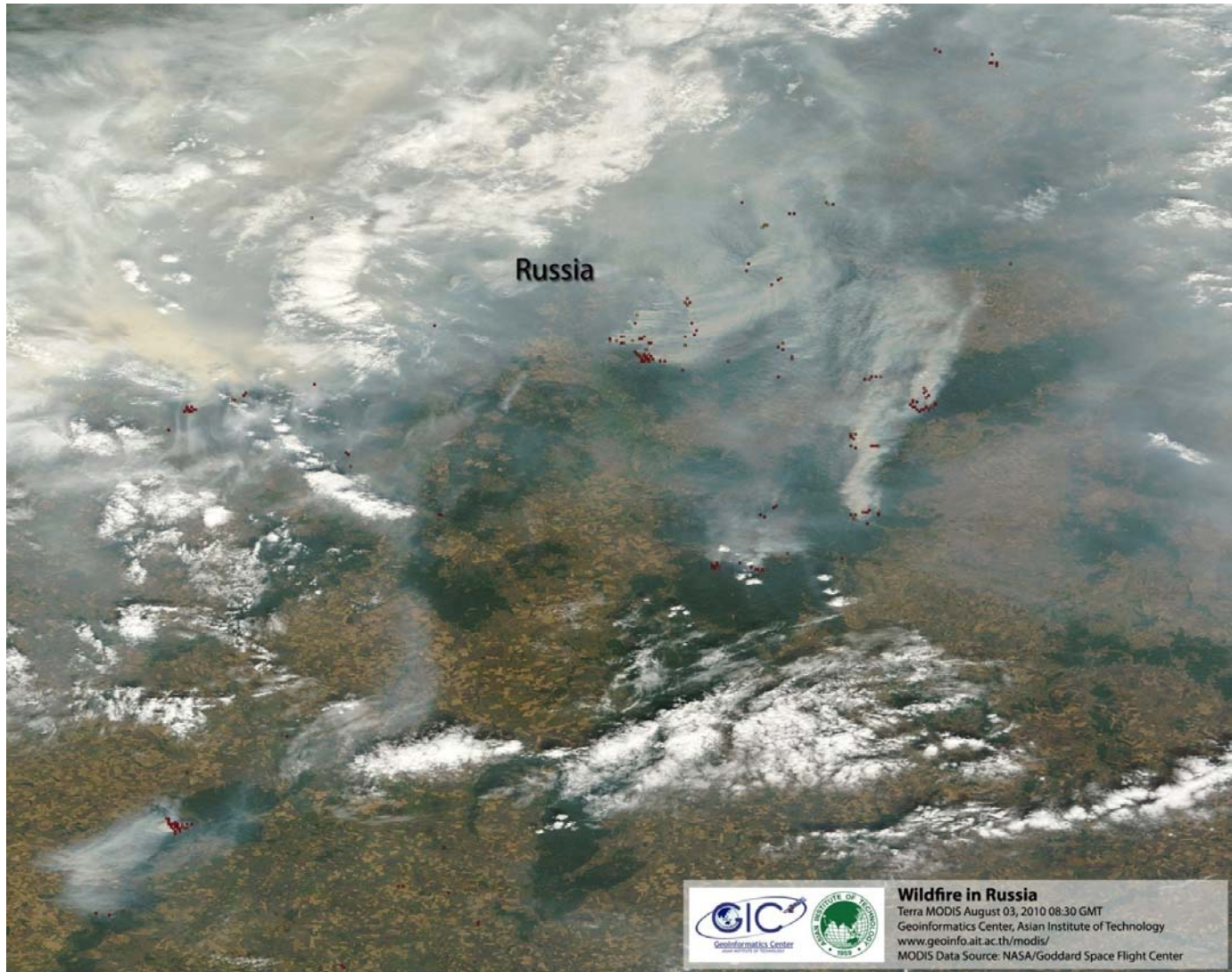
MODIS Active Fire Monitoring System in Regional Level – South and Southeast Asia

Myanmar & Thailand – Aqua MODIS March 22, 2008 06:52 GMT



MODIS Active Fire Monitoring System in Global Region

Fire in Russia – Terra MODIS August 03, 2010 08:30 GMT



Wildfire in Russia
Terra MODIS August 03, 2010 08:30 GMT
Geoinformatics Center, Asian Institute of Technology
www.geoinfo.ait.ac.th/modis/
MODIS Data Source: NASA/Goddard Space Flight Center

MODIS Active Fire Monitoring System in National Level - Laos

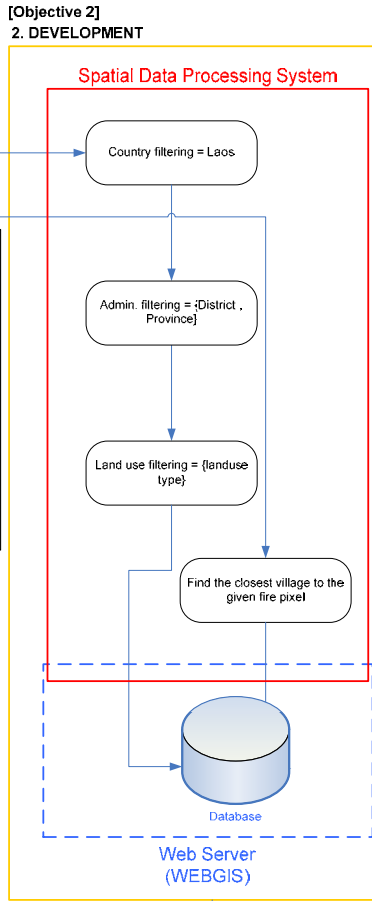
Flowchart of the Development

- Developed & opened to public
- Under development

System for Monitoring in Country Level

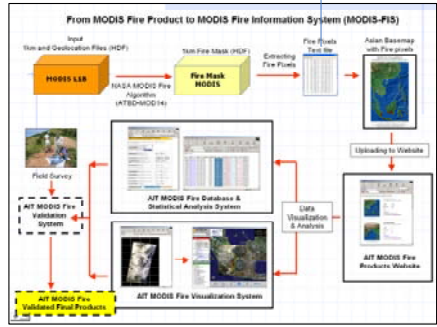


Extended System for Laos



System for Monitoring in Regional Level

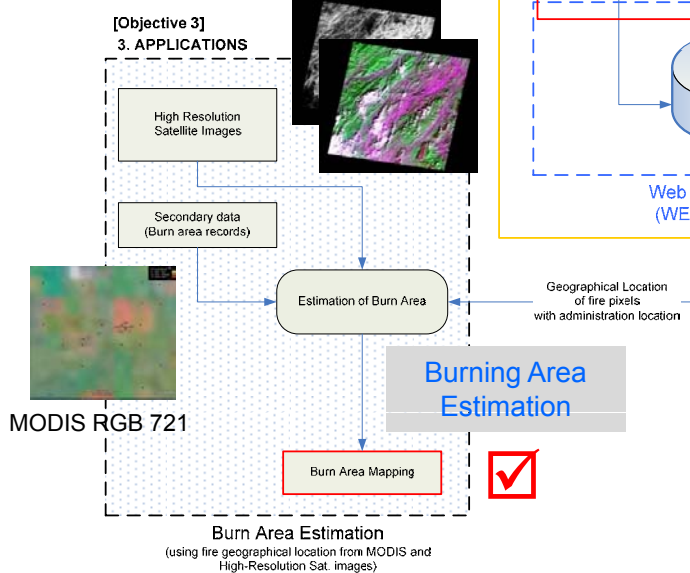
[Objective 1] 1. DEMONSTRATION



Existing MODIS Fire Information System

ASTER, Landsat

[Objective 3] 3. APPLICATIONS



Burning Area Estimation

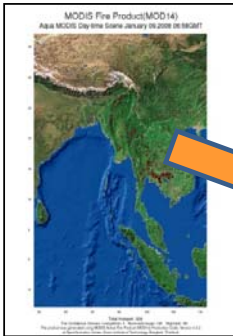
Burn Area Estimation (using fire geographical location from MODIS and High-Resolution Sat. images)



Terra ASTER specifications			
Instrument	VNIR	SWIR	TIR
Bands	1-3	4-9	10-14
Spatial Resolution	15m	30m	90m
Swath Width	60km	60km	60km
Cross Track Pointing	$\pm 318\text{km} (\pm 24 \text{ deg}) \pm 116\text{km} (\pm 8.55 \text{ deg}) \pm 116\text{km} (\pm 8.55 \text{ deg})$		
Quantisation (bits)	8	8	12

MODIS Active Fire Monitoring System in National Level - Laos

Regional level



National level



high	nom	low	dist	prov
0	1	0	Sanxai	Attapu
0	0	0	Samakhixai	Attapu
0	0	0	Xaisettha	Attapu
0	0	0	Phouvong	Attapu
0	0	0	Sanamxai	Attapu
2	0	0	Houayxay	Bokeo
0	0	0	Meung	Bokeo
0	0	0	Tonpheung	Bokeo
2	0	0	Paktha	Bokeo
9	3	0	Pha-Oudom	Bokeo
27	20	1	Bolikhamxai	Bolikhamxai
12	14	1	Viengthong	Bolikhamxai
1	0	0	Thaphabat	Bolikhamxai
0	0	0	Pakxan	Bolikhamxai
6	1	0	Pakkading	Bolikhamxai
8	5	0	Khamkheut	Bolikhamxai
0	0	0	Xanasomboun	Champasak
0	0	0	BachiangCh	Champasak
1	0	0	Pakxong	Champasak
0	0	0	Phonethong	Champasak
0	0	0	Pakxe	Champasak
4	1	0	Champasak	Champasak
2	1	0	Pathoumphone	Champasak
0	0	0	Soukhouma	Champasak
0	0	0	Mounlapamok	Champasak
1	0	0	Khong	Champasak
13	4	0	Et	Houaphan
1	3	0	Xiengkho	Houaphan
2	0	0	Sopbao	Houaphan
12	14	1	Viengthong	Bolikhamxai
9	10	0	Xamnuua	Houaphan
4	1	0	Viengxai	Houaphan
12	3	0	Houamuang	Houaphan

MODIS Fire Product (MOD14) Information System for Laos

Search Date: 2010-03-07 06:37:00

27 Results Reported (0/1)

41. Search a Single or Group of Parameters

42. Period of Query

43. Satellite Overflight Time

44. Day/Night Filter

45. Fire Intensity Band

46. Fire Intensity Threshold

47. Fire Brightness Temperature

48. Fire Perimeter

49. Fire Location

Search Query: []

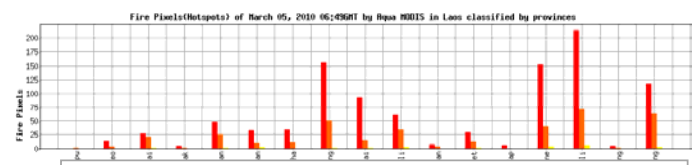
Submit Query

RESULT PAGE 792 of 826

id	date	time	daynight	satellite	lat	lon	refT	T21	T31	Fp	Fc	district	province	country
23589	2010-03-07	06:37:00	Day	Aqua	20.24	104.28	0.27	327.34	299.05	25.38	89	Xamnuua	Houaphan	Laos
23590	2010-03-07	06:37:00	Day	Aqua	20.18	103.81	0.27	356.11	303.24	77.4	100	Houamuang	Houaphan	Laos
23591	2010-03-07	06:37:00	Day	Aqua	20.19	103.81	0.27	345.81	301.1	54.2	100	Houamuang	Houaphan	Laos
23592	2010-03-07	06:37:00	Day	Aqua	20.19	103.8	0.27	365.02	305.19	102.14	100	Houamuang	Houaphan	Laos
23593	2010-03-07	06:37:00	Day	Aqua	20.19	103.79	0.29	350.17	305.34	64.01	100	Houamuang	Houaphan	Laos
23594	2010-03-07	06:37:00	Day	Aqua	20.15	103.46	0.25	316.36	303.33	10.57	71	Viengthong	Bolikhamxai	Laos
23595	2010-03-07	06:37:00	Day	Aqua	20.03	102.58	0.24	320.18	301.68	14.68	80	Pakxeng	Louangphabang	Laos
23596	2010-03-07	06:37:00	Day	Aqua	19.87	101.48	0.23	319.36	305.05	13.5	79	Houn	Oudomxai	Laos
23597	2010-03-07	06:37:00	Day	Aqua	19.76	100.73	0.21	314.01	302.67	5.16	27	Xianghon	Xaignabouli	Laos
23598	2010-03-07	06:37:00	Day	Aqua	20.27	104.34	0.24	313.8	296.69	11.16	66	Viengxai	Houaphan	Laos
23599	2010-03-07	06:37:00	Day	Aqua	20.22	103.92	0.26	312.2	300.49	7.21	52	Houamuang	Houaphan	Laos
23600	2010-03-07	06:37:00	Day	Aqua	20.22	103.91	0.27	310.77	299.52	6.27	33	Houamuang	Houaphan	Laos
23601	2010-03-07	06:37:00	Day	Aqua	20.07	102.86	0.26	334.89	300.75	36.42	96	Pakxeng	Louangphabang	Laos
23602	2010-03-07	06:37:00	Day	Aqua	20.07	102.85	0.26	332.08	300.91	32.24	94	Pakxeng	Louangphabang	Laos
23603	2010-03-07	06:37:00	Day	Aqua	19.77	100.73	0.18	322.01	303.85	14.23	83	Xianghon	Xaignabouli	Laos
23604	2010-03-07	06:37:00	Day	Aqua	20.04	102.53	0.2	328.69	300.78	25.43	90	Pakxeng	Louangphabang	Laos
23605	2010-03-07	06:37:00	Day	Aqua	20.04	102.53	0.21	327.63	304.13	15.67	100	Pakxeng	Louangphabang	Laos
23606	2010-03-07	06:37:00	Day	Aqua	20.04	102.53	0.21	327.63	304.13	15.67	100	Pakxeng	Louangphabang	Laos
23607	2010-03-07	06:37:00	Day	Aqua	20.04	102.53	0.21	327.63	304.13	15.67	100	Pakxeng	Louangphabang	Laos
23608	2010-03-07	06:37:00	Day	Aqua	20.04	102.53	0.21	327.63	304.13	15.67	100	Pakxeng	Louangphabang	Laos

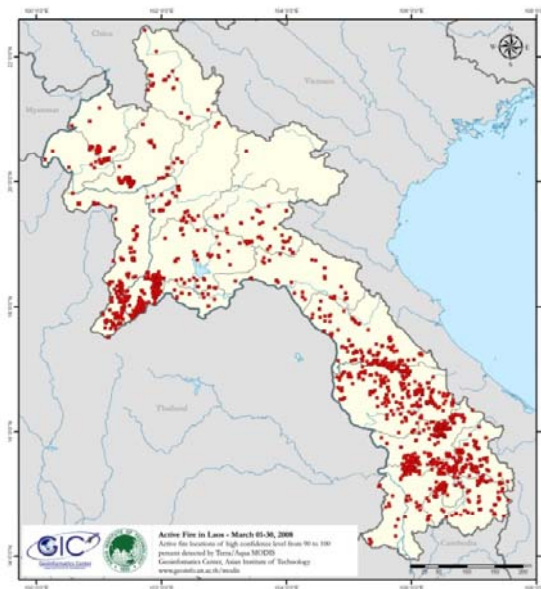
On-line Active Fire Distribution Database System by Provinces and Districts

Active Fire Distribution and Statistical Analysis System

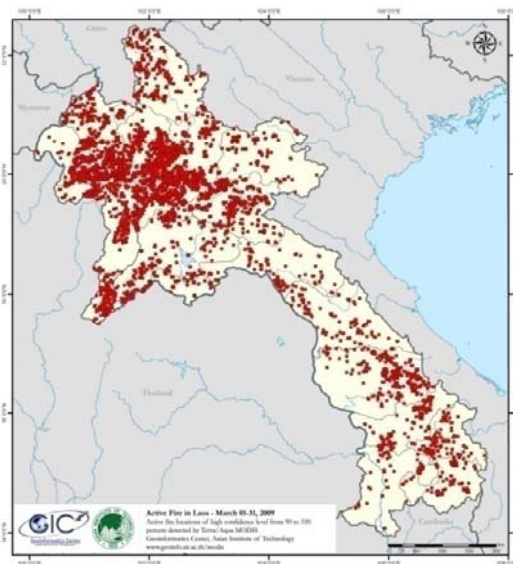


Statistical Distribution of Active Fire by Provinces

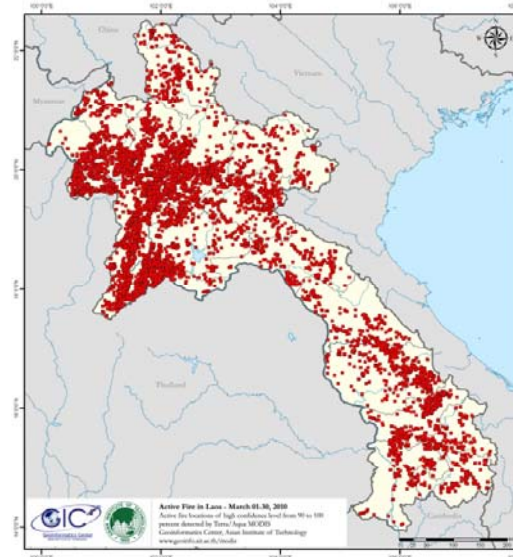
Annual Distributions of Detected Active Fire in Laos for March 2008, 2009 and 2010 (based on selected fire confidence of 90-100%)



March 01-31, 2008

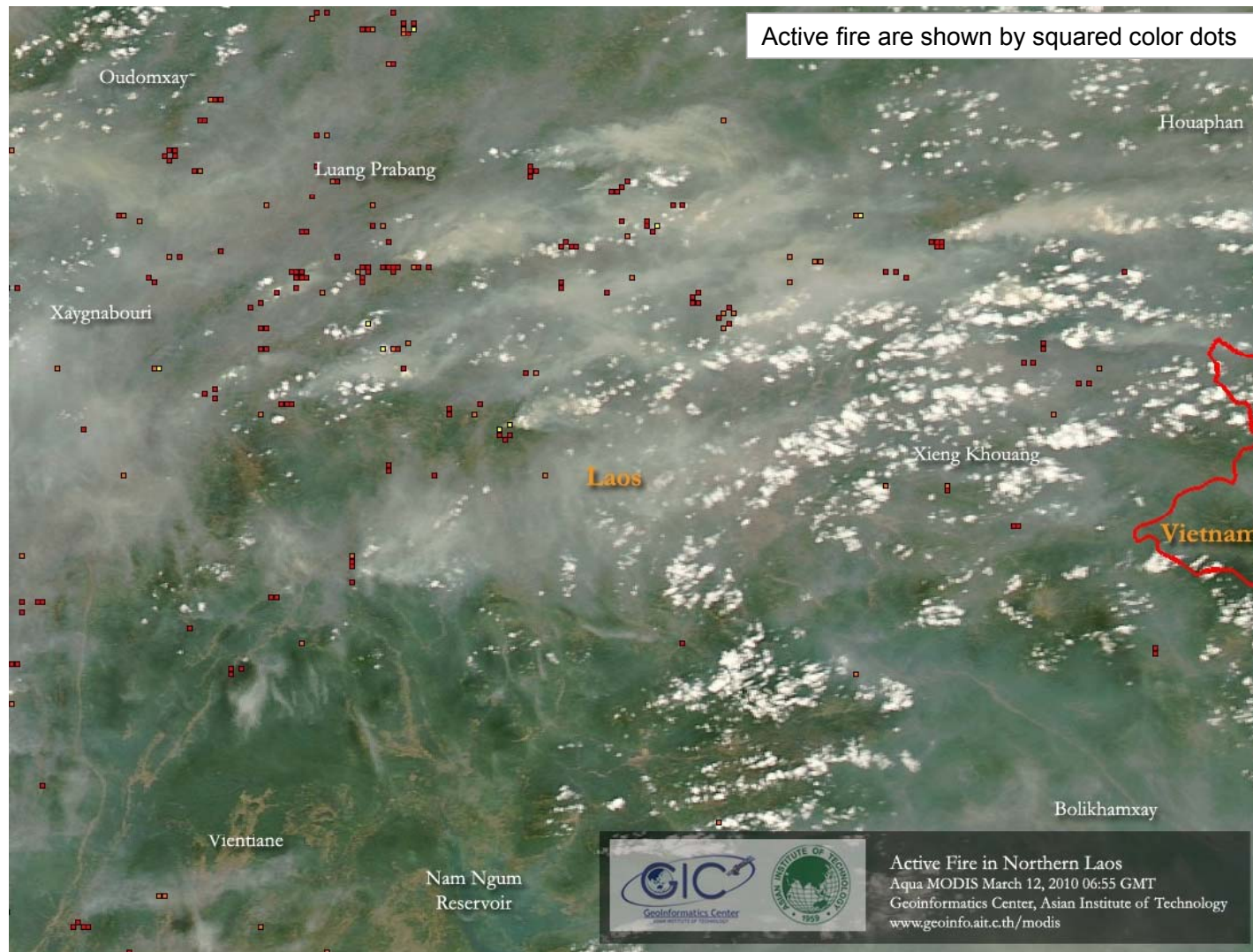


March 01-31, 2009

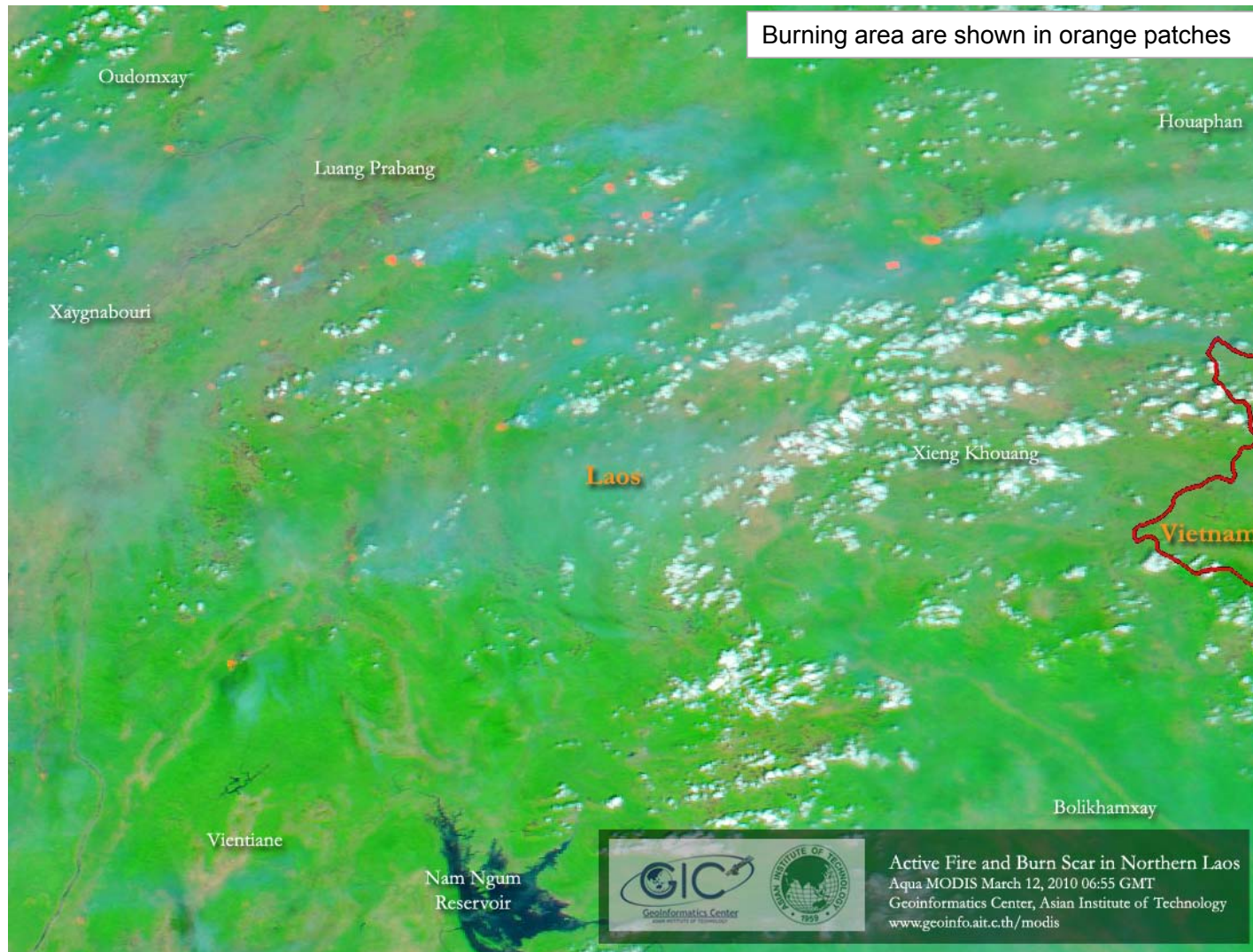


March 01-31, 2010

MODIS Burning Area Monitoring System in Regional Level South and Southeast Asia



MODIS Burning Area Monitoring System in Regional Level South and Southeast Asia



UNDERSTAND MODIS DATA FORMAT

MODIS Data Level, Format and Structure

- **MODIS Data Level**
 - **Raw Data** – Data in original packets as received from observer.
 - **Level 0** - a sequence of CCSDS packets in standard Production Data Set or PDS format
 - **Level 1B Calibrated Radiance (1km, 500m and 250m)**
 - – processed to sensor unit, radiometrically calibrated data stored with sub-sampled geolocation data
 - -- Calibration of earth view raw MODIS digital counts into radiance values
 - **Level 1B Geolocation** - geolocation product that contains useful ancillary products (geolocation parameters) such as position, sensor and solar angles for each 1km pixel.
 - **Level 2** – Derived Geophysical parameters in the location and resolution of source data.
 - **Level 3 (Gridded vs. Tiled)** – Variables mapped on uniformed space- time grid scales, usually with some completeness and consistency.
- **MODIS Data Format**
 - **Hierarchical Data Format** (HDF)
 - **MODIS EOS-HDF** vs. NCSA-HDF
- **Example of MODIS data in EOS-HDF format**
- **MODIS Scientific Data Sets (SDS)**
- **MODIS file name format (AIT, NASA)**

Hierarchical Data Format

1. HDF is common data and **multi-object file** format, developed by **NCSA** and **HDF Group** to assist users, scientists and programmers to assist users in the storing, sharing, transferring, distribution and manipulation of **scientific data** across diverse operating systems and computer platforms, using FORTRAN and C calling interfaces and utilities.
2. HDF is the **standard data format** for all NASA Earth Observing System (EOS) data products.
3. Some important features of HDF are:
 - 3.1 **Self-describing**: For each data object in an HDF file, there is also information (or **metadata**) about the data type, size, dimensions and location found within the file itself.
 - 3.2 **Extensibility**: HDF is designed to accommodate future (**new**) data types and data models.
 - 3.3 **Versatility**: Currently, HDF supports different data types and provides software and applications to read and write these data types in HDF, e.g: **Scientific Data sets which are Multi-dimensional integer or floating point arrays.**
 - 3.4 **Flexibility**: HDF lets the user group, store, and read/write different data types in the same file or in more than one file.
 - 3.5 **Portability**: HDF software is mainly platform **independent** and can be shared across most computer platforms.
 - 3.6 **Standardization**: HDF **standardizes** the formats and descriptions of many types of commonly- used data types (i.e., arrays, images, etc.).
 - 3.7 HDF is available in the **public domain**.

From HDF to HDF-EOS

Each **data object** in an HDF data file - predefined tags identify the type, amount, and dimensions of the data; and the file location of various objects. It also can accommodate different data types, such as symbolic, numerical, and graphical data

Self-describing capability of HDF helps users to fully understand the **file's structure and contents** from the information stored in the file itself. A program interprets and identifies **tag types** in an HDF file and processes the corresponding data.

However, raster images and multidimensional arrays are often **not geolocated**. Because many earth science data structures **need to be geolocated**, The HDF Group developed the **HDF-EOS (Hierarchical Data Format Earth Observation System)** format with additional conventions and data types for HDF files.

HDF-EOS supports **three geospatial data types: grid, point, and swath**, providing uniform access to diverse data types in a geospatial context. The HDF-EOS software library allows a user to query or subset the contents of a file by **earth coordinates** and **time** if there is a spatial dimension in the data. Tools that process standard HDF files also read HDF-EOS files; however, standard HDF library calls cannot access **geolocation data, time data, and product metadata** as easily as with HDF-EOS library calls.

From HDF to HDF-EOS

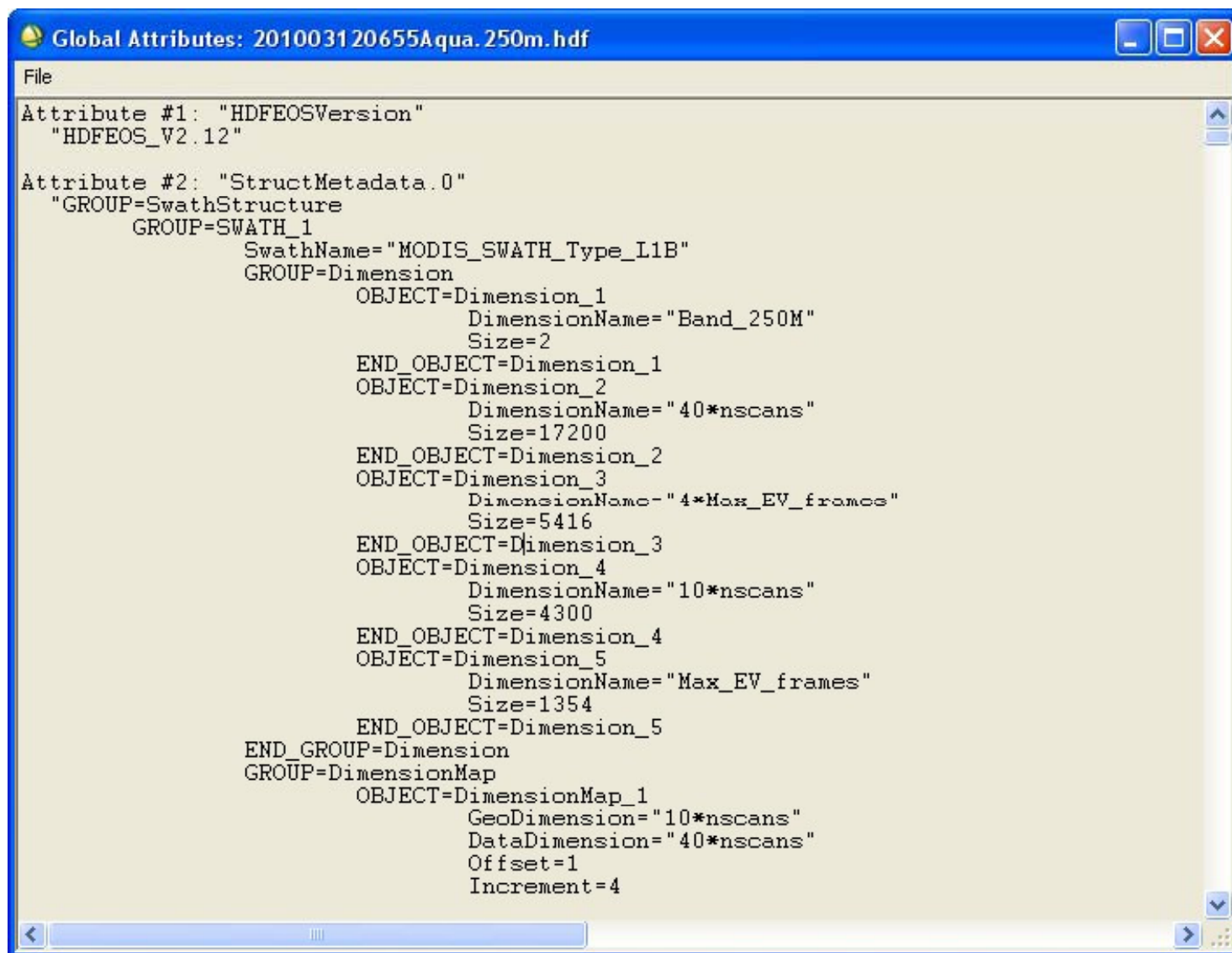
HDF-EOS supports three types of **geolocation** data types:

1.Point Data Types - Data, such as ship observation reports, that is irregularly spaced in time and/or space.

2.Swath Data Types - Time-ordered satellite data which represents time sequences of scan lines, profiles, or other array data.

3. **Grid Data Types** - Data that has been stored or can be represented on a regular grid and is based on certain set earth/map projection (i.e., Mercator, Lambert Conformal, etc..).

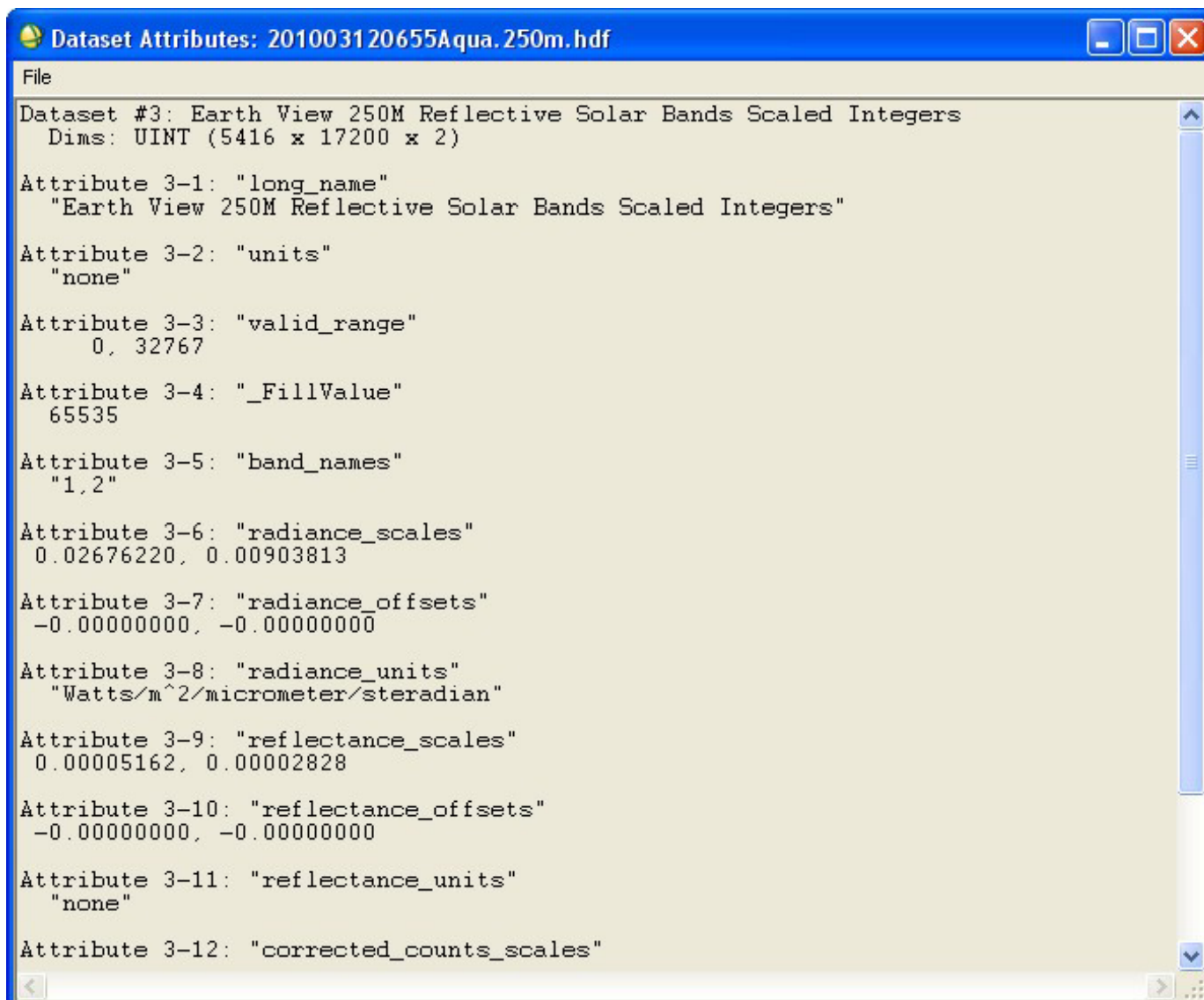
From HDF to HDF-EOS



The image shows a window titled "Global Attributes: 201003120655Aqua.250m.hdf". The window contains a list of global attributes for an HDF file. The attributes are displayed in a hierarchical, indented format. The first attribute is "HDFEOSVersion" with a value of "HDFEOS_V2.12". The second attribute is "StructMetadata.0", which contains a "GROUP=SwathStructure" with several sub-attributes. These sub-attributes include "GROUP=SWATH_1", "SwathName=MODIS_SWATH_Type_L1B", and "GROUP=Dimension". The "GROUP=Dimension" contains five "OBJECT=Dimension" entries, each with "DimensionName", "Size", and "END_OBJECT" values. Finally, there is a "GROUP=DimensionMap" with an "OBJECT=DimensionMap_1" containing "GeoDimension", "DataDimension", "Offset", and "Increment" values.

```
File
Attribute #1: "HDFEOSVersion"
  "HDFEOS_V2.12"
Attribute #2: "StructMetadata.0"
  "GROUP=SwathStructure
    GROUP=SWATH_1
      SwathName="MODIS_SWATH_Type_L1B"
      GROUP=Dimension
        OBJECT=Dimension_1
          DimensionName="Band_250M"
          Size=2
        END_OBJECT=Dimension_1
        OBJECT=Dimension_2
          DimensionName="40*nscans"
          Size=17200
        END_OBJECT=Dimension_2
        OBJECT=Dimension_3
          DimensionName="4*Max_EV_frames"
          Size=5416
        END_OBJECT=Dimension_3
        OBJECT=Dimension_4
          DimensionName="10*nscans"
          Size=4300
        END_OBJECT=Dimension_4
        OBJECT=Dimension_5
          DimensionName="Max_EV_frames"
          Size=1354
        END_OBJECT=Dimension_5
      END_GROUP=Dimension
    GROUP=DimensionMap
      OBJECT=DimensionMap_1
        GeoDimension="10*nscans"
        DataDimension="40*nscans"
        Offset=1
        Increment=4
```

From HDF to HDF-EOS



The screenshot shows a window titled "Dataset Attributes: 201003120655Aqua.250m.hdf". The window contains a list of dataset attributes for "Dataset #3: Earth View 250M Reflective Solar Bands Scaled Integers". The attributes are listed as follows:

```
File
Dataset #3: Earth View 250M Reflective Solar Bands Scaled Integers
  Dims: UINT (5416 x 17200 x 2)

Attribute 3-1: "long_name"
  "Earth View 250M Reflective Solar Bands Scaled Integers"

Attribute 3-2: "units"
  "none"

Attribute 3-3: "valid_range"
  0, 32767

Attribute 3-4: "_FillValue"
  65535

Attribute 3-5: "band_names"
  "1,2"

Attribute 3-6: "radiance_scales"
  0.02676220, 0.00903813

Attribute 3-7: "radiance_offsets"
  -0.00000000, -0.00000000

Attribute 3-8: "radiance_units"
  "Watts/m^2/micrometer/steradian"

Attribute 3-9: "reflectance_scales"
  0.00005162, 0.00002828

Attribute 3-10: "reflectance_offsets"
  -0.00000000, -0.00000000

Attribute 3-11: "reflectance_units"
  "none"

Attribute 3-12: "corrected_counts_scales"
```

MODIS Data Level, Format and Structure

Viewing MODIS Data format – Hierarchical Data Format (HDF) using HDF Viewer

The screenshot shows the HDFView application window. The left pane displays a tree view of the data structure. The right pane shows a 'TableView' window displaying a table of data.

HDFView - D:\200902040307Terra.250m.hdf

File Object Table Image Window Tools Help

200902040307Terra.250m.hdf

- MODIS_SWATH_Type_L1B (indicated by a red arrow)

 - Geolocation Fields
 - Latitude
 - Longitude
 - Data Fields
 - EV_250_RefSB
 - EV_250_RefSB_Uncert_Indexes
 - Band_250M
 - Swath Attributes
 - Noise in Thermal Detectors
 - Change in relative responses of thermal detectors
 - DC Restore Change for Thermal Bands
 - DC Restore Change for Reflective 250m Bands
 - DC Restore Change for Reflective 500m Bands
 - DC Restore Change for Reflective 1km Bands
 - Level 1B Swath Metadata (indicated by a red arrow)

TableView - D:\200902040307Terra.250m.hdf - /MODIS_SWATH_Type_L1B/Data Fields/EV_250_RefSB

	1	2	3	4	5	6	7
1	4762	4797	4727	4865	4888	4909	4996
2	8639	8612	8659	8875	9063	9186	9208

D:\200902040307Terra.250m.hdf
TableView - D:\200902040307Terra.250m.hdf - /MODIS_SWATH_Type_L1B/Data Fields/EV_250_RefSB [dims0x1x2, start0x0x0, count2x16600x1, stride1x1x1]
TableView - D:\200902040307Terra.250m.hdf - /Level 1B Swath Metadata [dims0, start0, count415, stride1]

46

MODIS Data Level, Format and Structure

Viewing of MODIS Scientific Data Set (SDS) using HDF Viewer

The screenshot displays the HDF Viewer interface for the file 'D:\200902040307Terra.250m.hdf'. The left pane shows a tree view of the file's structure. The right pane shows a 'TableView' window displaying data from the 'EV_250_RefSB' field.

HDF Viewer Structure:

- 200902040307Terra.250m.hdf
 - MODIS_SWATH_Type_L1B
 - Geolocation Fields
 - Latitude
 - Longitude
 - Data Fields
 - EV_250_RefSB
 - EV_250_RefSB_Uncert_Indexes
 - Band_250M
 - Swath Attributes
 - Noise in Thermal Detectors
 - Change in relative responses of thermal detectors
 - DC Restore Change for Thermal Bands
 - DC Restore Change for Reflective 250m Bands
 - DC Restore Change for Reflective 500m Bands
 - DC Restore Change for Reflective 1km Bands
 - Level 1B Swath Metadata

TableView Data:

	1	2	3	4	5	6	7
1	4762	4797	4727	4865	4888	4909	4996
2	8639	8612	8659	8875	9063	9186	9208

Table View Metadata:

- Table View - D:\200902040307Terra.250m.hdf - /MODIS_SWATH_Type_L1B/Data Fields/EV_250_RefSB [dims0x1x2, start0x0x0, count2x16600x1, stride1x1x1]
- Table View - D:\200902040307Terra.250m.hdf - /Level 1B Swath Metadata [dims0, start0, count415, stride1]

MODIS Data Level, Format and Structure

- MODIS Scientific Data Set (**SDS**) for 250m, 500m and 1000m spatial resolutions

0KM			HKM			1KM		
Index	Band	SDS name	Index	Band	SDS name	Index	Band	SDS name
1	1	EV_250_RefSB	1	1	EV_250_Aggr500_RefSB	1	1	EV_250_Aggr_1KM_RefSB
2	2	EV_250_RefSB	2	2	EV_250_Aggr500_RefSB	2	2	EV_250_Aggr_1KM_RefSB
			1	3	EV_500_RefSB	1	3	EV_500_Aggr_1KM_RefSB
			2	4	EV_500_RefSB	2	4	EV_500_Aggr_1KM_RefSB
			3	5	EV_500_RefSB	3	5	EV_500_Aggr_1KM_RefSB
			4	6	EV_500_RefSB	4	6	EV_500_Aggr_1KM_RefSB
			5	7	EV_500_RefSB	5	7	EV_500_Aggr_1KM_RefSB
						1	8	EV_1KM_RefSB
						2	9	EV_1KM_RefSB
						3	10	EV_1KM_RefSB
						4	11	EV_1KM_RefSB
						5	12	EV_1KM_RefSB
						6	13 L	EV_1KM_RefSB
						7	13 H	EV_1KM_RefSB
						8	14 L	EV_1KM_RefSB
						9	14 H	EV_1KM_RefSB
						10	15	EV_1KM_RefSB
						11	16	EV_1KM_RefSB
						12	17	EV_1KM_RefSB
						13	18	EV_1KM_RefSB
						14	19	EV_1KM_RefSB
						15	26	EV_1KM_RefSB
						1	20	EV_1KM_Emissive
						2	21	EV_1KM_Emissive
						3	22	EV_1KM_Emissive
						4	23	EV_1KM_Emissive
						5	24	EV_1KM_Emissive
						6	25	EV_1KM_Emissive
						7	27	EV_1KM_Emissive
						8	28	EV_1KM_Emissive
						9	29	EV_1KM_Emissive
						10	30	EV_1KM_Emissive
						11	31	EV_1KM_Emissive
						12	32	EV_1KM_Emissive
						13	33	EV_1KM_Emissive
						14	34	EV_1KM_Emissive
						15	35	EV_1KM_Emissive
						16	36	EV_1KM_Emissive

MODIS Data Level, Format and Structure

- **MODIS file name format**

- **GIC/AIT:** Terra MODIS of Feb 23, 2009 03:37 GMT

- **200902230337Terra.1000m.hdf**
- **200902230337Terra.500m.hdf**
- **200902230337Terra.250m.hdf**
- **200902230337Terra.geo.hdf**

- **NASA:** Terra MODIS of Feb 20, 2009 03:00 GMT

- **MOD021KM.A2009051.0300.005** 2009051133350.hdf
- **MOD02HKM.A2009051.0300.005** 2009051133350.hdf
- **MOD02QKM.A2009051.0300.005** 2009051133350.hdf
- **MOD03.A2009051.0300.005** 2009051115557.hdf

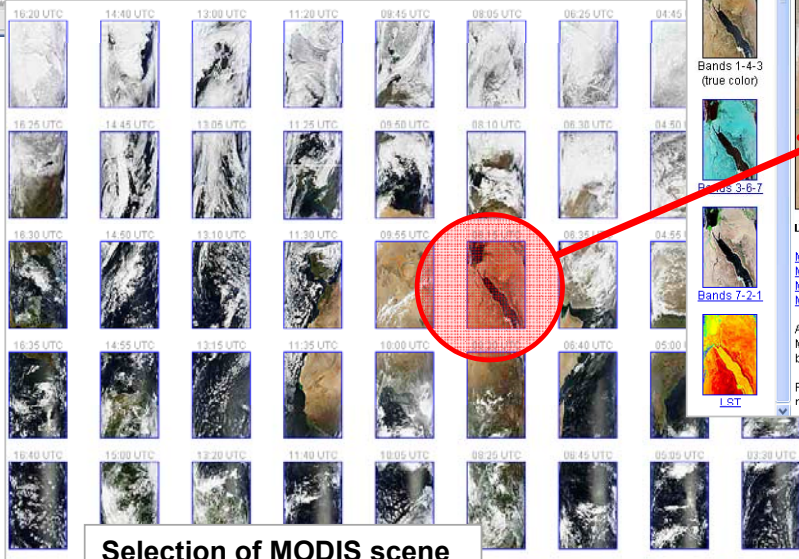
→ **NRT**

ANALYSIS OF MODIS DATA LEVEL1B & LEVEL2

MODIS Rapid Response System @ NASA/GSFC

<https://earthdata.nasa.gov/data/near-real-time-data>

Near Real-Time Data



Selection of MODIS scene

Terra
2011062
03/03/11
08:15 UTC

Pixel size:
2km

prev
next

Alternate pixel size:
4km
1km
500m
250m

Bands 1-4-3
(true color)

Bands 3-6-7

Bands 7-2-1

Download Level-1B and Geolocation data from the [LAADS FTP Site](#):

[MOD021HKM A2011062_0815_005_2011062181130.hdf](#)
[MOD02HKM A2011062_0815_005_2011062181130.hdf](#)
[MOD02QKM A2011062_0815_005_2011062181130.hdf](#)
[MOD03 A2011062_0815_005_2011062181130.hdf](#)

Alternatively you can [follow this link to place an order at the LAADS Web Site](#) (please be patient) for these files and other MODIS products corresponding to this granule, including level-2 atmosphere products. Note that recent granules processed by the Rapid Response System may not be processed by LAADS yet.

Please be aware that the Collection 5 data from LAADS uses internal HDF compression. This will be transparent when using most HDF utilities.

LST

Download MODIS Level1B data

Land Atmosphere Near real-time Capability for EOS (LANCE)

<https://earthdata.nasa.gov/lance>

The screenshot shows the NASA Earth Data website interface. At the top, the NASA logo and 'National Aeronautics and Space Administration' are visible. The main heading is 'EOSDIS NASA's Earth Observing System Data and Information System'. A navigation menu includes 'Home', 'About EOSDIS', 'Data', 'Our Community', 'User Resources', 'Labs', and 'Wiki'. Below this, there are sub-menus for 'Discovering Data', 'Data Tools', 'Data Centers', 'Near Real-Time Data', and 'Standards and References'. The main content area is titled 'Near Real-Time Data Land Atmosphere Near Real-time Capability for EOS'. A left sidebar contains a 'Feedback' button and a 'GET DATA' section with links for 'Instrument', 'Platform', and 'Application'. Below that is an 'NRT HIGHLIGHTS' section featuring 'FIRMS' and 'Download MODIS'. The main text area includes a 'What is Near Real-Time Data?' section with a description of NRT products and a 'How do I get started?' section. At the bottom, a Windows taskbar shows several open files: 'Journal.pdf', '555803_21153703232....jpg', '66161_211535535655....jpg', and '69619_211535968988....jpg', along with a 'Show all downloads...' button.

Land Atmosphere Near real-time Capability for EOS (LANCE)

<https://earthdata.nasa.gov/lance>

GET DATA

- ▶ Instrument
- ▶ Platform
- ▶ Application

NRT HIGHLIGHTS



FIRMS
Download MODIS
fire data



Rapid Response
Get imagery from
MODIS, AIRS, MLS
and OMI



Worldview
Visualize near
real-time data



Learn



Visualize



Download

LANCE NEWS

Gaps in MLS Level 2 NRT data starting from 2013-02-14 21:59:59
2/15/2013

Problems with MLS Level 2 NRT data resolved
2/15/2013

LANCE AIRS Level 2 sample data with updated algorithm software (Version 6) available
2/12/2013

Instrument has been restored to full functionality, Feb 10
2/11/2013

Worldview, version 0.3.0, has been released!
2/11/2013

MODIS Rapid Response

Sensing Our Planet

News

Events

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NASA Privacy Statement, Disclaimer, and Accessibility Certification

NASA Data & Information Policy

NASA Communications Policy

Freedom of Information Act

NASA Official: Kevin Murphy

Website Inquiries

Journal.pdf

555803_21153703232....jpg

66161_211535535655....jpg

69619_211535968988....jpg

Show all downloads...

Land Atmosphere Near real-time Capability for EOS (LANCE)

<https://earthdata.nasa.gov/lance>

The screenshot shows the NASA Earth Data website interface. At the top, the URL <https://earthdata.nasa.gov/lance> is displayed in the browser's address bar. The page header includes the NASA logo and the text "EOSDIS NASA's Earth Observing System Data and Information System". A navigation menu contains links for Home, About EOSDIS, Data, Our Community, User Resources, Labs, and Wiki. Below this, a secondary menu lists "Discovering Data", "Data Tools", "Data Centers", "Near Real-Time Data", and "Standards and References". The main heading is "Near Real-Time Data Land Atmosphere Near Real-time Capability for EOS". A left sidebar contains a "Feedback" button and a list of navigation options: "Near Real-Time Data", "Data", "Visualization" (with sub-items: Worldview, Browse Products, AIRS WMS), "Rapid Response" (with sub-items: Hazards & Disasters, MODIS Subsets, MODIS Near Real-Time Images, Gallery, Antarctica Mosaic, Arctic Mosaic), and "FIRMS". The main content area features a "Rapid Response Visualization" section with a paragraph explaining that it provides imagery for approximately 40 products from MODIS, AIRS, MLS, and OMI instruments, and that users can view this through Worldview*. A note states that NRT imagery can still be viewed and downloaded through the WMS client, but users are encouraged to switch to Worldview as LANCE will not continue to support the WMS client. A small satellite image of a hurricane is shown below the text. The bottom of the browser window shows a taskbar with several open files, including "Journal.pdf" and several image files.

Land Atmosphere Near real-time Capability for EOS (LANCE)

<https://earthdata.nasa.gov/lance>

NOTE: Worldview and the WMS client currently **do not work with Internet Explorer.**



MODIS Subsets

Download a large number of user-specified, geo-referenced and geographically sub-setted images around the world in GIS-compatible format. Examples include most of the AERONET sun photometer sites and the USDA Foreign Agriculture Service (FAS) sites.



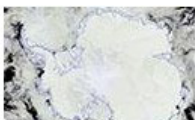
MODIS Near Real Time (Orbit Swath) Images

View and download swath images for each five-minute interval for Terra and Aqua MODIS data. Data posted approximately 2.5 hours after the observation at the spacecraft.



Gallery

View and download imagery for interesting events and phenomena from MODIS.



Antarctic Mosaic

Download daily Antarctic mosaic images at 4km, 2km, 1km resolutions. The mosaic is composed of smaller image tiles, which are available individually at 250 m, 500 m, 1 km, 2 km, and 4 km resolutions.

GET DATA

- ▶ Instrument
- ▶ Platform
- ▶ Application

NRT HIGHLIGHTS



FIRMS
Download MODIS fire data



Rapid Response
Get imagery from MODIS, AIRS, MLS and OMI



Worldview
Visualize near real-time data

Download MODIS daily Subsets (World-Wide)

Journal.pdf

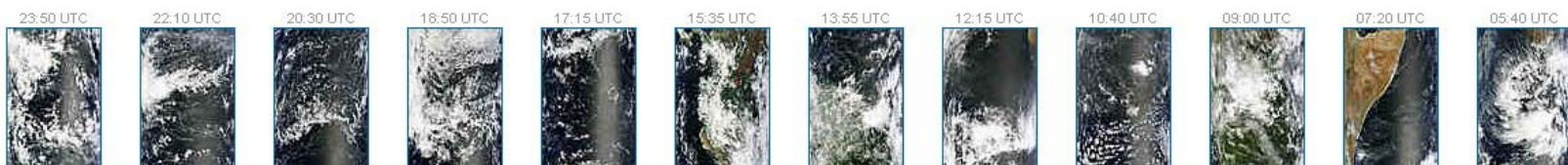
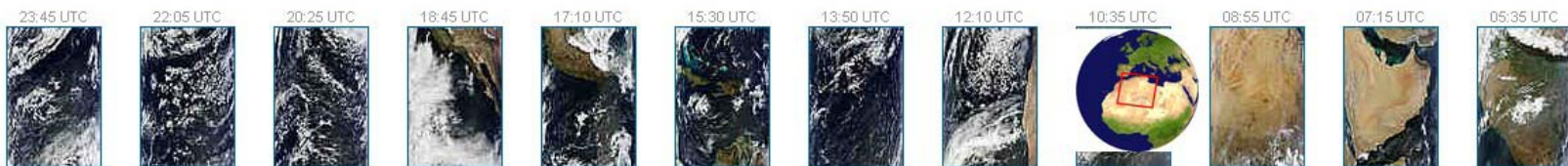
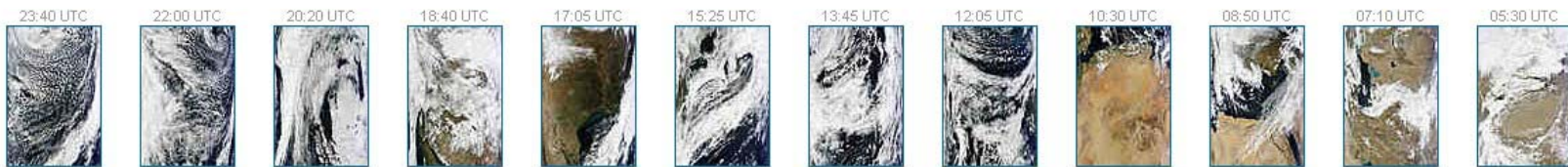
555803_21153703232....jpg

66161_211535535655....jpg

69619_211535968988....jpg

Show all downloads...

Land Atmosphere Near real-time Capability for EOS (LANCE)



lance-modis.eosdis.nasa.gov/cgi-bin/imagery/single.cgi?image=crefl1_143.A2013045103000-2013045103500.2km.jpg

206220_42057134801....jpg 196928_42078565465....jpg 270274_42095726130....jpg 543919_42097780463....jpg

Show all downloads...

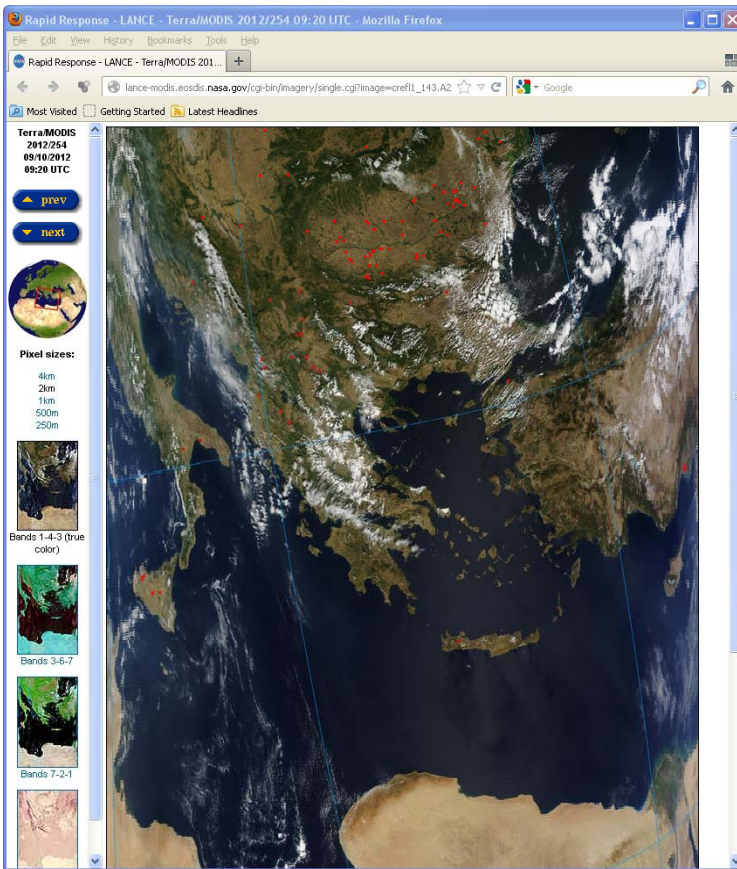
Land Atmosphere Near real-time Capability for EOS (LANCE)

The screenshot displays the LANCE web interface in a Mozilla Firefox browser. The main content area is titled "Near Real Time (Orbit Swath) Images" for the date 2012/254 - 09/10/2012. It features a grid of satellite images with timestamps in UTC. A red box highlights the image at 09:20 UTC, with a red arrow pointing to it from the left. To the right of the grid is a large map view of the Earth, showing the satellite's orbit path and a grid of red dots representing the image locations. The map view includes navigation buttons for "prev" and "next", a "Pixel sizes" dropdown menu (set to 4m), and a "Bands" dropdown menu (set to Bands 1-4-3 (true color)).

Grid of Images (UTC timestamps):

12:20 UTC	10:45 UTC	09:05 UTC	07:25 UTC	05:45 UTC	04:10 UTC	02:30 UTC
12:25 UTC	10:50 UTC	09:10 UTC	07:30 UTC	05:50 UTC	04:15 UTC	02:35 UTC
12:30 UTC	10:55 UTC	09:15 UTC	07:35 UTC	05:55 UTC	04:20 UTC	02:40 UTC
12:35 UTC	11:00 UTC	09:20 UTC	07:40 UTC	06:00 UTC	04:25 UTC	02:45 UTC
12:40 UTC	11:05 UTC	09:25 UTC	07:45 UTC	06:05 UTC	04:30 UTC	02:50 UTC
12:45 UTC	11:10 UTC	09:30 UTC	07:50 UTC	06:10 UTC	04:35 UTC	02:55 UTC

Land Atmosphere Near real-time Capability for EOS (LANCE)



Land Atmosphere Near real-time Capability for EOS (LANCE)

Rapid Response - LANCE - Terra/MODIS 2012/254 09:20 UTC - Mozilla Firefox

lance-modis.eosdis.nasa.gov/cgi-bin/imagery/single.cgi?image=crefl1_143.A2

Terra/MODIS
2012/254
09/10/2012
09:20 UTC

prev
next

Pixel sizes:
4km
2km
1km
500m
250m

Bands 1-4-3 (true color)

Bands 3-6-7

Bands 7-2-1

Users may download near-real time Level-1B and Geolocation data corresponding to this granule from LANCE:

- MOD021KM.A2012254.0920.005.NRT.hdf
- MOD02HKM.A2012254.0920.005.NRT.hdf
- MOD02GKM.A2012254.0920.005.NRT.hdf
- MOD03.A2012254.0920.005.NRT.hdf

Users must register before accessing the LANCE FTP sites. Please visit the EOSDIS User Registration System at <https://users.eosdis.nasa.gov/> to register for a username and password.

Land Atmosphere Near real-time Capability for EOS (LANCE)

The screenshot shows the LANCE web interface in Mozilla Firefox. The browser title is "Rapid Response - LANCE - Terra/MODIS 2012/254 09:20 UTC". The address bar shows the URL: lance-modis.eosdis.nasa.gov/cgi-bin/magery/single.cgi?image=refl1_143.A2. The page displays a satellite image of Earth with a context menu open over it. The menu options are: "Open Link in New Tab", "Open Link in New Window", "Bookmark This Link", "Save Link As...", "Send Link", "Copy Link Location", "Download helper", and "This Frame". The "Save Link As..." option is highlighted. Below the image, there is a list of pixel sizes (4m, 2m, 1m, 500m, 250m) and a list of bands (1-4-3 (true color), 3-6-7, 7-2-1). At the bottom, there is a note: "Users may download near-real-time Level-1B and Geolocation data corresponding to this granule from LANCE: MOD01HM A2012254 0920 005 NRT.hdf; MOD02HM A2012254 0920 005 NRT.hdf; MOD03HM A2012254 0920 005 NRT.hdf; MOD03 A2012254 0920 005 NRT.hdf". A footer note states: "Users must register before accessing the LANCE FTP sites. Please visit the EOSDIS User Registration System at <https://users.eosdis.nasa.gov/> to register for a username and password."

The screenshot shows the LANCE web interface in Mozilla Firefox. The browser title is "Rapid Response - LANCE - Terra/MODIS 2012/254 09:20 UTC". The address bar shows the URL: lance-modis.eosdis.nasa.gov/cgi-bin/magery/single.cgi?image=refl1_143.A2. The page displays a satellite image of Earth. A "Save As" dialog box is open over the image. The dialog box shows the "Save in:" location as "data". The "File name:" field contains "MOD01HM A2012254 0920 005 NRT.hdf". The "Save as type:" is set to "All Files". The "Save" button is highlighted. Below the image, there is a list of pixel sizes (4m, 2m, 1m, 500m, 250m) and a list of bands (1-4-3 (true color), 3-6-7, 7-2-1). At the bottom, there is a note: "Users may download near-real-time Level-1B and Geolocation data corresponding to this granule from LANCE: MOD01HM A2012254 0920 005 NRT.hdf; MOD02HM A2012254 0920 005 NRT.hdf; MOD03HM A2012254 0920 005 NRT.hdf; MOD03 A2012254 0920 005 NRT.hdf". A footer note states: "Users must register before accessing the LANCE FTP sites. Please visit the EOSDIS User Registration System at <https://users.eosdis.nasa.gov/> to register for a username and password."

Land Atmosphere Near real-time Capability for EOS (LANCE)

Rapid Response - LANCE - Terra/MODIS 2012/254 09:20 UTC - Mozilla Firefox

lance-modis.eosds.nasa.gov/cgi-bin/imagery/single.cgi?image=refit_143.A2

Terra/MODIS 2012/254 09:18/2912 09:20 UTC

prev next

Pixel sizes:
4m
2m
1m
500m
250m

Bands 1-4-3 (true color)
Bands 3-6-7
Bands 7-2-1

Users may download near real time Level-1B and Geolocation data corresponding to this granule from LANCE.

M00021KM_A2012254_0920_005_NRT.hdf
M00029HM_A2012254_0920_005_NRT.hdf
M00029HM_A2012254_0920_005_NRT.hdf
M0003_A2012254_0920_005_NRT.hdf

Users must register before accessing the LANCE FTP sites. Please visit the EOSDIS User Registration System at <http://users.eosds.nasa.gov> to register for a username and password.

Authentication Required

Enter username and password for ftp://rt1.modaps.eosds.nasa.gov

User Name: vivward
Password: *****
 Use Password Manager to remember this password.

OK Cancel

Rapid Response - LANCE - Terra/MODIS 2012/254 09:20 UTC - Mozilla Firefox

lance-modis.eosds.nasa.gov/cgi-bin/imagery/single.cgi?image=refit_143.A2

Terra/MODIS 2012/254 09:18/2912 09:20 UTC

prev next

Pixel sizes:
4m
2m
1m
500m
250m

Bands 1-4-3 (true color)
Bands 3-6-7
Bands 7-2-1

Users may download near-real time Level-1B and Geolocation data corresponding to this granule from LANCE.

M00021KM_A2012254_0920_005_NRT.hdf
M00029HM_A2012254_0920_005_NRT.hdf
M00029HM_A2012254_0920_005_NRT.hdf
M0003_A2012254_0920_005_NRT.hdf

Users must register before accessing the LANCE FTP sites. Please visit the EOSDIS User Registration System at <http://users.eosds.nasa.gov> to register for a username and password.

10% of 1 file - Downloads

M00021KM_A2012254_0920_005_NRT.hdf

18 minutes remaining — 15.9 of 156 MB (128 kB/sec)

Clear List Search...

Land Atmosphere Near real-time Capability for EOS (LANCE)

The screenshot shows the LANCE web interface in a Mozilla Firefox browser. The main content is a satellite image of the Earth. On the left side, there are navigation buttons for 'prev' and 'next', and a list of 'Pixel sizes' (4km, 2km, 1km, 500m, 250m). Below the image, there are thumbnails for different data bands: 'Bands 1-4-3 (true color)', 'Bands 3-6-7', and 'Bands 7-2-1'. A red box highlights a list of download links for MODIS level 1b data, with a red arrow pointing to a file list table below.

Users may download near real time Level 1B and Geolocation data corresponding to this granule from LANCE.

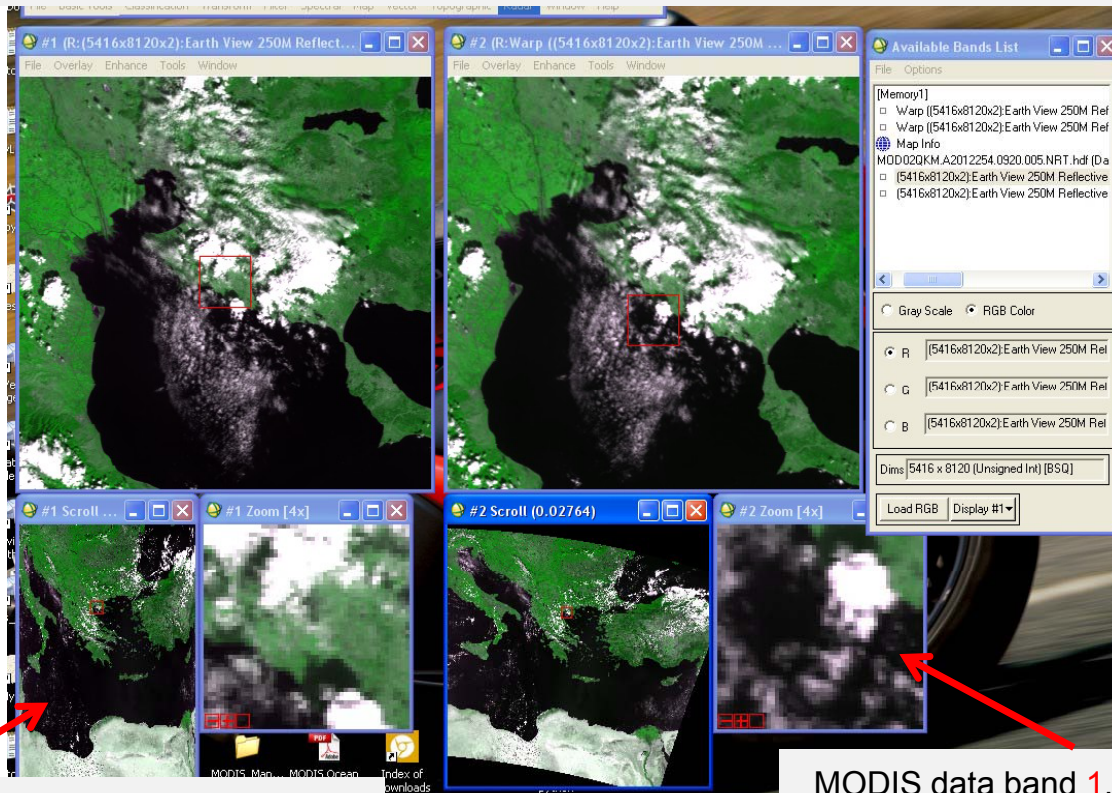
- MOD021KM.A2012254.0920.005.NRT.hdr
- MOD02QKM.A2012254.0920.005.NRT.hdr
- MOD03.A2012254.0920.005.NRT.hdr
- MOD03.A2012254.0920.005.NRT.tif

Downloaded MODIS level 1b data

Name	Size	Type	Date Modified
MOD021KM.A2012254.0920.005.NRT	147,653 KB	NCSA HDF Files	10/9/2555 22:37
MOD02QKM.A2012254.0920.005.NRT	159,645 KB	NCSA HDF Files	10/9/2555 22:39
MOD03.A2012254.0920.005.NRT	30,470 KB	NCSA HDF Files	10/9/2555 22:20
MOD03.A2012254.0920.005.NRT.tif	160,210 KB	NCSA HDF Files	10/9/2555 22:16

Land Atmosphere Near real-time Capability for EOS (LANCE)

Geometric Correction of MODIS Level1B image using ENVI






















MODIS data band 1,2 (Red,NIR) -
Before Geometric Correction

MODIS data band 1,2 (Red, NIR) -
After Geometric Correction

http://ladsweb.nascom.nasa.gov/

Index of ftp://ladsftp.nascom.nasa.gov/allData/5/

 [Up to higher level directory](#)

Name	Size	Last Modified
 ALBWS066		1/9/2006 12:00:00 AM
 ALBWS086		1/9/2006 12:00:00 AM
 ALBWS124		1/9/2006 12:00:00 AM
 ALBWS164		1/9/2006 12:00:00 AM
 ALBWS213		1/9/2006 12:00:00 AM
 AM1ATTN0		1/1/2011 2:38:00 AM
 AM1ATTNF		1/1/2011 5:09:00 AM
 AM1EPHN0		1/1/2011 2:38:00 AM
 D4LAXMNT		1/19/2007 12:00:00 AM
 GDAS_0ZF		1/1/2011 8:31:00 AM
 MCB43A1		1/27/2011 5:13:00 AM
 MCB43A3		1/27/2011 5:13:00 AM
 MCB43A4		1/27/2011 5:13:00 AM
 MCB43B1		1/27/2011 5:13:00 AM
 MCB43B3		1/27/2011 5:14:00 AM
 MCB43B4		1/27/2011 5:14:00 AM
 MCD43A1		1/27/2011 5:14:00 AM
 MCD43A2		1/27/2011 5:14:00 AM
 MCD43A3		1/27/2011 5:14:00 AM

Index of ftp://ladsftp.nascom.nasa.gov/allData/5/ - Mozilla Firefox

ftp://ladsftp.nascom.nasa.gov/allData/5/

Index of ftp://ladsftp.nascom.na... Index of ftp://ladsftp.nascom.nasa.go...

MOD02SSH	1/1/2011	3:07:00 AM
MOD03	1/1/2011	2:45:00 AM
MOD04_L2	1/5/2010	12:00:00 AM
MOD05_L2	1/5/2010	12:00:00 AM
MOD06_L2	1/5/2010	12:00:00 AM
MOD07_L2	1/1/2011	3:07:00 AM
MOD07_QC	1/1/2011	3:07:00 AM
MOD08_D3	1/6/2010	12:00:00 AM
MOD08_E3	1/10/2010	12:00:00 AM
MOD08_M3	2/1/2010	12:00:00 AM
MOD08_M3_NC	1/7/2010	12:00:00 AM
MOD09	1/2/2011	4:02:00 AM
MOD09A1	12/5/2007	12:00:00 AM
MOD09A1G_EVI	4/18/2011	11:18:00 AM
MOD09A1G_NDVI	4/18/2011	11:18:00 AM
MOD09A1P_EVI	4/18/2011	11:18:00 AM
MOD09A1P_NDVI	4/18/2011	11:18:00 AM
MOD09Q1	12/5/2007	12:00:00 AM
MOD09Q1G_EVI	4/18/2011	11:19:00 AM
MOD09Q1G_NDVI	4/18/2011	11:19:00 AM
MOD09Q1P_EVI	4/18/2011	11:19:00 AM
MOD09Q1P_NDVI	4/18/2011	11:19:00 AM
MOD15A2	12/5/2007	12:00:00 AM
MOD15A2GFS	2/25/2009	12:00:00 AM
MOD15A2PHN	2/26/2009	12:00:00 AM
MOD35_L2	1/1/2011	3:07:00 AM

Done

Index of ftp://ladsftp.nascom.nasa.gov/allData/5/MOD09/2011/112/ - Mozilla Firefox

ftp://ladsftp.nascom.nasa.gov/allData/5/MOD09/2011/112/

Index of ftp://ladsftp.nascom.nasa.gov... Index of ftp://ladsftp.nascom.na...

Index of ftp://ladsftp.nascom.nasa.gov/allData/5/MOD09/2011/112/

[Up to higher level directory](#)

Name	Size	Last Modified
MOD09.A2011112.0000.005.2011113090950.hdf	365826 KB	4/23/2011 8:25:00 AM
MOD09.A2011112.0005.005.2011113092346.hdf	371025 KB	4/23/2011 8:26:00 AM
MOD09.A2011112.0010.005.2011113093636.hdf	392087 KB	4/23/2011 8:26:00 AM
MOD09.A2011112.0015.005.2011113095015.hdf	241855 KB	4/23/2011 8:27:00 AM
MOD09.A2011112.0105.005.2011114201412.hdf	157180 KB	4/24/2011 7:49:00 PM
MOD09.A2011112.0110.005.2011114202713.hdf	350412 KB	4/24/2011 7:49:00 PM
MOD09.A2011112.0115.005.2011114203754.hdf	357375 KB	4/24/2011 7:50:00 PM
MOD09.A2011112.0120.005.2011114205147.hdf	366623 KB	4/24/2011 7:50:00 PM
MOD09.A2011112.0125.005.2011114210231.hdf	370779 KB	4/24/2011 7:50:00 PM
MOD09.A2011112.0130.005.2011114211648.hdf	370831 KB	4/24/2011 7:51:00 PM
MOD09.A2011112.0135.005.2011114213112.hdf	372748 KB	4/24/2011 7:50:00 PM
MOD09.A2011112.0140.005.2011114214434.hdf	341382 KB	4/24/2011 7:50:00 PM
MOD09.A2011112.0145.005.2011114215802.hdf	380899 KB	4/24/2011 7:51:00 PM
MOD09.A2011112.0150.005.2011114220847.hdf	388379 KB	4/24/2011 7:51:00 PM
MOD09.A2011112.0155.005.2011114221900.hdf	163286 KB	4/24/2011 7:51:00 PM
MOD09.A2011112.0245.005.2011114200520.hdf	232392 KB	4/24/2011 7:32:00 PM
MOD09.A2011112.0250.005.2011114201839.hdf	349947 KB	4/24/2011 7:32:00 PM
MOD09.A2011112.0255.005.2011114203027.hdf	364876 KB	4/24/2011 7:33:00 PM
MOD09.A2011112.0300.005.2011114204139.hdf	384346 KB	4/24/2011 7:34:00 PM
MOD09.A2011112.0305.005.2011114205741.hdf	368595 KB	4/24/2011 7:35:00 PM
MOD09.A2011112.0310.005.2011114211015.hdf	365407 KB	4/24/2011 7:35:00 PM

Done



- ▶ MODIS Overview
- ▶ ASTER Policies
- ▶ MODIS Products Table
- ▶ MODIS Policies
- ▶ ASTER Overview
- ▶ ASTER Products Table
- ▶ Other Data Links

MODIS Products Table

These links will direct you to specific information and access points for each of the MODIS Land Products distributed from LP DAAC.

- ▶ Radiation Budget Variables
- ▶ Ecosystem Variables
- ▶ Land Cover Characteristics

Full List

Search:

Shortname	Platform	MODIS Product	Raster Type	Res (m)	Temporal Granularity
MYD09GA	Aqua	Surface Reflectance Bands 1-7	Tile	500/1000m	Daily
MYD09G1	Terra	Surface Reflectance Bands 1-2	Tile	250m	Daily
MYD09G2	Aqua	Surface Reflectance Bands 1-2	Tile	250m	Daily
MOD09CM3	Terra	Surface Reflectance Bands 1-7	CMG	500m	Daily

https://lpdaac.usgs.gov/lpdaac/products/modis_products_table



HOME ABOUT PRODUCTS GET DATA TOOLS USER COMMUNITY CUSTOMER SERVICE Search

- ▶ ASTER DAR Tool
- ▶ MODIS Reprojection Tool
- ▶ MODIS Reprojection Too...
- ▶ LDOPE Tools

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Tools > MODIS Reprojection Tool - Swath NEWS FEED SITE MAP

MODIS Reprojection Tool - Swath

MRTSwath provides the capability to transform MODIS level-2 land products from HDF-EOS swath format to a uniformly gridded image that is geographically referenced according to user-specified projection and resampling parameters. Functionality includes spectral subsetting, spatial subsetting, map projection, resampling, and format conversion. MRTSwath does not currently support mosaicking or datum conversions. The tool is executed through a command line or graphical user interface (GUI).

MRTSwath was designed specifically to accommodate projection of LP DAAC MODIS swath products. Its success on other data

Download

Please log in to download files.

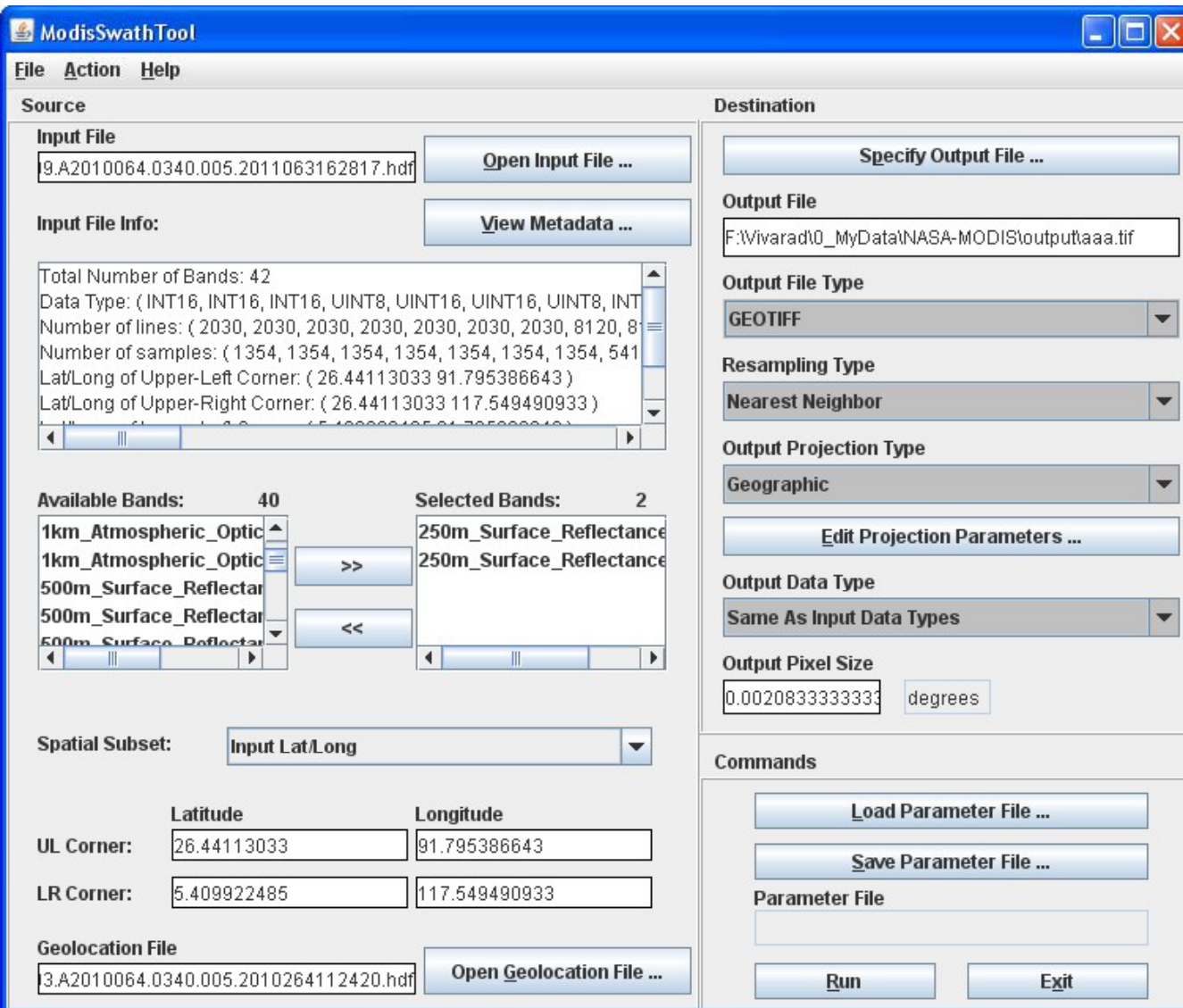
- Linux/Intel 32-bit 4 MB
- Linux/Intel 64-bit 4 MB
- Mac OS X/Intel 32-bit 4 MB
- Windows/Intel 32-bit 4 MB

Manuals

- MRT Swath Users Manual
- Release Notes

https://lpdaac.usgs.gov/lpdaac/tools/modis_reprojection_tool_swath

MODIS level-1B data are processed and distributed by NASA Level 1 and Atmosphere Archive and Distribution System (LAADS) Ground Station. The data are then made available by MODIS Direct Readout stations. The MODIS level-2 land products are distributed by the Land Processes Distributed Active Archive Center (LP DAAC) located at the U.S. Geological Survey (USGS) Earth Resources



ENVI 4.7

File Basic Tools Classification Transform Filter Spectral Map Vector Topographic Radar Window Help

#1 Band 1:aaa_250m_Surface_Reflectance_Band_1.tif

File Overlay Enhance Tools Window

#2 Band 1:aaa_250m_Surface_Reflectance_Band_2.tif

File Overlay Enhance Tools Window

Available Bands List

File Options

- aaa_250m_Surface_Reflectance_Band_2.tif
 - Band 1
 - Map Info
- aaa_250m_Surface_Reflectance_Band_1.tif
 - Band 1
 - Map Info

Gray Scale RGB Color

Selected Band

Band 1:aaa_250m_Surface_Reflectance_Band_1.tif

Dims: 12362 x 10095 (Integer) [BSQ]

Load Band Display #1

Cursor Location / Value

File Options

Disp #1 (4282,5852) Scrn: R:44 G:44 B:44
 Projection: Geographic Lat/Lon
 LL: 14.251547N, 100.714137E
 Disp #1 Data: 680
 Disp #2 Data: 3667

#1 Scroll (0.02071)

#1 Zoom [4x]

#2 Zoom [4x]

output

File Edit View Favorites Tools Help

Back Forward Refresh Search Folders Folder Sync

Address F:\Vivarad\0_MyData\NASA-MODIS\output

Name	Size	Type	Date Modified
test1		File Folder	4/25/2011 4:09
aaa_250m_Surface_Reflectance_Band_1	243,819 KB	TIF Image	4/25/2011 3:34
aaa_250m_Surface_Reflectance_Band_2	243,819 KB	TIF Image	4/25/2011 3:38

3 objects 476 MB My Computer

ENVI 4.7

File Basic Tools Classification Transform Filter Spectral Map Vector Topographic Radar Window Help

#1 Band 1:aaa_250m_Surface_Reflectance_Band_1.tif

File Overlay Enhance Tools Window

#2 Band 1:aaa_250m_Surface_Reflectance_Band_2.tif

File Overlay Enhance Tools Window

Available Bands List

File Options

- aaa_250m_Surface_Reflectance_Band_2.tif
 - Band 1
 - Map Info
 - Proj: Geographic Lat/Lon
 - Pixel: 0.002083 Degrees
 - Datum: WGS-84
 - UL Geo: 91°47'43.39"E, 26°26'28.07"N
 - aaa_250m_Surface_Reflectance_Band_1.tif
 - Band 1
 - Map Info
 - Proj: Geographic Lat/Lon
 - Pixel: 0.002083 Degrees
 - Datum: WGS-84
 - UL Geo: 91°47'43.39"E, 26°26'28.07"N

Gray Scale RGB Color

Selected Band

Band 1:aaa_250m_Surface_Reflectance_Band_1.tif

Dims: 12362 x 10095 (Integer) (BSQ)

Load Band Display #1

Cursor Location / Value

File Options

Disp #1 (4214.5979) Scm: R:53 G:53 B:53
 Projection: Geographic Lat/Lon
 LL: 13.986964N, 100.572470E
 Disp #1 Data: 881

#1 Scroll (0.02071)

#1 Zoom

#2 Zoom [4x]

Calculator

Edit View Help

249588780.

Hex Dec Oct Bin Degrees Radians Grads

Inv Hyp Backspace CE C

Sta	FE	()	MC	7	8	9	/	Mod	And
Ave	dms	Exp	In	MR	4	5	6	*	Or	Xor
Sum	sin	x^y	log	MS	1	2	3	-	Lsh	Not
s	cos	x^3	nl	M+	0	+/-	.	+	=	Int
Dat	tan	x^2	1/x	pi	A	B	C	D	E	F

Desktop icons: ocssw, Shutdown-S..., Access, MODIS System, MODIS_ba..., linux_phot...

END OF PRESENTATION

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