



MODIS Near-Real time Fire Information System

<http://www.geoinfo.ait.ac.th/mod14/>

Vivarad Phonekeo, Ph.D.

Ground Receiving System Manager

vivarad@ait.ac.th

Geoinformatics Center, Asian Institute of Technology Bangkok,
Thailand

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Introduction

- MODIS data receiving in AIT are archived for the purposes of research on the **global environmental change monitoring** and **management/prevention of disasters** of different types in the Southeast Asian region.
- The need for an information system to better manage and control the disasters caused by forest fires
- The MODIS Fire Information System is a **near-real time automatic system**, which consists of the following modules: MODIS Fire **Product generation**, MODIS fire **visualization**, MODIS Fire **Database & Statistical analysis** and MODIS fire **validation** systems. The system is based on **MODIS Active Fire Product (MOD14) Production Code, version 4.3.2**, developed by NASA which automatically generates fire pixels information and other physical parameters which would be useful to establish a better understanding of the fire occurrence phenomenon.
- The generated information is stored in a **database**, which could be accessed with ease via **Internet**.



Objectives

- To develop **automatic near-real time information system** for **thermal anomalies** monitoring (**fire, biomass burning**, etc.) in Southeast Asia using MODIS data based on NASA algorithm (ATBD MOD14). The system is accessible via internet.
- The system will be not only for near-real time monitoring, but also for **visualization, data archiving and statistical analysis, data validation** for the purpose of **multi-temporal study** on the thermal anomalies phenomena in the region, in which **forest fire** is the first priority in this study.

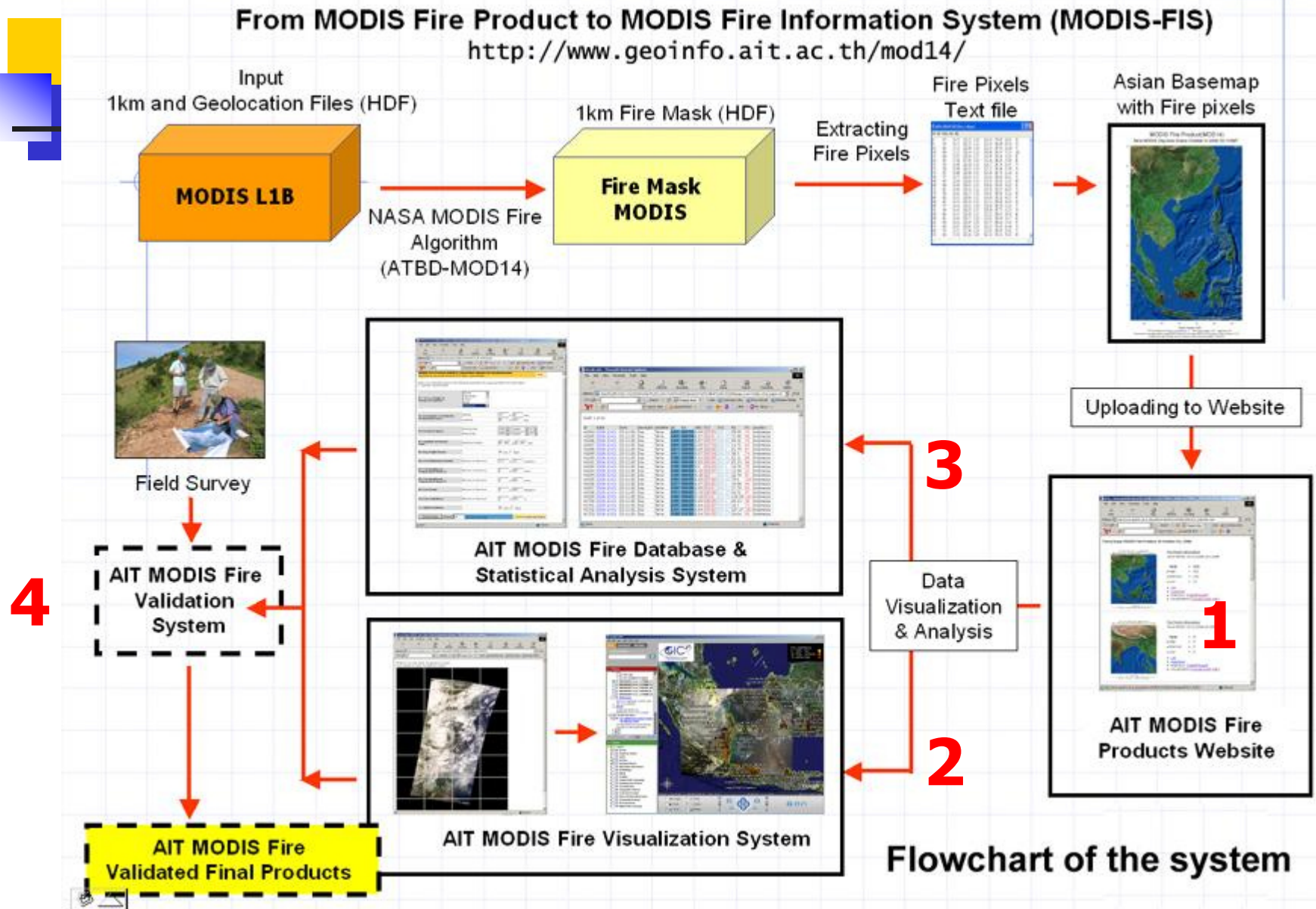


Concept of the System

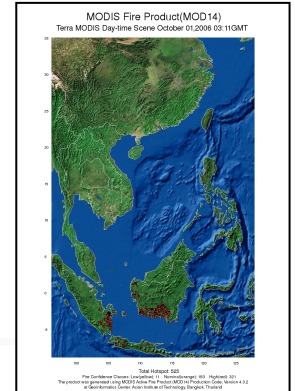
- 1. Product generation
- 2. Visualization
- 3. Database & Statistical analysis
- 4. Validation

from Concept -> to Modules development

Flowchart of the System



1. Product Generation



- To generate **fire pixels** using MODIS data and the software developed by NASA based on the NASA **ATBD-MOD14** algorithm.
- Number of fire pixels classified into **high**, **nominal** and **low** fire confidence levels.
- Number of fire pixels detected in each country in the region (**Statistical information** of the fire pixels distribution by country)
- Fire information with other physical parameters in **plain text** and **kml** formats.

2. Visualization (1/2)



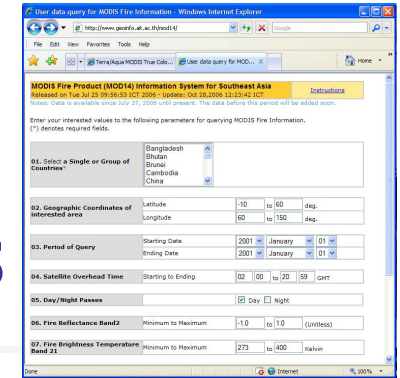
- To understand and make use the fire phenomenon detected by MODIS sensors in different areas, it is necessary to have a tool supporting **visual interpretation** of the MODIS image in the interested area. Therefore, a **visualization module** is developed.

2. Visualization (2/2)



- Terra/Aqua MODIS True Color 250m (developed using NASA algorithm) in jpg and kml data format, which are **low resolution**, but **near-real time**.
- Satellite images available in Google Earth which are **high resolution**, but **not near-real time**.
- The combination of the advantages of the two components provide better visualization for users to observe, monitor and validate the fire occurrence phenomenon.

3. Database & Statistical Analysis



- In order to perform further **statistical analyses**, the physical parameters in MODIS fire pixels are stored in a **database** designed to provide facilities for continued archiving and data retrieval. Also being web based, the database could conveniently be accessed via the Internet.



4. Validation

- To setup a web based validation system to **verify** the product by means of field inspection.

Geoinformatics Center - MODIS Fire Information System - Windows Internet Explorer

http://www.geoinfo.ait.ac.th/mod14/

1 2 3 4

Go to MODIS Fire [Product Generation][Visualization][Database and Statistical Analysis][Data Validation] System

■ MODIS Fire Picture of The Day
December 02, 2006

Platform:
Aqua

Sensor:
MODIS

Date/Time of Data Acquisition:
December 02, 2006 06:28 GMT

Ground Receiving System:
Geoinformatics Center, AIT

MODIS Fire Processing System
Geoinformatics Center, AIT

Description of the Picture:
Fires and smokes detected in
Southern part of Sumatra
(Indonesia)

Introduction

<http://www.geoinfo.ait.ac.th/mod14/>

[Geoinformatics Center](#) of the [Asian Institute of Technology \(AIT\)](#), Bangkok, Thailand acquires MODIS satellite data from MODIS sensors aboard Terra and Aqua Satellites on a daily basis. The data are archived for the purposes of research on the global environmental change monitoring and management/prevention of disasters of different types in the Southeast Asian region. In this context, the authors having identified the need for an information system to better manage and control the disasters caused by forest fires, have developed a system referred to as the [MODIS Fire Information System \(FIS\)](#). The MODIS FIS is based on [MODIS Active Fire Product \(MOD14\) Production Code, version 4.3.2](#), developed by NASA and automatically generates fire pixels or hotspot information with other physical parameters which would be useful to establish a better understanding of the fire occurrence phenomenon. The generated information is stored in a database, which could be accessed with ease via Internet. Details of the system, the associated algorithm producing the fire pixels information, and database access through the Internet are described in the following sections.

Overview of the MODIS Fire Information System

The AIT MODIS Fire Information System is a [near-realtime automatic](#) system, which consists of the following modules: MODIS Fire Product generation, MODIS fire visualization, MODIS Fire Database & Statistical analysis and MODIS fire validation systems. Click [here](#) to see the flowchart of the system (197 KB).

http://www.geoinfo.ait.ac.th/ Internet 100%



Fire Monitoring in SouthEast Asia

- An example of Indonesia, Oct 01, 2006 03:11 GMT by Terra MODIS

MODIS Fire Product(MOD14) Catalogue

Notes: Data is available since March 01, 2006 until present. The data before this period will be added later. Contact [System Developer](#) for more information.

2001 - 2002 - 2003 - 2004 - 2005 - **2006** - [2007](#)

[Jan](#) - [Feb](#) - [Mar](#) - [Apr](#) - [May](#) - [Jun](#) - [Jul](#) - [Aug](#) - [Sep](#) - [Oct](#) - [Nov](#) - [Dec](#)

January 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

[Top](#)

February 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28				

Terra/Aqua MODIS Fire Product of October 01, 2006

MODIS Fire Product(MOD14)
 Terra MODIS Day-time Scene October 01,2006 03:11GMT



Fire Pixels Information

Terra MODIS 10 01,2006 03:11GMT

Total	=	525
■ High	=	321
■ Nominal	=	193
■ Low	=	11

- [List](#)
- [Quicklook](#)
- Statistics: [\[Table\]](#)[\[Graph\]](#)
- Visualization: [\[Google Earth KML\]](#)

MODIS Fire Product(MOD14)
 Terra MODIS Day-time Scene October 01,2006 04:49GMT



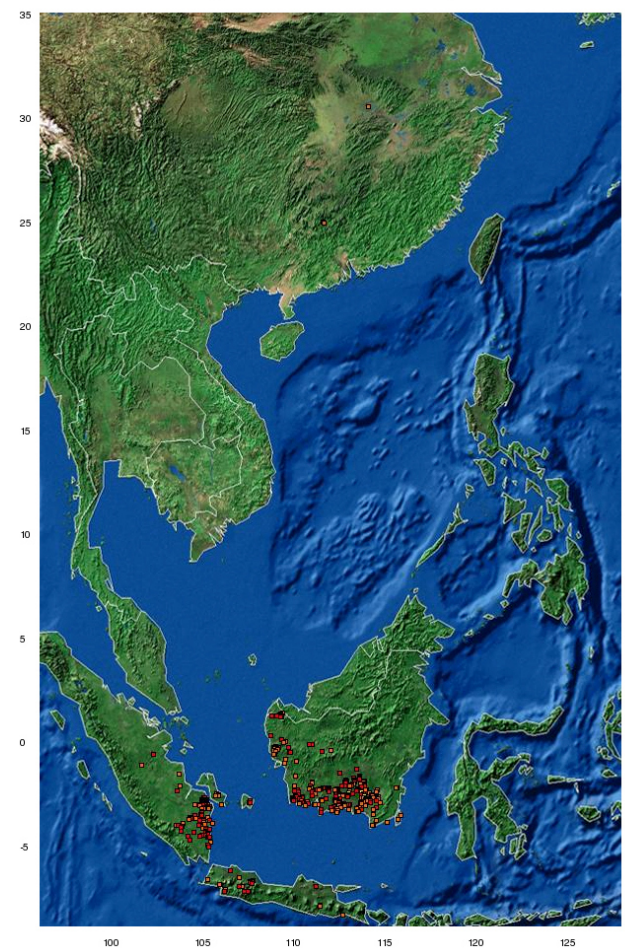
Fire Pixels Information

Terra MODIS 10 01,2006 04:49GMT

Total	=	2
■ High	=	0
■ Nominal	=	2
■ Low	=	0

- [List](#)
- [Quicklook](#)
- Statistics: [\[Table\]](#)[\[Graph\]](#)

MODIS Fire Product(MOD14)
 Terra MODIS Day-time Scene October 01,2006 03:11GMT



Total Hotspot: 525
 Fire Confidence Classes: Low(yellow): 11 Nominal(orange): 193 High(red): 321
 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

http://www.geoinfo.ait.ac.th/mod14/2006/10/text/MOD14.200610010311Terr...

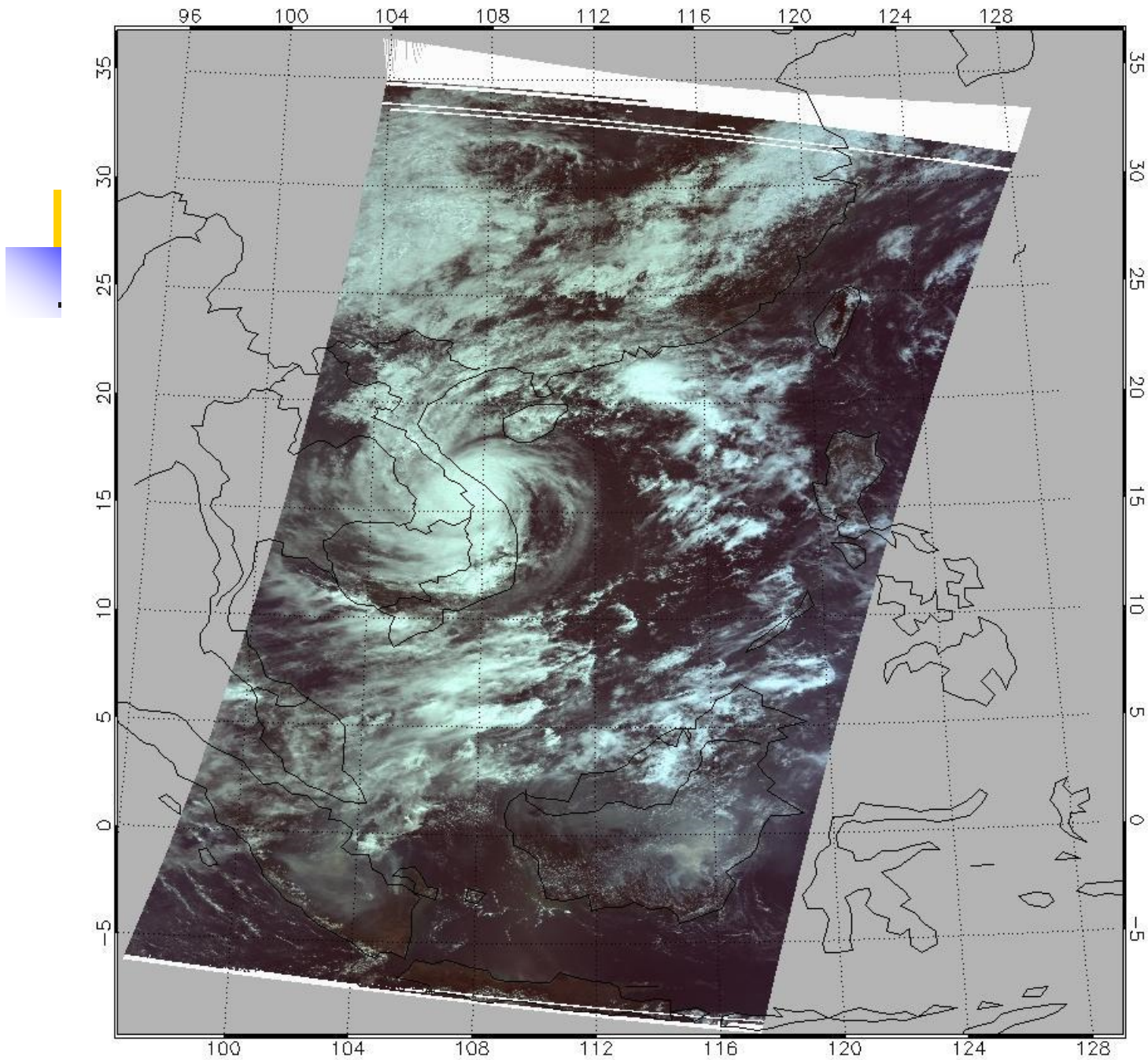
http://www.geoinfo.ait.ac.th/m... Google

File Edit View Favorites Tools Help

Geoinformatics... http://www.g... http://ww... x Home

477	576	30.63	114.44	0.12	313.46	296.64	8.89	56
1116	468	25.09	111.93	0.29	310.03	293.65	9.20	26
1122	477	25.03	112.02	0.27	311.25	290.85	10.35	53
3716	772	1.47	109.73	0.28	329.53	293.73	25.55	76
3716	773	1.47	109.74	0.27	323.90	297.45	17.65	50
3721	762	1.44	109.63	0.27	324.77	300.52	20.31	76
3725	762	1.41	109.62	0.28	317.34	298.52	11.72	63
3726	762	1.40	109.62	0.24	325.66	299.10	21.75	87
3726	763	1.40	109.63	0.27	323.34	298.59	18.30	74
3727	757	1.39	109.58	0.23	326.85	301.86	22.11	89
3727	758	1.39	109.58	0.22	326.61	300.49	22.14	88
3731	766	1.35	109.65	0.20	324.23	302.10	14.76	35
3732	765	1.34	109.64	0.19	322.57	301.52	11.99	33
3732	766	1.34	109.64	0.18	327.00	302.57	16.76	87
3735	767	1.31	109.65	0.28	357.62	299.98	78.60	100
3736	767	1.30	109.65	0.27	323.01	298.20	14.98	84
3737	737	1.33	109.38	0.29	321.60	296.17	17.78	82
3737	763	1.30	109.61	0.19	336.88	301.25	32.51	97
3738	763	1.29	109.61	0.18	371.60	303.76	118.39	100
3739	710	1.35	109.13	0.29	328.05	295.10	26.14	90
3846	728	0.37	109.09	0.24	316.57	299.83	12.70	73
3858	797	0.17	109.69	0.24	372.57	303.51	127.37	100
3858	963	-0.06	111.33	0.24	334.35	303.23	34.64	95
3859	949	-0.05	111.18	0.28	316.07	301.03	7.05	54
3860	950	-0.05	111.18	0.27	319.29	300.93	11.26	77
3861	821	0.11	109.90	0.26	316.47	301.66	10.87	70
3871	808	0.04	109.76	0.23	311.37	299.16	6.91	52
3873	1056	-0.35	112.40	0.27	314.78	299.69	8.64	69
3882	1015	-0.36	111.87	0.24	319.39	303.46	12.45	79
3882	1016	-0.36	111.89	0.26	317.37	301.63	9.69	75
3895	843	-0.21	110.05	0.28	316.73	300.08	10.54	74
3897	765	-0.12	109.33	0.24	319.28	301.99	9.15	72
3898	789	-0.17	109.54	0.28	320.99	301.98	14.46	81
3904	771	-0.19	109.36	0.25	318.55	302.31	9.21	36
3905	761	-0.19	109.27	0.27	325.37	300.55	19.40	85

Internet 100%



Terra MODIS Geoinformatics Center/AIT, Bangkok, Thailand
Day-time Scene October 01,2006 03:11 GMT True color composite R:G:B=1:4:3

Internet Explorer browser window showing a table of data. The address bar displays the URL: <http://www.geoinfo.ait.ac.th/mod14/2006/10/statistics/MOD14.20061001031...>

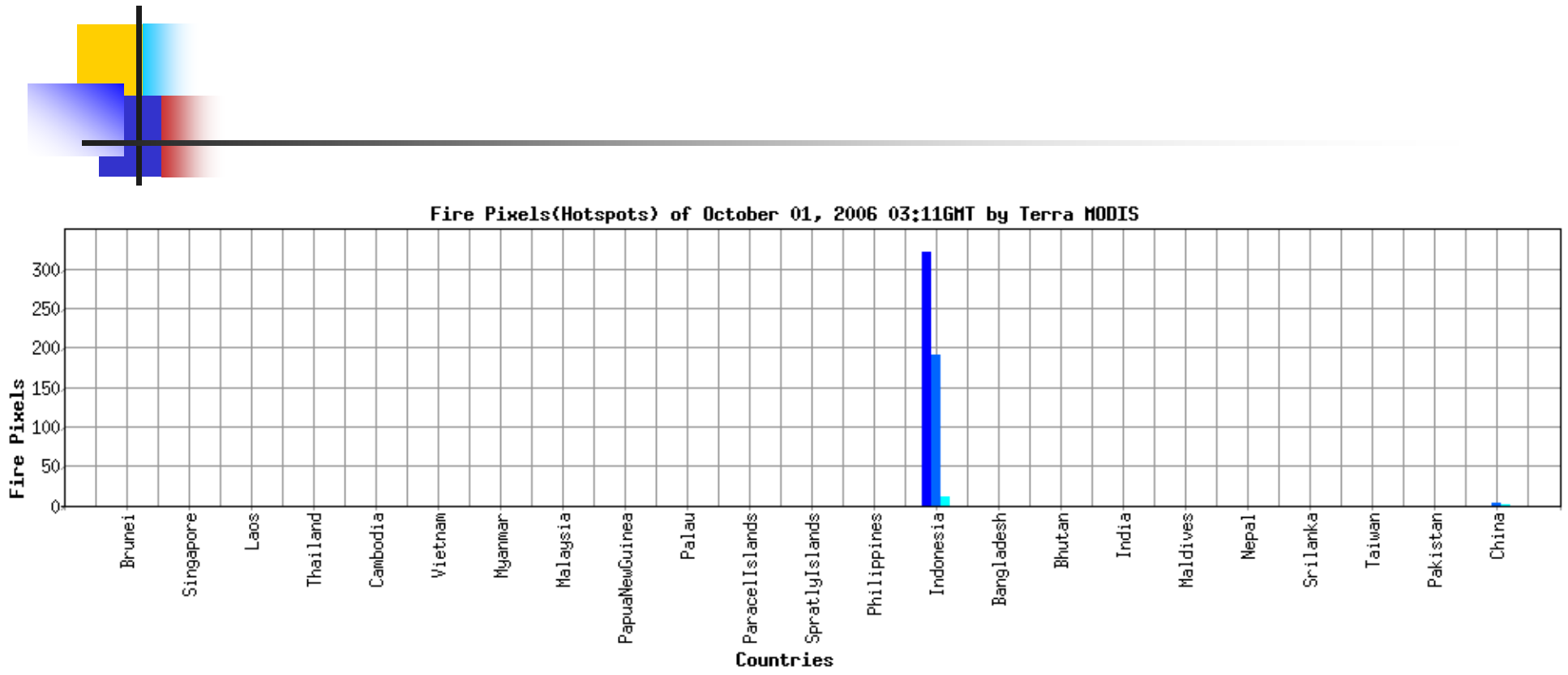
The browser interface includes a menu bar (File, Edit, View, Favorites, Tools, Help), a toolbar with navigation buttons and a search box, and a tab bar with several open tabs.

The main content area displays a table with the following data:

0	0	0	Brunei
0	0	0	Singapore
0	0	0	Laos
0	0	0	Thailand
0	0	0	Cambodia
0	0	0	Vietnam
0	0	0	Myanmar
0	0	0	Malaysia
0	0	0	PapuaNewGuinea
0	0	0	Palau
0	0	0	ParacelIslands
0	0	0	SpratlyIslands
0	0	0	Philippines
322	190	10	Indonesia
0	0	0	Bangladesh
0	0	0	Bhutan
0	0	0	India
0	0	0	Maldives
0	0	0	Nepal
0	0	0	Srilanka
0	0	0	Taiwan
0	0	0	Pakistan
0	2	1	China

A red arrow points to the row for Indonesia.

The status bar at the bottom shows "Internet" and "100%".



http://www.geoinfo.ait.ac.th/mod14/2006/10/kml/MOD14.200610010311Terra.kml - Windows Internet Explorer

http://www.geoinfo.ait.ac.th/mod14/2006/10/kml/MOD14.200610010311

File Edit View Favorites Tools Help

Geoinformatic... http://www.g... http://www.g... http://www.g... http://ww... X Home

```
<?xml version="1.0" encoding="UTF-8" ?>
- <kml xmlns="http://earth.google.com/kml/2.0">
- <Folder>
  <name>Terra MODIS Fire Product. October, 01,2006 03:11 GMT</name>
  - <description>
    - <![CDATA[
      Terra/Aqua MODIS Fire pixels(hotspots)<br>
      Copyright (C) 2006 Geoinformatics Center, Asian Institute of Technology, Bangkok, Thailand<br>
      Website http://www.geoinfo.ait.ac.th<br>
    ]]>
  </description>
  <open>1</open>
- <Folder>
  - <Placemark>
    <name>30.63,114.44 56%</name>
    - <LookAt>
      <longitude>114.44</longitude>
      <latitude>30.63</latitude>
      <range>90000</range>
      <tilt>0.0</tilt>
      <heading>0.0</heading>
    </LookAt>
    <StyleUrl>#khStyle688</StyleUrl>
  - <Style>
    - <IconStyle>
      <scale>0.25</scale>
    - <Icon>
      <href>http://www.geoinfo.ait.ac.th/modis/Level2/MOD14/icons/dotorange1.jpg</href>
    </Icon>
    </IconStyle>
  </Style>
  - <Point>
```

Internet 100%

http://www.geoinfo.ait.ac.th/modis/tcc250/2006/10/TCC250_20061001.html - Microsoft Internet Explorer

File Edit View Favorites Tools Help

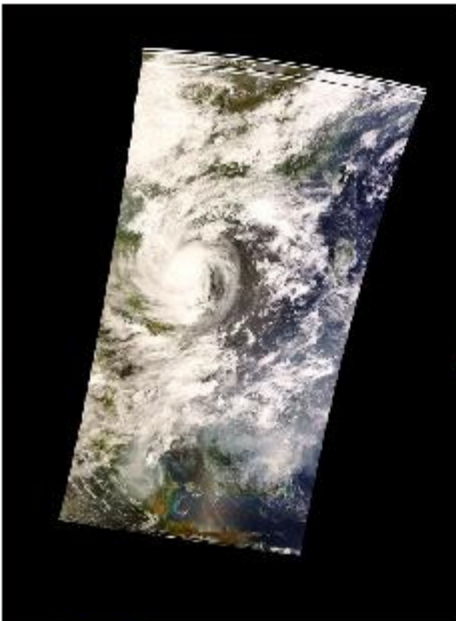
Back Forward Home Stop Search Favorites Refresh Print Yahoo

Address http://www.geoinfo.ait.ac.th/modis/tcc250/2006/10/TCC250_20061001.html Go Links


Y! Search Web Mail Shopping

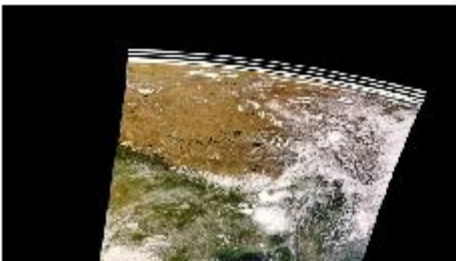
Google Go Bookmarks PageRank 34 blocked Check Settings

Terra/Aqua MODIS True Color Visualization of October 01, 2006

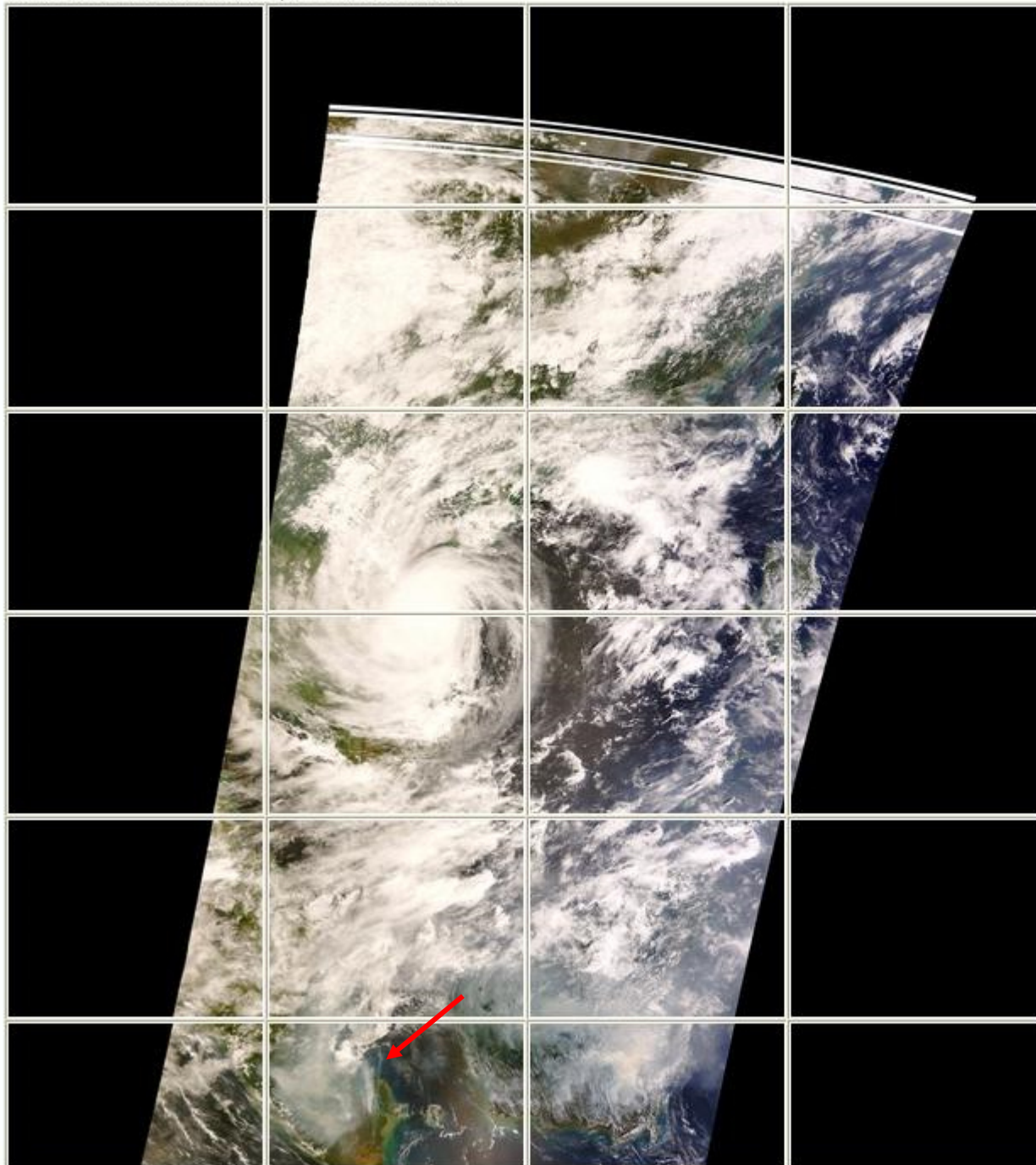


Scene 1 - Terra MODIS October 01,2006 03:11 GMT

 Terra MODIS Daytime Swath Color of 03:11 GMT
True Color Composite TCC 1:10, 250m resolution
Color Normalized Geostationary Advanced Very High Resolution Thermal
Water 1:10, 250m resolution



MODIS True Color 250m Visualization System
Terra MODIS October 01, 2006 03:11GMT

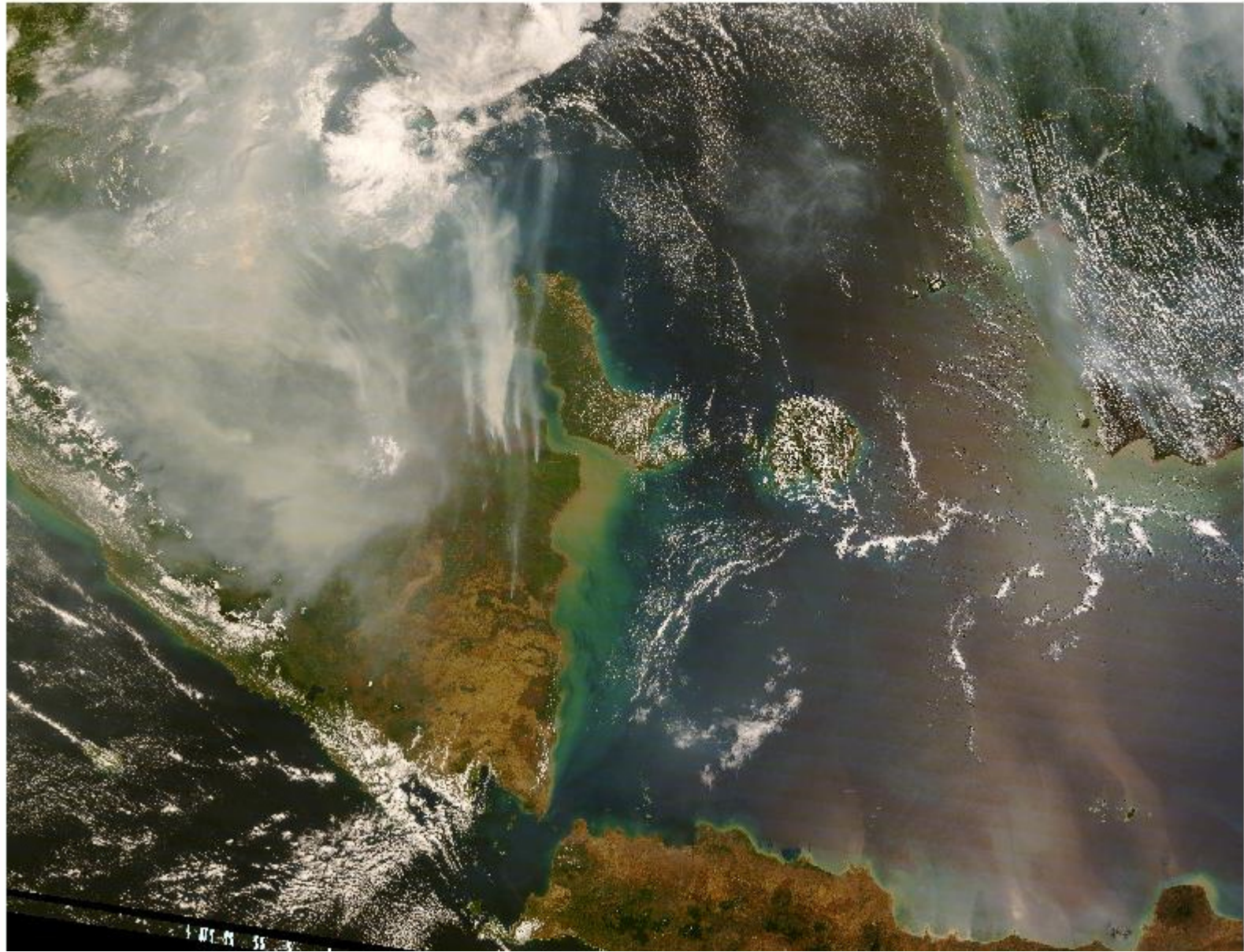


Back Home Search Favorites

Address http://www.geoinfo.ait.ac.th/modis/tcc250/2006/10/200610010311Terra.1000m.hdf_-3.1798000_106.4121836_img_true250r Go Links

Y! Search Web Mail Shopping My Yahoo!

Google G Go Bookmarks PageRank 34 blocked Check Settings



1 01 01 35

actions



Fire Confidence

0 - 30%	low	■
31-70%	nominal	■
71-100%	high	■

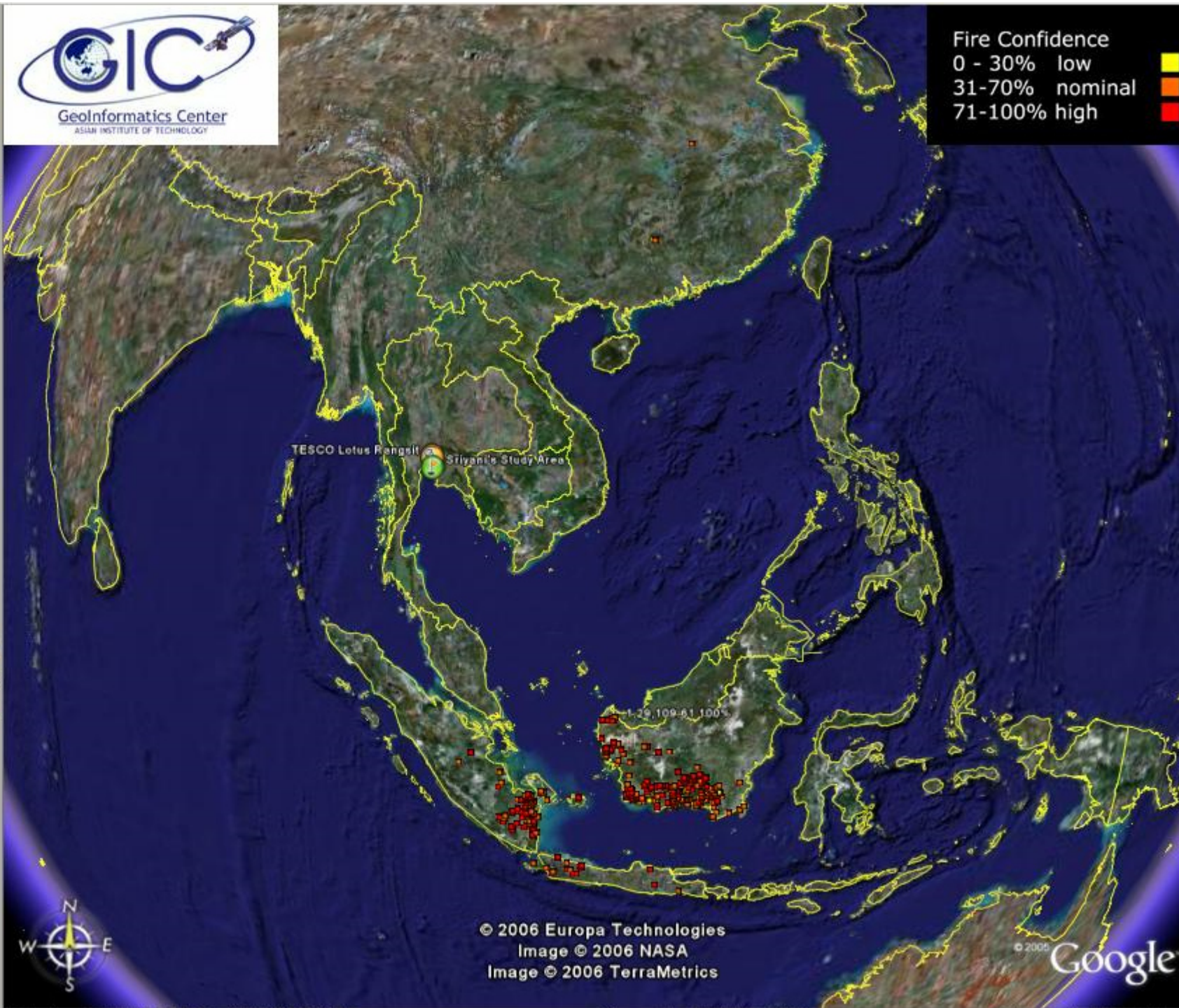
chool
partment
enter,AIT
irport
ea

world tour here!

2w.
ew to change

[Product. Octobe](#)
[AI](#)

pixels(hotspots)
informatics



© 2006 Europa Technologies
Image © 2006 NASA
Image © 2006 TerraMetrics

© 2006 Google

Names

community



Fly To Local Search Directions

e.g. Tokyo, Japan

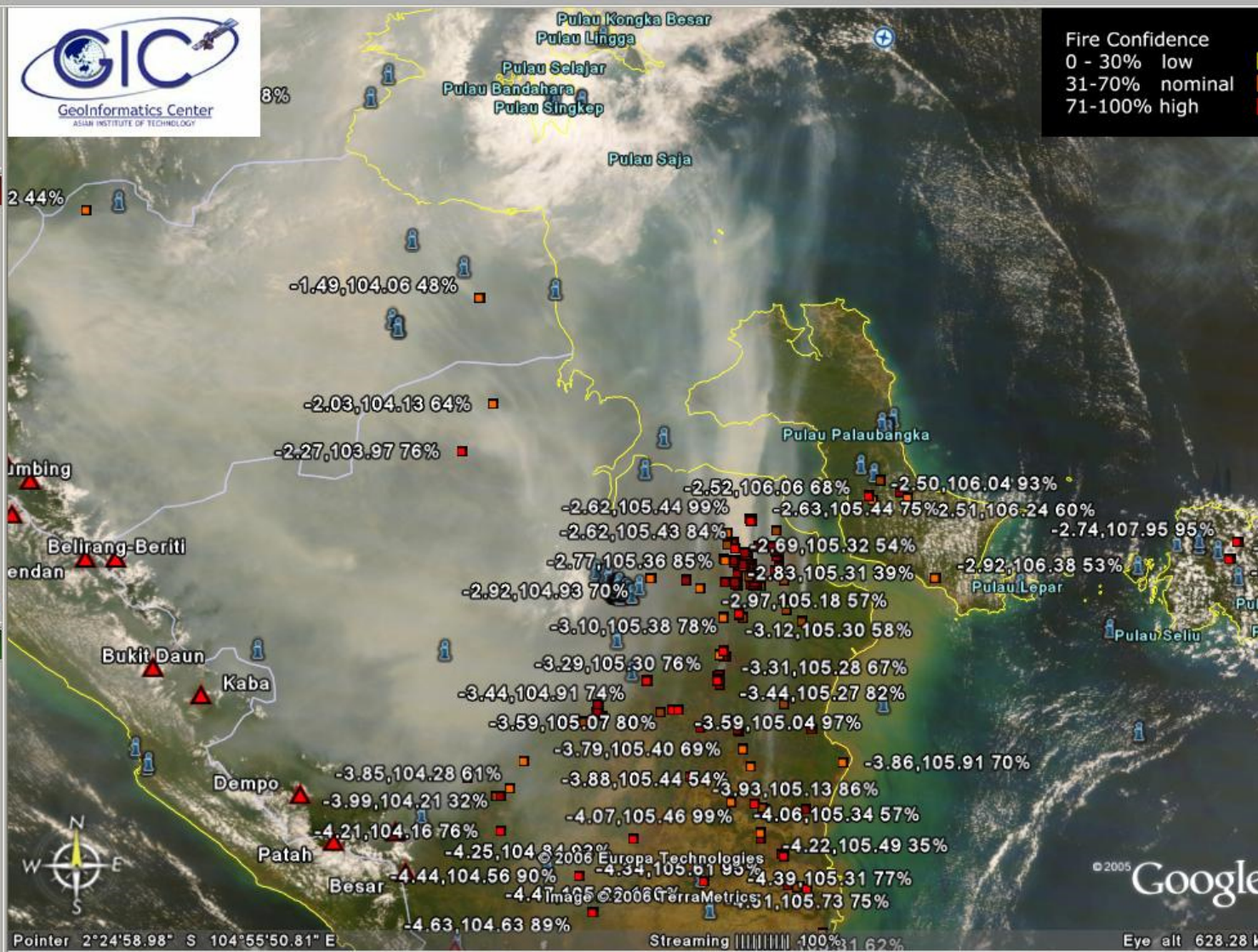


Places

- AIT Community School
- ST6-64, Vivarad Apartment
- Geoinformatics Center, AIT
- Suwannabhumi Airport
- Sriyani's Study Area
- Sightseeing
 - Start your Google Earth world tour here!
 - Click on an underlined
- default
 - Google Earth default view.
 - Edit/Snapshot a new view to change
- Temporary Places
 - 200610010311Terra_3.1798000_10
 - Terra MODIS Fire Product, Octobe
 - r, 01, 2006 03:11 GMT

Layers

- Layers
 - terrain
 - Geographic Web New!
 - Featured Content
 - roads
 - borders
 - Populated Places
 - Alternative Place Names
 - 3D Buildings
 - Dining
 - Lodging
 - Google Earth Community
 - Shopping and Services
 - Transportation
 - Geographic Features
 - Travel and Tourism
 - Parks and Recreation Areas
 - Community Services

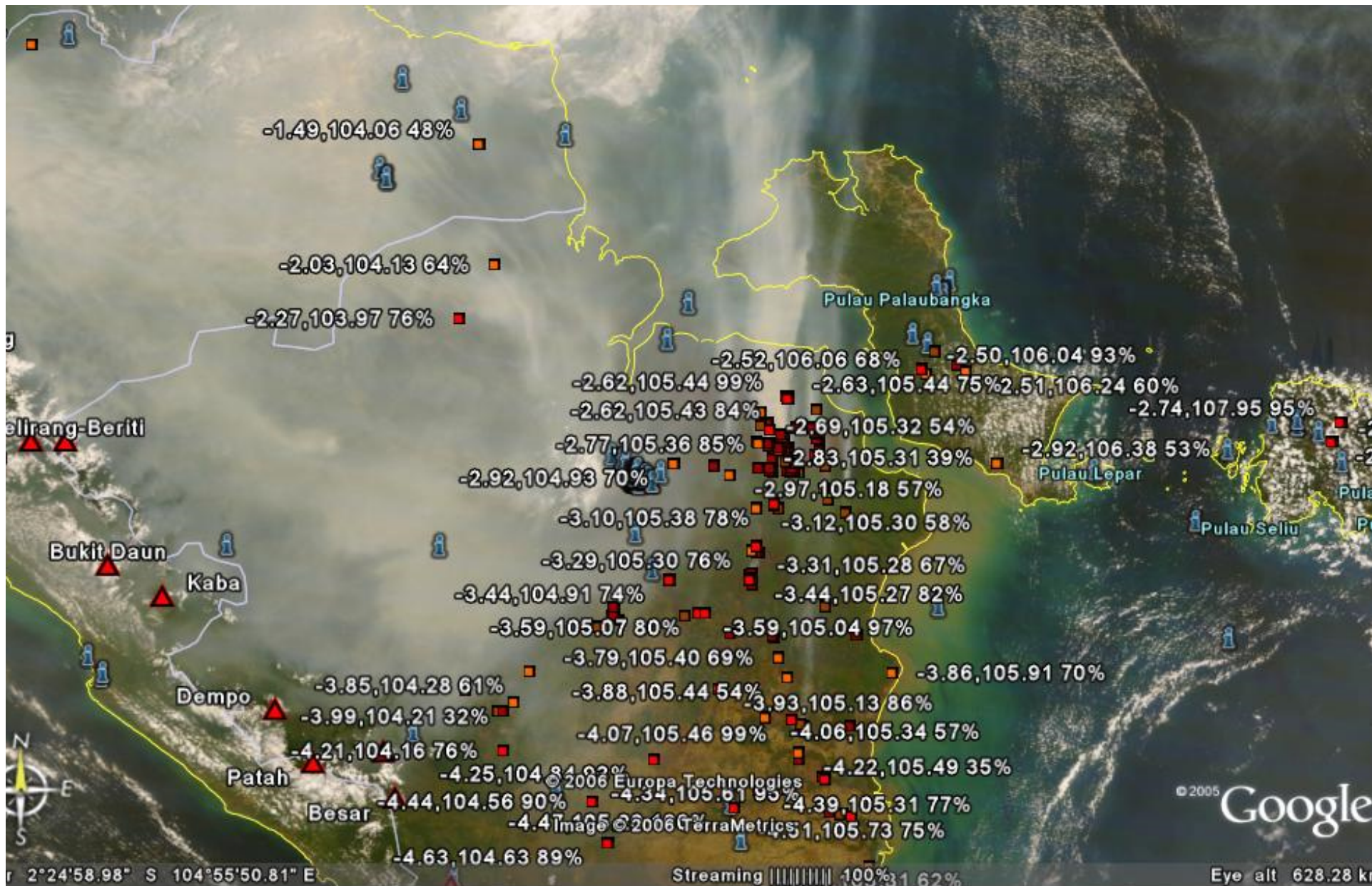


Pointer 2°24'58.98" S 104°55'50.81" E

Streaming 100% 1.62%

Eye alt 628.28 k

- Lodging
- Dining
- Roads
- Borders
- Terrain
- Buildings



Map navigation and legend interface. The legend includes:

- Lodging
- Dining
- Roads
- Borders
- Terrain
- Buildings

Navigation controls include a compass, zoom in (+) and zoom out (-) buttons, a directional pad, and a refresh button. The bottom right shows a scale bar (Streaming 100%), a zoom level indicator (31.62%), and an eye alt value (628.28 km).

User data query for MODIS Fire Information - Windows Internet Explorer

http://www.geoinfo.ait.ac.th/mod14/

File Edit View Favorites Tools Help

Terra/Aqua MODIS True Colo... User data query for MOD... X Home

MODIS Fire Product (MOD14) Information System for Southeast Asia

Released on Tue Jul 25 09:56:53 ICT 2006 - Update: Oct 28,2006 12:23:42 ICT

[Instructions](#)

Notes: Data is available since July 27, 2006 until present. The data before this period will be added soon.

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

01. Select a Single or Group of Countries*

Bangladesh
Bhutan
Brunei
Cambodia
China

02. Geographic Coordinates of interested area

Latitude -10 to 60 deg.
Longitude 60 to 150 deg.

03. Period of Query

Starting Date 2001 January 01
Ending Date 2001 January 01

04. Satellite Overhead Time

Starting to Ending 02 00 to 20 59 GMT

05. Day/Night Passes

Day Night

06. Fire Reflectance Band2

Minimum to Maximum -1.0 to 1.0 (Unitless)

07. Fire Brightness Temperature Band 21

Minimum to Maximum 273 to 400 Kelvin

Done Internet 100%

View User-query MODIS Fire Information - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Home Stop Refresh Search Favorites

Address http://www.geoinfo.ait.ac.th/mod14/mod14_db/view_db_mod14g.php Go Links

Y! Search Web Mail Shopping

Google Go Bookmarks PageRank 34 blocked Check Settings

AIT MODIS Fire Database & Statistical Analysis System [Instructions](#)

Released on Tue Jul 25 09:56:53 ICT 2006 - Update: Oct 28,2006 12:23:42 ICT

Show User Input Information

Geographic/Location parameters	Values
Country	Indonesia
Latitude	-10 ° to 60 °
Longitude	60 ° to 150 °

Date&Time parameters	Values
Date	2006-10-01 to 2006-10-01
Overhead Time	02:00:00 to 04:59:00
Day/Night	Day

Platform parameters	Values
Satellite	Terra

Fire parameters	Values
Fire Reflectance Band2	-1.0 to 1.0
Fire Brightness Temperature Band 21	273 to 400 Kelvin
Fire Brightness Temperature Band 31	273 to 400 Kelvin
Fire Power	0 to 400 Watt/m ²
Fire Confidence	0 to 100 %

Show User Query Result : Found 520 record(s)

Result Page # [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#) [20](#) [21](#) [22](#) [23](#) [24](#) [25](#) [26](#)

End of Query

User Query Result - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Home Stop Reload Search Favorites

Address http://www.geoinfo.ait.ac.th/mod14/mod14_db/view_db_mod14g_multipage.php?sql=select%20**%20%20from%20mod14_t Go Links

Search Web Search Web Mail Shopping

Google Go Bookmarks PageRank 34 blocked Check Settings

RESULT PAGE 24 of 26

id	date	time	daynight	satellite	lat	lon	ref2	T21	T31	Fp	Fc	country
42146	2006-10-01	03:11:00	Day	Terra	-3.86	105.91	0.18	322.15	306.81	12.85	70	Indonesia
42147	2006-10-01	03:11:00	Day	Terra	-3.79	105.4	0.26	337.38	306.2	29.21	69	Indonesia
42148	2006-10-01	03:11:00	Day	Terra	-3.88	105.44	0.14	333.34	312.44	15.07	54	Indonesia
42149	2006-10-01	03:11:00	Day	Terra	-3.93	105.13	0.24	330.23	305.63	14.75	86	Indonesia
42150	2006-10-01	03:11:00	Day	Terra	-3.85	104.28	0.25	321.12	304.65	9.6	61	Indonesia
42151	2006-10-01	03:11:00	Day	Terra	-4.1	105.72	0.25	322.23	303.3	14.63	83	Indonesia
42152	2006-10-01	03:11:00	Day	Terra	-4.07	105.46	0.17	339.36	309.4	30.6	99	Indonesia
42153	2006-10-01	03:11:00	Day	Terra	-4.06	105.34	0.26	325.06	304.69	10.98	57	Indonesia
42154	2006-10-01	03:11:00	Day	Terra	-4.09	105.5	0.2	332.78	312.28	19.6	65	Indonesia
42155	2006-10-01	03:11:00	Day	Terra	-4.1	105.5	0.23	339.94	313.49	34.88	99	Indonesia
42156	2006-10-01	03:11:00	Day	Terra	-4.1	105.51	0.2	333.85	313.16	25.36	95	Indonesia
42157	2006-10-01	03:11:00	Day	Terra	-4.11	105.5	0.27	375.49	319.97	130.4	100	Indonesia
42158	2006-10-01	03:11:00	Day	Terra	-4.11	105.51	0.28	363.53	315.77	91.39	100	Indonesia
42159	2006-10-01	03:11:00	Day	Terra	-3.91	103.9	0.29	313.83	297.06	9.57	66	Indonesia
42160	2006-10-01	03:11:00	Day	Terra	-3.94	103.99	0.29	315.44	297.79	10.48	71	Indonesia
42161	2006-10-01	03:11:00	Day	Terra	-3.99	104.21	0.29	323.25	304.05	12.69	32	Indonesia
42162	2006-10-01	03:11:00	Day	Terra	-4.22	105.49	0.19	325.17	307.55	10.41	35	Indonesia
42163	2006-10-01	03:11:00	Day	Terra	-4.03	104.14	0.25	324.15	306.28	13.37	57	Indonesia
42164	2006-10-01	03:11:00	Day	Terra	-4.03	104.16	0.29	333	305.04	25.87	94	Indonesia
42165	2006-10-01	03:11:00	Day	Terra	-4.25	105.49	0.24	328.78	308	16.11	85	Indonesia



Conclusion & Further Work

- Conclusion:
 - The near-real time automatic MODIS Fire Information System was developed, which users can access via internet for fire occurrence monitoring, visualization, data retrieving from database for multi-temporal statistical analysis for interested areas.
- Further Work:
 - The validation module need to be completed for conducting field work to validate the product generated by the system.
 - Improving the system performance