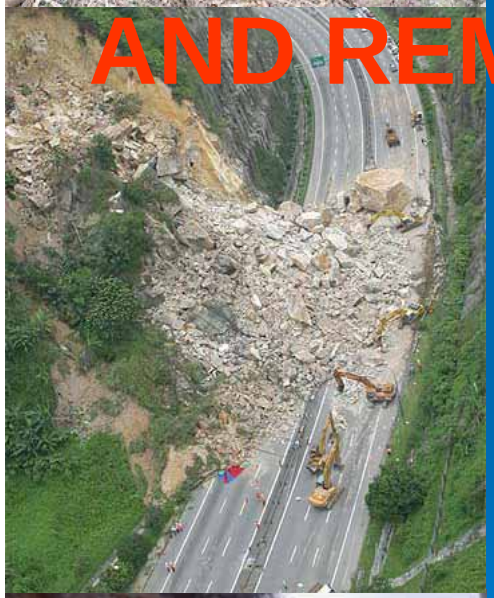
Malaysian Centre for Remote Sensing (MACRES)
Ministry of Science, Technology and Innovation, Malaysia









NATIONAL DISASTER AND REMOTE SENSING IN MALAYSIA

Siti Atikah Mohamed Hashim

Malaysian Centre for Remote Sensing

2nd JPTM Meeting, Bangkok, Thailand

MACRES SUPPORT THE NEEDS OF THE NATIONAL SECURITY DIVISION WHICH IS THE NATIONAL COORDINATOR FOR DISASTER MANAGEMENT

THREE (3) COMPONENTS

(i) EARLY WARNING SYSTEM
(ii) DETECTION AND MONITORING
(iii) MITIGATION AND RELIEF

ADDRESES SIX (6) MAJOR DISASTERS

(i) FOREST FIRE
(ii) FLOOD
(iii) LANDSLIDE
(iv) OIL SPILL
(v) HOT- INSTALLATIONS
(PETROCHEMICAL, REFINERIES AND GAS, CENTRAL TOXIC WASTE STORAGE FACILITIES, TOXIC CHEMICALS AND FLAMEABLE, etc.)
(vi) TSUNAMI

NSC DIRECTIVE 20 AND STANDARD OPERATING PROCEDURES (SOP)

MACRES ROLES :

- **DISSEMINATION** of information obtained from remote sensing via the detection and monitoring
- Provide **EARLY WARNING**
- Establish **DISASTER MANAGEMENT SYSTEM** using remote sensing and related technologies

NATURAL DISASTER MANAGEMENT

ADDRESSES THE REQUIREMENTS FOR

- EARLY WARNING
- DETECTION AND MONITORING
- MITIGATION AND RELIEF

AND THE REQUIREMENTS FOR MANAGING THE DISASTERS AT DIFFERENT STAGES

- BEFORE
- DURING
- AFTER

COLLABORATION AND COOPERATION

NADDI

EARLY WARNING

DETECTION & MONITORING

MITIGATION & RELIEF

MACRES

DISSEMINATION

DATA INPUT

BKN

COORDINATION
MOBILISATION
COMMAND, CONTROL & COMMUNICATION

AUTHORITIES

- JBT. PENGAIRAN & SALIRAN
- JABATAN KERJA RAYA
- JABATAN MINERAL & GEOSAINS
- JABATAN ALAM SEKITAR
- JABATAN MARIN
- JABATAN PERHUTANAN
- KAJICUACA, dll

OUTPUTS TO SUPPORT :

- JK PENGURUSAN & BANTUAN BENCANA PUSAT (JPBBP)
- JK PENGURUSAN & BANTUAN BENCANA NEGERI
- JK KEBANGSAAN BANJIR
- JK KEBANGSAAN JEREBU
- JK KEBANGSAAN PELAN KONTIGENSI MELAWAN TUMPAHAN MINYAK

Malaysian Centre for Remote Sensing (MACRES)
Ministry of Science, Technology and Innovation (MOSTI)

MACRES GROUND RECEIVING STATION (MGRS)

TO ADDRESS REAL-TIME DATA REQUIREMENT FOR DISASTER MANAGEMENT, THE GOVERNMENT ESTABLISHED THE MGRS, TEMERLOH, PAHANG

CURRENTLY RECEIVE DOWNLINKS FROM SPOT-2, 4 & 5, RADARSAT, NOAA, MODIS AND OCM

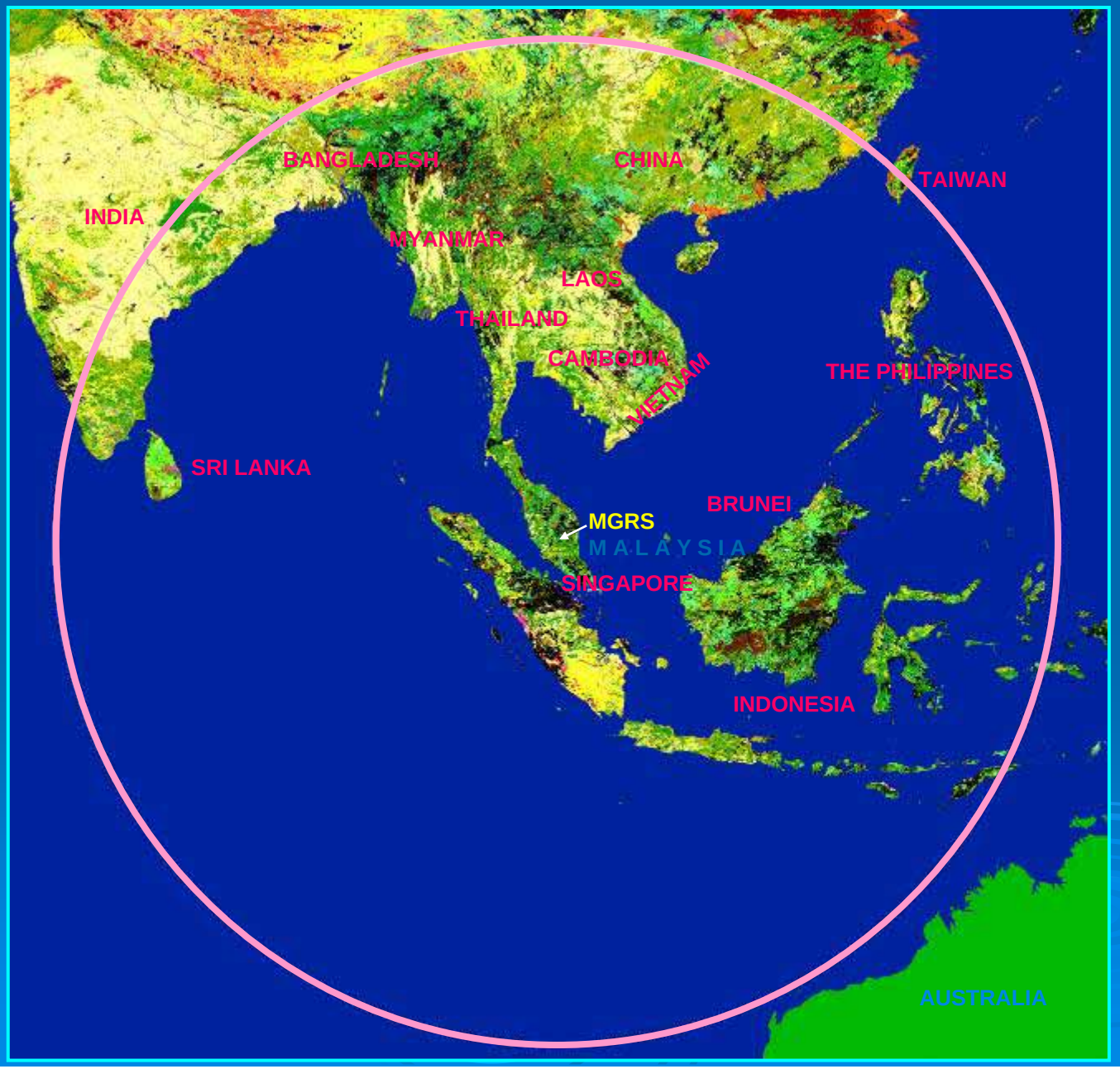
"TIMELINESS" IS THE KEY FOR EFFECTIVE DISASTER MANAGEMENT SYSTEM

- DATA COLLECTION
- DATA PROCESSING
- INFORMATION DESSIMINATION

} REAL TIME

→ REMOTE SENSING TECHNOLOGY

MACRES GROUND RECEIVING STATION (MGRS) – 2500 KM RADIUS COVERAGE

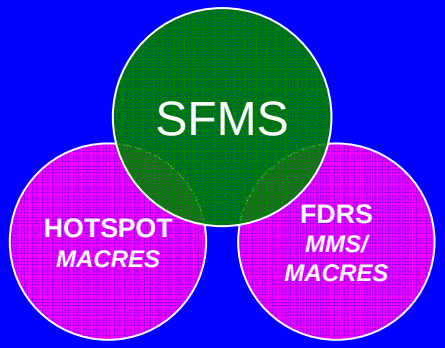


FOREST FIRE MANAGEMENT SUPPORT SYSTEM

EARLY WARNING

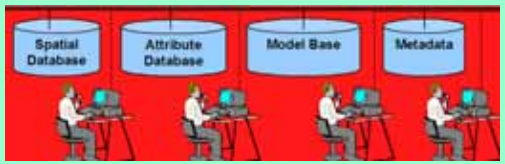
FOREST FIRE DATA AND INFORMATION

EMERGENCY RESPONSE MAP
FOREST FIRE ALERT SYSTEM
HOTSPOT MAP
ACTIVE FOREST FIRE MAP
FOREST FIRE SUSCEPTIBLE MAP
FOREST FIRE DAMAGED MAP
FOREST FIRE RISK MAP



GIS MODELLING

FOREST FIRE DATABASE



MACRES HQ

MITIGATION & RELIEF

BKN

PKOB

PUSAT KAWALAN OPERASI BENCANA – FOREST FIRE

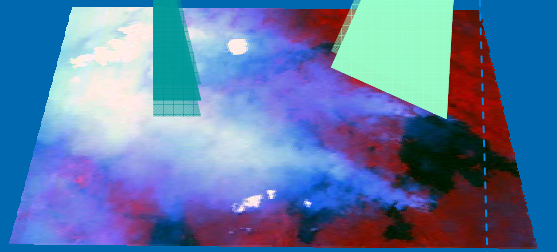
DISASTER RESPONSE TEAMS

Jabatan Bomba dan Penyelamat
DOE, DOF
PDRM, ATM, JPA3, RELA, SMART
JMG
Jabatan Pengairan dan Saliran
Jabatan Perkhidmatan Kajicuaca
Majlis Tempatan
Jabatan Kebajikan Masyarakat
Jabatan Penerangan
TNB, STMB, NGOs, dll

DETECTION & MONITORING

SATELLITE REMOTE SENSING

AIRBORNE REMOTE SENSING



Ground and Air Surveillance

Fire Watch Tower

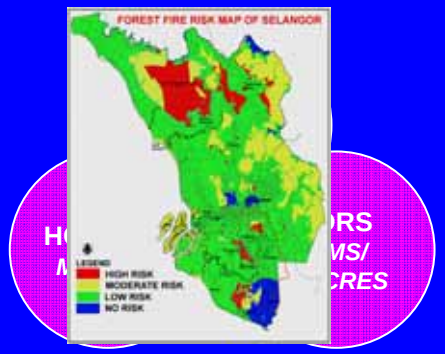
MGRS-TEMERLOH

FOREST FIRE MANAGEMENT SUPPORT SYSTEM

EARLY WARNING

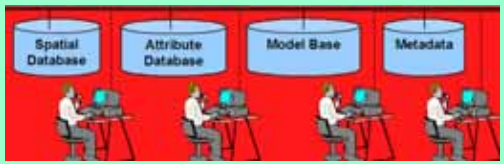
FOREST FIRE DATA AND INFORMATION

EMERGENCY RESPONSE MAP
FOREST FIRE ALERT SYSTEM
HOTSPOT MAP
ACTIVE FOREST FIRE MAP
FOREST FIRE SUSCEPTIBLE MAP
FOREST FIRE DAMAGED MAP
FOREST FIRE RISK MAP



GIS MODELLING

FOREST FIRE DATABASE



MACRES HQ

MITIGATION & RELIEF

BKN

PKOB

PUSAT KAWALAN OPERASI BENCANA – FOREST FIRE

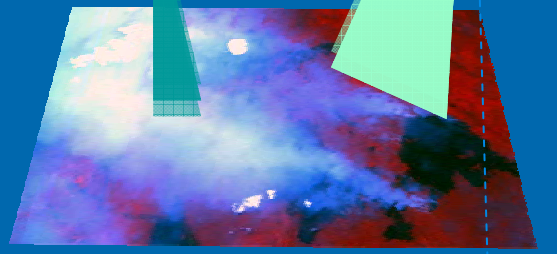
DISASTER RESPONSE TEAMS

Jabatan Bomba dan Penyelamat
DOE, DOF
PDRM, ATM, JPA3, RELA, SMART
JMG
Jabatan Pengairan dan Saliran
Jabatan Perkhidmatan Kajicuaca
Majlis Tempatan
Jabatan Kebajikan Masyarakat
Jabatan Penerangan
TNB, STMB, NGOs, dll

DETECTION & MONITORING

SATELLITE REMOTE SENSING

AIRBORNE REMOTE SENSING



Ground and Air Surveillance

Fire Watch Tower

MGRS-TEMERLOH

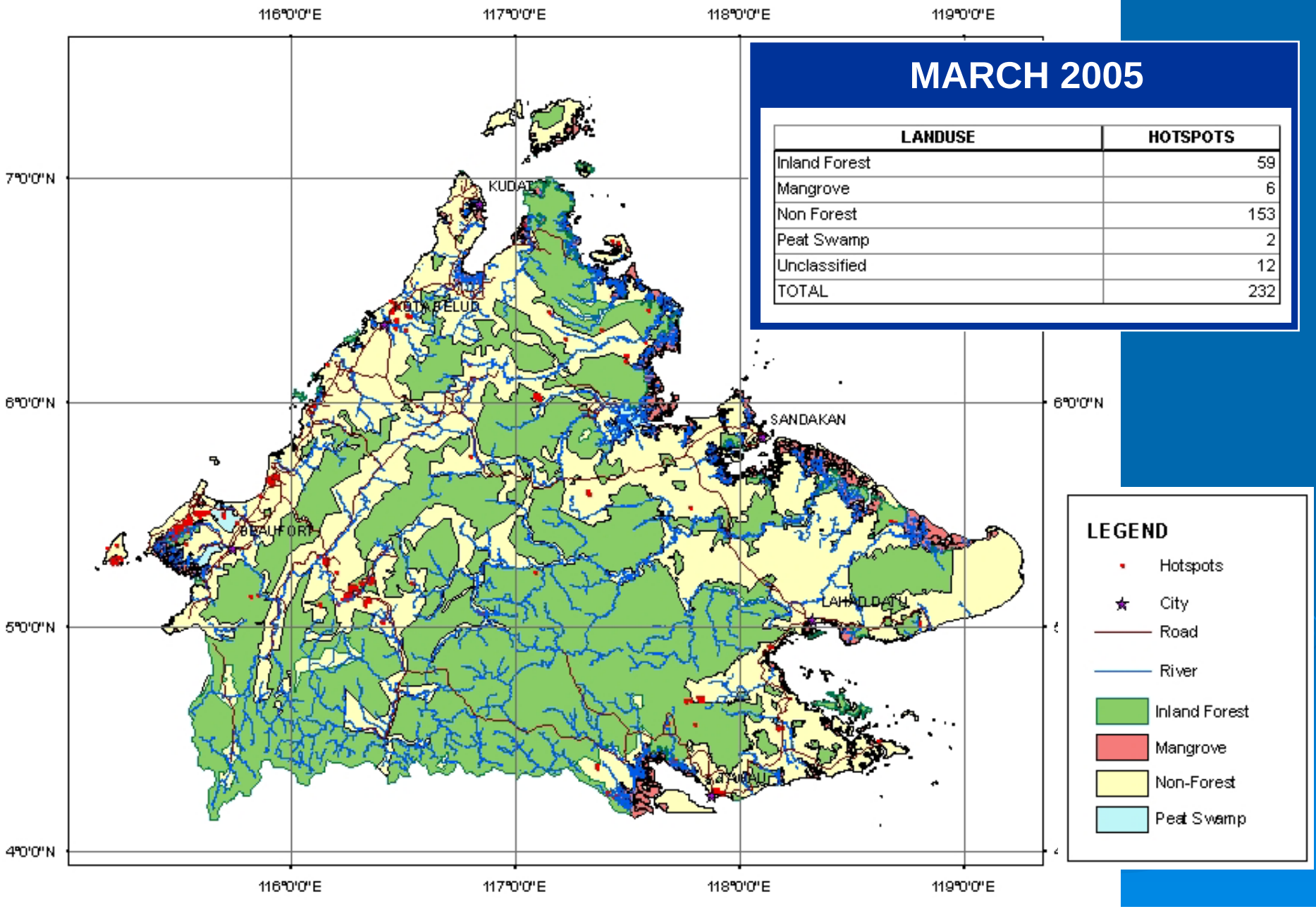
FIRE MODEL

Forest Fire Disaster Model uses the Spatial Fire Management System (sFMS), developed by Canadian Forest Service to:

- Monitor daily fire danger for Malaysia as an early warning
- Characterizing forest fire risk in Malaysia through the analysis of fire occurrence, values at risk, fire behavior potential and suppression capability.

Forest Fire Disaster Model uses remote sensing and GIS products to portray active forest fire situations, appropriate emergency responses and assessment of forest fire damage.

DAILY MONITORING OF HOTSPOTS WITH NOAA



MARCH 2005

LANDUSE	HOTSPOTS
Inland Forest	59
Mangrove	6
Non Forest	153
Peat Swamp	2
Unclassified	12
TOTAL	232

DAILY HOTSPOTS INFORMATION ARE DISSEMINATED TO:

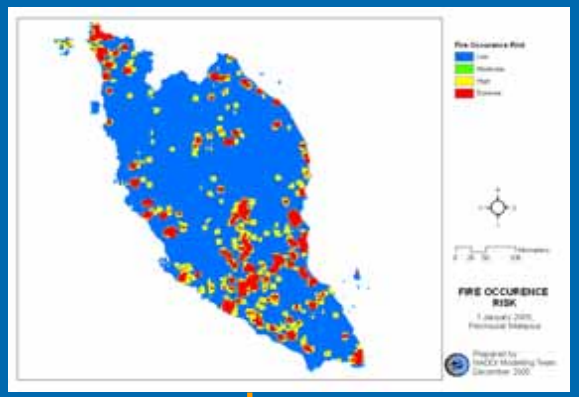
1. YB MINISTRY OF SCIENCE AND INNOVATION (MOSTI)
2. BKN, JPM
3. WISMA PUTRA & CONSULATE MALAYSIA IN JAKARTA, MEDAN, PONTIANAK DAN SINGAPURA
4. DOE (HQ & STATE)
5. FIRE AND RESCUE DEPARTMENT
6. FORESTRY DEPARTMENT MALAYSIA
7. FORESTRY DEPARTMETN SABAH
8. NREB, SARAWAK

FOREST FIRE RISK MAP : MALAYSIA

- Show the risk classification based on several components

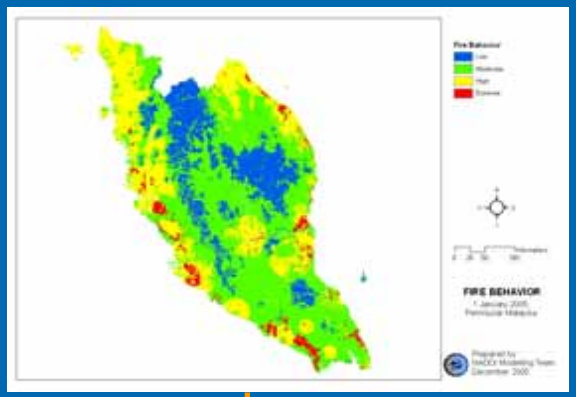
Fire Occurrence Risk

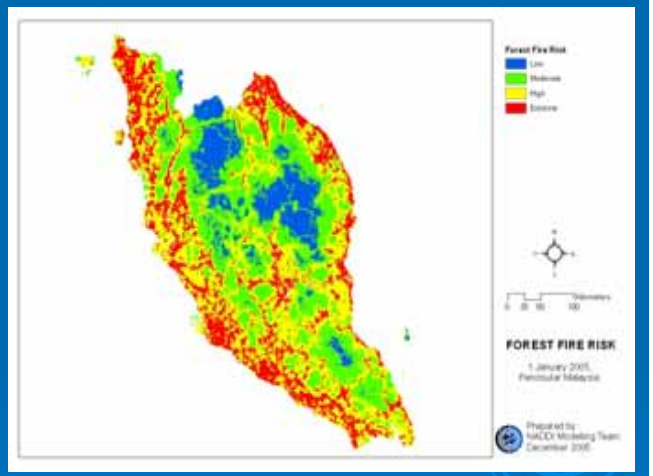
f (historical hotspots)



Fire Behavior

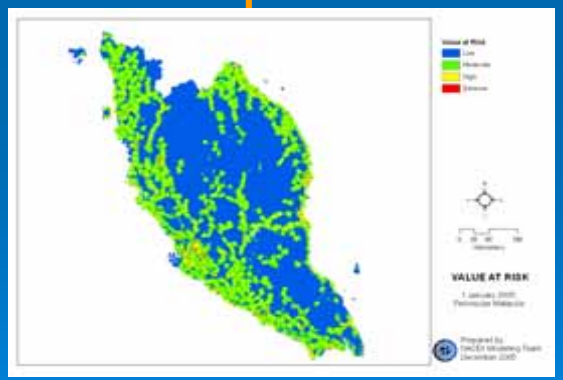
f (fuel, FFMC, DC)





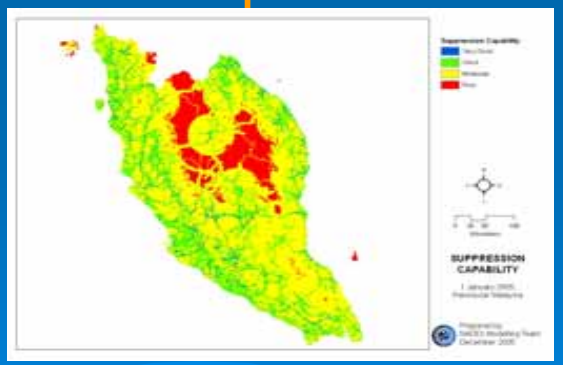
Forest Fire Risk

f (weather) + f (topography) + f (fuel) + f (historical hotspots) + f (roads, railroads, town, built-up areas) + f (water source)



Values at Risk

f (historical hotspots) + f (road, railroad, town, built-up areas)



Suppression Capability

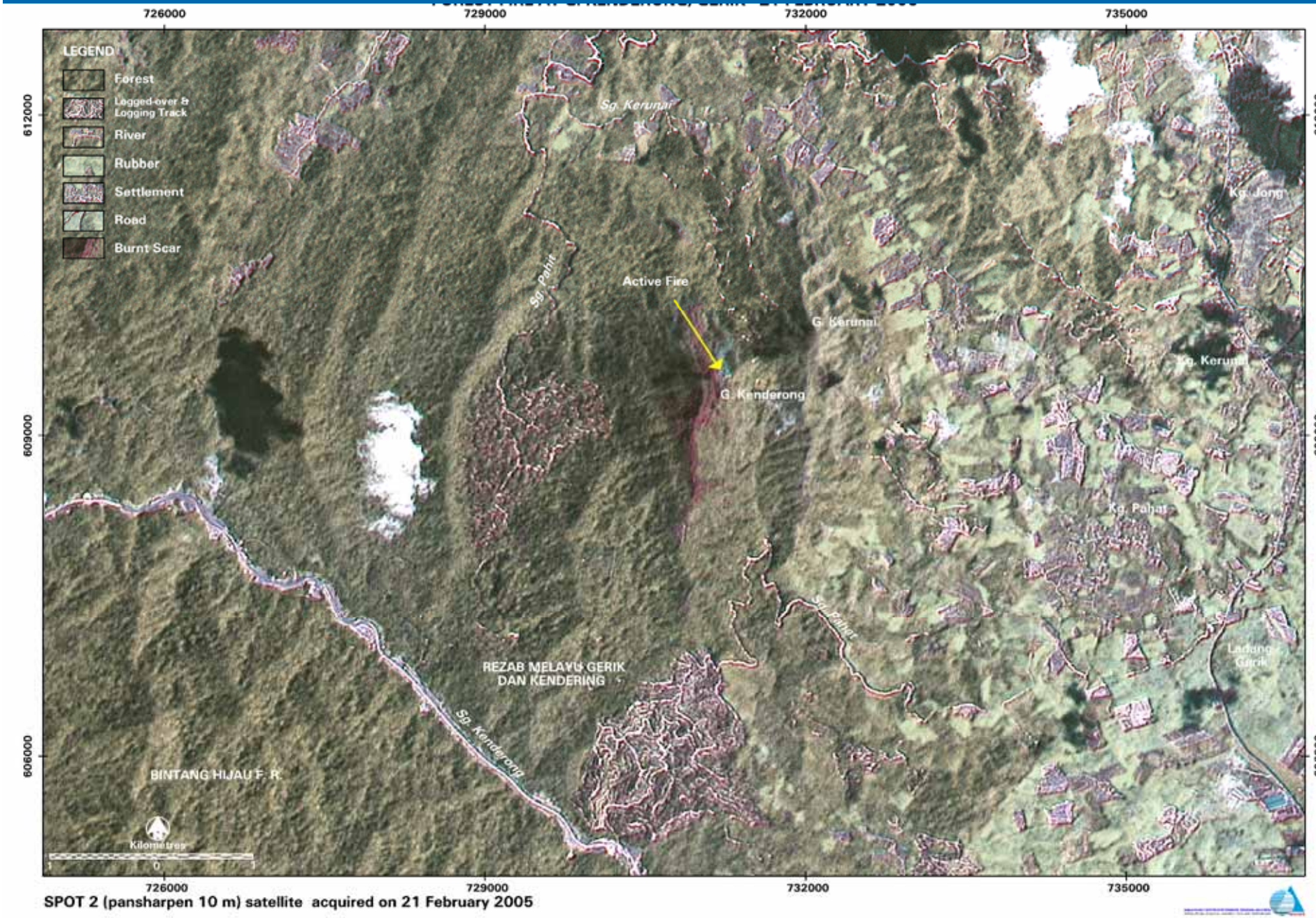
f (fire station, slope, road, water source)

MAPPING OF PEAT SWAMP AND PEAT SOIL AREAS
- FOREST FIRES HIGH RISK AREAS -

DETECTION AND MONITORING

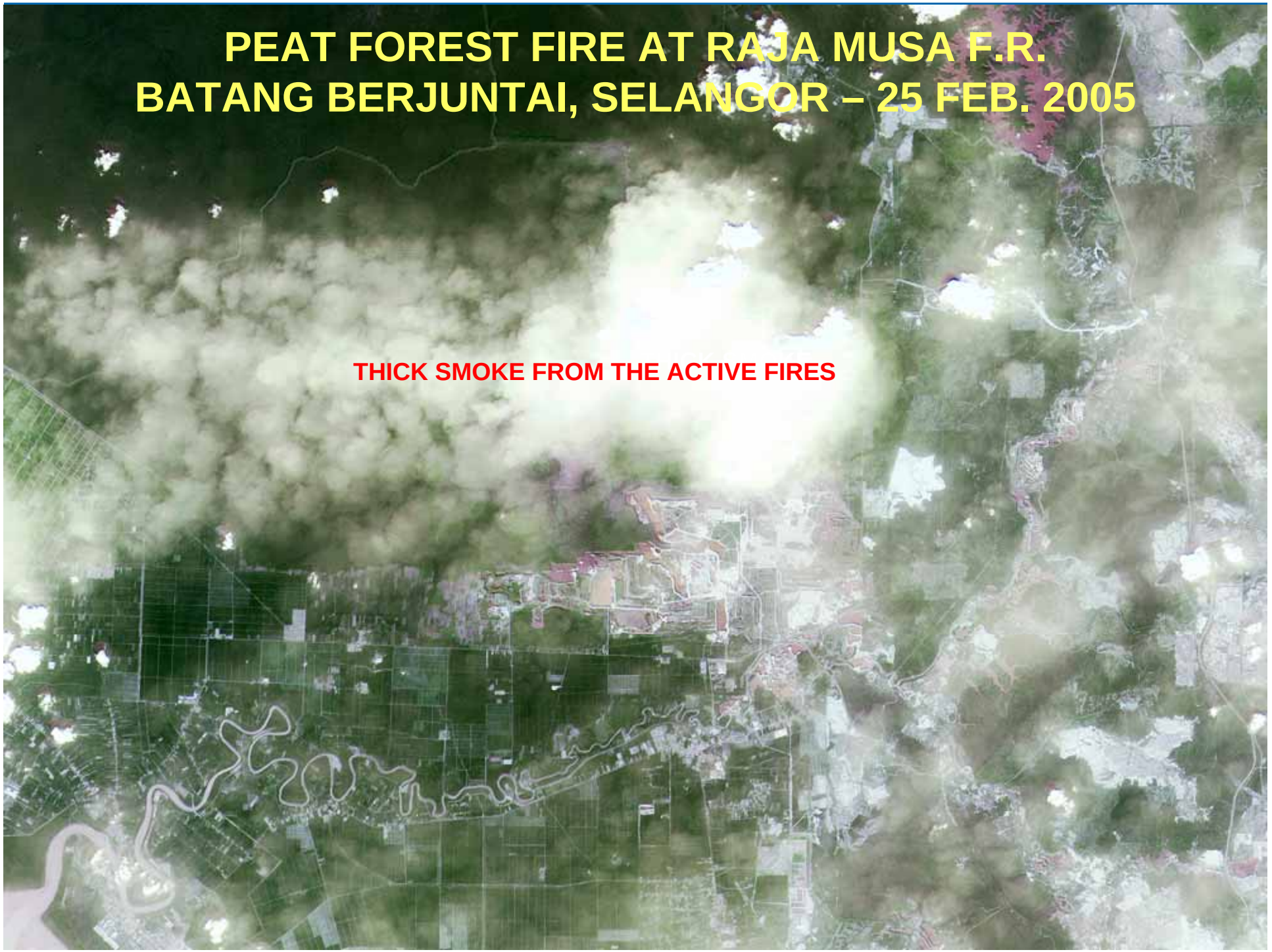
OPEN BURNING DETECTED BY SPOT
5 ON THE 15 JAN 2005

FOREST FIRE AT GUNUNG KENDERONG, GERIK



SPOT 2 (pansharpen 10 m) satellite acquired on 21 February 2005

PEAT FOREST FIRE AT RAJA MUSA F.R. BATANG BERJUNTAI, SELANGOR – 25 FEB. 2005



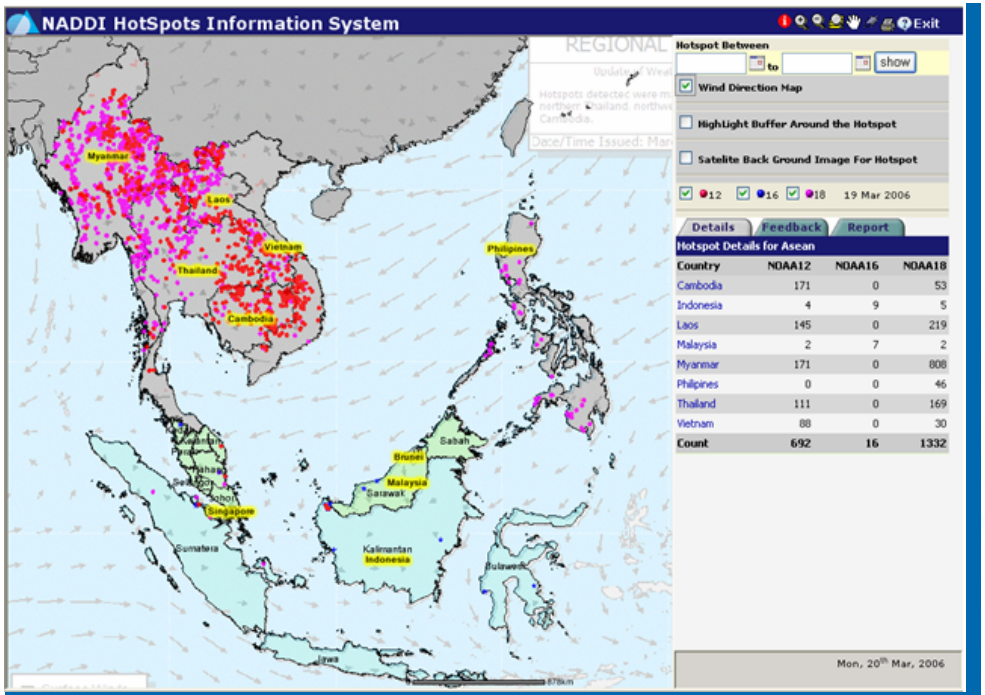
FOREST FIRE DISASTER PRODUCTS

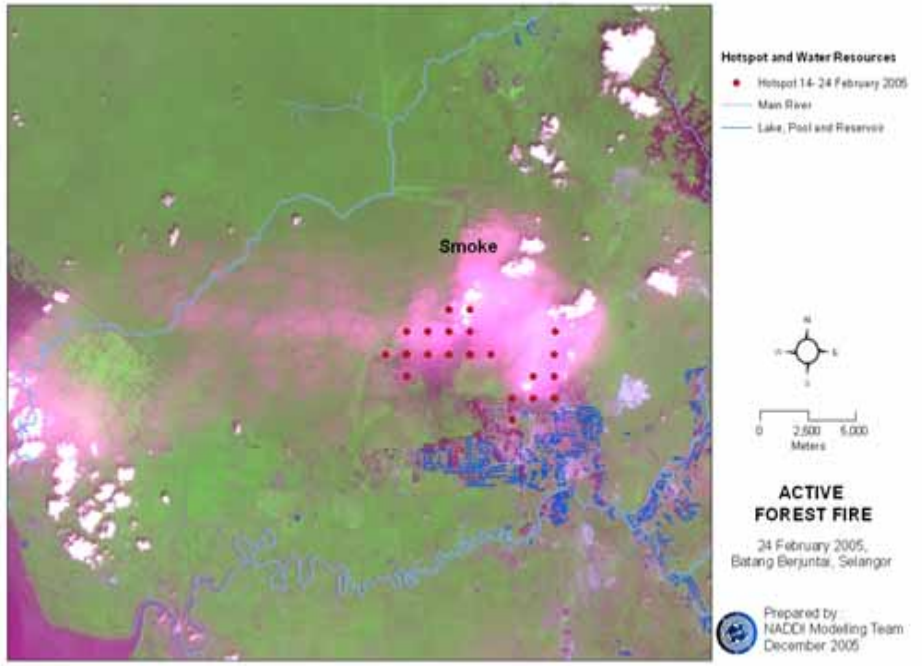
FOREST FIRE PRODUCTS

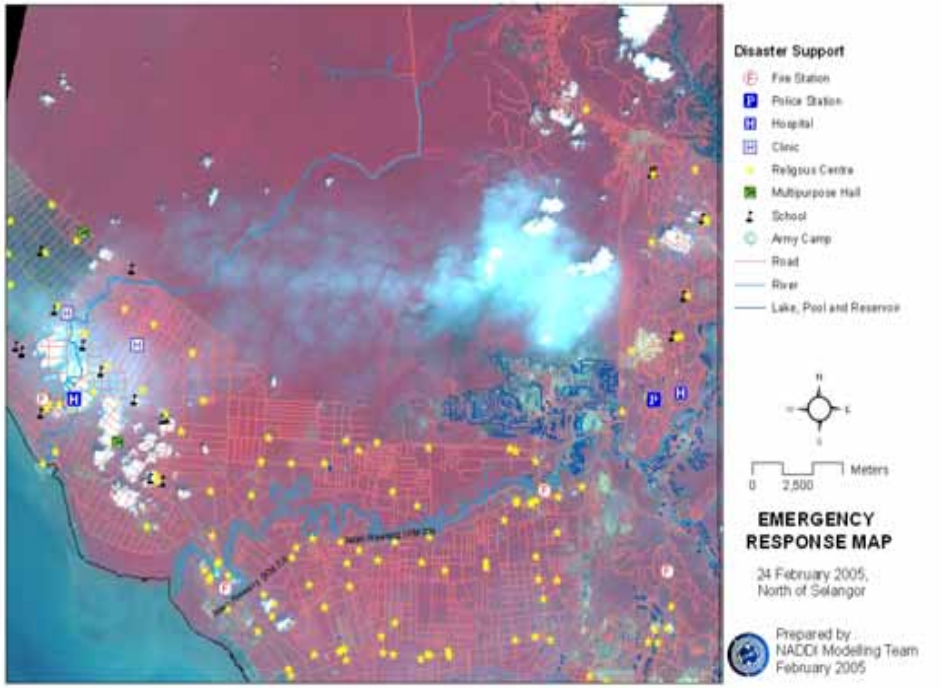
- FUEL TYPE MAP
- FOREST FIRE RISK MAP
- FOREST FIRE DANGER RATING SYSTEM
- HOTSPOT MAP
- ACTIVE FOREST FIRE MAP
- EMERGENCY RESPONSE MAP
- FOREST FIRE DAMAGED MAP

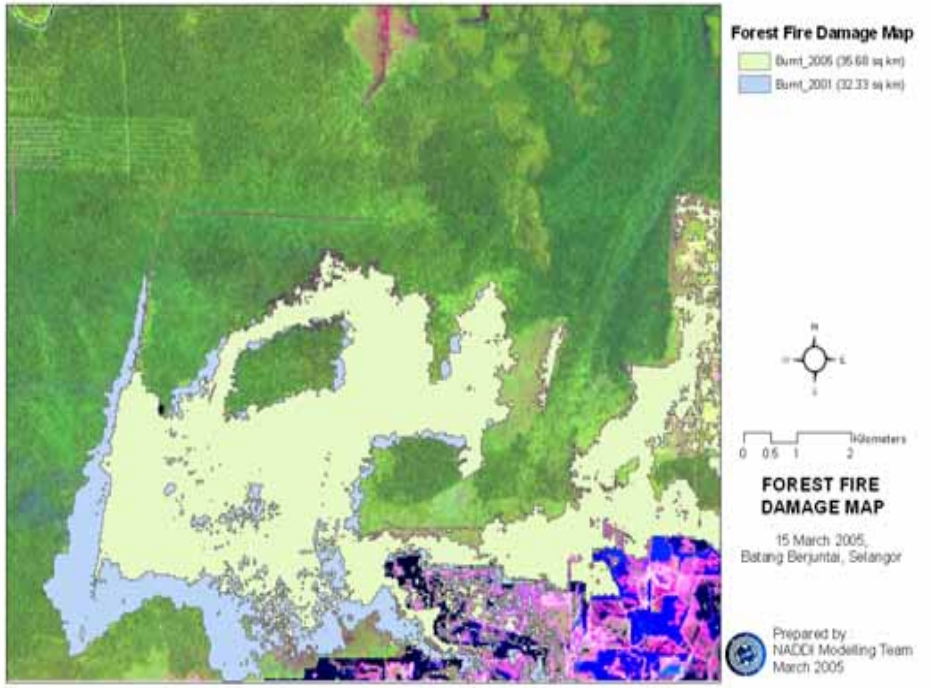
FUNCTIONALITIES OF THE PRODUCTS

- Provide information for fuel type
- Provide information about values at risk, risk of fire occurrence, potential fire behaviour, suppression capability
- Provide early warning and preparedness information
- Provide information about location and distribution of hotspot
- Identify of current event and the condition of forest fire
- Provide information for emergency responses and mitigation
- Perform damaged assessment of forest fire


NADDI HotSpots Information System
Exit
Hotspot Between
to
show
Wind Direction Map
HighLight Buffer Around the Hotspot
Satelite Back Ground Image For Hotspot
12
16
18
19 Mar 2006
Details
Feedback
Report
Hotspot Details for Asean
Country NOAA12 NOAA16 NOAA18
Cambodia 171 0 53
Indonesia 4 9 5
Laos 145 0 219
Malaysia 2 7 2
Myanmar 171 0 808
Philipines 0 0 46
Thailand 111 0 169
Vietnam 88 0 30
Count 692 16 1332
Mon, 20th Mar, 2006
Myanmar
Laos
Vietnam
Thailand
Cambodia
Philipines
Brunei
Sabah
Malaysia
Sarawak
Singapore
Sumatera
Kalimantan
Indonesia


Smoke
Hotspot and Water Resources
Hotspot 14- 24 February 2005
Main River
Lake, Pool and Reservoir
0 2,500 5,000
Meters
ACTIVE
FOREST FIRE
24 February 2005,
Batang Berjuntai, Selangor
Prepared by
NADDI Modelling Team
December 2005

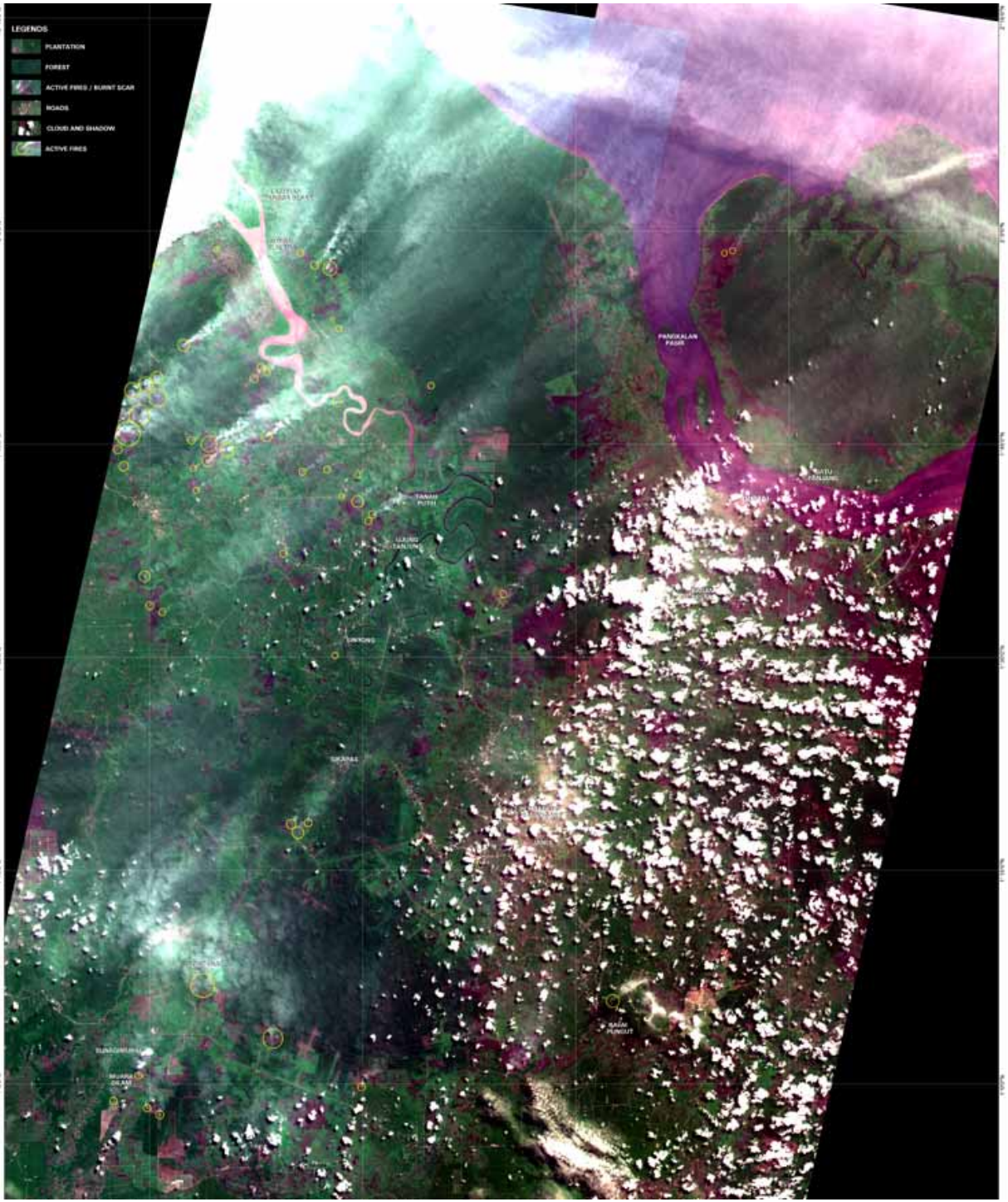

Disaster Support
Fire Station
Police Station
Hospital
Clinic
Religous Centre
Multipurpose Hall
School
Army Camp
Road
River
Lake, Pool and Reservoir
Meters
0 2,500
EMERGENCY
RESPONSE MAP
24 February 2005,
North of Selangor
Prepared by
NADDI Modelling Team
February 2005


Forest Fire Damage Map
Burnt_2005 (35.68 sq km)
Burnt_2001 (32.33 sq km)
Kilometers
0 0.5 1 2
FOREST FIRE
DAMAGE MAP
15 March 2005,
Batang Berjuntai, Selangor
Prepared by
NADDI Modelling Team
March 2005

Malaysian Centre for Remote Sensing (MACRES)
Ministry of Science, Technology and Innovation (MOSTI)

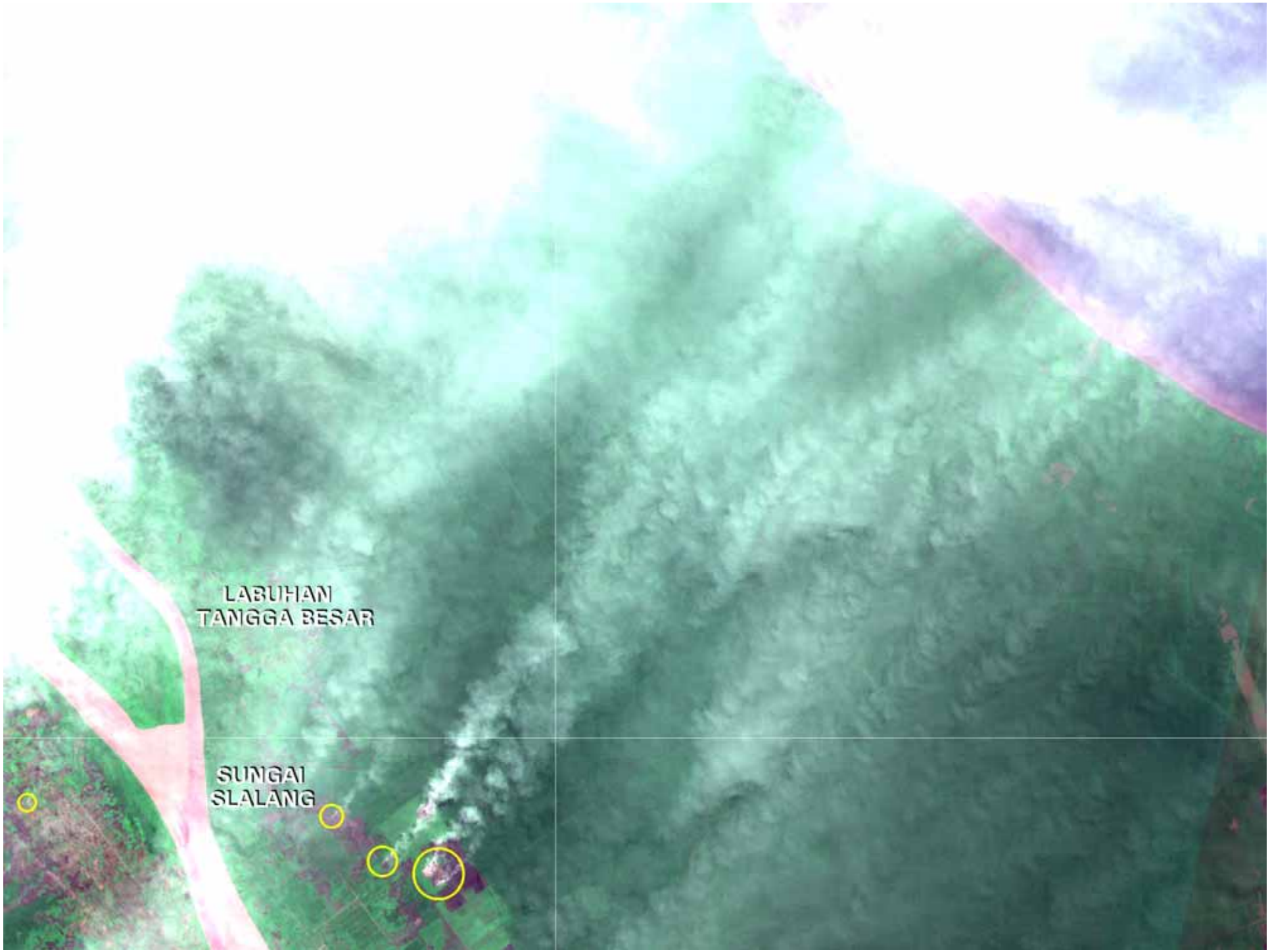
FOREST FIRES DETECTED BY SPOT AND MODIS SATELLITES

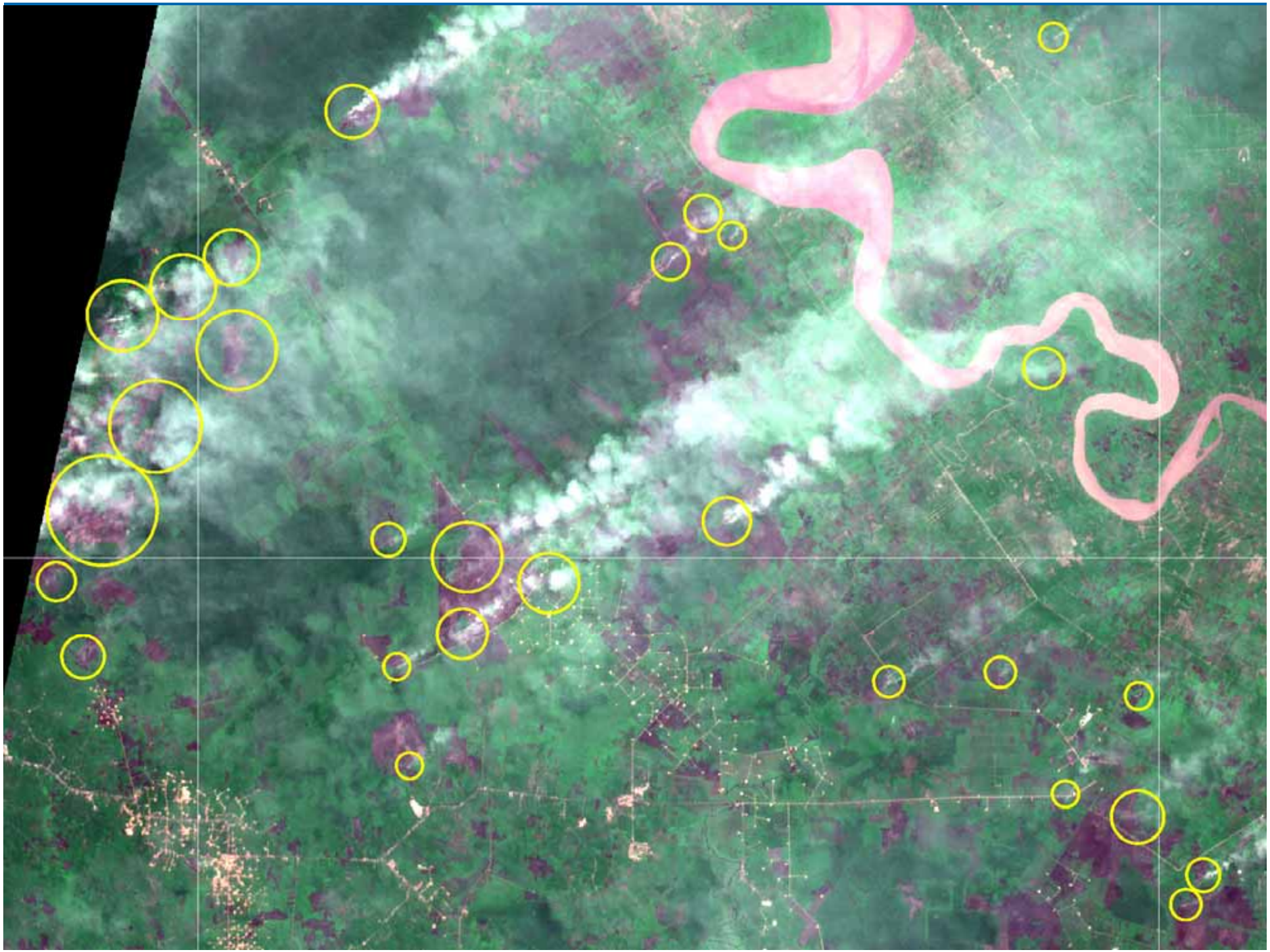
8th, 9th AND 13th AUGUST 2005

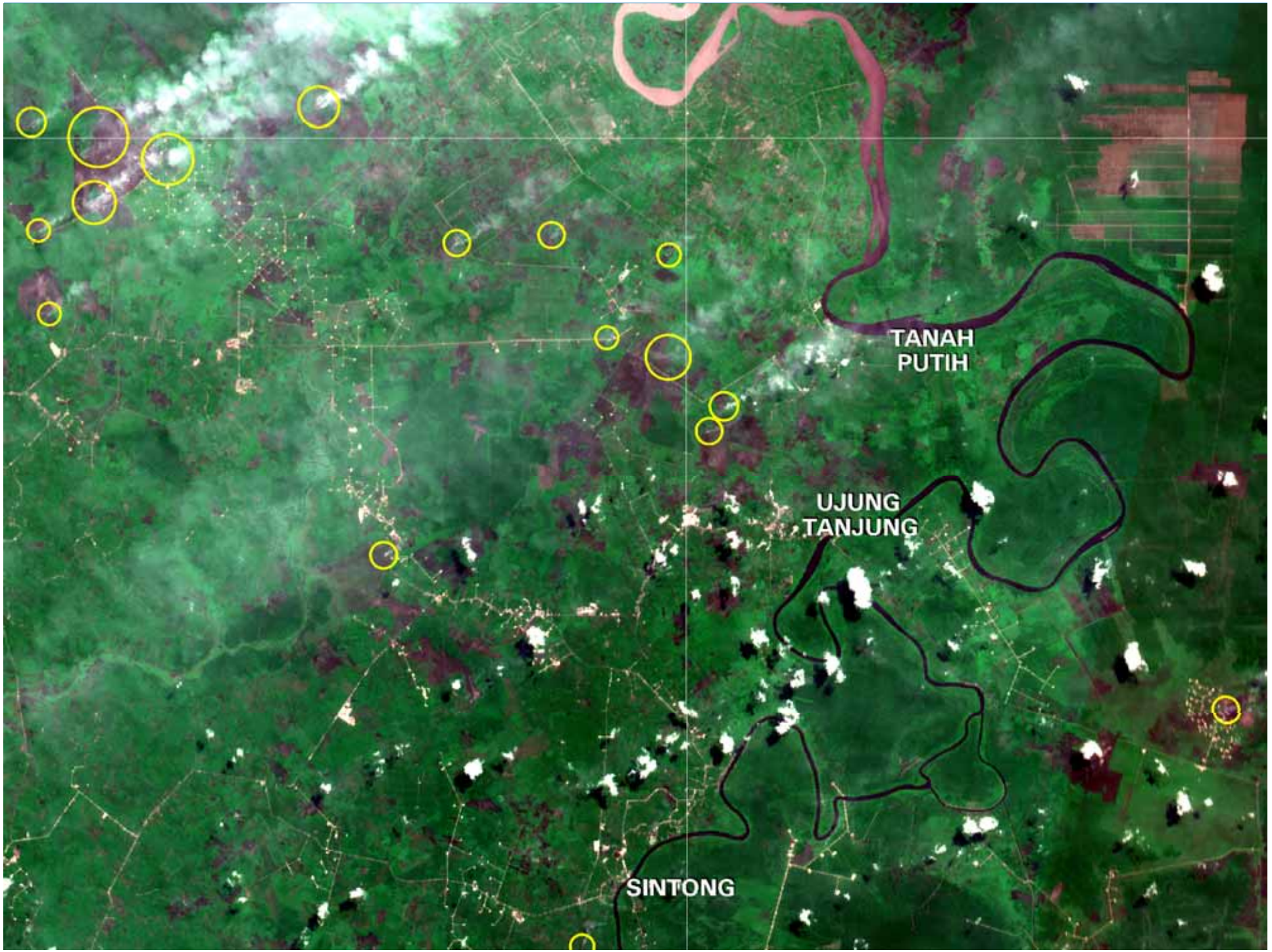


FOREST FIRES IN RIAU, SUMATRA DETECTED BY SPOT SATELLITES

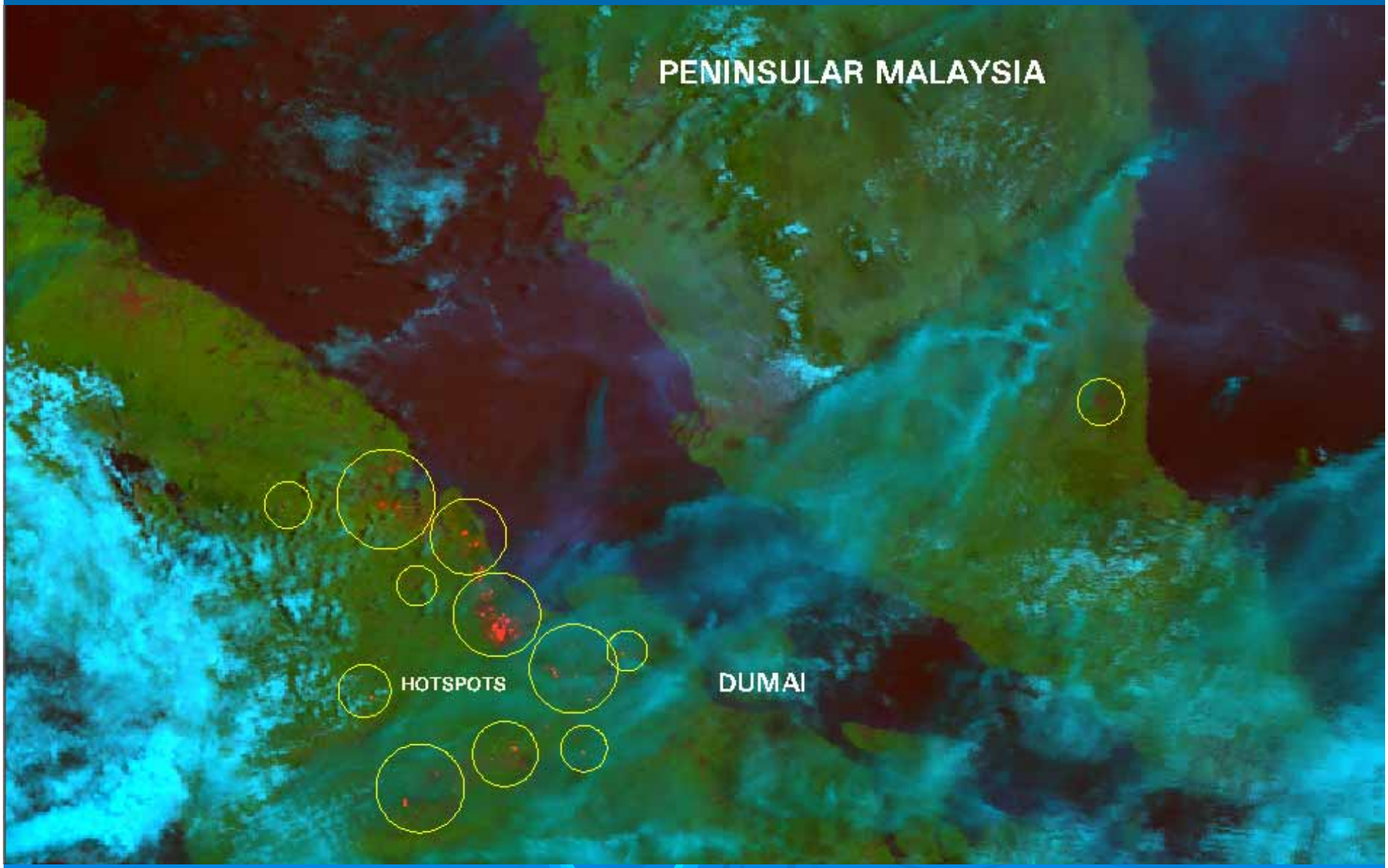
9th AUGUST 2005

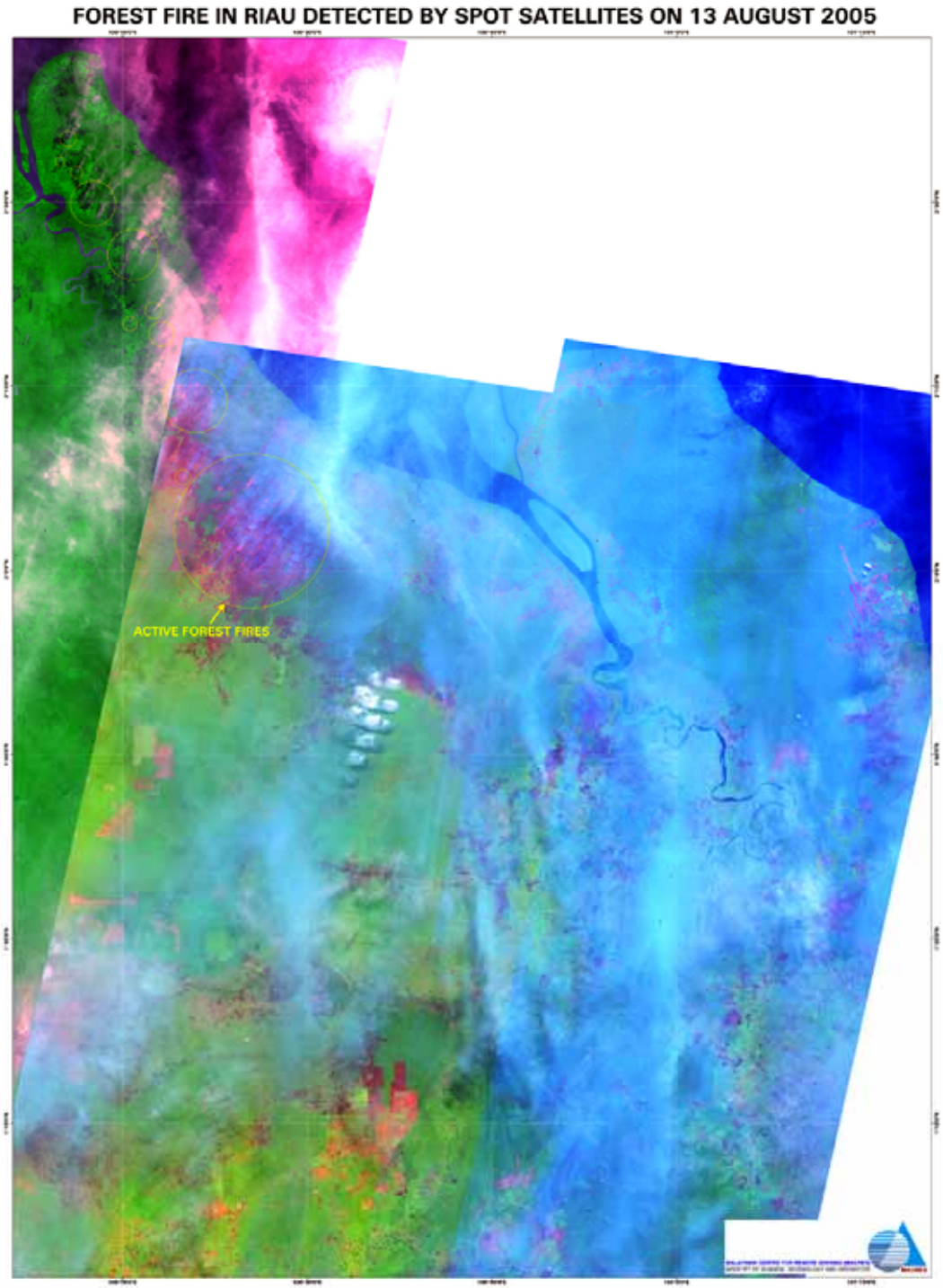

LABUHAN
TANGGA BESAR
SUNGAI
SLALANG




TANAH
PUTIH
UJUNG
TANJUNG
SINTONG

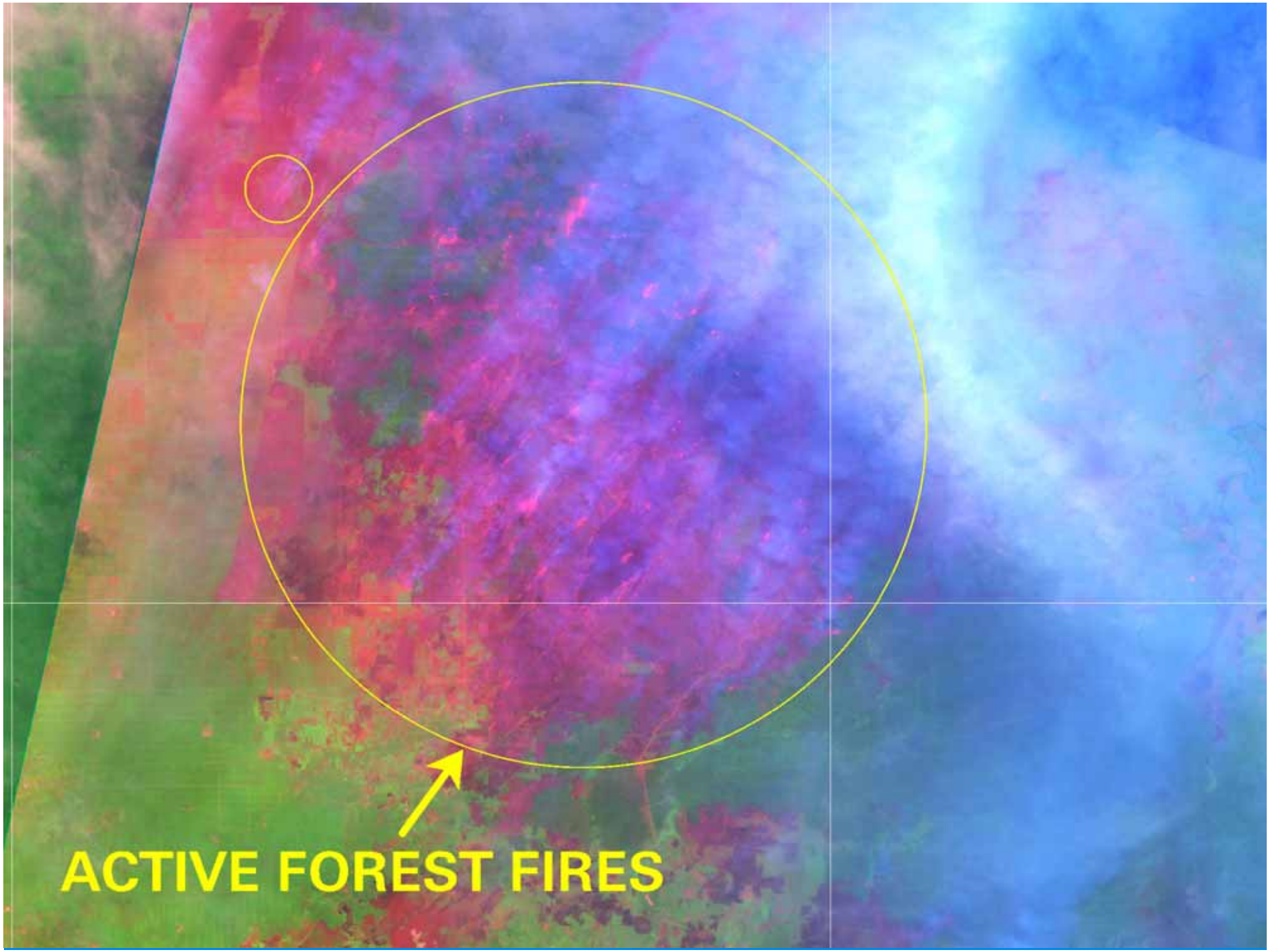
HOTSPOTS DETECTED BY MODIS SATELLITE ON 12 AUGUST 2005





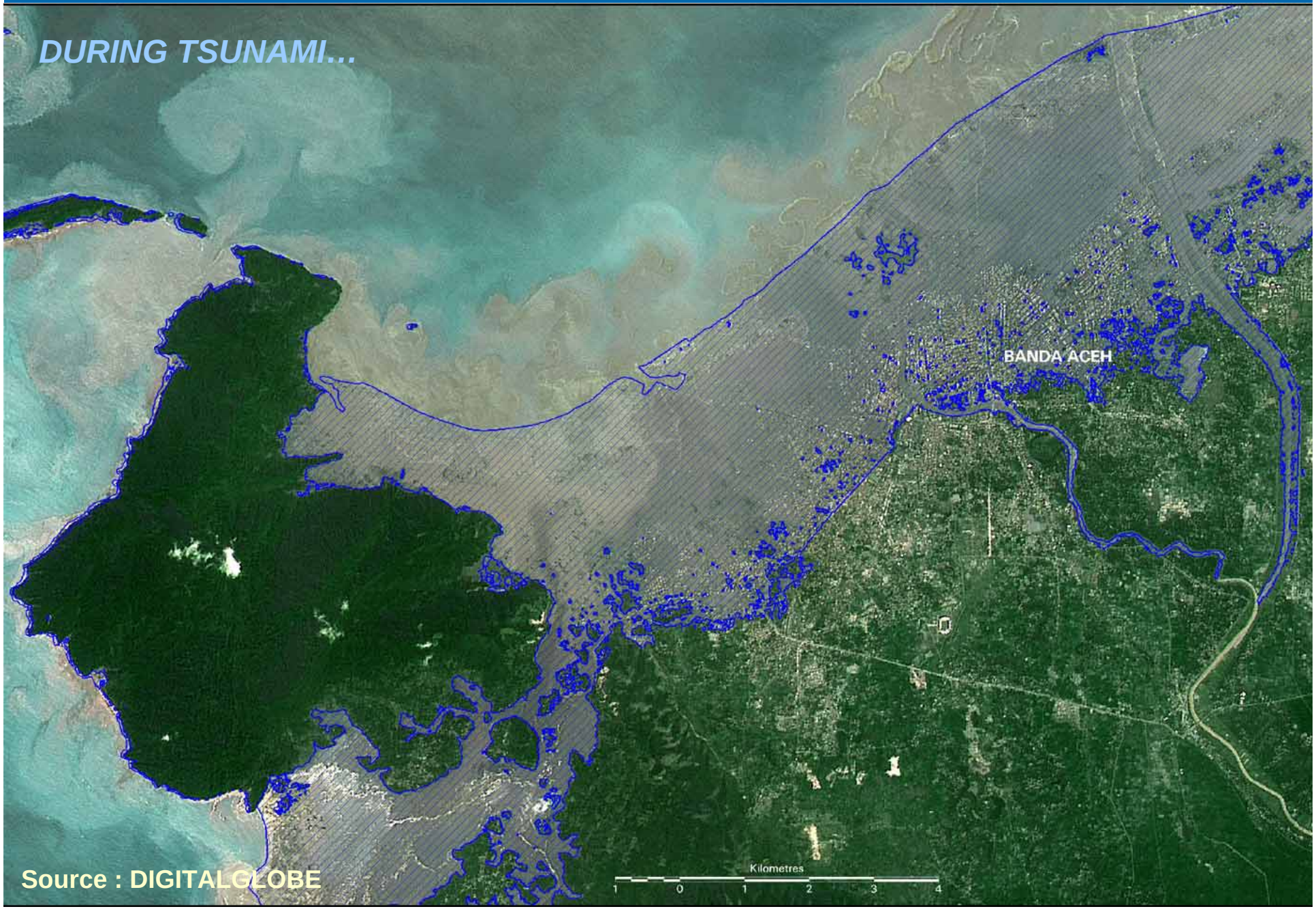
FOREST FIRES IN RIAU, SUMATRA DETECTED BY SPOT SATELLITES

13th AUGUST 2005


ACTIVE FOREST FIRES

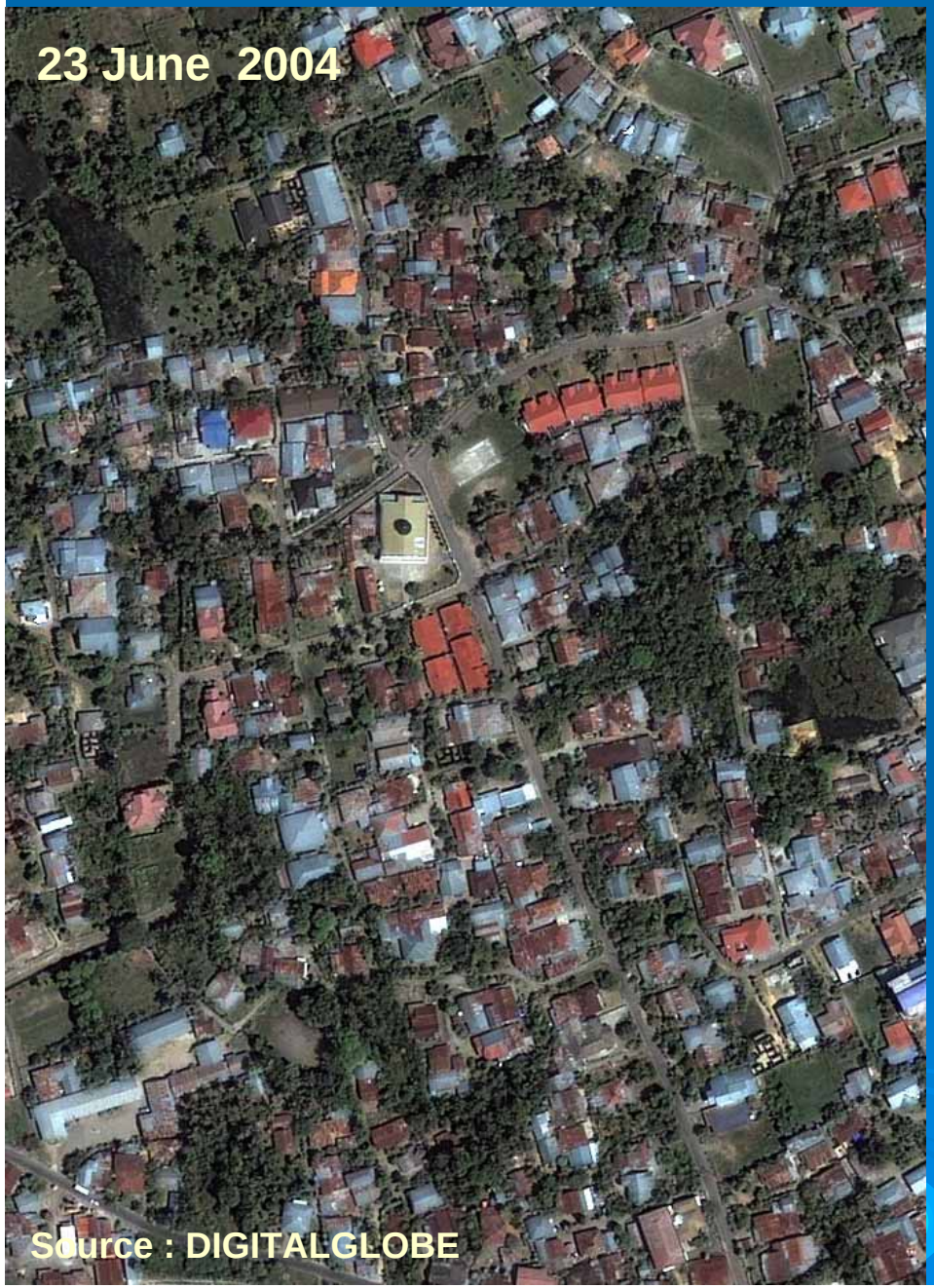
BANDA ACEH, SUMATRA – 21 NOVEMBER 2004

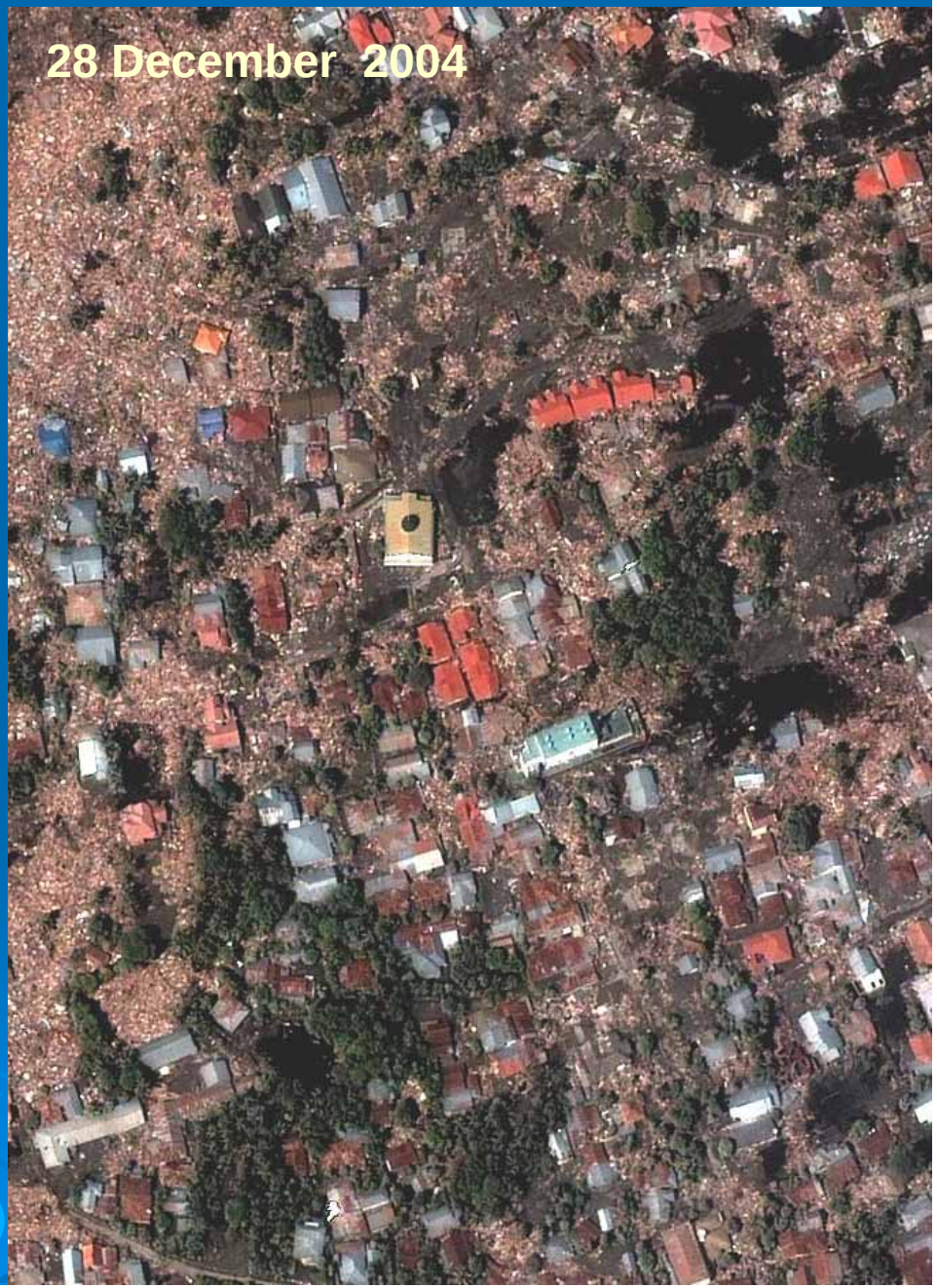
BANDA ACEH, SUMATRA – 26 DECEMBER 2004



BANDA ACEH, SUMATRA – 30 DECEMBER 2004

IMPACT OF TSUNAMI - BANDA ACEH





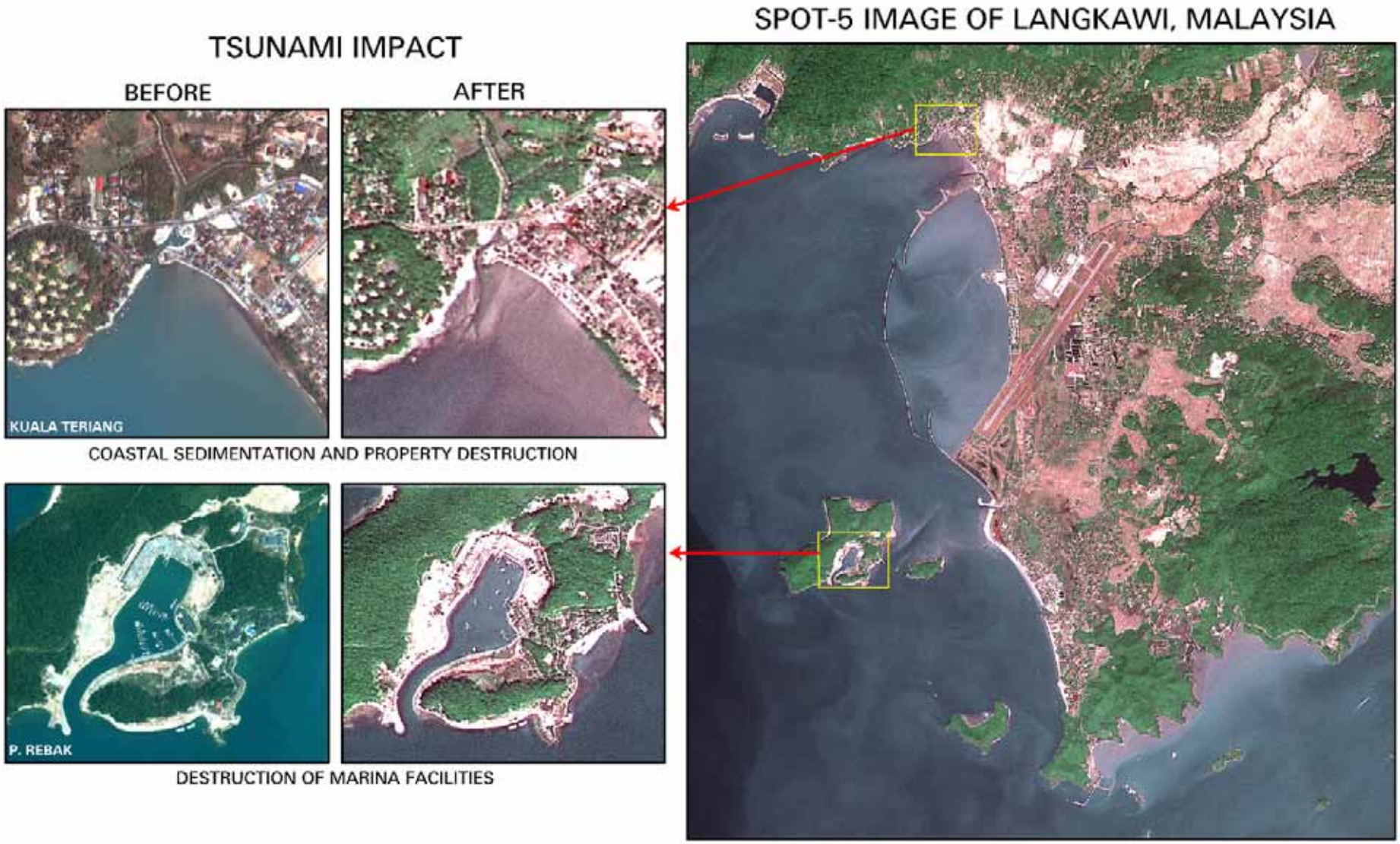
IMPACT OF TSUNAMI - BANDA ACEH

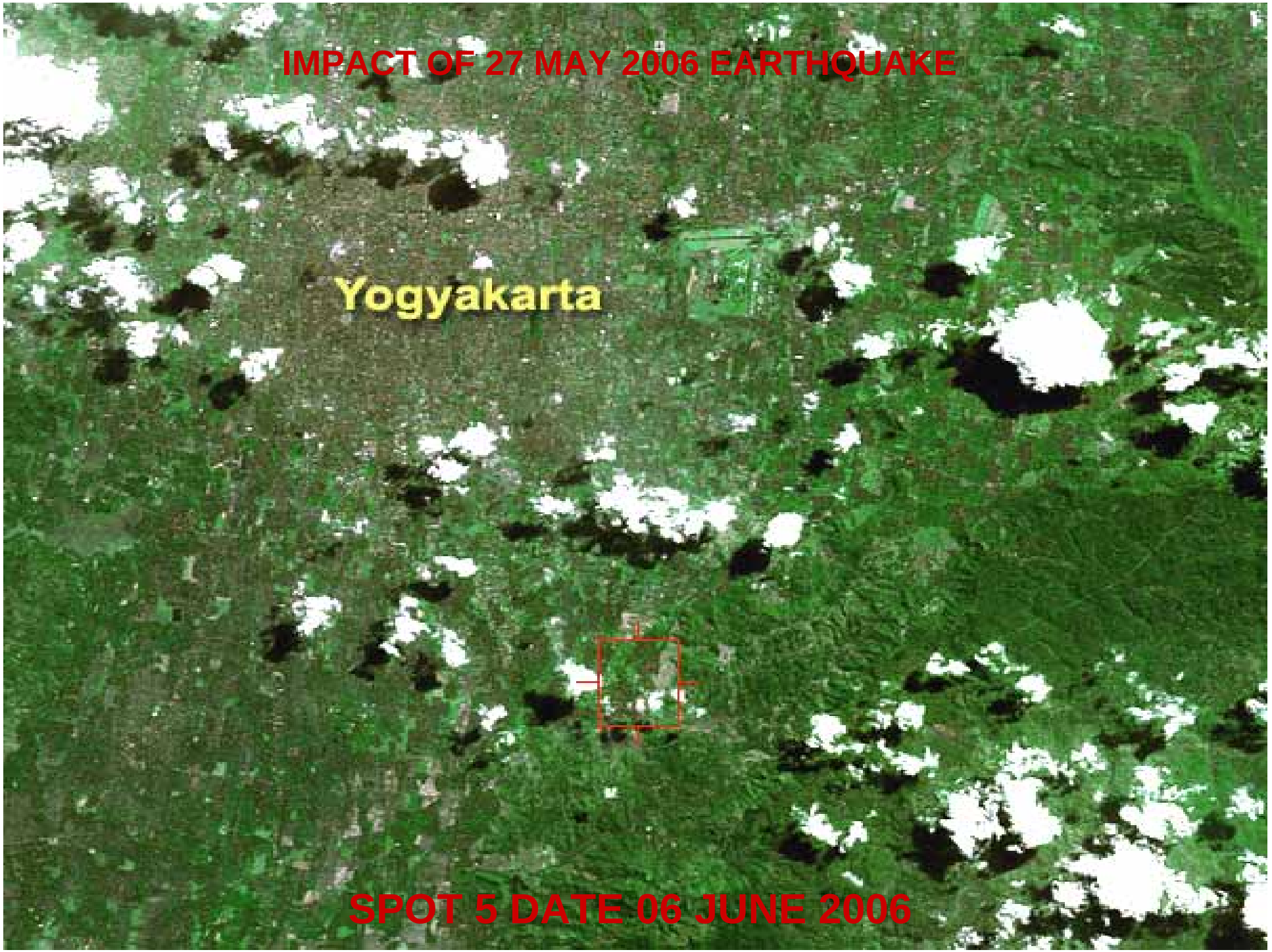
23 JUNE 2004

28 DECEMBER 2004

Source : DIGITALGLOBE

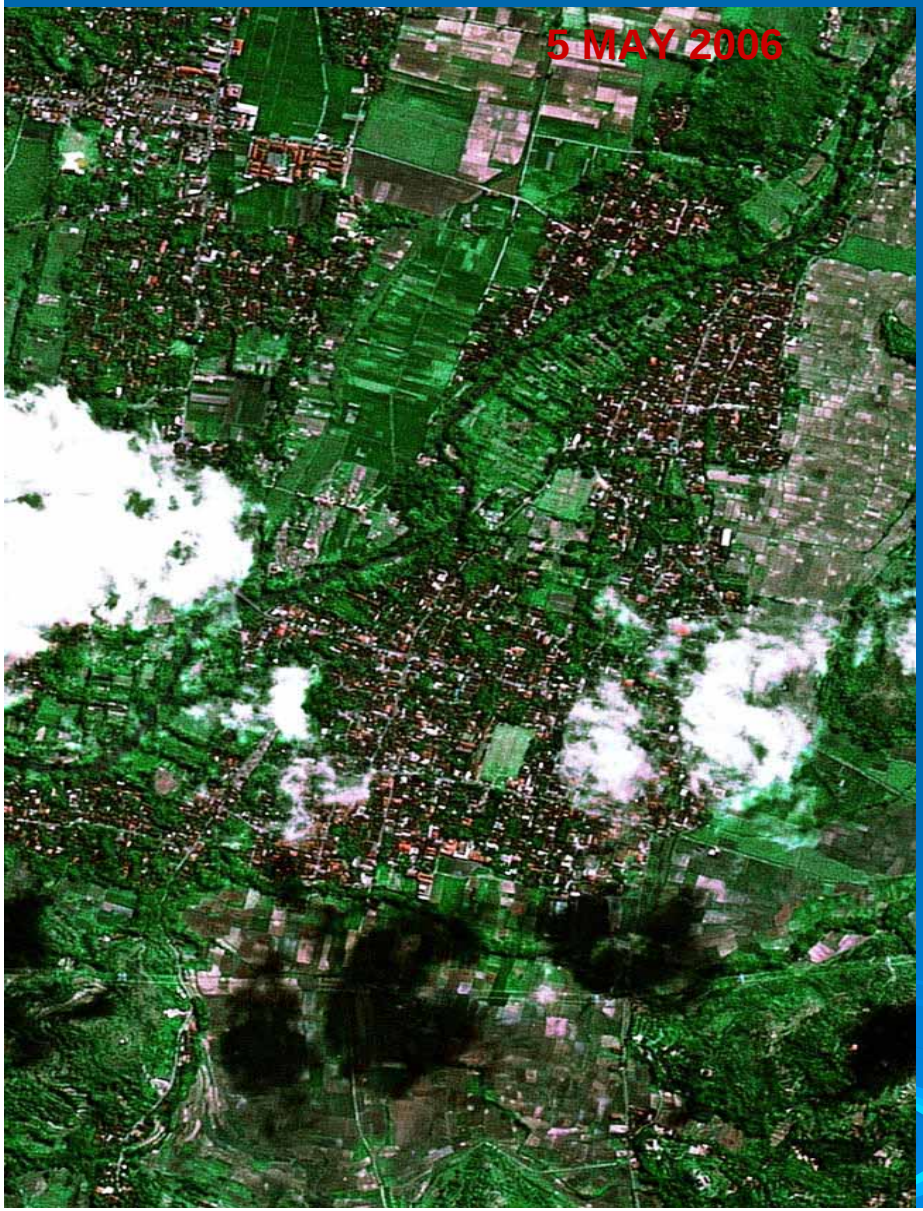
LANGKAWI, MALAYSIA




IMPACT OF 27 MAY 2006 EARTHQUAKE
Yogyakarta
SPOT 5 DATE 06 JUNE 2006

IMPACT OF EARTHQUAKE, YOGJAKARTA

27 MAY 2006



IMPACT OF EARTHQUAKE, YOGJAKARTA

27 MAY 2006

5 MAY 2006

6 JUNE 2006

THANK YOU