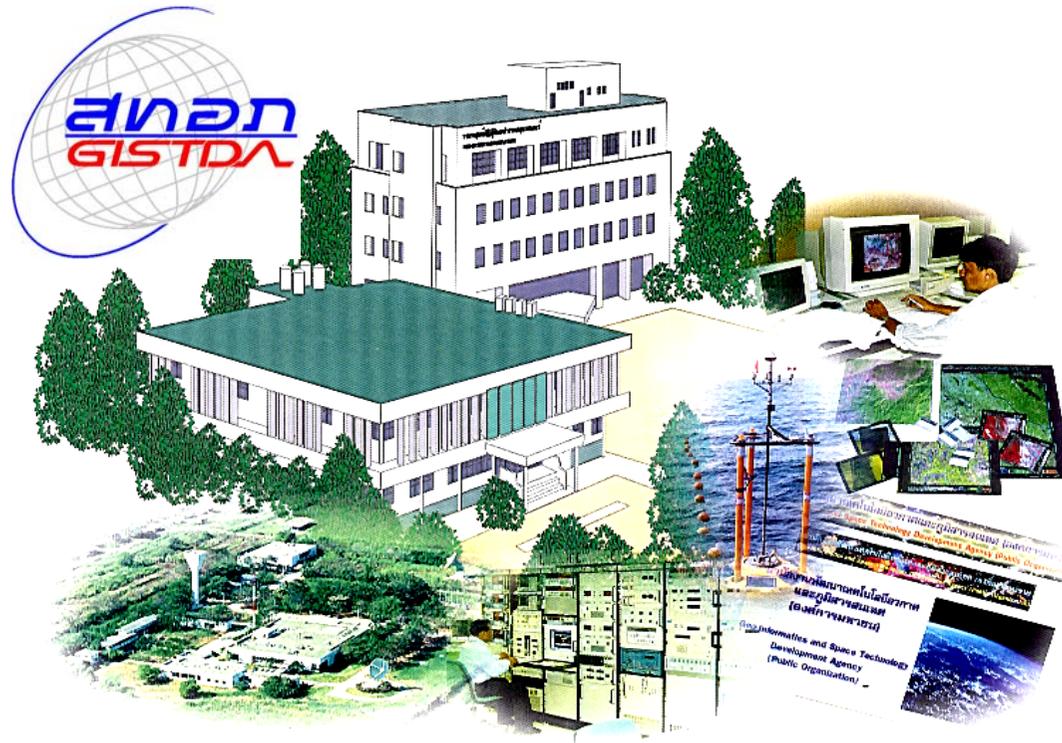




# GISTDA Overview



**Dr. Thongchai Charupatt**  
**Director**

Geo-Informatics and Space Technology Development Agency (GISTDA)  
Ministry of Science and Technology, Thailand



## About GISTDA

- Thailand has been involved in earth observation satellite technology since 1971.
- Thailand Landsat Ground Receiving Station has been in operation since 1982.
- GISTDA was officially established as a public organization on November 2, 2000.



# Objectives of GISTDA

To develop space technology and geo-informatics applications for public concern

To develop the satellite data base and the derived natural resources information center

To provide data services relating to space technology and geo-informatics

To provide technical services and help develop human resources in satellite remote sensing and geo-informatics

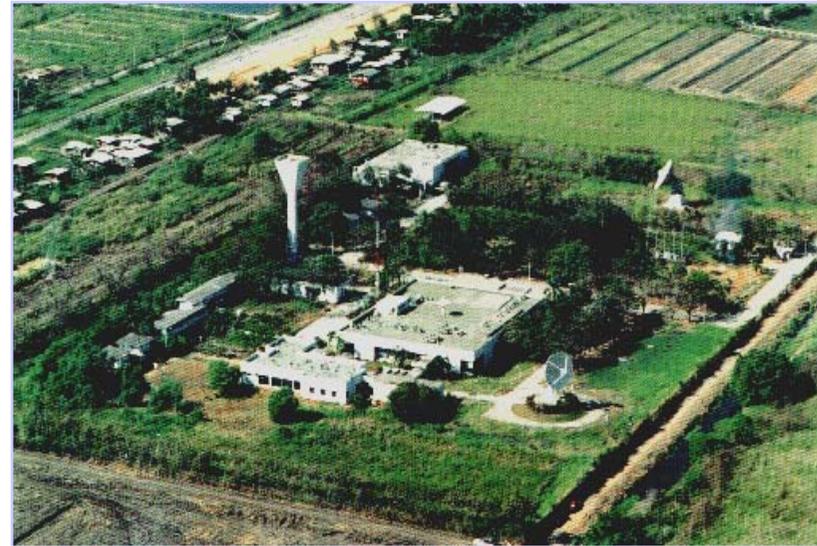
To conduct research and development as well as to implement other activities related to space technology, **including the development of small satellites for natural resources survey**

To be the core organization to establish common standards for remote sensing and geo-informatics systems

# Offices of GISTDA



**Headquarters, Chatuchak,  
Bangkok**



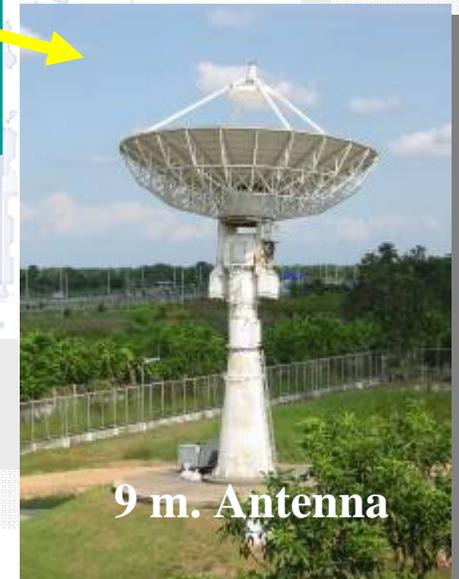
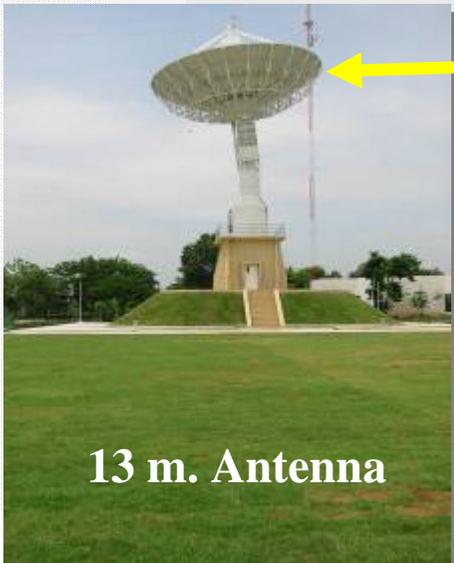
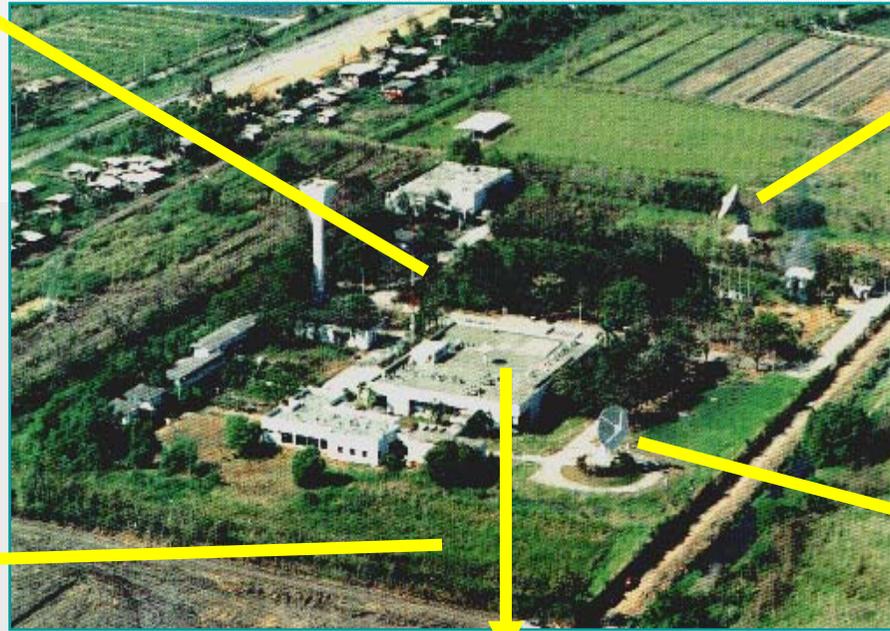
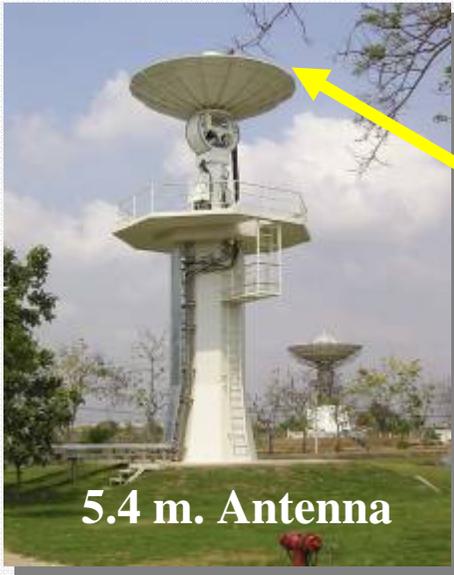
**Satellite Ground Receiving Station,  
Lad Krabang, Bangkok**



**Satellite Ground Controlling &  
Receiving Station, Sri Racha, Chonburi**

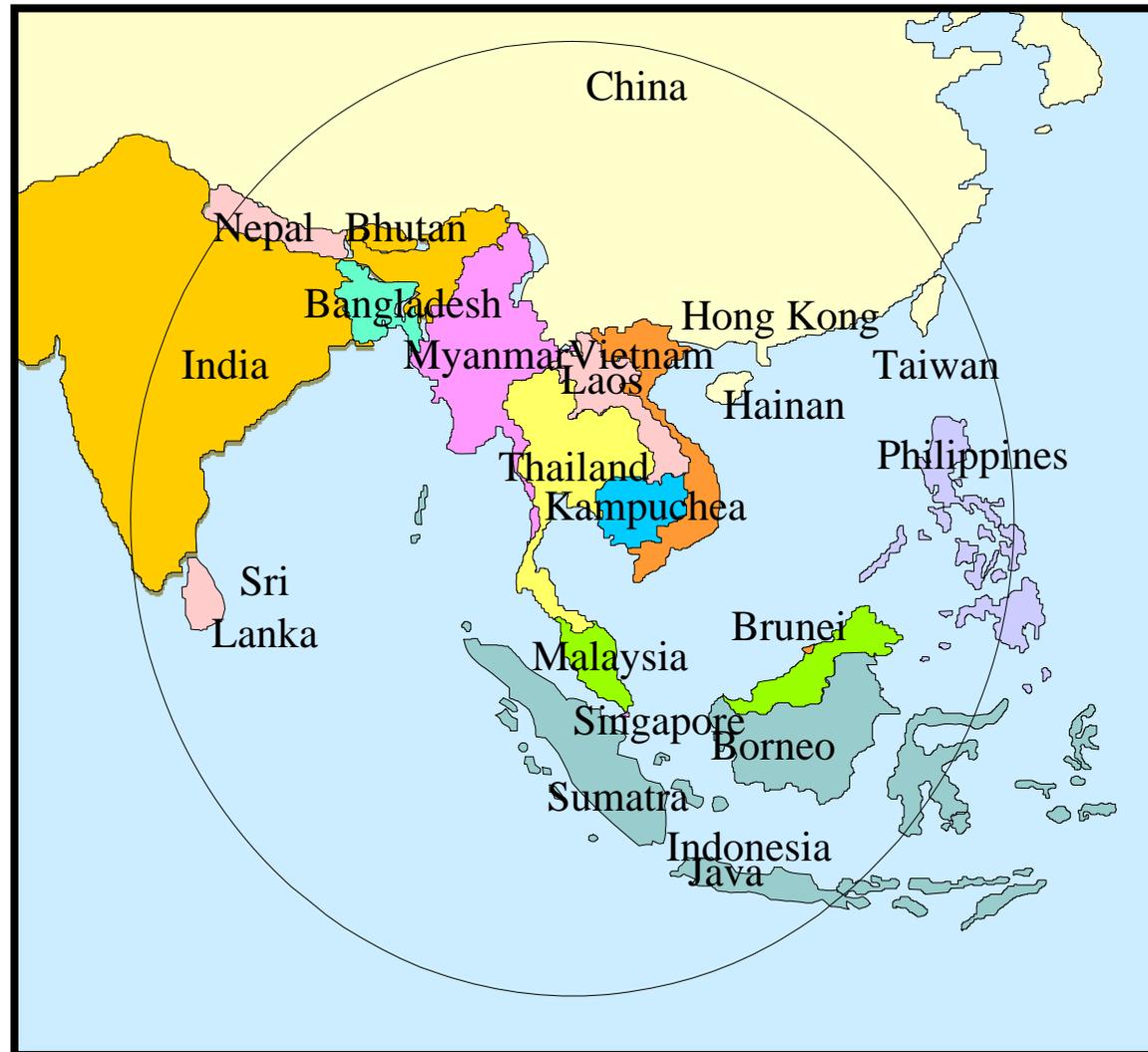


# GISTDA Ground Receiving Station



# Thailand Ground Station Coverage Circle

1. Malaysia
2. Singapore
3. Philippines
4. Indonesia
5. Brunei
6. Myanmar
7. Laos
8. Vietnam
9. Cambodia



10. Thailand
11. Bangladesh
12. India
13. Nepal
14. Sri Lanka
15. Phutan
16. Taiwan
17. South China
- Hong Kong

# EO Data Acquisition & Services

## Current Status of Ground Receiving Station

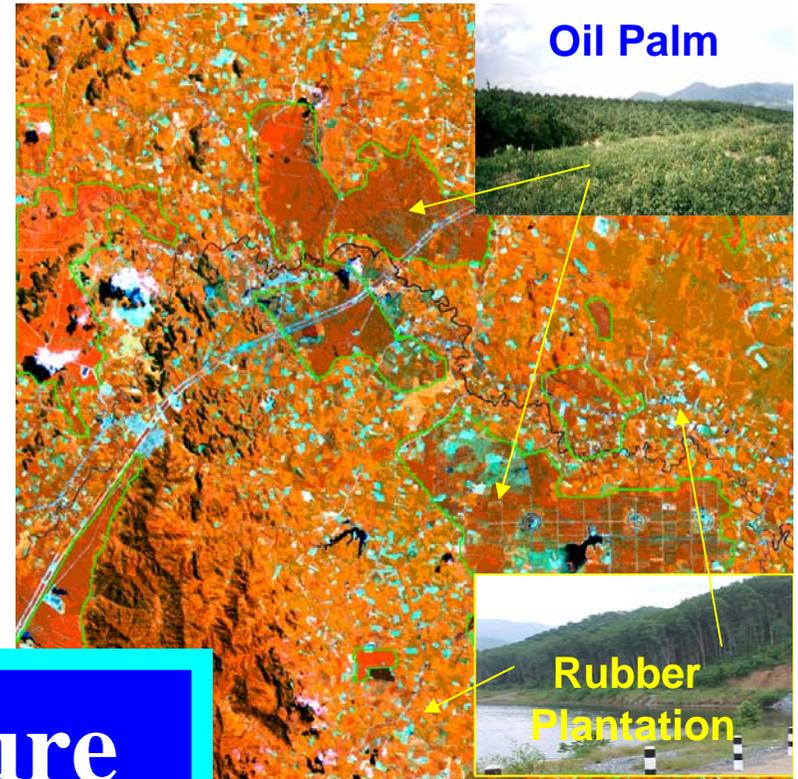
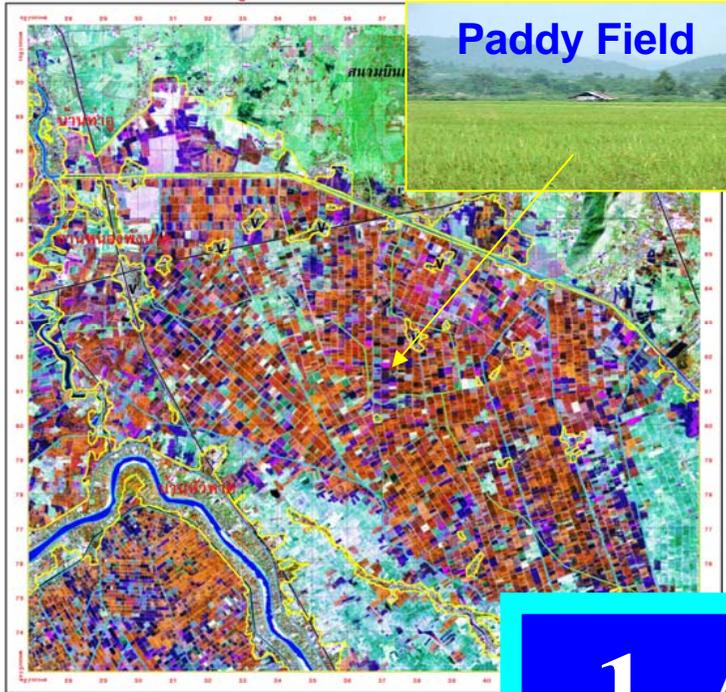
- LANDSAT-5
- SPOT-2, 4 and 5
- RADARSAT
- ALOS

Reseller : QuickBird, WorldView and ASTER

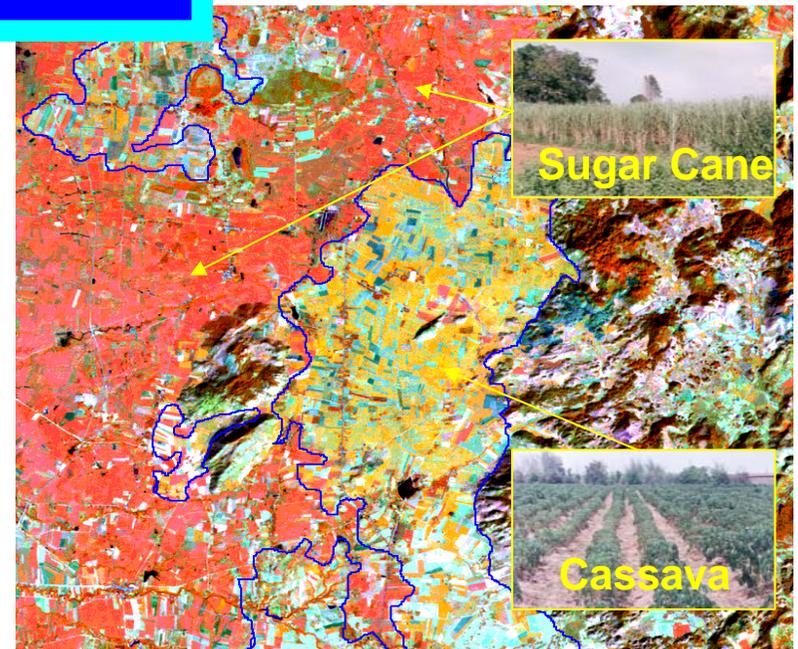
## Satellite Data in Archive:

LANDSAT, SPOT, MOS, ERS, JERS, ADEOS,  
RADARSAT, IRS.

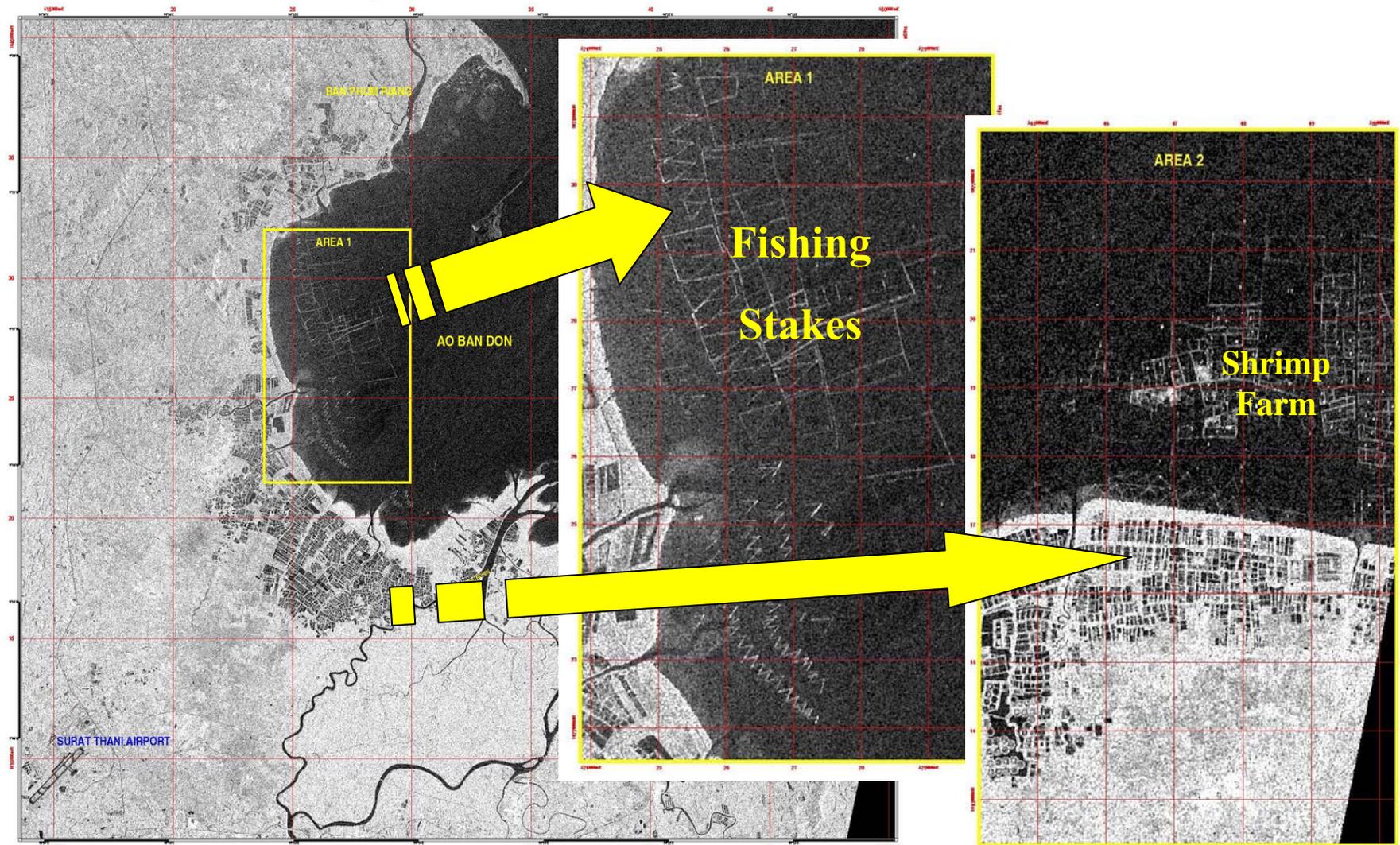
พื้นที่นาข้าว : บริเวณเมืองชัยนาท สรรพพยา และตาคลี จังหวัดนครสวรรค์  
ภาพถ่ายข้อมูลดาวเทียม LANDSAT-7 วันที่ 24 มกราคม 2545



# 1. Agriculture



## 2. Aquaculture



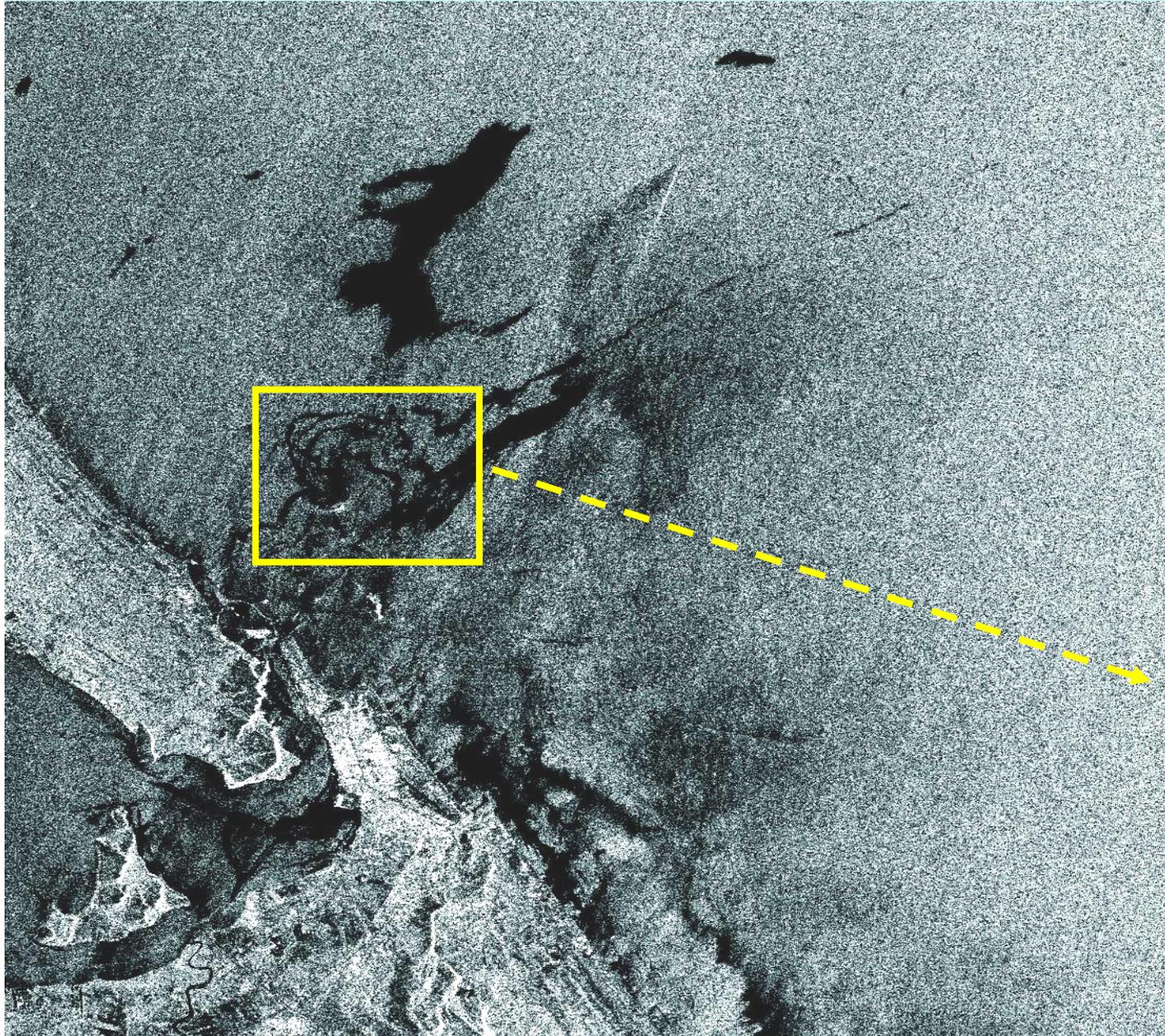
RADARSAT Images of Surat Thani Province

# 3. Coastal Zone Management

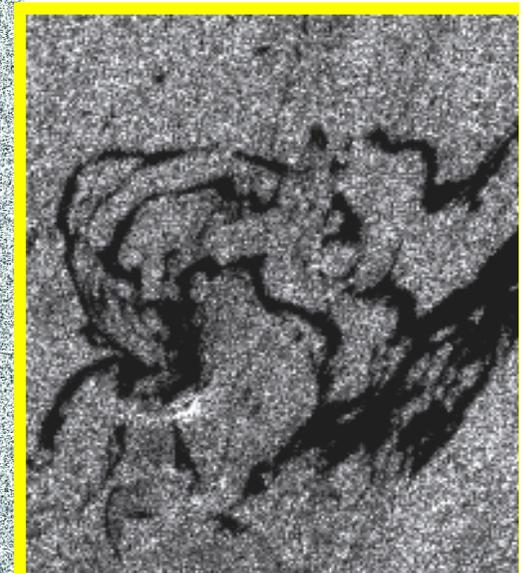
## Laem Chabang Deep Sea Port



# 4. Oil Spill Detection



**ERS-1**



# 5. Land Use Change Detection

Landsat 1987



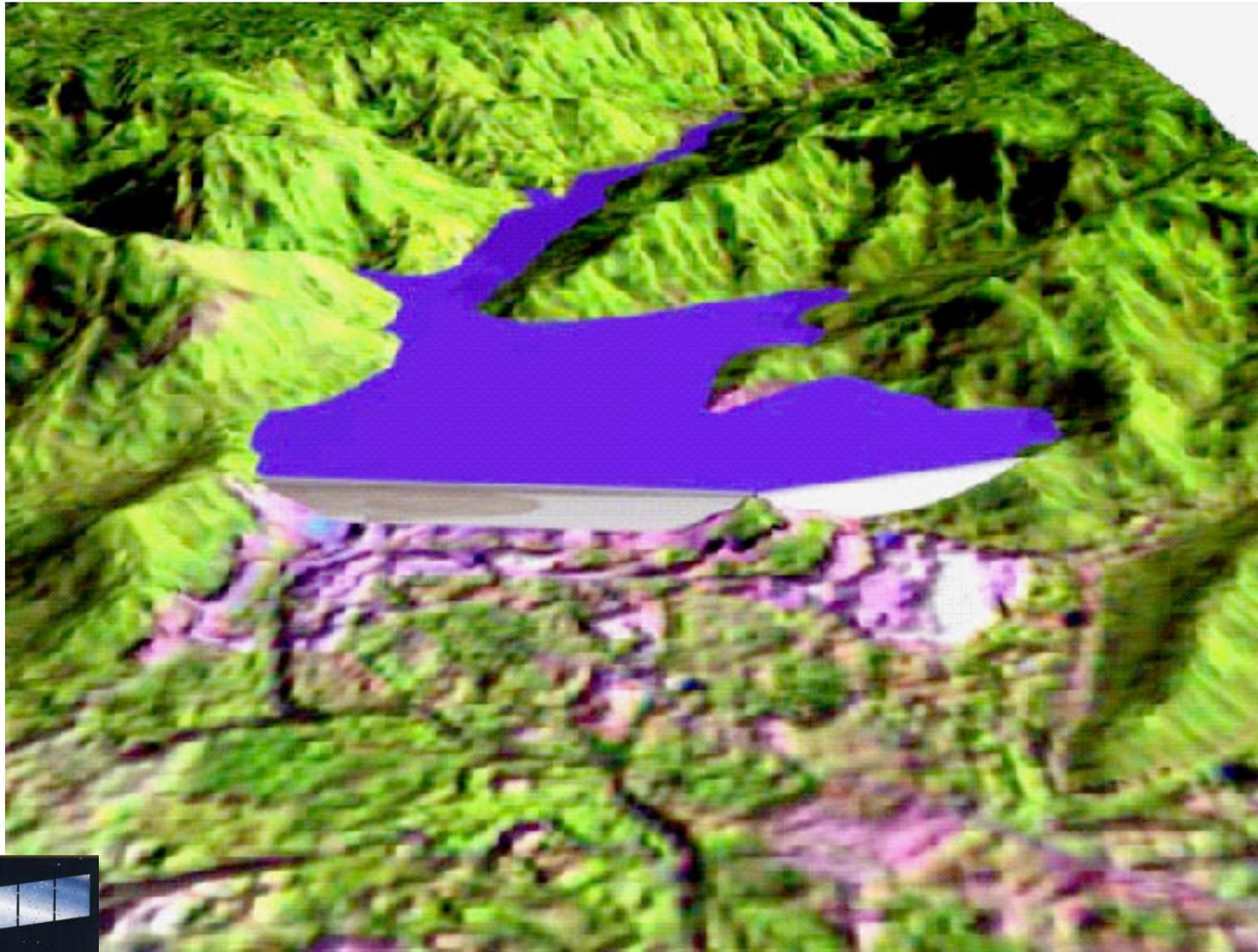
SPOT 1993



Landsat 1998



# 6. Planning for Dam Construction



# 7. Planning for Airport Construction



13 December 2002

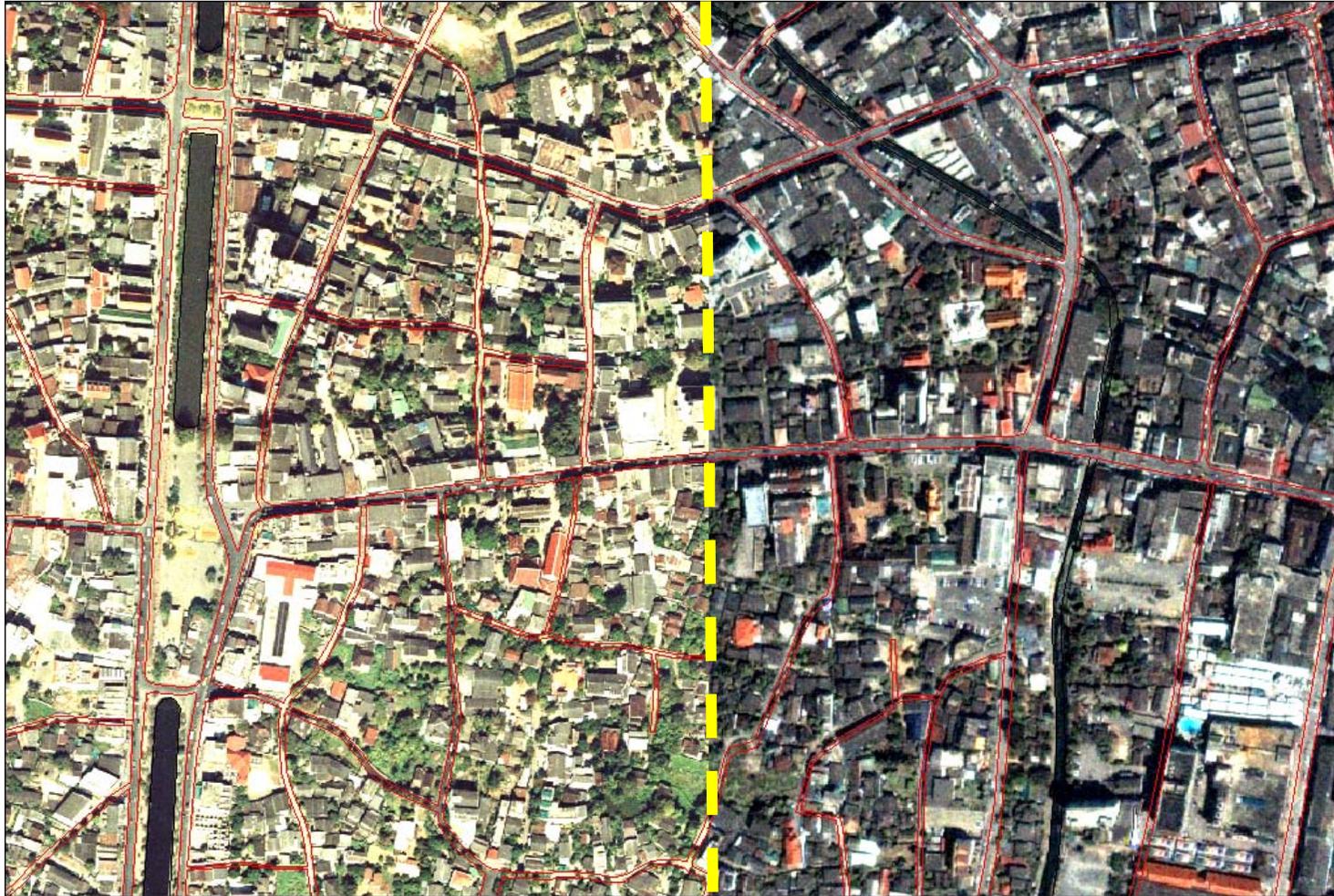
©\_DigitalGlobe 2002



4 December 2003

©\_SISEA 2003

# 8. Mapping



Aerial

IKONOS Data

## 9. Urban Planning



IKONOS Image at resolution of 1 m. , Chiangmai Airport

Plaza  
Pizza

## 10. Application of Satellite Data to Forestry

*Tropical Rain Forest*

# **National Forest Policy**

**(Cabinet Resolution on 3 December 1985)**

---

**It declared that 40 percent of the country shall be kept under forest and divided as follows :-**

## **Protected Forest**

**15 percent of the area shall be kept as protection forest for nature conservation, recreation and environmental quality protection.**

## **Production Forest**

**25 percent of the country shall be designated as production forest for production timber and other forest products**



# Thailand from Landsat-5 (TM) Satellite

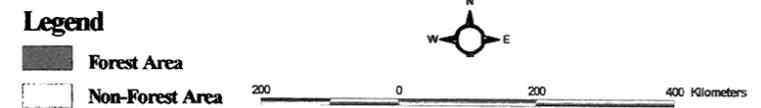
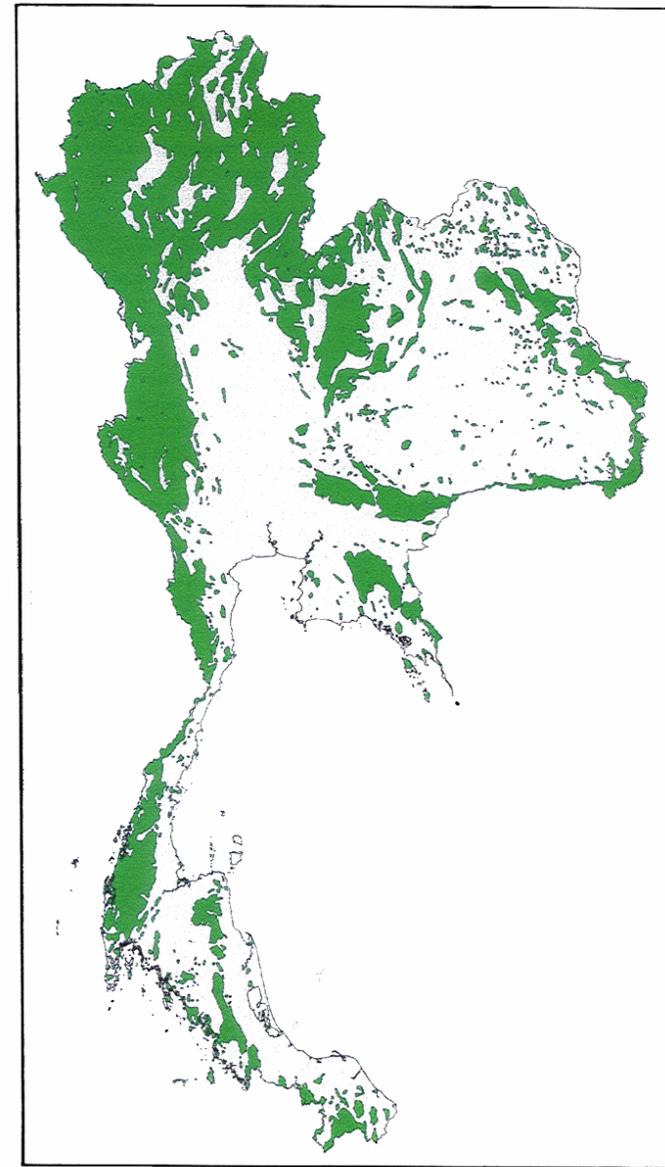
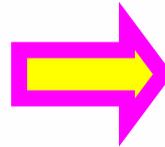
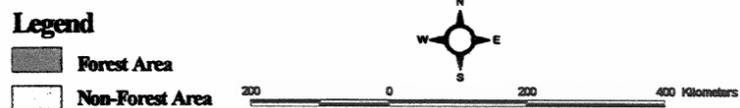
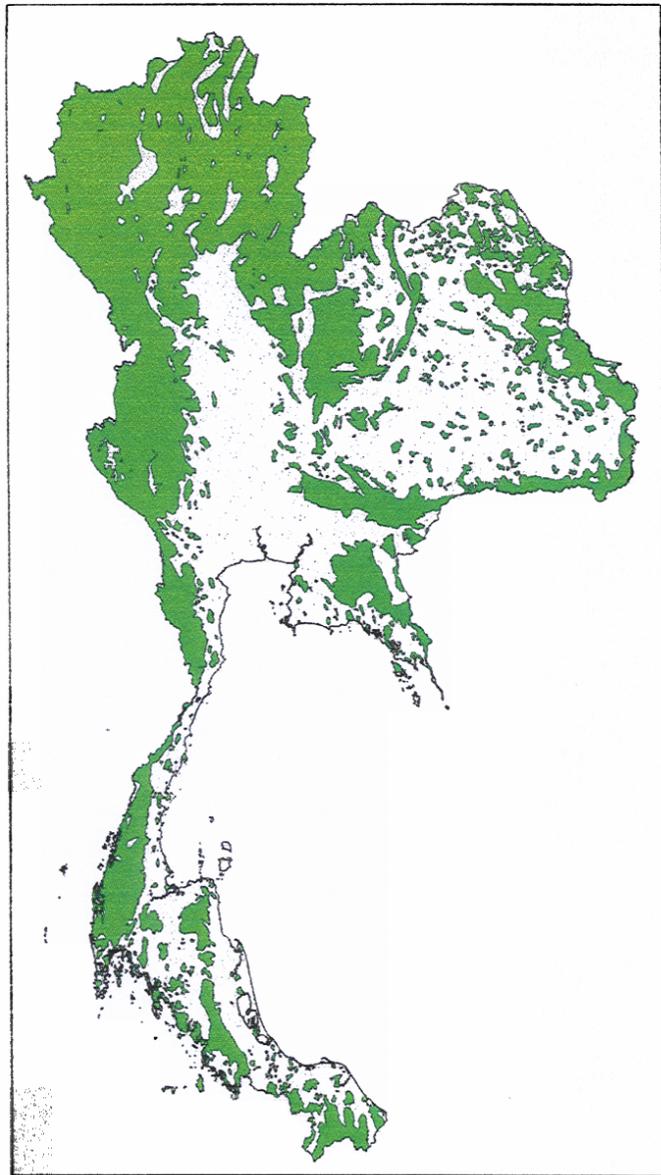
# EXISTING FOREST AREA OF THAILAND

## OVER THE PAST 37 YEARS (1961-1998)

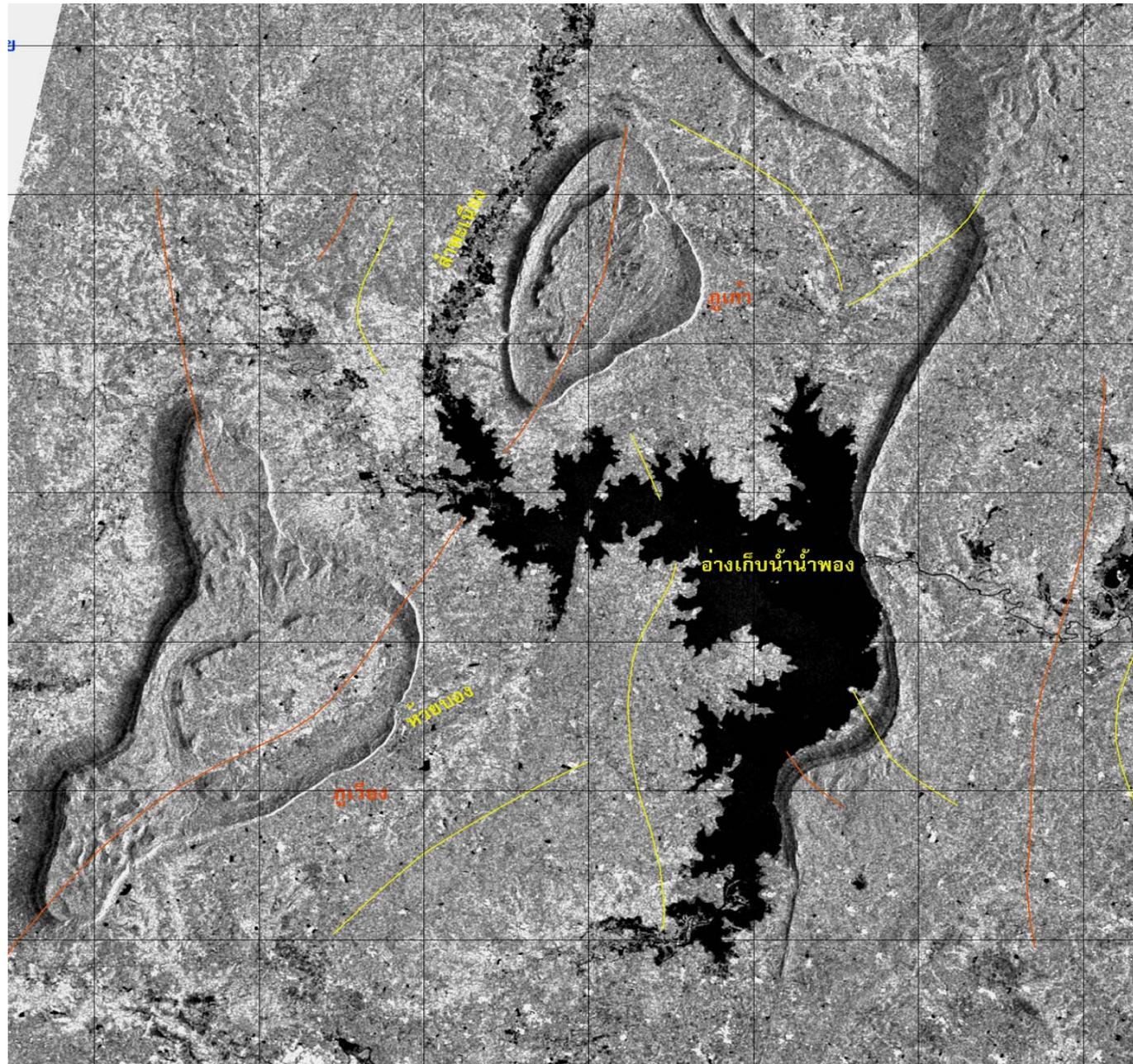
Year	Area (ha)	Percent
1961	171,017,812	53.33
1973	138,578,125	43.21
1976	124,010,625	38.67
1978	109,515,000	34.15
1982	97,875,000	30.52
1985	94,291,349	29.40
1988	89,877,182	28.03
1989	89,635,625	27.95
1991	85,436,284	26.64
1993	83,470,967	26.03
1995	82,178,161	25.62
1998	81,076,428	25.28

# EXISTING FOREST AREA IN 1973

# EXISTING FOREST AREA IN 1998



# 11. Geology



Phu Kao and Phu Wieng  
Khon Kaen Province

Red : Syncline  
Yellow : Anticline

**RADARSAT-1**  
**14 September 2001**

# 12. Geomorphology

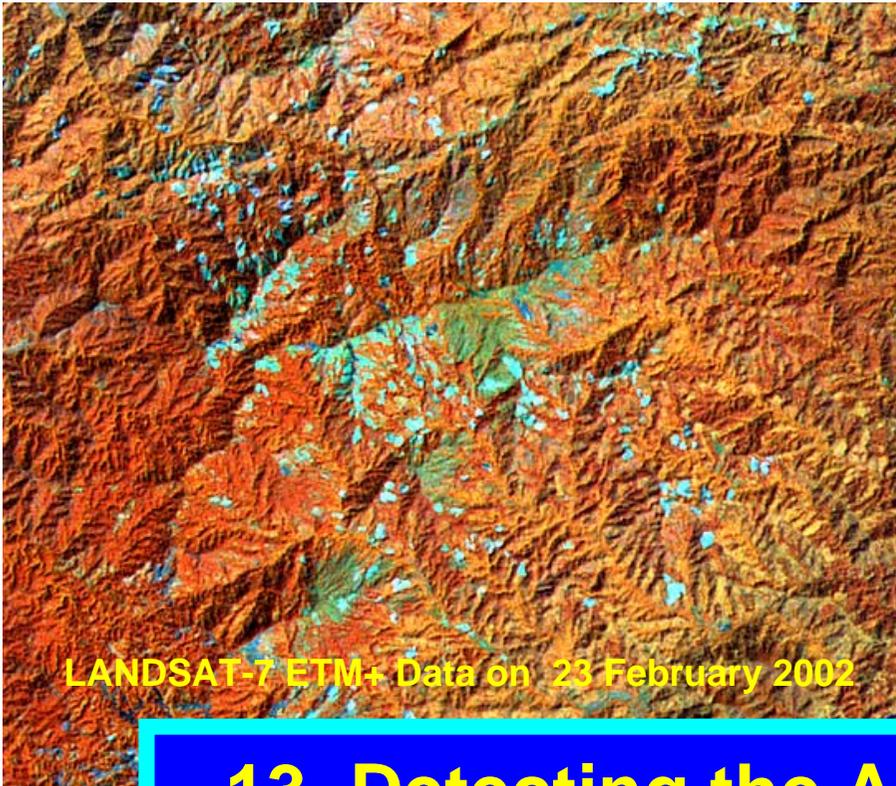


**Laem Poh, Pattani**

**LANDSAT-7**

**on 6 March 2002**

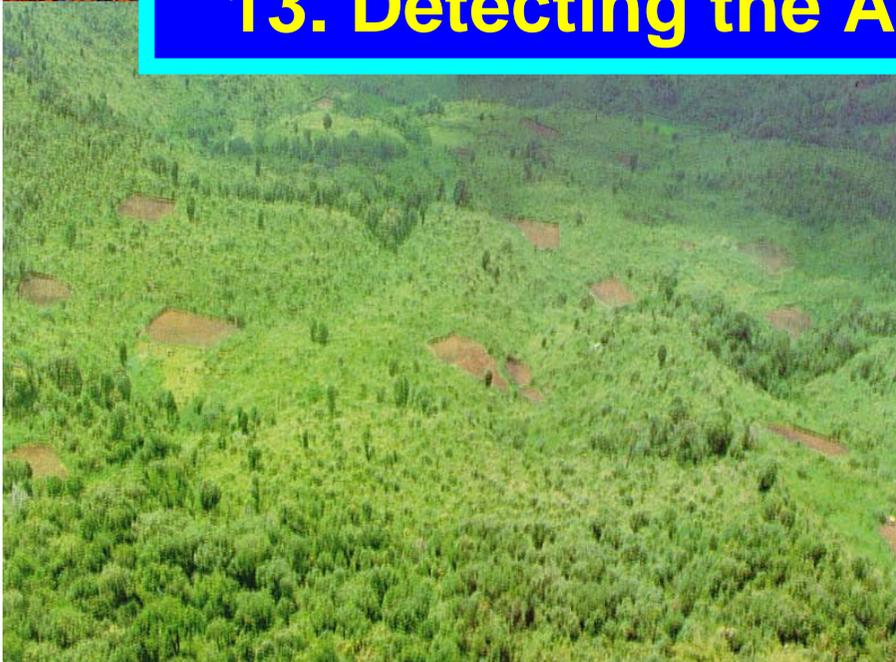
**Pattani Province**

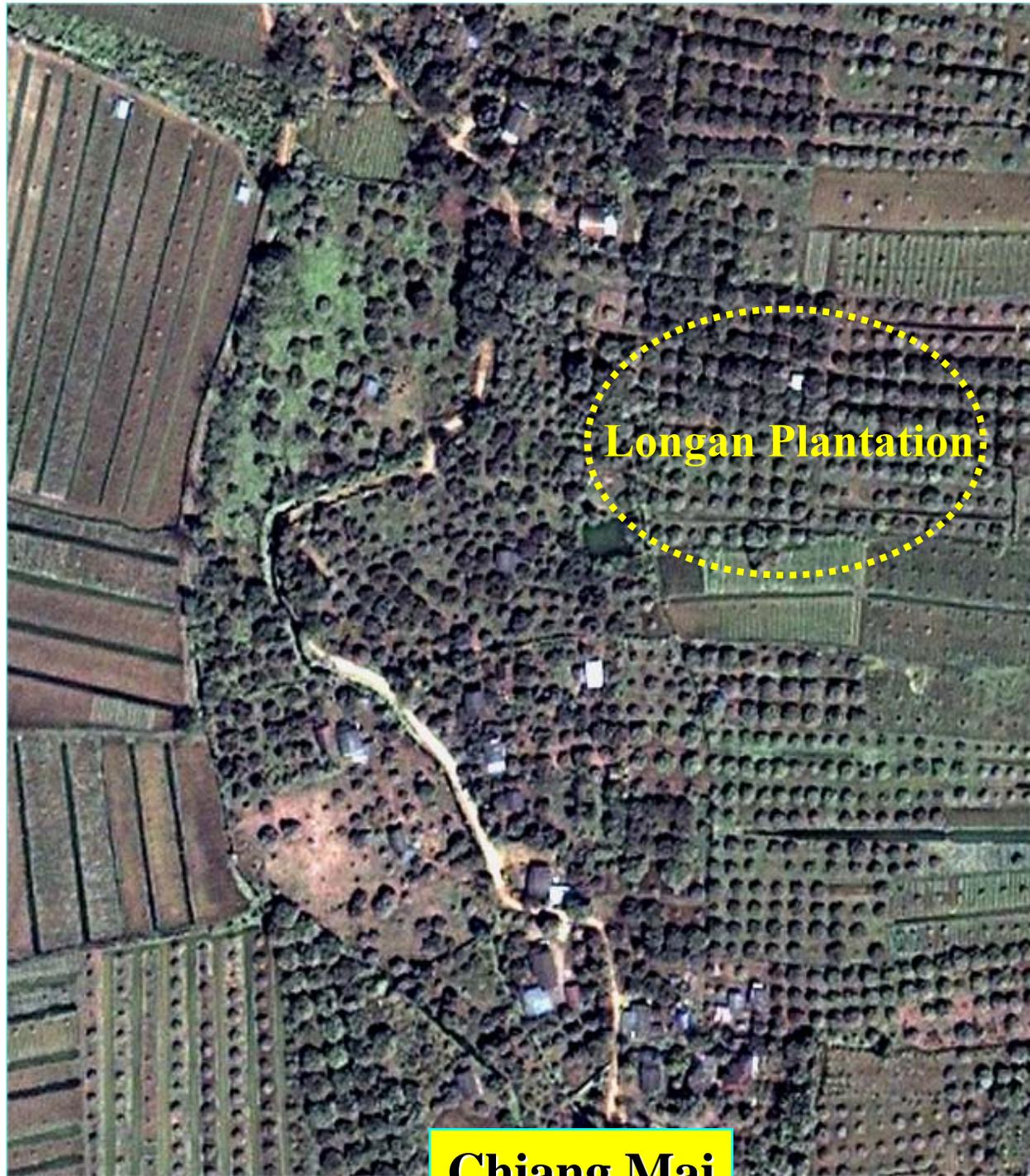


LANDSAT-7 ETM+ Data on 23 February 2002



## 13. Detecting the Areas of Planting Opium



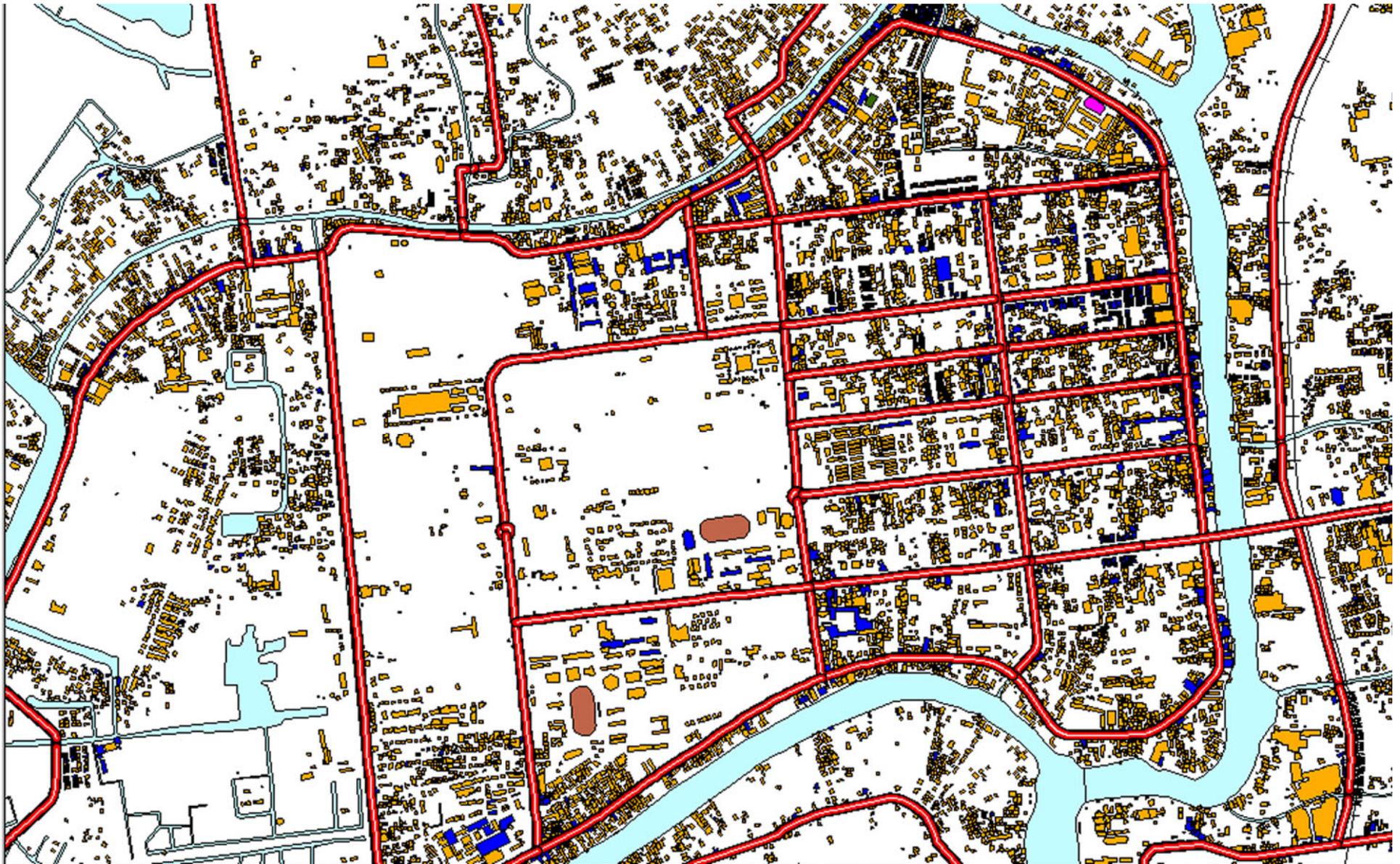


**Chiang Mai**

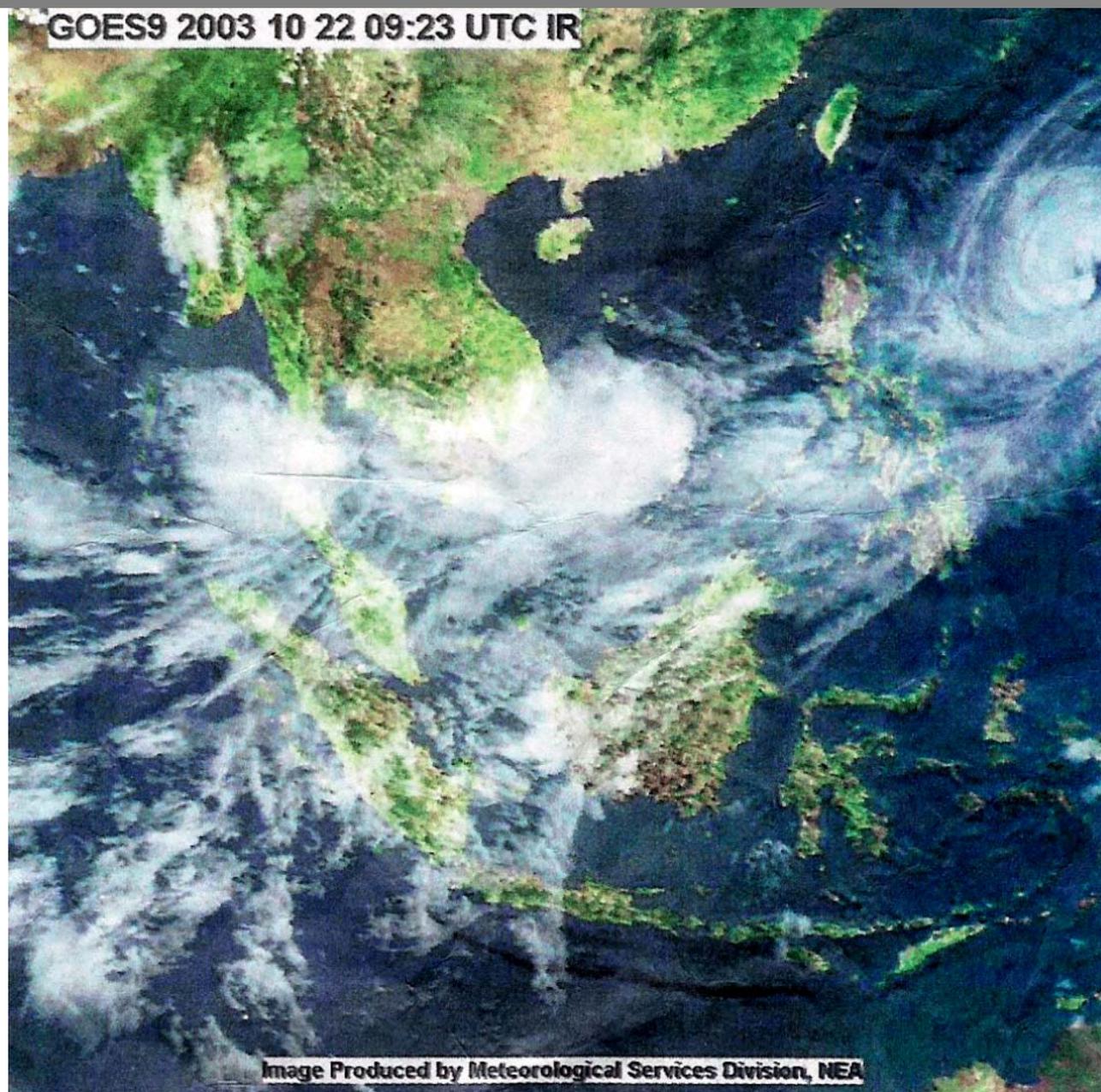


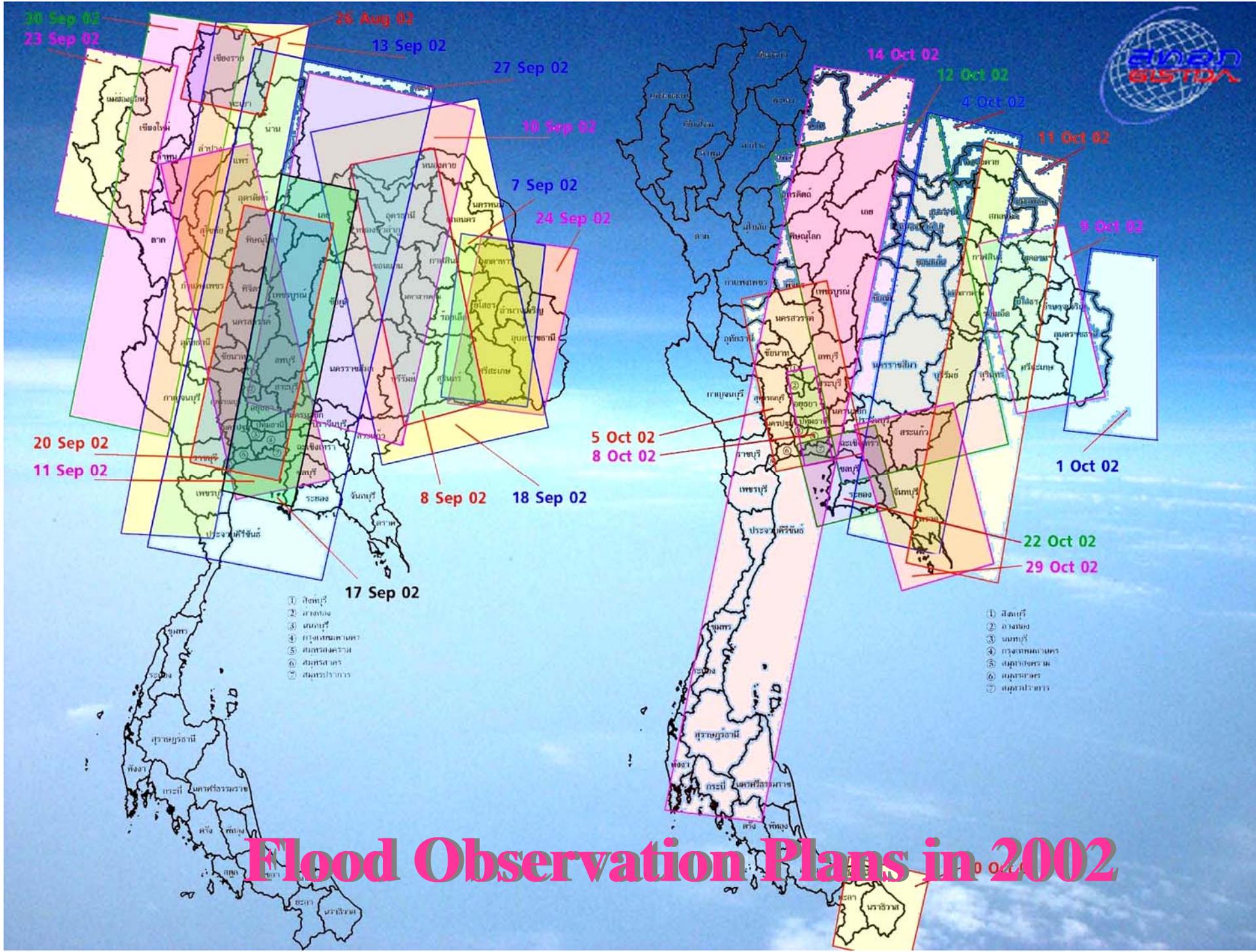
**14.  
Using IKONOS  
Data in the  
Assests  
Capitalization  
Project**

## *15. Using High Resolution Data for Tax Collection*

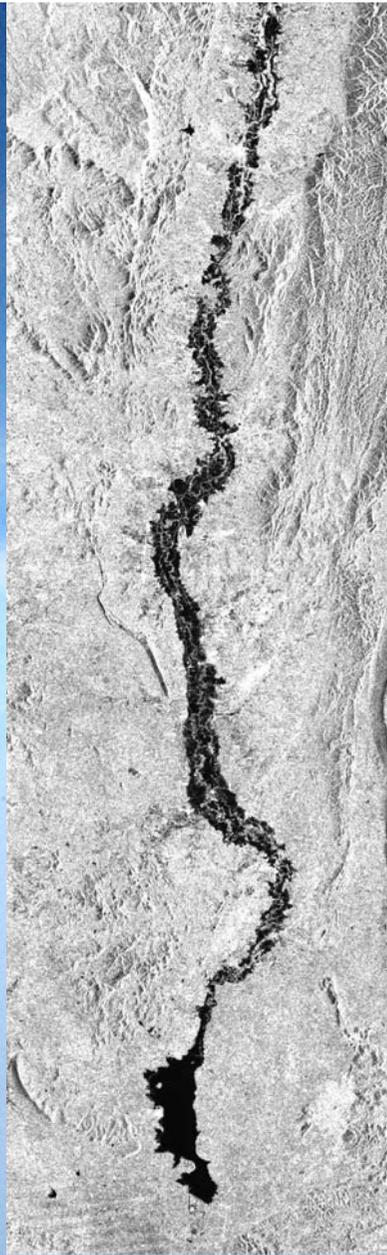


# 16. Flood Monitoring

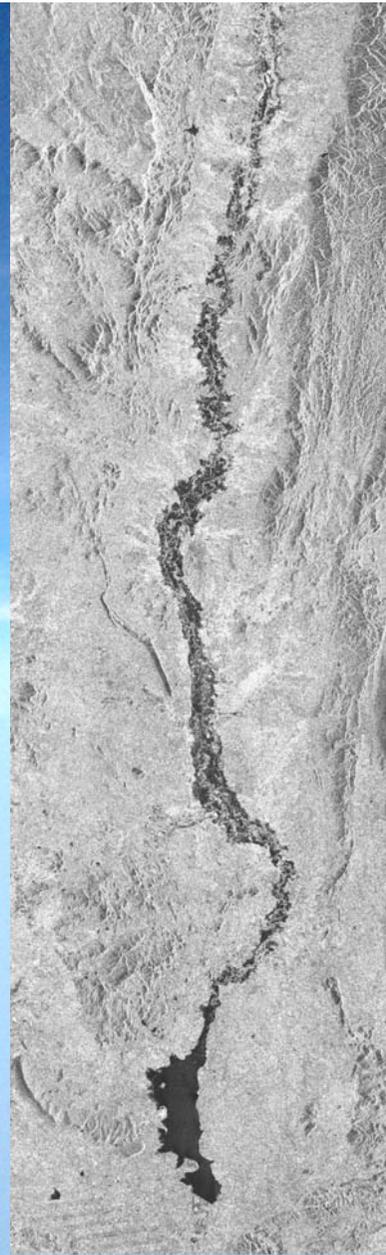




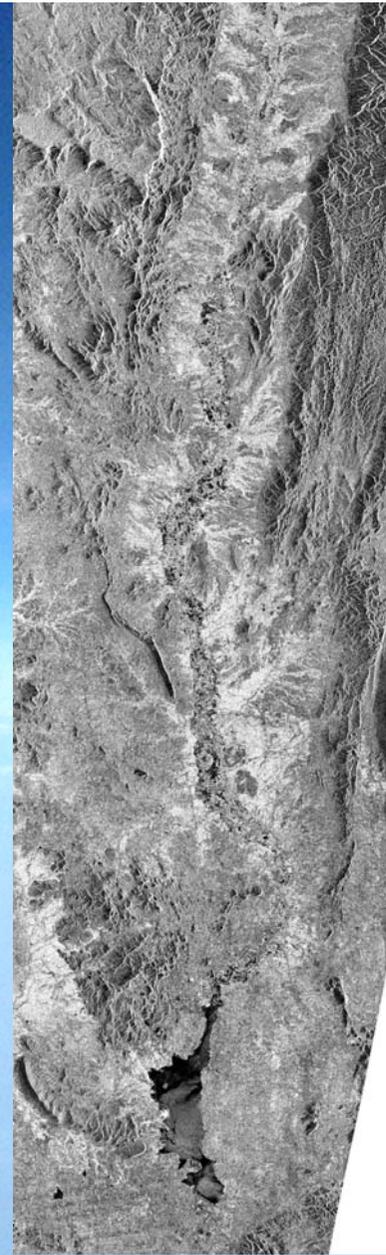
# Flood Observation Plans in 2002



10 Sep 2002



27 Sep 2002



14 Oct 2002



Multitemporal

# Pasak Basin

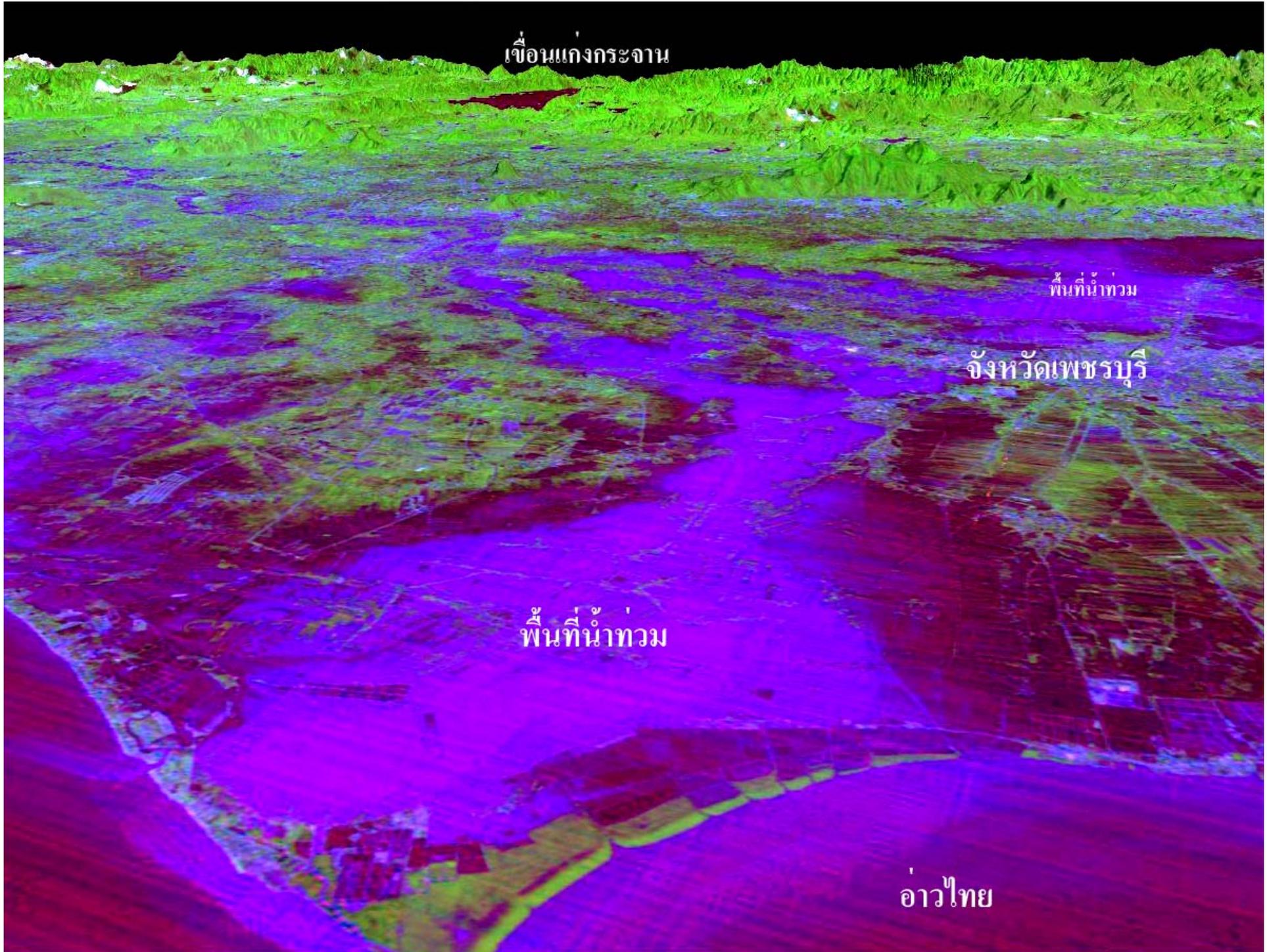
เขื่อนแก่งกระจาน

พื้นที่น้ำท่วม

จังหวัดเพชรบุรี

พื้นที่น้ำท่วม

อ่าวไทย





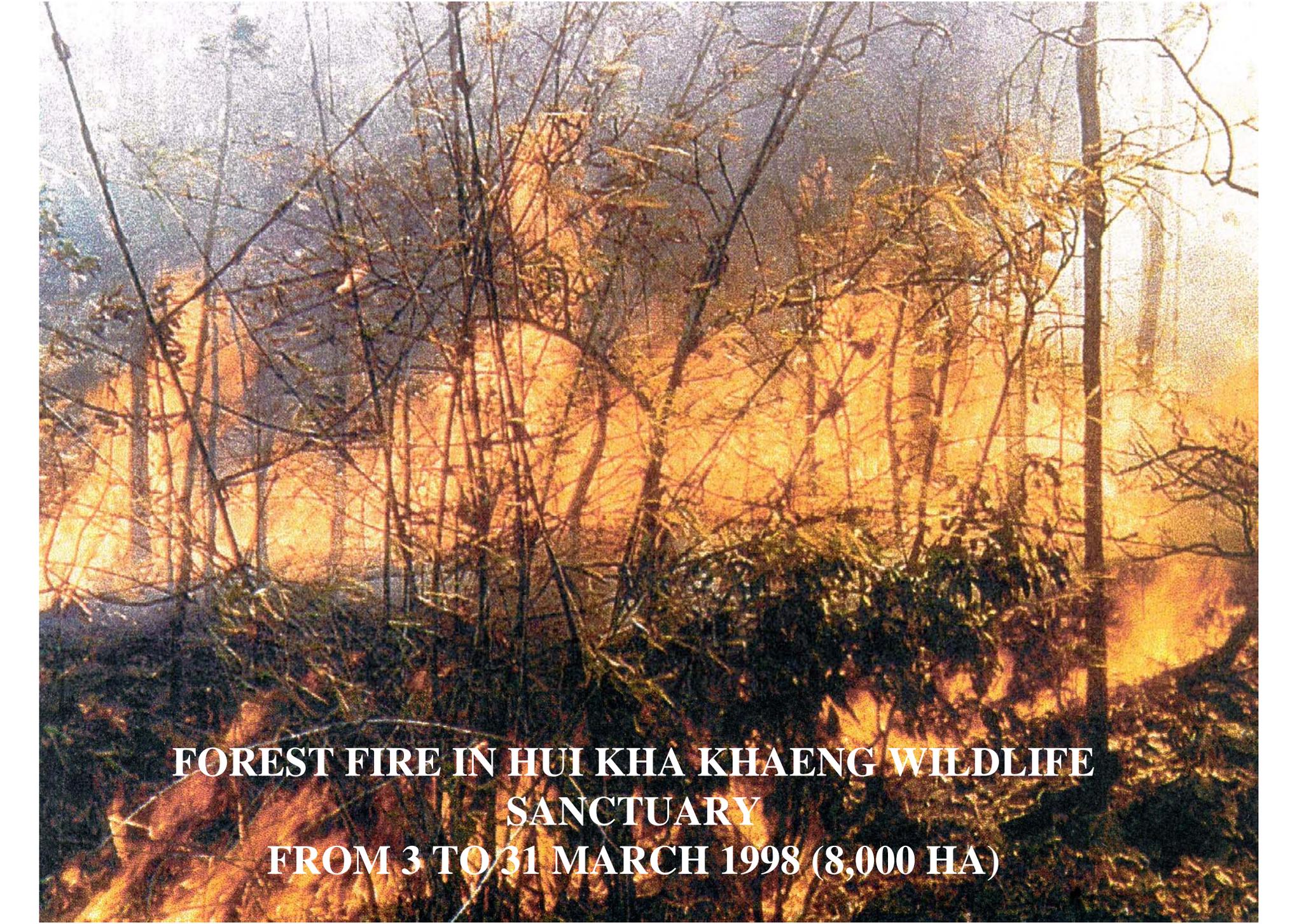
**17. Landslide**



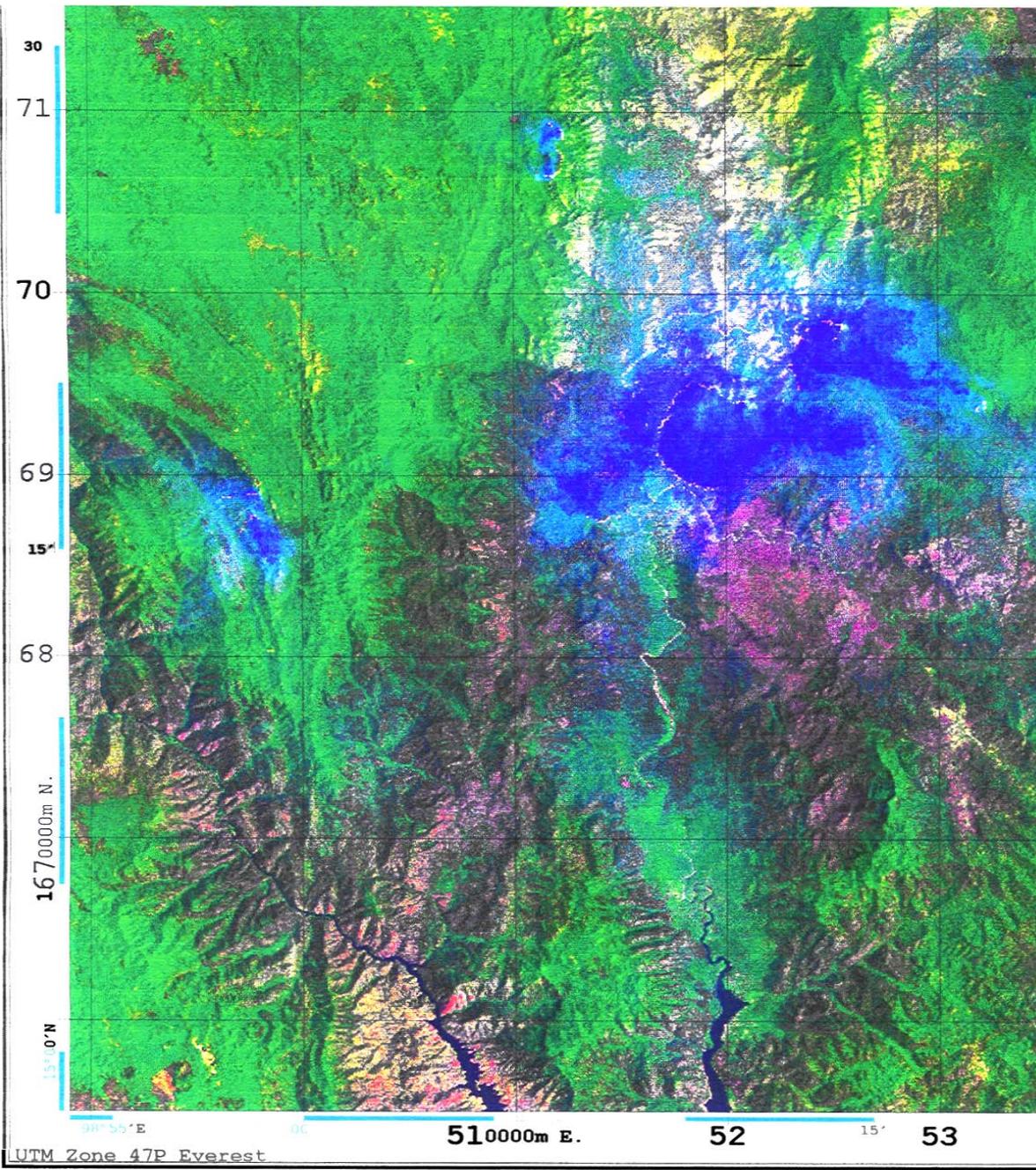


A helicopter is shown in flight, dropping a bucket of water onto a forest fire. The fire is a large, bright orange and yellow blaze that is spreading across a hillside. The surrounding forest is dark green and appears to be in a state of emergency. The helicopter is positioned in the upper left quadrant of the frame, and the bucket is suspended below it, releasing a stream of water onto the fire. The background shows a hazy, mountainous landscape under a clear sky.

***18. FOREST FIRES  
IN THAILAND***

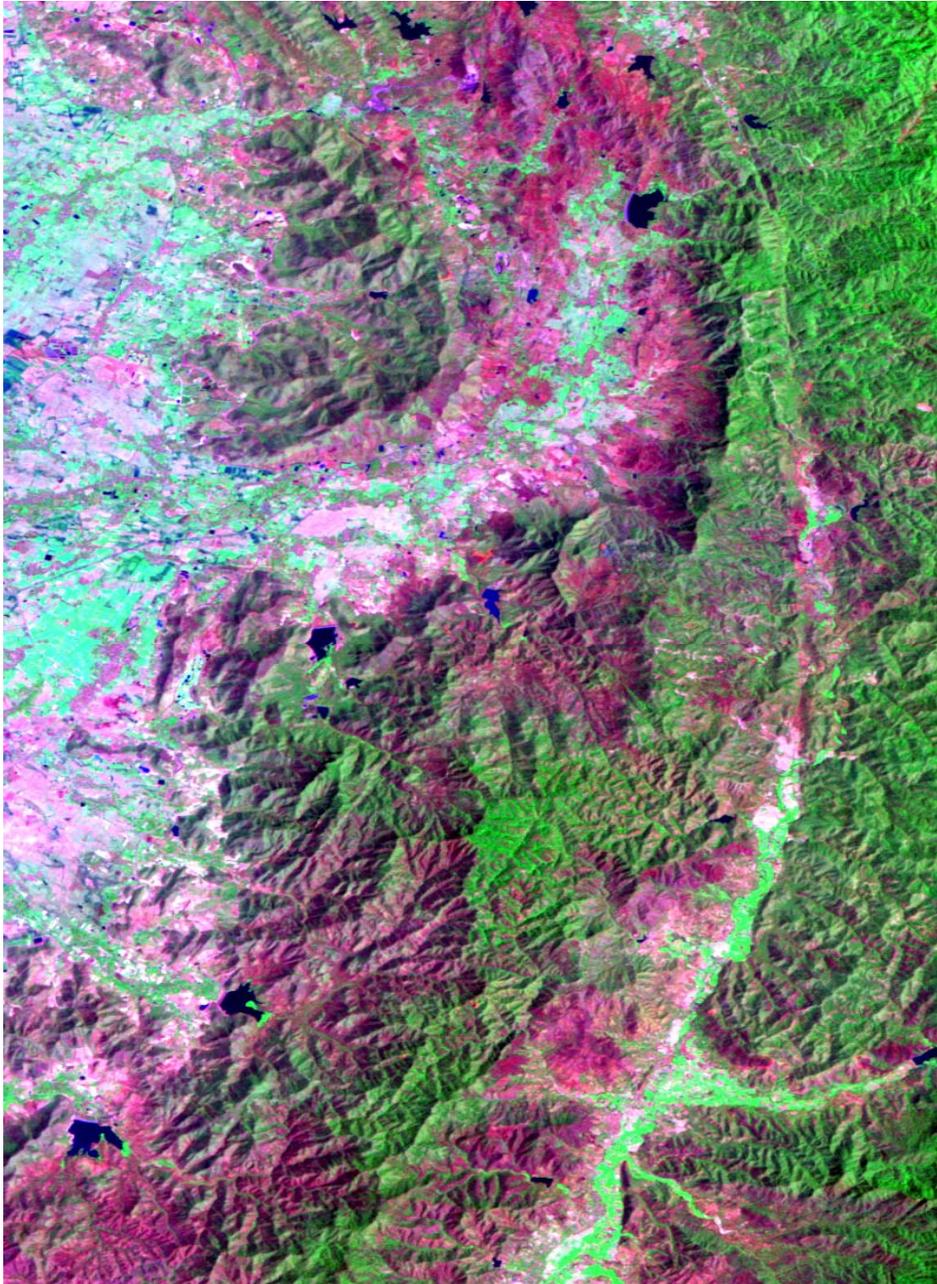


**FOREST FIRE IN HUI KHA KHAENG WILDLIFE  
SANCTUARY  
FROM 3 TO 31 MARCH 1998 (8,000 HA)**



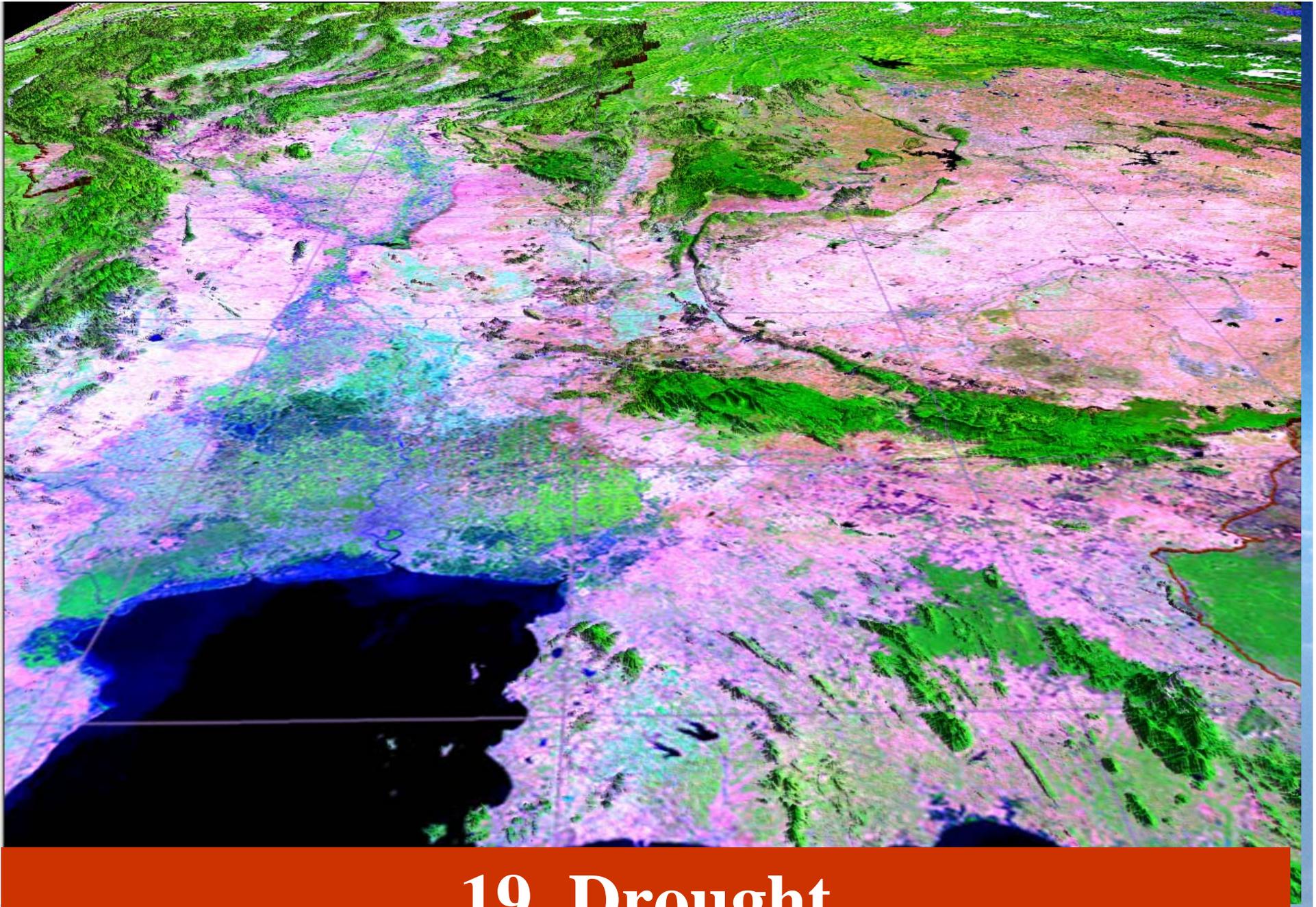
# Forest Fire in Hui Kha Khaeng Wildlife Sanctuary

HUAI KHA KHAENG WILDLIFE SANCTUARY: UTHAI  
LANDSAT 5 TM DATA ACQUIRED ON 17 MARCH 1998  
1:250 000 Scale



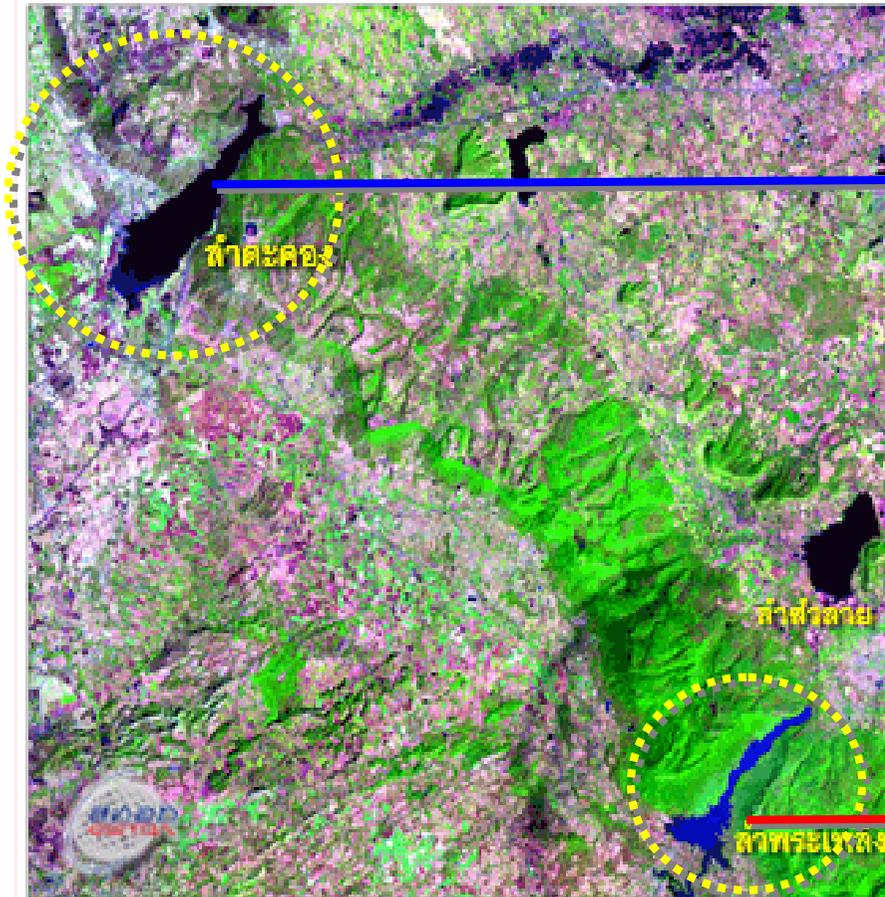
**Landsat Data  
Showing  
Forest Fire  
Occurred  
in Chiang Mai**

**BAND 2 - BLUE  
BAND 4 - GREEN  
BAND 7 - RED**



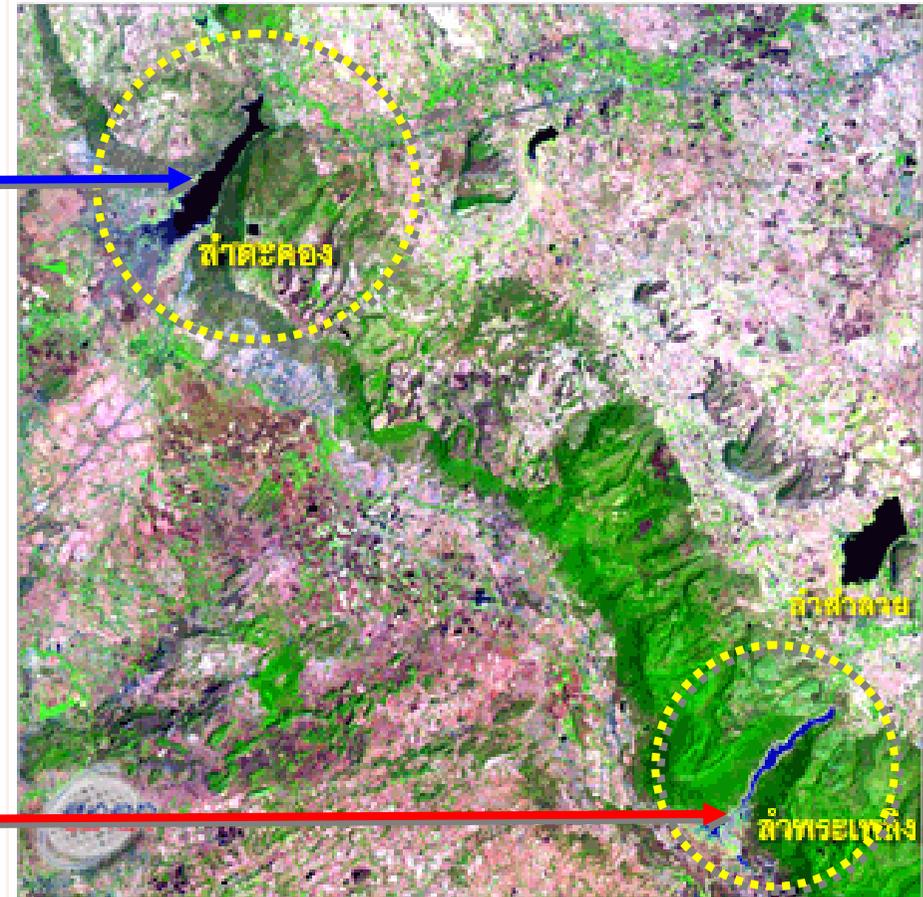
# 19. Drought

27 September 2002 - 203 million cu.m.



27 September 2002 - 116 million cu.m.

6 March 2005 - 47 million cu.m.



6 March 2005 - 10 million cu.m.

Using Landsat-5 Data for Monitoring the Water Level  
in Lam Taklong Reservoir

## *20. Tsunami*



*Tsunami Activities in Thailand*

# Patong Beach, Phuket Island before and after the Tsunami Impact

Before



After



# Patong Beach, Phuket Island before and after the Tsunami Impact

**Before** IKONOS Natural Color Image 24 January 2004      **After** IKONOS Natural Color Image 29 December 2004

**BEFORE** : ข้อมูลภาพถ่ายจากดาวเทียม IKONOS วันที่ 24 ม.ค.2547

**AFTER** : ข้อมูลภาพถ่ายจากดาวเทียม IKONOS วันที่ 29 ม.ค.2547

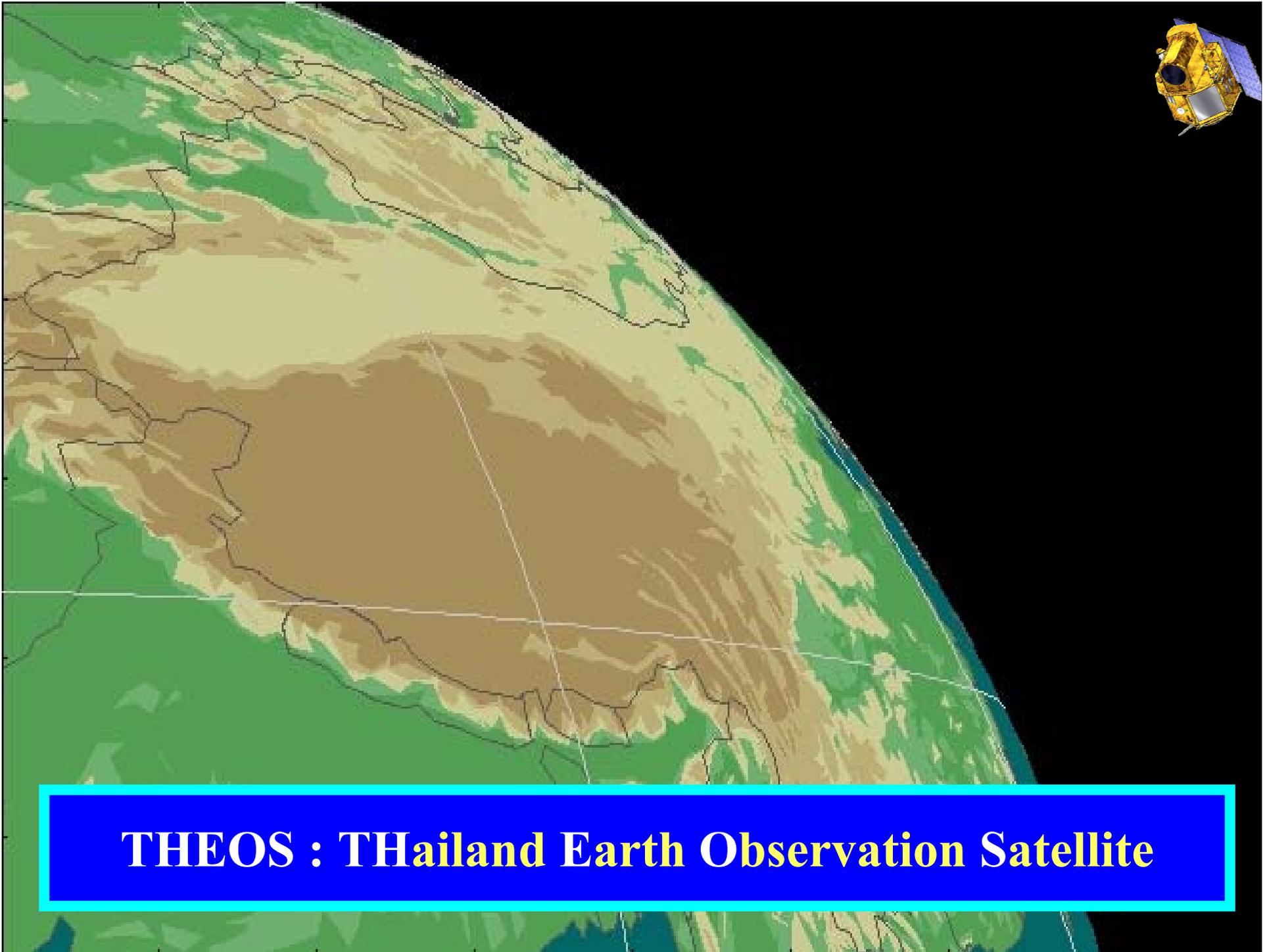
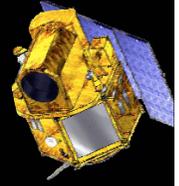


**Destroyed Areas, Buildings, Roads, Beaches, Port and Flooded areas Patong Beach, Phuket**

# Coral Cape, Phang Nga Province before and after the Tsunami Impact

**Before:** IKONOS Natural Color Image 11 February 2001    **After:** IKONOS Natural Color Image 29 December 2004





**THEOS : THailand Earth Observation Satellite**



**Signing Ceremony between GISTDA and EADS Astrium Company  
for Developing THEOS Satellite  
on 19 July 2004, Regency Room, Oriental Hotel, Bangkok**



**THEOS TEAM**

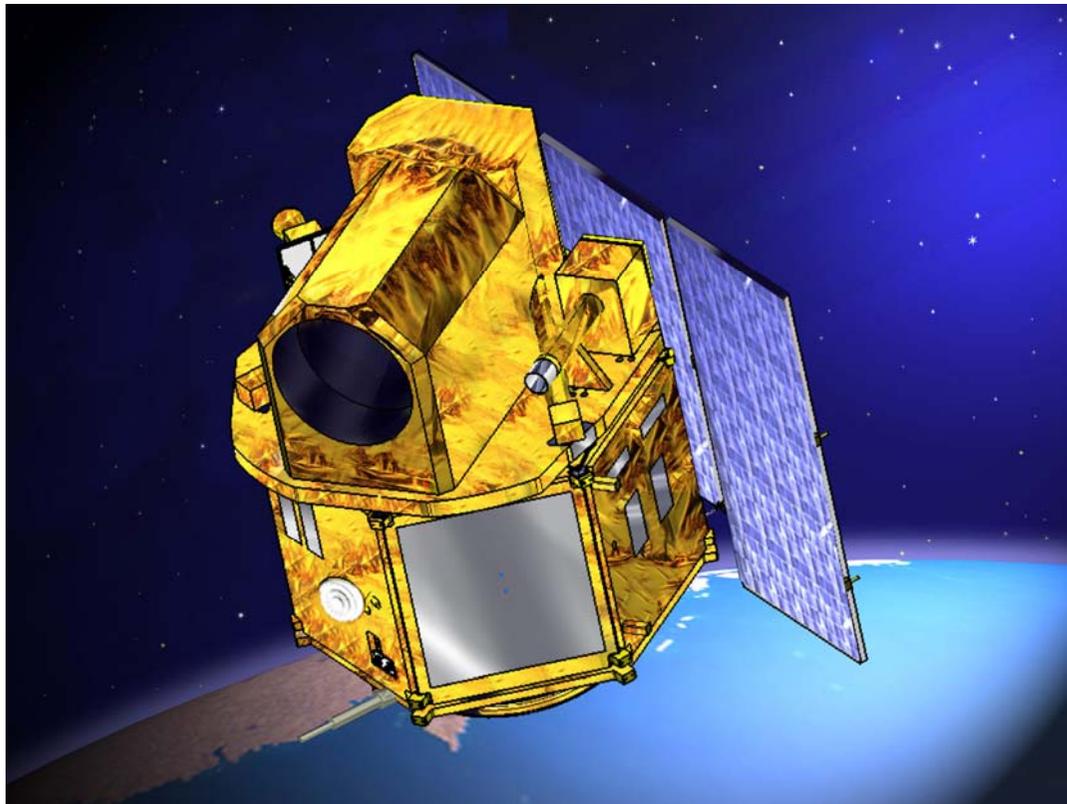
# GISTDA-ASTRIUM THEOS Team



# GISTDA trainees office



# Characteristics of THEOS Satellite



- **Mass: 750 kg.**
- **Orbit: Sun Synchronous**
- **Altitude: 822 km.**
- **Orbit : 14+ 5/26 orbits per day**
- **Period : 101.4 minutes**
- **Speed : 6.6 km./second**
- **Inclination: 98.7 degrees**
- **Repeat Cycle: 26 days**
- **Mean Local Time: 10.00 a.m.**
- **Payload:**
  - **Panchromatic telescope**
  - **Multi-spectral camera**
- **On-board Memory: 51Gb**
- **TT&C: S-band Link**
- **Mission Data: X-band Link**
- **Attitude Orbit Control and Orbit Determination:**
  - 3-axis stabilized, Star Tracker, Gyro, GPS, Magnetic Torque, Sun Sensor**
- **Design Life Time: 5 Years**
- **Launch Date: Mid 2007**



Full scope of launch services is provided, including:

- development and manufacture of SC individual adapter and separation system
- SC delivery to and storage at launch site
- clean room for SC processing
- SC thermostating before launch
- SC health telemetry data acquisition in real time at launch
- comfortable conditions for customer personnel

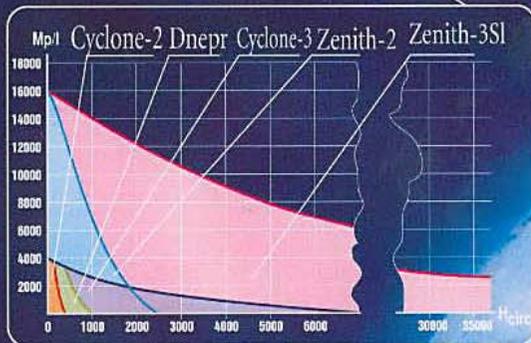
# LAUNCHER

Sea Launch Joint Venture (Ukraine, Russia, USA, Norway) is a provider of Zenit launch services

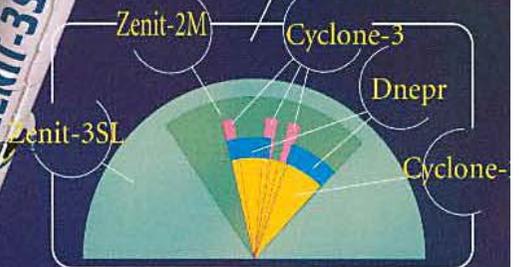
Cosmotras Joint Venture (Ukraine, Russia) is a provider of Dnepr launch services

## Launch services

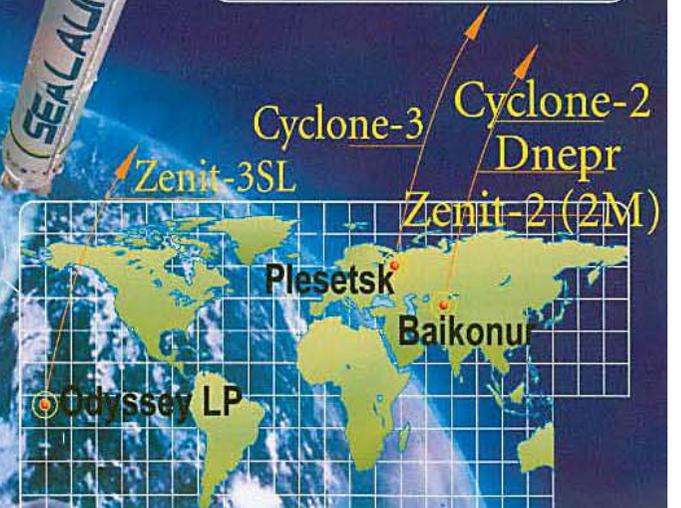
### Yuzhnoye's launch vehicle payload capability



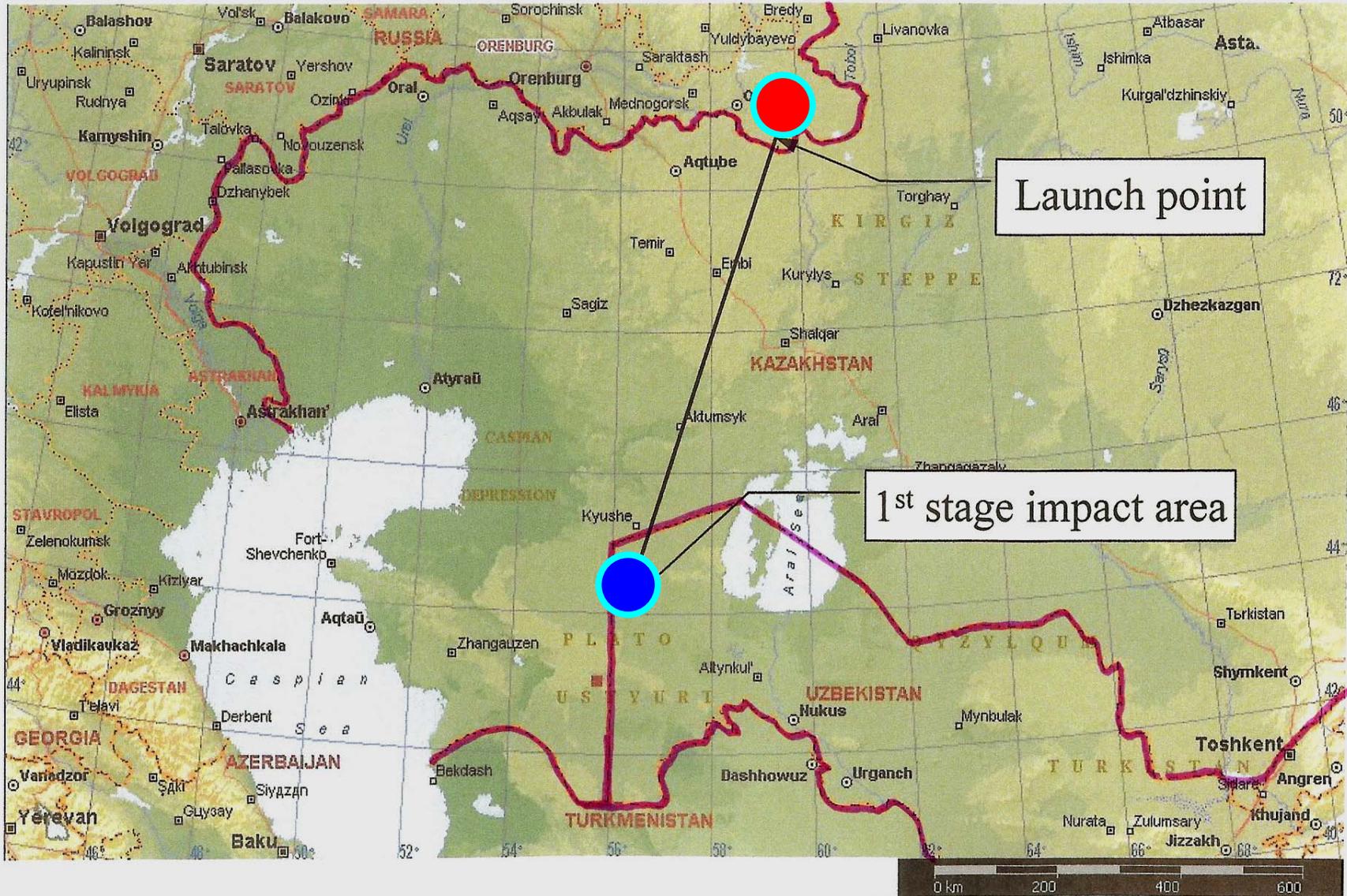
## Available inclinations



## Available launch sites

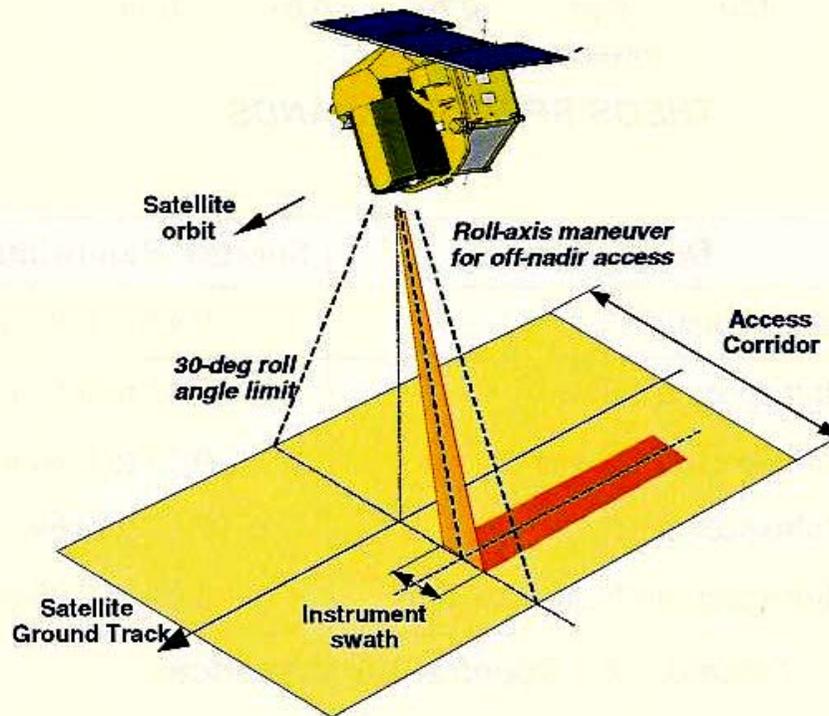


# Yasni : Drop zone

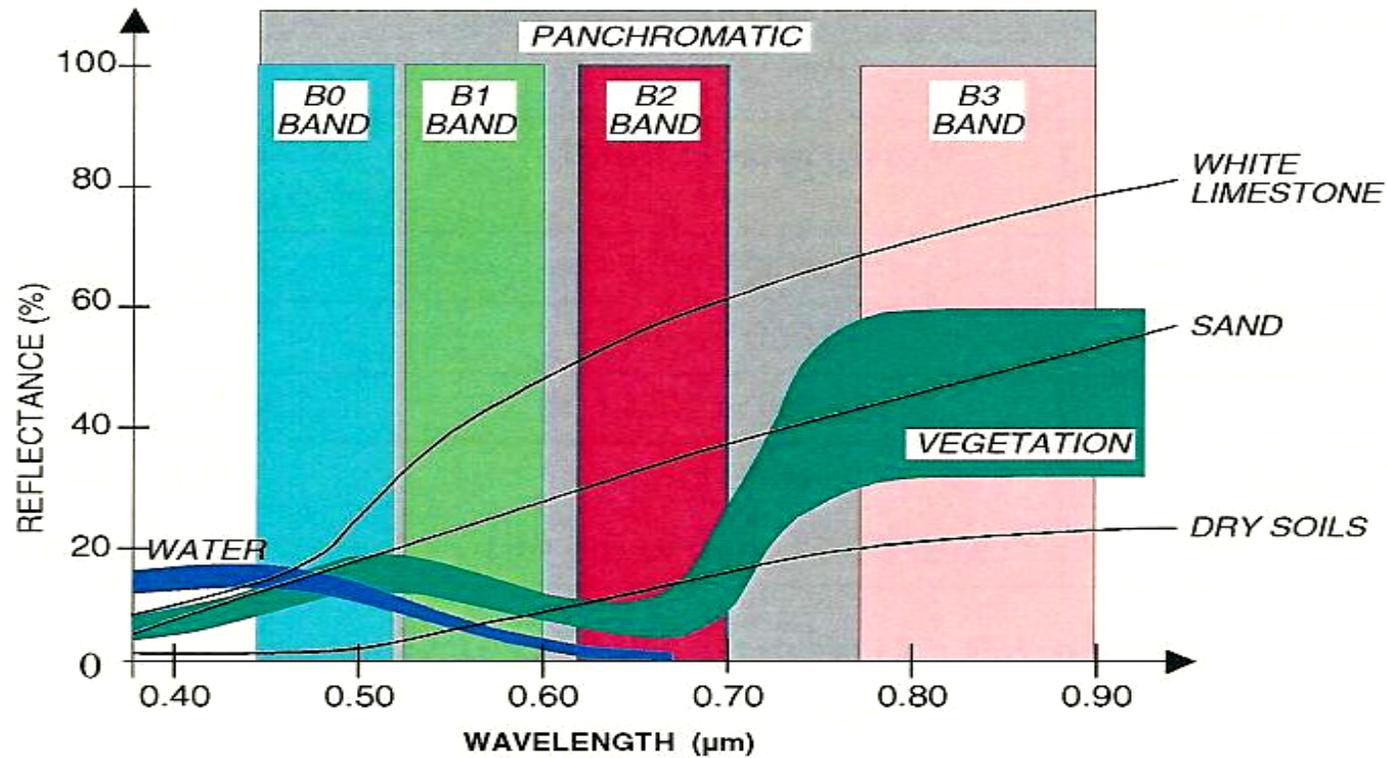


Parameter	Panchromatic Band	Multispectral Band (for each band)
Ground Sampling Distance	2 m at Nadir	15 m at Nadir
Number of pixels per line	12000 pixels	6000 pixels
Swath Width	~22 km at Nadir	90 km at Nadir
Accessible Corridor	~1000 km (with $\pm 30^\circ$ satellite roll tilt)	~1100 km (with $\pm 30^\circ$ satellite roll tilt)

**Table 4.1/B : System Spatial Performances**



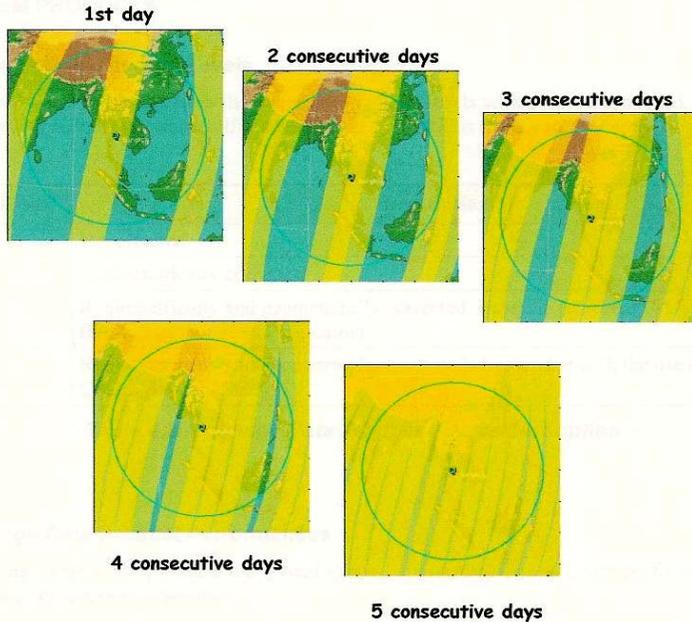
**ILLUSTRATION OF THE ACCESS CORRIDOR**



**THEOS SPECTRAL BANDS**

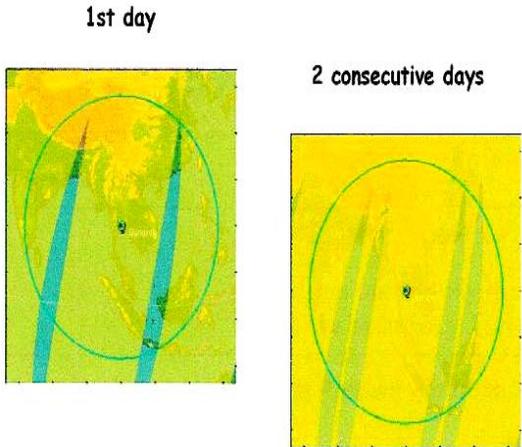
Name	Description	Spectral Bandwidth (TBC)
<b>PAN</b>	Panchromatic	0.45 to 0.90 $\mu\text{m}$
<b>B0</b>	Multispectral / Blue	0.45 to 0.52 $\mu\text{m}$
<b>B1</b>	Multispectral / Green	0.53 to 0.60 $\mu\text{m}$
<b>B2</b>	Multispectral / Red	0.62 to 0.69 $\mu\text{m}$
<b>B3</b>	Multispectral / Near Infra-Red	0.77 to 0.90 $\mu\text{m}$

**Table 4.1/A : Spectral Performances**



**ILLUSTRATION OF THE 5-DAYS FULL ACCESSIBILITY PERFORMANCE  
(WITH +/- 30° ROLL TILT)**

**With +/- 30 ° Roll Tilt  
5 Days Full Accessibility  
Performance**



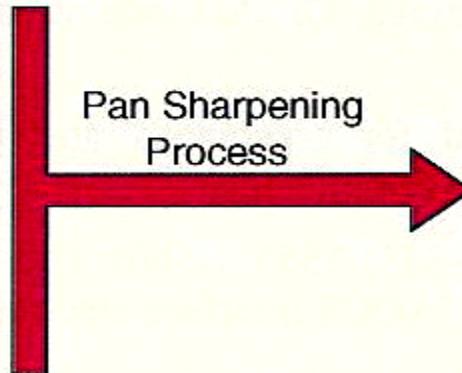
**ILLUSTRATION OF THE 2-DAYS FULL ACCESSIBILITY PERFORMANCE  
(WITH +/- 50° ROLL TILT)**

**With +/- 50 ° Roll Tilt  
2 Days Full Accessibility  
Performance**

Multispectral Image (Medium resolution)



Panchromatic Image (High resolution)



Pan Sharpened Image (High resolution)

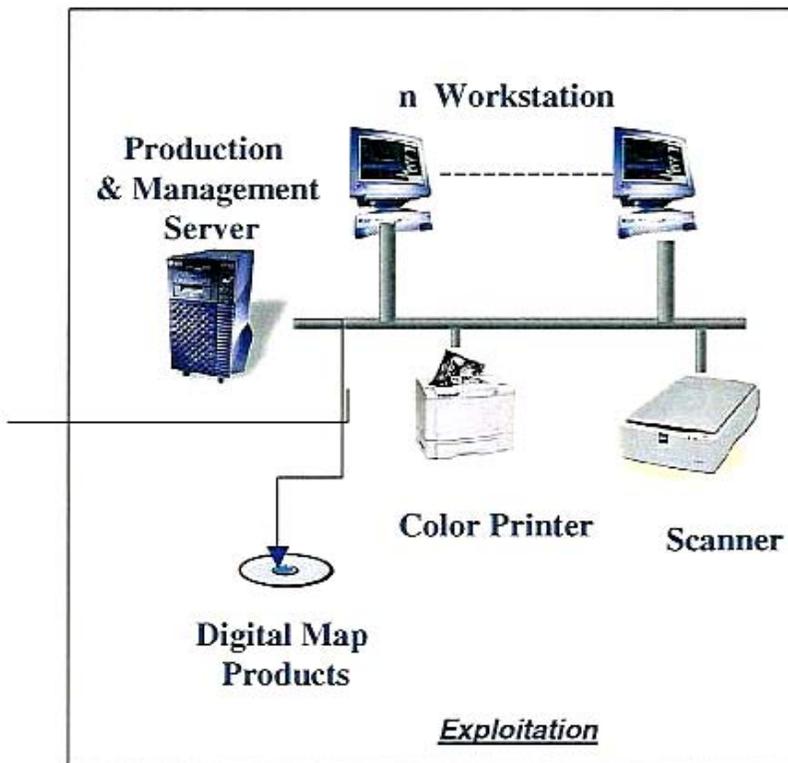


### **ILLUSTRATION OF THE PAN SHARPENING PROCESS**

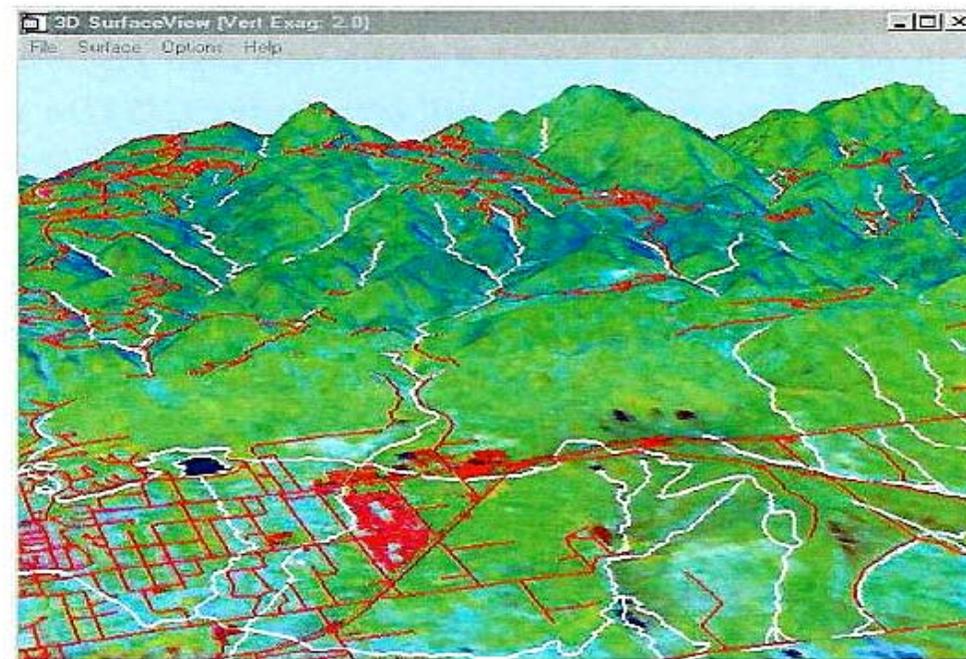
***The PAN sharpening technique allows the production of very detailed coloured images (with representative colors thanks to the choice of the 4 MS bands)***

**THEOS – The THAILAND EARTH OBSERVATION SYSTEM**  
**Technical Proposal**

**Section 1 : System Presentation**  
**Chapter 7 : THEOS Image Ground Segment**



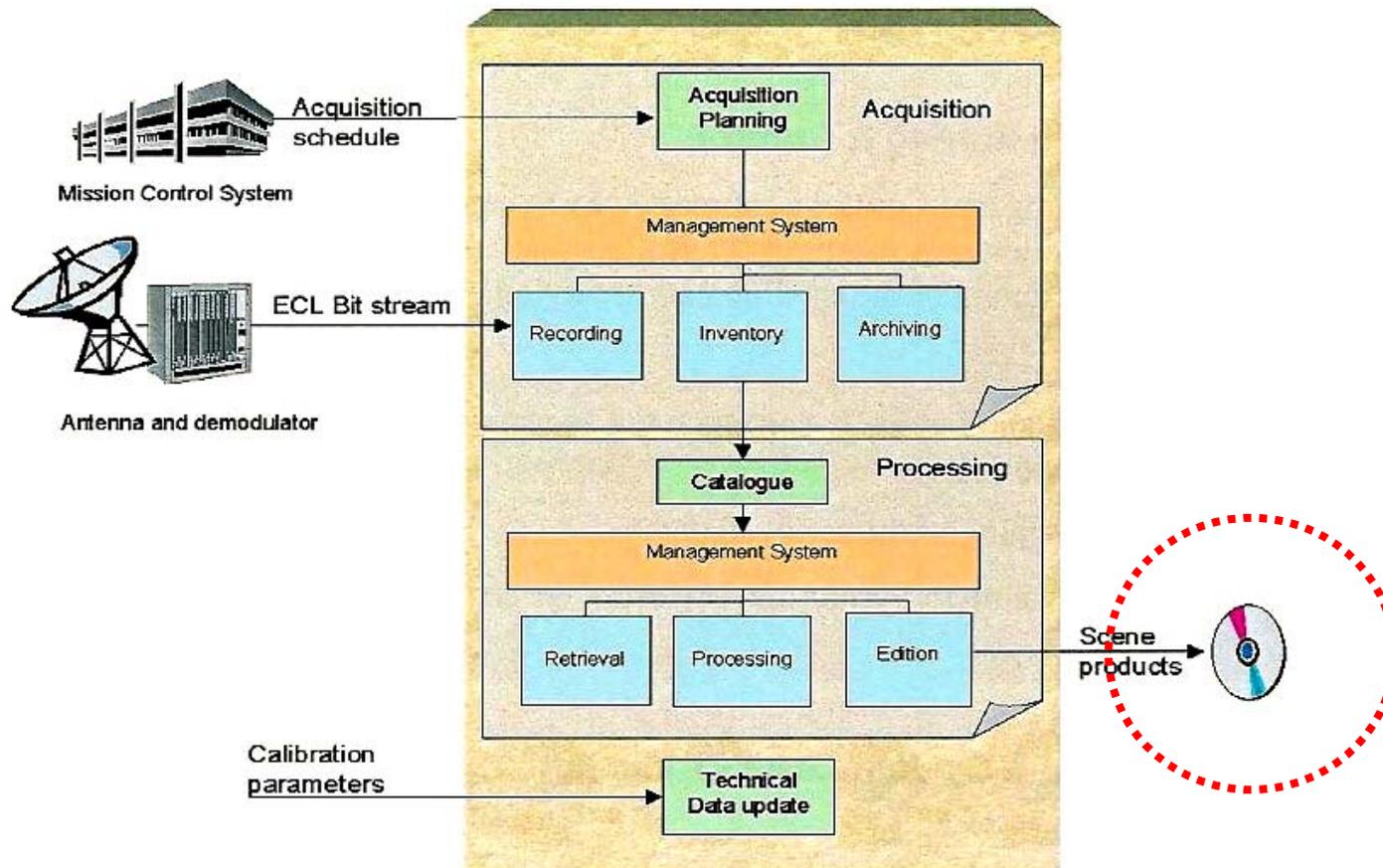
**Typical IGS-Exploitation hardware configuration**



**Example of DTM generation**

# THEOS – The THAILAND EARTH OBSERVATION SYSTEM Technical Proposal

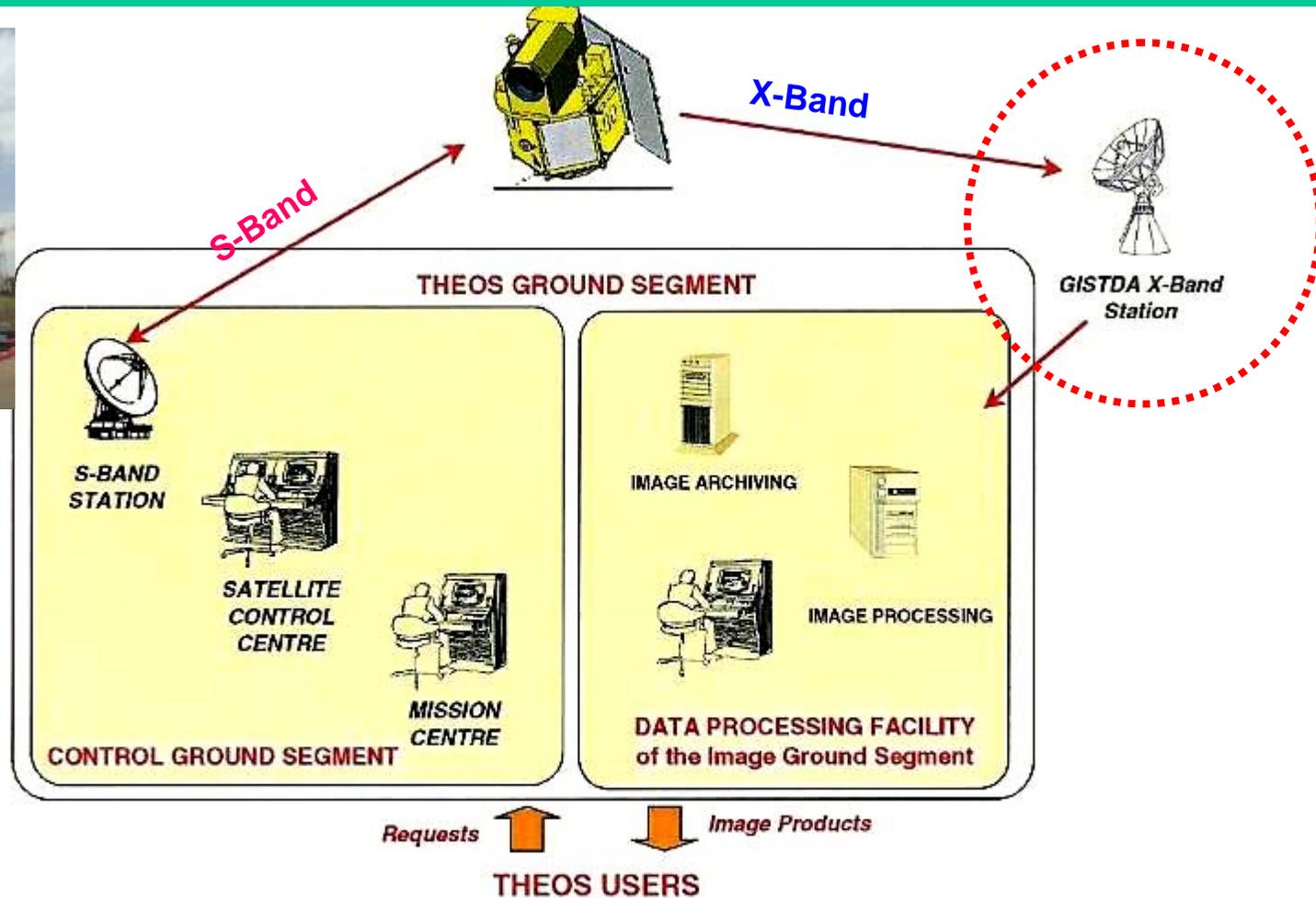
## Section 1 : System Presentation Chapter 7 : THEOS Image Ground Segment



**TYPICAL IGS-DPF FUNCTIONAL ARCHITECTURE OVERVIEW**

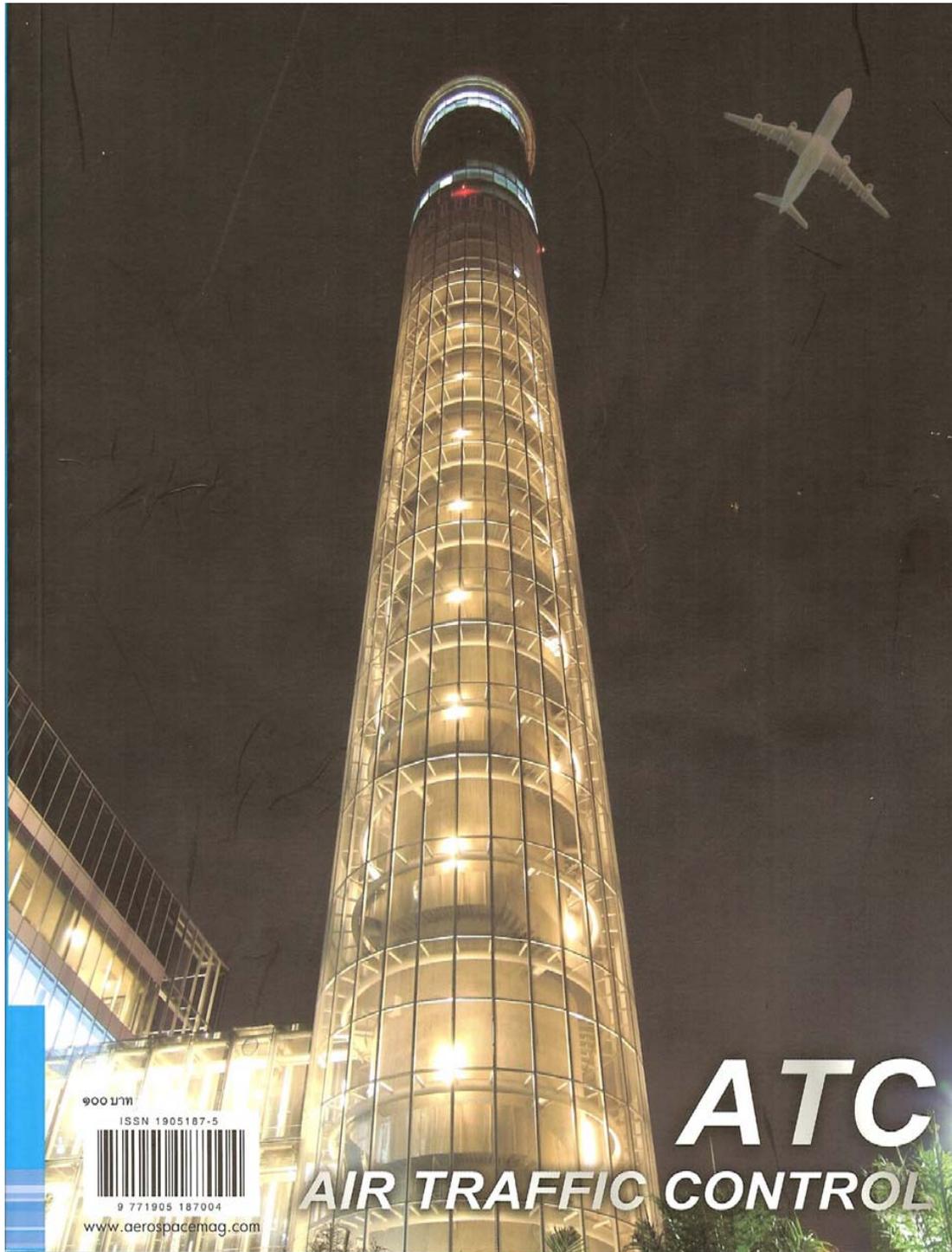


# THEOS Satellite

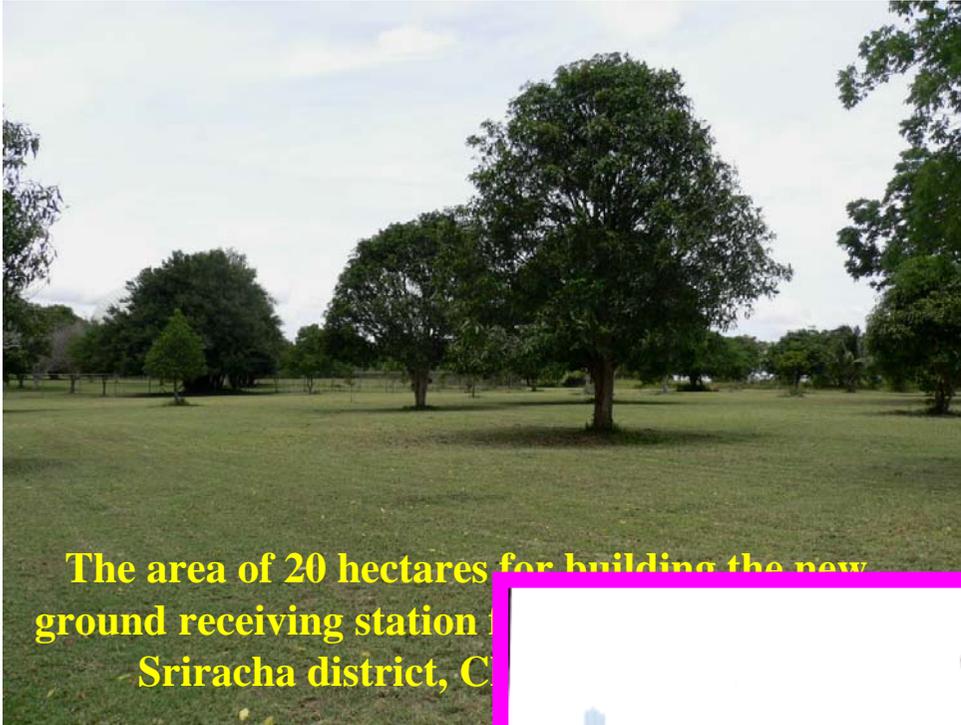


## UPDATED THEOS SYSTEM AND SATELLITE ARCHITECTURES

*A high performance THEOS mission can be performed with the proposed satellite a system characteristics*

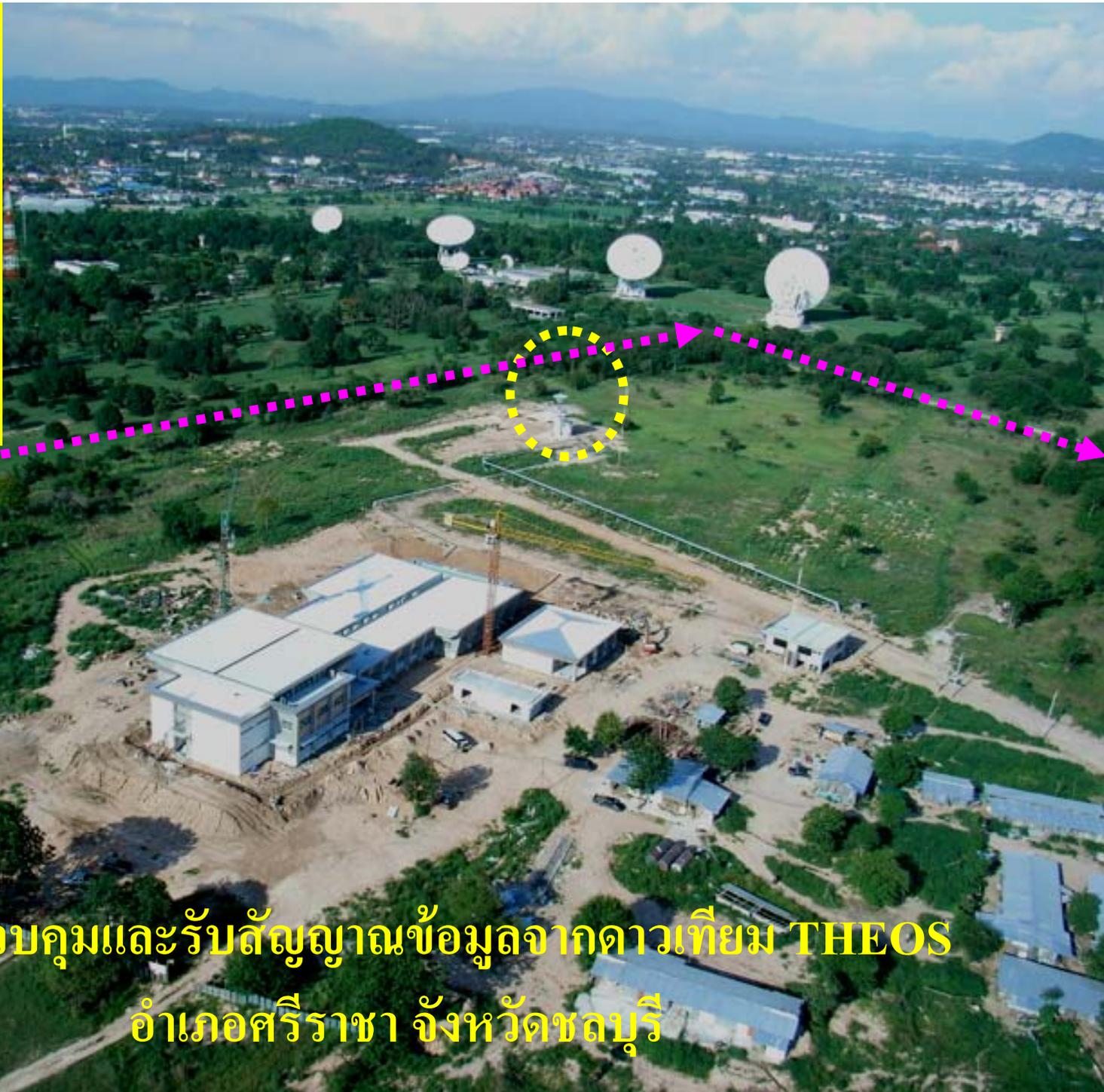


**The height of radar tower for controlling air traffic of Suvannabhumi Airport is 192 m. which will interfere the signal of S band of THEOS satellite**



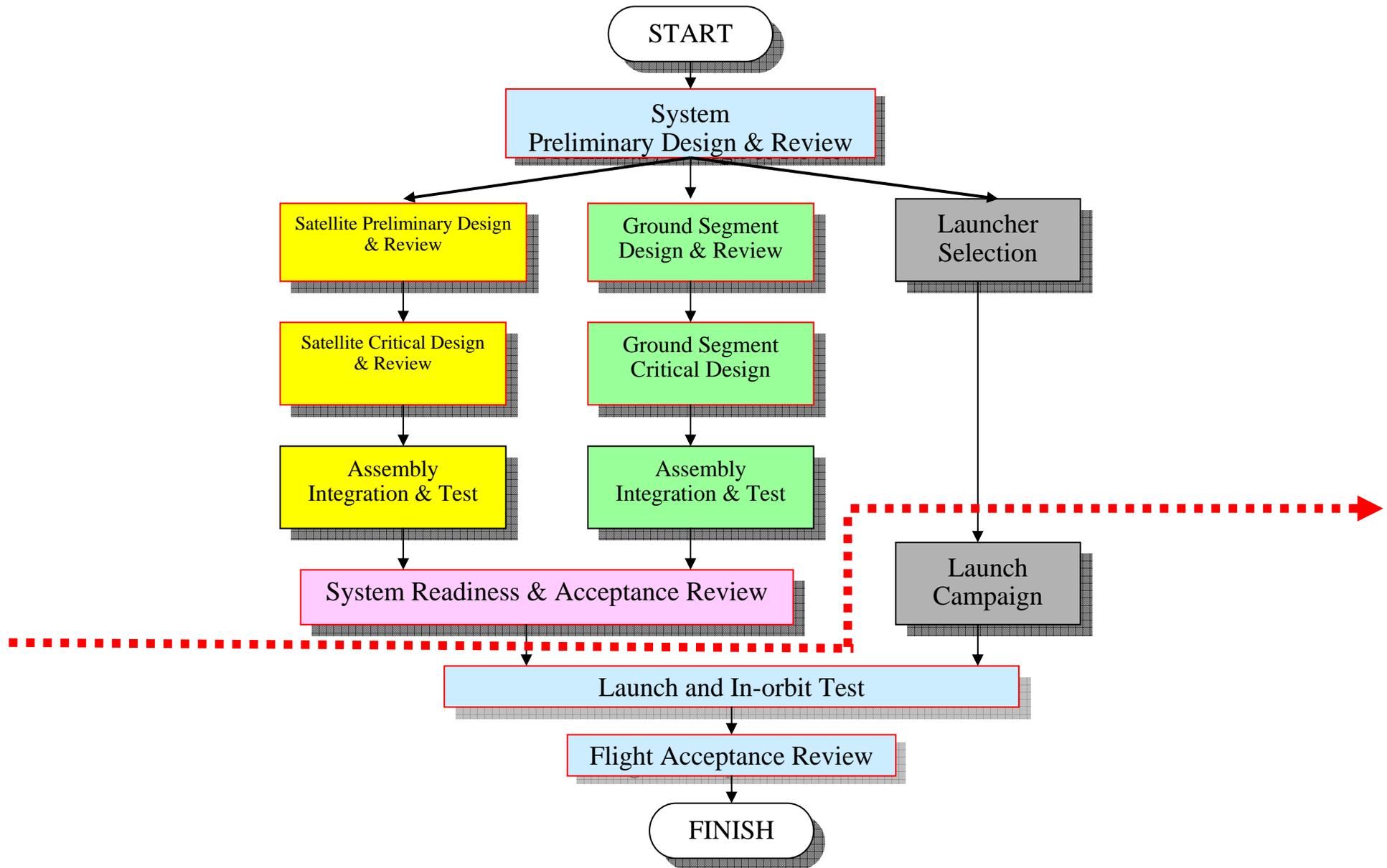


S-band station:



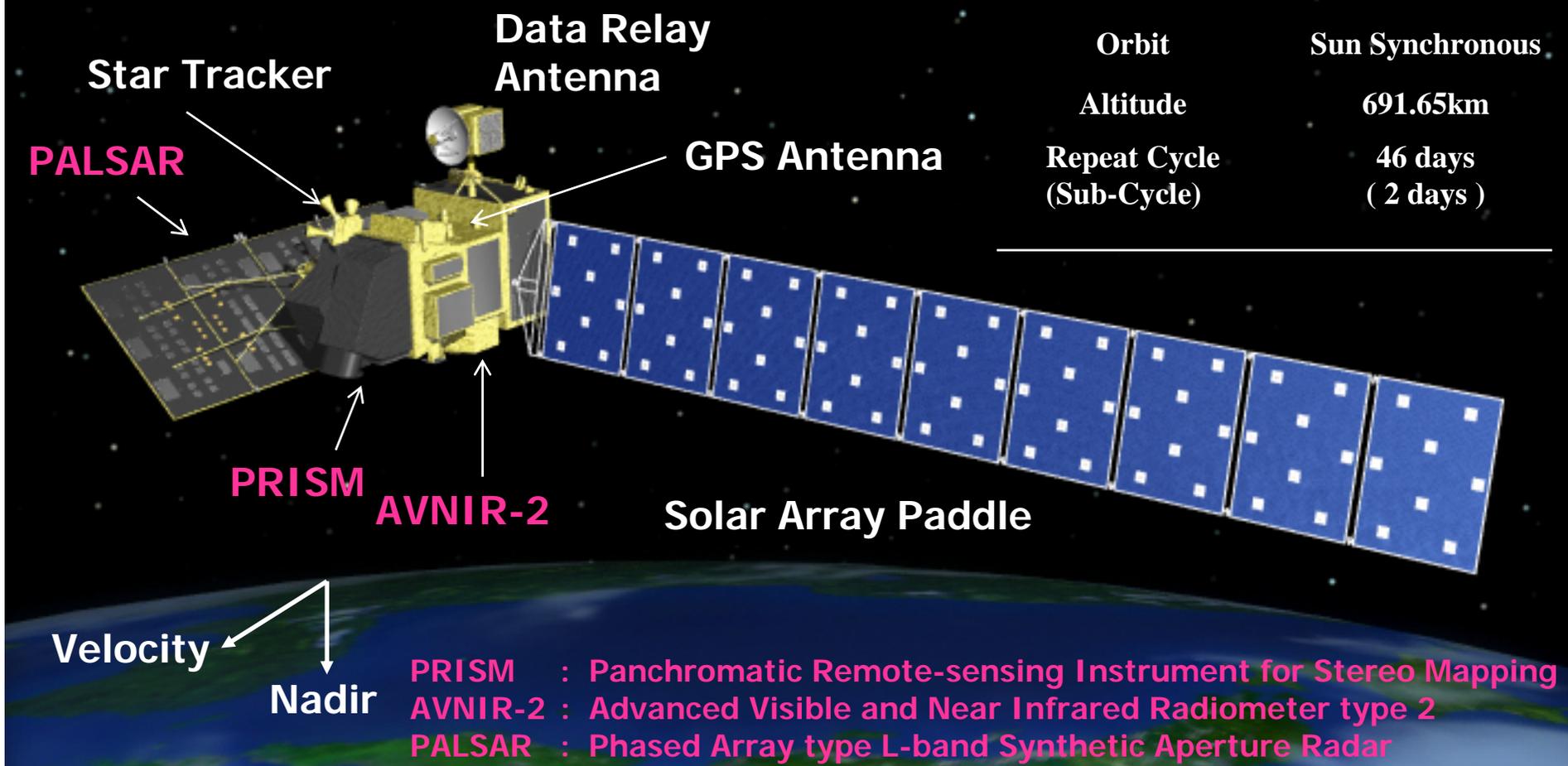
สถานีควบคุมและรับสัญญาณข้อมูลจากดาวเทียม THEOS  
อำเภอศรีราชา จังหวัดชลบุรี

# Status of THEOS Programme



# ALOS Satellite System

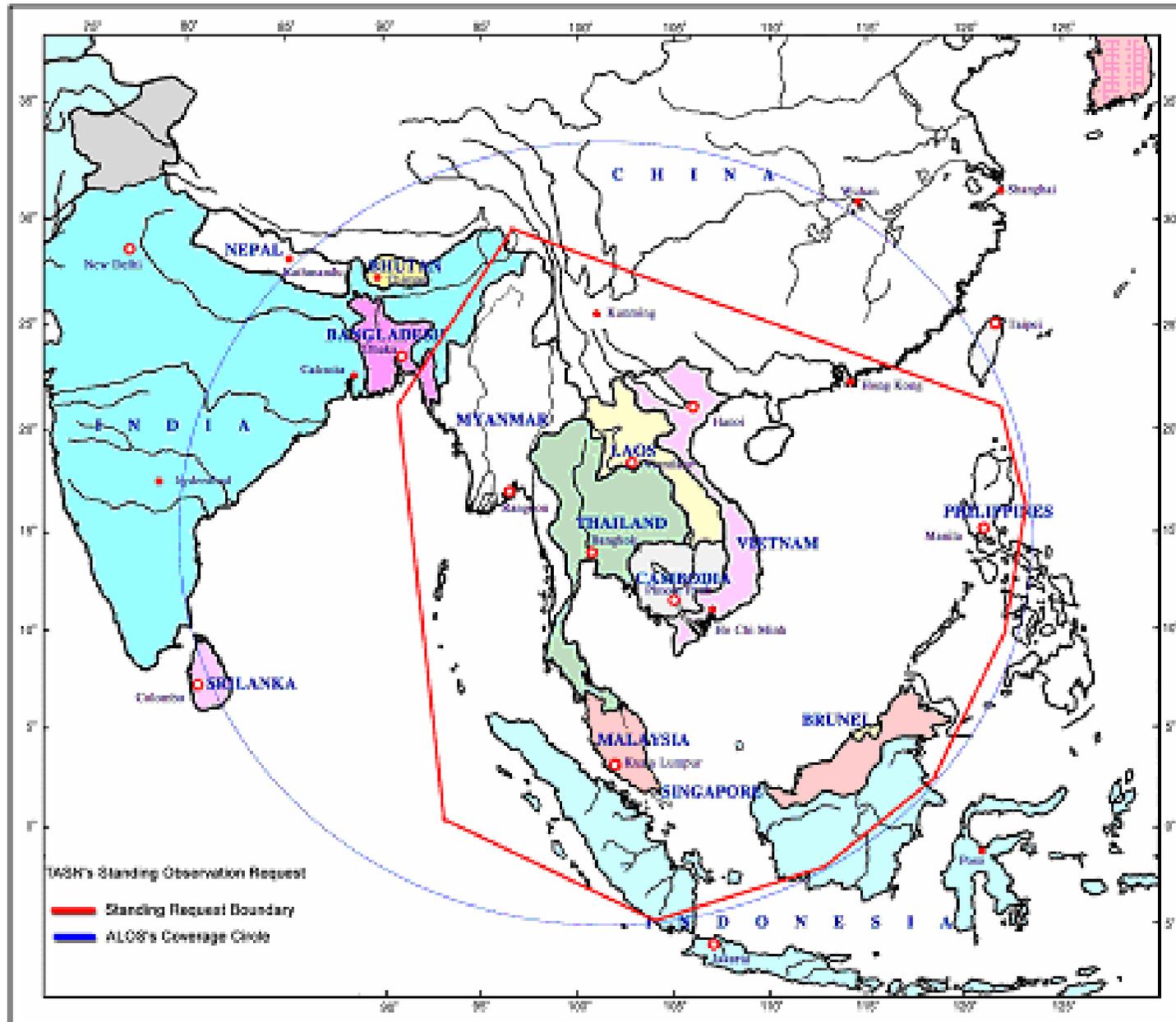
Launch Date	24 Jan. 2006
Launch Vehicle	H-IIA
Spacecraft Mass	about 4,000 kg
Generated Elec. Power	about 7kW at EOL
Orbit	Sun Synchronous
Altitude	691.65km
Repeat Cycle (Sub-Cycle)	46 days ( 2 days )



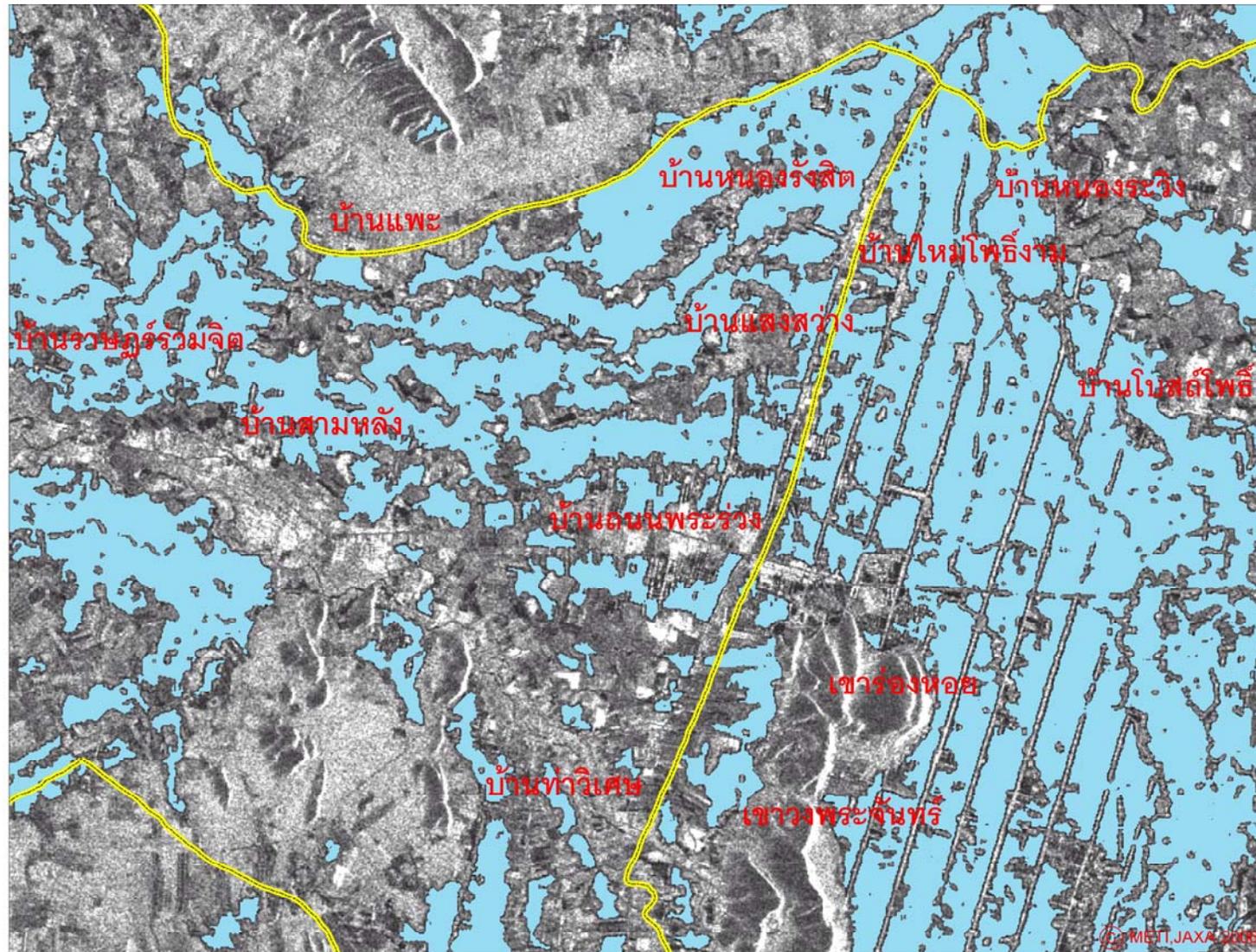
**Using ALOS Data for Flooding in Thailand**



# GISTDA ALOS COVERAGE MAP



# Flood Monitoring Using ALOS -PALSAR Part of Sukhothai Province

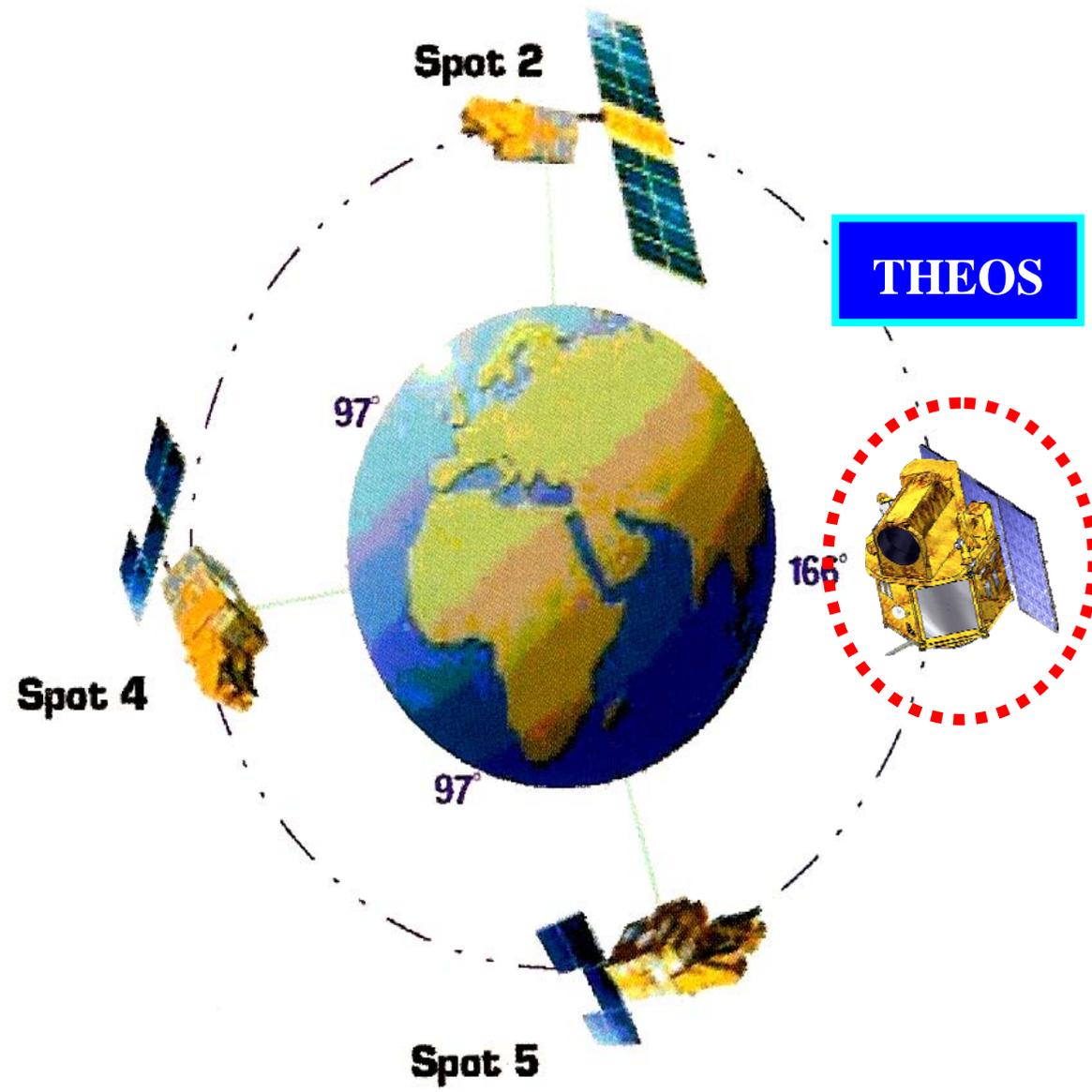


May 25, 2006

แนวแบ่งเขตอำเภอ

มาตราส่วน 1: 35,000

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Thank you for  
Your attention

**Website of GISTDA :**  
<http://www.gistda.or.th>

