Thailand’s EOS Activities: Toward Sustainable Development

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History of GISTDA

- Thailand has been involved in earth observation satellite technology since 1971.
- Thailand Ground Receiving Station has been in operation since 1982, as first of its kind in SEAsia.
- GISTDA was officially established as a public organization on November 2, 2000.
- Assumes responsibilities for space technology developments and geo-informatics of the country.
Headquarters, Chatuchak

Offices of GISTDA

Ground Receiving Station, Lad Krabang, Bangkok

Ground Control Station for THEOS, Sri Racha, Cholburi
New Office of GISTDA
Ground Receiving Station at Ladkrabang, Bangkok

5.4 m. antenna for receiving IKONOS

5.4 m. Antenna

10 m. Antenna

13 m. Antenna

3.6 m. Antenna

9 m. Antenna
Earth Observation Satellite Data Acquisition & Services

Current Status of Ground Receiving Station
- LANDSAT-5
- SPOT-2, 4 and 5
- RADARSAT-1
- ALOS (sub-node of JAXA)
- THEOS

Reseller: THEOS, QuickBird and ASTER

Satellite Data in Archive:
LANDSAT, SPOT, MOS, ERS, JERS, ADEOS, RADARSAT, IRS.
Objectives of GISTDA

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<th>Objective</th>
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<td>To develop space technology and geo-informatics applications for public concern</td>
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<td>To develop the satellite data base and the derived natural resources information center</td>
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<td>To provide data services relating to space technology and geo-informatics</td>
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<td>To provide technical services and help develop human resources in satellite remote sensing and geo-informatics</td>
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<td>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</td>
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<td>To be the core organization to establish common standards for remote sensing and geo-informatics systems</td>
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Signing Ceremony between GISTDA and EADS Astrium Company for Developing THEOS Satellite on 19 July 2004, Regency Room, Oriental Hotel, Bangkok
THEOS Human Resource Development

On-the-job training for 20 Thai engineers during THEOS design, assembly, integration and testing in Toulouse, France for 2 years.
THEOS
Satellite in clean room at Yasny launch site.
Launch Profile

1. Ejection from silo
2. 1st stage drop zone
3. 1st stage motor ignited
4. 1st stage drop zone
5. 1st stage separation
6. 2nd stage motor ignited
7. 2nd stage drop zone
8. 2nd stage motor shutdown, 2nd stage separation
9. Failing separation
10. Failing ann
11. 3rd stage motor ignited at full power, beginning of 3rd stage programmed 180-degree turn
12. 3rd stage motor separated, 3rd stage gets off the parking orbit
13. Tier A Platform Separation
14. Gas-dynamic shield separation
15. Spacecraft separation
16. End of 3rd stage programmed 180° turn and transfers all full-stage motors to throttled back operation mode

Profile
Kosmotras Launch Bases and Dnepr LV Flight Route for THEOS Launch
THEOS LAUNCH

- Launch Vehicle: DNEPR
- Launch Site: Yasny, Russia
Characteristic 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: 1 October 2008
System Performances - Accessibility

- Full accessibility in less than 5 days with up to 30° roll angle
- Accessibility is only 3 days for 80% of the area

30° roll angle
Revisit 5 days

System Performances - Accessibility

- Full accessibility in less than 2 days with up to 50° roll angle
- Accessibility is only one day for 90% of the area

50° roll angle
Revisit 2 days
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
Launch Campaign at Clean Room of Yasny, Russia
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

Available inclinations

Available launch sites

Yuzhnoye's launch vehicle payload capability

Launch services
The height of air traffic controller at Suvarna bhumi Airport is 132 m. The radar signal from this tower interferes the system at Lad Krabang Ground Receiving Station for controlling THEOS satellite.
Date of Launching THEOS

1st October 2008
THEOS Global Orbits

Swedish-GISTDA Cooperation: THEOS Polar Ground Station
THEOS LAUNCH

1st October 2008

13:37:16
13:52:34
THEOS SC Separation
A high performance THEOS mission can be performed with the proposed satellite and system characteristics.
THEOS First Images

Latkrabang Ground Receiving Station, October 3rd, 2008
First THEOS multi-spectral image (GSD : 15 meters) over Phuket island
3rd of October 2008  10h11 local time
First THEOS multi-spectral image over (GSD : 15 meters) Phuket island
(3rd of October 2008  10h11 local time)
First THEOS panchromatic image (GSD : 2 meters) over Phuket island (3rd of October 2008 10h11 local time)
First Image of Bangkok, Thailand on 3 October 2008

- Rama IV Road
- Waterford Park Condominium
- Port Authority of Thailand
- Klong Hua Lamphong
- Klong Pra Kanong
- PTT Fuel Store Tanks
- Bangkok Mass Transit Sky Train
- Sukhumvit Road
- Sathorn Road
- Pan. 2 m.
Image from QuickBird Multispectral Resolution .61 m.

Image from THEOS Panchromatic Resolution 2 m.
From parking orbit at 690 km. from the earth THEOS was moved up to operating orbit at 822 km. within 2 weeks.
THEOS IMAGES OF THAILAND
Suvarnabhumi Airport, Samut Prakan
Don Muang International Airport, Bangkok
THEOS IMAGES
OF OTHER COUNTRIES
Forbidden Palace, Beijing, China, 19th October 2008
Los Angeles, USA, 19th October 2008
Hanoi, Vietnam, 13rd November 2008

Baudinh Square
and
Ho Chi Minh Museum
REAL TIME SATELLITE TRACKING powered by AJAX

MOST POPULAR
ISS (ZARYA)
CHANDRAYAAN-1
VENESAT-1
GOES 19
NAVSAT 62
USA
TOP 50

LATEST LAUNCHES
VENESAT-1
SHUJAN-6F
SHUJAN-6E
COSMO-SKYMED 3
CHANDRAYAAN-1
LAST 50

POPULAR CATEGORIES
GEOSTATIONARY BRIGHTEST
WEATHER
NOAA
IRIDIUM
GLOBALSTAR
MILITARY
AMATEUR RADIO
GPS
OPERATIONAL
TV SATELLITES

LIVE IN YOUR SKY
GPS SATELLITES
IRIDIUM SATELLITES
GLOBALSTAR SATELLITES
SIRIUS/XM SATELLITES
WHAT'S UP?

OTHER SATELLITE FEATURES
ALL CATEGORIES
BROWSE BY LAUNCH
HURRICANE TRACKING
SEND FEEDBACK
PREFERENCES
SATELLITE NEWS
FAQ
SATELLITE LINKS
SEARCH DATABASE
SUPPORT
NZYO.COM

YOUR CURRENT SELECTION
THEOS

Wed, 5 Nov 2008 06:14:20 UTC
Latitude: -52.03°
Longitude: 44°
Right Ascension: 6h 55m 3s
Declination: +54° 41' 5"
Azimuth: 211.4°
Elevation: -36.84°
Altitude [km]: 846.04
Altitude [miles]: 524.54
Speed [km/s]: 7.53
Speed [miles/s]: 4.87
Eclipsed? NO

5 day predictions with graphics
This map is showing all satellites as seen on the sky above an elevation of 60°. Satellite debris is not displayed.

Draw lines
Show satellites as text
Keep current selection centered

YOUR CURRENT LOCATION
Your IP address: 203.146.189.100
Latitude: 13.75°
Longitude: 100.517°
Magnetic declination: 0° -42° EAST
Set your custom location

VSAT Broadband Internet

www.ts2.nl

Broadband Satellite and Military Communications Systems

Thuaya & Iridium Satellite Phones

203.146.189.100

Razr
Conclusion

• Thailand has engaged in EOS activities more than three decades

• Significant progress of EOS in Thailand can be declared in 2008 with a successful launch of THEOS

• Thailand is stepping toward operation and sustainable development with its full function in EO activities: satellite operator, ground receiving station, data distribution and services, capacity building.
Website of GISTDA

: http://www.gistda.or.th