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**NATIONAL SPACE AGENCY** • MINISTRY OF SCIENCE, TECHNOLOGY AND INNOVATION

# **MALAYSIA REPORT TO GEOSS AP SYMPOSIUM: Working Together Towards a Secure and Prosperous Society**

**Mustafa Din Subari**  
National Space Agency  
(ANGKASA)

# Vision and Mission

## Ministry of Science, Technology and Innovation (MOSTI)

### Vision

**“Science, Technology and Innovation for knowledge generation, wealth creation and societal well-being.”**

### Mission

**“Harnessing Science, Technology and Innovation (STI) and human capital to value-add the agricultural and industrial sectors and to develop the new economy, particularly through information and communications technology (ICT), and biotechnology.”**



# 5 Clusters Of MOSTI

- Information Technology
- Biotechnology
- Sea-To-Space (S2S)
- Industry
- Service



# Sea-To-Space MOSTI Cluster



- National Space Agency (ANGKASA)



- Malaysian Meteorological Department (MMD)



- Malaysian Centre for Remote Sensing (MACRES)



- National Oceanography Directorate (NOD)



- Astronautic Technology (M) Sdn Bhd (ATSB)



# House Of Sea-To-Space

**S2S**

**Earth Observation**

**Disaster Management**

**Technology Development**

**Human Capital  
Development**

**Awareness & Outreach**

**Capacity and Capability Building**



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Agency for Air Force, Malaysia, Malaysia

# S2S Core Strategy

## Capacity and Capability Building in Sea-to-Space Cluster for:

- Knowledge Generation
- Wealth Creation
- Societal & National Well-Being





# Thrust Areas of Common Endeavour under S2S Core Strategy

- Earth Observation
- Disaster Management
- Technology Development
- Human & Capital Development
- Awareness & Outreach



# Earth Observation Programme

- Space-and Air-borne Remote Sensing Technology Development & Applications
- Water and Ocean Monitoring and Forecasting
- Marine Exploration
- Seismic Activity & Tsunami Monitoring
- Meteorology-Oceanographic Interaction
- Sun-Earth Relationship



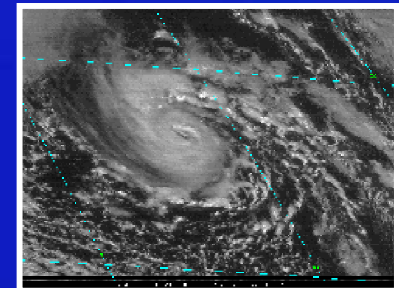
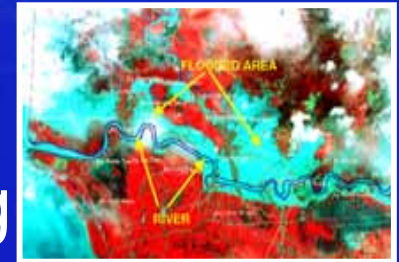
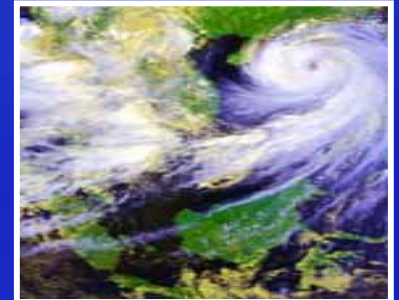
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# Disaster Management Programme

- Earthquake Information
- Tsunami Early Warning
- Forest Fire / Haze Monitoring
- Flood Monitoring
- Landslide Monitoring
- Oil Spills Monitoring
- Industrial “Hot” Installations Monitoring



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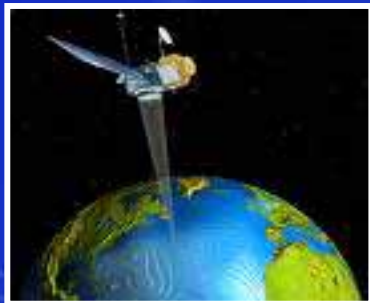
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# Technology Development

- Payload & Control Systems Development
- Communications Satellite
- Global Navigation Satellite System (GNSS) Augmentation



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# Human Capital Development Programme

- Professional Development
- Angkasawan Programme



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Science and Technology Malaysia



# Awareness & Outreach Programme

- Public Awareness & Education, in Particular Schools & Rural Communities.



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Science and Technology Malaysia

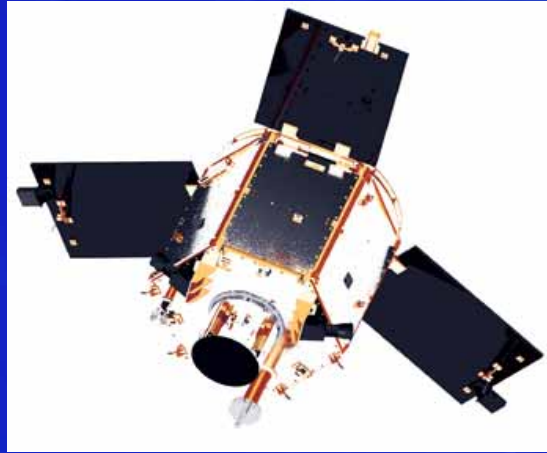
# Possible Collaboration Activities

- RazakSAT
- Tsunami Early Warning System
- National Disaster Data and Information Management (NADDI)
- SEA Fire Danger Rating System (FDRS)
- Langkawi National Observatory
- Malaysian Space Centre





# RazakSAT



- A Medium Aperture Camera Satellite (RazakSAT™) Malaysia's own small satellite will be able to provide specific and timely data for its users in Malaysia as well as being able to cater to the needs of countries located on the equatorial belt. The RazakSAT™ spacecraft is a small LEO satellite.
- It carries an electro-optical payload, a Medium-sized Aperture Camera (MAC) a pushbroom camera with 5 linear detectors (1 panchromatic, 4 multi-spectral).
- The RazakSAT™ satellite will be operated through its ground segment in Malaysia, consisting of a Mission Control Station (MCS) and Image Receiving and Processing Station (IRPS). ATSB's engineers are operators at the MCS and they will execute RazakSAT™'s mission plan, command generation and telemetry receiving, archiving and analysis.
- The IRPS will receive and archive images for post processing and distribution to the users.



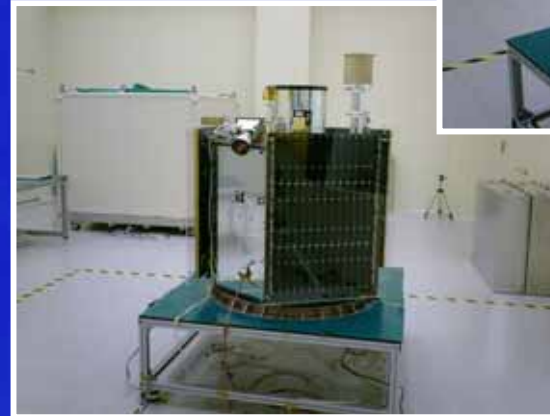
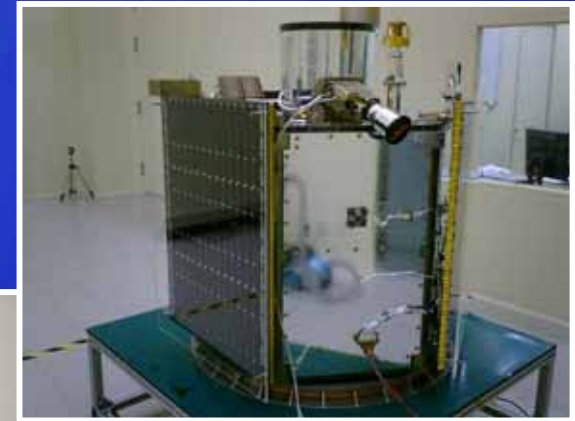
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# RazakSAT

## Specification

Subsystems	Specifications
Altitude	600-800 km
Inclination	7° ~ 9°
Payload (MAC)	GSD : 2.5 m (PAN), 5 m (MS) Swathwidth : 20 km @ 685 km
Attitude Determination & Control Subsystem (ADCS)	Three-axis stabilization based on four (reaction wheels) Pointing Accuracy : < 0.2° (2 $\sigma$ ) Pointing Knowledge : 1 arcmin (2 $\sigma$ )
Electrical Power Subsystem (EPS)	GaAs/Ge solar cells on honeycomb substrate NiCd batteries (18 Ahr) Peak Power Tracking (PPT) & constant current control Solar Power : >300 W @ EOL
Command & Data Handling Subsystem (C&DH)	Two on-board computers Telemetry and command interface modules Analog Telemetry channels : up to 90 Digital Telemetry channels : up to 120
Telecommunication Subsystem (TS)	9600 bps / 1200 bps S-brand TT&C uplink 38.4 kbps / 9600 bps / 1200 bps S-brand TT&C downlink
Payload Data Management	32 Gbits On-board solid-state memory 30 Mbps X-brand payload data downlink
Structure & Thermal	Ø1200 x 1200 mm Hexagonal shape Mass : < 200 kg Modular structure Passive & Active thermal control
Mission Lifetime	>3 years



## Payload Specification

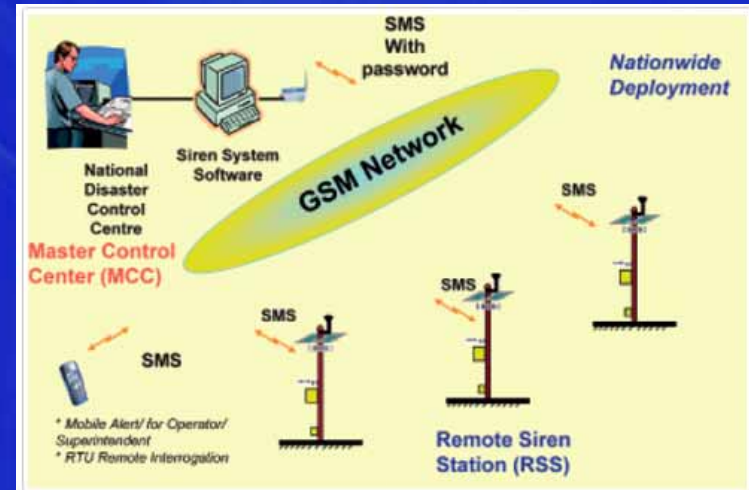
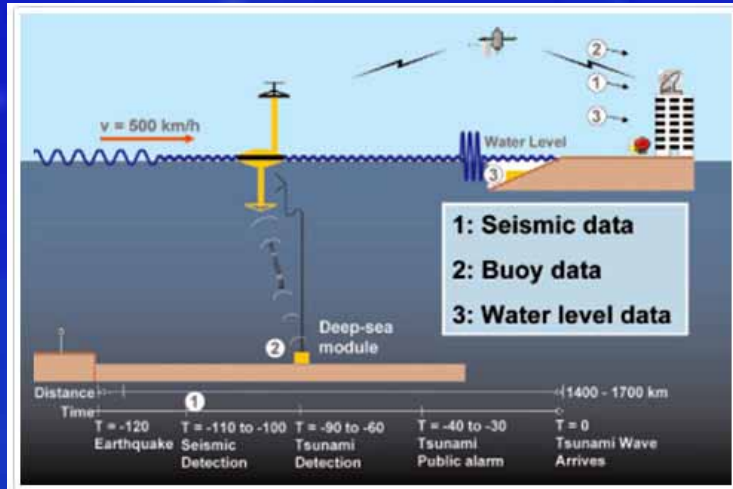
Spectral Bands	1 panchromatic Band 4 Multispectral Bands	510-730 nm 450 - 890 nm
Ground Sampling Distance (GSD)	PAN : 2.5 m MS : 5.0 m	at 685 km
Swath Width	20 km	at 685 km
Signal to Noise Ratio	> 70	
Quantization	> 8 bits	For all bands
Signal Gain	Programmable	
Mass Storage	32 Gbits	(approximately 500 km image strip)
Mission Lifetime	> 3 years	



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# Tsunami Early Warning System

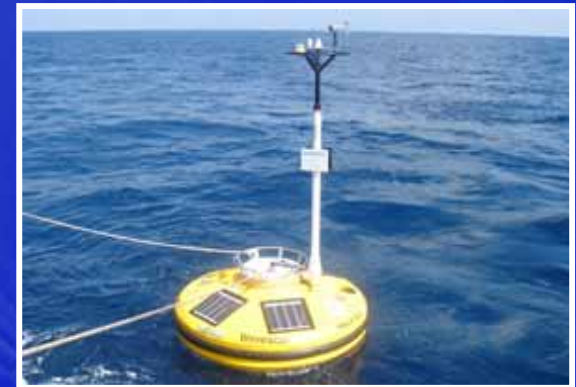
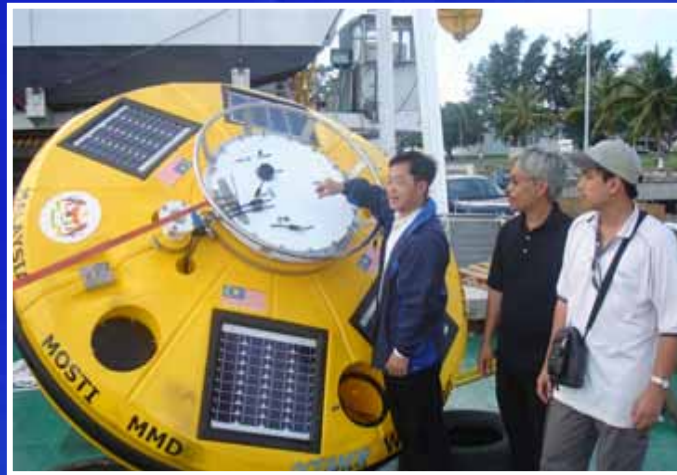


- Real-time continuous monitoring of earthquake and tsunami on 24-hour basis
- Issuance of information, advisory, notice, early warning and warning on the occurrence of earthquake and tsunami that threaten the security and safety of a country.
- Integral part of regional and global tsunami warning systems coordinated by the Intergovernmental Oceanic Commission (IOC), UNESCO.





# Tsunami Early Warning System



- First tsunami buoy near the Andaman Sea off Rondo Island, Indonesia
- Second tsunami buoy at Pulau Layang-Layang, South China Sea
- Third buoy will be deploy within east of Sabah.



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**Earthquake/Tsunami Alert** (IDM20024)  
7:12 pagi, 27hb Dis 2006

## REVISION OF EARTHQUAKE INFORMATION

Issued by Malaysian Meteorological Department  
Ministry of Science, Technology & Innovation  
at 7.12 am 27/12/2006

**This is a revision of the earthquake information issued at 7.03 am.**

A moderate earthquake has occurred with these revised parameters:

Time of Occurrence : 6.56 am on 27 December 2006

Coordinates : 2.4 North 126.1 East

Location : Molucca Passage, 176km Northeast of Manado, Indonesia, 912km Southeast of Tawau.

Magnitude : 5.5 on Richter scale

### Assessment

No tsunami threat.

This will be the final information issued by the department for this event unless there are further developments or additional information becomes available

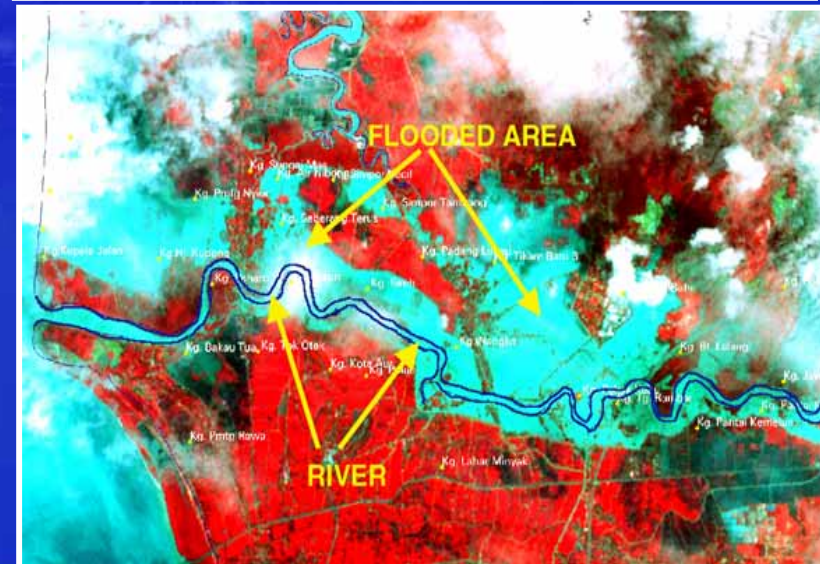




# National Disaster Data and Information Management (NADDI)

NADDI is developed with the objective of establishing a central system for collecting, storing, processing, analyzing and disseminating value-added data and information to support the National Security Division of the Prime Minister's Department and relevant agencies in the management of major disasters in the country. The system consists of three components,

- (i) Early Warning;
- (ii) Detection and Monitoring
- (iii) Mitigation and Relief.



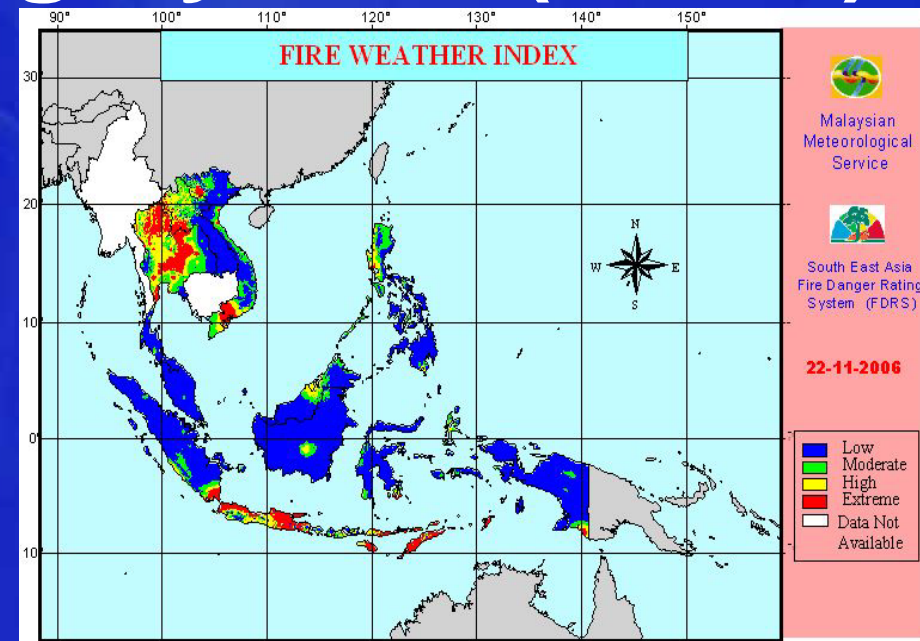
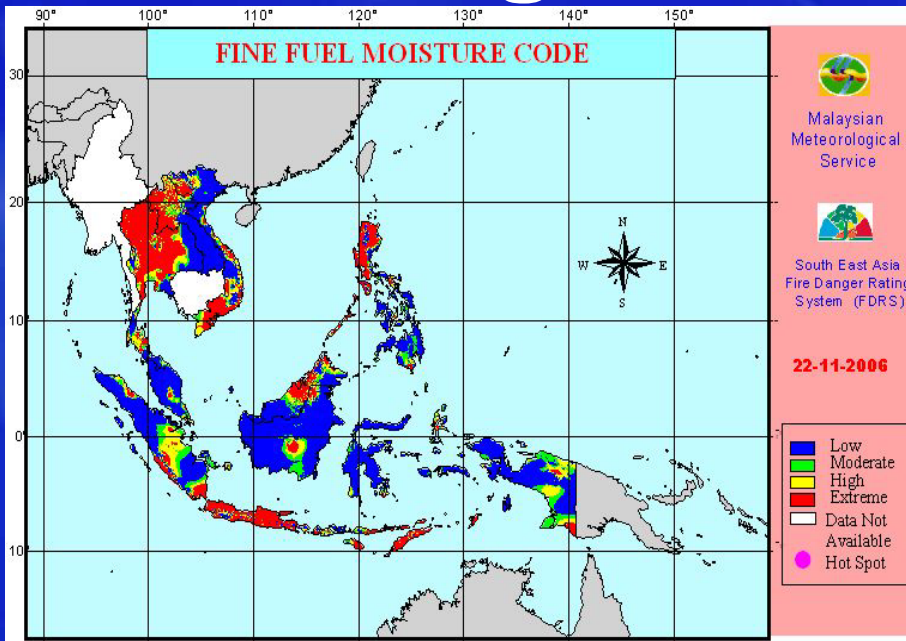
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# Southeast Asia Fire Danger Rating System (FDRS)



In 1997/98, extensive forest fire in one of the ASEAN country caused widespread haze in the SEA region. This significantly affected the tourism industries, the health of the population and the environment. The total loss was estimated to be US \$9 billion. In response to this environmental disaster, the SEA Environment Ministers initiated a Regional Haze Action Plan. As part of this Action Plan, a monitoring and warning system for forest/vegetation fires need to be developed and implemented. Adopted from the Canadian Forest Fire Danger Rating System, the SEA Fire Danger Rating System (FDRS) was subsequently developed and implemented



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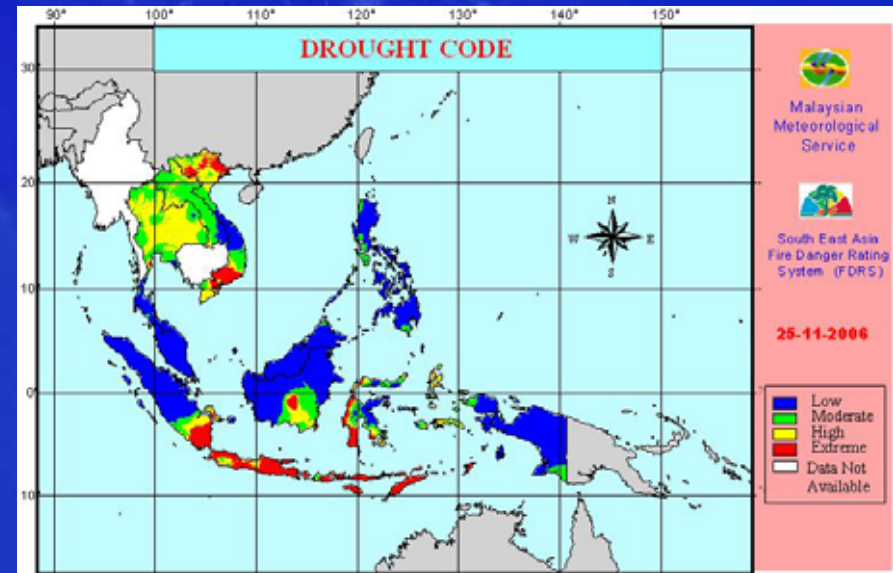
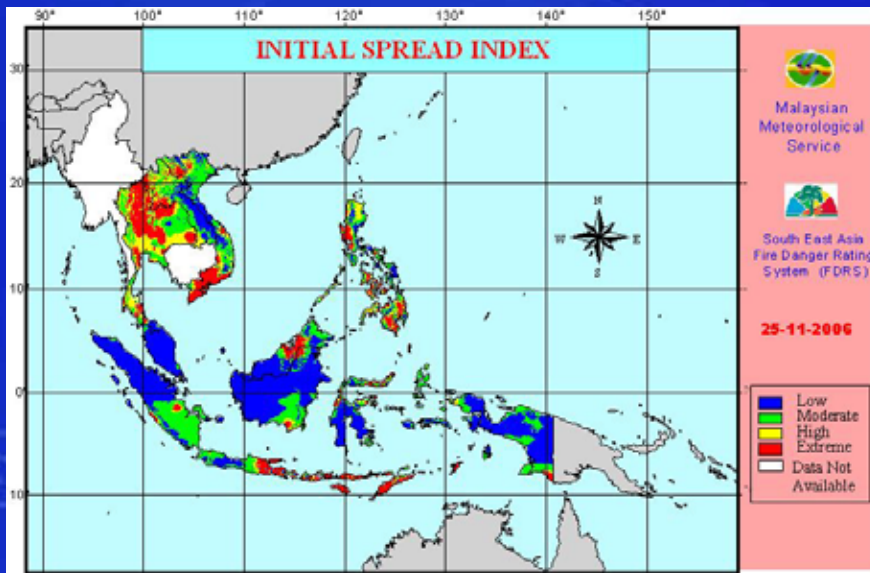
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# Southeast Asia

## Fire Danger Rating System (FDRS)

The FDRS is a system that monitors forest/vegetation fires risk and supplies information that assists in fire management. The products of FDRS can be used to predict fire behaviour and can be used as a guide to policy-makers in developing actions to protect life, property and the environment.

The meteorological variables used (Temperature, Relative Humidity, Rainfall, Wind Speed) are those measured at meteorological stations throughout the Southeast Asia region that are made available on the Global Telecommunication System (GTS). Spatial Analysis is carried out using the ArcView software.



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# Langkawi National Observatory



## The Malaysian Robotic Observatory

The objectives of the LNO are to develop the capability of using the telescope among the local and international scientists and to contribute the development of space science knowledge in Malaysia. The objectives are as followed:

1. To develop and enhance the Malaysians understanding of space science
2. As the facilities for especially Malaysia researchers and Malaysians to do the astronomy or astrophysics research more deeply and systematic with the complete infrastructures
3. To enhance the awareness of science, technology and innovation to develop the creative and innovative culture
4. To make the National Observatory as a part of international cooperation netting in the astronomy and solar physics research



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# Langkawi National Observatory



The concept of robotic observatories is to have all the equipments and linked instruments work together and automatically controlled as an automated system. The basic equipments that automatically work together are the mounting, the primary and secondary telescope, focuser, the CCD's camera, the spectrograph, the dome, the weather sensor and auxiliary equipment. All are web integrated / internet control.



There are three (3) modes of operations (control systems) of the observatories as below:

- i) On-site control will also be available (observer present at the observatory)
- ii) Access Remote PC will be the secondary control software and should be used only by the authority and experienced astronomer
- iii) Web Based Control System is proposed to be the primary integrated control for robotic observatory



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Geography and Technology in Malaysia

# Malaysia Space Centre

The development of Malaysia Space Centre began towards the end of 2004. This centre is situated in a 400 acre land in Sungai Lang, Banting, Selangor. The first phase involved the development of the Mission Operations Centre (MOC) and was completed in 5th May 2005.

## Mission Operations Centre

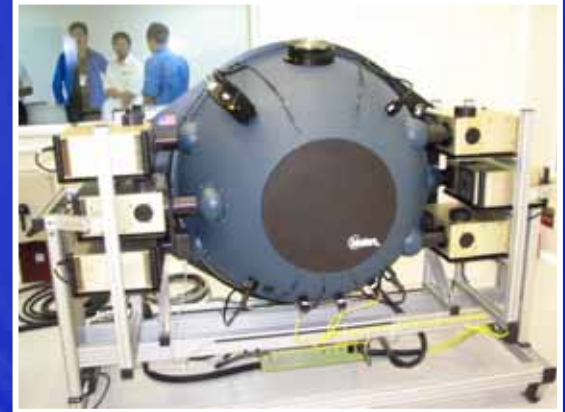
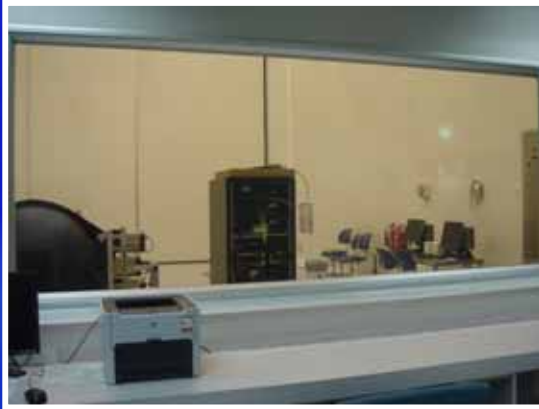
The function of the Mission Operations Centre is to control and maintain the satellites operations and this centre is equipped with communications equipment capable of communicating with the satellites launched into lower orbits and middle orbits (LEO & MEO)



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# Malaysia Space Centre



## Role of Mission Operation Centre

The main role of the Mission Operations Centre (MOC) is Tracking, Telemetry dan Monitoring (TT&C) of satellites. MOC consists of Mission Station Control (MSC) and Image Receiving & Processing Station (IRPS). MOC is responsible for: In-Orbit Commissioning of national satellites. In-Orbit operations of national satellites.

Supporting national space earth-to-earth and space-to-earth communication requirement. Providing international access for collaboratives values in tracking, command and control of satellites. The Assembly, Integration and Test (AIT) facility are ready to be utilized by the government and internationally.



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Shah Alam, Selangor, Malaysia



# Thank You

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