METEOROLOGICAL SERVICE SINGAPORE

Country Report - Singapore

The 5th Meeting of the Coordinating Group of the RA II WIGOS Satellite Project

Vladivostok city, Russky Island, Russia
Far Eastern Federal University

21 October 2017

Outline

I. Introduction

II. Overview of Meteorological Service Singapore

III. Observation system and network

IV. Collection, processing and utilization of satellite data and products

V. Satellite data to address regional challenges

Introduction and Overview of Meteorological Service Singapore (MSS)

Meteorological Service Singapore is the National Authority for Weather and Climate

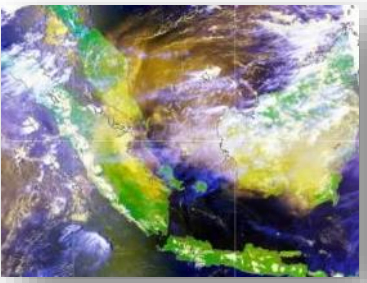
MISSION			
To observe and understand the weather and climate affecting Singapore and to provide services in support of national needs and international co-operation.			
Collect and maintain reliable long-term national weather records	Conduct high quality research to advance understanding and prediction of the weather and climate of Singapore and the region	Provide reliable weather and climate services	Perform risk and impact assessment of natural environmental hazards

Remit and Key Services

- **Weather Forecast and Warning Services**
  Support Safe and Efficient Operations and Better Prepare for Severe Weather

- **Monitoring and Early Warning Of Multi-Hazards**
  Enable Agencies to Better Plan and Prepare for Hazard

Serve a wide spectrum of customers and users



Transboundary Haze

Tropical Cyclone

Seismic/Tsunami

Volcanic Eruption

Radioactive Fallout

Observation System and Network

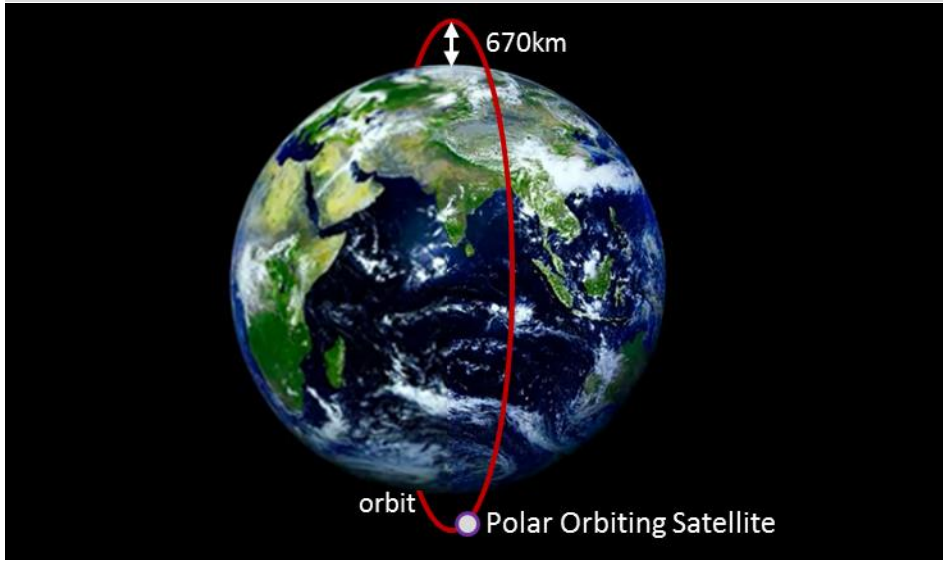
MSS' Observation Network

- WMO Climate Station
- WMO Synoptic Weather Station
- Aeronautical Met Station

Collection, Processing and Utilisation of Satellite Data and Products

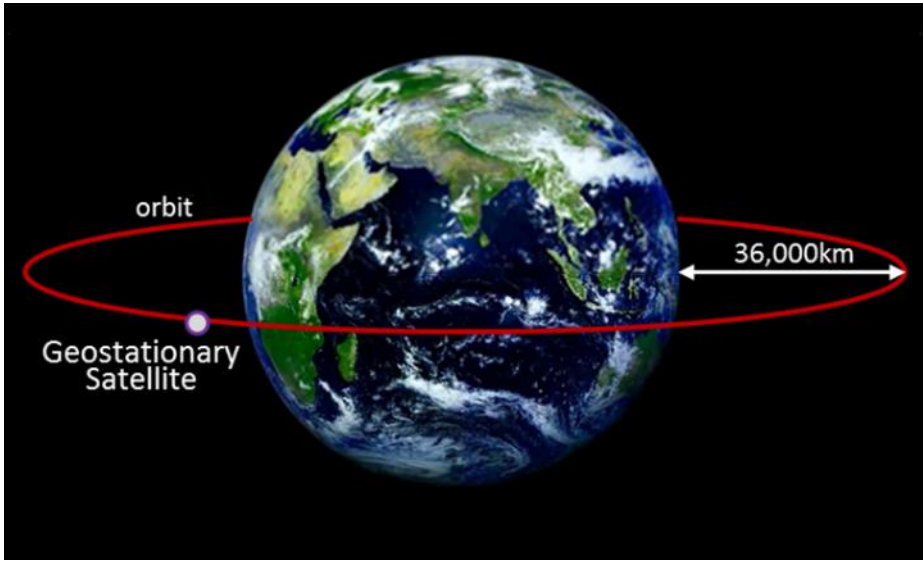
MSS Satellite Processing System

LEO Satellites



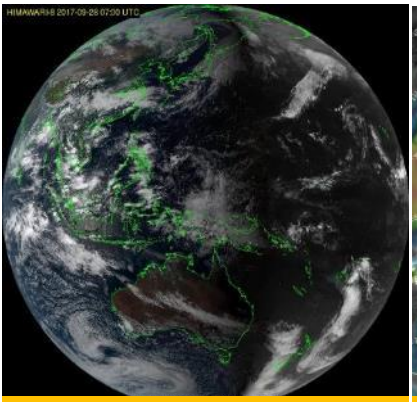
- Suomi-NPP
  - VIIRS, ATMS, CRIS
- NOAA-18/19
  - AVHRR, MHS, HIRS
- NASA EOS TERRA, AQUA
  - MODIS
- METOP-A/B
  - AVHRR, MHS, HIRS, IASI

GEO Satellites

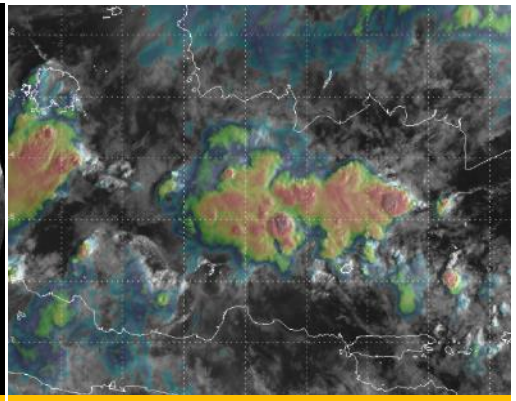


- Himawari-8
  - HimawariCloud and HimawariCAST
- FY-2G/E
  - Direct broadcast reception

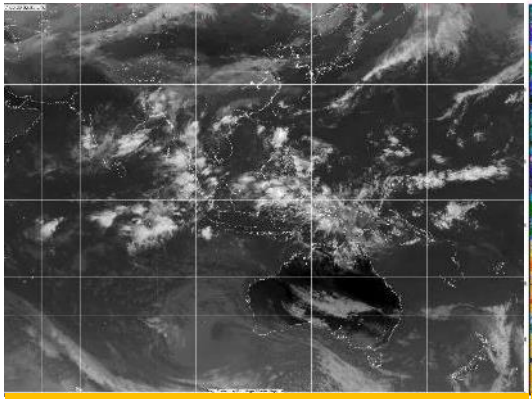
Examples of Operational Products (GEO)



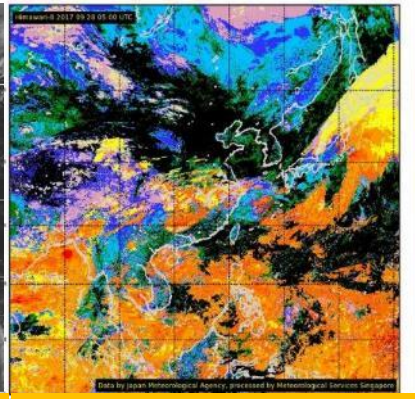
True Color RGB



VIS-IR Sandwich Product

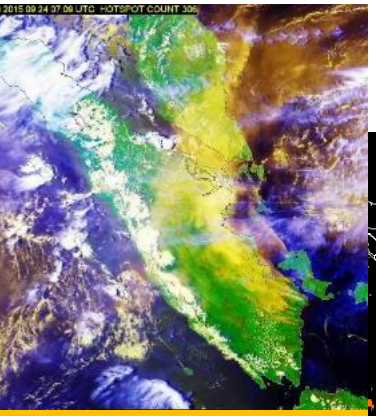


FY and H-8 Mosaic Composite

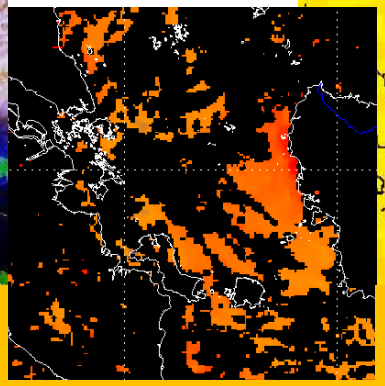


H-8 Cloud Top Heights / Classification

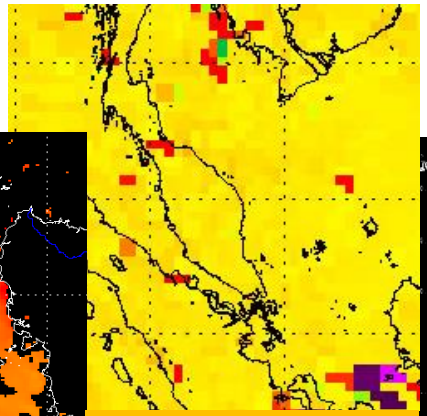
Examples of Operational Products (LEO)



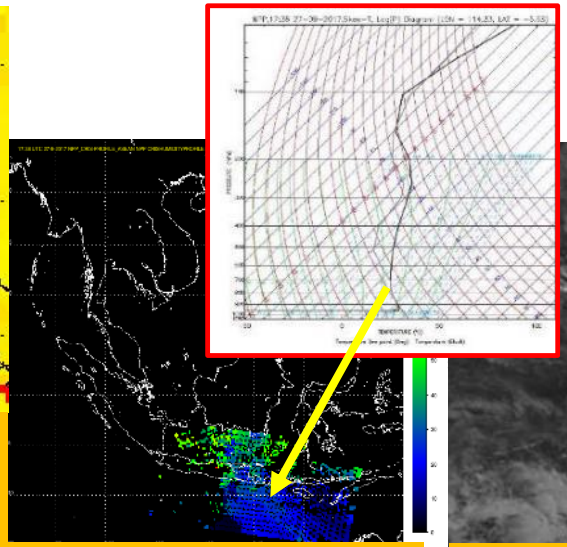
NOAA-19 AVHRR RGB and Fire Hotspots



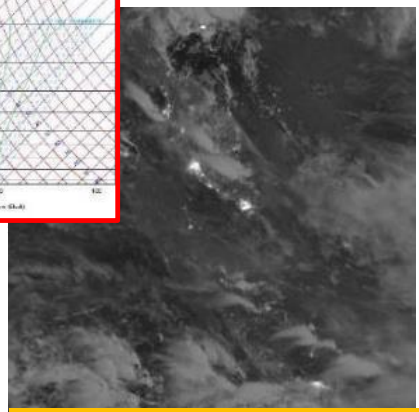
VIIRS Aerosol Optical Depth (AOD)



NUCAPS Carbon Monoxide Concentration



CrIS Sounding Profile

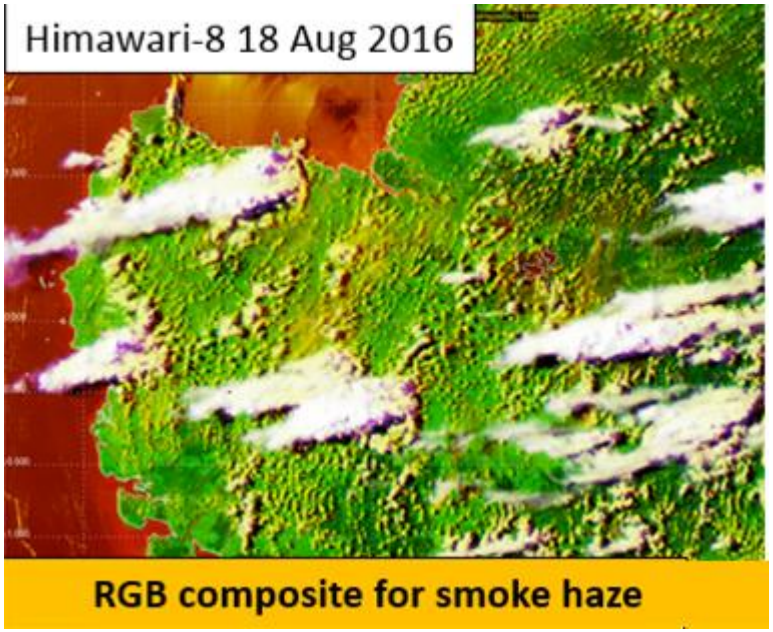


S-NPP Day Night Band

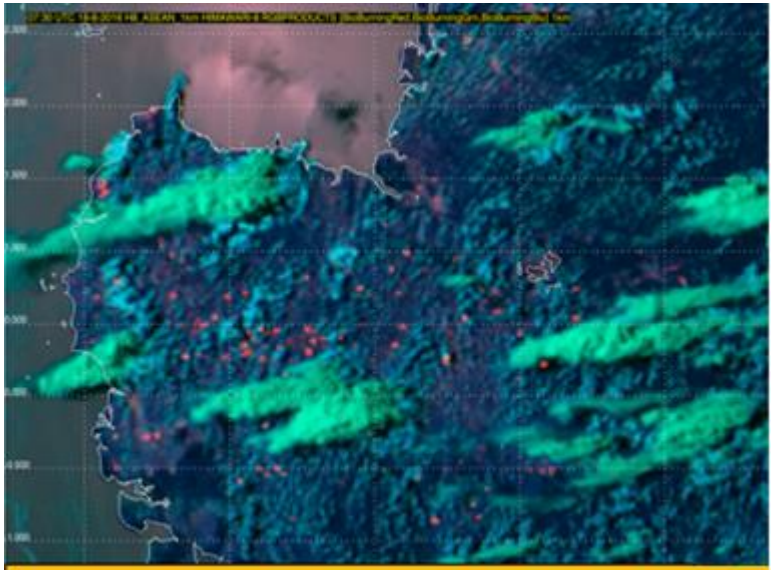
Satellite Data to Address Regional Challenges

Land Fires & Smoke Haze Monitoring

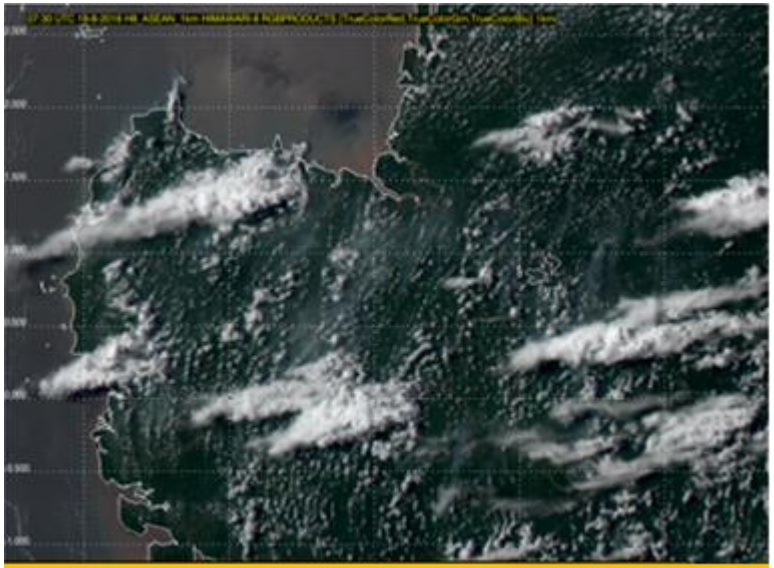
- Remote sensing observation is crucial due to the sparse distribution of ground observation stations
- 10-min data and multi-spectral channels allow near real-time monitoring for the development of land fires and smoke haze in Southeast Asia



RGB composite for smoke haze



Fire Temperature RGB

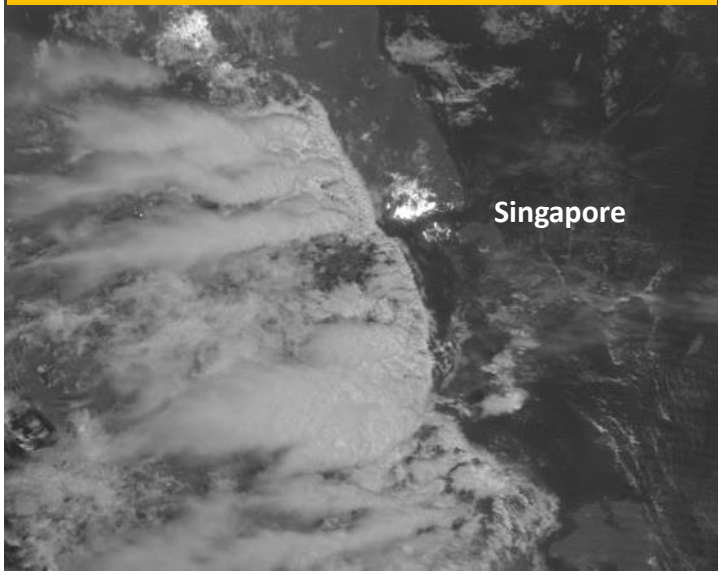


True Color RGB

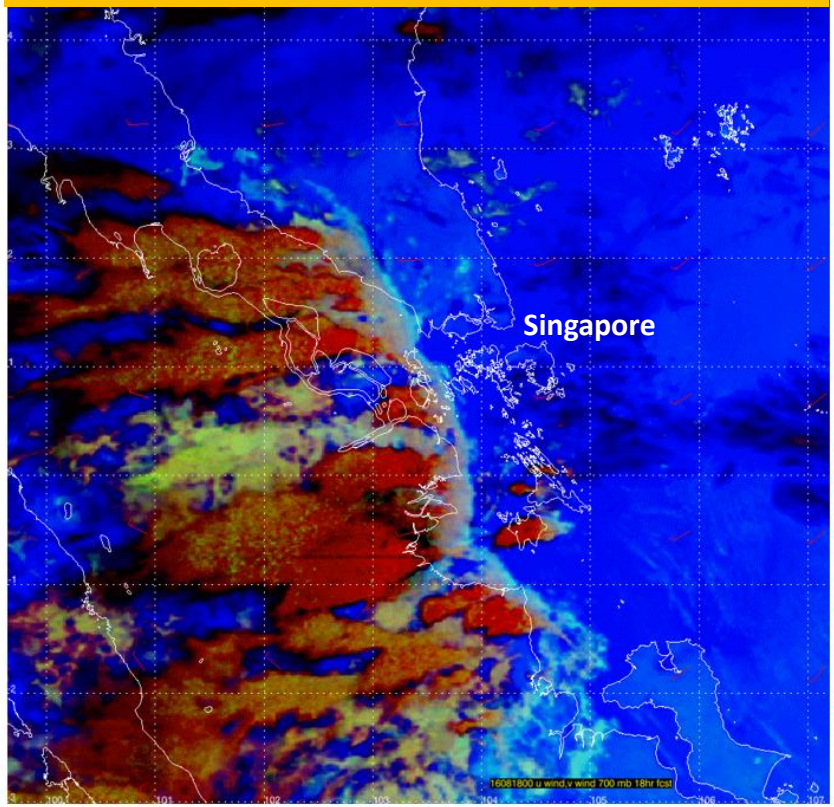
Sumatra Squall Lines

- Use of Himawari-8 Night Microphysics RGB with NPP Day Night Band useful for monitoring the development of Sumatra Squall Lines

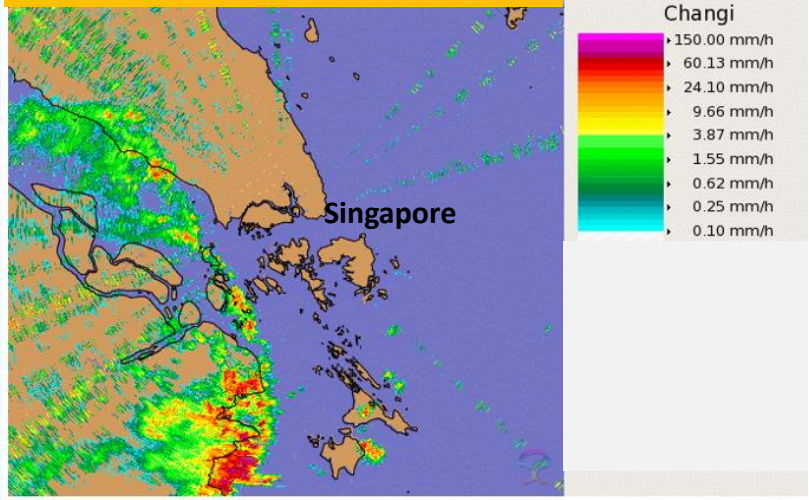
S-NPP Day Night Band
3.06 am 19 Aug 2016



Night Microphysics RGB



Radar



Challenges

- Hardware requirements are becoming increasingly challenging due to exponential growth in satellite data
- Limited capability to meet growing demands for Level-2 GEO products such as rapidly developing convective areas, aerosol optical depth, cloud types…

Suggestions for Satellite Operators

- Consider providing pre-processed Level-2 GEO products (i.e fire hotspots, cloud classifications, aerosol optical depth) to end users
- Standardization of data format across different satellites would help to reduce complexities faced by end-users
- Leverage on e-Learning platforms for capacity building and knowledge exchange

Capacity Building Efforts

- Meteorological Service Singapore (MSS) organised a 3-day training workshop on Himawari-8 and GPM in Singapore on 28 – 30 March 2016 with funding from JAIF, and co-sponsorship by MSS, JMA and JAXA

Experts from JMA going through practical exercises on Himawari-8 satellite

Attendees: 18 participants from 9 ASEAN NHMSs, representative from ASEAN Sec, 2 trainers from Japan Meteorological Agency (JMA) and 1 trainer from Japan Aerospace Exploration Agency (JAXA)

- Singapore regularly participates in the monthly Regional Focus Group webinar hosted by Melbourne VLab

- Internal coaching for new meteorologists by leveraging on training materials by SHyMet, METED, JMA, BOM & EUMETSAT

Singapore Focal Points for Satellite Systems

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Valid as of Oct 2017


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