



METEOROLOGICAL AND AIR TRAFFIC MANAGEMENT COLLABORATION IN SINGAPORE

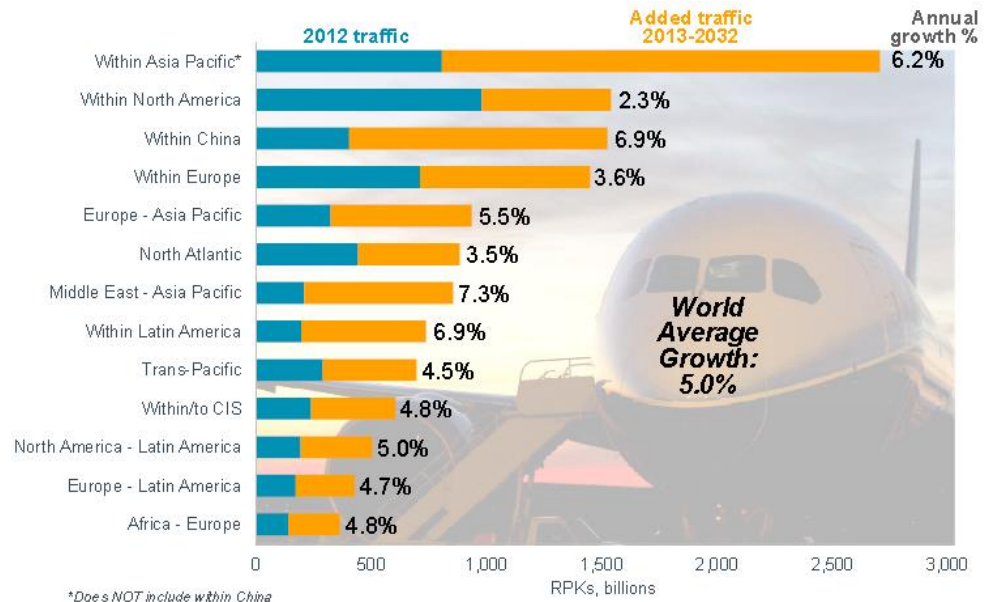
**FOURTH MEETING OF ASIA/PACIFIC METEOROLOGICAL
REQUIREMENTS TASK FORCE (MET/R TF/4)**

2 – 3 JULY 2015

Tokyo, Japan

Introduction

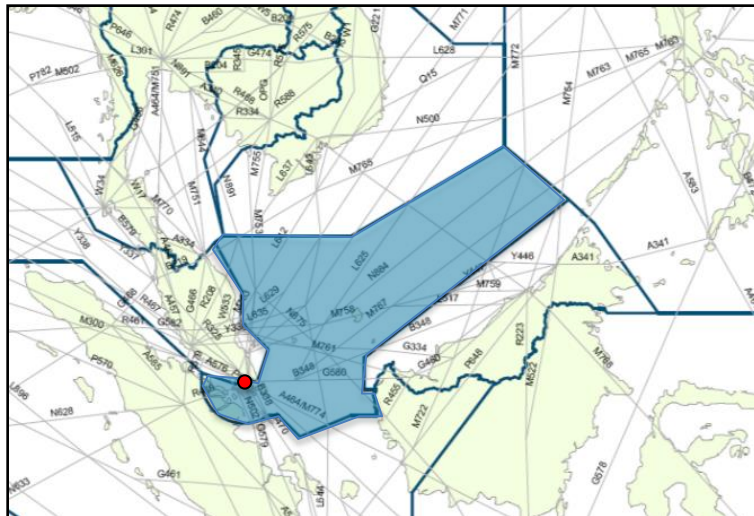
- Air traffic movement in the Asia Pacific region will continue to grow in the years to come and the need for MET and ATM to work together becomes an important factor to support a safe and efficient environment for flights to operate in
- Advancement of MET is a key element to enable aviation industry to face the future challenge of continued growth in air traffic
- ICAO recognised this and have developed the Aviation System Block Upgrade (ASBU) framework



Source: Boeing Current Market Outlook 2013

Organization Structure

- CAAS; a statutory board under the Ministry of Transport
 - Provides air navigation services including Air Traffic Management over the Singapore Flight Information Region
- MSS; a division of the National Environment Agency under the Ministry of the Environment and Water Resources

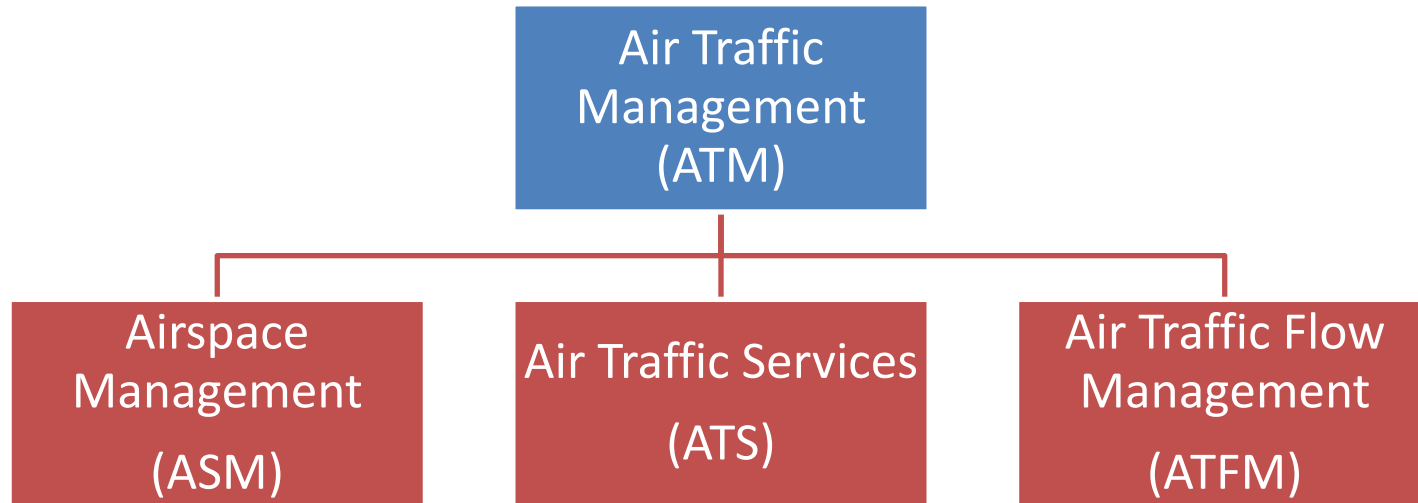


National Environment Agency

Safeguard · Nurture · Cherish



Why MET is important to ATM



- **ATS Operations**
 - Timely and accurate dissemination of weather information
 - Air traffic controllers can make effective tactical decisions
- **ATFM**
 - Proactively balance demand and capacity
 - Anticipate capacity reduction events

MET-ATM Collaboration Framework



Jointly develop a roadmap to implement ASBU

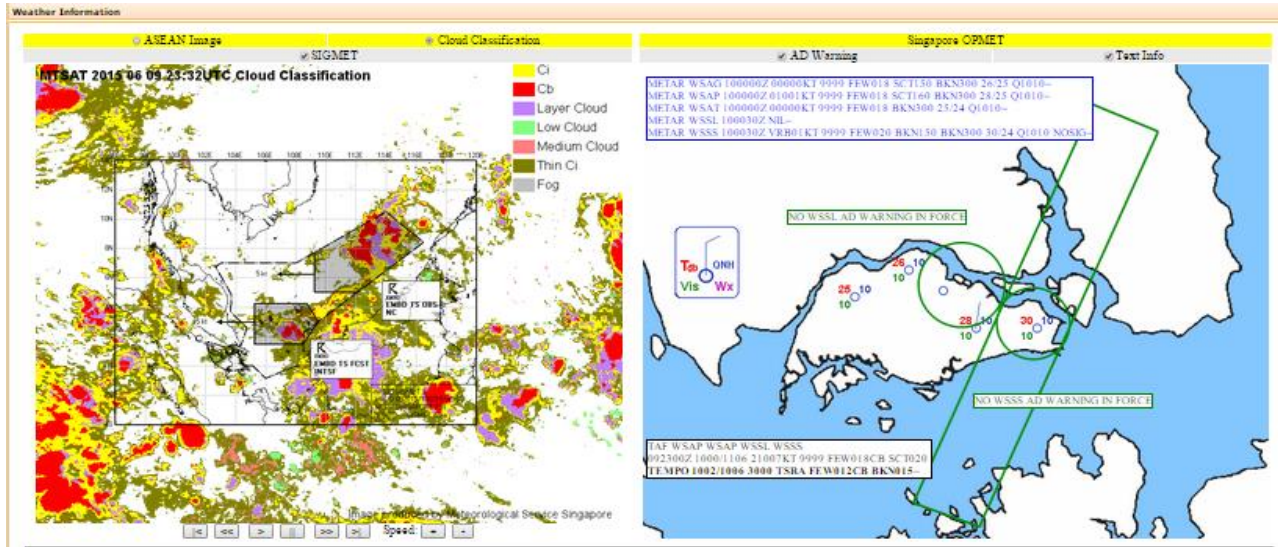
Knowledge sharing sessions

Regular dialogues and meetings

Established service agreement

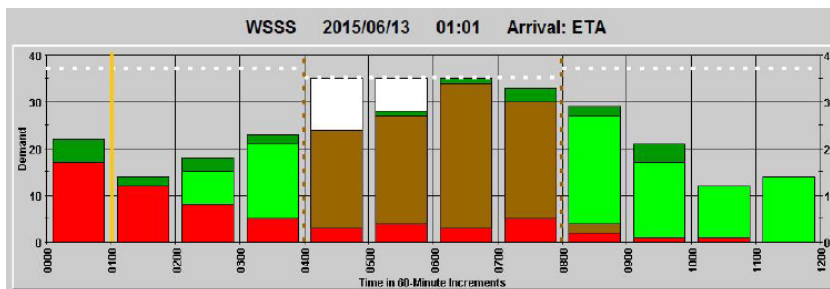
MET Support for ATS Operations

- Regular MET teleconference briefing to air traffic controllers
- Augmented with the visuals from the MSS' web portal
- Improve ATC situational awareness and operational planning
- Provide a feedback platform to MSS to further enhance their product



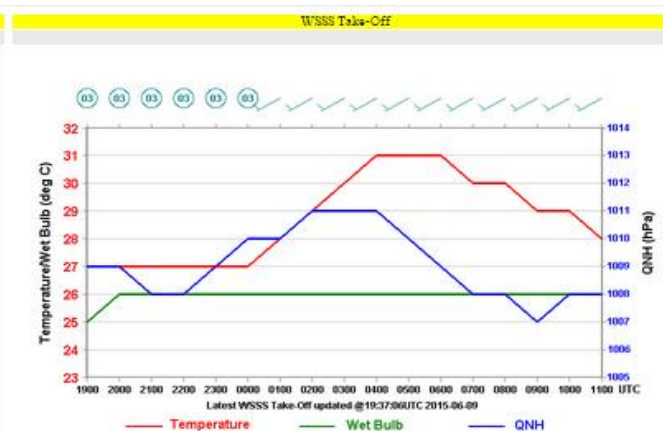
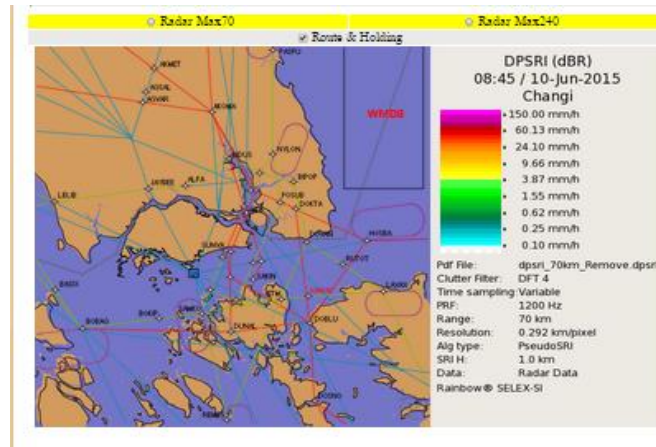
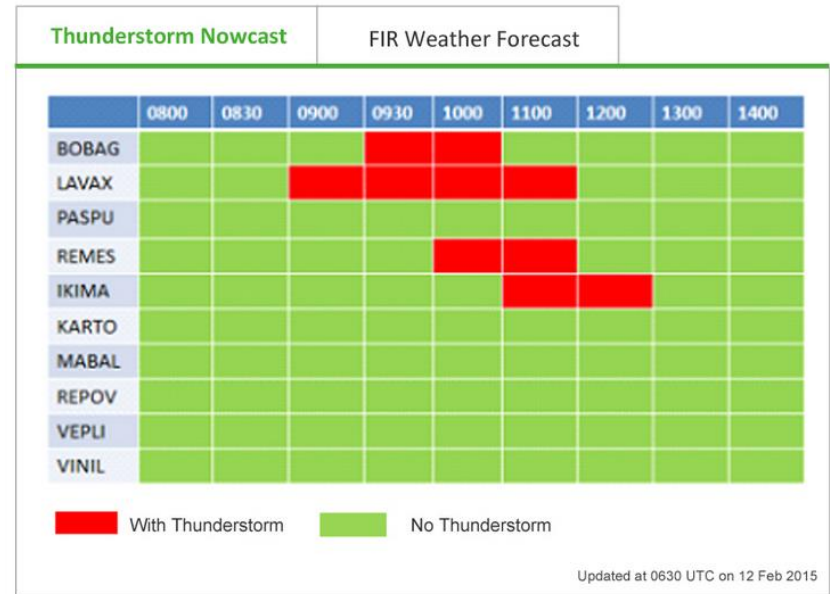
MET Support for ATFM

- ATFM; regulation of air traffic to avoid exceeding the capacity
- Efficiently use the available capacity to minimise delay
- Look ahead on events that may reduce capacity
- MET product need to match the ATFM planning horizon



MET Support for ATFM

- ATFM Operational trial commenced on 29 June 2015
- Enhancements to MET information will help air traffic flow planners to effectively declare the appropriate capacity.



MET-MET Collaboration

- Objective to overcome challenges associated predictability of TS over the tropical belt
- Limited predictability beyond nowcast to very short time-scale (up to 6 hours)
- Yet such TS pose significant impact to ATS operations
 - Go-arounds & missed approaches
 - Flight diversions
- The potential from MET-MET Collaboration and cooperation can potentially enhance MET products for ATM

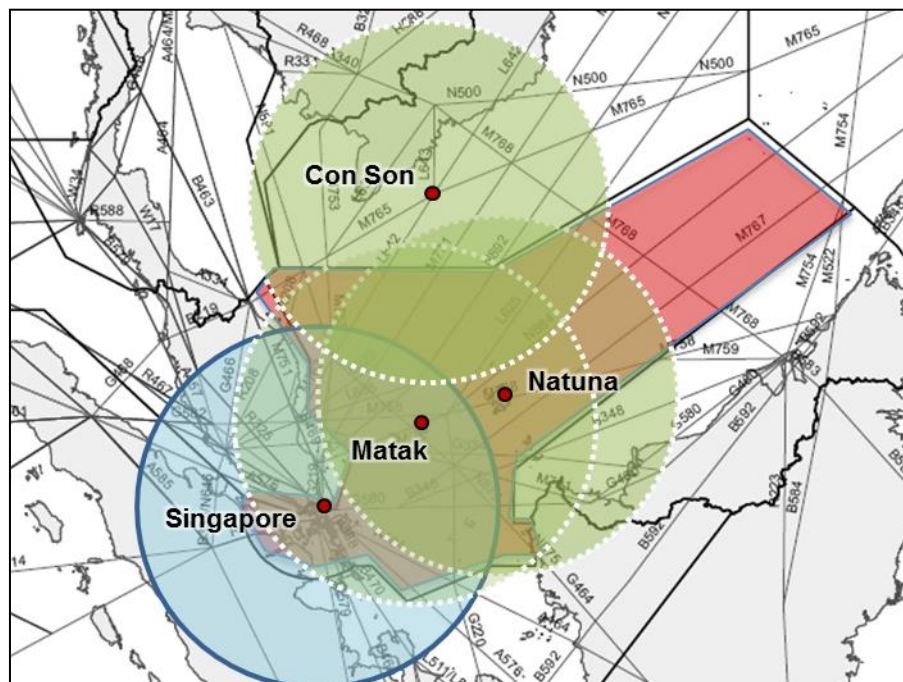
MET-MET Collaboration

- MSS initiated a multi-year research collaboration with United Kingdom's Met Office
- Undertaken by Centre for Climate Research Singapore (CCRS)
- To develop the Numerical Weather Prediction (NWP)/ Nowcasting capability for Singapore.
- Aims to build a tropical convective-scale model with data assimilation that can provide improved weather forecast for Singapore and the surrounding region.

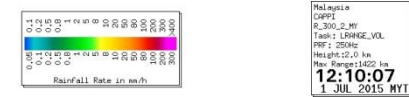
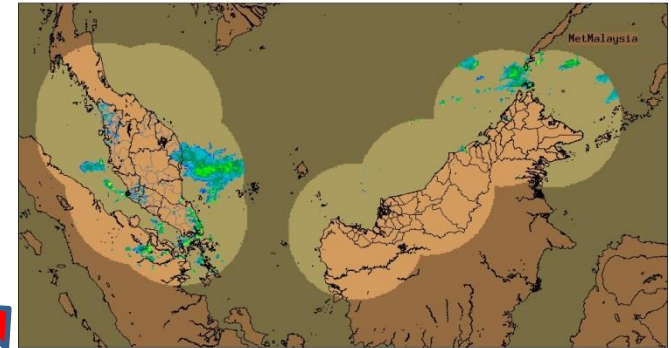
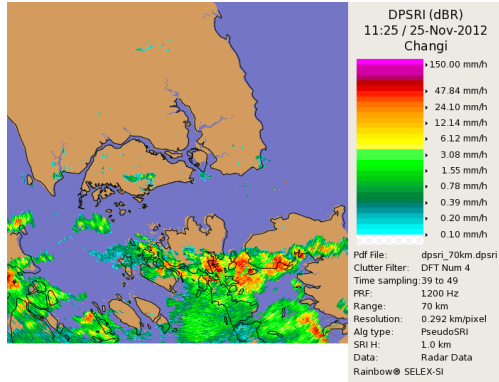


MET-MET Collaboration

- Limited availability of real-time observation data over the South East Asia region.
- Data sharing in the ATM community is gaining traction through collaboration between ANSPs
 - ADS-B Surveillance Data
- Endeavour for similar collaboration and cooperation between MET services in the Asia Pacific region



MET-MET Collaboration

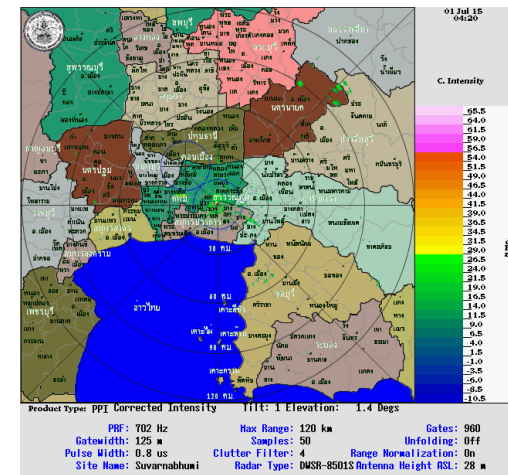


Source: Malaysian Meteorological Department
<http://www.met.gov.my/>

Data Sharing



Source: Badan Meteorologi Klimatologi dan Geofisika
<http://meteo.bmkg.go.id/>



Source: Thai Meteorological Department
<http://www.tmd.go.th/>

Formulation of MET/ATM Requirements

- Noting the limited predictability of convective-scale weather system in the equatorial tropical region
- Invite the relevant ICAO expert groups to take into consideration this limitation when formulating MET/ATM requirements specific to forecast performance, instead of the one-size-fits-all approach that omits the types of weather systems and their challenges

Action by the Meeting

- note the progress of MET/ATM collaboration in Singapore;
- encourage States to consider collaboration between meteorology authorities or service provider through exchange of data to enhance aviation meteorology products and services;
- note the challenges for States in the tropical region to forecast convective-scale weather system and for ICAO to consider such limitation when formulating MET/ATM requirement;



Thank you