



International Civil Aviation Organization

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

Tokyo, Japan, 2 – 3 July 2015

Agenda Item 3: MET/ATM Coordination

Also relates to:

Agenda Item 4: MET required to support end user system (CDM, AT/ATFM)

Agenda Item 5: Sub-regional exchange of MET

**METEOROLOGICAL AND AIR TRAFFIC MANAGEMENT COLLABORATION IN
SINGAPORE**

(Presented by Singapore)

SUMMARY

This paper presents the progress of MET/ATM collaboration in Singapore in line with the ICAO GANP framework and the ASBU methodology. The various effort highlighted in this paper aims to promote sharing of best practices of collaboration between the air navigation service provider (ANSP) and the aeronautical meteorology service provider. Beyond such partnership, collaboration between aeronautical meteorology service providers can further encourage development of solutions to support the progress to ASBU implementation in the area of MET.

1. Introduction

1.1 The advancement of aeronautical meteorology (MET) is one of the key elements to enable the aviation industry to face the future challenge of continued growth in air traffic movement globally. ICAO has recognized the importance of development and progress in the area of MET and leveraging on existing technologies and anticipated future developments. This emphasis is evident in the latest edition of the ICAO Global Air Navigation Plan (GANP, Doc 9750) and the inclusion of the MET element in the Aviation System Block Upgrade (ASBU) methodology.

1.2 The provision of air navigation services including Air Traffic Management (ATM) in the Singapore Flight Information Region (FIR) is undertaken by the Civil Aviation Authority of Singapore (CAAS), a statutory board under the Ministry of Transport, whereas the provision of aeronautical meteorological services is provided by the Meteorological Service Singapore (MSS), a division of the National Environment Agency of Singapore.

1.3 This paper presents the progress of MET/ATM collaboration in Singapore in line with the ICAO GANP framework and the ASBU methodology. The various effort highlighted in this paper aims to promote sharing of best practices of collaboration between the Air Navigation Service Provider (ANSP) and the Aeronautical Meteorological Service Provider. Beyond such partnership, collaboration between meteorological service providers can further encourage development of solutions to support the progress to ASBU implementation in the area of MET.

2. Discussion

2.1 As air traffic movement in the Asia Pacific region will continue to grow in the years to come, 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. Two of the three elements of ATM are Air Traffic Service (ATS) and Air Traffic Flow Management (ATFM). Timely and accurate dissemination of weather information is critical to support the ATS operations to ensure air traffic controllers can make effective decisions when the airport or portions of airspace are affected by adverse weather such as thunderstorms. A step further from managing air traffic tactically would be employing Air Traffic Flow Management (ATFM) to balance demand and capacity. ATFM provides the proactive planning dimension to ensure that the demand-capacity imbalance does not affect operations. The introduction of ATFM will also mean that MET forecasting horizon and accuracy would also need to commensurate with the delivery of ATFM.

MET-ATM Collaboration Framework

2.2 Since 2014, MSS and CAAS have held a series of dialogues and meetings to identify areas of collaboration between the two agencies. The dialogues provide the opportunity for both parties to understand better needs, limitation and potential areas where MET can better support ATM. To strengthen the coordination and cross-sharing of knowledge between meteorologist and air traffic controllers, regular exchange visits have been organized. Such visits enable meteorologist to better understand ATC operations and how adverse weather can impact aviation safety and efficiency. In return, air traffic controllers could enhance their operation through better comprehension and interpretation of MET products.

MET Support for ATS Operations

2.3 To enhance the support to air traffic control operations, MSS has been providing regular MET teleconference briefings to air traffic controllers through since late 2014. The teleconferences are augmented with visuals from MSS' web-based weather portal. Such regular briefs enhance the air traffic controllers' situational awareness and help in the operational planning for the day. This interaction also provides a platform for MSS to gather feedback which allows MSS to bring about further enhancements and improvement to the web portal as shown in Figure 1 below. With such visuals, MET and ATS were able to achieve a common weather situational awareness.

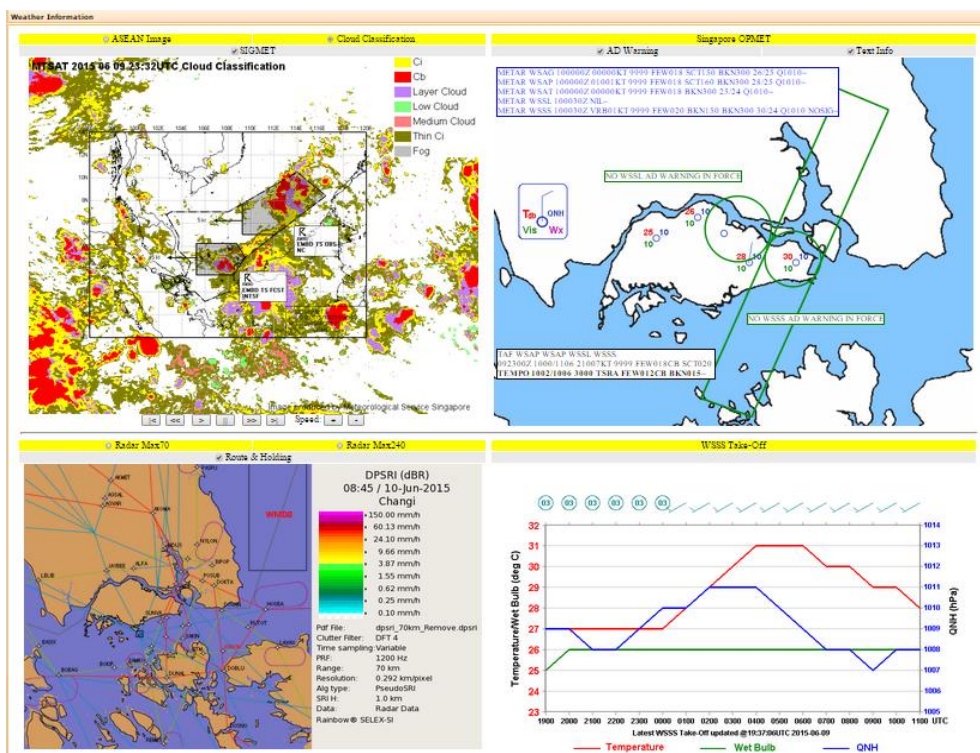


Figure 1. Enhanced graphical representation incorporating air-routes, holding areas and weather information (graphical and textual information e.g. OPMET, graphical SIGMET etc.) overlaid onto a common base map and integrated into a single display

MET Support for ATFM

2.4 The other aspect of ATM is ATFM. ATFM is the regulation of air traffic in order to avoid exceeding airport, airspace or air traffic control capacity in handling traffic. ATFM also ensures that available capacity is used efficiently to minimize delay. The imbalance of demand and capacity could arise from abnormal operations such as disabled aircraft on the runway, urgent maintenance on facilities or adverse weather conditions. In the recent months, CAAS has been collaborating with other ANSPs, airlines and airport operators to conduct an operational trial based on the multi-nodal ATFM concept for the region which will commence in June 2015. For ATFM to be effective to manage demand-capacity imbalance arising from adverse weather conditions, existing MET product would need to be tailored to match the planning horizon of the ATFM. This will help the air traffic flow planners to effectively declare the appropriate capacity. In addition, the MET forecast will also need to be focused on geographical areas that affect the overall capacity. Such areas include the approach and departure paths of the airport and the holding areas that serve arrivals into the airport. An example of enhancements to the web portal is shown in Figure 2.

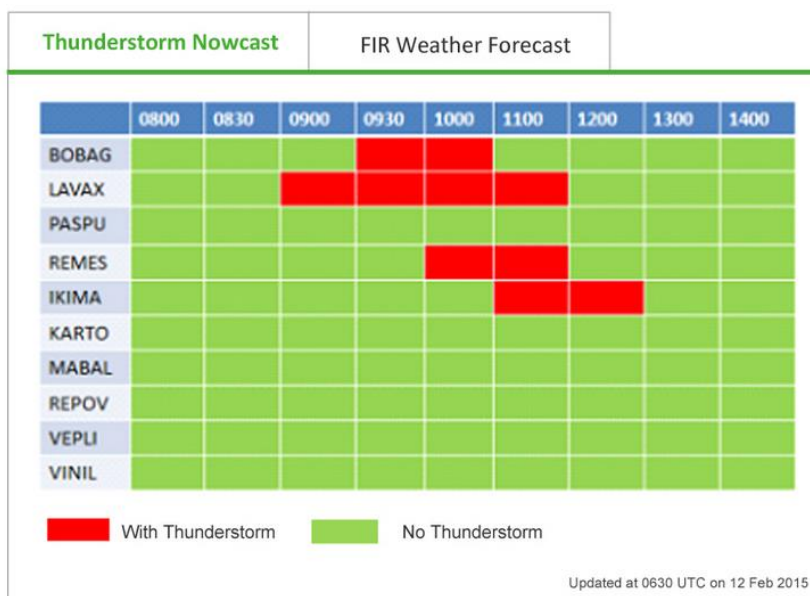


Figure 2. Customized thunderstorm forecast for the holding areas currently being developed for the ATFM operational trial

MET-ATM Collaboration Roadmap

2.5 The MET-ATM collaboration in Singapore also galvanized the two parties to develop a joint roadmap to progress with the MET elements in the ICAO ASBU methodology. The joint roadmap enables both parties to make the necessary preparation in committing resources to implement the various modules in the block-upgrades. For instance, Singapore is progressing well with Block 0 of the ICAO ASBU (B0-AMET) which includes flexible airspace management through MET information, improved situational awareness for ATC and ATFM through collaborative decision making.

2.6 For Block 1 (B1-AMET - Enhanced Operational Decisions through Integrated Meteorological Information - Planning and Near-term Service) which will commence from 2018 onwards, the established MET-ATM collaboration framework will form the foundation to progress the various modules such as automated decision processes and exchange of OPMET information in a digital form. Such processes would ride on CAAS’ ongoing effort to implement System Wide Information Management (SWIM).

MET Collaboration with other MET Services

2.7 Weather systems in the tropics especially the region in the proximity of Equator tend to be dominated by thunderstorms that are localized and short-lived but yet have great impact on ATC’s operations. It’s well known that such systems generally have limited predictability beyond the nowcast to very-short-range time scale (up to 6 hours) and it is a major challenge to forecast their occurrence reliably. To address these challenges, Singapore has initiated a multi-year research project in collaboration with UK Met Office to develop the Numerical Weather Prediction (NWP)/ Nowcasting capability for Singapore. The project aims to build a tropical convective-scale model with data assimilation that can provide improved weather forecast for Singapore and the surrounding region.

2.8 One factor that may impact the performance of the model is the limited availability of real-time observation data over the Southeast Asia region. Such cooperation to share data has already

gain traction between ANSPs in this region. One example is the sharing of real-time Automatic Dependent Surveillance – Broadcast (ADS-B) data between ANSPs to enhance safety and efficiency. MET authorities or service providers in the region should similarly endeavor to do the same in sharing real-time MET data to enhance aviation meteorological products. For example, real-time radar composite for the region could serve as an important tool for adverse weather monitoring and as inputs to model and bring benefits to both MET and ATM communities.

2.9 In view of the limited predictability of convective-scale weather system in the equatorial tropical region, the relevant ICAO expert groups are invited 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.

3. Action by the Meeting

3.1 The meeting is invited to:

- a) note the progress of MET/ATM collaboration in Singapore;
- b) encourage States to consider collaboration between meteorology authorities or service provider through exchange of data to enhance aviation meteorology products and services;
- c) 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;
- d) discuss any relevant matters as appropriate.
