



International Civil Aviation Organization

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

Tokyo, Japan, 2 – 3 July 2015

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

**MET INFORMATION TO SUPPORT ATM AND ATFM**

(Presented by the Secretariat)

**SUMMARY**

This paper presents outcomes from the Asia/Pacific Air Traffic Flow Management Steering Group, related to the provision of MET information to support ATFM.

**1. Introduction**

1.1 The Asia/Pacific Seamless ATM Plan, adopted by APANPIRG/24 in June 2013, includes among its performance objectives requirements for Meteorological information.

1.2 The Fifth Meeting of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/5, Bangkok, Thailand, 30 March to 3 April 2015), finalized the draft Regional Framework for Collaborative ATFM, which includes among its performance objectives the implementation of meteorological information, in particular the so-called ‘tailored MET’ products and information developed in a number of States in addition to traditional OPMET information to support ATFM.

**2. Discussion**

Asia/Pacific Seamless ATM Plan

2.1 The Asia/Pacific Seamless ATM Plan includes performance objectives, arranged into two categories: *Preferred Aerodrome/Airspace and Route Specifications* (PARS); and *Preferred ATM Service Levels* (PASL). The performance objectives are expected to be implemented in two phases: Phase I by 12 November 2015, and Phase II by 8 November 2018.

2.2 The following performance objectives relate to aviation meteorological services:

***PASL Phase I (expected implementation by 12 November 2015)***

7.26 *All high density aerodromes<sup>1</sup> should provide meteorological forecasts, aerodrome warnings and alerts that support efficient terminal operations*

7.39 *ATM systems should be supported by implementation of appropriate meteorological information reporting systems, providing, inter-alia, observations, forecasts, warnings and alerts, and also provide for information to meteorological authorities or offices where required.*

**Draft Regional Framework for Collaborative ATFM**

2.3 The final Draft Regional Framework for Collaborative ATFM will be presented to the ATM Sub-Group of APANPIRG in August 2015, and subsequently to APANPIRG for endorsement in September 2015.

2.4 The content and structure of the Framework is aligned with the Seamless ATM Plan, and its performance objectives, where necessary, expand upon those included in the Seamless Plan. The Framework provides information, guidance and performance objectives including *inter alia* the expectation of the development and delivery of meteorological information supporting ATFM. The Framework notes that:

*Global, regional and local meteorological information including aerodrome warnings, SIGMETs, and other operational meteorological (OPMET) information, including METAR/SPECI and TAF, supporting flexible airspace management, improved situational awareness, collaborative decision-making and dynamically optimized flight trajectory planning. Meteorological information other than the OPMET products currently defined in Annex 3 provide optimized decision-making information to support ATFM.*

**Regional Framework for Collaborative ATFM - Background Information**

2.5 The Framework includes background information on meteorological services to support ATFM, and associated performance objectives. The following information is mainly extracted from the Framework.

2.6 The accuracy of pre-tactical and tactical demand and capacity assessment is reliant on the predictability of events that will impact capacity. In the case of weather-related constraints, the traditional Annex 3 services in support of aerodrome operations and FIR/Global operations do not fully address the needs of ATFM. While globally, ICAO members are working steadily towards the institutional provision of Meteorological Services to support (ATM in) the Terminal Area (MSTA), there is a greater urgency for ATFM providers to collaborate closely with MET service providers to develop products that bridge the gap between the traditional products.

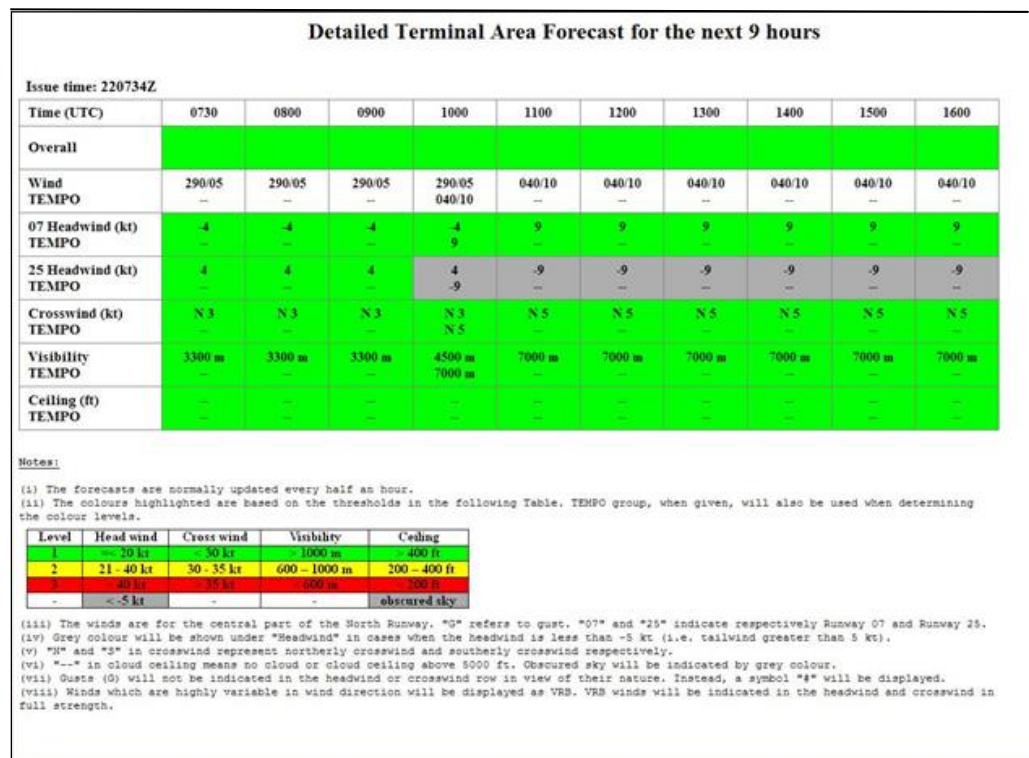
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<sup>1</sup> The Asia/Pacific Seamless ATM Plan defines high density aerodromes as those with 100,000 scheduled movements per annum or more. The Plan states that the 100,000 movement benchmark must not be viewed as lessening more stringent requirements or criteria established by the State.

2.7 When predicting the capacity of an airport with regard to forecast meteorological conditions, it is important to not only consider the runway/s and immediate airport surroundings, which are covered by the Aerodrome Forecast (TAF) to a distance of 8km, but to also take into consideration the ability for air traffic to flow via the terminal area on the normal arrival routes and instrument approach procedures to that airport. In particular, weather affecting the airspace in the vicinity of the primary holding areas and initial approach fixes can have a significant impact on the delivery of flights into the approach airspace and onto the runway.

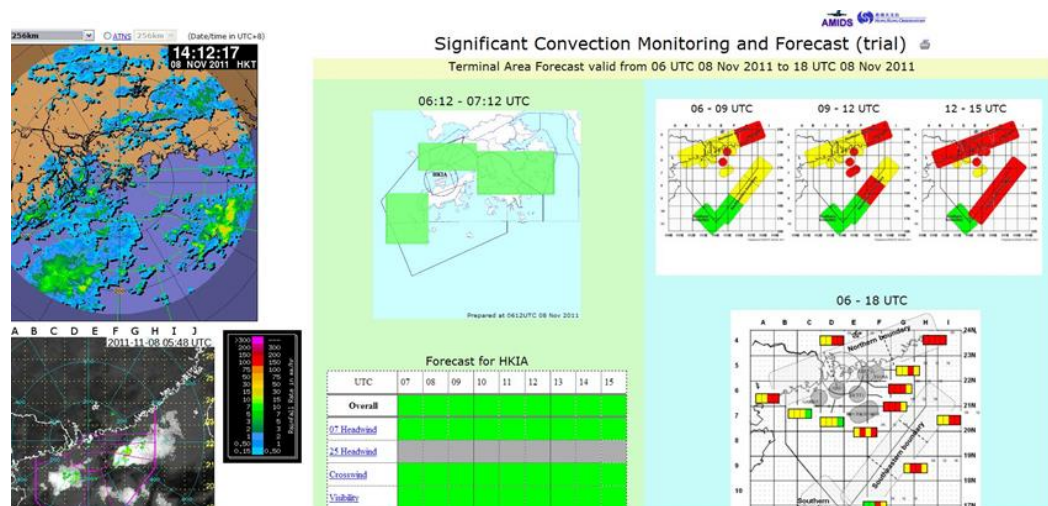
2.8 The current Annex 3 provisions do not include provisions for meteorological products or information that specifically support the determination of weather impact on capacity, e.g., OPMET information is typically air traffic services and/or pilot oriented with limited air traffic management (ATM) orientation and generally focussed on either operations at the aerodrome or en-route and are largely produced in coded text format, which makes rapid interpretation difficult for ATM officers.

2.9 The meeting is reminded of the ICAO Annex 3 requirement that each Contracting State shall determine the meteorological service which it will provide to meet the needs of international air navigation, and that this shall consist of the provision of meteorological information to users that is necessary for the performance of their respective functions. In view of the aforementioned requirement, to enable rational and quantifiable capacity determination, the designated authorities for AN and MET services should collaborate closely to define meteorological services to be provided to support ATM decisions based on specific impact to operations. Such targeted MET information should address key thresholds for various weather criteria which have a quantifiable impact on airport and terminal airspace capacity, such as headwind, crosswind, visibility, ceiling, wind shear, and convective weather at the initial approach fix IAF or in the vicinity of critical arrival fixes, holding points and sequencing areas. An example of the simple type of matrix that could be produced, with intuitive colour coding for quick recognition by ATM staff, is shown in Figure 1. In terms of the wider Terminal area, similar defined criteria, thresholds and colour coding can enable rapid interpretation of impact on operations.



**Figure 1:** Example Colour-Coded Matrix of Met Information

2.10 An example of IAF and holding stack prediction based on weather intensity and coverage area is shown in Figure 2, using similarly defined criteria and thresholds to facilitate rapid interpretation of the impact on operations.



**Figure 2:** IAF and Holding Stack Weather Prediction.

2.11 When determining MET services, consideration should be given to thresholds for meteorological elements that result in a change of runway operating mode, such as:

- a change of runway dependency;
- a change of spacing between arriving aircraft;

- a change in nominal aircraft approach speeds;
- an exceedance of aircraft operating limitations for significant numbers of aircraft (eg maximum crosswind component);
- an inability to commence an approach via the IAF; or
- an inability to hold in the primary published holding areas, etc.

2.12 When considering the lead time requirements for such forecastss, it is necessary to strike a balance between the desired probability and accuracy and the target ATFM aircraft population.

2.13 Given the direction towards Regional ATFM through ground delay programs, it is therefore desirable that the forecast period cover at least 6-8 hours ahead to encompass the majority of regional length flights with notification of ATFM measures an acceptable time before estimated off-blocks time (EOBT).

2.14 In accordance with the Annex 3 requirements mentioned above, including that close liaison shall be maintained between those concerned with the supply and those concerned with the use of meteorological information on matters which affect the provision of meteorological service for international air navigation, States should ensure that the MET service provides sufficient detail and accuracy.

Regional Framework for Collaborative ATFM - Performance Objectives

**REGIONAL ATFM CAPABILITY PHASE IA**

***Expected implementation by 12 November 2015***

7.8 Daily pre-tactical airport and airspace capacity and demand analysis should be conducted for all ATFM Program Airports and associated terminal area airspace, and for all en-route ATC sectors supporting the busiest Asia/Pacific city pairs, including consideration of:

- i. expected runway and airspace configurations;
- ii. forecast meteorological phenomena;
- iii. ATC resources, facilities and equipment;
- iv. other known or expected capacity constraints; and
- v. updated flight schedule and flight plan information.

**REGIONAL ATFM CAPABILITY PHASE II**

***Expected implementation by 08 November 2018***

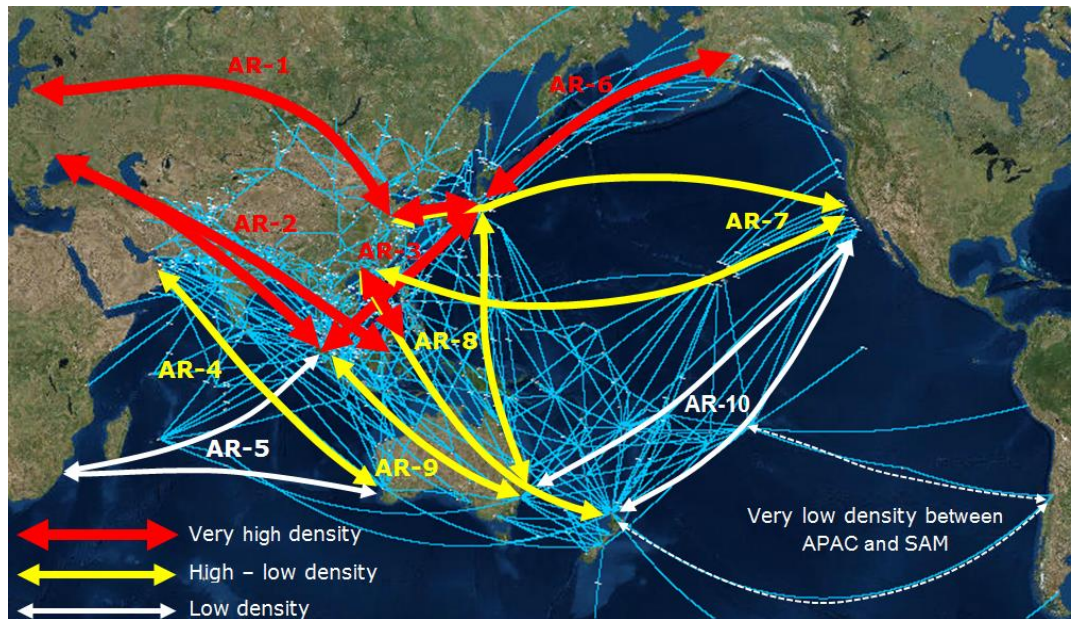
7.31 Meteorological services for the terminal area (MSTA) should be implemented, including near-term or *now-casting* forecasts of convective weather activity at or affecting ATFM Program Airports and associated instrument approach procedures, terminal area ATS routes and holding points and other significant locations.

ATM Requirements for Meteorological Services

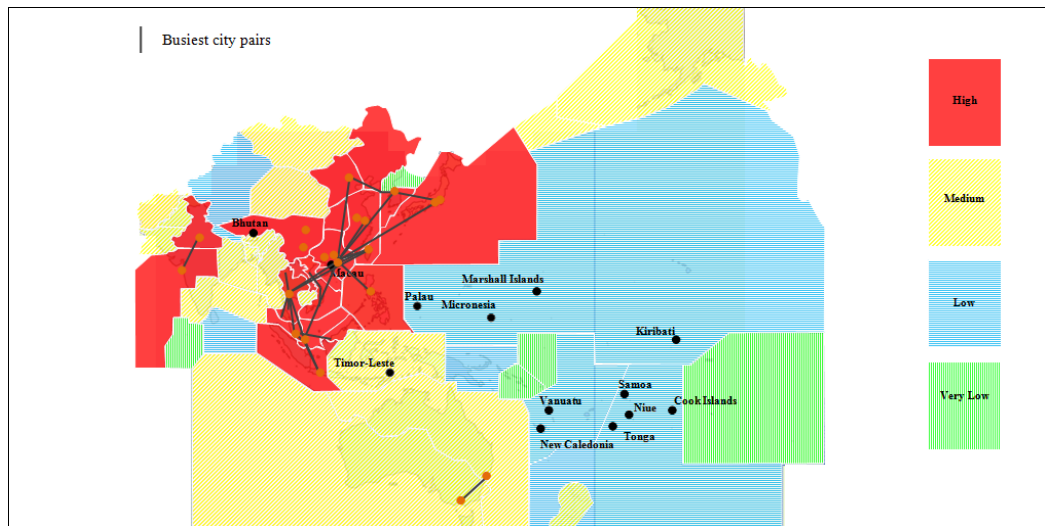
2.18 Both the Seamless ATM Plan and the Framework for Collaborative ATFM are iterative in nature. They will be updated at regular intervals, and whenever a need for further update is identified. It is expected that the performance objectives of the Framework, in particular, will be updated to extend the objective of near term (*now-casting*) forecasts of convective weather activity to en-route ATC sectors supporting high density major traffic flows (MTF)<sup>2</sup> (**Figure 3**) and the busiest Asia/Pacific city pairs (**Figure 4**), and to other en-route airspace where there is an identified need to support collaborative ATFM.

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<sup>2</sup> Major Traffic Flows (MTF), previously included in ICAO Doc. 9750 *Global Air Navigation Plan*, are currently under review before being included in the *Asia/Pacific Region Air Navigation Plan* on its transition to the online version (eANP).



**Figure 3:** eANP Major Traffic Flow Depiction



**Figure 4:** Asia/Pacific High Density FIRs, showing Busiest City Pairs  
(Source: Asia/Pacific Seamless ATM Plan)

2.19 The meeting should note that the Framework's performance objective of implementation of near-term convective weather forecasting does not specify forecast issuance times, lead times before the effective forecast period, specific content, or provisions for continuous review and amendment of forecasts and the automatic cancellation of any previously issued same-type forecast for the same location. Regional guidance in these matters should be developed to ensure harmonized practices, and to facilitate sharing of this forecast information between States (Note, however, that Annex 3 does require that States ensure the quality management of the meteorological information to be supplied to the users).

2.20 Several Administrations have implemented near-term forecasts of convective weather activity, including Hong Kong China, Japan and USA, as demonstrated at the MET/ATM Seminar

held in conjunction with MET/R TF 2 in November 2013. These implementations may be considered as examples for the development of regional guidance.

2.21 Cross-FIR boundary alignment of SIGMET information, as discussed at MET/R TF/3 (Agenda Item 2, WP/05) is also necessary to ensure optimized airspace capacity, harmonization of ATC tactical traffic management and ATFM measures, and improved operating efficiencies for airspace users.

### **3. Action by the Meeting**

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) discuss State plans to support the MET-related performance objectives of the Seamless ATM Plan;
- c) commence the development of regional guidance for the provision of near-term (now-casting) forecasts of convective weather for MSTA and other future en-route ATC sector requirements;
- d) discuss progress in the alignment of SIGMET information across FIR boundaries; and
- e) discuss any relevant matters as appropriate.

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