



International Civil Aviation Organization

The Sixth Meeting of ICAO Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/6)

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Agenda Item 5: Joint Session Meteorology Sub-Group – ATFM Steering Group

METEOROLOGY-RELATED PROVISIONS OF SEAMLESS ATM AND ATFM PLANNING

(Presented by the Secretariat)

SUMMARY

This paper reviews the meteorology-related provisions of the Asia/Pacific Seamless ATM Plan and the Regional Framework for Collaborative Air Traffic Flow Management.

1. INTRODUCTION

1.1 The Asia/Pacific Seamless ATM Plan, approved in 2013 by the 24th Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/24), provides a seamless ATM performance framework with a focus on technological and human performance within Aviation System Block Upgrade (ASBU) Block 0 elements, non-ASBU elements, and civil/military cooperation elements. It includes a deployment plan for specific operational improvements, transition arrangements, expected timelines and implementation examples.

1.2 The Asia/Pacific Regional Framework for Collaborative Air Traffic Flow Management (ATFM), approved in 2015 by APANPIRG/26, provides a common Regional framework that addresses ATFM implementation and ATFM operational issues in the Asia/Pacific Region.

2. DISCUSSION

Asia/Pacific Seamless ATM Plan

2.1 The Seamless ATM Plan categorises airspace by reference to its CNS (Communications, Navigation and Surveillance) capability as:

- a) Category R: remote en-route airspace with Air Traffic Services (ATS) communications and surveillance coverage dependent on a third-party Communication Service Provider (CSP); or
- b) Category S: serviced (or potentially serviced) en-route airspace – by direct (not dependent on a CSP) ATS communications and surveillance; or
- c) Category T: terminal operations serviced by direct ATS communications and surveillance.

2.2 The Plan identifies relevant ASBU as *Critical ASBU Upgrades*, *Recommended ASBU Upgrades*, or *ASBU Elements Which May Not Be Universally Implemented*. The Plan is currently undergoing its first review, and the final draft of the updated version will be presented to

APANPIRG/27 in September 2016 for endorsement. The next review of the plan, in 2019, will introduce ASBU module B1-AMET.

2.3 The ASBU module B0-AMET is identified as a Recommended ASBU Upgrade, as follows (2016 update):

5.31 **B0-AMET: Meteorological information supporting enhanced operational efficiency and safety** Global, regional and local meteorological information provided by world area forecast centres, volcanic ash advisory centres, tropical cyclone advisory centres, aerodrome meteorological offices and meteorological watch offices in support of flexible airspace management, improved situational awareness and collaborative decision making, and dynamically-optimized flight trajectory planning

5.32 The future, net-centric oriented ATM system requires the smart use of uncertainty characteristics often associated with MET information, enabling decision-makers to make choices according to their own objectively determined thresholds for action. This needs a transition of MET information, specifically in table-driven data representation supporting ATM collaborative, knowledge-based, decision-making through free-flowing information exchange (ASBU B1-AMET).

5.33 The first evolutionary step in the improved provision of MET information included the provisions introduced in Amendment 76 to Annex 3 – *Meteorological Service for International Air Navigation* (applicable November 2013), which enabled the exchange of OPMET information (specifically METAR, SPECI, TAF and SIGMET) in a digital form (XML/GML), accompanied by the appropriate metadata, by States in a position to do so, in accordance with the globally interoperable information exchange model. These developments were designed to foster the future SWIM environment, which will include meteorological, aeronautical and flight information, amongst others.

5.34 Amendment 77 to Annex 3 (intended applicability in November 2016) is expected to elevate these particular provisions to the status of recommended practice, while Amendment 78 to Annex 3 (intended applicability in November 2018 or 2019) is expected to make it an ICAO Standard for States to exchange such OPMET information in digital form. During Amendments 77 and 78 of Annex 3, and beyond, a significant portion of current MET information is envisaged to transition to supporting digital information exchange within SWIM. In addition, there will be an increased reliance on the automated relay of meteorological information to and from aircraft, including enhanced aircraft-based meteorological reporting capabilities (ASBU B3-AMET).

2.4 The draft 2016 update of the Plan includes discussion of B1-AMET among a suite of ASBU modules envisaged to be implemented from 2022:

5.39 These elements are expected to be discussed during the 2019 review of the Seamless ATM Plan and implemented accordingly. States, international organizations and other stakeholders are expected to analyse these elements with regard to their own implementation strategy and actions, which may be earlier than 2022 as appropriate.

5.44 **B1-AMET Meteorological information supporting enhanced operational efficiency and safety** Full ATM-Meteorology integration is needed to ensure that meteorological information is included in the logic of a decision process and the impact of the meteorological conditions on the operations including the support to the cross-polar and trans-polar routes with space weather forecasts. The Regional Advisory System for Hazardous Weather and Radioactive Materials Information Centers.

2.5 The performance improvement plan incorporated in the 2016 update of the Seamless ATM Plan includes performance expectations arranged into 3 phases of implementation aligned with ASBU implementation timelines; Phase I by 12 November 2015 and Phase II by 7 November 2019 (previously 8 November 2018).

2.6 Performance expectations relating to meteorological information include:

Phase I (expected implementation by 12 November 2015)

(Terminal Operations)

7.30 All high density aerodromes should have meteorological information provided by aerodrome meteorological offices (e.g., aerodrome meteorological forecasts and reports, aerodrome warnings and wind shear warnings) and automated equipment (e.g., wind shear alerts) as necessary supporting enhanced efficiency and safety of efficient terminal operations.

7.47 Each component of an ATM systems should be supplied with the meteorological information necessary for the performance of its respective functions, including *inter-alia*, meteorological reports, forecasts, warnings alerts, advisory and briefing information

Phase II (expected implementation by 07 November 2019)

(ATM Systems)

7.66 An agreement between the MET authority and the appropriate ATS authority should be established to cover the exchange of meteorological information obtained from aircraft.

Phase III (expected implementation by November 2022)

(ASBU Block 1 Modules under Consideration)

B1-AMET – Improvements in the content, format, quantity, quality, timeliness and availability of meteorological information (observations and forecasts) will lead to enhanced situational awareness of meteorological conditions, and in particular the location, extent, duration and severity of hazardous meteorological conditions and their impacts on airspace. This in turn enables more precise estimates of expected capacity of that airspace. Improvements in the content, format, quantity, quality, timeliness and availability of meteorological information (observations and forecasts) will lead to enhanced situational awareness of meteorological conditions, and in particular the location, extent, duration and severity of hazardous meteorological conditions, as well as space weather, and their impacts on airspace.

Asia/Pacific Regional Framework for Collaborative ATFM

2.7 The structure and performance improvement plan of the Asia/Pacific Regional Framework for Collaborative ATFM are aligned, where possible, with those of the Seamless Plan. The Framework was adopted by APANPIRG/26 in September 2015.

2.8 The Framework includes discussion of meteorological information for ATFM purposes, noting that the accuracy of pre-tactical and tactical demand and capacity assessments is reliant on the predictability of events that will impact capacity. In the case of weather-related capacity constraints the traditional Annex 3 services do not fully address the needs of ATFM. The Framework, while recognizing the work by global MET authorities towards the institutional provision of MET services to support the Terminal Area, recognizes that there is a greater urgency for ATFM providers to collaborate closely with MET service providers to develop products that bridge the gap between existing Annex 3-defined MET information and any new provisions under development.

2.9 The Framework includes examples of tailored MET information including, for example, a detailed Terminal Area forecast (Figure 1) and convective weather prediction for significant points such as initial approach fixes (IAF) and holding stacks (Figure 2).

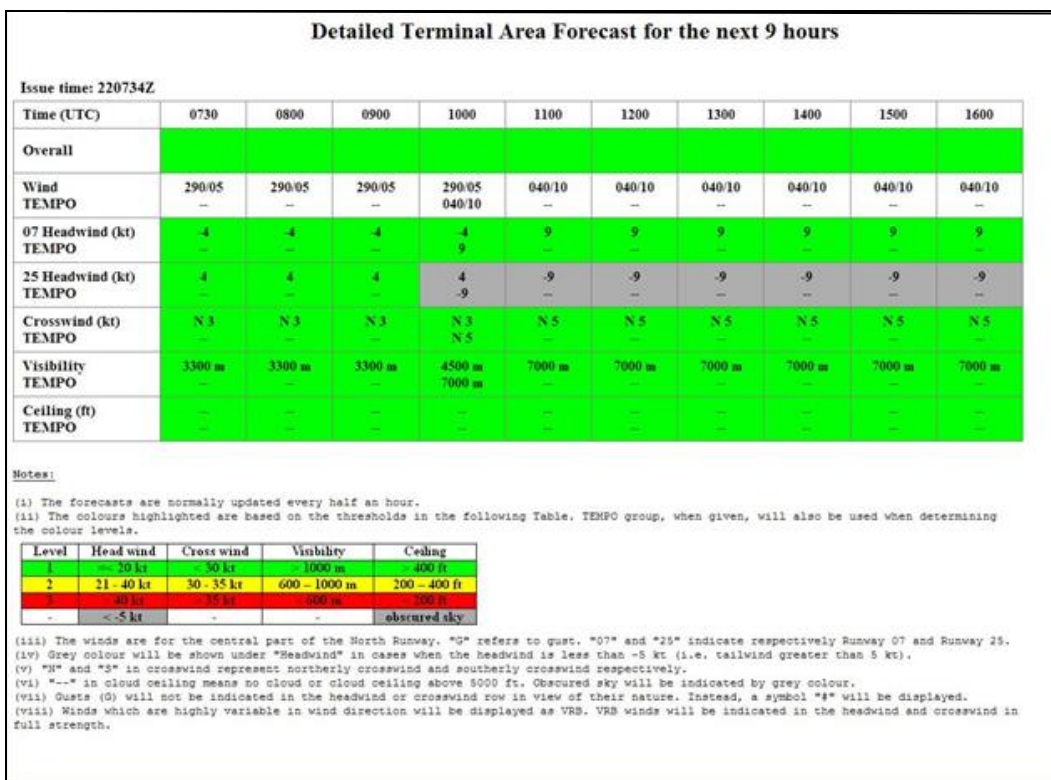


Figure 1: Example Colour-Coded Matrix of Met Information

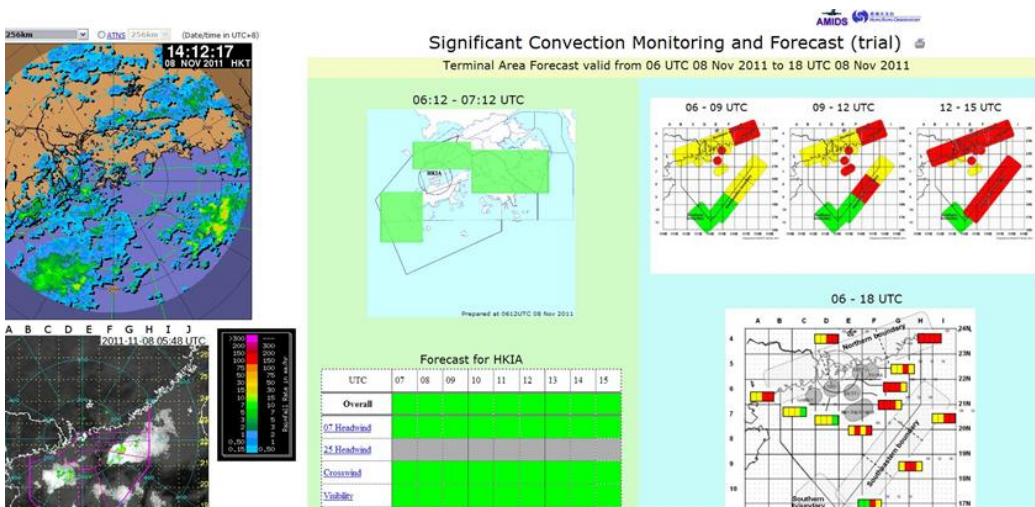


Figure 4: IAF and Holding Stack Weather Prediction.

2.10 The Framework includes the following performance expectations related to meteorological information:

REGIONAL ATFM CAPABILITY PHASE IA

Expected implementation by 12 November 2015

(Pre-Tactical Capacity and Demand Monitoring and Analysis)

7.8 Daily pre-tactical¹ 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:

- ii. forecast meteorological phenomena;

REGIONAL ATFM CAPABILITY PHASE II

Expected implementation by 08 November 2018

(Tactical Capacity and Demand Monitoring and Analysis)

7.31 Meteorological services to support ATM in 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.

Note: Annex 3 requires that States ensure the quality management of meteorological information.

2.11 Future updates of the Framework may include the expectation that States also develop tailored meteorological information for the pre-tactical and tactical assessment of airspace capacity in the en-route ATC environment.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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¹ ICAO Doc 9971 – *Manual on Collaborative ATFM defines ATFM Phases:*

- i. Strategic – measures taken more than one day prior to the day of operation;
- ii. Pre-tactical – measures taken one day prior to operations; and
- iii. Tactical – measures adopted on the day of the operation.