International Civil Aviation Organization

The Third Meeting of the APANPIRG ATM Sub-Group (ATM /SG/3)

Bangkok, Thailand, 03-07 August 2015

Agenda Item 6: AOP, MET, AIM, SAR

METEOROLOGY ISSUES RELEVANT TO ATM

(Presented by the SECRETARIAT)

SUMMARY

This paper presents consolidated information from a number of ICAO Asia/Pacific groups on activities in the field of Aviation Meteorology related to ATM requirements for MET information for ATM contingency planning and air traffic flow management (ATFM).

1. INTRODUCTION

1.1 The 4th Meeting of the Asia/Pacific Regional ATM Contingency Plan Task Force (RACP/TF/4) was held in Bangkok, Thailand, from 26 to 30 January 2015.

1.2 The 5th Meeting of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/5) was held in Bangkok, Thailand, from 30 March to 3 April 2015.

1.3 The 1st Meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group (VOLCEX/SG/1) was held in Manila, Philippines, from 27 to 29 May 2015.

1.4 The ICAO Asia/Pacific Meteorology/Air Traffic Management (MET/ATM) Seminar and 4th Meeting of the Asia/Pacific Meteorological Requirements Task Force (MET/R TF/4) were held in Tokyo, Japan, from 29 June to 3 July 2015.

2. DISCUSSION

Regional ATM Contingency Plan

2.1 The draft Asia/Pacific Region ATM Contingency Plan, developed by RACP/TF, defines 3 categories of ATM contingency events:

Category A – Airspace Safe, but Restricted or No Air Traffic Service (ATS), due to causal events such as industrial action, pandemic, earthquake, nuclear emergency affecting the provision of ATS, or ATM system failure or degradation;

Category B – Airspace Not Safe, due to causal events such as Volcanic Ash Cloud (VAC), nuclear emergency, military activity; and

Category C – Airspace Not Available, due to causal events such as pandemic, national security – normally a political decision.

Meteorological Information for Contingency Planning

2.2 ICAO provided RACP/TF with information discussing aeronautical meteorological information in support of contingency planning, in particular the progress made in the Asia/Pacific Region and work still to be done.

2.3 To address the need for effective coordination between States in the event of significant hazardous meteorological events (e.g., volcanic ash in Southeast Asia) the Meteorology Sub Group (MET SG) was tasked with developing a framework for contingency plans in the APAC Region for specific phenomena including volcanic ash, tropical cyclone, radioactive cloud and tsunami.

2.4 It was envisaged that consideration of existing bilateral and multilateral contingency arrangements, which were practiced by some APAC States (e.g. ATM coordination between Singapore and Indonesia in case of a volcanic ash event), would support development of the regional contingency plans.

2.5 The list of State Contingency Points of Contact for Volcanic Ash Events could be accessed at the ICAO APAC eDocuments website: http://www.icao.int/APAC/Pages/edocs.aspx, under the heading 'MET'.

2.6 In 2011, under direction from the MET SG, the Meteorological Advisories and Warnings Implementation Task Force (METWARN/I TF, now the Meteorological Hazards Task Force – MET/H TF) in coordination with the Meteorology / Air Traffic Management Task Force (MET/ATM TF, now Meteorological Requirements Task Force – MET/R TF) developed a draft framework for APAC regional contingency plans for phenomena that include volcanic ash, tropical cyclone, radioactive cloud and tsunami (**ATM/SG/3 WP/18 Attachment C**).

2.7 In subsequent reviews it was noted that a detailed set of requirements from RACP/TF with respect to the MET input necessary for development of regional ATM contingency plans, would assist the MET/H TF in progressing development of the framework for APAC regional contingency plans for phenomena that include volcanic ash, tropical cyclone, radioactive cloud and tsunami.

2.8 The meeting was reminded of the Air Traffic Management Volcanic Ash Contingency Plan (ATM VACP) template. The ATM VACP template was finalized and made available to all ICAO Planning and Implementation Regional Groups (PIRGs) in 2012 for use in the preparation of regional volcanic ash contingency plans.

Noting that the APAC Region was preparing to conduct an APAC volcanic ash / ATM exercise in 2015 the RACP/TF was invited to consider utilizing experience from the proposed APAC volcanic ash exercise to assist with its development of the Regional ATM Contingency Plan.

Volcanic Ash Cloud Contingency Planning

2.9 The RACP/TF/4 meeting was reminded of the RACP/TF TOR requirement that development of the Regional ATM Contingency Plan detailed recommended Regional contingency practices to events such, as severe meteorological and geological phenomena, health emergencies (pandemics, etc), military onflicts and industrial relations issues.

2.10 Noting that a volcanic ash exercise was planned for the Asia/Pacific region in 2015 (IP/03), it was agreed that RACP/TF would examine documents including ICAO Doc 9691 *Manual on Volcanic Ash, Radioactive Material and Toxic Chemical Clouds*, the ICAO *Volcanic Ash Contingency Plan Template*, the EUR Region Doc. 019 – *EUR Volcanic Ash Contingency Plan* and the *Volcanic Ash Contingency Informal Arrangement (Indonesia and Singapore)*, with a view to developing regional volcanic ash contingency guidance which, as suggested in Doc 9691, could also be used to respond to radioactive cloud and toxic chemical cloud events. Further development of the guidance would be supported by the outcomes of the volcanic ash exercise.

VOLCEX/SG/1

2.11 The 1st Meeting of the Asia/Pacific Volcanic Ash Exercises Steering Group (APAC VOLCEX/SG/1) was held in Manila, Philippines, from 27 to 29 May 2015. The VOLCEX/SG meeting agreed to conduct two volcanic ash exercises. The first exercise, Volcanic Ash Exercise – Philippines 2015/1 (VOLPHIN15/01), is scheduled to be held on August 11 2015. The second meeting of the VOLCEX/SG, scheduled for 14 – 16 September 2015, will include an exercise debrief of VOLPHIN/15/01, and conduct planning for VOLPHIN/15/02, tentatively scheduled for mid-December 2015.

2.12 The overall objective of the VOLPHIN/15/1 exercise is to maintain enhanced safety, regularity and efficiency of aviation in the event of a volcanic eruption by demonstrating the provision and exchange of volcanic ash information in support of flexible airspace management, improved situational awareness and collaborative decision making, and dynamically-optimized flight trajectory planning.

2.13 In particular, the exercise aims to demonstrate the practice of applicable global and regional procedures related to volcanic activity and volcanic ash, including:

a) Distribution of alerts (e.g., VONA)
b) Distribution of AIS and MET messages (e.g., VAA/VAG, SIGMET, NOTAM, AIREP)
c) Responses by air traffic control and air traffic flow and capacity management units and aircraft operators (e.g., safety risk assessments, tactical re-routes)
d) Enhanced situational awareness and collaborative decision-making (CDM, e.g., via a teleconference, website, or other media)

2.14 The exercise shall be planned and conducted to ensure that detrimental effects on the aviation system performance are avoided, but that nevertheless useful experience and information is generated.

2.15 The exercise is envisaged as the first of two or more exercises based in Philippines, to identify and address local and sub-regional issues. The first exercise shall be confined to the Manila FIR. The primary objective of the first exercise is to test information flows by checking AFTN addressing, message distribution, information handling and coordination between agencies.

2.16 The exercise shall be conducted over a period of approximately six (6) hours on 11 August 2015, with the first VONA to be issued at 0045 UTC and message/s to announce cessation of the exercise at 0645 UTC.

2.17 The exercise scenario involves the eruption of the TAAL volcano near Manila, Philippines (Name: TAAL, Number: 273070, Position: N1400 E12100, Area: Philippines) with volcanic ash cloud up to FL370 and above moving north at 45 knots to impact ATS routes and airspace within the Manila FIR close to and north of Manila.

2.18 The exercise scenario for the VOLPHIN/15/2 exercise will involve the volcanic ash cloud impacting upon multiple FIRs.

2.19 Lessons learned from the volcanic ash exercises will be used to develop specific guidance and performance objectives for inclusion in the Regional ATM Contingency Plan.

Regional Framework for Collaborative ATFM

2.20 The draft Regional Framework for Collaborative ATFM, developed by ATFM/SG, includes information and performance objectives relating to MET information for ATM that is outside the scope of current OPMET information defined in Annex 3 to the Convention.

Meteorological Information Requirements for ATFM

2.21 The meteorological service provided for the aerodrome and terminal area needs to evolve to fill the gap between traditional products in ICAO Annex 3 and user requirements to support the global ATM system. The ability to accurately perform pre-tactical and tactical demand-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.

2.22 In particular, weather affecting the airspace in the vicinity of the primary holding areas and initial approach fixes could have a significant impact on the delivery of flights into the approach airspace and onto the runway.

2.23 Some states have developed ATM-tailored meteorological information for use in sophisticated ATM decision support tools. **Figure 1** shows an example of initial approach fix (IAF) and holding stack prediction based on weather intensity and coverage area.

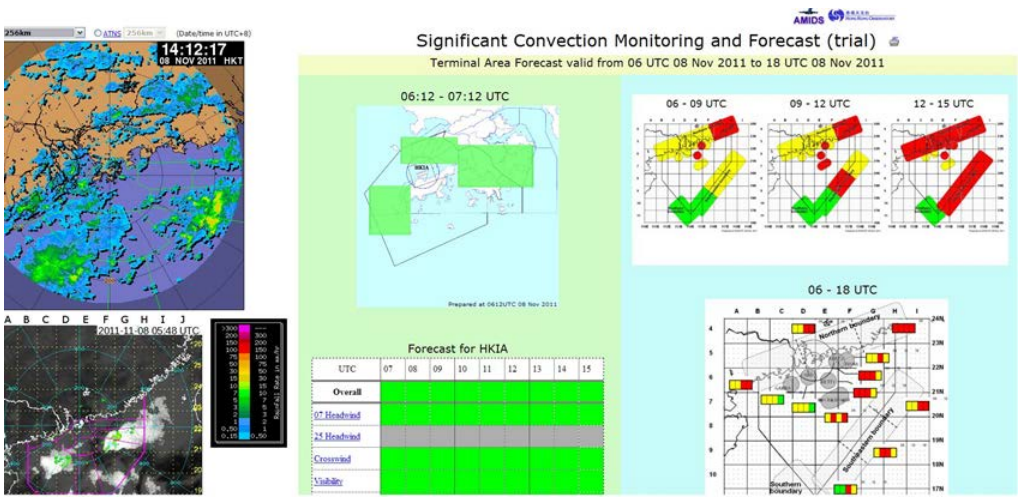

Figure 1: IAF and Holding Stack Prediction Tools

2.24 The ICAO Air Navigation Commission (ANC) has approved a proposal for the establishment of the Meteorology Panel (METP). It was envisaged that expert groups determined by METP would assist the Secretariat in the development of global provisions such as SARPS and amendments in Annex 3 relating to meteorological information to support ATM and Meteorological services in the terminal area.

2.25 The Draft Regional Framework for Collaborative ATFM includes guidance, primarily developed by Hong Kong, China, for the development of the MET services required to support ATFM

and the collaboration between ATFM service providers and MET providers in developing MET products.

2.26 ATFM/SG noted that the development of specialized MET products would incur costs. Such products should therefore only be defined for situations where there was an established need, such as demand exceeding capacity or growing traffic demand nearing capacity.

2.27 The Asia/Pacific Region Meteorological Requirements Task Force (MET/R TF) has been tasked to evaluate requirements for meteorological information in support of ATM/ATFM and to assist States to develop meteorological services to meet the requirements. It was envisaged that as the global provisions develop, regional implementation of meteorological services to support ATM in the terminal area would be facilitated through the appropriate regional group/s. In the meantime, the MET/R TF would continue to promote coordination between the MET and ATM communities to enhance the level of understanding of the requirements and the capabilities for meteorological information in support of ATM, including ATFM.

Regional ATFM Performance Improvement Plan

2.28 The Performance Improvement Plan section of the draft Regional Framework for Collaborative ATFM includes performance objectives arranged into 3 phases. The following performance objectives relate to MET information to support ATFM:

Regional ATFM Capability Phase IA – Expected implementation by 12 November 2015

Regional ATFM Capability Phase IB – Expected implementation by 25 May 2017

Regional ATFM Capability Phase II – Expected implementation by 8 November 2018

2.29 The Phase II includes the following performance objective related to MET information:

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.

2.30 Ongoing and future research and development to be considered by ATFM/SG includes, inter alia, *collaborative trajectory options*, providing for flexible routing options that permit aircraft operators to elect to re-route flights via longer trajectories to avoid constrained airspace and take advantage of the reduction or removal of ground delay (or en-route delay, where implemented) that would be imposed if the flight continued through the constrained airspace.

2.31 A collaborative trajectory options program would significantly improve the safety and efficiency of ATM in cases of large scale weather deviations (LSWD) such as those experienced in the cyclonic weather season in the Bay of Bengal and South China Sea areas, and contingency operations including the avoidance of airspace that is either unsafe (e.g. volcanic ash cloud) or unavailable. It could be anticipated that a collaborative trajectory options program would include development of MET capability to support the need for more detailed MET information similar to that provided in MSTA, but applied to the en-route ATM environment.

MET/ATM Seminar and MET/R TF/4

MET/ATM Seminar

2.32 Outcomes of the Asia/Pacific MET/ATM Seminar 2015 considered by the MET/R TF/4 meeting included examples of ATM-tailored solutions being developed for the provision of MET information to support ATM. The MET/R TF/4 meeting noted that such information is still required to comply with the Annex 3 ‘General Provisions’ wherever these services are provided for international air navigation, even though the detailed technical specifications are yet to be specified.

2.33 Noting that an ad-hoc group consisting of Australia, China, Hong Kong China and Japan was developing a list to guide States on MET information or services necessary to support the Seamless ATM Plan, the meeting also considered how to develop specific regional guidance material to assist States with the implementation of ATM-tailored MET information.

MET/R TF/4

2.34 The meeting considered that further action was required for the provision of additional guidance to States on the alignment of SIGMET for cross-FIR boundary phenomena. Further coordination would be conducted with the MET/H TF on this issue, with a view to possibly updating the Asia/pacific Regional SIGMET Guide.

2.35 The meeting noted that the ATFM survey conducted by ATFM/SG did not include analysis of MET information that States may have developed to support ATFM. A survey of this information would provide important input to the development of regional guidance. The following Draft Conclusion was agreed:

Draft Conclusion MET/R TF 4/2: Survey of State Meteorological Information Supporting Air Traffic Management

That, States are urged to respond to a survey of meteorological information provided by MET services to support Air Traffic Management including Air Traffic Flow Management operations.

2.36 The meeting agreed that collaboration and information/data sharing between States' MET service providers would be a key initiative supporting the Regional collaborative ATFM program and other ATM operations. Future meetings of MET/R TF should, after the analysis of survey information on current MET information supporting ATM/ATFM, encourage collaboration, sharing of relevant MET data and harmonization of MET information. It was acknowledged that there would be issues to be identified and managed relating to the sources, format and content of shared data.

4.1 The meeting was informed of the information and performance objectives contained in the draft Regional Framework for Collaborative ATFM. Both the Seamless ATM Plan and the draft Regional Framework for Collaborative ATFM are iterative in nature, and will be updated at regular intervals or whenever a need for further update is identified. The meeting was informed that the performance objectives of the Framework, in particular, may 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)[1] (**Figure 2**), the busiest Asia/Pacific city pairs, and to other en-route airspace where there is an identified need to support collaborative ATFM.

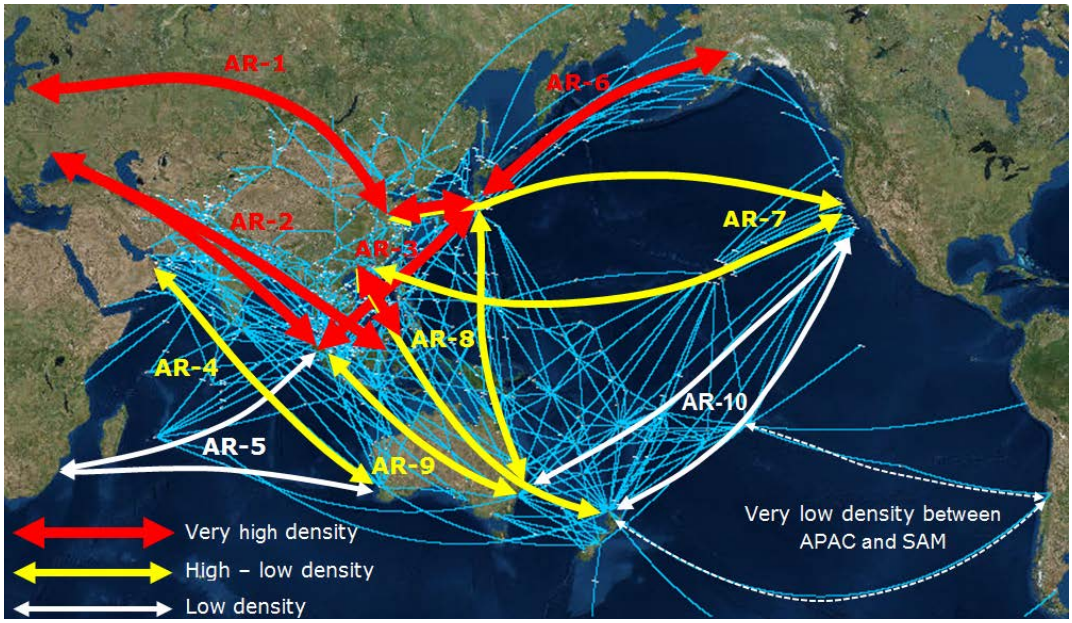

Figure 2: eANP Major Traffic Flow Depiction

[1] 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).

2.37 The MET/R TF/4 discussed the development of regional guidance material to assist States in developing tailored MET information and services to support ATM and ATFM. The guidance should include, but not be limited to:

- Procedures to determine the content and format of ATM-tailored meteorological information in close coordination between the MET and ATM service providers;
- Examples of technologies, systems and infrastructure necessary for providing ATM-tailored meteorological information;
- Methods to estimate the impacts of weather conditions on air traffic flow; and
- Collaborative operational procedures for MET and ATM service providers.

2.38 The meeting agreed to commence the development of regional guidance material to assist States in developing tailored MET information and services to support ATM and ATFM.

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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