



**WORKING PAPER**

**ASSEMBLY — 39TH SESSION**

**TECHNICAL COMMISSION**

**Agenda Item 36: Aviation safety and air navigation implementation support**

**STRENGTHENING AERONAUTICAL METEOROLOGY (MET) AND AIR TRAFFIC  
MANAGEMENT (ATM) INTEGRATION**

(Presented by Singapore supported by the Civil Air Navigation Services  
Organisation (CANSO) and the International Air Transport Association (IATA))

**EXECUTIVE SUMMARY**

The paper presents the need for enhanced integration between the service provision of aeronautical meteorology (MET) and air traffic management (ATM) to fulfil the vision of a safe and efficient air transport environment. Guided by the ICAO Global Air Navigation Plan (GANP) and the Aviation System Block Upgrade (ASBU) methodology, States/Administrations are working to progress the implementation of the various ASBU elements, some of which require greater support from MET than before. There is a need to strengthen the integration between MET and ATM to develop MET solutions to support the growing traffic needs. A systematic approach would greatly assist States/Administrations to fulfil the GANP in relation to the MET elements.

**Action:** The Assembly is invited to:

- a) note the information contained in this paper;
- b) encourage States to adopt the proposed framework for MET and ATM integration at the national level;
- c) encourage greater participation and exchange between MET and ATM experts at the national, regional and global level; and
- d) request ICAO and the World Meteorological Organization (WMO) to continue to provide strategic guidance for effective MET-ATM integration.

<i>Strategic Objectives:</i>	This working paper relates to the Safety and Air Navigation Capacity and Efficiency Strategic Objectives.
<i>Financial implications:</i>	Not applicable.
<i>References:</i>	Annex 3 — <i>Meteorological Service for International Air Navigation</i> Doc 9750, <i>Global Air Navigation Plan</i>

## 1. INTRODUCTION

1.1 Air traffic in the Asia Pacific Region has grown at a steady pace in the last decade and is expected to continue growing in the years to come. The impact of meteorological phenomena on air transport multiplies with growing traffic volumes. To ensure that the provision of air navigation services continues to facilitate safe and efficient air traffic operations, stronger collaboration and joint innovation between the Meteorological Authorities<sup>1</sup> and the air navigation service providers (ANSPs) will be necessary to enhance the provision of aeronautical meteorology (MET) in tandem with developments in air traffic management (ATM).

## 2. NEED FOR GREATER COORDINATION

### 2.1 Current constraints

2.1.1 The MET-ATM relationship can be limited if conducted on the basis of operational requirements as spelt out in ICAO Annex 3<sup>2</sup>. When these requirements are interpreted too rigidly, interactions are restricted to a tactical level. This limits awareness and appreciation of each other's business. Greater coordination between the Meteorological Authority and the ANSP will foster a better understanding that would allow ANSPs to tap on the strength and capabilities of MET technologies to jointly develop MET solutions and decision support tools that would assist to overcome ATM challenges.

2.1.2 Furthermore, meteorological phenomena have no respect for man-made geographical boundaries and their impact is felt cross-boundary. Just like ATM, a regional or sub-regional approach to MET will ultimately lead to better support to airspace users.

### 2.2 Proposed framework for MET-ATM integration

2.2.1 The 4th Edition of the ICAO *Global Air Navigation Plan* (GANP,– Doc 9750) along with the Aviation System Block Upgrades (ASBU) methodology provides States/Administrations with the strategic guidance to progress with enhancements to ATM to meet the growing demand of air traffic. MET has been identified as one of the elements in the ASBU<sup>3</sup> and the importance of MET development is similarly emphasized in the Asia Pacific Seamless ATM Plan. MET upgrades will require States/Administrations to establish a systematic framework for integration between Meteorological Authorities and ANSPs.

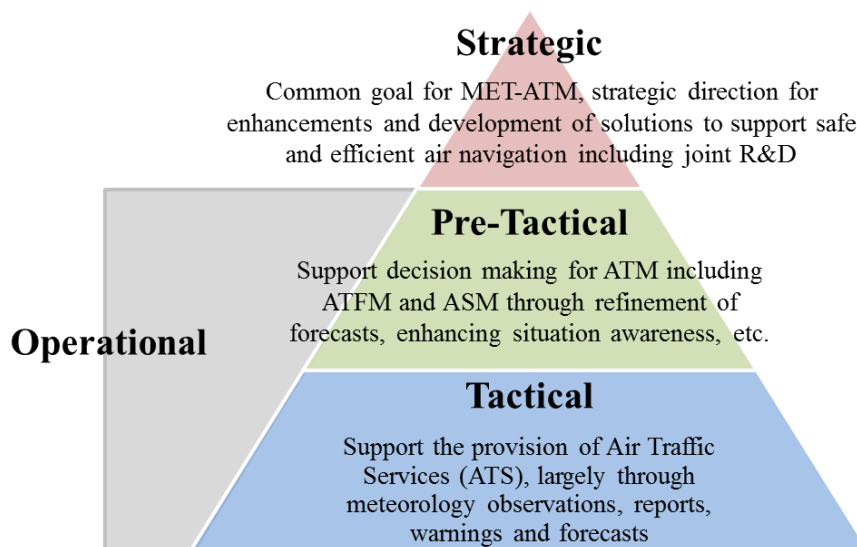
2.2.2 One way to implement such a framework is to model it after the existing tiered approach that is applied to ATM such as in Air Traffic Flow Management (ATFM) and Airspace Management (ASM), which would cover the full spectrum of: a) tactical; b) pre-tactical; and c) strategic interaction as shown in Figure 1.

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<sup>1</sup> The authority providing or arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State as defined in ICAO Annex 3.

<sup>2</sup> ICAO Annex 3 – *Meteorological Service for International Air Navigation* which outlines the Standards and Recommended Practices (SRPs) for Contracting States to determine the meteorological services required to meet the needs of international air navigation.

<sup>3</sup> B0-AMET Meteorological Information Supporting Enhanced Operational Efficiency and Safety, B1-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Planning and Near-term Service) and B3-AMET Enhanced Operational Decisions through Integrated Meteorological Information (Near-term and Immediate Service).



**Figure 1.** Proposed Framework for MET-ATM Collaboration at the national level

2.2.3 Previously, the provision of MET was limited to the “tactical” level as the requirements were scoped according to ICAO Annex 3. The implementation of ATFM, however, has driven the establishment of “pre-tactical” interaction between MET and ATM as ATFM requires the ability to predict the capacity of a block of airspace that supports en-route, approach or aerodrome operations. This translates to the need for refinements to MET products tailored to suit the specific ATM operations. Examples of refinement include the provision of impact-based warnings and probabilistic forecasts for specific areas used for ATM such as holding stacks, critical arrival and departure routes. Such products enable pre-tactical decision making when executing ATFM measures to minimize delay and optimize the available capacity.

2.2.4 While the “tactical” and “pre-tactical” interactions are operational in nature, the interaction at the “strategic” level is key to enabling stronger integration between Meteorological Authorities and ANSPs. MET and ATM experts need to jointly assess the growth in air traffic and emerging trends in weather phenomena to develop new and innovative MET solutions. This is especially so where the implementation of the various ASBU for ATM requires greater support from MET than before. Having a common strategic goal will also help States/Administrations to allocate the appropriate resource to the development of MET solutions as well as participation at the various regional and global platforms.

2.2.5 To assist States/Administrations, ICAO has established the ICAO Meteorology Panel (METP) to provide support to acquire the necessary resources and expertise to realize the MET components of the GANP. ICAO, working closely with the World Meteorological Organization (WMO), has also rolled out several Standards to enhance the quality of aeronautical MET information, including the requirement for Meteorological Authorities to implement a quality management system and for personnel providing aeronautical MET services to meet stringent competency Standards. These requirements provide a high level of assurance on the quality of the MET information. As such, ICAO and WMO are requested to continue to provide strategic guidance for MET-ATM integration. For example, ICAO and WMO could consider accrediting more training centres to provide specialized training on aviation MET, including the need for closer MET-ATM integration. Such training could be catered for both MET and ATM experts so as to bridge the knowledge gap between both parties.

### **2.3 Strengthening MET-ATM integration at the regional and global level**

2.3.1 Given the cross-border nature of both ATM and meteorology, collaboration should be coordinated at both regional and global levels. For instance, in the Asia and Pacific Region, the MET Sub Group under ICAO APANPIRG facilitates such regional coordination. In this regard, States/Administrations can step up their participation at such ICAO fora for greater coordination of regional and global developments in MET. MET developments need not be isolated from advances made in ATM. MET providers can leverage on System Wide Information Management (SWIM) development to provide a platform for sharing of MET information to promote greater situational awareness amongst all stakeholders. Further to this, Meteorological Authorities and ANSPs could collaborate in joint research and development (R&D) projects to tackle challenges posed by meteorological phenomena unique to the region. Such R&D efforts can build on other on-going projects such as the Aviation Research Demonstration Project (AvRDP) led by WMO to enhance Meteorological Service Information for the Terminal Area (MSTA).

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