



WORKING PAPER

TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 4: Optimum capacity and efficiency – through global collaborative ATM

4.3: Enhanced operational decision-making through integrated meteorological information

MAKING AVAILABLE AND INTEGRATING METEOROLOGICAL INFORMATION

(Presented by the Presidency of the European Union on behalf of the European Union and its Member States¹; by the other Member States of the European Civil Aviation Conference²; by the Member States of EUROCONTROL; and by the United States)

SUMMARY

Implementing ASBU Module B0-105 (Meteorological information supporting enhanced operational efficiency and safety) proportionally to justified operational needs, and including Module B1-105 in the Global Air Navigation Plan are elementary steps in achieving optimum capacity and efficiency through global collaborative ATM. However, more emphasis should be put on the complex nature of using MET information instead of considering only its availability.

Action: The Conference is invited to agree to the recommendation in paragraph 4.

1. INTRODUCTION

1.1 The provision of aeronautical meteorological (MET) services is traditionally focussed on safety issues, and as such primarily targeted at airspace users. Within the context of the future ATM system, the considerable impact of weather on safety, capacity and efficiency, and the potential to mitigate some of the environmental impacts of flight must now be addressed.

1.2 The Conference is aware of the updated *Global Air Navigation Plan* (Doc 9750) and the associated concept of the aviation system block upgrades (ASBUs). The notion of timely, accurate and easily accessed MET information for decision support is captured in a set of air traffic management (ATM) solutions or upgrades listed as Modules B0-105, B1-105 and B3-105 named Meteorological information supporting enhanced operational efficiency and safety.

¹ Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and United Kingdom. All these 27 States are also Members of ECAC.

² Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, Georgia, Iceland, Moldova, Monaco, Montenegro, Norway, San Marino, Serbia, Switzerland, The former Yugoslav Republic of Macedonia, Turkey and Ukraine.

1.3 These modules on meteorological information indicate ways to apply the concepts defined in the *Global Air Traffic Management Operational Concept* (Doc 9854) to achieve regional performance improvements to the evolving air traffic management (ATM) system whilst ensuring global interoperability. These modules are recognized as cornerstones of effective planning and management of the optimum flight trajectory by integrating state-of-the-art and fit for purpose MET information in the associated decision-making processes.

1.4 It is important to consider in more detail the various aspects of *applying* the concepts described in the *Global ATM Operational Concept*. The challenge for the Conference is to consider the need for ICAO to work on the definition of the required level of MET service provision needed to support the required performance improvements, at a reasonable cost and with demonstrable benefits. Essential to this concept is the need for a clear focus from ATM on the services required from the ‘MET community’ and vice-versa. Consequently, ICAO should accommodate this transition not only approached from a traditional MET service provision perspective but also from the ATM integration viewpoint. The real challenge lies in integrating MET information into ATM decision-making, not in making more or more diverse MET information available.

2. THE REQUIRED CHANGE

2.1 Modules B0-105, B1-105 and B3-105 provide the ICAO perspective on the changes needed to adapt to and accommodate this new environment of improved decision-making by integrating MET information. The underpinning themes for change can be grouped into three main categories.

MET information provision

2.1.1 MET information remains a pre-requisite for a safe and efficient air transport system. The well-established national meteorological service provider community is still envisioned to be the backbone for the provision of MET information to the aviation community. Based on changing functional and performance requirements, a consolidation of provision could however be envisaged. In short, MET information providers will make timely and accurate aviation weather information increasingly accessible across the whole ATM system. With the foreseen advances in sensing technology and numerical prediction capabilities, MET information will be improved in temporal and spatial resolution when required instead of providing a restricted set of services for a limited number of ATM stakeholders.

2.1.2 This evolution of MET information provision is strongly linked with the on-going engagement and commitment of the user community to clearly define their requirements. These requirements in turn are used to define how MET information integration concepts will evolve. Since progress has been limited so far, the risk that MET providers will not wait and not invest in aeronautical meteorology is becoming higher. This introduces the intrinsic risk that MET providers will not be ready to provide the MET information when ATM stakeholders conclude on the development of their MET information integration concepts. To overcome this risk, a pro-active approach from ATM is required.

MET information services infrastructure

2.1.3 System-wide information management (SWIM) is essential for the exchange of network-enabled and consistent MET information. This will provide support to a consistent and coherent operational ATM picture at the various levels of required granularity. An integral part of SWIM is the MET information exchange standard that will ensure global interoperability. This standard, the WXXM, should be interlinked to other data domains that are relevant for ATM as integral part of SWIM, as discussed under Agenda Item 3.

2.1.4 WXXM is the single common reference for MET information exchange between all systems including decision support tools and air traffic stakeholders. The benefits of WXXM are increased interoperability, flexibility and adaptability leading to increased quality of MET information across ATM operations. For more information, see www.wxxm.aero.

MET information integration

2.1.5 ATM stakeholders will integrate the provided MET information into the ATM processes through a SWIM-compliant MET information services infrastructure. The impact of weather on the ATM system will be assessed with the help of ATM decision-support-systems in a more consistent and transparent manner. The present concept of operations in which ATM stakeholders primarily interpret MET and subsequently manually integrate the information into traffic decisions based on their understanding of the information presented.

2.1.6 A reactive rather than proactive approach to decision-making based on MET information is currently the norm, as the perceived level of associated risk is considerably lower than in the proactive alternative. To change this practice, it is clear that significantly greater access to shared MET information and a higher degree of understanding and cooperation between the user and supplier communities must evolve and should be institutionalised in the form of ICAO provisions.

2.1.7 The integration of MET information should drive the capabilities to provide MET information and the required (services) infrastructure. It is important to consider that the past, current and especially the future state of the atmosphere is difficult to describe in a deterministic manner. Nevertheless, MET information can be statistically characterised or at least bounded for a specific use. This would aid the determination of uncertainty and risk, and as such serve ATM decision making. The type of uncertainty associated with MET which is used in the identification of risk and the determination of a range of options for action can be addressed with powerful analytical techniques. Its exploitation will be essential for future ATM operations.

3. CONCLUSION

3.1 Modules B0-105, B1-105 and B3-105 provide the direction for change. Implementing B0-105 proportionally to justified operational needs and including B1-105 in the Global Air Navigation Plan are elementary steps in achieving optimum capacity and efficiency through global collaborative ATM.

3.2 More emphasis should be put on the complex nature of MET information integration aspects instead of on only MET information provision considerations. ICAO needs to undertake activities to assure that the ATM related provisions to integrate MET information will be in place. These initiatives will drive the requirements for MET information provision and associated infrastructural aspects from both a development and deployment perspective.

3.3 The Conference could consider the development by ICAO of an 'ATM, MET Information Integration Plan' in support of the identified 105-modules. This plan should identify the ATM-concepts, ATM-processes, ATM-procedures and ATM-provisions that need to integrate MET information and followed by the development of an ICAO MET integration roadmap identifying implementable solutions. This will also form the basis of required updates to all relevant ICAO provisions for international air navigation. An upgrade of all provisions relevant to achieving optimum capacity and efficiency by using MET information not strictly limited to updates of ICAO Annex 3.

4. **RECOMMENDATIONS**

4.1 The Conference is invited to:

- a) agree on the need for a global ATM-MET information integration plan in support of the aviation system block upgrade (ASBU) Modules B0-105, B1-105 and B3-105; and,
- b) request ICAO to undertake the development of the ATM, MET information integration plan and an associated roadmap by a cross-disciplinary team of experts established by the air traffic management programme of the Air Navigation Bureau.

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