



*International Civil Aviation Organization*

**Seventh Meeting of CNS/MET Sub-Group of APANPIRG and  
Tenth Meeting of CNS/ATM IC Sub-Group of APANPIRG**

Bangkok, Thailand, 15 – 21 July 2003

**Agenda Item 13:                      Review developments, research, trial and  
   demonstration relating to CNS/ATM**

**MET REQUIREMENTS FOR ATM**

(Presented by Chairman of the Task Force)

**SUMMARY**

This paper reports on the work of the METATM Task Force on CNS/ATM.

**1.                      Background**

1.1                      Decision 5/30 of the Fifth Meeting of CNS/MET Sub-Group of APANPIRG, Bangkok, July 2001 established a METATM task force to investigate the MET requirements for ATM.

1.2                      The Task Force terms of reference are –

- a)                      Evaluate the current status of implementation, capabilities and developments of meteorological systems in the ASIA/PAC Region.
- b)                      Evaluate the operational needs and emerging capabilities of meteorological systems in the ASIA/PAC Region, and develop proposals/requirements for changes necessary to meet those needs.
- c)                      Develop the Regional plan for the implementation of meteorological services and facilities for the new CNS/ATM systems.
- d)                      Report to the CNS/MET Sub-Group of APANPIRG for further co-ordination through the ICAO Secretariat with other relevant bodies.

**2.                      Introduction**

2.1                      The meteorological information/products (MET) specified in Annex 3 in the majority of cases have been developed to cater for flight planning requirements. Traditionally ATM has used these products which are adequate for a range of uses. In recent times however, the advancement of ATM systems and procedures brought about by increased traffic and user expectations has generated demand for more user focussed meteorological information. This demand has been approached on a number of fronts and scales. On the global scale we have seen the development of the WAFS while at the local scale a wide range of MET information is being provided by States to satisfy the specific

requirements of ATM. This report will concentrate on the MET being provided by a number of States in the Asia/PAC region with respect to user requirement, content and systems.

### 3. Meteorological Requirements of ATM

3.1 ATM requires the provision of MET over a range of spatial and temporal scales. Generally speaking ATM requires MET for airspace organisation and management, flow and capacity management, en-route ATC and terminal and airport ATC.

3.2 A brief discussion on the specific uses of individual MET elements for ATM follows.

**Surface Wind** determines runway selection and hence approach procedures and airport capacity. Critical thresholds relate to downwind (typically 0 to 5 knots) and crosswind components (typically 20 to 30 knots). Strong headwinds (greater than about 35 knots) slow acceptance rates due to the use of distance in aircraft separation minima.

**Upper Winds** are used in flow planning and sequencing. The accuracy of upper winds is perceived to be adequate for most uses however some ATM services are investigating the development of conflict resolution systems that may require greater accuracy.

**Visibility** affects airport capacity and is critical to flow planning. It may also have a significant impact on ground operations/procedures.

**Cloud** base and location is a major component in approach procedures and airport capacity.

**Weather** such as freezing precipitation and snow can impact greatly on airport ground operations (such as de-icing and runway clearing) while strong winds, lightning and heavy rain can cause long delays in ground operations.

3.3 The impacts of the weather have to be dealt with by ATM, obviously the greatest benefit can be gained by the provision of accurate and timely MET. There is generally a range of contingencies available to ATM to manage the weather component of their work. It is important to keep ATM informed of any developments and possible developments to assist them planning and eliminate any weather “surprises”.

3.4 ATM service providers will have specific requirements dependant on their ‘system’ (procedures, infrastructure, technology). This often means weather dependent ATC operations and procedures are based upon different weather thresholds to those focussed on by traditional Met products particularly with respect to aerodrome weather information. An example of this is the significance of cloud bases as high as 2000 and 3000 feet to determine approach procedures and airport capacity while alternate and circling minima for operations are well below these values.

3.5 These specific MET requirements for ATM are being addressed locally and a number of products and specific information is being provided to meet these requirements.

3.6 There is an obvious requirement for consultation between MET and ATM providers to determine an appropriate service however due the limitations of MET it has often been under-utilised and only now beginning to be more fully exploited by ATM providers.

### 4. MET Currently Provided in Support of ATM in the Asia/Pac Region

4.1 A range of information being is provided by a number of Asia/Pacific States in support of ATM that is in addition to the requirements of Annex 3 (supplementary information). The following Table provides an overview of some of the information being provided and its use in ATM.

<b>Product/Information/Service</b>	<b>ATM Use*</b>	<b>Usual Source</b>	<b>Format/Delivery</b>
1. OPMET – TAF/Landing Forecasts	A, B	Local Met office**	Text - web, AFTN, FTP
2. OPMET – Winds/Temps	A	WAFS	Grib
3. Winds/Temp	A	Local Models	Graphical - web
4. Tropical Cyclone Advisories/Volcanic Ash Advisories	A	TCAC/VAAC	Text – web, AFTN, FTP , fax
5. TC/VA information - Enhanced (graphical/extended/more detailed)	A	Local met office/TCAC	In-Person Briefing, verbal, text, graphical – web, fax, in person, telephone.
6. SIGMET/AIRMET	A, B, C	Various	Text, graphical – AFTN, FTP, web
7. Routine Tailored Briefing products***	A	Local met office	Text, verbal/graphical – web, FTP, fax, telephone
8. Ad hoc briefings	A	Local met office	Verbal, in-person – phone, in-person
9. Met presence in ATS Unit	A, B, C, D	Local met office	Verbal, graphical - In-person
10. OPMET – METAR/SPECI	B	Local met office	Text - web, FTP, AFTN
11. Current/recent surface conditions	B	Local met office	Text, graphical – web, FTP, dedicated displays
12. Weather Radar	B	Local met office	Graphical – web, local area network
13. Derived radar thunderstorm nowcasts	B, C	Local met office	Graphical – web, local area network
14. Satellite cloud imagery	B, C	Local met office	Graphical - web
15. Aircraft/Pilot reports	B, C	Aircraft	Text, graphical – AFTN, FTP, web
16. SIGWX – High	C	WAFS	Graphical - web
17. Medium	C	Local/regional	Graphical - web/fax
18. Icing Charts	C	Local model	Graphical - web, FTP
19. Extended range forecasts	D	Local met office	In-Person Briefing, verbal, text, graphical – In-person, telephone, fax, web, FTP.
20. Climatological information	D	Various	Graphical, text – web, mail.

\*A – Capacity/flow management, B – Terminal/Airport ATC, C – En-route ATC, D – Airspace organisation and management

\*\* The expression “local met office” is used to represent a meteorological office responsible for the provision of MET for a given location or airspace.

\*\*\*Tailored briefing products refer to a number of products providing MET related to critical thresholds relevant to ATC operations.

## **5. Discussion**

5.1 The supplementary information listed above is generally being used by ATM as an input to Collaborative Decision Making.

5.2 The routine tailored briefing (text/graphical) products provided by some states are tailored to operationally significant ATM thresholds and offer confidence levels of different scenarios that may impact on ATM. Forecast scenarios for a particular ports are then considered in the context of the ATM network with ATM decisions being made after consideration of the impact on the network. A Met presence and in-person briefings (often performed routinely) are of tremendous benefit by allowing direct focussed consultation.

5.3 The most prevalent supplementary information routinely provided for ATM is satellite and radar information. To an educated user this information is excellent for identifying existing hazardous weather, principally thunderstorms. A number of States in the region are also providing thunderstorm nowcasts. ATM procedures regarding the use of this information vary as they are developed locally.

5.4 Displays of current weather observations in the vicinity of aerodromes are often provided to offer ATM a better understanding and monitoring capacity of the local meteorological situation. The provision of recent weather information also assists in this capacity.

## **6. Systems**

6.1 The provision of supplementary products such as weather radar, satellite imagery and other graphical products is predominantly via the web (inter/intra net). Integration of this information into ATM systems is obviously dependent on the system. More work is required to determine the best way to integrate weather information into ATM systems.

6.2 Although somewhat ad hoc, the provision of most of the supplementary information in the region has been integrated into ATM systems by local arrangement. The variance of ATM systems does not at this stage allow any formal format specifications of this supplementary type information.

## **7. Short Term Strategies**

7.1 It is clear that existing information supplementary to that provided by traditional OPMET data can be utilised by ATM.

7.2 The type of supplementary information described is currently available for many locations in the region however may not be provided specifically to ATM.

7.3 The simple provision of information relating to ATM specific weather criteria at aerodromes can greatly increase the efficiency ATM. This information should be readily available as a consequence of the aerodrome forecasting process. The provision of confidence levels and possible alternative forecast scenarios can also greatly aid the decisions of ATM.

## **8. Longer Term Strategies**

8.1 Consultation with appropriate ATM authorities is critical in understanding local ATM requirements. It is also important for the ATM authority to understand the limitations of meteorological information and the resources required to provide a particular level of service.

8.2 Utilisation of new information or products by ATM often requires development of new ATM procedures.

8.3 The advancement of ATM systems has seen a greater reliance on the accuracy of meteorological products, it is important that the design of future ATM systems considers the likely limitations of meteorological input. This will require co-ordination between Met and ATM authorities at the planning stage.

## **9. Recommendations**

9.1 The task force recommends that Met Authorities/providers consider the supplementation of information provided for ATM with the type of information discussed in this paper that can be provided with little development. To expedite its provision the task force suggests the utilisation of readily available systems such as inter/intra net, fax, or telephone.

9.2 The task force recommends that Met Authorities/providers continually assess with ATM authorities ATM MET requirements with the aim of developing new products/information for use in ATM bearing in mind the potential costs and benefits involved.

9.3 The task force recommends that individual Met Authorities/providers be involved with the development of future ATM systems to ensure their MET requirements are taken into account.