



International Civil Aviation Organization

**ASIA/PACIFIC METEOROLOGY/AIR TRAFFIC MANAGEMENT
(MET/ATM) SEMINAR**

Tokyo, Japan, 29 June – 1 July 2015

Agenda Item 2: Impact of MET on Air Traffic Flow Management (ATFM)

**DIFFERENT AIR TRAFFIC MANAGEMENT UNIT HAS DIFFERENT NEEDS FOR
AERONAUTICAL METEOROLOGICAL SERVICE**

(Presented by China)

SUMMARY

This paper presents: Air traffic management, including airspace management, air traffic flow management and air traffic services. ATC include tower control, Approach control, Area control; the ATFM process is generally divided into different stages, The ATFM organizational structure and hierarchy are also different in each country. We should fully understand that different air traffic management unit have different needs for aviation meteorological applications. The better understanding the demands of different air traffic management unit, the better satisfying the demands of air traffic management.

1. Introduction

1.1 Aeronautical meteorological services/application for air traffic management is different from the aviation meteorological science, the former focusing on the application of the Aeronautical meteorological ability we have to improve the ATM activities, while the latter is more focused on science and technical research of the aeronautical meteorological regular and elements. Aeronautical meteorological services directly affect the safety and efficiency of aviation operations. Only we fully understand the needs of different aviation meteorological services to different air traffic management unit, we are able to better promote the safety and efficiency of air traffic operations.

1.2 Aeronautical meteorological application affect the whole activities and process of ATM. Different levels of air traffic management and aeronautical weather ability makes the great differences in aeronautical weather service between countries. In recent years, air traffic flow management developed rapidly in Asia and Pacific Regional, the traditional aeronautical meteorological service can not fully satisfy the needs for ATFM uses, we need to move forward to improve the traditional aeronautical weather service. Collaborative decision-making (CDM) process has also contributed to the development of ATM-MET.

2. Discussion

2.1 According to "Air Traffic Management" (ICAO Doc4444). Air traffic management include airspace management, air traffic flow management and air traffic services. The needs for

aeronautical meteorological service are quite different which based on the air traffic management process. For example:

2.1.1 **Airspace management.** Airspace management usually includes airport site and airport infrastructure, airspace design, routes planning, communication, navigation and surveillance infrastructure etc. The needs for aeronautical meteorology to airspace management usually include the meteorological historical data requirements and the regular climatic features in the airspace. If the process of Airspace management does not take the aviation weather factors into consideration, that will cause very serious problems. To some extent, aviation activities can not be carried out due to unreasonable infrastructure configuration. For example: we choose a site which not suitable to build a airport.

2.1.2 **Traffic flow management.** In recent years, the Asia-Pacific region ATFM develop so rapidly, which makes more challenge to traditional aeronautical meteorological service. The FIRs area and ATFM organization structure are so different in each country, which lead to the process of ATFM and the needs for aeronautical weather service is so different. Traffic flow management usually divided into 4 stages: strategic, pre-tactical, tactical and post operation analysis. The demands for aeronautical weather service is also so different to this 4 stages. In China, we intend to build three levels traffic flow management operating system (national/regional/Terminal level) to be responsible for different traffic management process. Their needs for aeronautical meteorology service are different as well due to different stages and different levels of traffic management process.

2.1.2.1 **Strategic stage.** Usually two to six months before operation. According to ICAO Doc9971 Part 2 (Draft figure2), it is not need to consider the weather factor in this stage, but obviously the ATC capacity will decrease duo to frequently thunderstorms in summer. If the airline and slot does not consider these factors, that will lead to frequent flight delays.

2.1.2.2 **Pre-tactical phase.** Usually one day before operation. This is a very important stage. If we can forecast the bad weather and flight delay, we can issue relevant warning information early, the passengers will be able to plan their trip according to those information. They can switch to high-speed rail or long-distance buses, they can depart from other airports! What's more, most of the passengers will not be delayed at the airport, they will not miss the important business matters. From June 2014, ATMB try to issue such warnings, which played a very significant role in ATFM process.

2.1.2.3 **Tactical phase.** Usually the day for operation. Depending on China's traffic flow management organizational structure, aeronautical meteorology needs are quite different.

A. **National.** To be responsible for traffic flow management across the regional FIRs boundaries. Flight operation time span is usually over two hours, so national level should usually focused on more than 2 hours systemic weather trend at busy airports and routes. Weather within two hours for them is not enough.

B. **Regional.** To be responsible for traffic flow management in regional FIR areas. Flight operation time span is usually less than 3 hours, so regional level should usually focused on weather trend at busy airports and routes within 3 hours in their responsibility areas.

C. **Terminal.** To be responsible for traffic flow management in their control area. Flight operation time span is usually less than 2 hours, so terminal level should usually focused on weather trend at busy airports and routes within 2 hours in their responsibility areas.

2.1.2.4 **Post operation analysis.** After operation. This stage also needs to consider the impact of aeronautical meteorological factors and the process to deal with the situation caused by weather, so as to improve the air traffic flow management process.

2.1.3 **ATC service.** Air traffic control services include tower, approach and area control services. They usually require accurate and timely meteorological information, such as weather radar information.

2.2 How aeronautical meteorology affects air traffic management process. Aeronautical weather factors will impact air traffic control capacity. Significant weather will affect the operation direction and operating modes of an airport, it can affect the size of the available airspace, it can affect the available time of the airspace, thus affect the air traffic control capacity.

2.3 How to determine the air traffic control capacity is a very complex matter when meteorological factors affect the operation. In China, each airport and ATC sector has a capacity baseline, when the weather impact is expected to occur, the flow management positions (FMP) will make their decisions about capacity according to the weather forecast and their experience. Each FMP's ability and experience is different and weather forecast has certain probability, how to make a good decision about the capacity value and ensure the safety and efficiency of air traffic is hard for the air traffic controllers, we need some theory/methods/rules in addition to the long-term accumulation of experience.

2.4 Massive delay reduction system (MDRS). In order to reduce the massive delay in our system, a lot of collaborative decision-making (CDM) processes were created to reduce the delay in China from 2012, which include the collaborative departure management process, collaborative airport operation process, collaborative tel-com between ATC/Airlines/Airport/MET/etc., collaborative ATFM delay alert process, collaborative POA Process, and we are trying to conduct collaborative arrival slot management process and collaborative rerouting process. As mentioned above, pre-tactical stage is a very important stage in ATFM process, if we can give an ATFM delay alert early, the airlines are able to re-plan their operation, they need to decide whether to stop ticket sales, cancel or combine the flights, if they decide to cancel the flights, they need to notice the passengers to choose other traffic tools. All of these decisions are based on the CDM process and the ability of weather forecast. I will simply introduce the process to decide and issue ATFM delay alert process in China. As follows:

2.4.1 **CDM meteorological preparatory meeting.** Every day 15:00, Aeronautical weather service center attend weather consulting meeting held by the national weather bureau. Every day 16:00, AMSC will hold the regular CDM meteorological preparatory meeting in conjunction with the regional aviation meteorological services department to make the conclusions about the influence of weather in busiest airports and routes which the flight operation will be affected for the next day.

“引发大面积航班延误的重要天气发生概率”通报表

机场	预报时段	重要天气描述	天气出现结束时间	天气强度	可能影响方位、范围	发生概率	备注
虹桥	17时-次日08时	中阵雨或雷雨	15日04:08时	中等	本场及周边	30%以下	
	次日08时-17时	中阵雨或雷雨	15日08-15时	中等	本场及周边	70%	
浦东	17时-次日08时	降雨	15日02时起	小到中	机场终端区及周边航路	70%	
	次日08时-17时	零星(系统性成片)	15日10-16时	轻到中	机场终端区及周边航路	70%	
青岛	17时-次日08时	无					
	次日08时-17时	无					
杭州	17时-次日08时	雷雨	14日22:02时				
	次日08时-17时	中到大阵雨或雷雨	15日13-17时				
南京	17时-次日08时	雷雨	14日17-18时 15日01-08时				
	次日08时-17时	间歇性雷雨	15日08-17时				
厦门	17时-次日08时	无					
	次日08时-17时	无					
福州	17时-次日08时	无					
	次日08时-17时	无					

14日16:00第一次给出上海两场雷雨影响时段及概率(起止预报), 提前量达16小时以上;
 事实证明本次预报结论与实况(虹桥15日09:34-14:30、浦东15日12:32-14:16出现雷雨)相比准确率较高。

2.4.2 **CDM preparatory meeting in regional.** Every day 16:00, Regional ATFM department will hold the CDM preparatory meeting, the ATC/MET/ASM/Equipment(etc.) department will attend the meeting. They will discuss about the weather, the military movement, the equipment maintenance situation and so on, they will give a suggestion whether issue any ATFM delay alert according to the conclusion of this meeting. Those alert was divided into three levels with different colors, the red\orange\yellow. We have many KPIs to decide the alert levels, the degree of capacity decrease is an important one, the red generally means the ATC capacity in busy hours is expected to decline more than 75%, orange 50-75%, yellow25%-50%.

2.4.3 **CDM telcom.** Every day 17:30, OMC of ATMB will hold the regular CDM telcom, the Airlines/airports/ATC/MET/ASM/Equipment(etc) will attend the meeting. The OMC will organize those stakeholders to discuss the ATFM delay alert suggested by regional ATMB. The OMC will decide whether issue ATFM delay alert and decide the level of alert according to the discuss in CDM telcom.

通告名称	当前状态	通告时间	预警级别	预警区域	预期响应
昆明长水机场航班延误黄色预警	解除	2014/11/13 8:30:00		昆明/长水	长水机场航班延误黄色响应 详细
首都机场航班延误预警	终止	2014/11/10 18:21:00		北京/首都国际	请持续关注保障任务影响情况, 提前制定保障预案。 详细
首都机场航班延误预警	终止	2014/11/8 18:25:00		北京/首都国际	请持续关注保障任务影响情况, 提前制定保障预案。 详细
南京机场航班延误预警	终止	2014/10/23 18:06:00		南京/禄口国际	0600开始响应 详细
青岛机场航班延误黄色预警	终止	2014/10/22 20:45:00		青岛/流亭国际	黄色响应 详细
青岛机场航班延误预警	终止	2014/10/21 19:00:00		青岛/流亭国际	请持续关注活动影响情况, 提前制定保障预案。 详细
青岛机场航班延误预警	终止	2014/10/21 18:59:00		青岛/流亭国际	请持续关注活动影响情况, 提前制定保障预案。 详细
青岛机场航班延误预警	终止	2014/10/21 18:51:00		青岛/流亭国际	请持续关注活动影响情况, 提前制定保障预案。 详细
青岛机场航班延误黄色预警	解除	2014/10/21 18:57:00		青岛/流亭国际	青岛机场航班延误黄色响应 详细
西安咸阳机场航班延误预警	终止	2014/10/20 18:31:00		西安/咸阳国际	0500启动响应 详细

3. Action by the Meeting

3.1 The meeting is invited to: AMEND AS APPROPRIATE

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