International Civil Aviation Organization

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Agenda Item 7: AOP, AIM, MET, SAR

DEEP CONVECTION NOTIFICATION SERVICE FOR DEMAND CAPACITY BALANCING AT THE HONG KONG INTERNATIONAL AIRPORT

(Presented by Hong Kong, China)

SUMMARY

This paper shares the experience of Hong Kong, China in close collaboration between Air Navigation Service Provider (ANSP) and Meteorological (MET) Agency in providing a safe, efficient and orderly air navigation service. Hong Kong, China has developed a Deep Convection notification service, which assists in the determination of Airport Arrival Rate (AAR) of the Hong Kong International Airport (HKIA) and initiation of appropriate Air Traffic Flow Management (ATFM) measures in the event of a forecasted Deep Convection event.

1. INTRODUCTION

1.1 "Deep Convection" (DC) is a mechanism in the atmosphere for transferring energy from the Earth's surface to higher altitudes through precipitation and storm formation. It is characterized by its significant vertical development, often resulting in thunderstorms or large cumulonimbus clouds, and frequently leads to intense and localized thunderstorms, heavy rainfall, strong gusts or, in extreme circumstances, severe weather phenomena like squall lines, hail, or microbursts.

1.2 These phenomena are serious hazards to aviation and highly disruptive to the flow of air traffic, especially if they occur at or near the airport. Experience shows they can severely disrupt runway movement, in more severe cases, for almost an hour.

1.3 In the southern China region, meteorological phenomena, such as cold fronts, low pressure troughs, and heat troughs, which usually occur in spring and summer, often lead to unstable atmospheric conditions that can trigger the process and set off the mechanism mentioned in paragraph 1.1.

1.4 Given that the traffic demand at the HKIA will gradually increase following the implementation of Three-Runway System (3RS), it is essential that a judicious AAR to be calculated and announced, with the assistance of a new notification service by the MET Agency of Hong Kong, China – the Hong Kong Observatory (HKO), so as to maximize operational efficiency and minimize traffic delay.

2. DISCUSSION

2.1 The 3RS of the HKIA commissioned in November 2024 represents an increase in the operational capacity of the HKIA. With the new flight procedures and airspace design, it could accommodate air traffic growth while providing greater flexibilities in mitigating delay through effective ATFM measures during adverse weather conditions.

2.2 During the occurrence of DC, the potential for severe meteorological phenomena such as microbursts can lead to substantial disruptions in Air Traffic Control (ATC) operations. These microbursts can halt arrivals for 10 minutes or longer, creating a ripple effect on airport arrival throughput. Coupled with the necessary runway changes due to shifting wind directions, this could result in a cumulative delay of approximately 30 minutes for arrivals. Such interruptions underscore the critical need for timely response mechanisms to manage DC occurrences.

2.3 If the DC occurrences are not taken into consideration for the determination of AAR, ATFM measures might not be able to be initiated timely and effectively. It could lead to congested airspace with extensive airborne delay which increases operational risks.

2.4 Close coordination between the ANSP and the MET Agency is paramount to the understanding and prediction of the development of DC events. This collaboration ensures that ATFM units are well-informed about atmospheric conditions that may affect ATC operations.

2.5 The introduction of the DC notification service by the HKO marks a significant advancement in aviation safety and operational efficiency. By issuing bulletins up to 72 hours in advance regarding the likelihood of severe gusts of 30 knots or greater at the HKIA, the service empowers ATFM personnel with the foresight needed to make informed decisions. This proactive approach is vital in a rapidly changing weather landscape, allowing for better preparedness and response strategies.

2.6 A sample bulletin from the HKO is included below for reference. This bulletin serves as a template for how critical weather information is communicated to ATFM personnel, highlighting the format and type of data that can be expected.

DEEP CONVECTION ALERT FOR HKIA
Issued at: 120145Z April 2025

Probability of deep convection: High
Forecast storm severity: Gust 35-40 knots
Probable occurrence period: 120700Z – 120900Z
Estimated duration of impact: Approximately 15 min starting from 120700Z

Synopsis: A squall line associated with a cold front is expected to move across the coast of Guangdong this afternoon. Microburst is possible.

Remarks:
Nil.

2.7 The DC notification service significantly enhances situational awareness for ATFM personnel, offering a clear prediction and understanding of potential DC events. This proactive approach improves operational safety and efficiency, aligning with the Hong Kong China's commitment to excellence in aviation operations.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) encourage States/Administrations to share their experience in collaboration between Air Navigation Service Provider and Meteorological Agency for capacity assessment: and

c) discuss any relevant matters as appropriate.

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