International Civil Aviation Organization

INFORMATION PAPER

ASIA AND PACIFIC (APAC) FIFTEENTH MEETING OF THE METEOROLOGICAL REQUIREMENTS WORKING GROUP (MET/R WG/15)

Bangkok, Thailand, 07 April to 10 April 2026

Agenda Item 3: Collaboration between MET and ATM stakeholders

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

(Presented by Hong Kong, China)

SUMMARY

This paper shares the experience of Hong Kong, China, wherein a close collaboration mechanism between the Air Navigation Service Provider (ANSP) and the Meteorological Service Provider (MSP) has been established for supporting the provision of a safe, efficient and orderly air navigation service. Hong Kong, China has developed a Deep Convection Notification Service, which assists the Air Traffic Flow Manager to determine the Airport Acceptance Rate (AAR) for the Hong Kong International Airport (HKIA) and, in turn, initiate appropriate Air Traffic Flow Management (ATFM) measures, if necessary, in the event of a forecasted deep convection event.

1. INTRODUCTION

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

1.2 These phenomena poses significant hazards to aviation and is highly disruptive to the flow of air traffic, especially if they occur at or around the airport. Experience shows that they can severely disrupt runway movement, for instance in an extreme case recently, for hours.

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

1.4 Given that the traffic demand at the HKIA will gradually increase following the implementation of the Three-runway System (3RS), it is essential to be judicious in the process of determination of the AAR, with the assistance of a new notification service provided by the MSP of Hong Kong, China – the Hong Kong Observatory (HKO), so as to maximise operational efficiency to the greatest extent possible.

2. DISCUSSION

2.1 The 3RS commissioned at HKIA in November 2024 marks a substantial enhancement of the airport's capacity. Together with the redesigned airspace and flight procedures, it is capable of meeting the long-term traffic demand. Consequently, effective and appropriate air traffic flow management becomes vital under adverse weather conditions.

2.2 When DC occurs at or around the airport, with its potential for hazardous meteorological phenomena such as microbursts, substantial disruption to the operation of air traffic is imminent. These microbursts could typically halt runway movement for 10 minutes or longer, creating a ripple effect on the airport's throughput. Coupled with runway changes which are likely due to shifting wind directions, the resulting traffic delay could accumulate to 30 minutes or more. In a busy international airport like HKIA, such a major interruption highlights the critical need for an effective mechanism to promptly manage the flow of air traffic in the face of possible DC.

2.3 If such capacity reduction has not been adequately considered during the AAR determination process, appropriate ATFM measures may not be able to be ready in time. This may lead to prolonged traffic delay, extensive holding, etc. As a result, operational risk would likely increase.

2.4 Close coordination between the ANSP and the MET Agency is paramount to the understanding and prediction of the development of DC events. The Deep Convection Notification Service (DCNS) employs a Three-Tier notification system that forecasts the probability of occurrence of deep convection, magnitude of the severe gust, probable occurrence period and estimated duration of impact. A sample bulletin is included below for reference. It illustrates which types of data, in what format and how these critical weather information are communicated to ATFM personnel.

DEEP CONVECTION ALERT FOR HKIA
Issued at: 131400Z August 2025

Probability of deep convection (P): Medium High
Forecast storm severity: Gust 30 knots
Probable occurrence period (T): 132300Z – 140200Z
Estimated duration of impact (D): 10 mins

Synopsis: Deep convection associated with the tropical cyclone Podul is expected to affect the coastal region of Guangdong in the morning tomorrow (14 August 2025).

Remarks:
Microburst is possible in the deep convection event.

2.5 By issuing bulletins as early as 72 hours in advance regarding the likelihood of severe gusts of 30 knots or greater at the HKIA, as well as if a microburst is possible, the service empowers ATFM personnel with the foresight needed to make informed decisions. This collaboration ensures that ATFM units are well-informed about atmospheric conditions that may affect ATC operations. The assessment relies on aviation forecasters' experience and professional judgment which integrates radar-based nowcasting, numerical weather prediction, and products like short-term storm tracking using AI techniques. This proactive approach is vital in a rapidly changing weather landscape, allowing for better preparedness and strategies in response.

CONCLUSION

2.6 The DCNS exemplifies a commitment to safety, innovation, and broad relevance in aviation. It significantly enhances situational awareness for ATFM personnel, offering a clear prediction and understanding of potential DC events. This proactive approach and close collaboration between MET and ATFM unit 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; and
b) discuss any relevant matters as appropriate.

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