



*International Civil Aviation Organization*

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

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**Discussion Topic 2: Meteorological Impacts on ATM and MET Information Required  
for Air Traffic Flow Management (ATFM)**

**1) En-route – Large Scale Weather Deviations**

**AVIATION METEOROLOGICAL PRODUCTS AND SERVICES**

(Presented by Hong Kong, China)

**SUMMARY**

This working paper describes tailor made aviation meteorological products and services from the Hong Kong Observatory for Hong Kong air traffic control to handle air traffic under inclement weather conditions.

**1. INTRODUCTION**

1.1 During the months from April to October, convective weather quite often develops in the South China Sea impacting on flight operations in the Hong Kong Flight Information Region (HK FIR).

1.2 With significant growth of air traffic handled by Hong Kong air traffic control (ATC) (flights landing and taking off from the Hong Kong International Airport (HKIA) and overflying the HK FIR), it is necessary for ATC to be aware of the presence and movement of convective weather within or approaching the HK FIR to allow sufficient lead time to implement measures to ensure flight safety.

1.3 The Hong Kong Observatory (HKO) was therefore approached for the development of an aviation meteorological product that would provide forecast of convective weather at strategic locations to facilitate ATC operations.

## **2. BACKGROUND**

### 2.1 Large Scale Weather Deviation (LSWD).

2.1.1 Flights will avoid convective weather as much as possible. The resultant avoidance can take a flight significantly away from its route and into another route where another flight is flying at the same flight level. Under such situation, ATC will have to change one of the flights to another flight level to ensure flight safety.

2.1.2 If this continues or persists, ATC will have to consider suspension of the use of certain flight levels on a route (or a number of routes). As this will also affect other ATC units, the suspension has to be coordinated in a timely manner in order to minimize the impact on overall ATC operations. For example, a decision by HK ATC to suspend the use of certain flight levels may impact on flights in Singapore, about 3.5 hours flying time away.

2.1.3 Therefore an effective forecast of convective weather round the clock will therefore be crucial for LSWD that results in suspension of using certain flight levels across the South China Sea requiring corresponding actions by neighbouring ATC units.

### 2.2 Arrivals at the HKIA

2.2.1 Convective weather can disrupt a smooth flow of air traffic, particularly the arrivals at the HKIA. Instead of accommodating 32 arrivals in an hour, the number can be reduced significantly in the presence of weather. Since the timetables/schedules of airlines are based on the best case scenario, reduction in the number of arrivals means some of the arrivals will be delayed in the air. Of the three primary holding patterns for delaying arrivals in the air, two of them are relatively closer to the coast and operational experience showed that they are more subject to the impact of convective weather than the other. As such the full capacity for delaying aircraft in holding patterns cannot be used. The diminished holding capacity will have to be addressed through other measures and ATFM is often used.

2.2.2 Thus knowing the development and movement of convective weather affecting the holding patterns will allow HK ATC time to work out ATFM measures with adjacent ATC units to address the “shortfall” of holding capacity and that will also be important to facilitate air traffic flow within the region.

## **3. NEW MET PRODUCT AND SERVICES**

3.1 HKO was thus requested to develop convective weather forecast for strategic locations of the HK FIR.

3.2 The new service, Significant Convection Monitoring and Forecast, is a web-based product for ATC supervisors and has been introduced for trial use since June 2010. See Appendix 1.

3.2.1 The integrated webpage shows weather radar reflectivity data (range settings at 64km, 128km and 256 km) overlaid with lightning location data, composite radar and satellite image highlighting deep convection and forecast of convective weather within the FIR as well as in the vicinity of the three primary holding patterns.

3.2.2 Significant convection time series forecast for the coloured areas is at 3-hourly intervals up to 12 hours ahead. Different colours (green / yellow / red) indicate various levels of chance (low / medium / high) of significant convection over the specified area within the 3-hour time block.

3.2.3 The new forecasting service has proved to be very useful in providing ATC supervisors with the necessary MET information to support smooth ATC operations.

3.3 In addition to the new forecasting service, the Aviation MET Forecaster of HKO and the ATC Watch Manager will also confer with each other on the trend and development of weather at HKIA and in the HK FIR, currently once a day at a prescribed schedule. In view of the usefulness of the weather briefing service, there is a plan to increase its frequency to twice a day in the coming summer months.

3.4 The convection monitoring and forecast product and the daily weather conference call commenced in June 2010. ATC and HKO are in close collaboration to explore ways to fine tune the product using cases of severe weather bringing significant air traffic disruption during the summer months in 2010.

3.5 It was also recognized that a closer understanding between controllers and aviation forecasters of each other's work would be beneficial. Two workshops were therefore held for such purposes. Joint workshops will continue to be held in the future to exchange views on future development and application of the forecast product.

#### **4. ACTION BY THE MEETING**

4.1 The meeting is invited to note the actions taking by HKO and HK ATC to ensure a safe, orderly and effective flow of air traffic under the impact of convective weather.

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