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INFORMATION PAPER

Working Group (MET/S WG/11)

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Agenda Item 3: Planning and implementation of meteorological services

MET SERVICES DURING THE THUNDERSTORM SEASON IN SOUTH CHINA

(Presented by China)

SUMMARY

This paper presents the MET services during the thunderstorm season in south China. The Regional Severe Weather Forecasts (RSWF) are issued 3 times a day, while MET forecasters and ATFM officers make collaborative decisions through face-to-face consultation every 2 hours to minimize the negative impacts of adverse weather, thus optimizing the regional flights operation.

1. INTRODUCTION

1.1 In order to minimize the negative impacts of adverse weather and support Air Traffic Management (ATM) operation, Civil Aviation Administration of China (CAAC) has developed a Massive Delay Response System (MDRS) since 2014.

1.2 Under the rules of MDRS, Air Traffic Flow Management (ATFM) officers make strategic and preliminary tactics decisions through MET-ATM coordination to ensure that the air traffic flow matches the air capacity.

1.3 However, the weather in the thunderstorm season (from March to October) in South China is complex and capricious, which reduce air traffic capacity seriously. MET forecasters and ATM experts have developed a Regional Severe Weather Forecasts (RSWF) and face-to-face MET-ATM consultation to support ATFM decision making during the thunderstorm season since 2019. Through the weather briefing with RSWF and MET-ATM consultation, MET forecasters and ATFM officers establish common situational awareness, thus improving ATFM operation further.

1.3.1 The RSWF focus on not only the convective weather occur in South China, but also adverse weather impacts on main airports, air routes, busy terminal sections and key navigation points. The content of the RSWF includes: (1) Convective area, direction, speed, base and top height of convective clouds. (2) Forecast convective area, base and top height of convective clouds, coverage rate of

thunderstorm. (3) Affecting Period, especially for the Beijing-Guangzhou air route (A461), the Shanghai-Guangzhou air route (A599), Guangzhou (ZGGG) Terminal Manoeuvring Area (TMA) and Zhuhai (ZGSD) TMA. The RSWF are issued 3 times a day, at 07:30am (CST), 11:00am and 05:00pm respectively, and the corresponding forecast period are 08:00am-05:00pm, 11:00am-08:00pm and 06:00pm-08:00am the next day (Table 1).

1.3.2 Face-to-face MET-ATM consultation held every 2 hours from 07:30am to 09:30pm in the thunderstorm season focus on the convective weather impacts in the next 6 hours to support ATFM decision making. MET forecasters use red solid line describing the main convective area, black solid line describing the forecast convective area with occurrence probability of more than 70%, and orange solid line describing the forecast convective area with occurrence probability of 30%~40%.

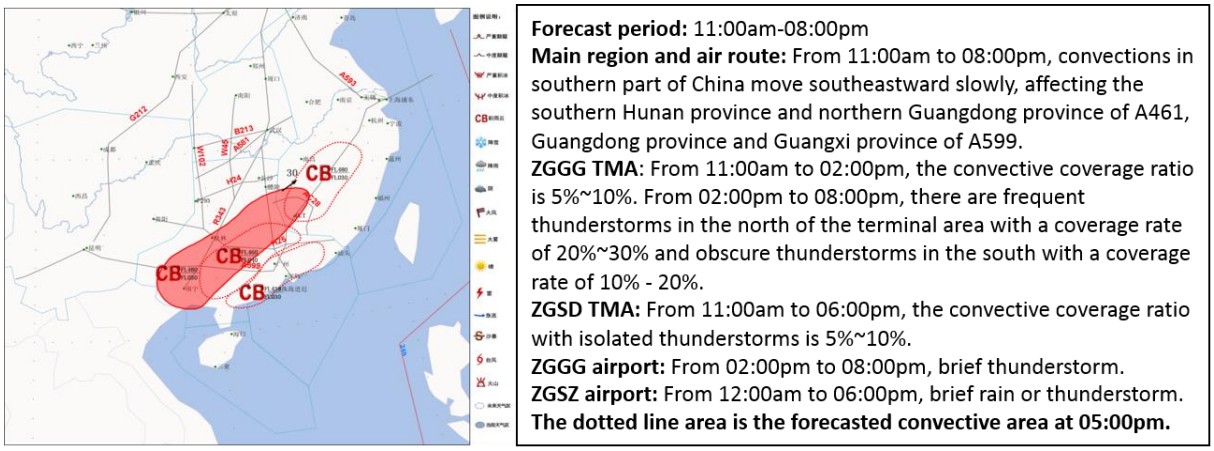
Table 1. The RSWF in the thunderstorm season

Issue time	Forecast period	Content
07:30am	08:00am-05:00pm	(1) Convective area, direction, speed, base and top height of convective clouds. (2) Forecast convective area, base and top height of convective clouds, coverage rate of thunderstorm. (3) Affecting Period.
11:00am	11:00am-08:00pm	
05:00pm	06:00pm-08:00am the next day	

1.4 Case study

On June 25th 2020, the southern part of China was attacked by a Mesoscale Convective System (MCS) with severe thunderstorms and heavy rain. Due to the MET-ATM collaboration, ATFM officers issued MDRS level warning accurately. The effective flow control measures not only reduce the conflicts of flights, but also ensure arrival and departure flights safely.

1.4.1 As figure 1 shows, there would be wide-ranged convections with frequent CB affecting air route A461, A599 and ZGGG TMA, ZGSD TMA from 11:00am to 08:00pm. MET forecasters kept monitoring the weather variation and giving face-to-face MET-ATM consultation to support ATFM officers to make or update collaborative decisions. Due to the combination of systematic and thermal thunderstorms, the weather became worse than predicted. The ZGGG TMA would be attacked by frequent CB from west to east and ZGGG airport would suffer strong thunderstorms for more than 3 hours from 05:00pm to 08:00pm. According to the latest conclusion in the MET-ATM consultation at 00:30pm (Figure 2), ATFM officers issued a timely MDRS level warning and regulated airspace traffic.



Forecast period: 11:00am-08:00pm
Main region and air route: From 11:00am to 08:00pm, convections in southern part of China move southeastward slowly, affecting the southern Hunan province and northern Guangdong province of A461, Guangdong province and Guangxi province of A599.
ZGGG TMA: From 11:00am to 02:00pm, the convective coverage ratio is 5%~10%. From 02:00pm to 08:00pm, there are frequent thunderstorms in the north of the terminal area with a coverage rate of 20%~30% and obscure thunderstorms in the south with a coverage rate of 10% - 20%.
ZGSD TMA: From 11:00am to 06:00pm, the convective coverage ratio with isolated thunderstorms is 5%~10%.
ZGGG airport: From 02:00pm to 08:00pm, brief thunderstorm.
ZGSZ airport: From 12:00am to 06:00pm, brief rain or thunderstorm.
The dotted line area is the forecasted convective area at 05:00pm.

Figure 1. The RSWF issued at 11:00am

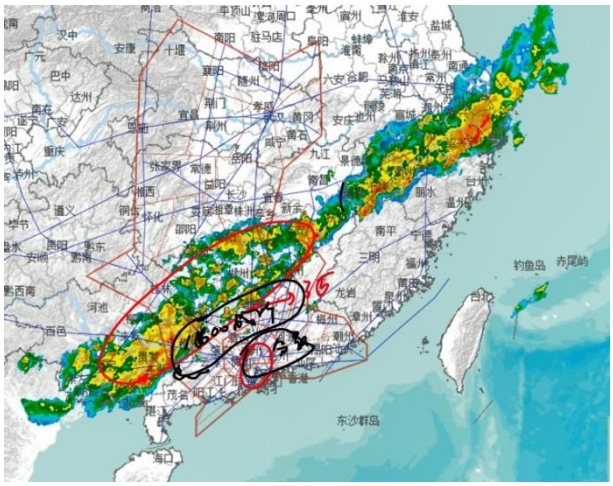


Figure 2. The face-to-face MET-ATM consultation at 00:30pm

1.4.2 In consequence, ZGGG airport stopped taking off and landing at 05:45pm. With the help of MET-ATM consultation and collaboration, ATFM officers took effective flow control measures and Air Traffic Controllers (ATCO) commanded the aircraft orderly. Table 2 indicates that the implementation rate of flow control in MDRS period is 115% from 03:00pm to 05:00pm, and 80% from 05:00pm to 08:00pm, which shows the flow control measures were reasonable and efficient. The tailor MET services not only reduces the workload of ATCO and flight conflicts, but also ensures the safety and orderly operation of arrival and departure flights.

Table 2. Analysis of ATFM measures in MDRS period

Airspace capacity decision time	MDRS period	Landing target capacity	Actual average flow	Implementation rate
02:00pm	03:00pm-05:00pm	20	23	115%
02:00pm	05:00pm-08:00pm	15	12	80%

2. DISCUSSION

2.1 MET services support ATM operation effectively during the thunderstorm season in south China.

2.2 The RSWF shows ATM experts the convective weather visually and comprehensively and help ATFM officers to make strategic and tactics.

2.3 Frequent face-to-face consultation help MET and ATM experts establish common situational awareness, support ATFM decision making/ adjustment, and optimizing the regional flights operation.

3. ACTION BY THE MEETING

3.1 Note the information contained in this paper.