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 – 10 April 2026

Agenda Item 3: Collaboration between MET and ATM stakeholders

METEOROLOGICAL SUPPORT FOR CONTROL OPERATION DECISION-MAKING BAS ED ON WEATHER SERVICE ZONES

(Presented by China)

SUMMARY

This paper introduces a new "language" for communication between ATC(air traffic control) departments and MET departments—weather service zones ， and analyzes its application in MET departments and its role in ATC operations from both pre-tactical and tactical levels.

1. INTRODUCTION

1.1 To meet the demands for refined user services and more accurately describe the impact of convective weather, such as thunderstorms, on key locations within ATC areas, thereby promoting the rapid establishment of shared operational situational awareness among meteorologists and controllers and enhancing communication efficiency, the MET department of Southwest ATMB(Air Traffic Management Bureau), through discussions with ATC departments such as Chengdu Terminal and Tower, has delineated weather service zones within the terminal area and provides corresponding services.**(Appendix A Fig.1)**

2. DISCUSSION

Pre-tactical Phase: Integration of ATC and Meteorology

2.1 Relying on high-resolution NWP (numerical weather prediction) models, the MET department overlays weather service zones onto service products. A typical example is the "Rapid Update High-Resolution Numerical Model Interpretation Products" embedded in the weather service zones, which provides users such as flow management, area control, and terminal control units with hourly convective weather forecasts for each weather service zone, including echo intensity and coverage information. **(Appendix A Fig.2)**

2.2 When significant weather is forecast to occur at airports, terminal areas, or major air routes that may trigger large-scale flight delays, the MET department integrates weather service zones

with Significant Weather Probabilistic Forecast Products, providing users with key information such as the intensity, location, scope, start and end times, and probability of occurrence of the significant weather. The area affected by significant weather within the terminal area is described according to the weather service zones. **(Appendix A Fig.3)**

2.3 At this stage, ATC units may use information for the corresponding weather service zones regarding the probability, intensity, and affected areas of convective weather ， combined with the impact of other airspace activities on capacity for the following day, to initiate applications for the release of airspace resources in advance, conduct dynamic capacity assessments, and achieve refined utilization of airspace resources. Specific conclusions from weather service zones can be visualized and incorporated into cross-site coordination effectively assisting control units across different operational sites in making more refined judgments and forming a visualized chessboard for collaborative operations in complex scenarios.

Tactical Phase: Integration of ATC and Meteorology

2.4 When significant weather that severely impacts aviation operations occurs or is expected within the terminal area, the MET department integrates weather service zones with Terminal Area Warning Products. This provides ATC users with information such as the time of occurrence or expected occurrence, location, scope, intensity, movement direction, movement speed, development trend, and duration of convective clouds within the terminal area, as well as other significant weather that may accompany them.

2.5 Live products, such as"ATC Meteorological Radar Fusion Products" and "3D Radar Fusion Products", when combined with weather service zones, allow for an intuitive view of which weather service zones are affected by radar echoes, as well as the intensity and coverage of radar echoes within each zone.

2.6 At this stage, based on objective factors such as the affected areas of convective weather within weather service zones and the occupancy of airspace by other users, ATC units on-site can assess the actual available airspace resources, evaluate holding procedures and available flight levels, and issue scientific and reasonable flow management measures in advance. Area and terminal control units can utilize graphical forecast conclusions from weather service zones to assess local airspace efficiency and achieve flexible adjustments to sector opening strategies.

2.7 In addition to the application scenarios mentioned above, during phone services or weather briefings, weather service zones are used to provide detailed descriptions of weather locations, enabling faster establishment of shared situational awareness with controllers.

Practical Thinking

2.8 The delineation of weather service zones can also incorporate color-coded impact levels based on the severity of weather impacts on aircraft operations.

2.9 The requirements for refined zone forecasting are extremely high. With current technological capabilities, achieving ideal accuracy through manual forecasting alone is difficult. Although numerical prediction models can automatically output forecast results, their inherent uncertainty leads to insufficient reliability of these results.

3. ACTION BY THE MEETING

3.1 The meeting is invited to note the information contained in this paper.

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APPENDIX A

1.

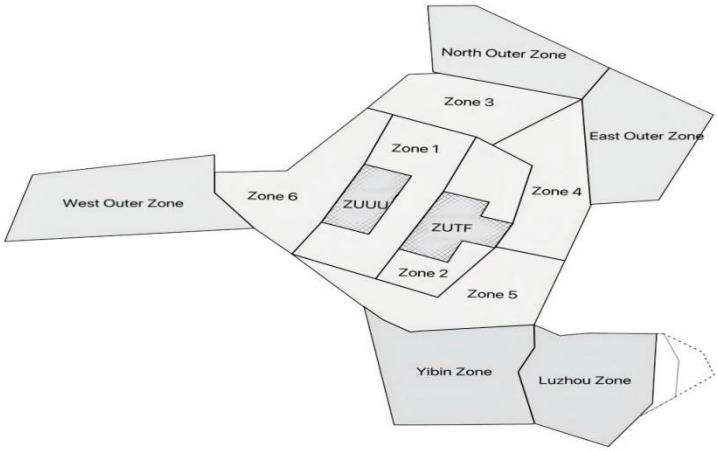

Fig. 1 Weather Service Zones Schematic

2.

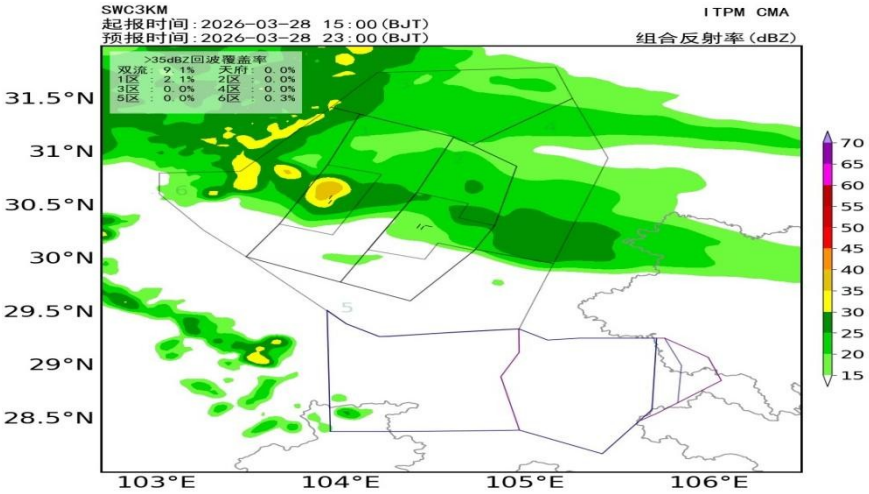

Fig. 2 Rapid Update High-Resolution Numerical Model Interpretation Products

3.

机场或区域	重要天气	强度	出现时段	影响范围 Affected area	覆盖率	重要天气发生概率	备注
成都双流机场	阵雨伴雷暴	小到中	21日22时-22日00时	成都双流机场		≥70%	阵风8-12米/秒
成都终端区 Chengdu Terminal Area	阵雨伴雷暴	云顶高7-11千米	21日18时-22日08时	自西向东影响成都终端区6区、3区、1区、2区、5区、4区	15-20%	≥70%	系统性
	阵雨伴雷暴	云顶高7-11千米	22日08-12时	成都终端区宜宾、泸州分区	5-10%	≥70%	
	雷暴伴阵雨	云顶高7-10千米	22日12时-23日00时	成都终端区6区、5区西部、3区 Chengdu Terminal Area Zone 6, the western part of Zone 5, and Zone 3	5-10%	≥70%	
西南航路	阵雨伴雷暴	云顶高7-11千米	21日20时-22日01时	B330航路 MEXID-OMBDN		≥70%	
	阵雨伴雷暴	云顶高7-12千米	22日00-08时	G212航路 BUPMI-SUBUL		≥70%	

Fig. 3 Significant Weather Probabilistic Forecast Products