International Civil Aviation Organization

Thirteenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/13) of APANPIRG

Singapore, 25 – 29 August 2025

Agenda Item 5: ATM Systems (Modernization, Seamless ATM, CNS, ATFM)

CHALLENGES ARISING FROM AIRSPACE RESTRUCTURING IN JAPAN AND THEIR SOLUTIONS

(Presented by Japan)

SUMMARY

This paper describes the domestic airspace restructuring in Fukuoka FIR. During the intermediate stages of this restructuring, traffic concentrations occurred in some upper sectors due to changes in aircraft cruising altitude trends, and measures to resolve this issue will be shared.

1. INTRODUCTION

1.1 In order to respond to the increasing demand for air traffic, Japan Civil Aviation Bureau (JCAB) undertook airspace reorganization over the five-year period from 2020 to 2025 (**Figure 1**). Taking into consideration traffic flow in domestic airspace and distributing the workload of air traffic controllers, emphasis was placed on dividing airspace into high-altitude and low-altitude airspace, with FL335 as the boundary altitude.

1.2 After a gradual transition, the airspace restructuring was completed in March 2025, and the system was changed to one in which three large air traffic control centers are responsible for air traffic control. In Fukuoka FIR, Fukuoka ACC is responsible for the high-altitude airspace, Tokyo ACC is responsible for the low-altitude airspace for eastern Japan, and Kobe ACC is responsible for the low-altitude airspace for western Japan.

1.3 The review of the effects of the airspace restructuring will be fully underway in the future. However, due to the trend change of cruising altitudes of aircraft, the separated high and low airspaces have been affected, resulting in traffic imbalances in some sectors and making measures necessary.

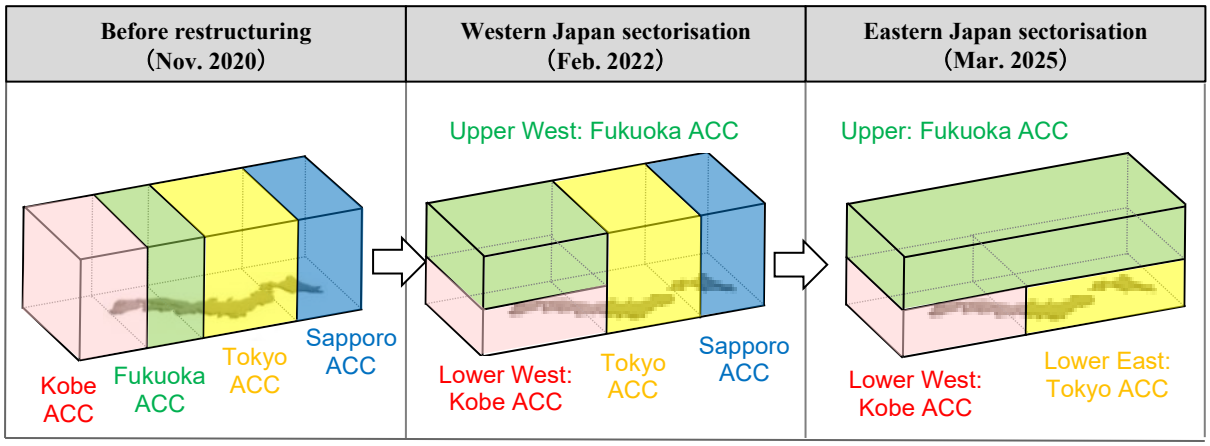

Figure 1: Airspace Reorganization (2020 - 2025)

2. DISCUSSION

Flow Control Situation and Measures in the High-Altitude Airspace and Low-Altitude Airspace in Fukuoka FIR

2.1 During the airspace restructuring of Fukuoka FIR into high and low airspace, there have been days when the number of flights subject to flow control and delay times in some upper sectors in Fukuoka FIR were greater than expected, and measures have been implemented taking into account the changing situation.

2.2 For example, from 10:00JST to 18:00JST on 7 April 2024, the number of flights per hour was 64.7, the number of flights subject to flow control was 35.0, and the average delay was 14.0 minutes. Analysis of the traffic flow revealed that the main reasons for this are believed to be the increase in the amount of time that aircraft that were expected to fly in the lower sector spend in the upper sector, due to the downsizing and more frequent operation of aircraft in order to flexibly respond to passenger demand, and the increase in climb rate and cruising altitude due to improved aircraft performance.

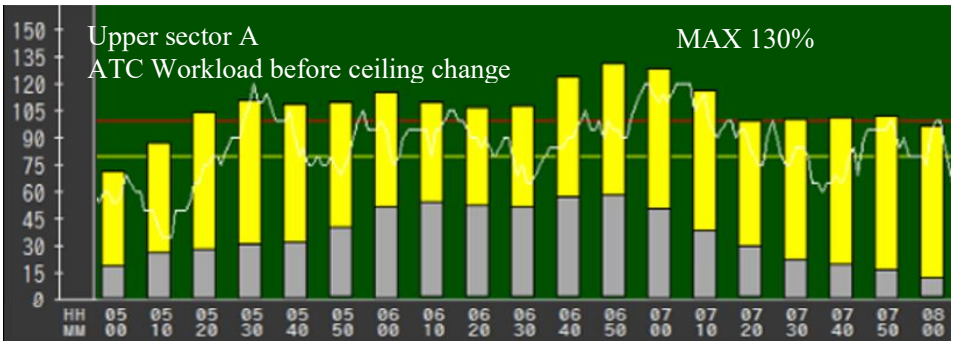

Figure 2: Upper Sector A in Fukuoka FIR

Table 1: Number of Flights/Number of Flights Subject to Flow Control/Average Delay Before Ceiling Change on 7 April 2024

Before Ceiling Change		
Number of Flights	Number of Flights Subject to Flow Control	Average Delay
64.7	35.0	14.0 min

2.3 A simulation was conducted to raise the ceiling of the lower sectors to an altitude where traffic flow control in upper sectors during the same time period is no longer necessary, and it was decided that the ceiling altitude would be FL415 from 11 July 2024 (**Figure 3** and **Table 2**).

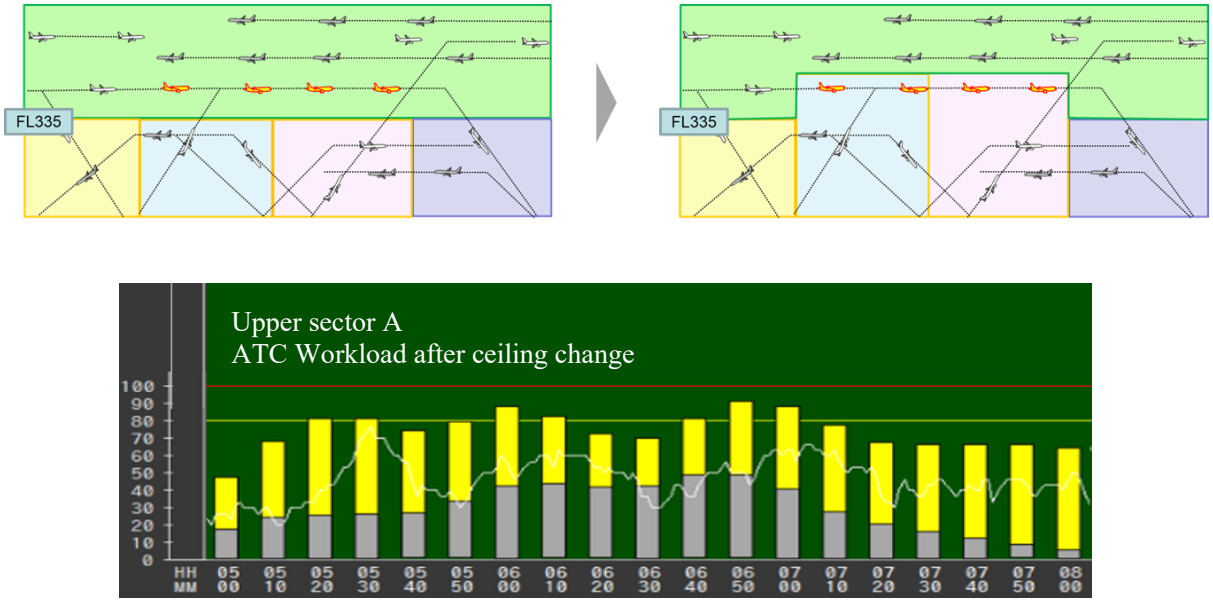

Figure 3: Simulation of Raising the Ceiling of the Lower Sectors (N47/N49)

Table 2: Number of Flights/Number of Flights Subject to Flow Control/Average Delay Before Ceiling Change

Before Ceiling Change		
Number of Flights	Number of Flights Subject to Flow Control	Average Delay
42.3	0	0 min

2.4 As a result of reviewing the ceiling altitude, the daily average traffic volume in the four high-altitude and low-altitude sectors in Fukuoka FIR increased from 1,323.1 flights to 1,440.1 flights during the same period, but the number of flights subject to flow control per day and the total delay time decreased dramatically from 2023 to 2024, and the overall airspace shape, including the ceiling altitude, was optimized (**Figure 4**).

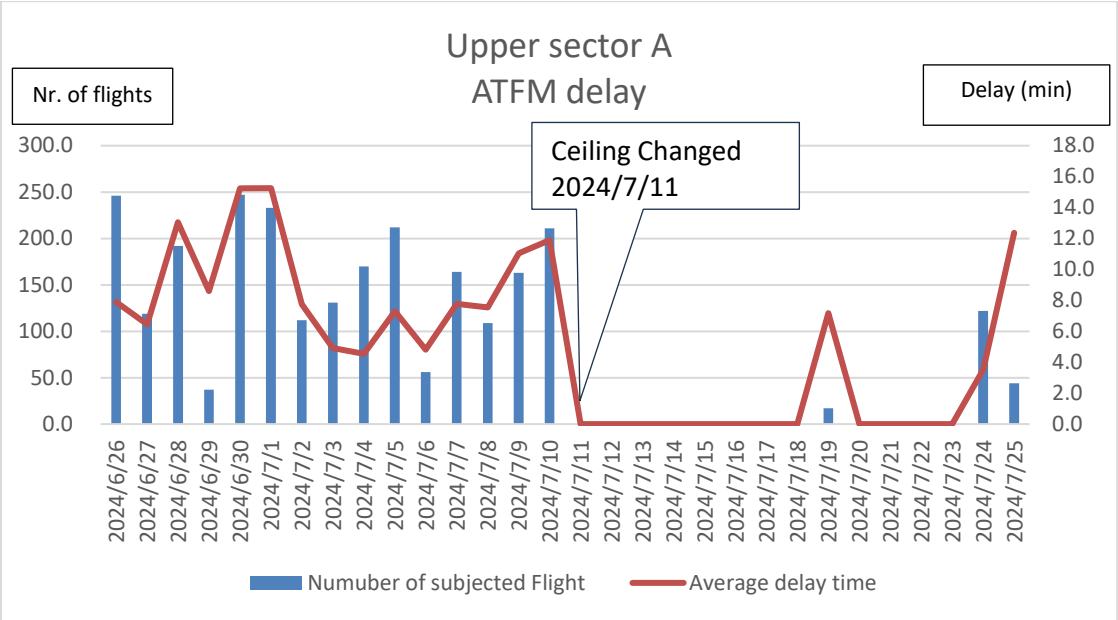

Figure 4: Daily Traffic Volume in Fukuoka FIR

Conclusion

2.5 Between the time when the sectorization of high-altitude and low-altitude airspace was planned and when it was completed, there were changes in air traffic demand due to the COVID-19 pandemic, and the number of flights increased due to the downsizing of aircraft, which is thought to be due to changes in management policies by operators, and traffic imbalances occurred due to improved aircraft performance. If the imbalance is due to the setting of the ceiling altitude between upper and lower sectors, raising the ceiling altitude based on the results of simulations could be an effective corrective measure. However, it is important to note that the increased complexity will result from the ceiling altitude no longer being uniform across sectors.

Future Plan

2.6 In Japan, we are planning to introduce dynamic sectorization in accordance with the CARATS 2040 plan. We will gradually introduce ceiling altitude changes, horizontal shape changes of required airspace, and DAC (Dynamic Airspace Configurations) hereafter.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper;

b) share best practices regarding vertical airspace sectorization;

c) consider the impact of increased complexity resulting from partial changes in the ceiling altitude between upper and lower sectors; and

d) discuss any relevant matters as appropriate.

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