International Civil Aviation Organization

Tenth Meeting of the Air Traffic Management Sub-Group (ATM/SG/10) of APANPIRG

Video Teleconference, 17 – 21 October 2022

Agenda Item 6: ATM Coordination (Meetings, Route Development, Contingency Planning)

THE FEASIBILITY OF LARGE-SCALE DETOUR PROCEDURE (LSDP)

(Presented by China)

SUMMARY

This paper presents the TDP (Typhoon Detour Procedure) trial jointly evaluated by China, Japan and Republic of Korea in September 2022, as well as the real TBO operational verification in China. Discuss the feasibility of establishing a large-scale detour procedure (LSDP) coordination mechanism based on pre-tactical ATFM and tactical TBO operation. This paper recommends that ICAO can plan and guide relevant follow-up tests and form the standard as required.

1. INTRODUCTION

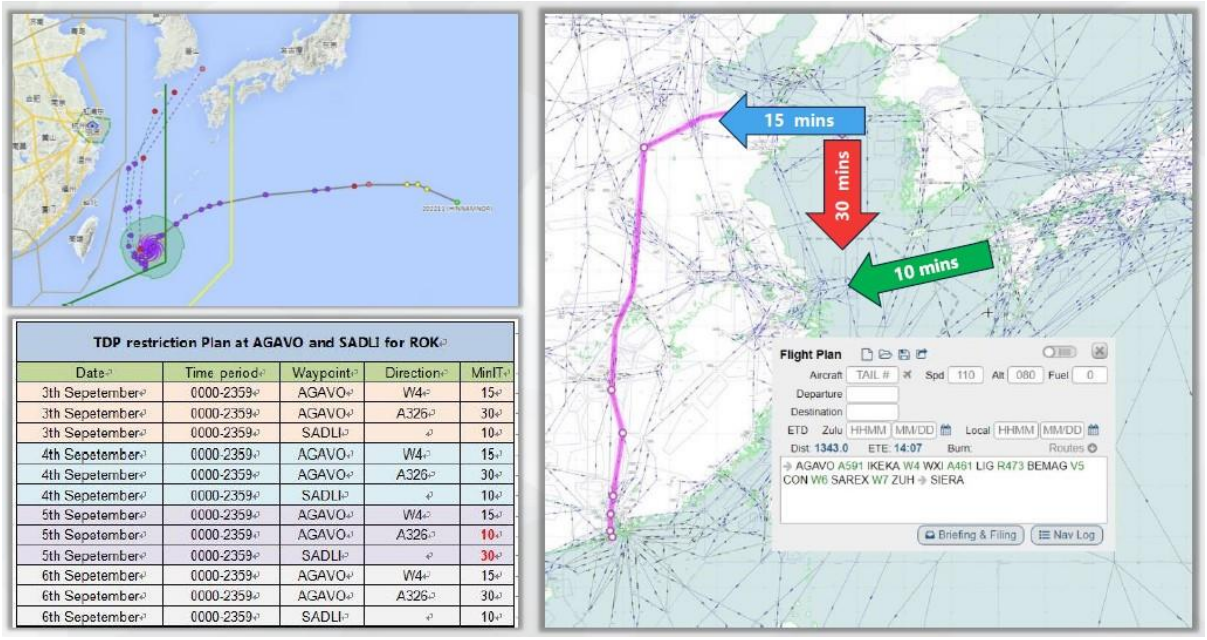
The Background of TDP

1.1 Northeast Asia has a high density of flights, and the flow of the airways continues to be high all the year round. Therefore, large-scale and large-volume detour flights are often cause large-scale delays including regular flights. To solve this problem, NARAHG (Northeast Asia Region ATFM Harmonization Group) try to jointly conducted the operation test of TDP (Typhoon Detour Procedure). The major purpose of China is to accurately manage the number of detour flights, to organize as many detour flights as possible without affecting regular flights.

1.2 NARAHG shared the demand and ATFM plan in the pre-tactical stage. In the tactical phase, when the downstream FIR imposes the restrictions to the upstream FIR, the upstream FIR converts to CTOT and imposes it. By exchanging prior information between NARAHG member States, we were able to minimize the congestion that could occur on the day of operation.

The Operation of TDP Trial in China

1.3 In September 1st 2022, Shanghai ATCC issued a restriction plan （Figure 1）to the ROK ATMO two days in advance. Different than before, this TDP restriction didn`t effetc requlars flights at all. Considering the sector being combined during night operation, the restrictions of the three main detour directions are consistent throughout the day. China believes that it is the most efficient to flexible modify the restriction according to the capacity, but considering that the three countries are mainly manual coordination and have not yet implemented it. China believes that similar capacity based dynamic restrictions are worth encouraging to try after dynamic data connection is achieved in the future.



TDP restriction Plan at AGAVO and SADLI for ROK

Date	Time period	Waypoint	Direction	MinIT
3th Sepetember	0000-2359	AGAVO	W4	15
3th Sepetember	0000-2359	AGAVO	A326	30
3th Sepetember	0000-2359	SADLI		10
4th Sepetember	0000-2359	AGAVO	W4	15
4th Sepetember	0000-2359	AGAVO	A326	30
4th Sepetember	0000-2359	SADLI		10
5th Sepetember	0000-2359	AGAVO	W4	15
5th Sepetember	0000-2359	AGAVO	A326	10
5th Sepetember	0000-2359	SADLI		30
6th Sepetember	0000-2359	AGAVO	W4	15
6th Sepetember	0000-2359	AGAVO	A326	30
6th Sepetember	0000-2359	SADLI		10

Figure 1: Shanghai ATCC issued TDP Plan 2 days in advance

1.4 According to flight data, from September 1st to 18th, a total of 888 flights from 25 airlines applied to enter Shanghai FIR via AGAVO or SADLI. Although airlines are not used to planning diversion plans according to the restriction plan, but ANSP can flexble decide which restriction molde can be used. Statistics of TDP flights confirm that the delay time is significantly shortened than before. This results shows that it is worth to study and improve the pre-tactical detour coordination.

The Test of TBO Operation in China

1.5 Shanghai ATCC and ADCC (Aviation Data Communication Corporation) conducted a TBO operation verification test with Shandong Airlines B737 aircrafts in September. The purpose of this trial is to verify the data upload and downlink between ATC and cockpit based on the VHF data link, and realize the early intervention of converging traffic streams through CTO-based RTA management.

1.6 Shanghai ATCC establishes queues based on specific waypoints in the ATFM system and sorts them according to ETO time. Before the test began, the data sources for ETO coming from radar speculation and empirical values from the ATFM system. Test starts, after clicking the update button by ATFM staff (Figure 2), ADCC inquiries about the relevant flight through the VHF data link, and gets the ETO time update in about 20 seconds. By comparing the previous data, we found that when the range is 600 kilometers, the ETO time will have an error of about 5 minutes. According to the updated time, we release the CTO time of the relevant waypoint to the B737 of Shandong Airlines according to the operation situation, and the time is sent to the MCDU in the cockpit through the data link. At the same time, the ACC controller informs the crew of the RTA time by voice, and the aircraft automatically adjusts the passing time after the crew confirms the MCDU. In addition, we evaluated STAR and landing runway data download and check, which will help ATC uncover potential runway selection errors by pilots.

1.7 According to the results of the test, whether the time of ETO data update or the effect of the aircraft performing RTA, the response has reached the second level. Benefits to the accurate ETO time, there is no longer the embarrassment of the crew not being able to execute due to inconsistency in the estimated time.

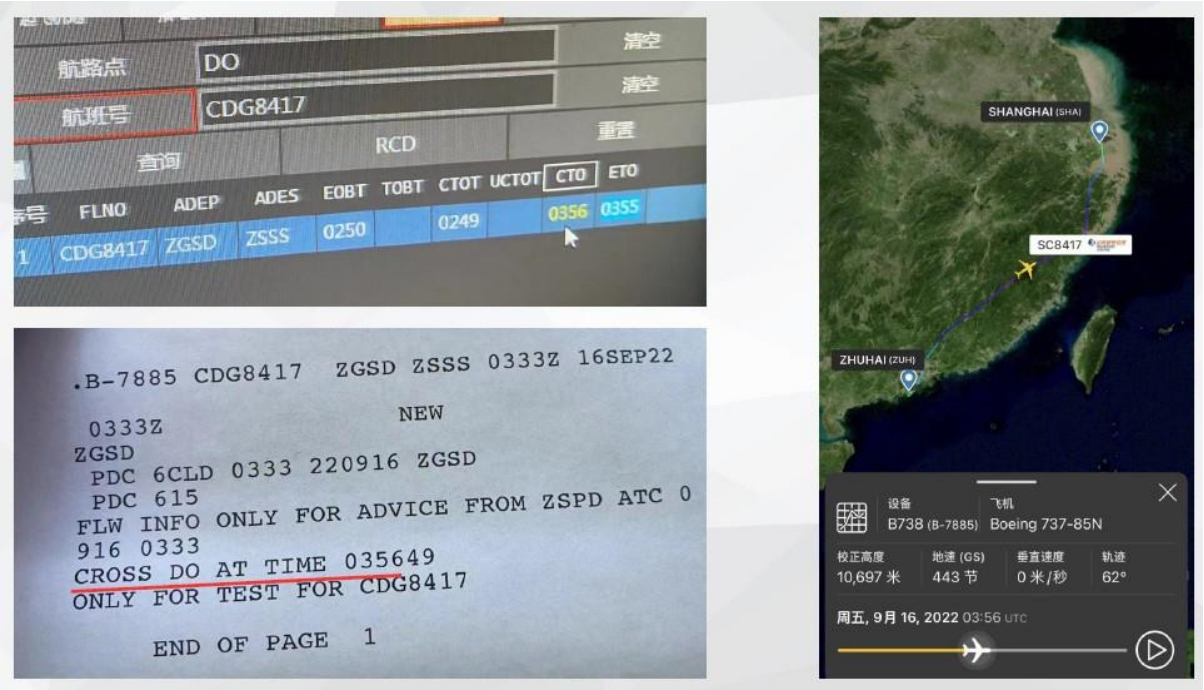


Figure 2: ETO requested from ANSP and pilots implemented CTO by voice confirmation

2. DISCUSSION

The Effects of TDP operation

2.1 The TDP procedure precisely focuses on detour flights, thus avoiding the impact of a large number of detour flights on regular flights.

2.2 The TDP procedure has the potential to help airlines formulate the best detour plan through the coordination of China, Japan and ROK in the pre-tactical stage.

2.3 The TDP test helps NARAHG examine the most needed data items in the cross-border collaboration process and verify the best implementation.

The Effects of TBO operation

2.4 The TBO test verifies that the accuracy of the cockpit data in operation is far greater than that of radar detection and EET.

2.5 Early intervention through CTO time can help ACC avoid overload caused by multi-route convergence.

2.6 TBO operation based on data link can effectively reduce the coordination workload of ATC and pilots.

The Feasibility of Large-Scale Detour Procedure Based on Pre-tactical and TBO in APAC

2.7 Benefits to the mechanism of central flow management, Eurocontrol's route detour has achieved a high degree of automation. Northeast Asia and the Asia-Pacific region cannot achieve central management, but can achieve automatic distribution of detour capabilities and requirements with the help of the seamless connection of the unified standard of operational data.

2.8 Through precise filtering and fine-tuning of detour flights based on the TBO operation, the flow of regular flights and detour flights can be effectively balanced when multiple routes converge, thereby avoiding larger-scale flow restrictions. Before we reach this goal, the common standard ICD for data exchange between systems and same coordination procedure are necessary to be established.

2.9 Large-scale detour coordination and command is a scenario that integrates ATFM and ATC command for optimization. By this way, ANSP can make restricted segments based on the attributes of the flight, which can greatly reduce the scope of flight restrictions and accept as many detour flights as possible. It is necessary for ICAO to guide in-depth research and establish necessary common standards for LSDP.

2.10 The number of detours is generally very limited, which is suitable for TBO real operation trial, and accumulate experience as much as possible.

2.11 China believes that the standards need to be unified at present include at least the following:

a) Professional coordination terminology that can avoid misunderstandings

b) The pre-tactical coordination stage and method of LSDP

- 1 day before the operation day;
- ANSP provides transparent information on available accept capacity through website for airline decision-making ;

c) The tactical coordination stage and method of LSDP

- Only on operation day;
- The way that ANSP filtering the detour flights by ATC or ATFM systems; (E.g: via IFPS, A/Os marking in FPL, etc.)
- The way TBO instruction specified and issued;

d) The operation KPI for LSDP

- On time performance for detour flights and regular flights;
- The effective of TBO operation.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) Discuss and track the operation test in relevant regions, if required; and

b) To study and formulate the specification for coordinated operation of large-scale diversion in the Asia Pacific region.

<table>
<tr><td colspan="3">Draft Conclusion/Decision ATM/SG/10-X: formulate the specification for coordinated operation of large-scale diversion in the Asia Pacific region</td></tr>
<tr><td colspan="2">What: Summarize the experience of large-scale detouring and form a guiding document for the Asia Pacific region, including main principles, suggestions, etc.</td><td>Expected impact:
☐ Political / Global
☐ Inter-regional
☐ Economic
☐ Environmental
☒ Ops/Technical</td></tr>
<tr><td>Why: To improve the operational safety and efficiency of large-scale detouring by integrating pre-tactical ATFM and tactical TBO.</td><td colspan="2">Follow-up: ☐Required from States</td></tr>
<tr><td>When: dd-Mmm-yy</td><td colspan="2">Status: Draft to be adopted by Subgroup</td></tr>
<tr><td colspan="3">Who: ☐Sub groups ☐APAC States ☒ICAO APAC RO ☐ICAO HQ ☐Other:</td></tr>
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