International Civil Aviation Organization

Fourteenth Meeting of the Asia/Pacific Air Traffic Flow Management Steering Group (ATFM/SG/14)

Bangkok, Thailand, 22 – 26 April 2024

Agenda Item 4: Review of Current ATFM Operations and Problem Areas

PROGRESS OF THE CTO TRIAL WITHIN FUKUOKA FIR

(Presented by Japan)

SUMMARY

This paper presents the progress of the CTO trial within Fukuoka FIR to improve the efficiency of ATFM. The purpose of this trial is to develop the CTO operational method and to improve the CTO calculation method of the ATFM system.

1. INTRODUCTION

1.1 The CTO trial in Fukuoka FIR started on March 23, 2023, and is collecting trial results on the status of compliance with the speed instructions based on the CTO, the accuracy of the time calculated by the CTO, and the effect of simultaneous implementation of CTO and CTOT. This document reports on the results of the trial, the challenges in CTO operation in Japan, and the study of improving the efficiency of traffic flow control through integrated operation with CTOT.

2. DISCUSSION

Purpose of introducing CTO within Fukuoka FIR

2.1 ATFM with integrated CTO measure for the international flight and CTOT measure for the domestic flight to reduce the in-flight delay caused by radar vector or airborne hold at low altitude nearby the airport. Reducing the case of radar vectors to reduce the workload of air traffic controllers and increase the airspace capacity.

Challenges to implement the CTO within Fukuoka FIR

2.2 For reducing radar vectors, the time accuracy of the CTO is important. The CTO calculated by the ATFM system, using integrated information, speed and altitude on the flight plan, ground speed measured by radar or other surveillance sensors, and area-specified wind information at high altitude provided by MET Agency. Even the flight according to the flight plan, there were some cases the CTO calculated by the ATFM system, and the ETO of the aircraft differed 5 minutes or more. Analysis of the causes and countermeasures are required.

Procedures for CTO Trial in Fukuoka FIR

2.3 CTO trials were conducted during traffic flow control at Tokyo International Airport

- Assign CTOT to the domestic flight.
- Assign Mach Number based on CTO to the international flight.

– number specified by air traffic controller for reduced speed is current Mach number minus Mach 0.01

a) CTO trial procedure

– The current Mach number of the target aircraft is recognized by radio communication or Downlink Aircraft Parameters (DAPs).

– The specified Mach number is according to the time difference between the ETA and CTO of the CTO FIX on the En-route ATC system. (**Table 1**)

– ATC use the CTO data displayed on the ATC system. (Figure 1 and 2)

– ATC apply the flight planned route. If necessary for spacing, radar vector or rerouting are available.

b) Cases excluded from the CTO trial.

– Altitude less than FL335

– Avoid bad weather

– Aircraft cannot maintain specified Mach.

– Descend below FL335

Table 1: The specified Mach number is according to CTO

Calculated in-flight delay	Mach number specified by the ATC
Less than 0 minutes	Current Mach number
More than 1 minute	Current Mach number minus Mach 0.01

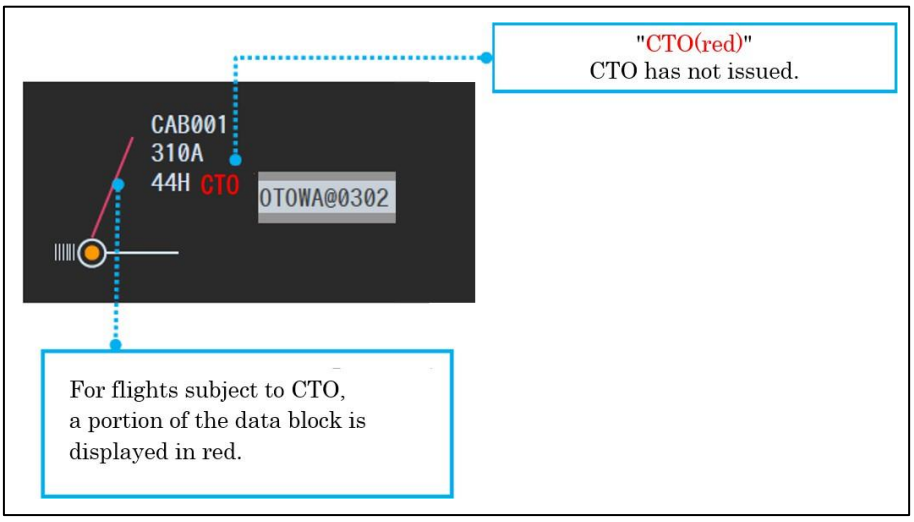

Figure 1: CTO display image in the En-route ATC system

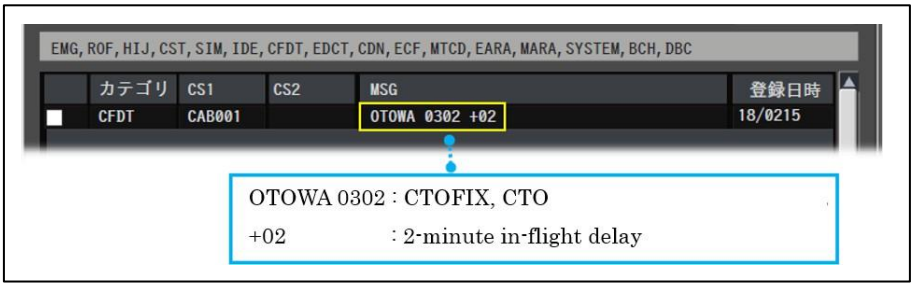

Figure 2: In-flight delay by CTO indicated by the En-route ATC system.

2.4 CTO trials were conducted during traffic flow control at Tokyo International Airport

- Assign CTOT to the domestic flight.
- Assign Mach Number based on CTO to the international flight.
- The Mach number for Trial should be current Mach number minus Mach 0.01

Results of CTO Trial in Fukuoka FIR

2.5 Results of the CTO trial between April 2023 to December 2023

a) Total number of flights for the CTO trial was 1066 flights.

b) The reasons for excluding CTO measure are as follows.

- Flight Altitude (Below FL335)
- Radar vector or reroute due to bad weather
- Requested by pilot

c) The results obtained from the trial in **Table 2 and 3**. **Table 2:** Matrix of the CTO trial results

	Number of flights subject to CTOT	Number of flights subject to CTO	Ground delay by CTOT (per flight)	In-flight delay by CTO (per flight)	Percentage of CTOs that could not be assigned
April-23	2,811	61	0:11:00	0:01:03	33%
May-23	1,584	122	0:09:17	0:01:07	34%
June-23	1,791	314	0:12:05	0:00:49	42%
July-23	1,117	179	0:09:36	0:00:55	35%
August-23	1,347	185	0:12:57	0:01:14	42%
September-23	1,076	155	0:11:55	0:01:03	41%
October-23	803	156	0:13:43	0:01:01	23%
November-23	1,418	210	0:12:02	0:01:05	13%

	Number of flights subject to CTOT	Number of flights subject to CTO	Ground delay by CTOT (per flight)	In-flight delay by CTO (per flight)	Percentage of CTOs that could not be assigned
December-23	411	87	0:11:01	0:00:58	13%

Table 3: Time difference between CTO and ATO

Time difference between CTO and ATO	
More than 5 minutes early	10%
3 to 5 minutes early	24%
1 to 3 minutes early	41%
Within ±1 minute	19%
1 to 3 minutes late	3%
3 to 5 minutes late	1%

Analysis of CTO Trial in Fukuoka FIR

2.6 The CTO trial in Fukuoka FIR will continue for the following reasons. It is preferable that flights subject to CTO be able to arrive at the intended time even when radar guidance or rerouting is performed due to bad weather. Itis necessary to consider the operational procedures to maintain the effectiveness of CTO even in bad weather conditions. A time difference of more than 5 minutes still occurs between CTO and ATO. It is necessary to Continue gathering data, analyzing the causes, and consider the measures to improve the system.

2.7 The Reason of time difference between CTO and ATO is not only the CTO calculation method, but also ATC can radar vector or rerouting for the purpose of ATC separation. It seems to be one of the natures of time difference. The key factor in further improving the accuracy of ATFM is the collaboration between ATFM and ATC to execute ATFM measures in accordance with actual traffic flow.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this paper; and

b) discuss any relevant matters as appropriate.

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