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

**ENHANCED WAKE TURBULENCE SEPARATION IN JAPAN**

(Presented by Japan)

**SUMMARY**

This paper presents the implementation process and current status of the enhanced Wake Turbulence Separation (eWTS) at Tokyo/Haneda International Airport (RJTT) and Tokyo/Narita International Airport (RJAA) in Japan to support the ATM/SG action item 9/6.

**1. INTRODUCTION**

1.1 At the ninth meeting of ATM Sub-Group (ATM/SG/9), Hong Kong China presented the implementation process of the enhanced Wake Turbulence Separation (eWTS) scheme at Hong Kong International Airport (HKIA) on 5 November 2020. It was agreed at the meeting to consider sharing experiences and lessons learned in the implementation of eWTS as action item 9/6.

1.2 Since being a member of the Wake Turbulence Specific Working Group (WTSWG) hosted by ICAO headquarters (ICAO HQ), having implemented eWTS at Tokyo/Haneda International Airport (RJTT) and Tokyo/Narita International Airport (RJAA) and having shared experience by using **Attachment A** at the Re-categorization of wake turbulence categories (RECAT) webinar hosted by the Beijing Sub-Regional office on 22 September 2021, Japan offered to contribute action item 9/6 at the ATM/SG/9 meeting.

**2. DISCUSSION**

Background of eWTS implementation in Japan

2.1 Before the COVID-19 pandemic, air traffic demand in Japan was expected to grow 2 to 3 percent per year, and it drove the need for expansion of the airport and terminal airspace capacity, particularly at the Tokyo metropolitan airports, RJTT and RJAA.

2.2 In the long-term vision for the future air traffic systems of Japan, which was called “Collaborative Actions for Renovation of Air Traffic Systems (CARATS)”, the Japan Civil Aviation Bureau (JCAB) established the implementation plan of RECAT in accordance with the Global Air Navigation Plan (GANP) of the International Civil Aviation Organization (ICAO), in 2013.

2.3 The implementation for the reduced wake turbulence separation with RECAT (seven wake turbulence groups) in Japan was named RECAT-Japan. The introduction of RECAT-Japan at RJTT and RJAA by early 2020 was determined in 2018, it was also considered one of the reasons to prepare for the Tokyo 2020 Olympic and Paralympic Games which were originally planned to hold in 2020.

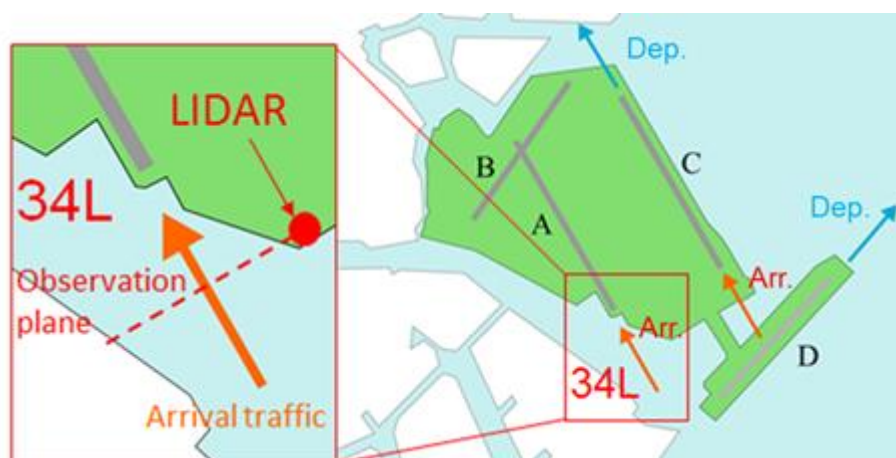
### Implementation process of RECAT-Japan as trial operation

2.4 JCAB planned to implement RECAT-Japan with a phased approach since the RECAT would be standardized in the Procedures as the enhanced Wake Turbulence Separation (eWTS) for Air Navigation Services - Air Traffic Management (PANS-ATM), ICAO Doc 4444, on 5 November 2020.

2.5 The implementation of a trial operation until 5 November 2020 was conducted based on the result of conducting safety assessments by JCAB with close support from the Japanese research organizations, the Electronic Navigation Research Institute (ENRI) and the Japan Aerospace Exploration Agency (JAXA). The materials of RECAT-EU provided by EUROCONTROL and RECAT-US provided by the Federal Aviation Administration (FAA) also contributed to the trial operation.

2.6 The working group for the implementation of RECAT-Japan was established by the Air Traffic Control (ATC) Division of JCAB Headquarters (JCAB HQ). Members of the working group were above two research organizations, some Japanese airline operators, ATC units of RJTT and RJAA, the Tokyo Regional Civil Aviation Bureau (TCAB) and the Air Navigation Services Safety Office which was one of the regulatory divisions of JCAB.

2.7 To implement RECAT-Japan at RJTT, three specific analyses and assessments were needed. First, evaluation of the decay characteristics over the sea surface was required because most of the flight procedures for departure/approach were established over the sea. **Figure 1** shows an example of RJTT runway operation and the observing direction of the Light Detection and Ranging (LIDAR). **Figure 2** shows LIDARs installed by ENRI and JAXA.

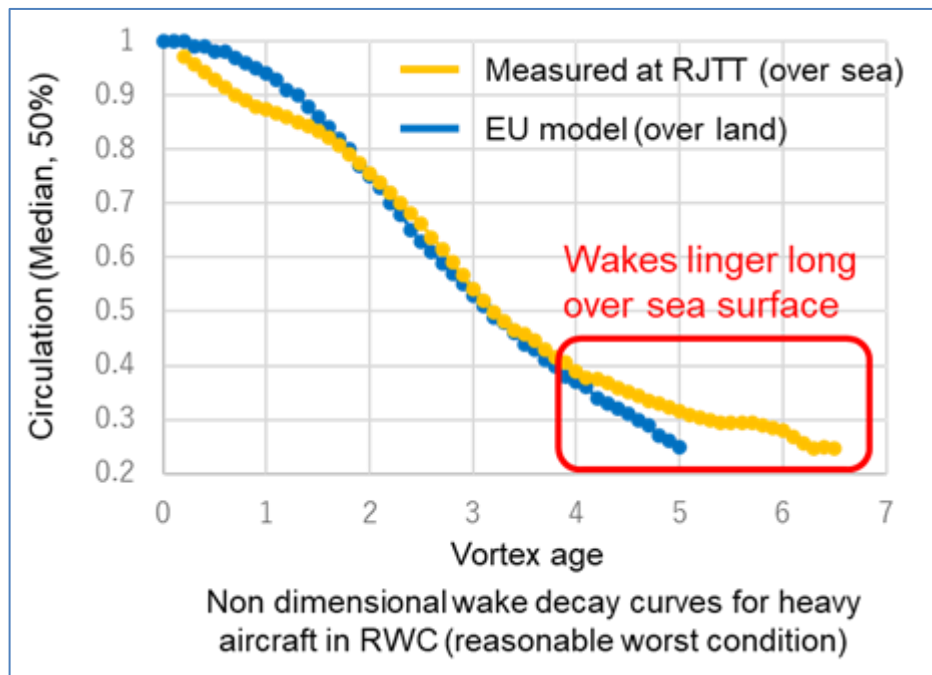


**Figure 1:** Example of RJTT runway operation and observing direction of LIDARs



**Figure 2:** LIDARs installed by ENRI and JAXA

2.8 It was verified by JAXA that wake decay over the sea would be within an acceptable safety level for implementation of the reduced wake turbulence separation with RECAT although it was slightly observed slower than over the land. Figure 3 shows the observed wake decay characteristics over the sea surface around RJTT.



**Figure 3:** Observed wake decay characteristics over the sea

2.9 Second, the benefit of RECAT-Japan in runway throughput needed to consider the realistic ATC operation for arrival aircraft at RJTT, where the Point Marge System was introduced in 2019. Another aspect was an improvement of runway throughput considering airport surface operations. ENRI developed two types of simulators to evaluate each terminal airspace and airport surface operation.

2.10 Third, two PBN approach procedures for RJTT runway 16L and 16R have 3.45 degrees vertical pass, slightly steeper than usual the 3 degrees vertical pass, on the final approach segment, so that JAXA also verified that the safety level of the RECAT-Japan operation at two these procedures would be acceptable because the duration time under wake influence would be shorter on the steeper vertical pass and the RECAT-US operation had been already introduced into the similar approach procedures with steeper vertical pass such as KSAN runway 27 approach.

2.11 Nine hazards were identified, and five mitigation measures were established by the working group. **Table 1** shows a summary of hazards and mitigation measures. The format and submission procedure for the Wake Turbulence Encounter Report (WTER) were also discussed in the working group.

ID No	Identified Hazard	Precondition	Result of Analysis	Mitigation Measure
RCT-01	Difference of final approach speed between approaching aircraft	Procedural speed on final approach by AIP	Acceptable with mitigation	a. Instruction of final approach speed by ATC
RCT-02	Encounter of wake turbulence from other aircraft	Encounter of wake turbulence from other aircraft	Acceptable without mitigation	Not necessary

ID No	Identified Hazard	Precondition	Result of Analysis	Mitigation Measure
RCT-11	Long runway occupation of preceding arrival aircraft	Procedure of speedy turn off or crossing runway by AIP	Acceptable with mitigation	b. Remind of Procedure of speedy turn off or crossing runway
RCT-12	Crossing traffic on runway between arrival aircraft	Procedure of speedy turn off or crossing runway by AIP	Acceptable with mitigation	b. Remind of Procedure of speedy turn off or crossing runway
RCT-13	Applying wrong wake turbulence minimum	Using ATC support system	Acceptable with mitigation	c. Training for ATC
RCT-14	Delay of flight crew's response for ATC instruction	Awareness and intervention by ATC	Acceptable with mitigation	c. Training for ATC
RCT-15	Starting roll of departure aircraft without ATC clearance	Awareness and intervention by ATC	Acceptable without mitigation	Not necessary
RCT-21	Failure of ATC support system	Awareness and coping by ATC	Acceptable with mitigation	d. Operational procedure without ATC support tool e. Preparation of alternative tool
RCT-22	Wrong setting of ATC support system	Awareness and coping by ATC	Acceptable with mitigation	d. Operational procedure without ATC support tool e. Preparation of alternative tool

**Table 1:** Summary of hazards and mitigation measures

2.12 The working group was consideration on the human factor due to complicated seven grouping of RECAT-Japan led to the upgrade of the Trajectorized Airport Traffic Data Processing System (TAPS), which is a system for Tower ATC and Terminal Radar ATC, to indicate specific wake turbulence group on data blocks of a radar target.

2.13 The plan, tool and procedure for the training of ATC personnel were considered and established by JCAB HQ and TCAB. The best way of ATC personnel training, applying the upgraded program to the TAPS simulator, had difficulty due to technical issues. The ATC personnel took classroom learning based on the teaching material which was prepared by JCAB HQ.

2.14 After the 6 runs of the working group, the working group agreed to implement RECAT-Japan at RJTT and RJAA as a trial operation from 26 March 2020. It was noticed and published by the Aeronautical Information Publication (AIP) Supplement.

2.15 Although JCAB planned to hold explanatory meetings for aircraft operators at RJTT and RJAA, the meetings were forced to be canceled due to COVID-19. JCAB distributed material for the meeting to the Aircraft Operators, instead. **Attachment B** is the material.

#### Transition process to official operation based on eTWS

2.16 The transition from trial operation to official operation was considered based on the draft of the Manual on Implementation of Wake Turbulence Separation Minima, ICAO Doc 10122, which had been considered and discussed by the ICAO WTSWG meetings until May 2020.

2.17 Besides, the draft amendment of the PANS-ATM and the Aircraft Type Designators (ICAO Doc 8643), review for the safety assessment of the trial operation, and analysis of WTERs reported and submitted from aircraft operators to JCAB were of great contribution to the transition.

2.18 Seven WTERs were reported to JCAB during the trial period from 25 March 2020 to 30 September 2020. **Table 2** shows a summary of WTER which was analyzed and assessed with the support of ENRI and JAXA. **Figure 3** and **Figure 4** show the encounter location maps of the reported WTERs.

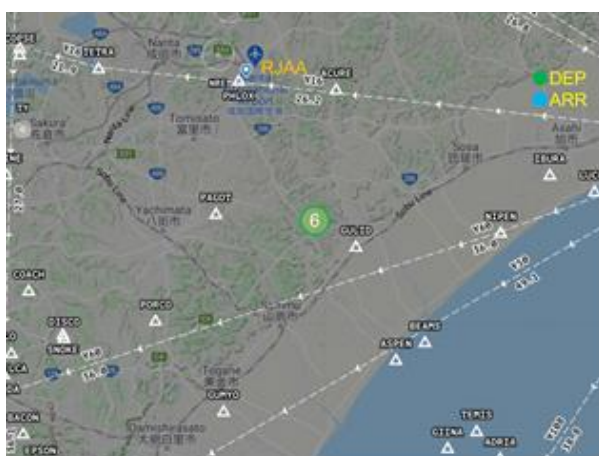
2.19 It was analyzed and assessed by ENRI, JAXA and JCAB that case 2 was not due to wake turbulence from preceding aircraft. There were two reasons, one was that the vertical climbing pass of the reporter aircraft was higher than the generator aircraft. The other was that the average wind strength was 21knots and the maximum was 32knots at that time.

	Airport	Reporter	Generator	DEP/ARR	Flight Phase	Encounter Location	Altitude	Severity	Pilots' Operation	Sec *
1	RJTT	B738	B763	DEP	Climb	3NM from RWY	2,500FT	Moderate	Controlled manually	111
2	RJTT	B738	A359	DEP	Initial climb	Between RWY END and 1NM from RWY	500FT-1,600FT	Moderate	Controlled manually	-
3	RJTT	A320	A359	ARR	Approach	8NM from RWY	2,500FT	Weak	Remained engaged	109
4	RJTT	B738	B763	DEP	Climb	3NM from RWY	3,000FT	Weak	Remained engaged	87
5	RJTT	B738	B763	ARR	Approach	Between 15NM and 10NM from RWY	2,000FT-3,000FT	Moderate	Disengaged manually	97
6	RJAA	A320	B763	DEP	Climb	7-10NM from	3,500FT-4,000FT	Weak	Remained engaged	97
7	RJTT	B738	B788	ARR	Landing	Before touch down	20FT	Moderate	Controlled manually	106
* Time separation at encounter location from generator aircraft to reporter aircraft analyzed by ENR										

**Table 2:** Summary of WTER during trial phase



**Figure 3:** Encounter locations around RJTT



**Figure 4:** Encounter location around RJAA

2.20 The working group was held 3 times during the period from June 2020 to October 2020 to review the trial operation. Nine hazards and five mitigation measures were reviewed by the working group. **Table 3** shows a summary of the review. The working group confirmed and determined that additional hazards were not identified and mitigation measures were not needed to add and change

ID No	Identified Hazard	Occurrence of Operational Impact	Result of Review	Mitigation Measure
RCT-01	Difference of final approach speed between approaching aircraft	Not occurred	Acceptable	No change
RCT-02	Encounter of wake turbulence from other aircraft	Occurred (7 events)	Acceptable	No change (Not necessary)
RCT-11	Long runway occupation of preceding arrival aircraft	Occurred (1 event)	Acceptable	No change
RCT-12	Crossing traffic on runway between arrival aircraft	Not occurred	Acceptable	No change
RCT-13	Applying wrong wake turbulence minimum	Not occurred	Acceptable	No change
RCT-14	Delay of flight crew's response to ATC instruction	Not occurred	Acceptable	No change
RCT-15	Starting roll of departure aircraft without ATC clearance	Not occurred	Acceptable	No change (Not necessary)

ID No	Identified Hazard	Occurrence of Operational Impact	Result of Review	Mitigation Measure
RCT-21	Failure of ATC support system	Not occurred	Acceptable	No change
RCT-22	Wrong setting of ATC support system	Not occurred	Acceptable	No change

**Table 3:** Summary of review for hazards and mitigation measures

2.21 As the result of the review by the working group, it was agreed to implement eWTS officially based on the PANS-ATM, ICAO Doc 10122 and Doc 8643 from 5 November 2020, and noticed and published by the AIP.

#### Current and future work for eTWS in Japan

2.22 Obtaining and analyzing WTERs at airports and airspace where eWTS is implemented is required by ICAO HQ. **Table 4** shows the number of WTERs at RJTT and RJAA submitted by aircraft operators. A total of 25 WTERs have been reported from aircraft operators as of September 2022.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	SUM
2020				1			2	4	1		2	1	11
2021						1					3		4
2022	1	1				1	2	3	2	-	-	-	10
SUM	1	1	0	1	0	2	4	7	3	0	5	1	25

**Table 4:** Number of submitted WTERs

2.23 According to **Table 4**, the number of WTERs seems to be in proportion with the traffic volume since the traffic volume in Fukuoka FIR in 2021 decreased from it in 2020 and the traffic volume in 2022 continues to be in a recovery trend.

2.24 Additionally, it is identified that the summer season, from July to September, seems to be reported more WTERs than other months except for November. One of the reasons would be that the wind strength in the summer season is weaker than in other seasons in Japan.

2.25 JCAB has the implementation plan of eWTS at other airports in Japan such as Osaka/Kansai International Airport. Besides, the implementation of advanced eWTS including time-based wake turbulence separation for arrival aircraft has been considered and discussed in CARATS.

2.26 Japan is willing to contribute to the ATM/SG action item 9/6 and support States and ATS providers in the Asia Pacific region that are considering to implement eWTS.

### **3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- note the information contained in this paper;
- discuss how to achieve the action item 9/6, and
- discuss any relevant matters as appropriate.

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## Attachment A: Material of RECAT webinar in September 2021



Ministry of Land, Infrastructure, Transport and Tourism  
**JAPAN CIVIL AVIATION BUREAU**

**RECAT Implementation in Japan**

Yasuhiro MARUTSUKA  
Special Assistant to the Director,  
Japan Civil Aviation Bureau

ICAO Asia-Pacific Wake Turbulence Recategorization (RECAT) Webinar 2021

## Why was RECAT required in Japan?

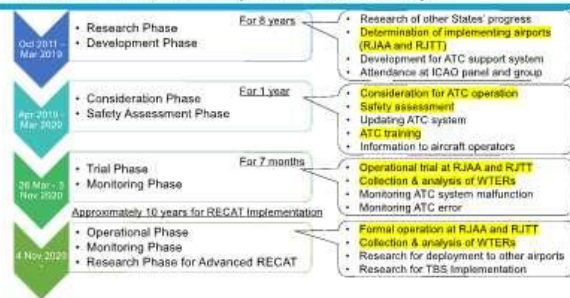
- Air traffic demand in Japan was expected to grow 2 to 3 percent per year before the pandemic of COVID-19.
- Efficiency of the runway and terminal airspace operation was required, particularly at the Tokyo metropolitan airports, Tokyo/Narita International Airport (RJAA) and Tokyo/Haneda International Airport (RJTT).
- The introduction of RECAT at RJTT and RJAA by early 2020 was determined in 2018, and it was also considered one of the reasons to prepare for the Tokyo 2020 Olympic and Paralympic Games.



## RECAT Benefit



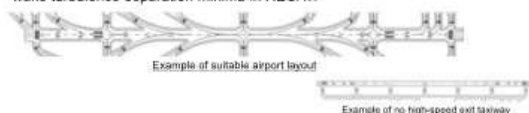
## Timeline for RECAT Implementation in Japan



## Consideration of Implementing Airport

## • Suitable Airport Conditions

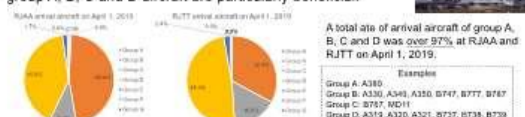
1. Approaching maximum runway and/or airspace capacity  
RECAT benefit is the proportion with the traffic volume, runway capacity and airspace capacity.
2. Multiple high-speed exit taxiways  
Runway Occupation Time (ROT) is required to be minimized to meet reduced wake turbulence separation minima in RECAT.



## Consideration of Implementing Airport

## • Suitable Airport Conditions

3. A380 is operated  
A380 is assigned as "Super" in the wake turbulence category, but RECAT allows to reduce the separation between A380 and other aircraft.
4. High rate of group A, B, C, and D aircraft  
RECAT Wake turbulence separations among group A, B, C and D aircraft are particularly beneficial.



## Determination of Implementing Airport

### ● Determination of reasons

- Runway and airspace capacities of RJAA and RJTT were approaching full.
- RJAA and RJTT have multiple high-speed exit taxiways.
- RJAA handles A380, and RJTT has the ability to handle A380<sup>2</sup>.
- Many group A, B, C, and D aircraft were operated at RJAA and RJTT.
- RJAA and RJTT were expected to be a gateway airport for Tokyo 2020.

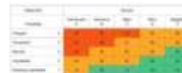
	1. Runway and/or airspace Capacity	2. Multiple high-speed exit taxiways	3. A380 is operated	4. High rate of group A, B, C, and D aircraft	Gateway for Tokyo 2020
RJAA	Approaching full (in peak hours)	Yes	Operated	Total 97% or more	Yes
RJTT	Approaching full	Yes	Not regularly operated <sup>2</sup>	Total 97% or more	Yes

<sup>2</sup>: RJTT has the ability to handle A380, but there are some operational restrictions.

## Consideration for ATC Operation and Safety Assessment

### ● Purpose

- Consideration to mitigate increasing ATC workload
- Identification of expected hazards after implementing RECAT
- Consideration for mitigation measures to reduce the risks



### ● Method

- ICAO Doc 10122
- "Manual on Implementation of Wake Turbulence Separation"<sup>3</sup>

### ● Members for Working Group

- ANSP (JCAB HQ)
- Regulator (JCAB HQ)
- ATC facilities (TWR & TERMINAL)
- Aircraft operators (ANA & JAL)
- Research institutions (ENRI<sup>4</sup> & JAXA<sup>5</sup>)



<sup>3</sup>: JCAB has a draft version as a member of WTSWG.  
<sup>4</sup>: Electronic Navigation Research Institute  
<sup>5</sup>: Japan Aerospace Exploration Agency

## ATC Support System/Tool

### ● Purpose

- RACAT wake turbulence groups are not filled in a flight plan.
- ATC needs a support system/tool to identify a correct RECAT wake turbulence group of aircraft and applying separation.

### ● JCAB ATC Support System (One example of ATC support systems/tools)



## ATC Training

### ● Purpose

- To avoid applying incorrect wake turbulence separation
- To understand how to use ATC support system/tool
- To deal in case of failure of ATC support system/tool

### ● Method

- ATC simulator
- Classroom learning



### ● Period

- Depending on the ATC facility

## Wake Turbulence Encounter Report (WTER)

### ● Purpose

- Collection and analysis of WTERs are required to monitor safety issues after implementing RECAT.

### ● Format and Items

- The format of WTER is not standardized.
- The items for WTER have been considered and discussed at the Wake Turbulence Specific Working Group (WTSWG) hosted by ICAO HQ.

### ● Submission

- The collected and analyzed WTER is required to submit to ICAO HQ through the ICAO secure portal website.

WTER format in Japan

## Wake Turbulence Encounter Report (WTER) in Japan

- Pilots should report wake turbulence encounter events around RJTT and RJAA. (It is informed in AIP.)
- JCAB analyzes the reported events with ENRI.
- JCAB submits the report to ICAO through the ICAO secure portal website.

Seven wake turbulence encounter events, one event around RJAA and six events around RJTT, were reported and analyzed during the period from 25 March 2020 to September 2020.



Encounter Locations around RJTT



Encounter Location around RJAA

# Attachment B: Material for ATC units and aircraft operators before RECAT implementation

**Implementation of RECAT  
(Wake Turbulence Re-categorization)**

**Mar, 2020 JCAB**

**Air Navigation Services Planning Division  
Air Traffic Control Division  
Flight Procedures and Airspace Program Office  
Air Navigation Services Safety Office**

[Technical Cooperation]  
Japan Aerospace Exploration Agency  
Electronic Navigation Research Institute

### 1. Background of RECAT Implementation

#### 1. RECAT history

After intensive research, the traditional weight-based system of four categories (J/N/N/L) of aircraft were re-categorized into seven wake groups (A, B, C, D, E, F, G) according to wingspan and the maximum takeoff weight in order to better accommodate growing air traffic demand. RECAT separation, RECAT-US is local standard, were first implemented in the United States (FAA) at KREMH/WH in November 2012, then at KATL/ATL, KJFK/JFK, KORD/OHD, KSPD/SFO, etc. Europe (Eurocontrol) implemented RECAT-EU at LFPG/CDG in 2016, then at EGLL/LHR, LOWW/VIE, LFBO/TLS, etc. RECAT-US and RECAT-EU based on regionally developed safety assessment and standards. (CZYH/YZZ and OMDB/DXB also followed suit.)

\* ICAO began its work of assessing proposals for worldwide standardization of "RECAT group categorization method", "Minimum standard between RECAT groups", "Safety assessment method". Amendment to PANS-ATM Doc 4484 relating to wake turbulence is scheduled in November 2020.

#### 2. Development of RECAT in Japan

Implementation decision was made at the 4th Meeting of the Committee for Promoting CASATS (March 2014). JCAB conducted safety assessment. The operational use of RECAT scheme required changes to the ATM system. Common consent of RECAT standards is scheduled on March 26, 2020.

\* Official sign will be after a release of the revised PANS-ATM Doc 4484. The period between March 26, 2020 to the official start will be considered as a trial operation period.

#### 3. Development of safety assessment process

The study was conducted at Tokyo International Airport in 2016 and 2017 in cooperation with leading research institutes, Japan Aerospace Exploration Agency (JAXA) and Electronic Navigation Research Institute (ENRI), to observe effects and a decay rate of the vortices from data collected by the ground LIDAR wake measurements. JCAB also conducted a comparative study on the safety assessment process established by the United States (FAA) and EU (Eurocontrol). Knowledge gained from these studies was incorporated in our product of safety assessment process. It is JCAB's intent to harmonize Japan's program with ICAO's initiatives for RECAT global standardization. To stay at the forefront of the development, JCAB attended the international conference to ensure we are going in the same direction.

### 2. Characteristics of Wake Vortices

References  
JCAB Aeronautical Information Manual Japan (AIM-J) - Chapter 9 - 834  
FAA Aeronautical Information Manual (AIM) - Chapter 7 - Section 3

#### 1. Effects of wing vortices

An aircraft may experience an unexpected abrupt roll when it encounters vortices. Pilots of the shorter wingspan aircraft must be alert to vortex encounters when trailing behind the longer wingspan aircraft. Counteract the roll imposed by wake vortex is usually effective.

#### 2. Migration of wing vortices

An aircraft generates vortices from the moment it rotates on takeoff to touchdown, since trailing vortices are a by-product of wing lift. Prior to takeoff or touchdown, pilots should note the rotation or touchdown point of the preceding aircraft.

The vortices from larger aircraft sink at a rate of several hundred feet per minute, slowing their descent and diminishing in strength with time and distance behind the generating aircraft. Atmospheric turbulence hastens wake breakup, while other atmospheric conditions such as winds can transport wake horizontally and vertically.

The vortices spread to the right and left with a speed of 2 or 3 knots after touchdown on the ground. A crosswind reduces the extent on the windward side of vortices, and contrary increases on the downwind side. With 1-knot of crosswind, vortices remain touchdown area for a while.

The light gustiness tailwind allows the upward vortex to remain in the touchdown zone for a longer period of time and hence requires maximum caution when landing behind larger aircraft.

### 3. Wake Turbulence Formation, Effects & Re-categorization

#### 1. The strength is governed by the weight, speed & wingspan

An inflight pressure differential of the upper and lower wing surfaces triggers the roll up of the air (vortex) for the left wing and counter-clockwise for the right wing. The greatest strength occurs when the generating aircraft is "heavy at slow speed with wider wing span".

The strength is proportional to the weight of the aircraft (the heavier the weight, the stronger)  
The strength is inversely proportional to the speed of the aircraft (the slower the speed, the stronger)  
The one of the flow field of the vortex is proportional to the wingspan (the wider the wingspan, the bigger)

#### 2. Re-categorization according to a maximum takeoff weight and wingspan

Wake CAT	MTOW	Wake Group	MTOW	Wingspan
Super L	600,000kg (A380)	Group A	Over 136,000kg	Over 74.68m Under 80m
Heavy H	Over 136,000kg * excluding J1 B774, B772, A350, etc)	Group B	Over 136,000kg	Over 53.34m Under 74.68m
		Group C	Over 136,000kg	Over 38.1m Under 53.34m
		Group D	Over 18,600kg Under 136,000kg	Over 32m
Medium M	Over 7,000kg Under 136,000kg (A320, B738, E175, etc)	Group E	Over 18,600kg Under 136,000kg	Over 27.43m Under 32m
		Group F	Over 18,600kg Under 136,000kg	Under 27.43m
Light L	Under 7,000kg	Group G	Under 18,600kg	-

### 4. Benefits of RECAT

Re-categorization (revised separation standards) allows reduction of wake vortex separation minima

Original Rule-based separation minima of aircraft classes (based on ICAO Doc 4438)

Group	Following Aircraft	Lead Aircraft	Separation Minima
Group A	Boeing 747-400	A380-800	12.5 NM
Group B	Boeing 747-400	A380-800	10.5 NM
Group C	Boeing 747-400	A380-800	8.5 NM
Group D	Boeing 747-400	A380-800	6.5 NM
Group E	Boeing 747-400	A380-800	4.5 NM
Group F	Boeing 747-400	A380-800	3.5 NM
Group G	Boeing 747-400	A380-800	2.5 NM

Revised Rule-based separation minima of aircraft classes (based on ICAO Doc 4438)

Group	Following Aircraft	Lead Aircraft	Separation Minima
Group A	Boeing 747-400	A380-800	10.5 NM
Group B	Boeing 747-400	A380-800	8.5 NM
Group C	Boeing 747-400	A380-800	6.5 NM
Group D	Boeing 747-400	A380-800	4.5 NM
Group E	Boeing 747-400	A380-800	3.5 NM
Group F	Boeing 747-400	A380-800	2.5 NM
Group G	Boeing 747-400	A380-800	1.5 NM

### 5. Safety Assessment

#### 1. Purpose of safety assessment

- Introduction of original reduced separation is required safety assessment based on ICAO's manual
- Identify expected hazards and actions necessary to eliminate the hazard during pre-implementation safety assessment
- Safety monitoring and assessment are also required after implementation of reduced separation (wake turbulence encounter report etc.)

Installed location, observing range and result data of LIDAR

#### 2. Mitigation

- ATC personnel must receive training with the right set of training tools (e.g. textbook) on RECAT procedures including vortex formation and effect prior to implementation.
- Requirement definition to enable RECAT applications shall be established.
- In addition to the assisted function of ATC system, ensure an alternate tool which allows ATC officers to identify aircraft's RECAT groups available.

\* Flight plan format will not change, so that aircraft operators will not need to describe a RECAT group in the flight plan. ATC system will convert and indicate the RECAT group based on the ICAO aircraft type in the flight plan.

## 6. Wake Turbulence Encounter Report

### 1. Wake turbulence encounter report

- Pilots should report all wake turbulence encounters using "Wake Turbulence Encounter Report" form.
- The form is able to download from JASMA website, <http://www.jasma.jp/>.
- Aircraft operators should submit the form to Flight Procedures & Airspace Program Office, Air Traffic Control Division, JCAB without delay.
- Flight Procedures & Airspace Program Office will analyze the incident, monitor safety issues and perform safety assessment. Monitoring and assessment of global safety trend will be conducted by data exchange through ICAO forum in alignment with all local and international laws and regulations concerning data security and privacy protection.

### 2. JASMA Website

<http://www.jasma.jp/>



### 3. Submission

Flight Procedures and Airspace Program Office

TEL : 03-5253-8750 (Direct)  
E-mail : [ngt-jasma@ach.mhl.go.jp](mailto:ngt-jasma@ach.mhl.go.jp)

Air Navigation Service Department  
Civil Aviation Bureau

## 7. Q&A

### Q1. Separation

Q. What other separation minima does ATC plan to use besides the ones listed in the AIP SUP?  
A. Conventional system of four categories I/H/M/L will be used.

### Q2. Flight plan

Q. Do we have to describe one of the following letters A/B/C/D/E/F/G in ITEM 9: "NUMBER AND TYPE OF AIRCRAFT AND WAKE TURBULENCE CATEGORY" of the flight plan?  
A. No. Enter one of the following letters I/H/M/L to indicate the wake turbulence category of the aircraft in accordance with "Procedure for the submission of a flight plan".

### Q3. Application of RECAT

Q. How do we know which separation standard (conventional I/H/M/L or RECAT) will be applied to my flight?  
A. ATC does not announce an RECAT application status.

### Q4. Encounter of wake vortices

Q. It is difficult to draw a conclusion that a disturbance is caused by reduced separation minima of RECAT. Is there classification of intensities?  
A. The classification of intensities are as follows: Severe - roll angle in excess of 30° Moderate - roll angle of 30° to 50° Light - roll angle of less than 30°. Pilots are responsible for providing wake turbulence encounter report.

### Q5. Wake turbulence encounter reporting form

Q. Can pilots/aircraft operators use their own reporting form?  
A. Consult with Flight Procedures & Airspace Program Office in advance.

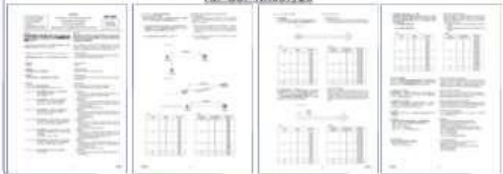
### Q6. Wake turbulence encounter report submission due date

Q. How soon do we have to submit a "Wake Turbulence Encounter Report"?  
A. Within a week from a date of incident (a date reported by the pilot).

## 6. Reference Document & Point of Contact

### 1. AIP SUPPLEMENT

AIP SUP NR037/20



### 2. Point of Contact

Air Traffic Control Division  
TEL : 03-5253-8749 (Direct)  
Flight Procedures and Airspace Program Office  
TEL : 03-5253-8750 (Direct)  
Air Navigation Service Department  
Civil Aviation Bureau



Thank you