International Civil Aviation Organization

Thirty-First Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/31)

Bangkok, Thailand, 29 June – 03 July 2026

Agenda Item 3: Reports from Asia/Pacific RMAs and EMAs

JASMA VERTICAL SAFETY REPORT

(Presented by JASMA)

SUMMARY

This paper presents the results of the vertical safety assessment of the Reduced Vertical Separation Minimum (RVSM) airspace in the Fukuoka Flight Information Region (FIR) by the Japan Airspace Safety Monitoring Agency (JASMA) for the period from January to December 2025.

1. INTRODUCTION

1.1 This paper provides the executive summary of the airspace safety oversight assessment undertaken by the Japan Airspace Safety Monitoring Agency (JASMA) for the Reduced Vertical Separation Minimum (RVSM) implementation in the Fukuoka Flight Information Region (FIR), which is a part of the Pacific Ocean Airspace and North-East Asia Airspace. Full details are provided in the **Appendix A**.

2. DISCUSSION

2.1 The report shows the estimated vertical collision risk for the Fukuoka FIR for the reporting period from 1 January 2025 to 31 December 2025 was 3.21 x 10^{-9} fatal accident per flight hour (fapfh) which was below the Target Level of Safety (TLS) 5.0 x 10^{-9} fapfh.

Executive Summary

2.2 **Table 1** summarizes the technical, operational, and total vertical collision risks for the Fukuoka FIR. **Figure 1** presents collision risk estimate trends by month during the period from January 2025 to December 2025.

Table 1. Japanese Airspace RVSM Risk Estimates

Japanese Airspace – estimated annual flying hours = 1,884,750 hours *(note: estimated hours based on Dec 2025 traffic sample data)*			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
RASMAG 30 Total Risk	*4.91 x 10^{-9}*	*5.0 x 10^{-9}*	*Below TLS*
Technical Risk	0.35 x 10^{-9}	2.5 x 10^{-9}	Below Technical TLS
Operational Risk	2.86 x 10^{-9}	-	-
Total Risk	**3.21 x 10^{-9}**	5.0 x 10^{-9}	**Below TLS**

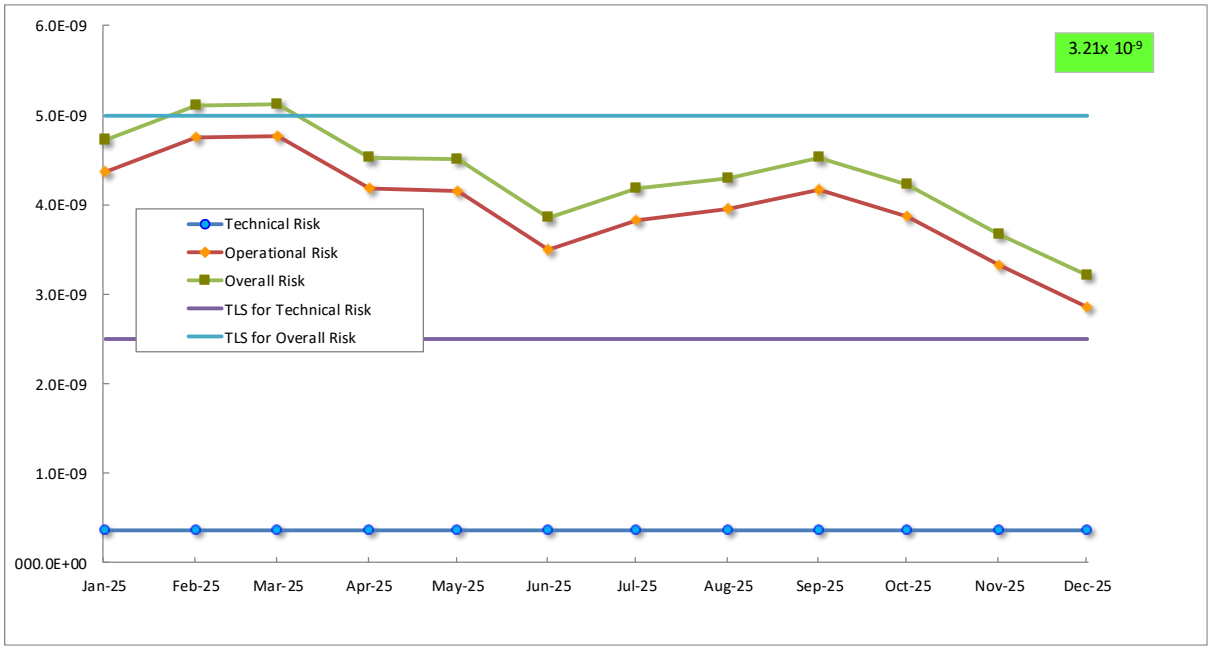

Figure 1. Japanese Airspace RVSM Risk Estimate Trends

2.3 **Table 2** presents a summary of the LHD causes within Japanese airspace from January 2025 until December 2025.

Table 2. Summary of LHD Causes within Japanese Airspace

Code	LHD Category Description		No.
A	Flight crew fails to climb or descend the aircraft as cleared		8
B	Flight crew climbing or descending without ATC clearance		6
C	Incorrect operation or interpretation of airborne equipment		1
D	ATC system loop error		4
E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues Sub-Category:		4
	E-NT: No Transfer or Negative Transfer	0	
	E-LT: Late Transfer	0	
	E-RI: No or Late Revision of Transfer Information	2	
	E-OT: Any Other Types	2	
F	ATC transfer of control coordination errors due to technical issues		0
G	Aircraft contingency leading to sudden inability to maintain level		2
H	Airborne equipment failure and unintentional or undetected level change		1
I	Turbulence or other weather related cause leading to unintentional or undetected change of flight level		22
J	TCAS resolution advisory; flight crew correctly climb or descend following the resolution advisory		11
K	TCAS resolution advisory; flight crew incorrectly climb or descend following the resolution advisory		0
L	An aircraft being provided with RVSM separation is not RVSM approved		0
M	Others		0
R	GNSS Radio Frequency Interference		0
Total			59

Figure 2 provides the geographic location of risk bearing LHD reports within Japanese airspace, Fukuoka FIR during the assessment period. The filled blue square symbols represent LHD location in the RVSM stratum of Fukuoka FIR. The circle size means an LHD duration of 50 seconds or more.

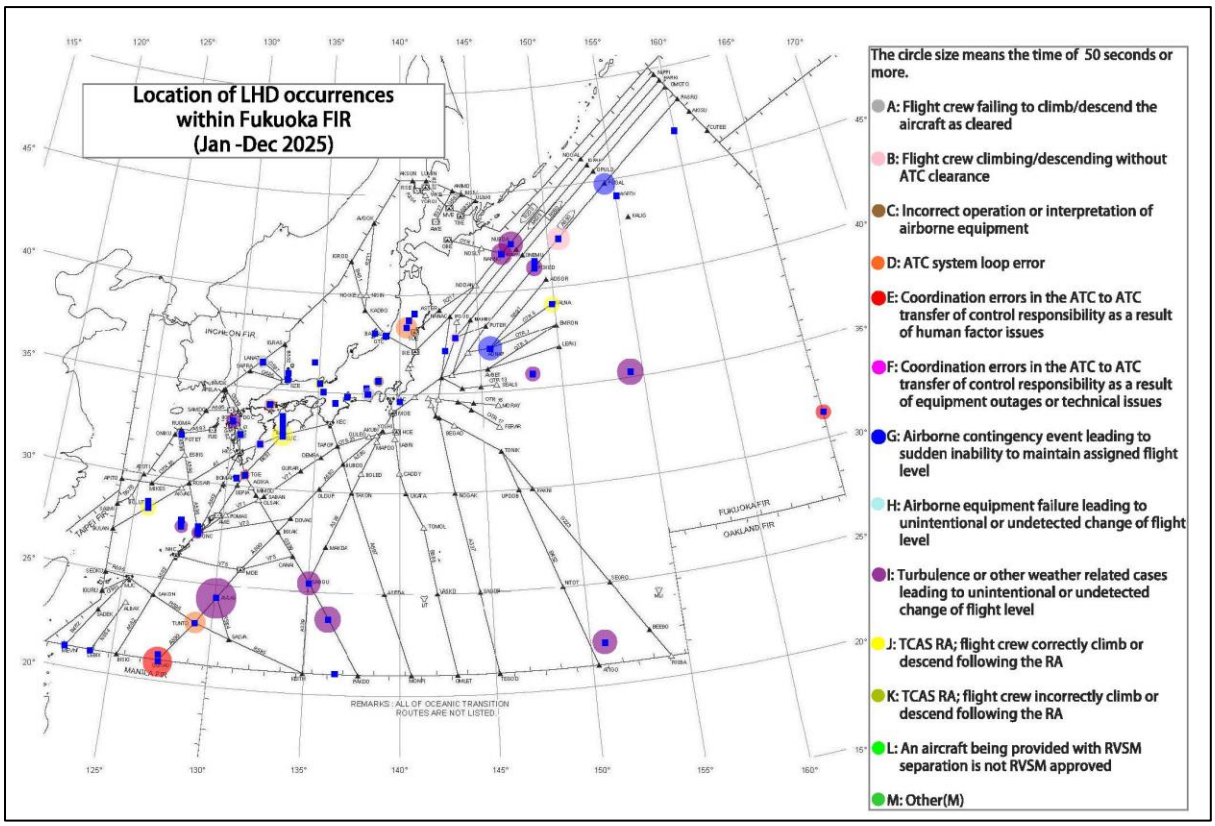

Figure 2. Geographical Location of LHDs within Fukuoka FIR

2.4 **Figure 3** compares the number of LHDs by category from 2021 to 2025. Overall, whilst the number of LHDs in 2025 increased compared with 2024, the total duration of LHDs in 2025 was shorter than in 2024.

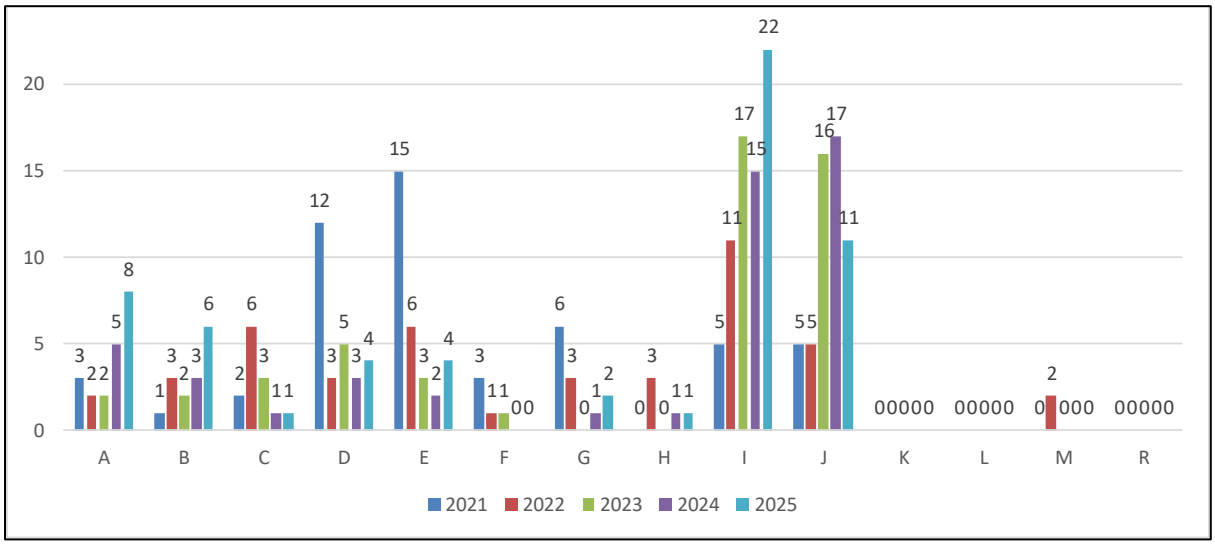

Figure 3: Comparing LHDs by Category from 2021 to 2025

2.5 JASMA has analyzed trends and changes in LHDs as follows:

a) in Category A LHDs, “Flight crew failing to climb/descend the aircraft as cleared,” there were eight occurrences in 2025, increased from five in 2024. In six of those cases, although the pilots correctly repeated the ATC instructions, they failed to comply with them;

b) in Category B LHDs, “Flight crew climbing/descending without ATC clearance,” the number of cases increased from three in 2024 to six in 2025. These cases were caused by pilots' wishful hearing regarding altitude changes. It is noteworthy that these LHDs occur not only in voice communications but also in text-based communications such as CPDLC;

c) in Category C LHDs, “Incorrect flight level provided due to incorrect operation or interpretation of airborne equipment,” there was one case in 2025, unchanged from 2024;

d) in Category D LHDs, “ATC system loop error,” the number of cases increased from three in 2024 to four in 2025. All four cases were attributed to communication errors and misinterpretations between controllers and pilots. Specifically, these cases involved the transmission of incorrect altitude during HF third party relay of an ATC clearance, call sign confusion, blocked radio transmissions due to simultaneous communications by another aircraft, and a pilot misinterpreting a heading instruction as an altitude change;

e) in Category E LHDs, “ATC transfer error due to human factors,” the number of cases decreased significantly from 15 in 2021 to three in 2023, and further declined to two in 2024. However, the number increased to four in 2025. The breakdown consisted of two E-RI cases and two E-OT cases;

f) in Category I LHDs, “Turbulence or bad weather,” the number of cases increased from 15 in 2024 to 22 in 2025. Approximately half of the cases were reported over the Pacific Ocean within the Fukuoka FIR. The duration of LHDs was approximately 300 seconds longer over oceanic airspace compared to overland airspace, with some LHDs lasting up to approximately 1000 seconds longer. It appears that being outside the radar coverage is causing delays in ATC detection of altitude deviations; and

g) in Category J LHDs, “TCAS resolution advisory and flight crew correctly following the resolution advisory,” decreased from 17 in 2024 to 11 in 2025. In all cases, ATC safe separation was maintained.

2.6 In response to the ICAO’s proposal and the RASMAG Chair’s suggestion , “RMAs/EMAs consider the percentage value of traffic volume recovery since 2019 and include traffic trend evaluation in their safety reports in order to assist RASMAG in the re-examination of current LHD Hot Spots,” at the Tenth Meeting of the RASMAG Monitoring Agencies Working Group (RASMAG/MAWG/10), **Figure 4** shows the trend of traffic volume in Fukuoka FIR from 2008 to 2025.

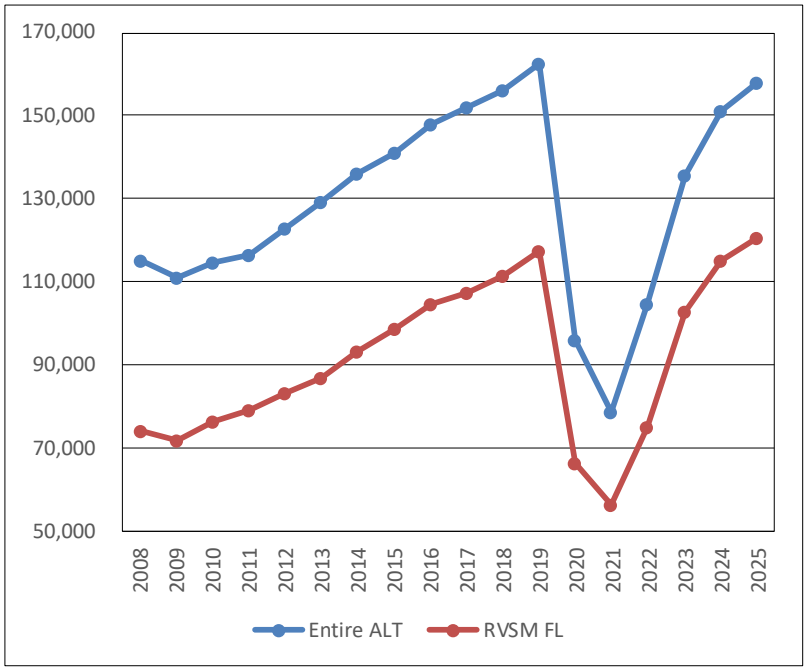

Figure 4. Traffic Volume in Fukuoka FIR from 2008 to 2025

2.7 The total traffic volume of Fukuoka FIR shows a solid recovery from 2021, in 2025 it was approximately 97% of it in 2019, which was a peak traffic volume before the COVID-19 pandemic. On the other hand, the number of aircraft in the RVSM altitude band in 2025 was 2% higher than the 2019 level.

Hot Spot D1 (FIR Boundary between Fukuoka and Manila FIRs)

2.8 **Figure 5** presents the number of LHD occurrences at the FIR boundary between Fukuoka FIR and Manila FIR, where designated a Hot Spot D1.

2.9 One Category E LHDs occurred when transferring from Manila ACC to Fukuoka ACC in 2025.

2.10 In order to mitigate transfer error caused by human factors at Hot Spot D1, the bilateral meetings between Fukuoka and Manila ACCs have regularly been held since December 2022, encouraging mutual understanding of both ACCs. The number of LHDs at Hot Spot D1 is steadily decreasing.

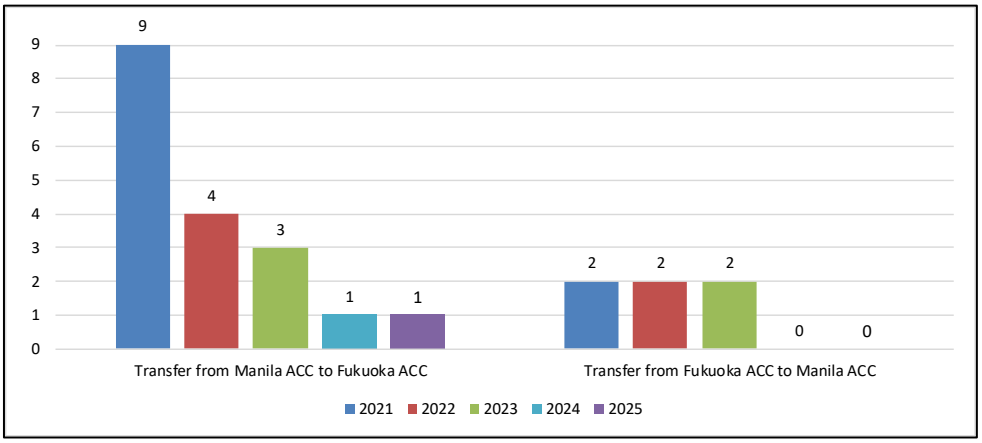

Figure 5. Number of LHDs at Hot spot D1 between Fukuoka and Manila FIR

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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APPENDIX A

AIRSPACE SAFETY REVIEW FOR THE RVSM IMPLEMENTATION IN FUKUOKA FLIGHT INFORMATION REGION

January 2025 to December 2025

(Presented by JASMA)

SUMMARY

The purpose of this report is to compare actual performance to safety goals related to the continued use of reduced vertical separation minimum (RVSM) in the Fukuoka Flight Information Region (FIR). This report contains a summary of large height deviation reports received by the Japan Airspace Safety Monitoring Agency (JASMA) and an update on the vertical collision risk for the period from January to December 2025. There are a total of 59 reported large height deviations that occurred during this period in Fukuoka FIR. The vertical collision risk estimate for the RVSM airspace in Fukuoka FIR was 3.21×10^{-9}, which was below the target level of safety (TLS).

1. INTRODUCTION

1.1 This Appendix A presents a summary of the Large Height Deviation (LHD) reports received by the JASMA and an update on the vertical collision risk for the period of 1 January 2025 to 31 December 2025.

2. DISCUSSION

2.1 Traffic Sample Data (TSD)

2.1.1 Traffic Sample data for December 2025 of aircraft operating in the Fukuoka FIR were used to assess the safety of RVSM airspace.

2.2 Large Height Deviation (LHD)

2.2.1 A series of cumulative 12-month LHD reports were used in this safety assessment starting from January 2025 to December 2025.

2.2.2 **Table 1** summarizes the number of LHD occurrences and associated LHD duration (in minutes) by month in the RVSM airspace of the Fukuoka FIR.

Month-Year	No. of LHD Occurrences	LHD Duration (Minutes)
January 2025	6	10.5
February 2025	3	6,5
March 2025	5	5.1
April 2025	3	5.2
May 2025	5	17.0
June 2025	2	1.5
July 2025	4	3.9
August 2025	9	20.1
September 2025	6	20.8
October 2025	10	16.2

November 2025	4	6.7
December 2025	2	1.9
Total	**59**	**115.4**

Table 1. Summary of LHD Occurrences and Duration per Month in the Fukuoka FIR

2.2.3 The LHD reports are separated by categories based on the details provided for each deviation. **Table 2** presents a summary of the LHD causes within Fukuoka FIR in 2024 and 2025. The number of LHDs reported in 2025 is increased from 2024.

Code	LHD Category Description	2024	2025
A	Flight crew fails to climb or descend the aircraft as cleared	5	8
B	Flight crew climbing or descending without ATC clearance	3	6
C	Incorrect operation or interpretation of airborne equipment	1	1
D	ATC system loop error	3	4
E	ATC transfer of control coordination errors due to human factors	2	4
F	ATC transfer of control coordination errors due to technical issues	0	0
G	Aircraft contingency leading to sudden inability to maintain level	1	2
H	Airborne equipment failure and unintentional or undetected level change	1	1
I	Turbulence or other weather related cause	15	22
J	TCAS resolution advisory and flight crew correctly responds	17	11
K	TCAS resolution advisory and flight crew incorrectly responds	0	0
L	Non-approved aircraft is provided with RVSM separation	0	0
M	Other	0	0
Total		**48**	**59**

Table 2. Summary of LHD Causes within Fukuoka FIR.

2.2.4 **Appendix B** contains the details of the 23 LHDs that contributed to the operational risk, which was reported to the JASMA during the assessment period.

2.2.5 **Appendix C** contains the details of the 36 LHDs that were not involved in the operational risk and were reported to the JASMA during the assessment period.

2.2.6 **Appendix D** contains the details of the three LHDs that occurred outside of Fukuoka FIR and were not involved in the operational risk during the assessment period.

2.2.7 **Appendix E** provides the geographic location of all LHD reports in Fukuoka FIR during the assessment period. The filled blue square symbols represent the LHD location in the RVSM stratum inside of Fukuoka FIR, and the hollow blue square symbols represent the LHD location in the RVSM stratum outside of Fukuoka FIR. The circle size means an LHD duration of 50 seconds or more.

2.2.8 The number of LHD occurrences between Fukuoka FIR and Manila FIR in 2025 remained unchanged from 2024.

3. Risk Assessment and Safety Oversight

3.1 This section updates the results of safety oversight for the RVSM implementation in the Fukuoka FIR. Accordingly, the internationally accepted collision risk methodology is applied in assessing the safety of the airspace.

3.1.1 Estimate of the Collision Risk Model (CRM) Parameters shown in **Table 3**. The average sizes of aircraft based on the TSD of December 2025 are slightly smaller than that of aircraft based on the TSD of December 2025.

Parameter Symbol	Parameter Definition	Parameter Value	Source for Value
Pz(1000)	Probability that two aircraft nominally separated by the vertical separation minimum 1000 feet are in vertical overlap	1.7×10^{-8}	Value specified in ICAO Doc. 9574
Pz(0)	Probability that two aircraft at the same nominal level are in vertical overlap	0.54	Value often used (shown in RVSM/TF-9-IP/2)
Py(0)	Probability that two aircraft on the same track are in lateral overlap	0.0711	Using the data of secondary surveillance radar obtained by the Hachinohe Air Route Surveillance Radar (domestic RNAV route, 2001-2002) and FDPS data (December 2012).
λx	Average aircraft length	0.0271 nm	JASMA (TSD of RVSM flights in Dec 2025)
λy	Average aircraft width	0.0245 nm	
λz	Average aircraft height	0.0077 nm	
$\overline{\lvert\Delta V\rvert}$	Average along track speed of aircraft pairs	28.9 kt	Kushiro Air Route Surveillance Radar data (R220 route, NOPAC, Apr. 1994)
$\overline{\lvert V\rvert}$	Individual-aircraft along track speed	480 kt	Value often used
$\overline{\lvert\dot{y}\rvert}$	Average cross track speed of aircraft pairs	11.6 kt	Kushiro Air Route Surveillance Radar data (R220 route, NOPAC, Apr. 1994)
$\overline{\lvert\dot{z}\rvert}$	Average vertical speed of aircraft pairs	1.5 kt	Value often used
Nx(same)	The passing frequency of aircraft pair assigned to the adjacent flight levels under the same direction traffic	2.78×10^{-2}	CCAW data (Dec 2025)
Nx(opp)	The passing frequency of aircraft pair assigned to the adjacent flight levels under the opposite direction traffic	12.26×10^{-2}	CCAW data (Dec 2025)
$Naz^{technical}$ (cross)	The collision risk for crossing routes (technical dimension)	1.48×10^{-10} [accidents/flight hour]	FO flight data (Dec 2025) is utilized for the calculation of $E_z(\theta)$.
$Naz^{operational}$ (cross)	The collision risk for crossing routes (operational dimension)	2.21×10^{-9} [accidents/flight hour]	By eq. (12).
H	Total flight hours of aircraft flying on the route segments within airspace under consideration	1,884,750 flight hours	Estimated flight hours from Jan 2025 to Dec 2025 *12 times the flight hours in Dec 2025
T(0)	LHD duration in hours	0.50	Total duration hours of 23 operational LHD reports received from Jan 2025 to Dec 2025

Table 3. Summarizes the Value of the Parameters Used for the Vertical Risk Calculation

3.2 Risk Calculation

3.2.1 Based on the TSD for one month of December 2025 extracted from the JCAB's Flight Object Administration Center System (FACE), the numbers of passing events, n_p(same) and n_p(opp), were calculated for each route segment consisting of two fixes.

3.2.2 Using the CRM parameters, such as the average size of the aircraft and average relative speed of the aircraft pair, contained in **Table 3**, kinematical coefficients of passing frequencies for the same and opposite direction traffic can be calculated by

$$K(same) = 1 + \frac{\lambda x}{Vrx(same)}\left(\frac{Vry}{\lambda y} + \frac{Vrz}{\lambda z}\right) \quad (1)$$

$$K(opp) = 1 + \frac{\lambda x}{Vrx(opp)}\left(\frac{Vry}{\lambda y} + \frac{Vrz}{\lambda z}\right) \quad (2)$$

Same-direction passing frequency $N_x(same)$, opposite-direction passing frequency $N_x(opp)$, and equivalent opposite-direction passing frequency $N_x{}^z(e)$ are defined by

$$N_x^z(same) = \frac{2n_p(same)}{H} \quad (3)$$

$$N_x^z(opp) = \frac{2n_p(opp)}{H} \quad (4)$$

$$N_x^z(e) = N_x^z(opp) + \frac{K(same)}{K(opp)} N_x^z(same) \quad (5)$$

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respectively.

Technical Risk is estimated by

$$N_{az}{}^{technical} = N_{az}{}^{technical}(o+s) + N_{az}{}^{technical}(cross) \quad (6)$$

$$N_{az}(o+s)^{technical} = P_z(1000)P_y(0)N_x{}^z(e)K(o) \quad (7)$$

$$N_{az}{}^{technical}(cross) = P_z(1000)\sum_\theta P_h(\theta)E_z{}^{cross}(\theta)\left[\frac{2\left|\overline{\dot{h}(\theta)}\right|}{\pi\lambda_{xy}} + \frac{\left|\overline{\dot{z}}\right|}{2\lambda_z}\right] \quad (8)$$

$P_h(\theta)$ was calculated assuming that the distributions of along-track positions and cross-track deviations follow normal distributions whose standard deviations are $5/\sqrt{6}$ NM and 0.132, respectively. Remark that 5NM is the radar separation standard and $5/\sqrt{6}$ NM is the standard deviation of the uniform distribution with the domain width = 5NM. The value 0.132 is calculated from the Hachinohe radar data collected from August 2001 till July 2002. $P_h(\theta)$, $E_z{}^{cross}(\theta)$ and $\left|\overline{\dot{h}(\theta)}\right|$ were calculated every ten degrees.

Operational Risk is given by

$$N_{az}{}^{operational} = N_{az}{}^{operational}(o+s) + N_{az}{}^{operational}(cross) \quad (9)$$

where,

$$N_{az}{}^{operational}(o+s) = \frac{\sum P_z(z)T(z)}{H} P_y(0)N_x{}^z(e)K(o) \quad (10)$$

$$N_{az}{}^{operational}(cross) = \frac{\Sigma P_z(z)T(z)}{H}\sum_\theta P_h(\theta)E_z{}^{cross}(\theta)\left[\frac{2\left|\overline{\dot{h}(\theta)}\right|}{\pi\lambda_{xy}} + \frac{\left|\overline{\dot{z}}\right|}{2\lambda_z}\right] \quad (11)$$

$$N_{az}{}^{operational}(cross) = \frac{\Sigma P_z(z)T(z)}{H} \cdot \frac{N_{az}{}^{technical}(cross)}{P_z(1000)} \quad (12)$$

Executive Summary

3.3 Safety Oversight for the RVSM implementation in the Fukuoka FIR

3.3.1 **Table 4** presents the estimates of vertical collision risk for the RVSM airspace of the Fukuoka FIR. The technical risk is estimated to be 0.35 x 10^{-9} fatal accidents per flight hour. The operational risk estimate is 2.86 x 10^{-9} fatal accidents per flight hour. The estimate of the overall vertical collision risk is 3.21 x 10^{-9} fatal accidents per flight hour, which is below the globally agreed TLS value of 5.0 x 10^{-9} fatal accidents per flight hour.

Japanese Airspace – estimated annual flying hours = 1,884,750 hours *(note: estimated hours based on Dec 2025 traffic sample data)*			
Source of Risk	**Risk Estimation**	**TLS**	**Remarks**
RASMAG 30 Total Risk	*4.91 x 10^{-9}*	*5.0 x 10^{-9}*	*Below TLS*
Technical Risk	0.35 x 10^{-9}	2.5 x 10^{-9}	Below Technical TLS
Operational Risk	2.86 x 10^{-9}	-	-
Total Risk	**3.21 x 10^{-9}**	5.0 x 10^{-9}	**Below TLS**

Table 4. Fukuoka FIR RVSM Risk Estimates

3.3.2 **Figure 2** presents collision risk estimate trends by type (technical, operational, and total) for each month using the appropriate cumulative during the period from January to December 2025.

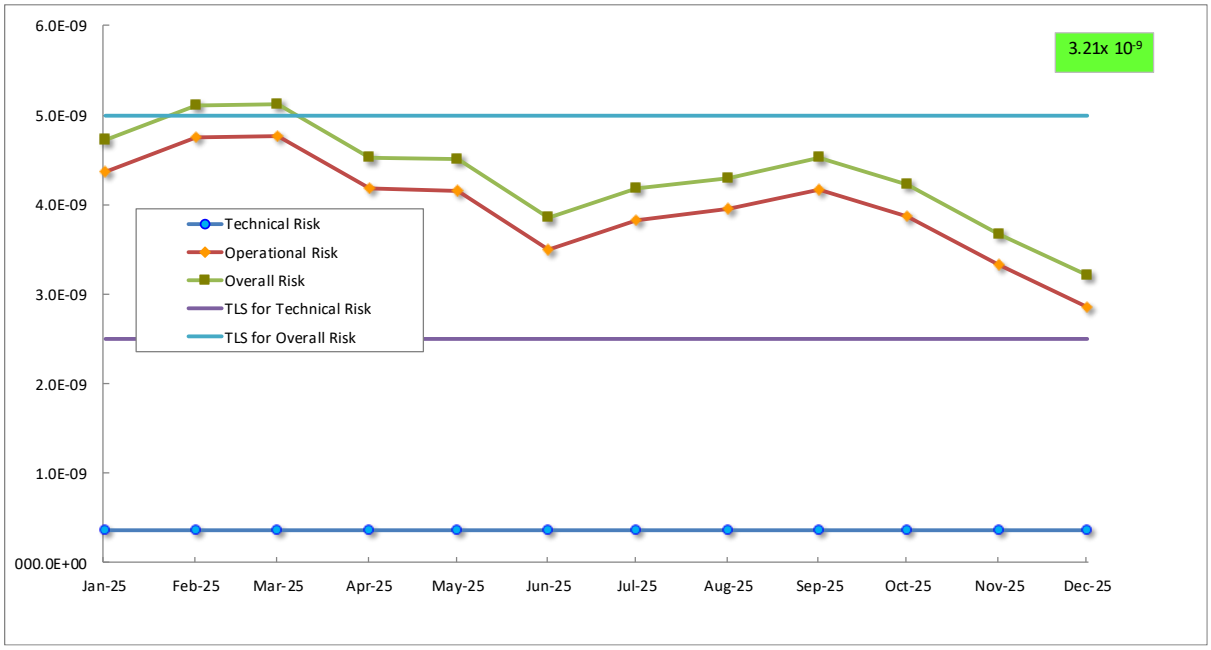

Figure 2. Fukuoka FIR RVSM Risk Estimate Trends

3.3.3 The estimated overall risk was below the TLS. The risk value is lower than the previous year.

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APPENDIX B

LHDs contributed to Operational Risk within the RVSM airspace in Fukuoka FIR reported to the JASMA during the assessment period

	Occurrence Date	Reporter	Location	ACFT Type	Assigned FL	Observed/ Reported ALT (ft)	Duration of LHD (min.)	Cause	CAT code	Hot Spot
1	8-Jan-2025	Fukuoka ACC	POTET	B77W	320	32,700	0.00	Flight crew fails to climb or descend the aircraft as cleared	A	
2	15-Jan-2025	Fukuoka ACC	AGEDI	A359	370	35,000	0.00	Flight crew fails to climb or descend the aircraft as cleared	A	
3	21-Jan-2025	Fukuoka ACC	TUNTO	A21N	330	30,000	0.57	ATC system loop error	D	
4	26-Jan-2025	Kobe ACC	KONGU	A320	320	32,500	1.00	Flight crew failing climbing/descending without ATC clearance	B	
5	19-Feb-2025	Fukuoka ACC	YTE	E190	350	34,000	3.97	ATC system loop error	D	
6	27-Mar-2025	Fukuoka ACC	MIHOU	B763	340	35,300	0.42	Flight crew failing climbing/descending without ATC clearance	B	
7	28-Mar-2025	Tokyo ACC	TGE	A35K	350	34,200	0.5	Flight crew failing climbing/descending without ATC clearance	B	
8	15-Jun-2025	Fukuoka ACC	TGE	A20N	380	36,100	0.83	ATC system loop error	D	
9	13-Jul-2025	Fukuoka ACC	OATIS	B744	310	31,700	0.95	Flight crew failing climbing/descending without ATC clearance	B	
10	19-Jul-2025	Fukuoka ACC	GURAG	B77W	330	35,000	2.00	ATC transfer error caused by operations (Any other types)	E-OT	D1
11	31-Jul-2025	Kobe ACC	MBE	A21N	300	30,300	0.37	Flight crew failing climbing/descending without ATC clearance	B	
12	9-Aug-2025	Tokyo ACC	MAMAS	B763	310	30,700	0.20	Flight crew fails to climb or descend the aircraft as cleared	A	

	Occurrence Date	Reporter	Location	ACFT Type	Assigned FL	Observed/ Reported ALT (ft)	Duration of LHD (min.)	Cause	CAT code	Hot Spot
13	18-Aug-2025	Fukuoka ACC	MARCO	A20N	350	35,600	1.22	ATC system loop error	D	
14	8-Sep-2025	Fukuoka ACC	LEBIX	B789	370	39,000	0.00	ATC transfer error caused by operations (Any other types)	E-OT	D1
15	11-Sep-2025	ANA	BIVET	B763	380	38,320	1.00	Incorrect operation	C	
16	18-Sep-2025	Tokyo ACC	BOPNO	A321	300	30,600	1.85	Flight crew fails to climb or descend the aircraft as cleared	A	
17	29-Sep-2025	Fukuoka ACC	EKUSA	B789	350	34,000	0.43	Flight crew fails to climb or descend the aircraft as cleared	A	
18	6-Oct-2025	Fukuoka ACC	3133N 16535E	B763	340	32,000	3.00	ATC transfer error caused by operations (No or late revision of transfer information)	E-RI	
19	11-Oct-2025	Fukuoka ACC	LANAT	A359	390	37,400	1.40	Flight crew fails to climb or descend the aircraft as cleared	A	
20	8-Nov-2025	Fukuoka ACC	4248N 15117E	A359	380	38,500	5.00	Flight crew failing climbing/descending without ATC clearance	B	
21	13-Nov-2025	Fukuoka ACC	1657N 13814E	B789	380	40,000	0.00	ATC transfer error caused by operations (No or late revision of transfer information)	E-RI	
22	22-Nov-2025	Fukuoka ACC	3859N 14102E	B737	380	37,100	0.38	Flight crew fails to climb or descend the aircraft as cleared	A	
23	27-Nov-2025	Fukuoka ACC	3215N 13023E	B738	340	35,000	1.27	Flight crew fails to climb or descend the aircraft as cleared	A	

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APPENDIX C

LHDs not contributed to Operational Risk in the Fukuoka FIR reported to the JASMA during the assessment period

	Occurrence Date	Reporter	Location	ACFT Type	Assigned FL	Observed/ Reported ALT (ft)	Duration of LHD (min.)	Cause	CAT code	Hot Spot
1	14-Jan-2025	Fukuoka ACC	ADNAP	K35R	310	34,000	5.00	Aircraft contingency leading to sudden inability to maintain level	G	
2	31-jan-2025	Kobe ACC	MIHOU	A320	170	31,400	0.50	Airborne equipment failure and unintentional or undetected level change	H	
3	1-Feb-2025	Kobe ACC	SUC	B78X	310	31,700	1.35	TCAS resolution advisory and flight crew correctly responds	J	
4	1-Feb-2025	Kobe ACC	SUC	B77W	300	29,500	1.17	TCAS resolution advisory and flight crew correctly responds	J	
5	26-Mar-2025	Kobe ACC	YME	B763	290	29,500	1.17	TCAS resolution advisory and flight crew correctly responds	J	
6	26-Mar-2025	Kobe ACC	ISAKY	B744	330	33,900	2.47	Turbulence or other weather related cause	I	
7	27-Mar-2025	Tokyo ACC	GOLDO	A320	300	29,600	0.52	Turbulence or other weather related cause	I	
8	11-Apr-2025	Fukuoka ACC	ONC	A21N	330	32,000	0.92	Turbulence or other weather related cause	I	
9	23-Apr-2025	Fukuoka ACC	PUGAL	B744	350	27,000	4.00	Aircraft contingency leading to sudden inability to maintain level	G	
10	23-Apr-2025	Fukuoka ACC	SAMON	B744	400	40,400	0.23	TCAS resolution advisory and flight crew correctly responds	J	
11	11-May-2025	Fukuoka ACC	NANNO	A359	390	38,356	4.00	Turbulence or other weather related cause	I	
12	17-May-2025	Fukuoka ACC	POXED	B789	370	37,304	2.00	Turbulence or other weather related cause	I	

	Occurrence Date	Reporter	Location	ACFT Type	Assigned FL	Observed/ Reported ALT (ft)	Duration of LHD (min.)	Cause	CAT code	Hot Spot
13	25-May-2025	Fukuoka ACC	POXED	B77L	330	33,300	0.00	Turbulence or other weather related cause	I	
14	29-May-2025	Fukuoka ACC	SABGU	K35R	360	36,308	5.00	Turbulence or other weather related cause	I	
15	31-May-2025	Fukuoka ACC	NUBDA	C17	320	28,000	6.00	Turbulence or other weather related cause	I	
16	23-Jun-2025	Tokyo ACC	ELMIR	A20N	390	40,100	0.68	Turbulence or other weather related cause	I	
17	14-Jul-2025	Kobe ACC	SUC	A321	330	32,600	0.57	TCAS resolution advisory and flight crew correctly responds	J	
18	4-Aug-2025	Fukuoka ACC	2240N 15105E	C17	380	37,700	6.00	Turbulence or other weather related cause	I	
19	8-Aug-2025	Fukuoka ACC	3516N 15453E	B744	330	32,688	7.00	Turbulence or other weather related cause	I	
20	12-Aug-2025	Kobe ACC	SANDA	B788	370	36,700	0.80	TCAS resolution advisory and flight crew correctly responds	J	
21	21-Aug-2025	Fukuoka ACC	3613N 14723E	B77L	400	40,300	3.00	Turbulence or other weather related cause	I	
22	30-Aug-2025	Fukuoka ACC	YURIX	B738	360	37,200	1.17	Turbulence or other weather related cause	I	
23	30-Aug-2025	Fukuoka ACC	YURIX	B738	360	34,600	0.47	Turbulence or other weather related cause	I	
24	30-Aug-2025	SKY	YAKUSHIMA IS.	B738	400	40,388	0.25	Turbulence or other weather related cause	I	
25	20-Sep-2025	Fukuoka ACC	2440N 13033E	B763	340	34,304	17.0	Turbulence or other weather related cause	I	

	Occurrence Date	Reporter	Location	ACFT Type	Assigned FL	Observed/ Reported ALT (ft)	Duration of LHD (min.)	Cause	CAT code	Hot Spot
26	30-Sep-2025	FDA	GTC	E170	360	36,496	0.5	Turbulence or other weather related cause	I	
27	8-Oct-2025	Fukuoka ACC	2321N 13545E	B738	320	31,700	7.00	Turbulence or other weather related cause	I	
28	8-Oct-2025	Fukuoka ACC	42N160E	A359	390	38,500	0.00	Turbulence or other weather related cause	I	
29	17-Oct-2025	Fukuoka ACC	KALNA	B77W	290	28,600	2.00	TCAS resolution advisory and flight crew correctly responds	J	
30	18-Oct-2025	JJP	MEVIN	A320	340	33,500	0.17	Turbulence or other weather related cause	I	D1
31	21-Oct-2025	Fukuoka ACC	SAPET	A20N	380	37,700	1.57	TCAS resolution advisory and flight crew correctly responds	J	
32	21-Oct-2025	Fukuoka ACC	SAPET	CL60	390	39,300	0.40	TCAS resolution advisory and flight crew correctly responds	J	
33	26-Oct-2025	JJP	GURAG	A320	330	32,400	0.33	Turbulence or other weather related cause	I	D1
34	1-Feb-2025	Fukuoka ACC	ONC	A320	380	37,500	0.37	Turbulence or other weather related cause	I	
35	1-Feb-2025	Kobe ACC	SUC	A20N	320	32,500	1.30	TCAS resolution advisory and flight crew correctly responds	J	
36	1-Feb-2025	Fukuoka ACC	YTE	A320	350	34,600	0.63	TCAS resolution advisory and flight crew correctly responds	J	

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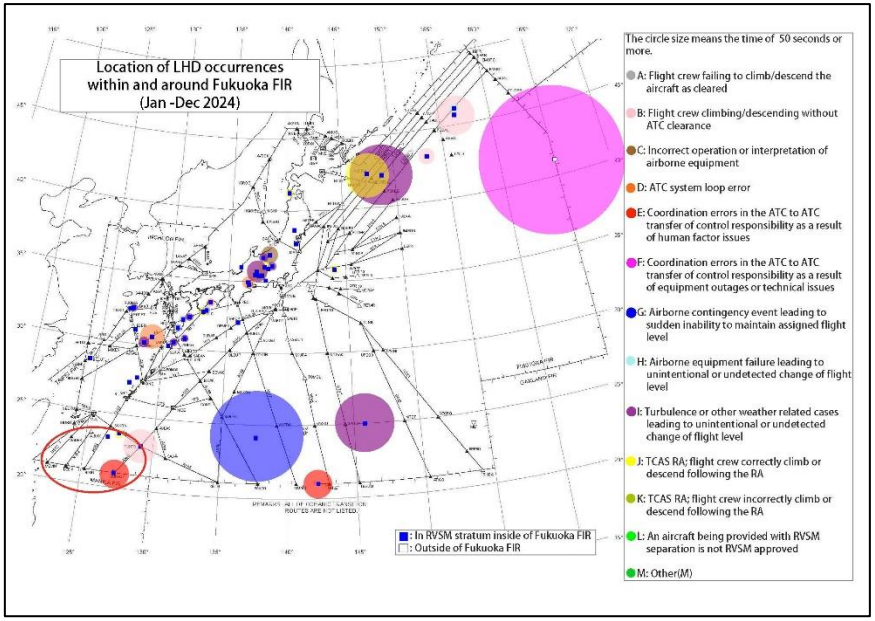
APPENDIX D

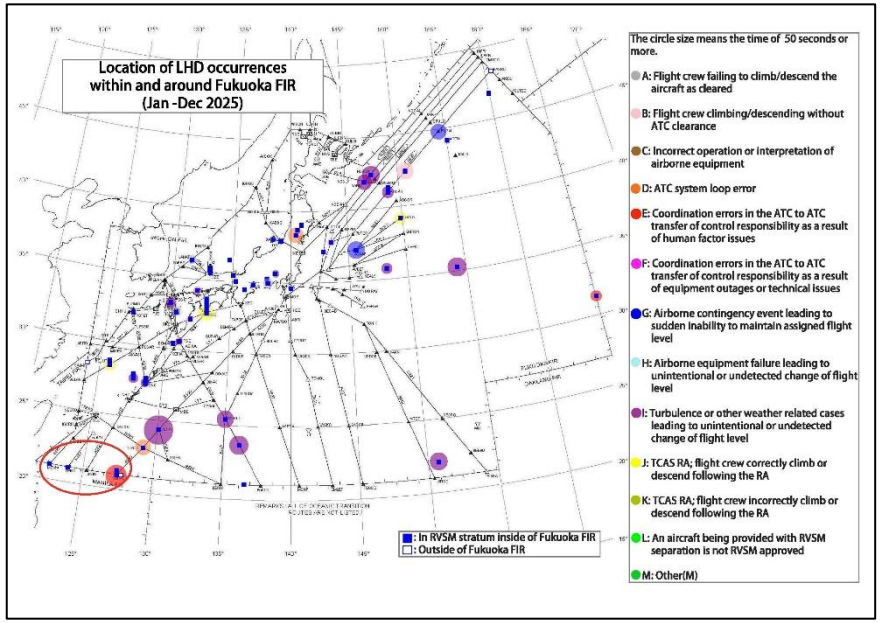
LHDs occurred outside of Fukuoka FIR

	Occurrence Date	Relevant ATC Unit	Location	ACFT Type	Assigned FL	Observed/ Reported ALT (ft)	Duration of LHD (min.)	Cause	CAT code	Hot Spot
1	13-Mar-2025	Fukuoka ACC	SALMI	A321	340	32,500	0.57	Flight crew failing climbing/descending without ATC clearance	B	
2	17-May-2025	Fukuoka ACC	PASRO	B77W	300	31,000	0.00	ATC transfer error caused by operations (No or late revision of transfer information)	E-RI	
3	11-Nov-2025	Fukuoka ACC	GURAG	A21N	320	33,648	6.00	ATC transfer error caused by operations (Any other types)	E-OT	D1

APPENDIX E



Geographical Location of all LHDs in Fukuoka FIR (2024)



Geographical Location of all LHDs in Fukuoka FIR (2025)

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