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

RVSM RISK ASSESSMENT IN THE JAKARTA AND UJUNG PANDANG FLIGHT INFORMATION REGIONS

1 JANUARY 2021 TO 31 DECEMBER 2021

(Presented by Australian Airspace Monitoring Agency)

SUMMARY

This paper presents an airspace Safety Review of RVSM airspace risk in the Jakarta and Ujung Pandang Flight Information Regions (FIRs) for the period 1 January 2021 to 31 December 2021. The risk meets the Target Level of Safety (TLS) of 5.0×10^{-9} fatal accidents per flight hour (fapfh). A brief quantitative assessment of the safety reporting culture is also conducted.

Results show a technical risk of 0.133×10^{-9} , an operational risk of 3.51×10^{-9} and a total risk of 3.64×10^{-9} , all below the TLS.

Two LHDs contributed significantly to the risk. Both were coordination errors as a result of human factors issues, with one assessed as 23 minutes duration, and the other assessed as 10 levels crossed.

1. INTRODUCTION

1.1 This report provides an airspace Safety Review of RVSM airspace risk in the Jakarta and Ujung Pandang FIRs for the period 1 January 2021 to 31 December 2021. The review is undertaken using a 12 month data sample period.

1.2 All airspace safety estimates and TLS values in this report are measured in terms of fatal accidents per flight hour (fapfh).

1.3 The estimated risk is compared to the TLS of no more than 2.5×10^{-9} for the technical component of the risk, and 5.0×10^{-9} for the total weighted risk.

1.4 The AAMA is revising our process of estimating collision risk modelling (CRM) parameters from the TSD, leading to more accurate results, along with more efficient calculations of the risk. This leads to slightly different risk values as that reported in previous meetings.

1.5 The results indicate risk below the TLS. A large increase in LHD duration for May 2021 was due to one LHD assessed as Category E (coordination error as a result of human factors issues), which was assessed as 23 minutes duration. The occurrence involved an Ujung Pandang controller noticing the presence of an ADS-B track without a coupled flight plan (FPL). Upon communication with the pilot, it was established that the aircraft had crossed into Ujung Pandang FIR from Oakland FIR 23 minutes earlier. Ujung Pandang ACC cannot find a record of the transfer.

1.6 An additional high-risk event occurred in November 2021. This was also a Category E occurrence and was assessed as 10 levels crossed. The event involved Kuala Lumpur ACC transferring an aircraft at FL300, whereas the aircraft was actually at FL400.

2. DISCUSSION

Data Sources

2.1 *Traffic Sample Data (TSD)*: TSD covering four weeks of the month of December 2020 of aircraft operating in the Jakarta and Ujung Pandang FIRs was used as required by ICAO Regional agreement.

2.2 *Large Height Deviations (LHDs)*: A cumulative 12 month data set of LHD reports was used, covering 1 January 2021 to 31 December 2021. All FIRs submitted LHD reports for all 12 months, including nil returns.

Summary of LHD Occurrences

2.3 The number of reported LHD occurrences, non-zero-duration LHDs, total LHD duration (in minutes), and total number of levels crossed for the period 1 January 2021 to 31 December 2021 are shown by month in **Table 1**. The number of reported LHDs, duration, and levels crossed are shown in **Figure 1**.

Month	Number of reported LHDs	Number of non-zero-duration LHDs	LHD duration (minutes)	Number of levels crossed
2021				
January	3	0	0	0
February	3	1	0.5	0
March	3	1	2	0
April	3	0	0	0
May	3	1	23	0
June	1	0	0	0
July	2	1	2	0
August	2	0	0	0
September	1	0	0	0
October	5	1	0	1
November	5	3	0.5	11
December	10	7	6.5	2
Total	41	15	34.5	14

Table 1: Summary of LHD occurrences by month for the period 1 January 2021 to 31 December 2021.

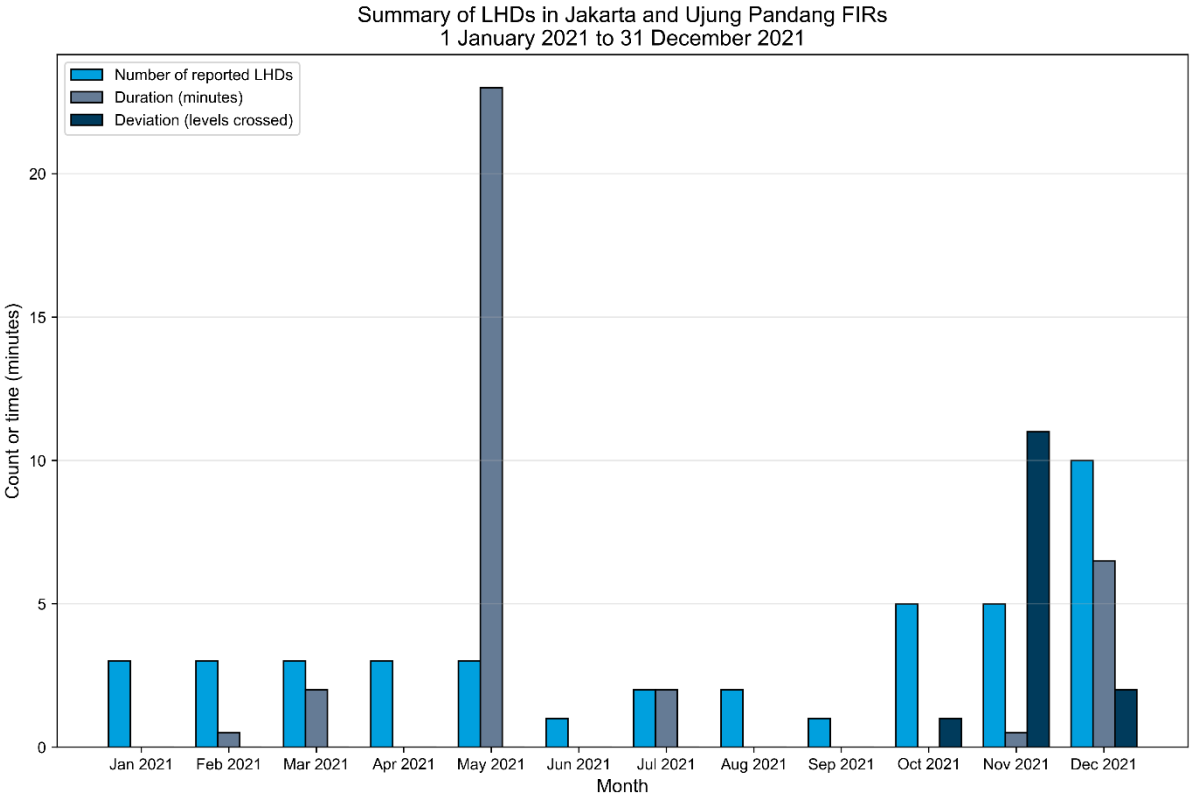


Figure 1: Number of LHDs, duration of LHDs, and number of levels crossed by month for the period 1 January 2021 to 31 December 2021.

2.4 The number of reported LHDs, total LHD duration (in minutes), and total number of levels crossed for the period 1 January 2021 to 31 December 2021 are shown by LHD category in **Table 2** and **Figure 2**.

LHD category	LHD category description	Number of reported LHDs	Duration of LHDs (minutes)	Number of levels crossed
A	Flight crew failing to climb/descend the aircraft as cleared	3	3.5	1
B	Flight crew climbing/descending without ATC clearance	1	0	1
C	Incorrect operation or interpretation of airborne equipment	0	0	0
D	ATC system loop error	0	0	0
E	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of human factors issues	27	29.5	12
F	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of equipment outage or technical issues	9	1	0
G	Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level	0	0	0
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level	0	0	0
I	Deviation due to turbulence or other weather related cause	0	0	0
J	Deviation due to TCAS resolution advisory; flight crew correctly following the resolution advisory	1	0.5	0
K	Deviation due to TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved	0	0	0
M	Other	0	0	0
Total		41	34.5	14

Table 2: Summary of LHD occurrences by category for 1 January 2021 to 31 December 2021.

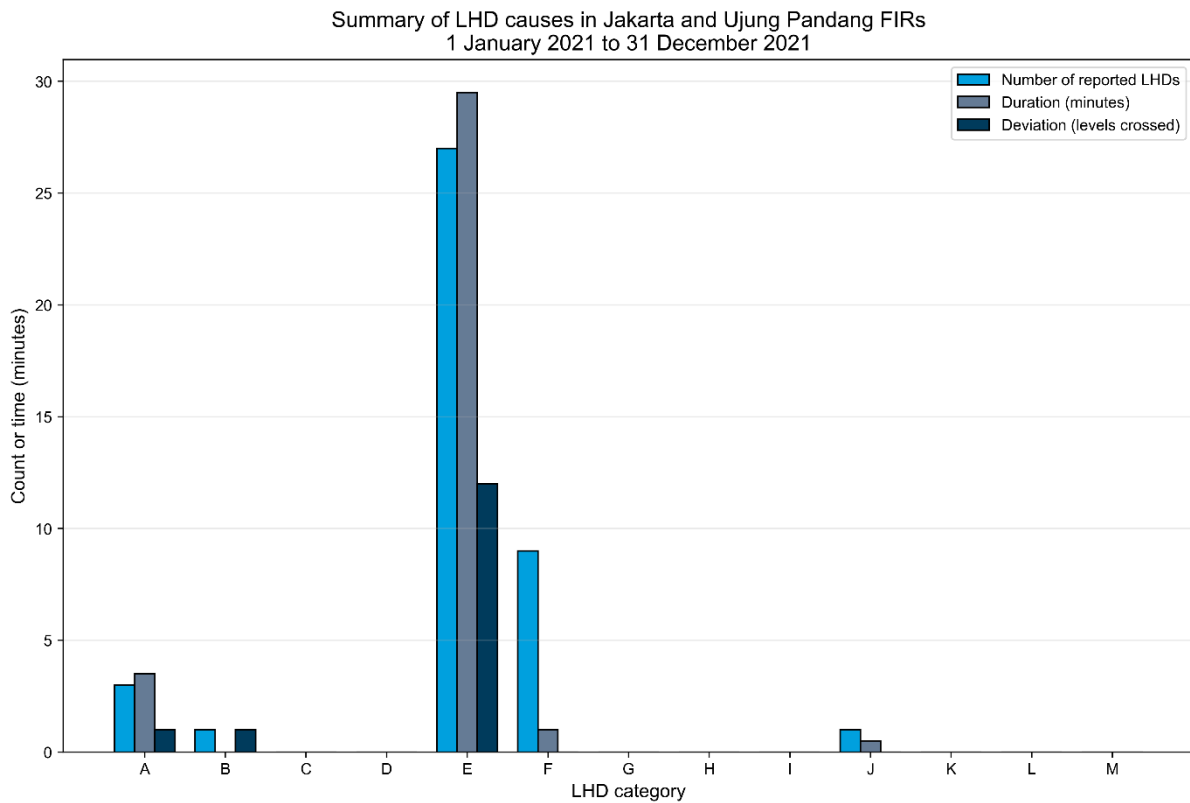


Figure 2: Number of LHDs, duration of LHDs, and number of levels crossed by LHD category for the period 1 January 2021 to 31 December 2021.

Collision Risk Estimate

2.5 The results for the technical, operational, and total risk for the RVSM implementation in Jakarta and Ujung Pandang FIRs for 1 January 2021 to 31 December 2021 are detailed in **Table 3**. The technical risk meets the TLS value of no more than 2.5×10^{-9} . The operational and weighted total risk meets the specified TLS value for these components of 5.0×10^{-9} .

Source of risk	Risk estimate	TLS	Comparison with TLS
Technical risk	0.133×10^{-9}	2.5×10^{-9}	Below technical TLS
Operational risk	3.51×10^{-9}	-	-
Total risk	3.64×10^{-9}	5.0×10^{-9}	Below total TLS

Table 3: RVSM Risk Estimates for the period 1 January 2021 to 31 December 2021. The number of estimated annual flying hours is 303,491 based on the December 2020 TSD.

2.6 The trends of the technical risk, operational risk, and total risk for the period 1 January 2021 to 31 December 2021 are shown in **Figure 3**.

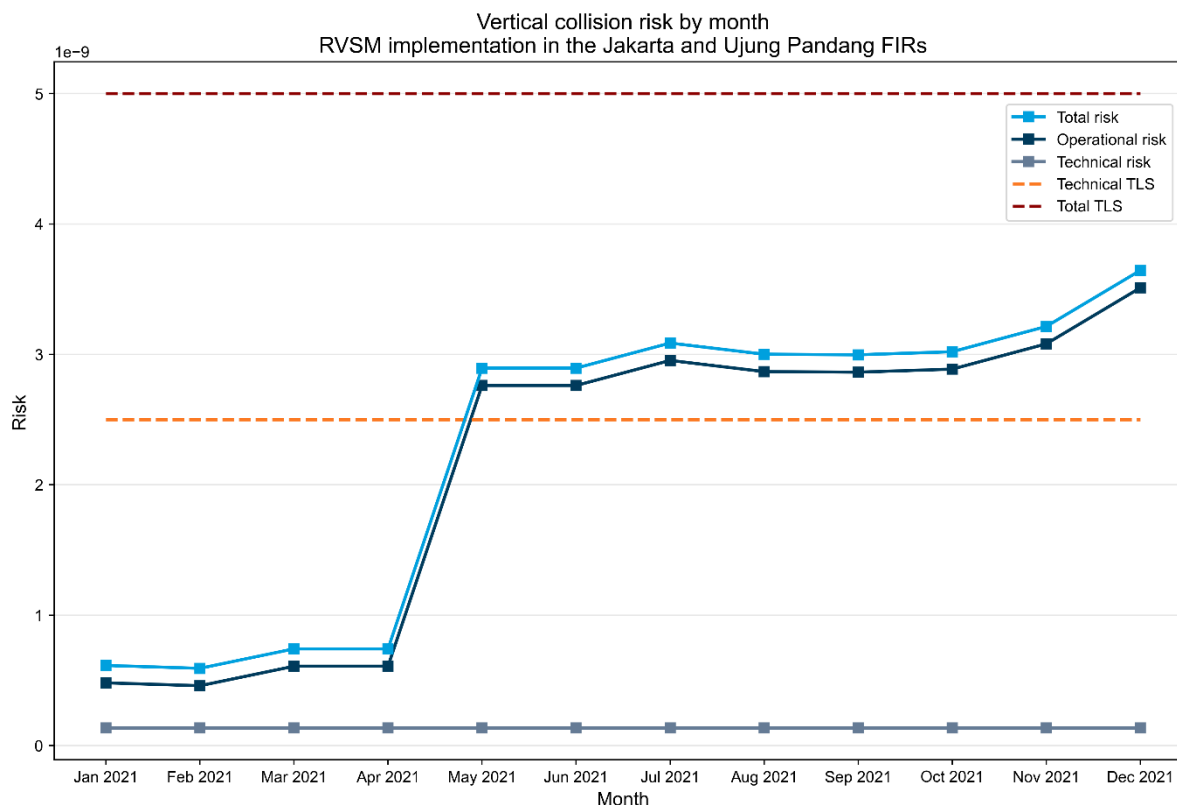


Figure 3: Trends of the technical, operational, and total risk for the period 1 January 2021 to 31 December 2021.

Assessment of Safety Reporting Culture

2.7 The 7th Meeting of the Monitoring Agencies Working Group (MAWG/7) proposed that Regional Monitoring Agencies (RMAs) assess States’ reporting culture, since the RVSM risk assessment is dependent on the accuracy and quality of the LHD reports received.

2.8 MAWG/7 proposed that the reporting safety culture metric would be measured by the reporting rate of occurrence per flight hour, with occurrences grouped by attribution: Pilot/Aircrew (Categories A, B, and C), ATC (Categories D, E, and F), and others (Categories G, H, I, J, K, L, and M). The safety culture metric for Indonesia is shown in **Table 4**.

Table 4: Safety culture metric for Indonesia by LHD attribution for the period 1 January 2021 to 31 December 2021.

Attribution	Number of reports	Flight hours	Number of reports per flight hour (x 10 ⁻⁵)
Pilot/Aircrew (A, B, C)	4	303,491	1.32
ATC (D, E, F)	36	303,491	11.9
Other	1	303,491	0.33
Total	41	303,491	13.5

2.9 Reports were consistently made by both pilots and ATC.

2.10 LHDs with ATC attribution were most widely reported. A high rate of reporting of occurrences with ATC attribution is an indication of a positive reporting culture, especially if ATC are comfortable reporting on their own errors as part of a ‘Just Culture’ framework.

2.11 Of the 36 ATC-attributed reports received, Jakarta or Ujung Pandang were the transferring unit in 24 occurrences and the accepting unit in 12 occurrences. ATC were twice more likely to report an occurrence if the error was made by their own unit. This is further evidence of a positive reporting culture.

Geolocation of LHDs

2.12 A map identifying the geographic location of LHD occurrences for the period 1 January 2021 to 31 December 2021 is shown in **Figure 5**. The occurrences at each location are represented by a coloured circle, with the radius proportional to the total risk at that location. The map is intended to provide a means to identify and visualise risk hot spots related to RVSM operations.

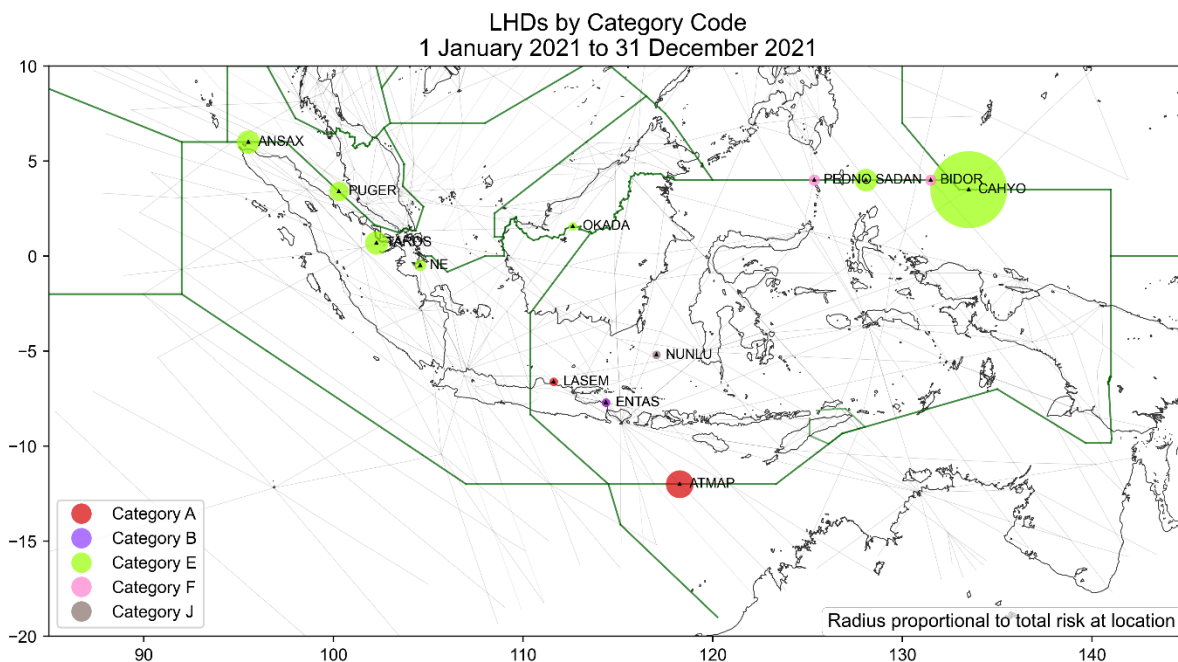


Figure 5: Geolocation of LHDs for Jakarta and Ujung Pandang FIRs for the period 1 January 2021 to 31 December 2021.

Summary and Discussion

2.13 The risk has increased since the value reported for the period 1 January 2020—31 December 2020 at the 26th Meeting of the RASMAG (RASMAG/26) in September 2021. This is partially because AAMA has revised our process of estimating collision risk modelling (CRM) parameters from the TSD, leading to more accurate results.

2.14 The number of reported and non-zero-duration LHDs increased towards the later part of 2021, coinciding with a general increase in traffic levels compared with 2020 and early 2021. This aligned with an increase in risk. The total risk remains below the TLS.

2.15 In May 2021, one Category E LHD (coordination error as a result of human factors issues) was assessed as 23 minutes duration. The occurrence involved an Ujung Pandang controller noticing the presence of an ADS-B track without a coupled flight plan (FPL). Upon communication with the pilot, it was established that the aircraft had crossed into Ujung Pandang FIR from Oakland FIR 23 minutes earlier. Ujung Pandang ACC cannot find a record of the transfer. This occurrence represents the largest contribution to the risk, at fix CAHYO shown in **Figure 5**.

2.16 An additional high-risk event occurred in November 2021. This was also a Category E occurrence and was assessed as 10 levels crossed. The event involved Kuala Lumpur ACC transferring an aircraft at FL300, whereas the aircraft was actually at FL400.

2.17 In the period 1 January 2021—31 December 2021, 36 of the 41 LHDs were in the ATC attribution category. Category E LHDs continue to be most prevalent, with 27 occurrences. These also represent the largest contribution to risk.

2.18 The number of Category F LHDs (coordination errors as a result of technical issues) is increasing as the Indonesian FIRs implement AIDC with the neighbouring FIRs.

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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