



ICAO

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Monitoring Advisory Group (RASMAG/29)**

Bangkok, Thailand, 19 – 22 August 2024

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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 Region**

**1 January 2023 to 31 December 2023**

(Presented by Australian Airspace Monitoring Agency)

#### **SUMMARY**

This paper presents an airspace Safety Review of RVSM airspace risk in the Indonesian Flight Information Regions (FIR) for the period 1 January 2023 to 31 December 2023. Results show a technical risk of  $0.12 \times 10^{-9}$ , an operational risk of  $5.23 \times 10^{-9}$  and a total risk of  $5.35 \times 10^{-9}$ . While the technical risk is below the Target Level of Safety (TLS) of  $2.5 \times 10^{-9}$  fatal accidents per flight hour (fafh), the total risk exceeds the relevant TLS ( $5.0 \times 10^{-9}$  fafh). A brief quantitative assessment of the safety reporting culture is also conducted.

## **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 2023 to 31 December 2023. The review is undertaken using a 12-month data sample period and is based on data supplied from Air Nav Indonesia.

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

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

1.4 The results indicate risk exceed the TLS. The LHD presenting the most operational risk occurred on a two-way route and lasted 26 minutes in duration. It involved an aircraft with a faulty airspeed indicator who had to request a block-level between FL300 and FL340, but its contribution to the total operational risk was less than 20%. In contrast, almost 60% of the operational risk was contributed by 36 LHDs involving coordination errors in the ATC-to-ATC transfer or control responsibility as a result of human factors issues. There were 67 additional LHDs falling into the same category; however, these presented no risk.

## 2. DISCUSSION

### Data Sources

2.1 *Traffic Sample Data (TSD)*: TSD covering four weeks of the month of December 2023 of aircraft operating in the Jakarta and Ujung Pandang FIRs was used as required by ICAO Regional agreement.

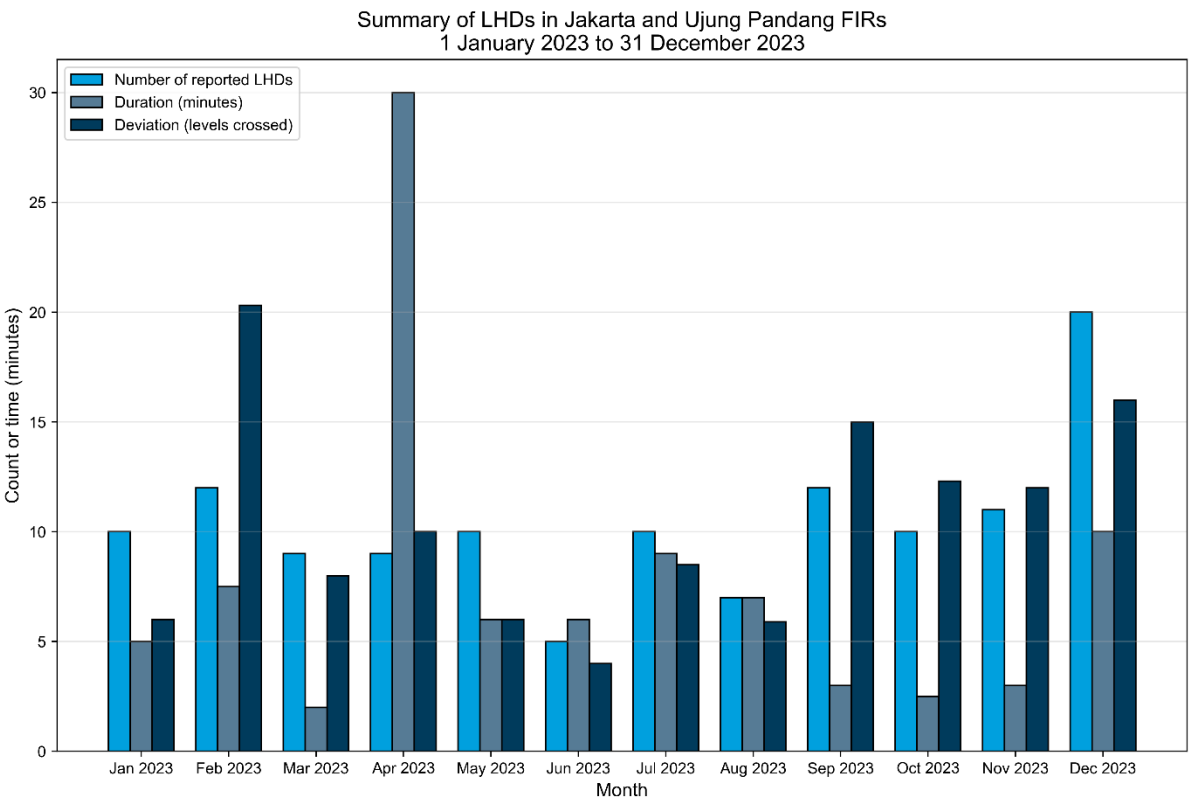
2.2 *Large Height Deviations (LHDs)*: A cumulative 12-month data set of LHD reports was used, covering 1 January 2023 to 31 December 2023.

### 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 2023 to 31 December 2023 are shown by month in **Table 1**. The number of reported LHDs, duration, and levels crossed are shown in **Figure 1**.

**Table 1:** Summary of LHD occurrences by month for the period 1 January 2023 to 31 December 2023. Results for 2022 are illustrated for comparison.

Month	Number of reported LHDs	Number of non-zero-duration LHDs	LHD duration (minutes)	Number of levels crossed
<b>2023</b>				
January	10	3	5.0	6.0
February	12	6	7.5	20.3
March	9	1	2.0	8.0
April	9	3	30.0	10.0
May	10	3	6.0	6.0
June	5	1	6.0	4.0
July	10	7	9.0	8.5
August	7	5	7.0	5.9
September	12	3	3.0	15.0
October	10	3	2.5	12.3
November	11	3	3.0	12.0
December	20	7	10.0	16.0
<b>Total</b>	<b>125</b>	<b>45</b>	<b>91.0</b>	<b>124.0</b>
<b>Total 2022</b>	<b>61</b>	<b>30</b>	<b>32</b>	<b>0</b>

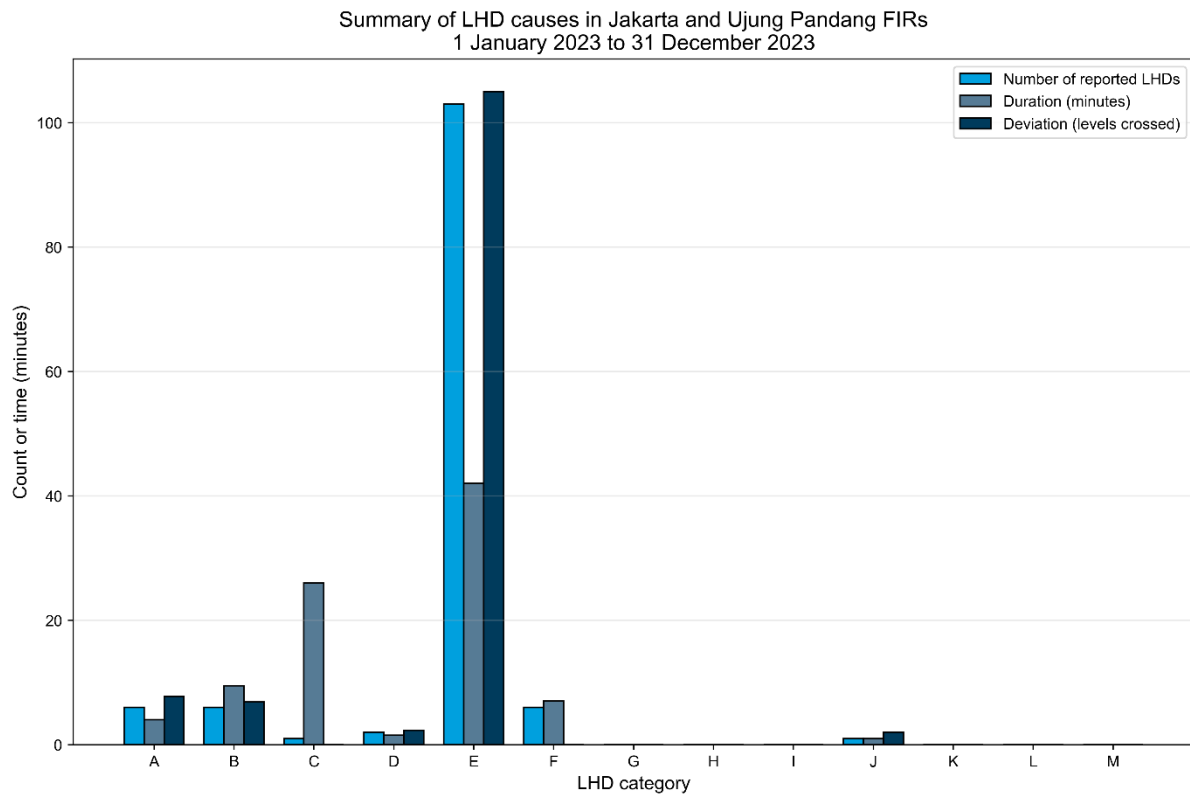


**Figure 1:** Number of LHDs, duration of LHDs, and number of levels crossed by month for the period 1 January 2023 to 31 December 2023.

2.4            The number of reported LHDs, total LHD duration (in minutes), and total number of levels crossed for the period 1 January 2023 to 31 December 2023 are shown by LHD category in **Table 2** and **Figure 2**.

**Table 2:** Summary of LHD occurrences by category for 1 January 2023 to 31 December 2023. Results for 2022 are also shown.

LHD category	LHD category description	2023			2022		
		Number LHDs	Duration of LHDs (minutes)	Number of levels crossed	Number LHDs	Duration of LHDs (minutes)	Number of levels crossed
A	Flight crew failing to climb/descend the aircraft as cleared	6	4.0	7.8	3	4	0
B	Flight crew climbing/descending without ATC clearance	6	9.5	6.9	3	4	0
C	Incorrect operation or interpretation of airborne equipment	1	26.0	0.0	0	0	0
D	ATC system loop error	2	1.5	2.3	0	0	0
E	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of human factors issues	103	42.0	105.0	53	23	0
F	Coordination errors in the ATC-to-ATC transfer or control responsibility as a result of equipment outage or technical issues	6	7.0	0.0	2	1	0
G	Deviation due to aircraft contingency event leading to sudden inability to maintain assigned flight level	0	0	0	0	0	0
H	Deviation due to airborne equipment failure leading to unintentional or undetected change of flight level	0	0	0	0	0	0
I	Deviation due to turbulence or other weather-related cause	0	0	0	0	0	0
J	Deviation due to TCAS resolution advisory; flight crew correctly following the resolution advisory	1	1.0	2.0	0	0	0
K	Deviation due to TCAS resolution advisory; flight crew incorrectly following the resolution advisory	0	0	0	0	0	0
L	An aircraft being provided with RVSM separation is not RVSM approved	0	0	0	0	0	0
M	Other	0	0	0	0	0	0
<b>Total</b>		<b>125</b>	<b>91</b>	<b>124</b>	<b>61</b>	<b>32</b>	<b>0</b>



**Figure 2:** Number of LHDs, duration of LHDs, and number of levels crossed by LHD category for the period 1 January 2023 to 31 December 2023.

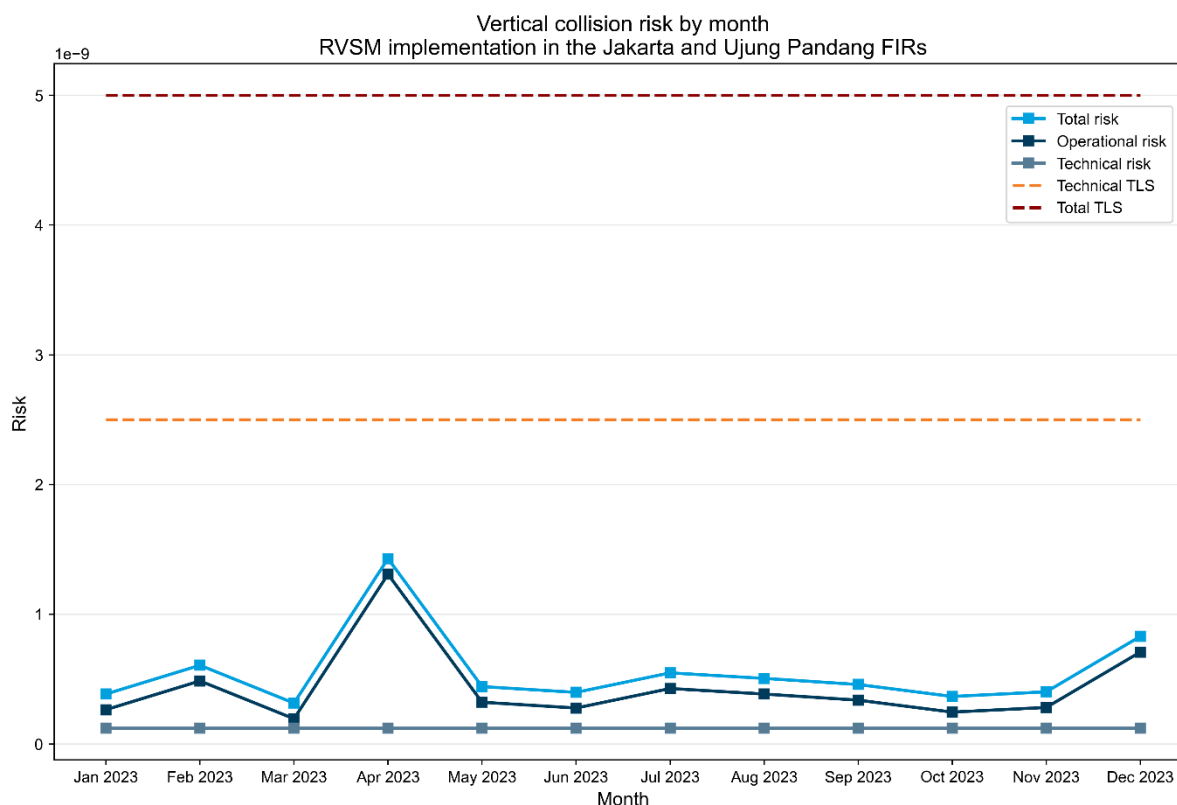
#### Collision Risk Estimate

2.5 The results for the technical, operational, and total risk for the RVSM implementation in the Indonesian FIR for 1 January 2023 to 31 December 2023 are detailed in **Table 3**. The technical risk meets the TLS value of no more than  $2.5 \times 10^{-9}$ . The weighted total risk exceeds the specified TLS value for these components of  $5.0 \times 10^{-9}$ .

**Table 3:** RVSM Risk Estimates for the period 1 January 2023 to 31 December 2023. The number of estimated annual flying hours is 762,410 based on the December 2023 TSD. Values for 2022 are illustrated for reference.

Source of risk	Risk estimate 2023	Risk estimate 2022	TLS	Comparison with TLS
Technical risk	$0.12 \times 10^{-9}$	$0.133 \times 10^{-9}$	$2.5 \times 10^{-9}$	Below technical TLS
Operational risk	$5.23 \times 10^{-9}$	$3.10 \times 10^{-9}$	-	-
<b>Total risk</b>	$5.35 \times 10^{-9}$	$3.24 \times 10^{-9}$	<b><math>5.0 \times 10^{-9}</math></b>	<b>Above total TLS</b>

2.6 The trends of the technical risk, operational risk, and total risk for the period 1 January 2023 to 31 December 2023 are shown in **Figure 3**.



**Figure 3:** Trends of the technical, operational, and total risk for the period 1 January 2023 to 31 December 2023.

#### Assessment of Safety Reporting Culture

2.7 The 7<sup>th</sup> 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**.

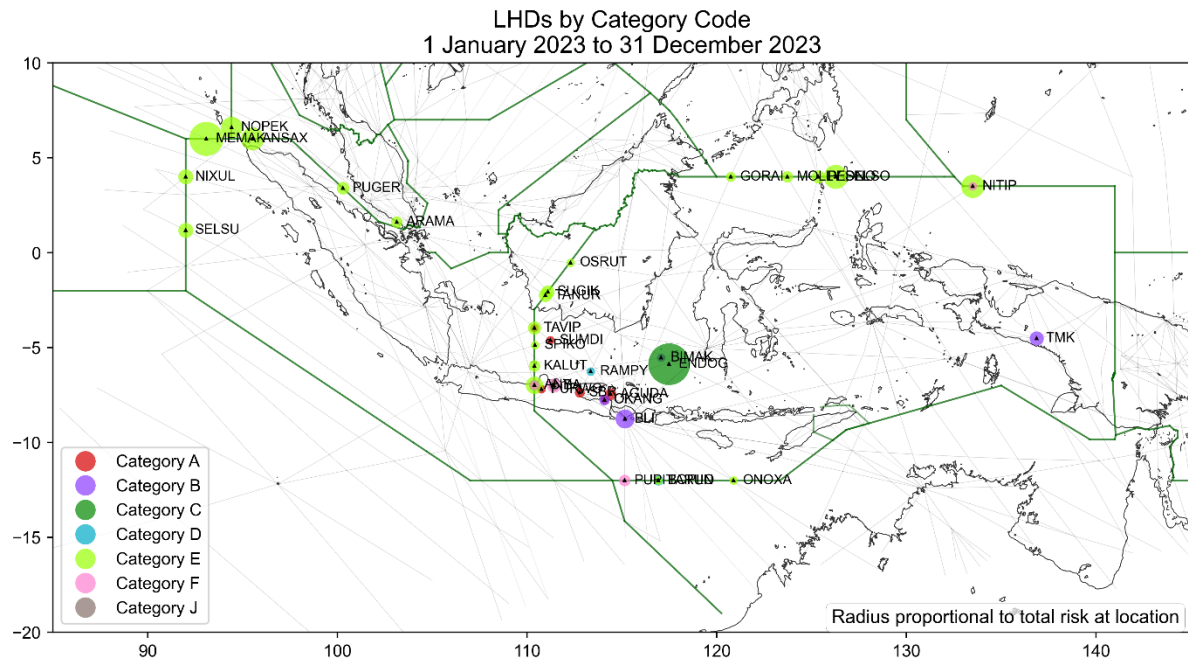
**Table 4:** Safety culture metric for Indonesia by LHD attribution for the period 1 January 2023 to 31 December 2023.

Attribution	Number of reports	Flight hours	Number of reports per flight hour (x 10 <sup>-5</sup> )
Pilot/Aircrew (A, B, C)	13	762 410	1.71
ATC (D, E, F)	111	762 410	14.60
Other	1	762 410	0.13
<b>Total</b>	<b>125</b>	<b>762 410</b>	<b>16.40</b>

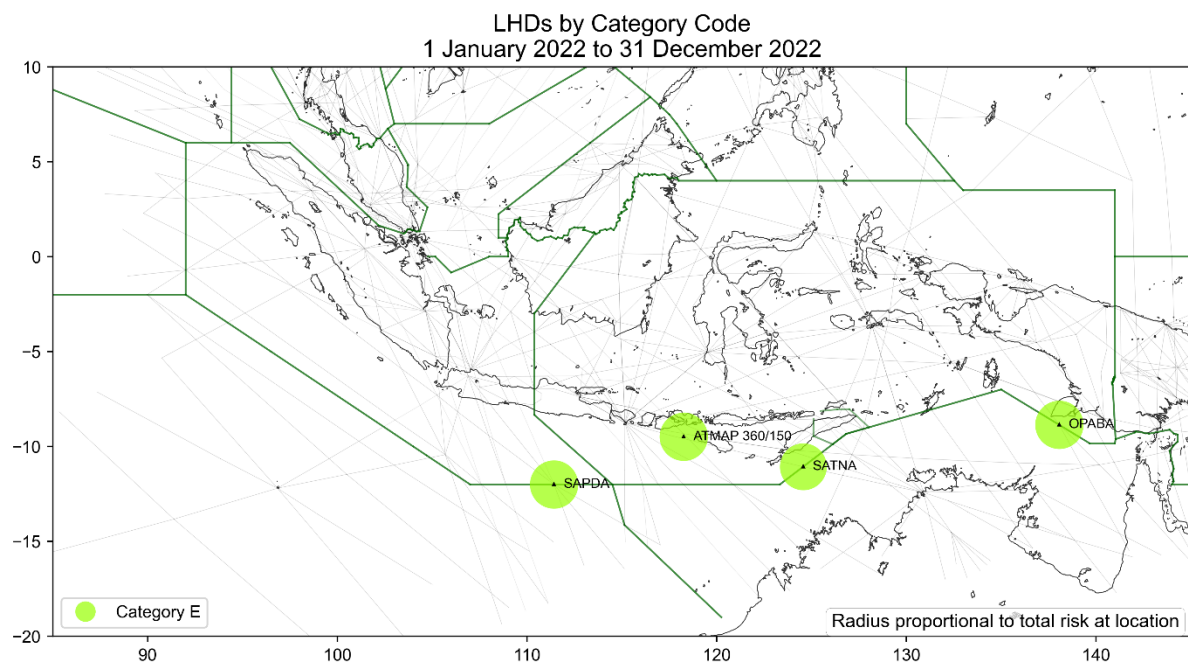
2.9 Of the 103 Category E LHDs, 63 reports corresponded to errors made by neighbouring ATCs, and 40 report correspond to errors made by Jakarta or Ujung Pandang ATCs.

### Geolocation of LHDs

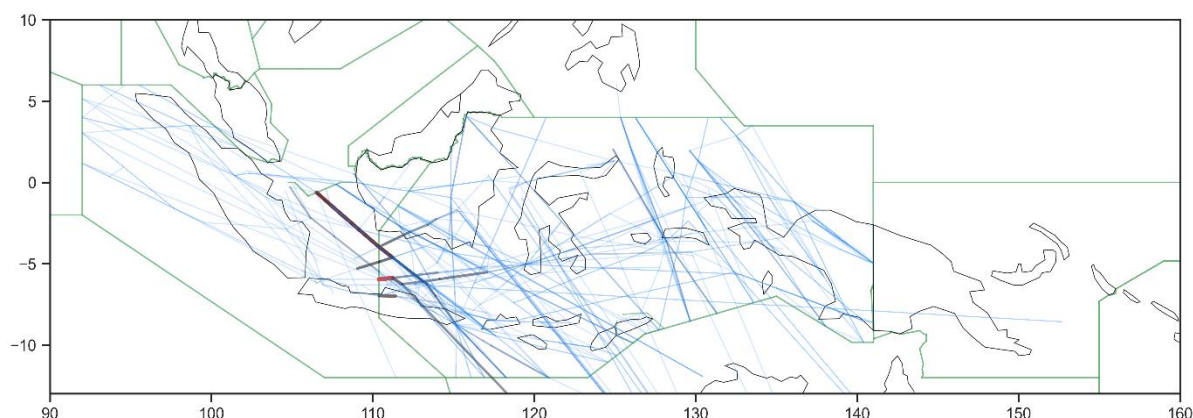
2.10 A map identifying the geographic location of LHD occurrences for the period 1 January 2023 to 31 December 2023 is shown in **Figure 5**. The occurrences at each location are represented by a coloured circle, with the radius proportional to the total risk at that location. The map is intended to provide a means to identify and visualise risk hot spots related to RVSM operations.



**Figure 4:** Geolocation of LHDs for the Indonesian FIR for the period 1 January 2023 to 31 December 2023.



**Figure 5:** Geolocation of LHDs for the Indonesian FIR for the period 1 January 2022 to 31 December 2022.



**Figure 6:** Example of RVSM traffic in the region based on the Dec 2023 traffic sample data. Line-width, transparency and colour are proportional to traffic volumes.

### Summary and Discussion

2.11 The total risk in 2023 ( $5.35 \times 10^{-9}$ ) has increased from the value reported for the period 1 January 2022 – 31 December 2022 at 28<sup>th</sup> Meeting of the RASMAG (RASMAG/28) in August 2023 (then  $3.24 \times 10^{-9}$ ). This appears to be due to an improvement in reporting culture and a value marginally above the TLS is not of major concern and will be monitored closely in future analysis.

2.12 Almost 60% of the operational risk was presented by 36 Category E LHDs (ATC coordination error as a result of human factor issues). All involved aircraft flying on 2-way routes, and they reported an average of 2.9 flight levels crossed and 1.2 minutes in duration.

2.13 In the period 1 January 2023—31 December 2023, the number of LHDs with Aircrew/Pilot attribution, 13, was almost 10% of the number of LHDs with ATC attribution, at 111.

## **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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