2025 Asia Pacific Consolidated Safety Report

Thirty-First Meeting of the Regional Airspace Safety Monitoring Advisory Group

(RASMAG/31)

Bangkok, Thailand 30 June –3 July 2026

Prepared by APAC RMAs and EMAs

Attachment A

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Background

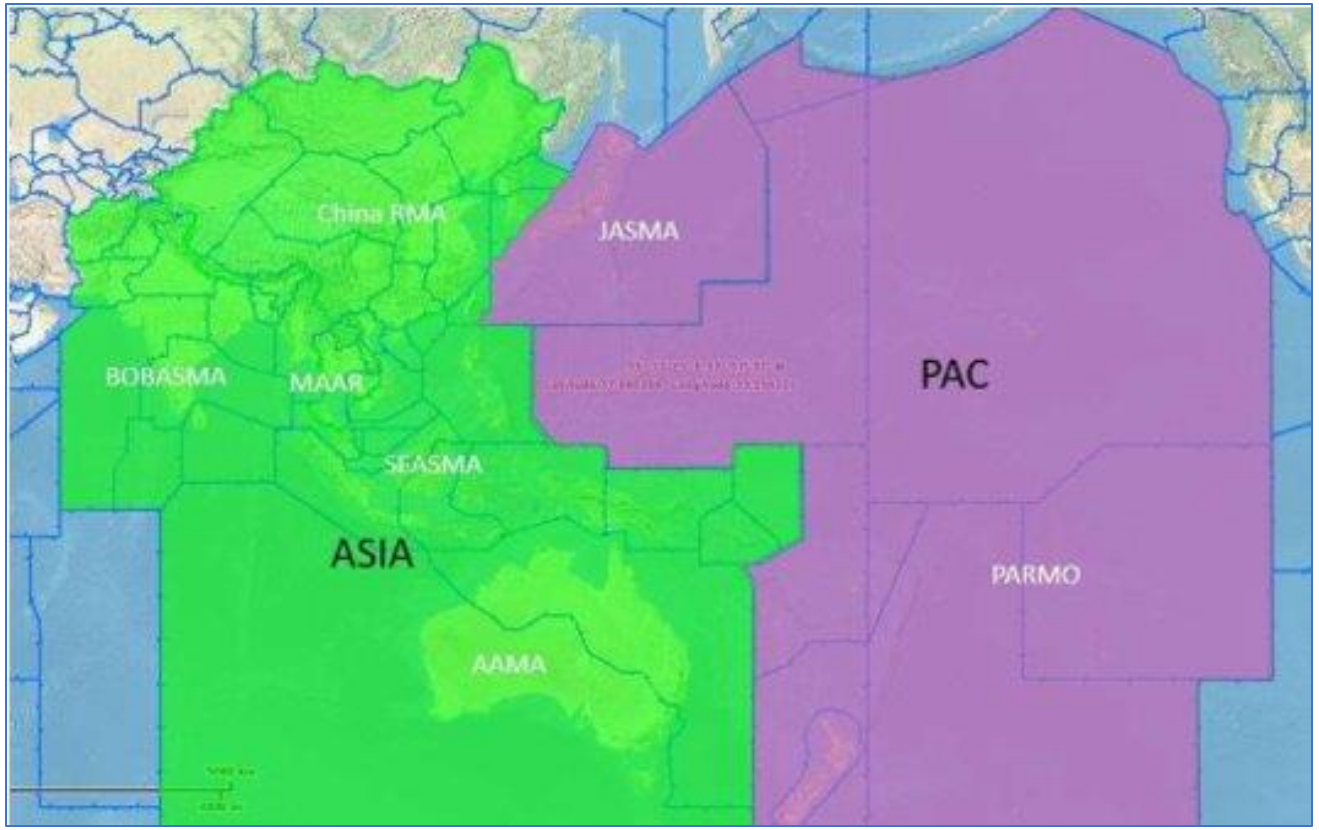
The Asia Pacific Consolidated Safety Report
is produced by APAC monitoring agencies to deliver a comprehensive overview of airspace safety risks in the Asia Pacific region.

This report is derived from the annual analysis of airspace risk conducted by each monitoring agencies bases on:

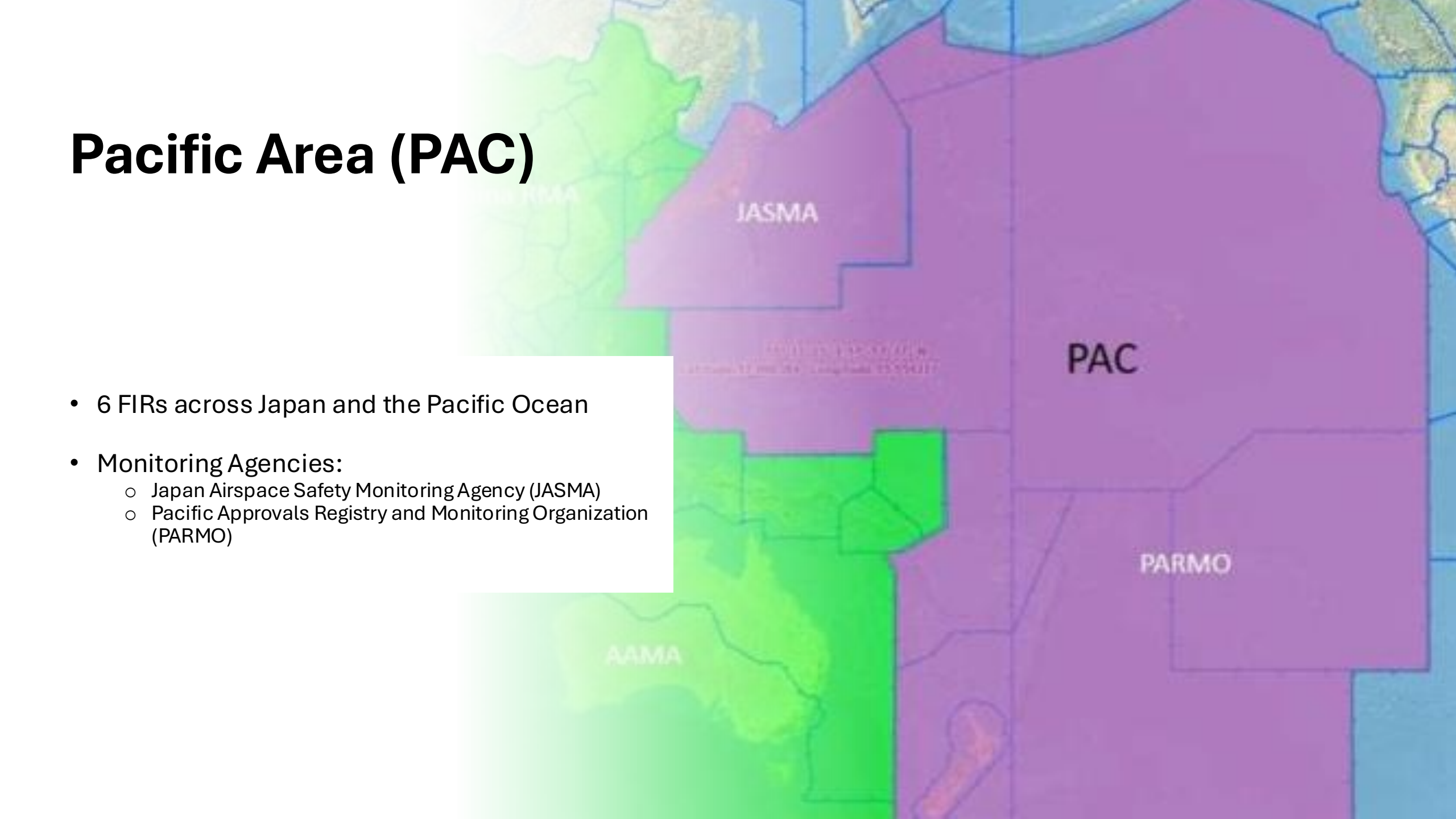
- Traffic Sample Data (TSD) collected in December 2025
- Large Height Deviations (LHDs), Large Longitudinal Errors (LLEs), and Large Lateral Deviations (LLDs) collected throughout 2025.

The report covers two areas:

- Pacific (PAC) Area | 6 FIRs, 2 monitoring agencies
- Asia Area | 37 FIRs, 5 monitoring agencies

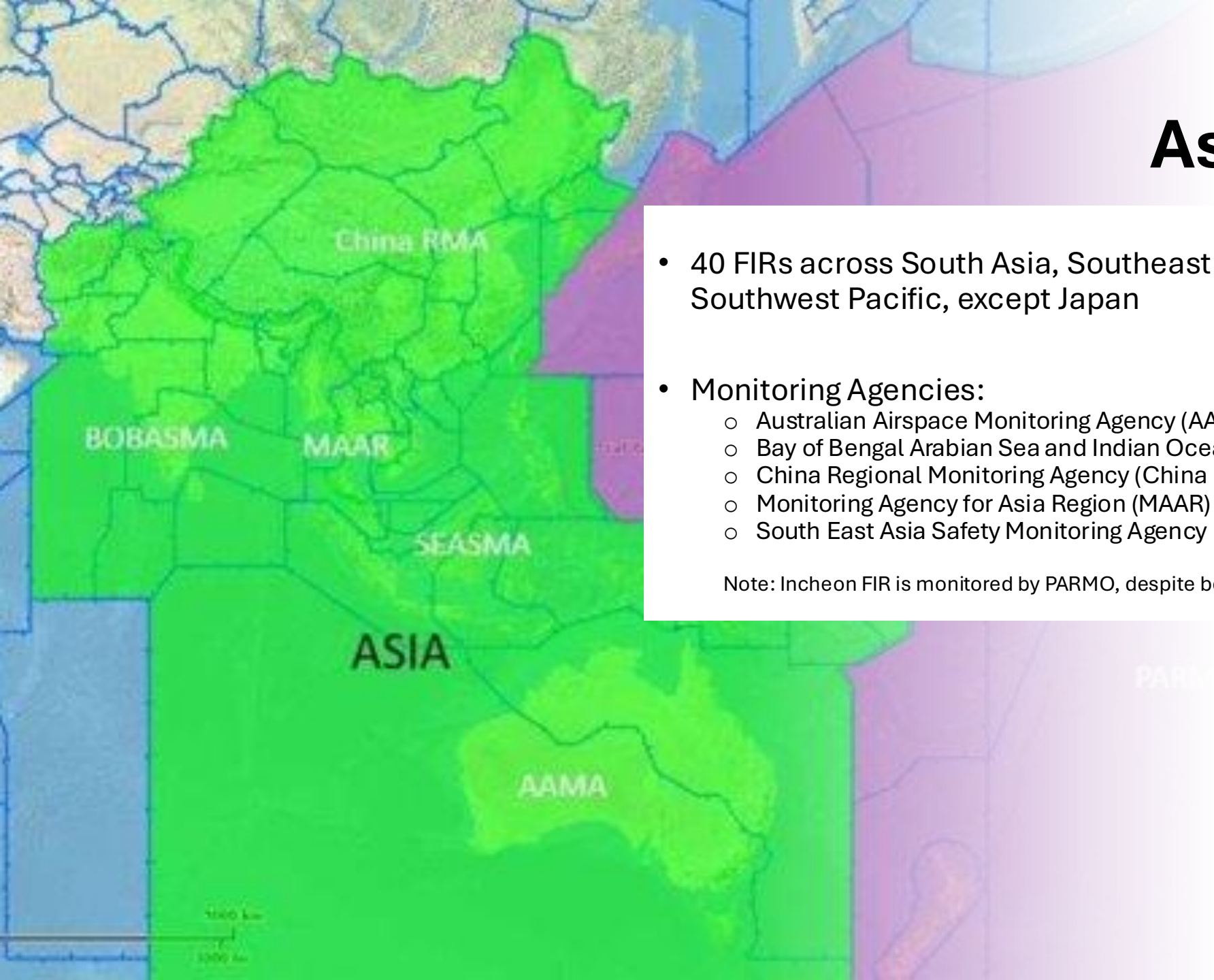


Pacific Area (PAC)



- 6 FIRs across Japan and the Pacific Ocean
- Monitoring Agencies:
  - Japan Airspace Safety Monitoring Agency (JASMA)
  - Pacific Approvals Registry and Monitoring Organization (PARMO)

Asia Area (Asia)



- 40 FIRs across South Asia, Southeast Asia, East Asia and Southwest Pacific, except Japan

- Monitoring Agencies:
  - Australian Airspace Monitoring Agency (AAMA)
  - Bay of Bengal Arabian Sea and Indian Ocean Safety Monitoring Agency (BOBASMA)
  - China Regional Monitoring Agency (China RMA)
  - Monitoring Agency for Asia Region (MAAR)
  - South East Asia Safety Monitoring Agency (SEASMA)

  Note: Incheon FIR is monitored by PARMO, despite being geographically located in East Asia

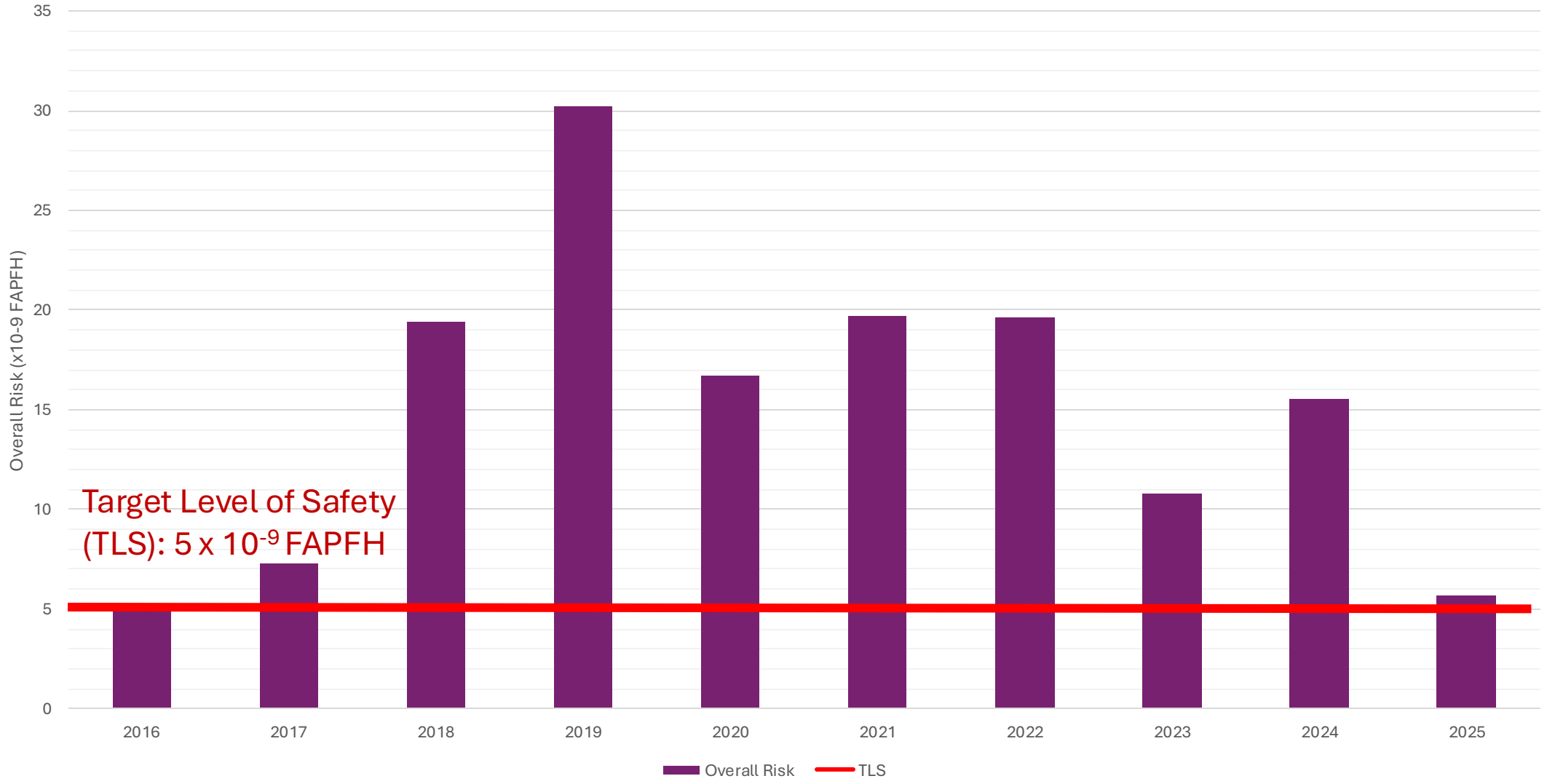
PAC : Vertical Collision Risk

PAC: Vertical Collision Risk Estimates

Annual flying hours: 3,840,508 hours/year

Risk Estimates		Remark
Vertical Technical Risk	0.22×10^{-9} FAPFH	Below Technical TLS
Vertical Operational Risk	5.45×10^{-9} FAPFH	
Vertical Overall Risk	5.67×10^{-9} FAPFH	Above TLS

PAC: Vertical Collision Risk Estimates



PAC: Summary of LHDs

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Number of Levels Crossed
Aircrew/ Pilot	A	Flight crew failing to climb/descend the aircraft as cleared	12	26.5	3
	B	Flight crew climbing/descending without ATC Clearance	14	21.8	3
	C	Incorrect operation or interpretation of airborne equipment	2	8	0
ATC	D	ATC system loop error	7	11	5
	E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues	70	166.3	5
	F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues	1	64	0

PAC: Summary of LHDs

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Number of Levels Crossed
Aircraft/ Avionics/ Contingencies	G	Aircraft contingency event leading to sudden inability to maintain assigned flight level	3	9	13
	H	Airborne equipment failure leading to unintentional or undetected change of flight level	3	0.5	0
Weather/ Turbulence	I	Turbulence or other weather-related causes leading to unintentional or undetected change of flight level	23	65	4
TCAS	J	TCAS resolution advisory, flight crew correctly climb or descend following the resolution advisory	12	11	0
	K	TCAS resolution advisory, flight crew incorrectly climb or descend following the resolution advisory	0	0	0
Other	L	An aircraft being provided with RVSM separation is not RVSM approved	0	0	0
	M	Other	0	0	0
		Total	**147**	**383.1**	**33**

PAC : Horizontal Collision Risk

PAC: Horizontal Collision Risk Estimates

Annual flying hours: 2,111,212 hours/year

2024 Horizontal Risk Estimates		Remark
Total Lateral Risk	1.22×10^{-9} FAPFH	Below TLS
Total Longitudinal Risk	0.01×10^{-9} FAPFH	Below TLS
2025 Horizontal Risk Estimates		**Remark**
Total Lateral Risk	0.68×10^{-9} FAPFH	Below TLS
Total Longitudinal Risk	0.02×10^{-9} FAPFH	Below TLS

PAC: Summary of LLDs and LLEs

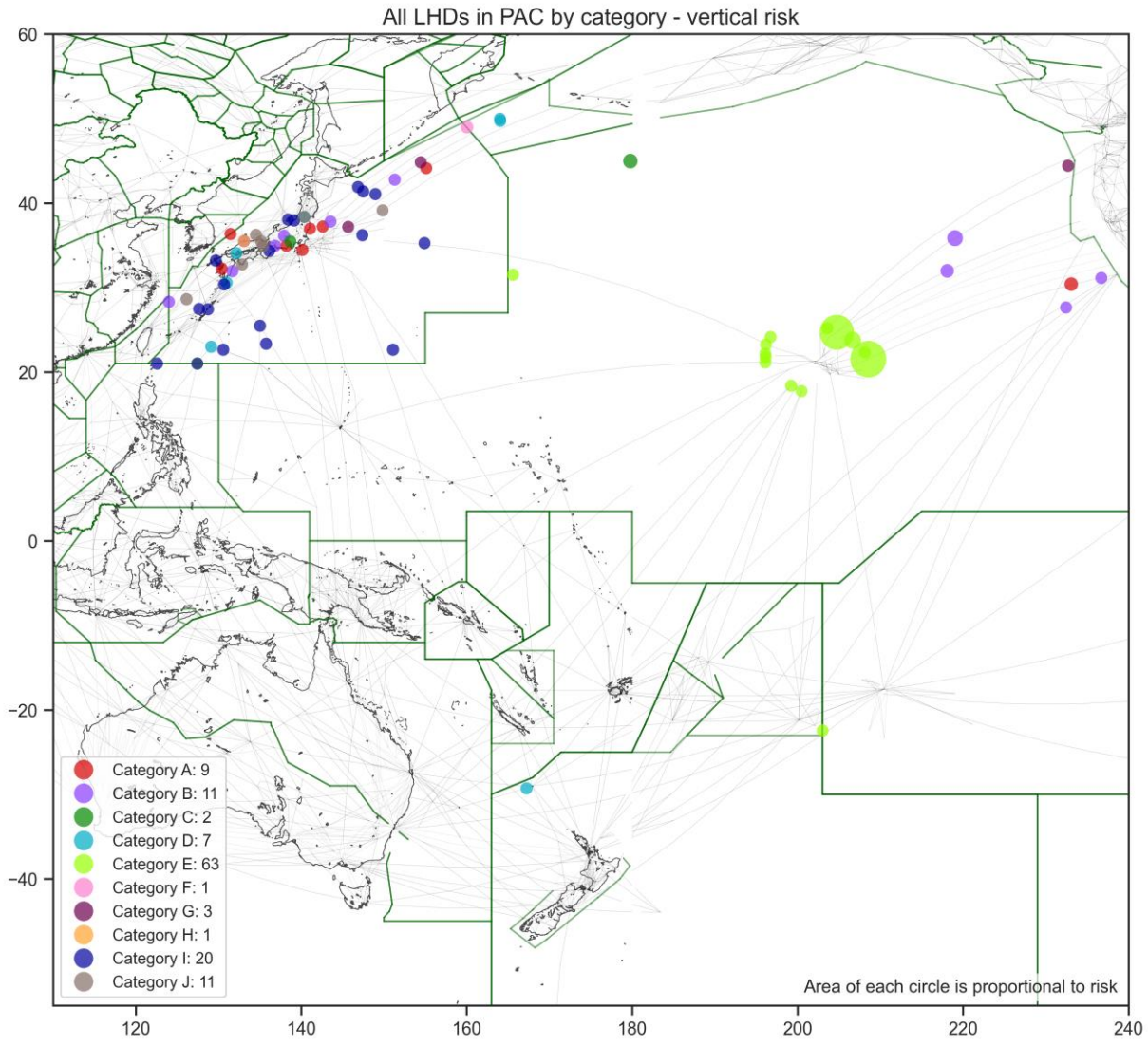
Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Horizontal Deviation (NM)
Aircrew/ Pilot	A	Flight crew deviate without ATC Clearance	21	122	528
	B	Incorrect estimate or route provided due to incorrect operation or interpretation of airborne equipment	19	38	106
	C	Flight crew waypoint insertion error, due to correct entry of incorrect position or incorrect entry of correct position	9	63	302
ATC	D	ATC system loop error	5	9	90
	E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues	155	220.5	207
	F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues	1	64	0

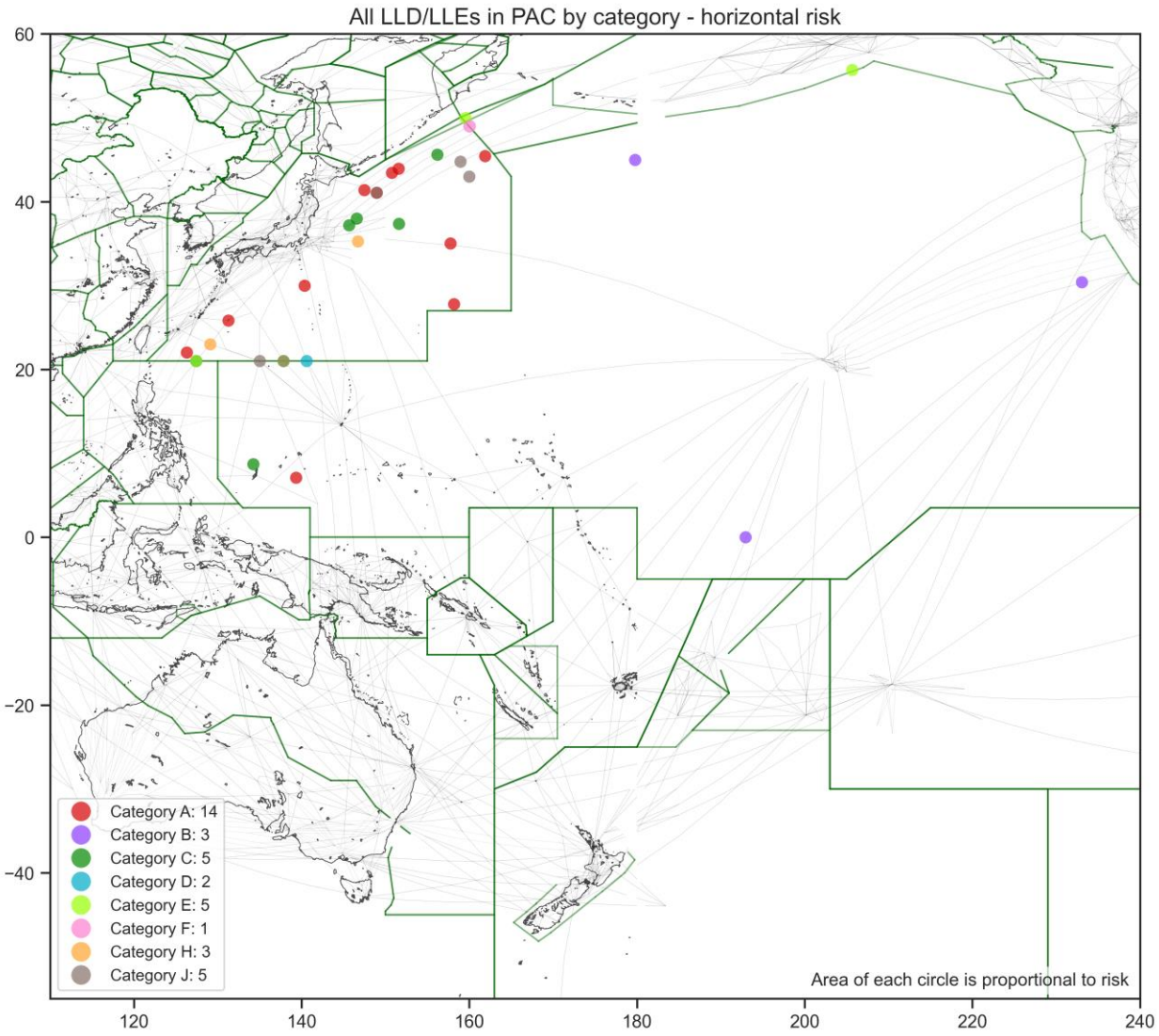
PAC: Summary of LLDs and LLEs

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Horizontal Deviation (NM)
Aircraft/ Avionics/ Contingencies	G	Navigation errors due to airborne equipment failure	2	18	0
Weather/ Turbulence	H	Turbulence or other weather-related causes leading to a deviation in the horizontal dimension	3	6	45
Other	I	An aircraft was provided with reduced horizontal separation minima but did not meet the RNP/RSP/RCP specification	0	0	0
	J	Other	6	62	325
		Total	**221**	**602.5**	**1603**

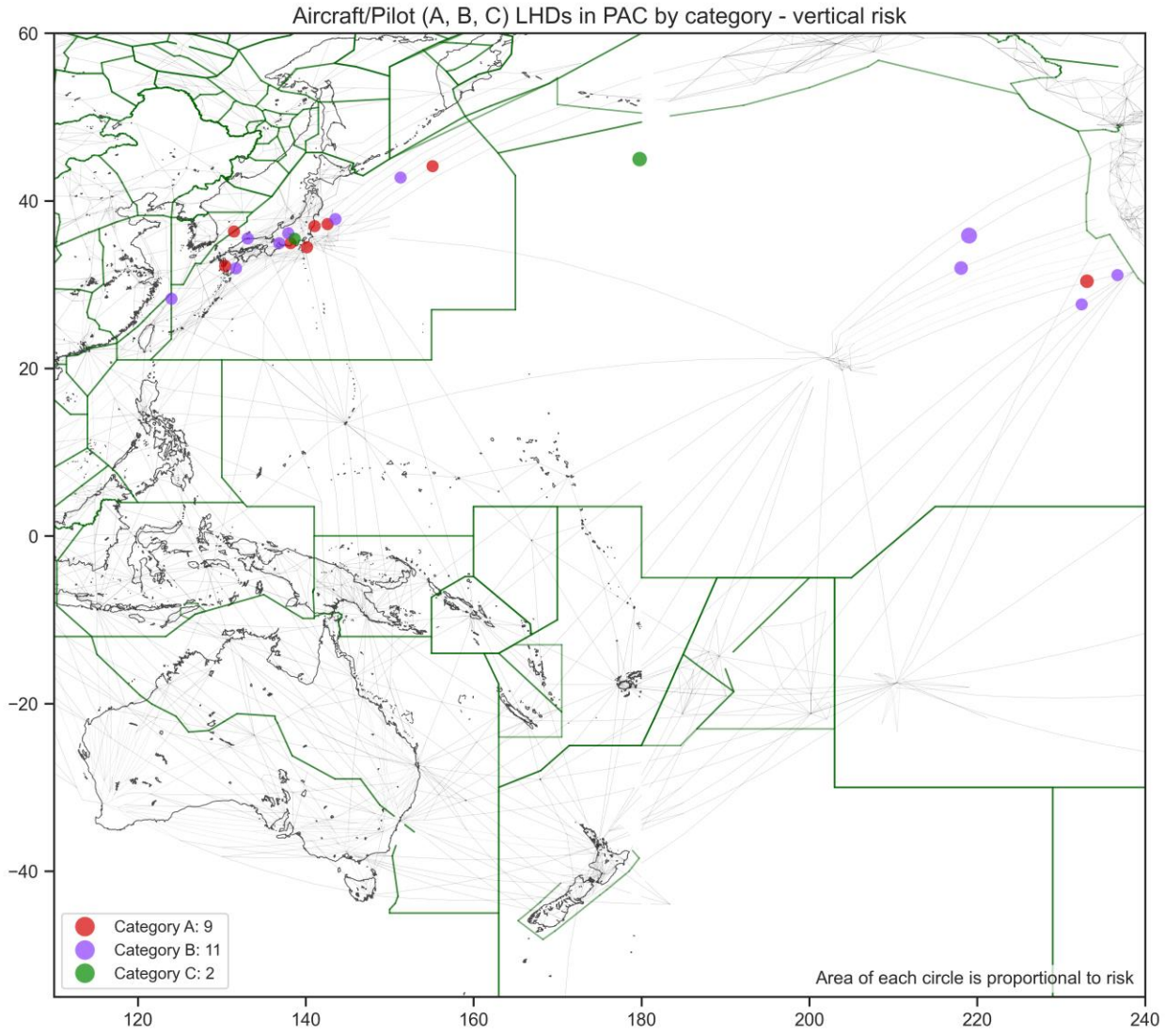
PAC : Geolocation of LHDs/LLDs/LLEs

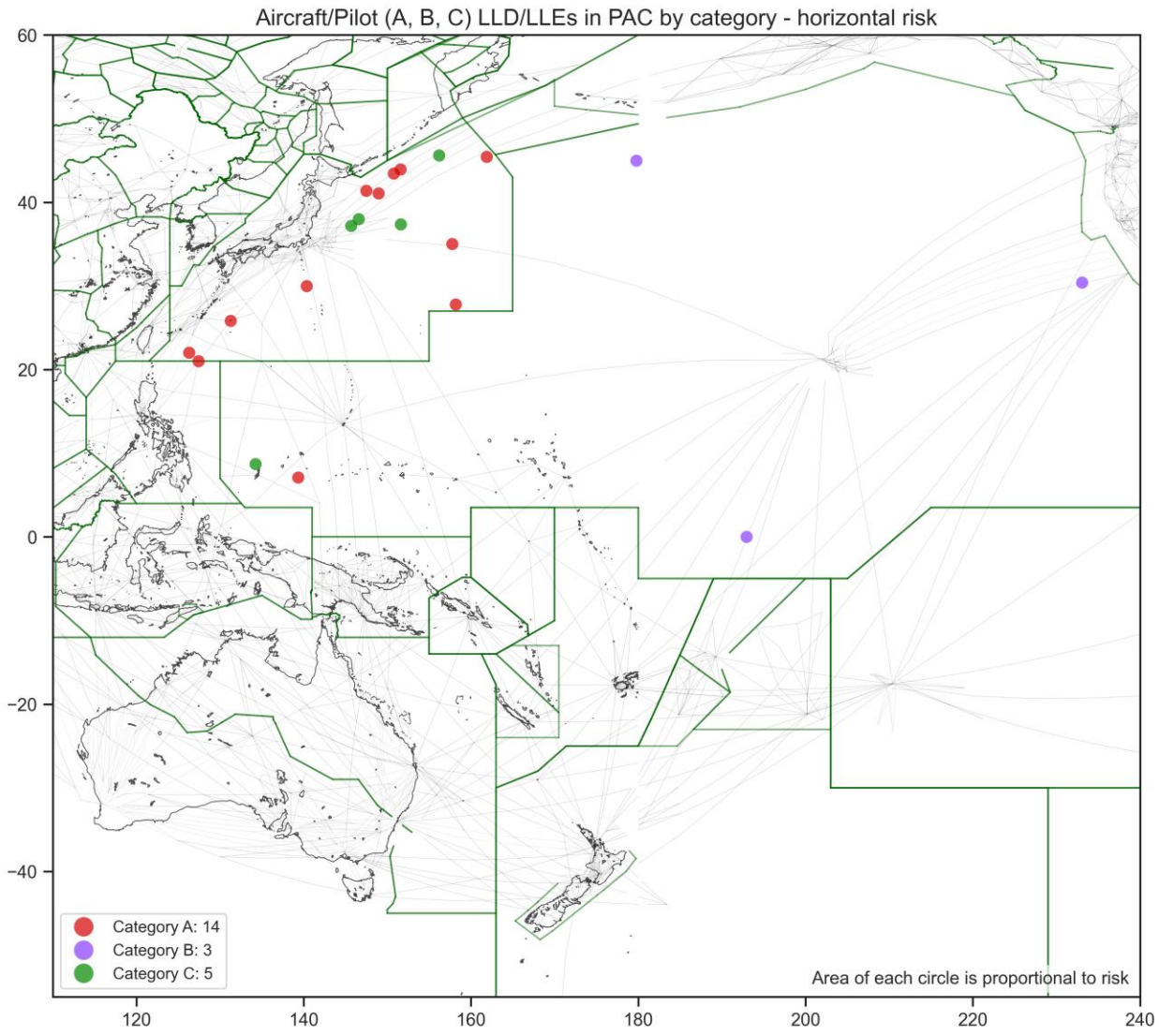
PAC: All Categories



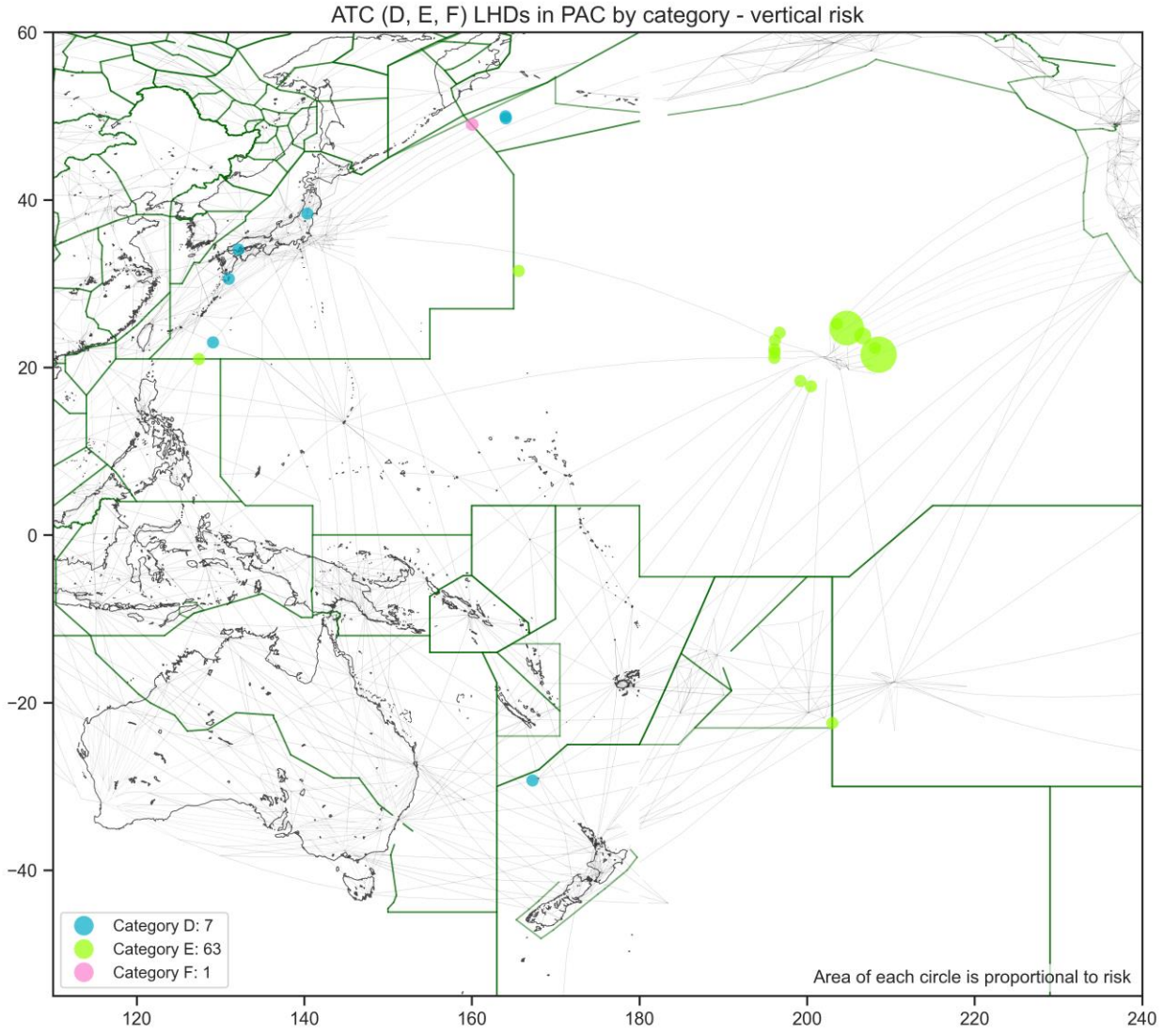


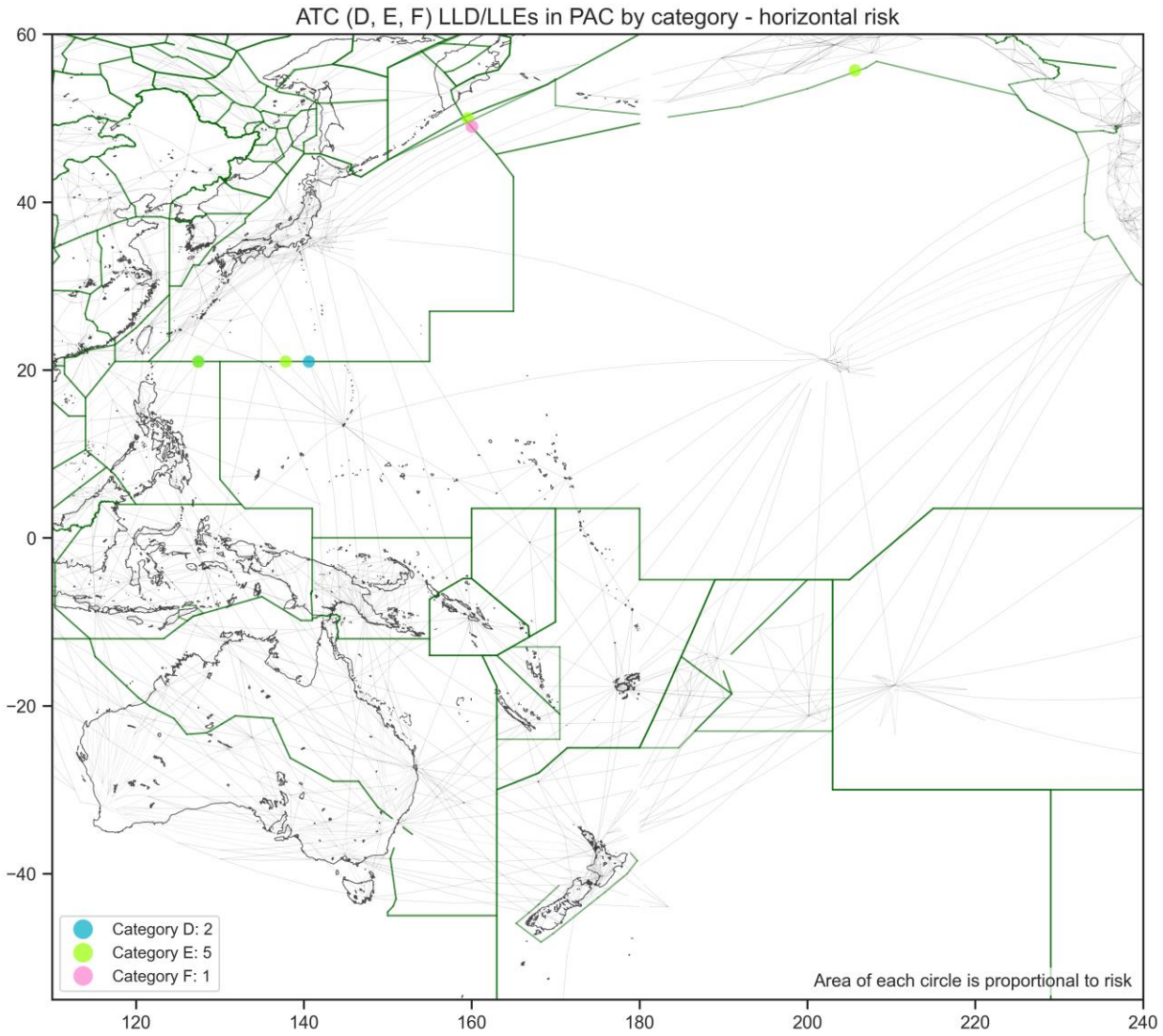
PAC: Aircrew/Pilot (A, B, C)





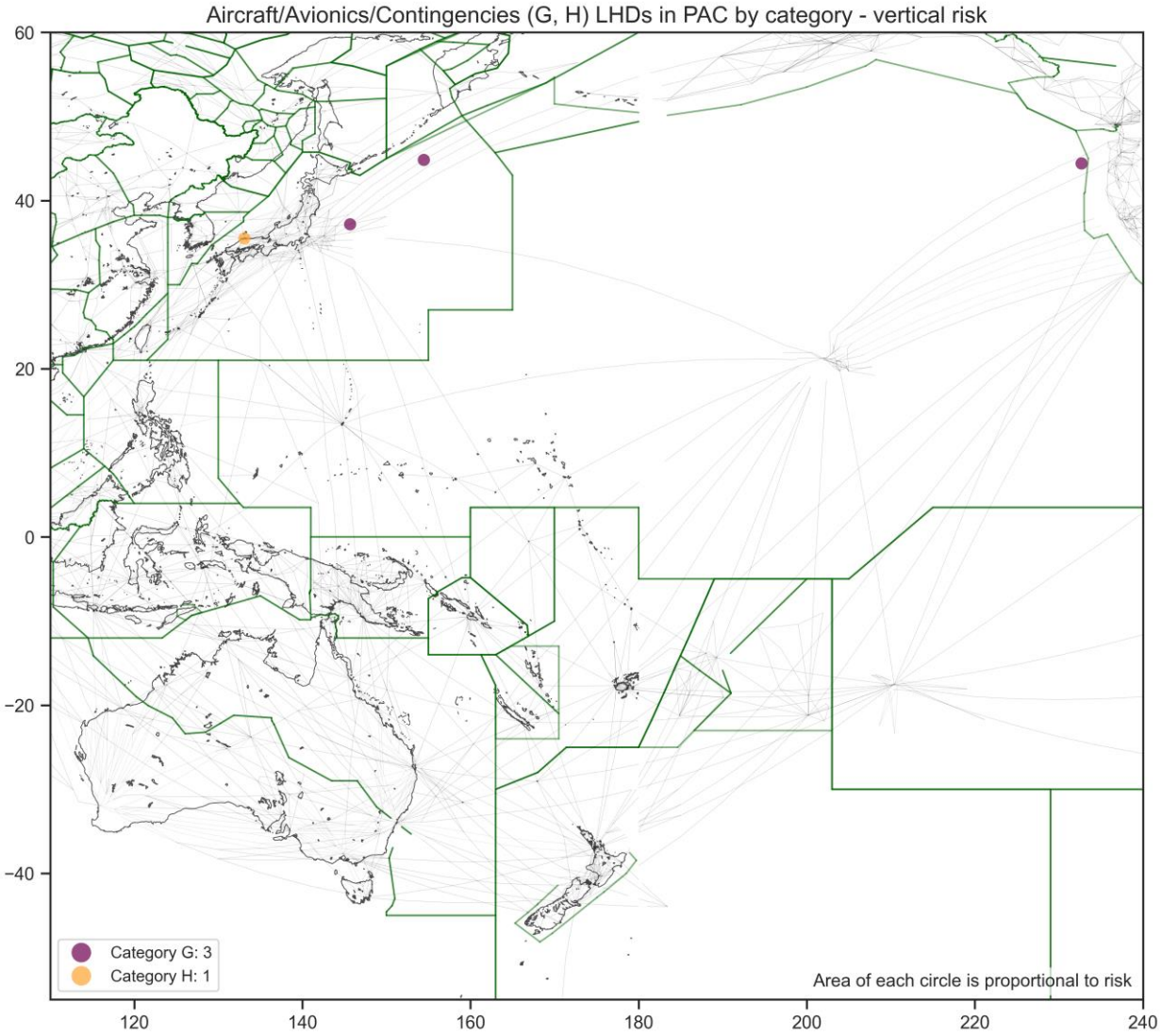
PAC: ATC (D, E, F)

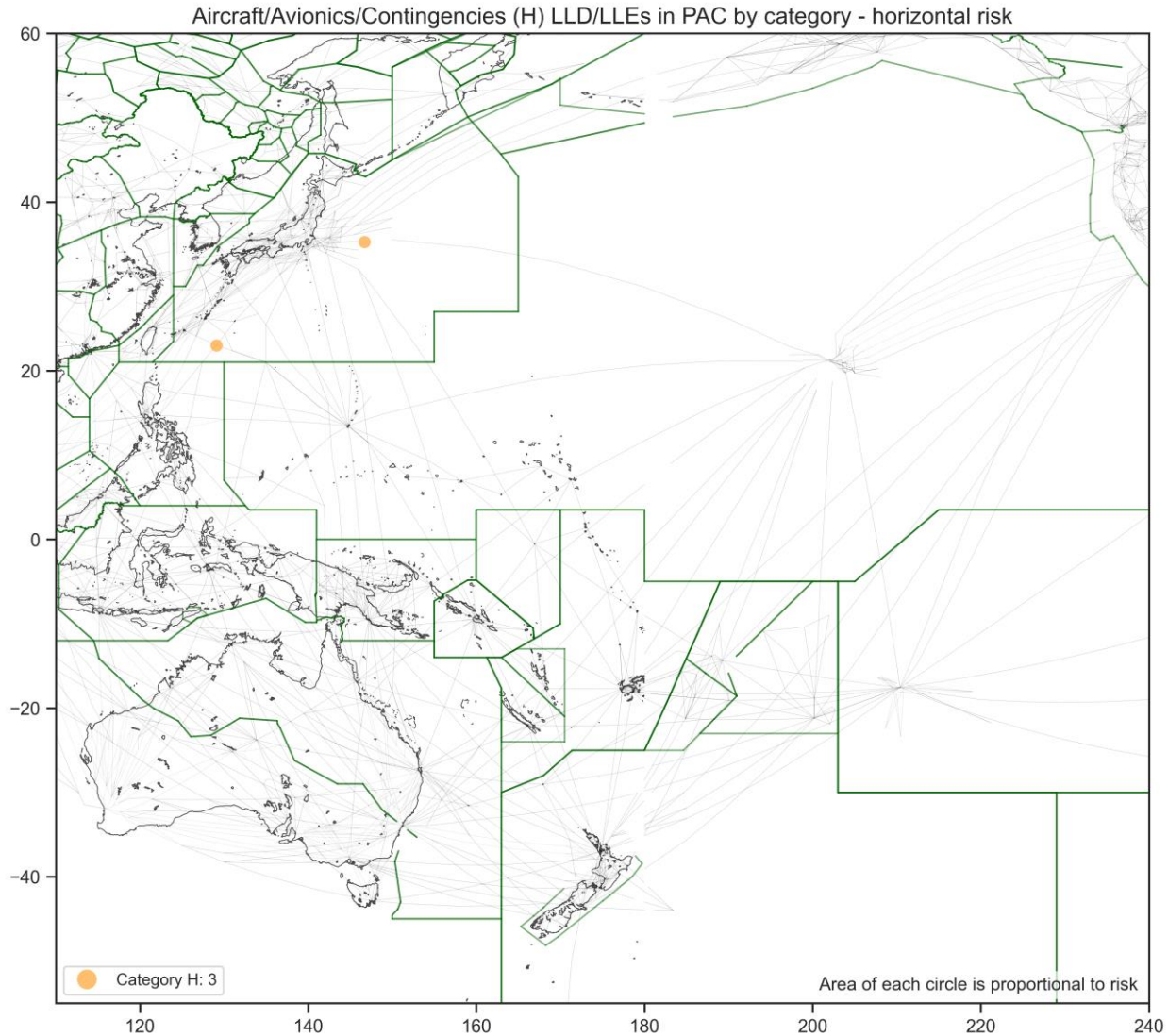

ATC (D, E, F) LHDs in PAC by category - vertical risk
60
40
20
0
−20
−40
120
140
160
180
200
220
240
Category D: 7
Category E: 63
Category F: 1
Area of each circle is proportional to risk


ATC (D, E, F) LLD/LLEs in PAC by category - horizontal risk
60
40
20
0
−20
−40
120
140
160
180
200
220
240
Category D: 2
Category E: 5
Category F: 1
Area of each circle is proportional to risk

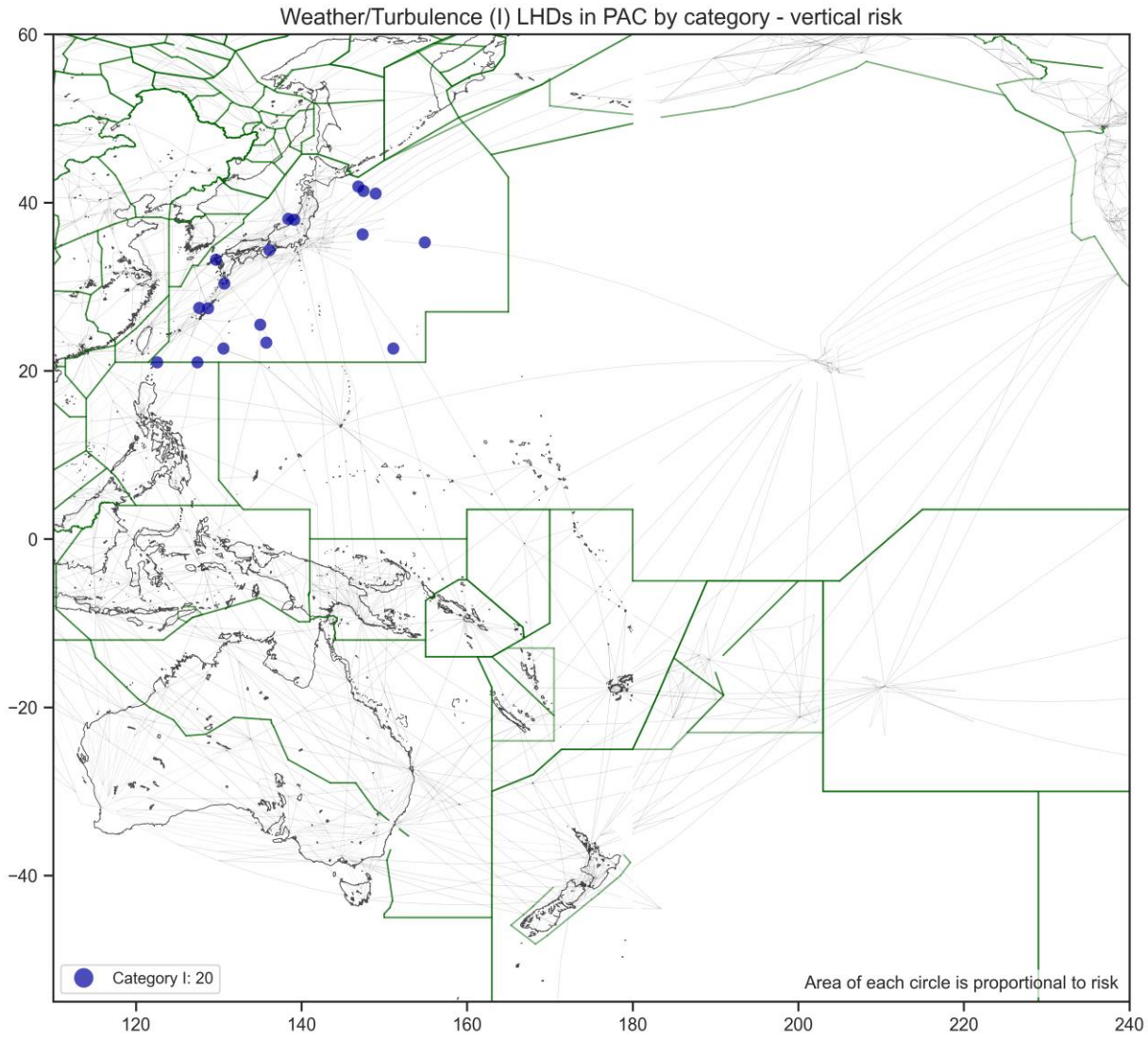
PAC: Aircraft Avionics/Contingencies

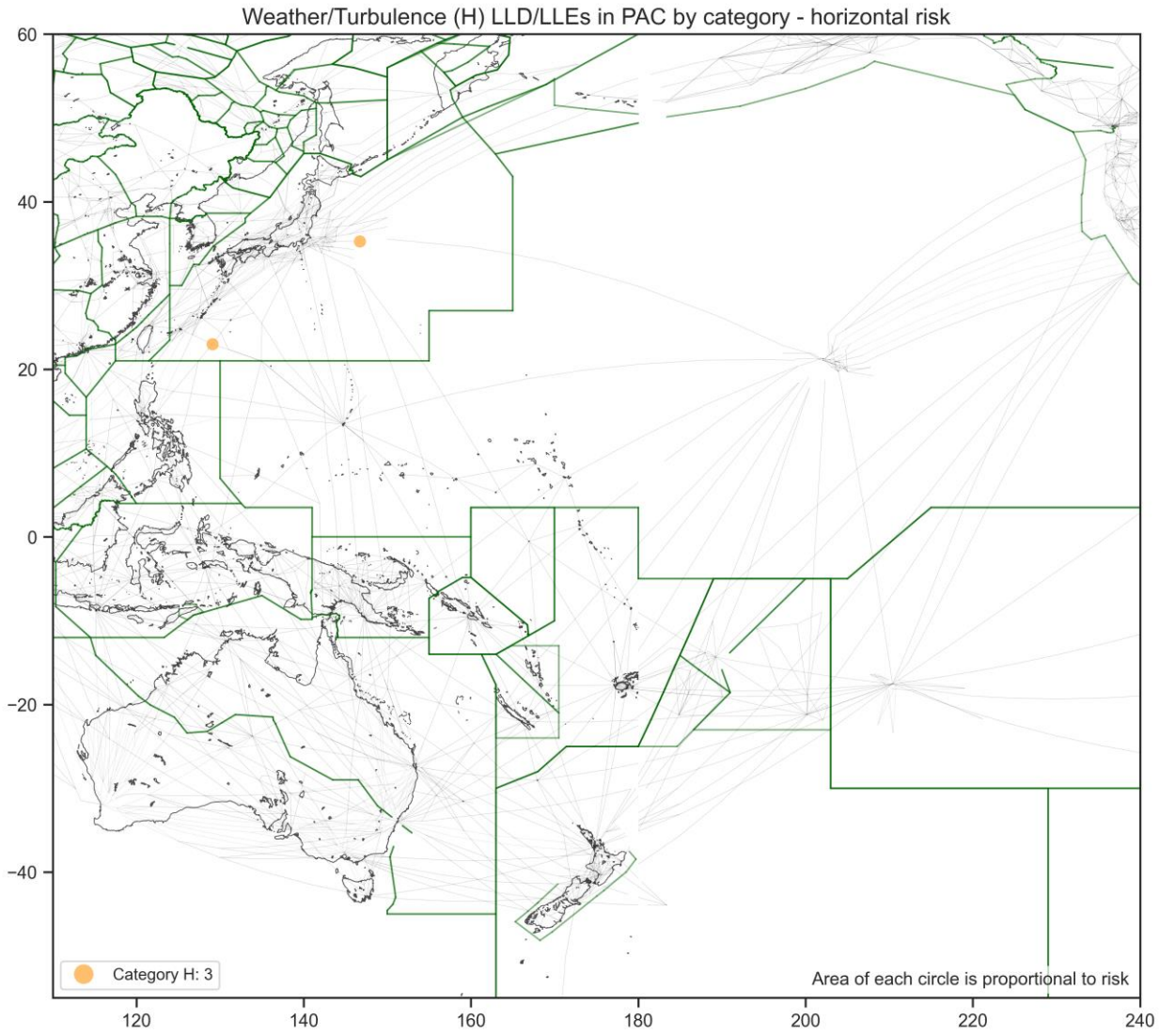
(LHD: G, H; LLD/LLE: H)



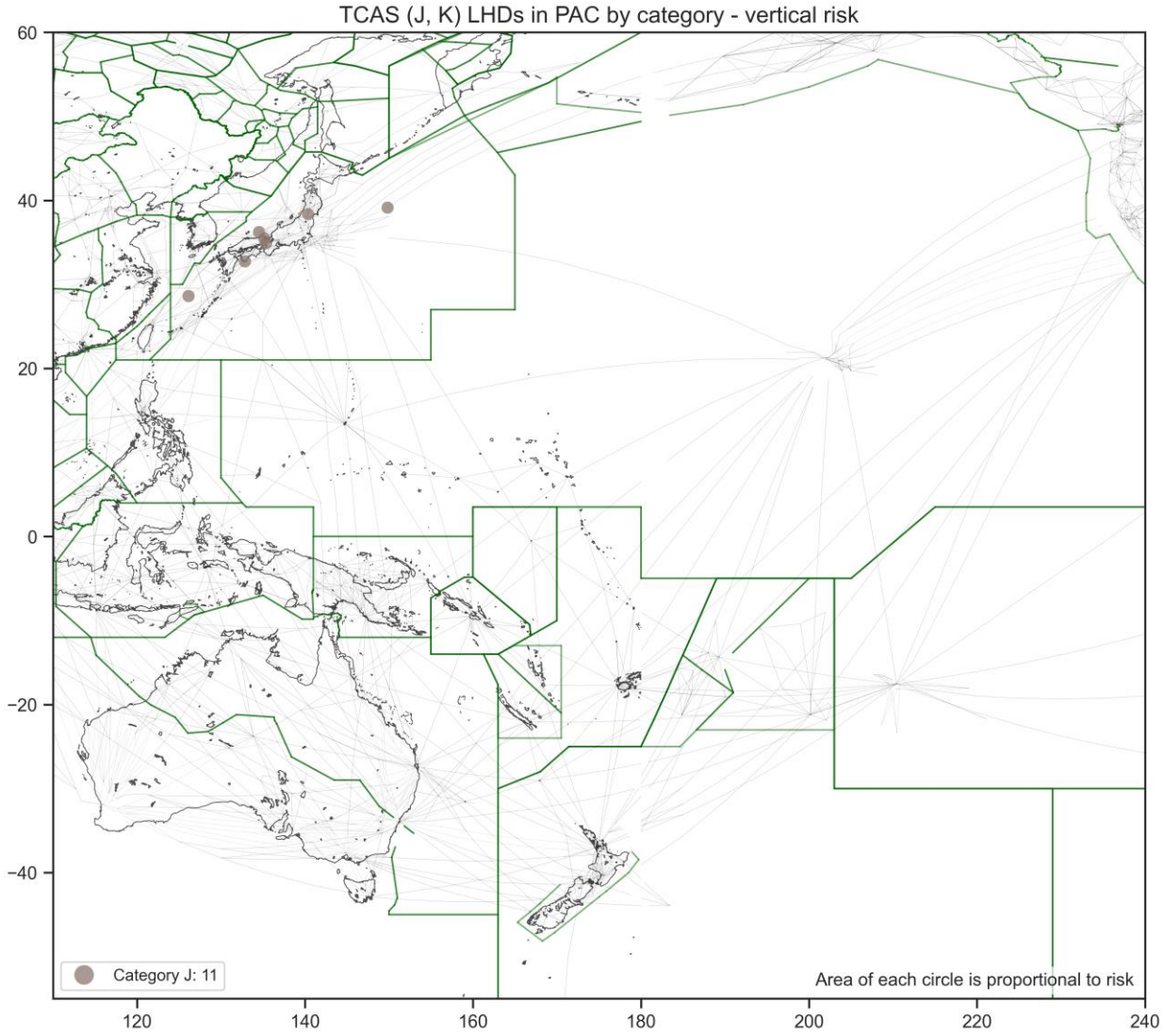


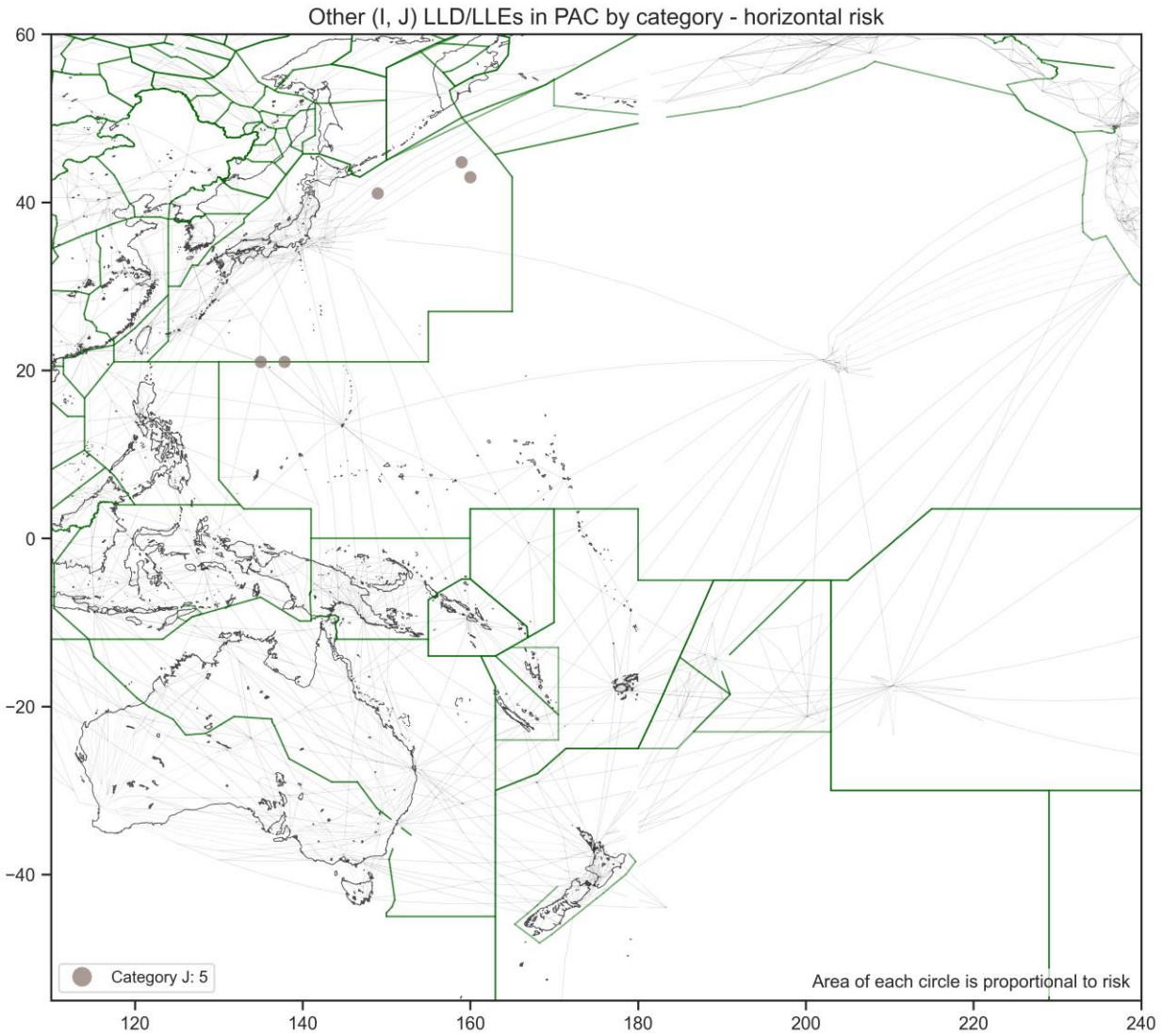
PAC: Weather/Turbulence (LHD: I; LLD/LLE: H)





PAC: TCAS (LHD: J, K; LLD/LLE: I, J)





PAC : Hot Spots

PAC: LHD Hot Spot N (Hawaii CEP/Oakland USA)

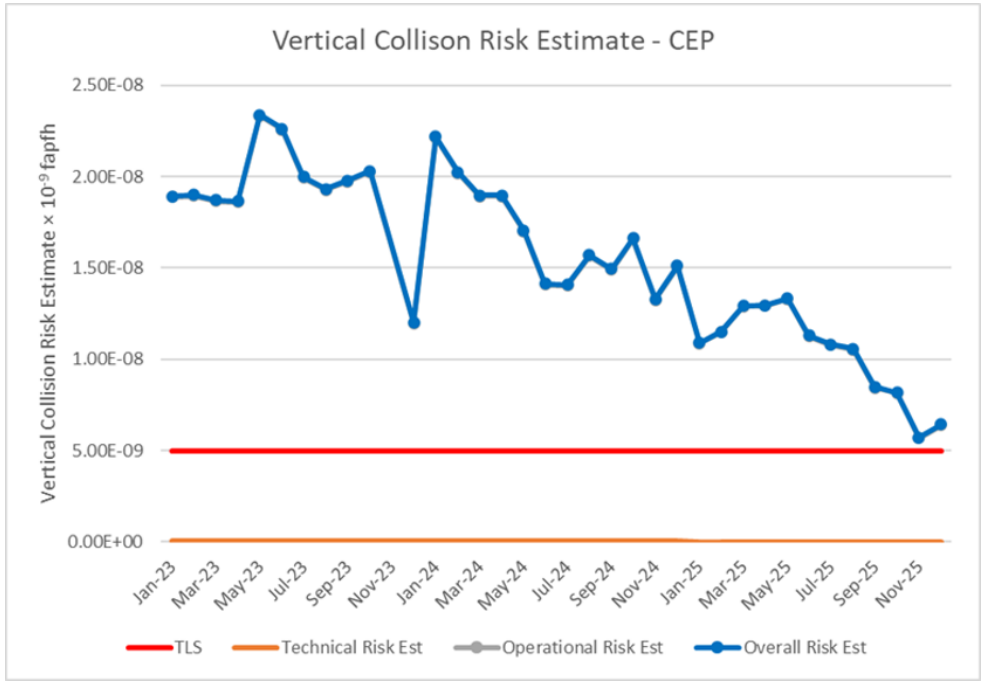
Nature of Occurrences: Coordination errors as a result of human factor issues (Category E-RI)

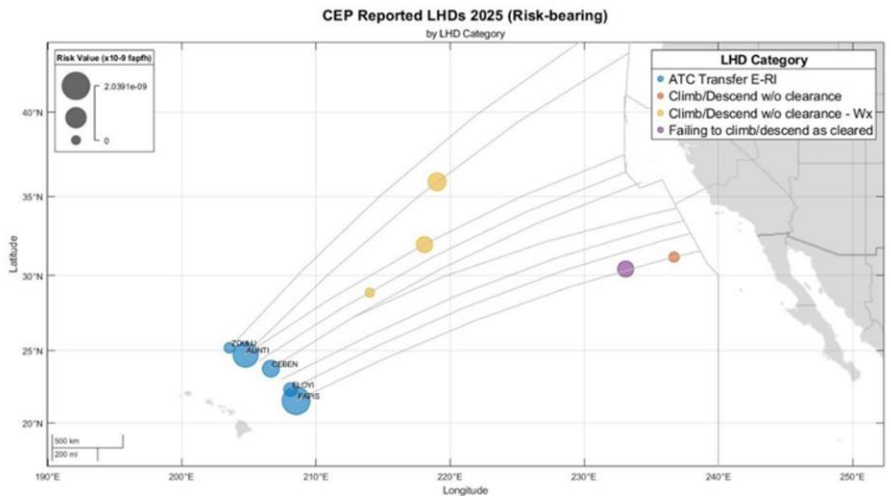
Contributing Factors: High traffic volume Central East Pacific (CEP) traffic flow and user-preferred routings that cross CEP airways

Trend:
- The number of LHDs in 2025 remained consistent with previous years.
- The operational risk decreased.

Mitigations: the data show that air traffic procedures, ATC intervention, and established mitigation strategies are working; the measured safety performance is improving despite the same level of reported LHDs.

Result from the hot spot identification process: **Hot Spot N remains on the hot spot list** and should continue to be monitored until the LHDs and risk are decreased and further safety improvement initiatives are implemented.





ASIA : Vertical Collision Risk

ASIA: Vertical Collision Risk Estimates

Annual flying hours: 11,115,453 hours/year

Vertical Risk Estimates		Remark
Vertical Technical Risk	0.84×10^{-9} FAPFH	Below Technical TLS
Vertical Operational Risk	0.71×10^{-9} FAPFH	
Vertical Overall Risk	1.55×10^{-9} FAPFH	Below TLS

ASIA: Vertical Collision Risk Estimates

ASIA: Summary of LHDs

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Number of Levels Crossed
Aircrew/ Pilot	A	Flight crew failing to climb/descend the aircraft as cleared	27	35	37.5
	B	Flight crew climbing/descending without ATC Clearance	27	32.5	36.6
	C	Incorrect operation or interpretation of airborne equipment	24	5	6
ATC	D	ATC system loop error	34	26.5	19.1
	E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues	458	85.5	7.3
	F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues	12	4	0

ASIA: Summary of LHDs

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Number of Levels Crossed
Aircraft/ Avionics/ Contingencies	G	Aircraft contingency event leading to sudden inability to maintain assigned flight level	7	7	10
	H	Airborne equipment failure leading to unintentional or undetected change of flight level	5	12	4
Weather/ Turbulence	I	Turbulence or other weather-related causes leading to unintentional or undetected change of flight level	103	15.4	115.3
TCAS	J	TCAS resolution advisory, flight crew correctly climb or descend following the resolution advisory	22	2	16
	K	TCAS resolution advisory, flight crew incorrectly climb or descend following the resolution advisory	0	0	0
Other	L	An aircraft being provided with RVSM separation is not RVSM approved	0	0	0
	M	Other	94	159.2	1
		Total	**813**	**384.1**	**252.8**

ASIA : Horizontal Collision Risk

ASIA : Horizontal Collision Risk Estimates

Annual flying hours: 672,493 hours/year

2024 Horizontal Risk Estimates		Remark
Total Lateral Risk	1.54×10^{-9} FAPFH	Below TLS
Total Longitudinal Risk	1.62×10^{-9} FAPFH	Below TLS
2025 Horizontal Risk Estimates		**Remark**
Total Lateral Risk	1.26×10^{-9} FAPFH	Below TLS
Total Longitudinal Risk	1.45×10^{-9} FAPFH	Below TLS

ASIA : Summary of LLDs and LLEs

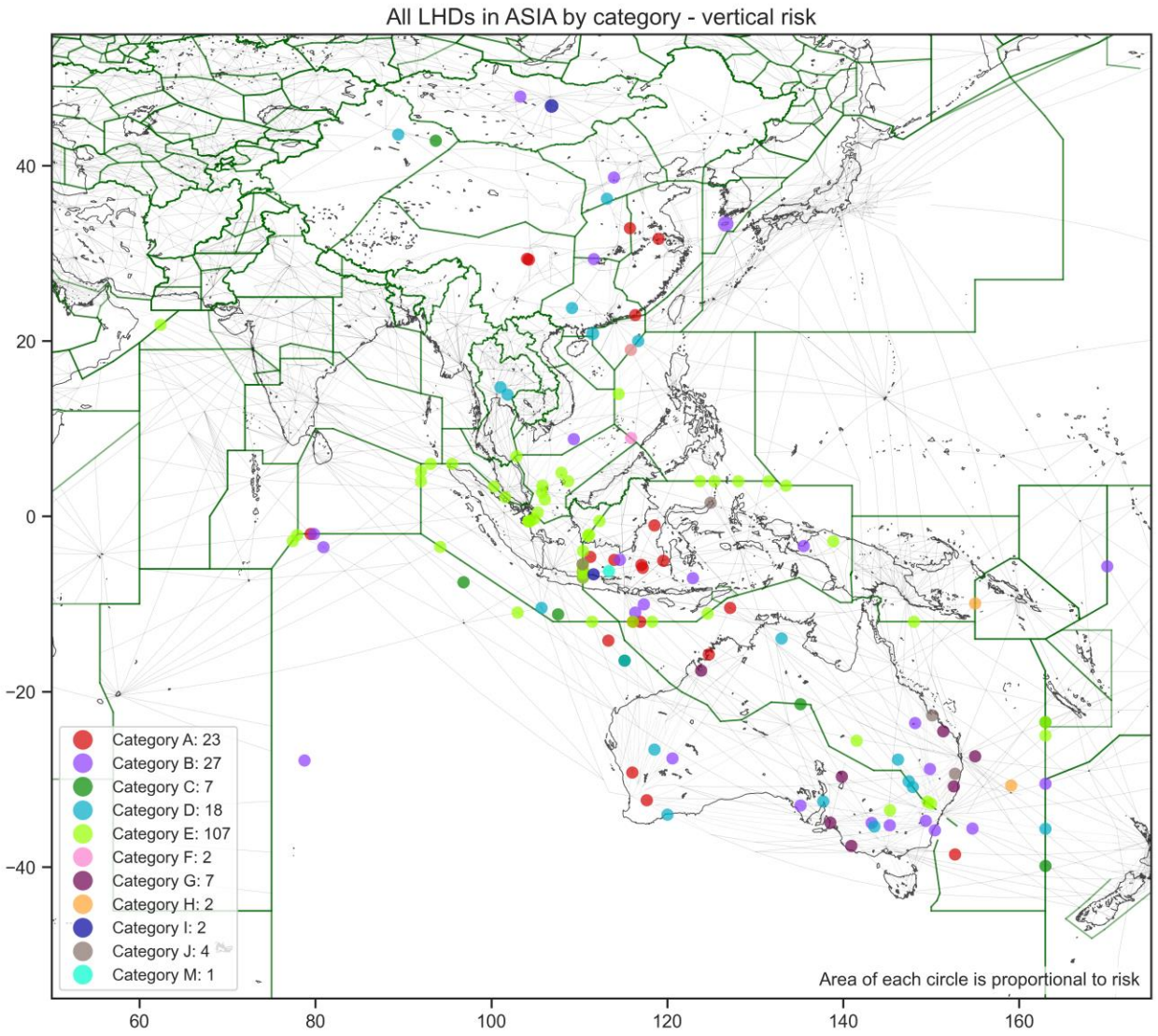
Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Horizontal Deviation (NM)
Aircrew/ Pilot	A	Flight crew deviate without ATC Clearance	4	0	67
	B	Incorrect estimate or route provided due to incorrect operation or interpretation of airborne equipment	1	0	20
	C	Flight crew waypoint insertion error, due to correct entry of incorrect position or incorrect entry of correct position	0	0	0
ATC	D	ATC system loop error	0	0	0
	E	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of human factors issues	2	0	10
	F	Coordination errors in the ATC-to-ATC transfer of control responsibility as a result of equipment outage or technical issues	0	0	0

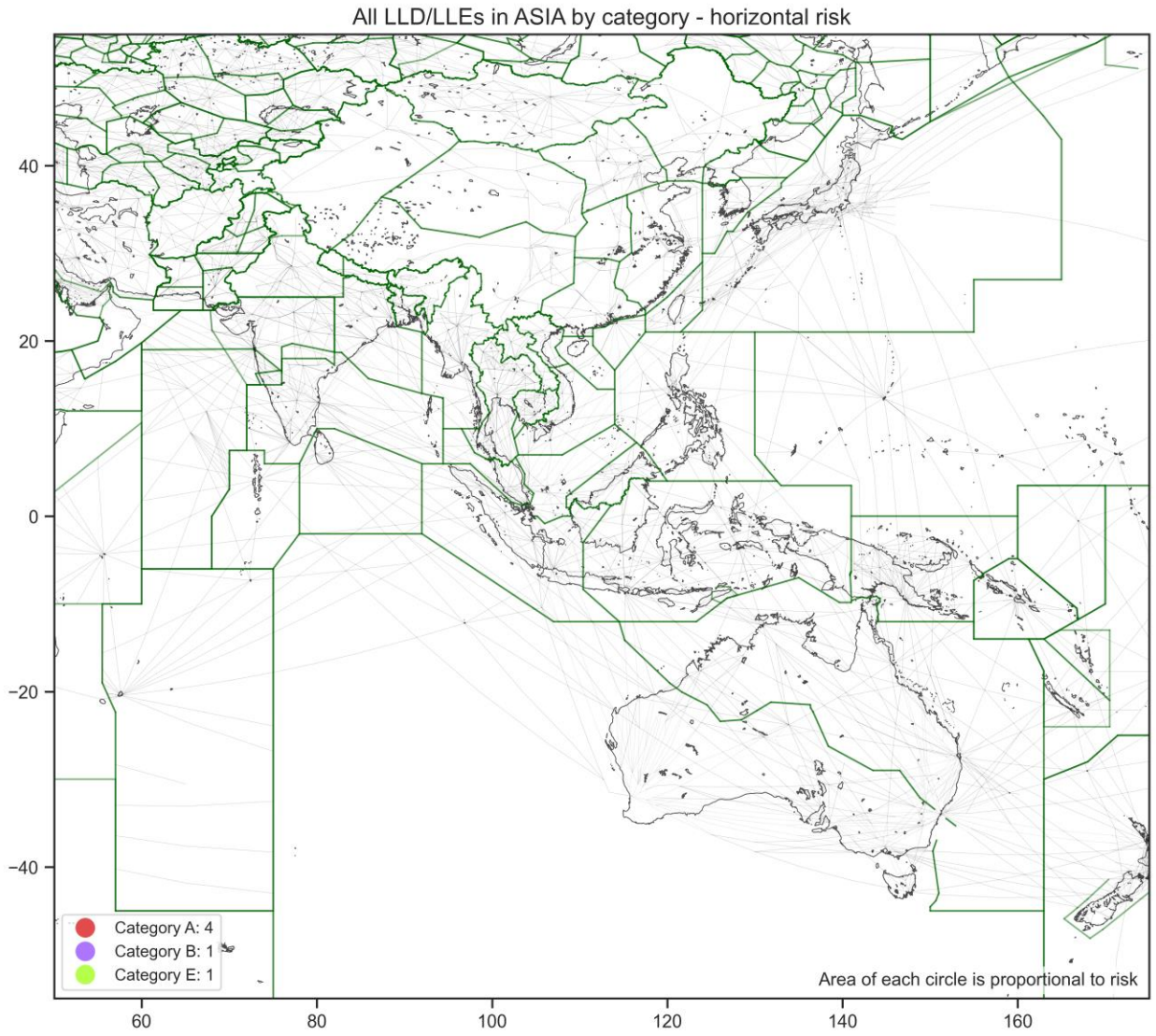
ASIA : Summary of LLDs and LLEs

Attributions	Category Code	Description	Number of Occurrences	Duration (minutes)	Horizontal Deviation (NM)
Aircraft/ Avionics/ Contingencies	G	Navigation errors due to airborne equipment failure	0	0	0
Weather/ Turbulence	H	Turbulence or other weather-related causes leading to a deviation in the horizontal dimension	0	0	0
Other	I	An aircraft was provided with reduced horizontal separation minima but did not meet the RNP/RSP/RCP specification;	0	0	0
	J	Other	0	0	0
		Total	**7**	**0**	**97**

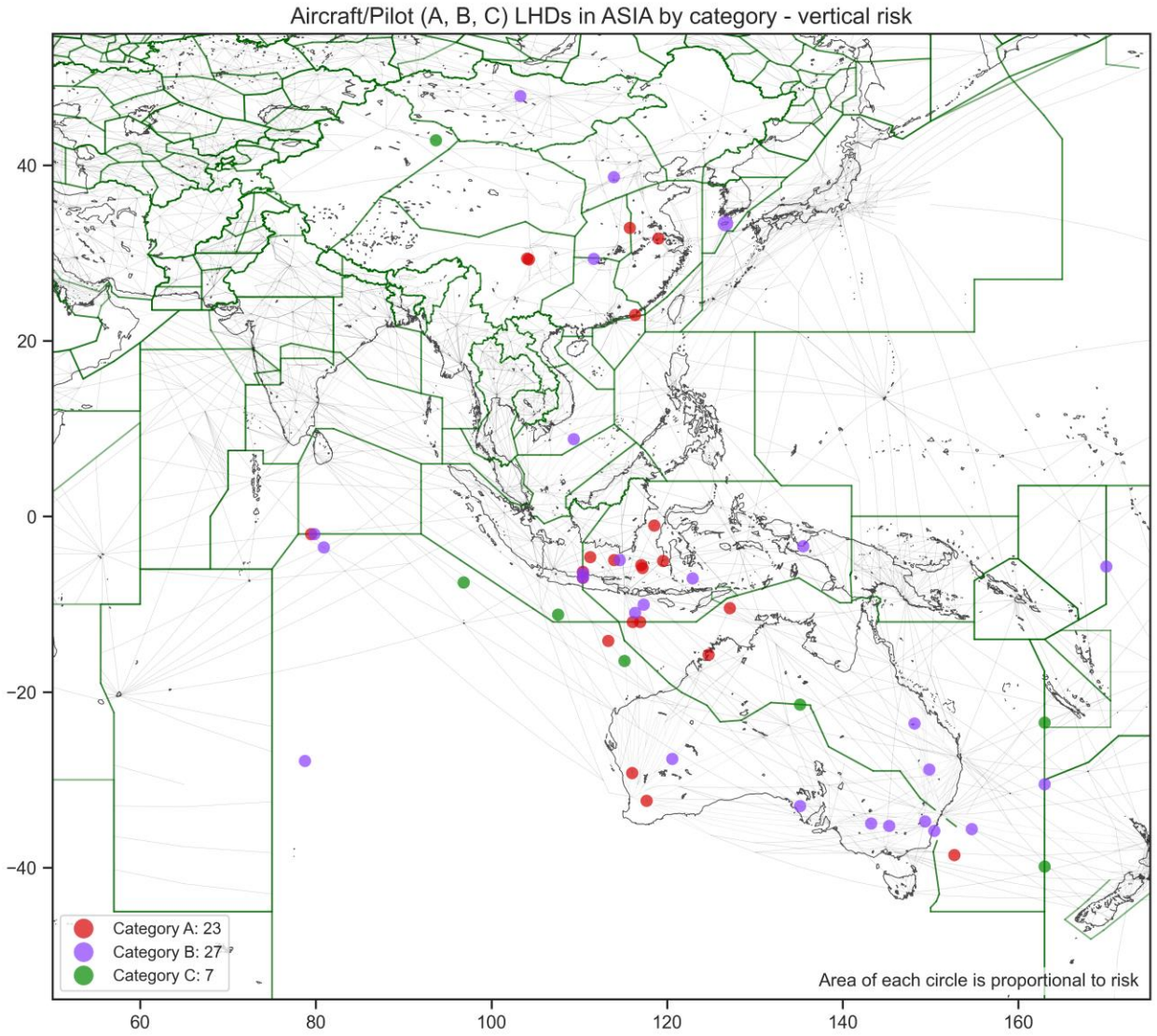
ASIA : Geolocation of LHDs/LLDs/LLEs

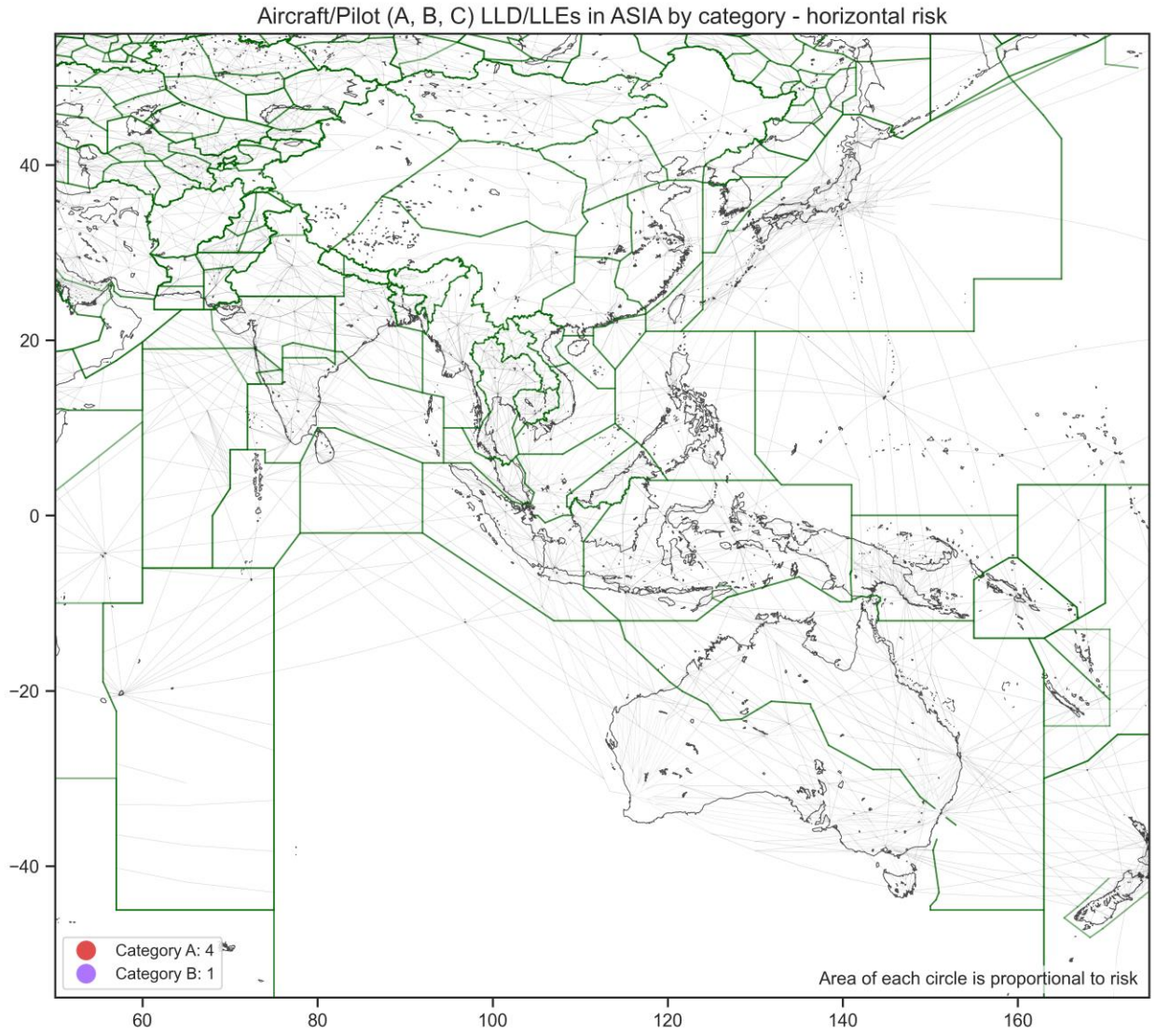
ASIA : All Categories



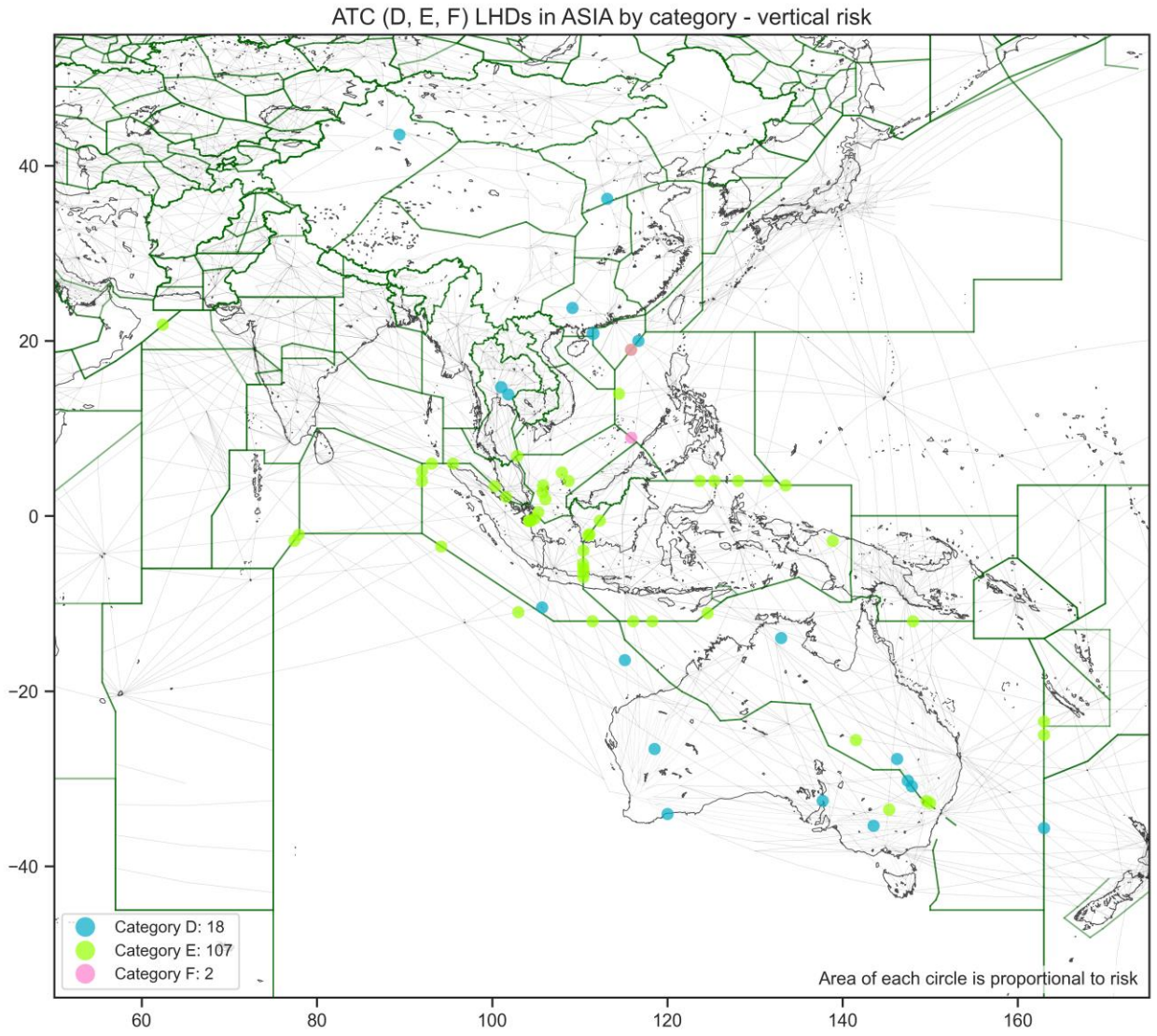


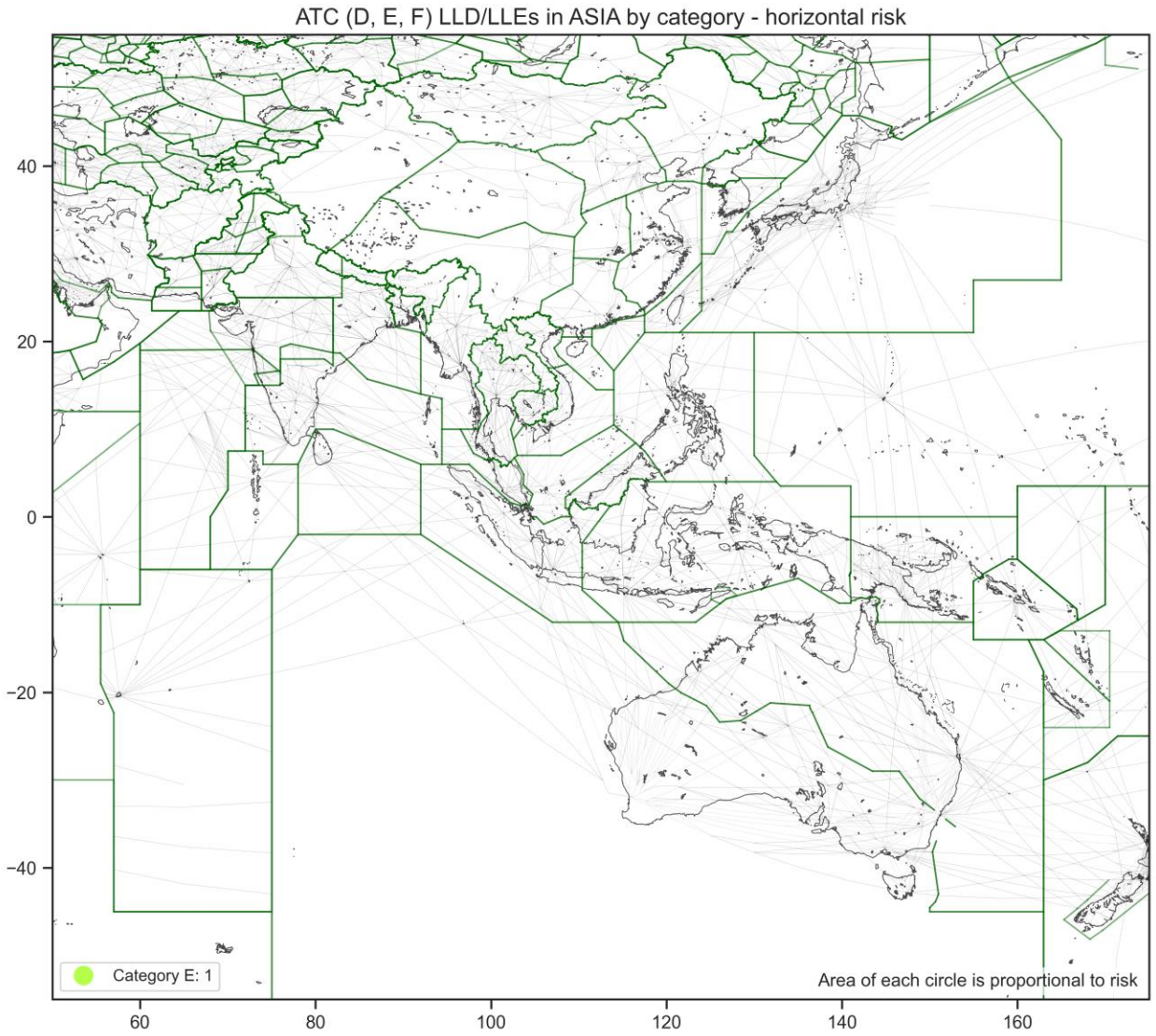
ASIA : Aircrew/Pilot (A, B, C)





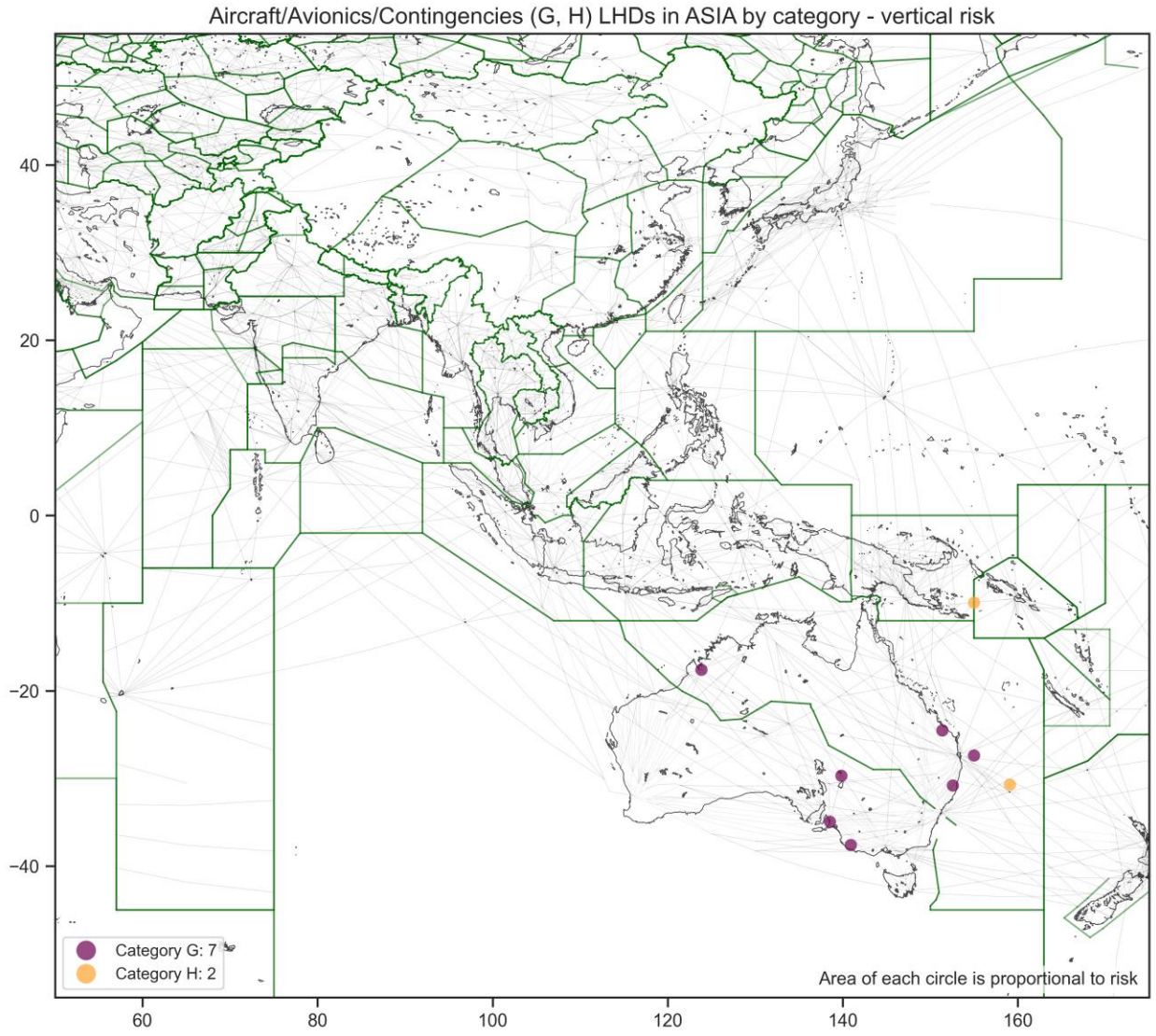
ASIA : ATC (D, E, F)

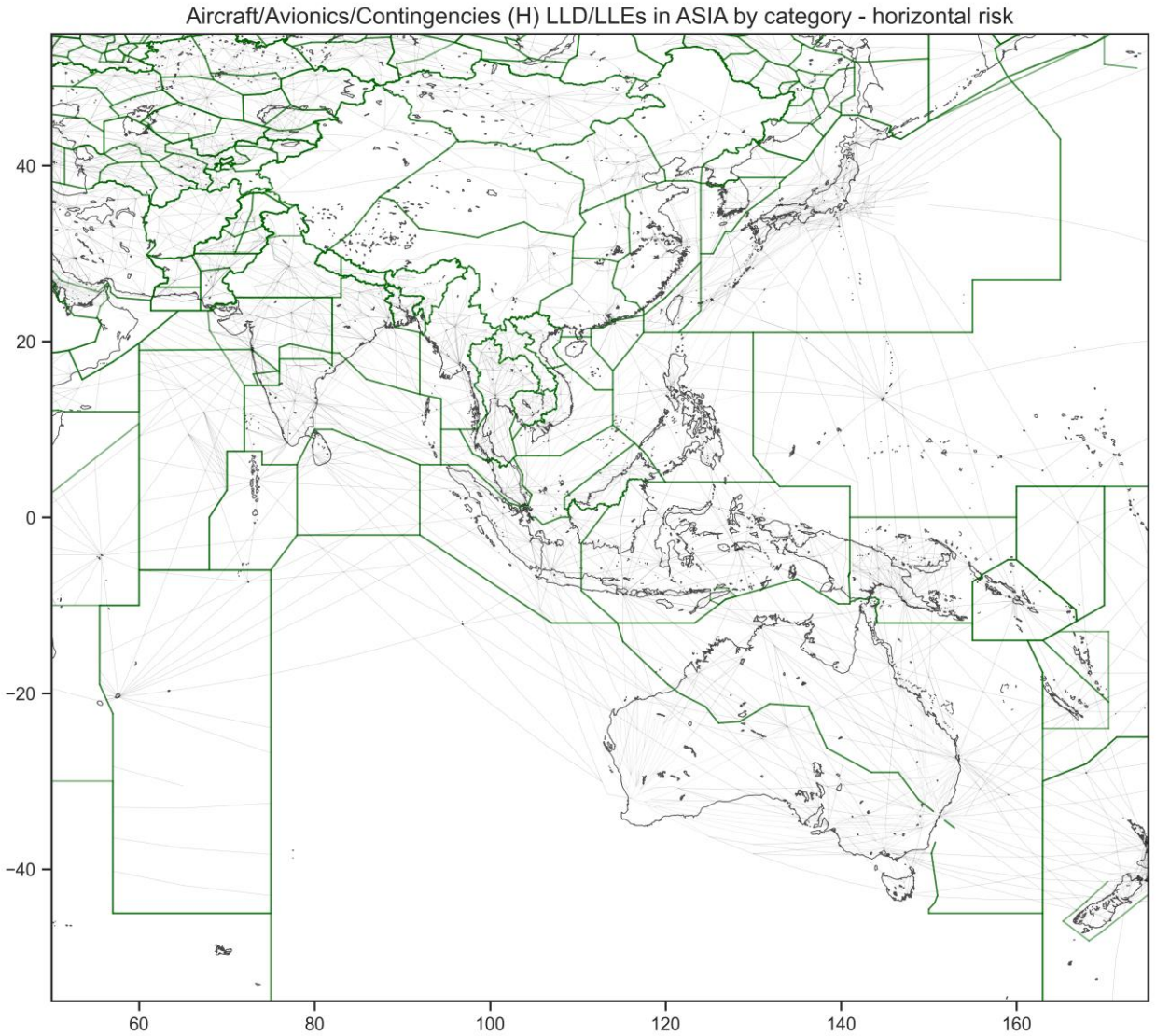

ATC (D, E, F) LHDs in ASIA by category - vertical risk
Category D: 18
Category E: 107
Category F: 2
Area of each circle is proportional to risk
40
20
0
−20
−40
60
80
100
120
140
160


ATC (D, E, F) LLD/LLEs in ASIA by category - horizontal risk
Category E: 1
Area of each circle is proportional to risk
40
20
0
−20
−40
60
80
100
120
140
160

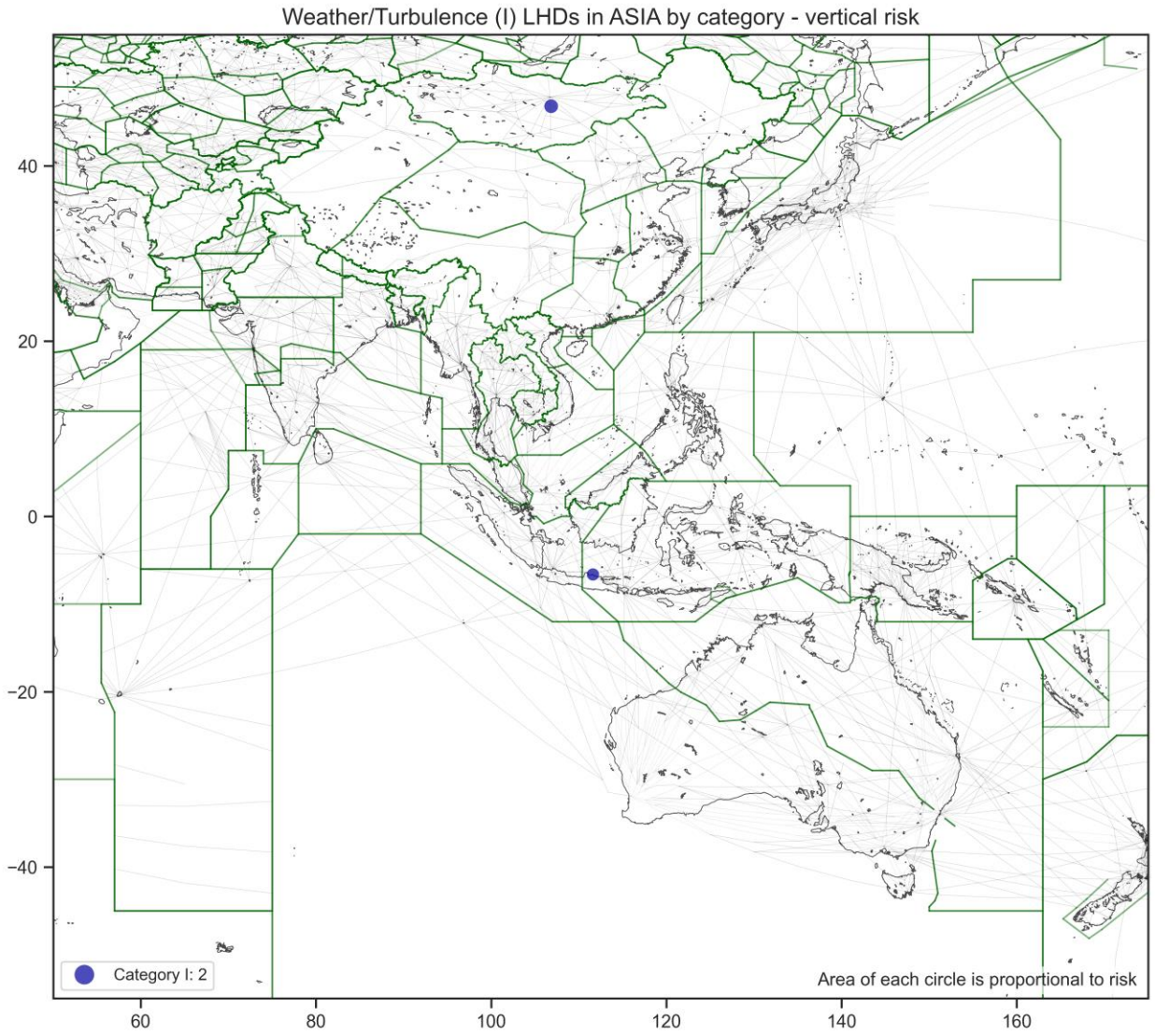
ASIA : Aircraft Avionics/Contingencies

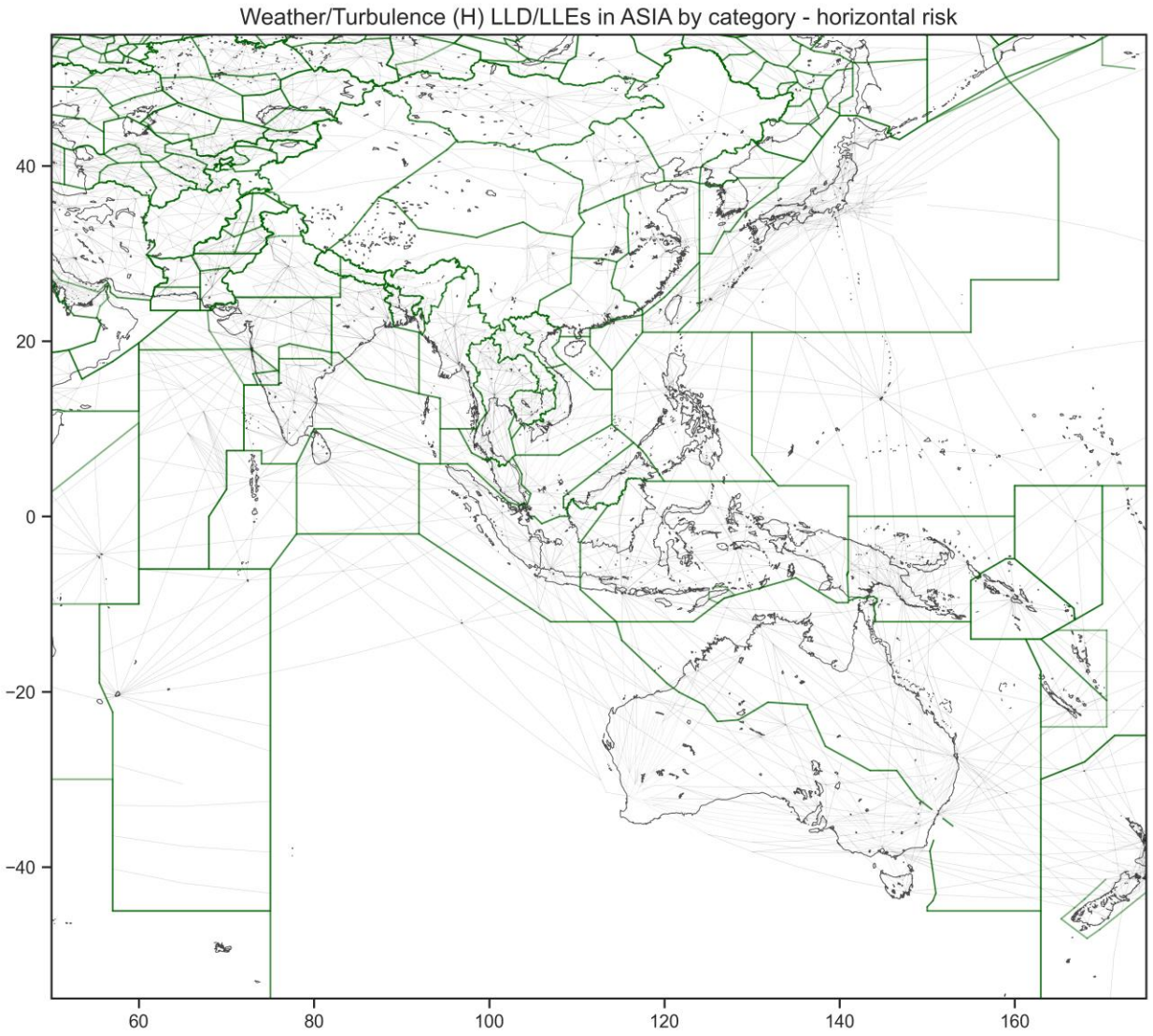
(LHD: G, H; LLD/LLE: H)



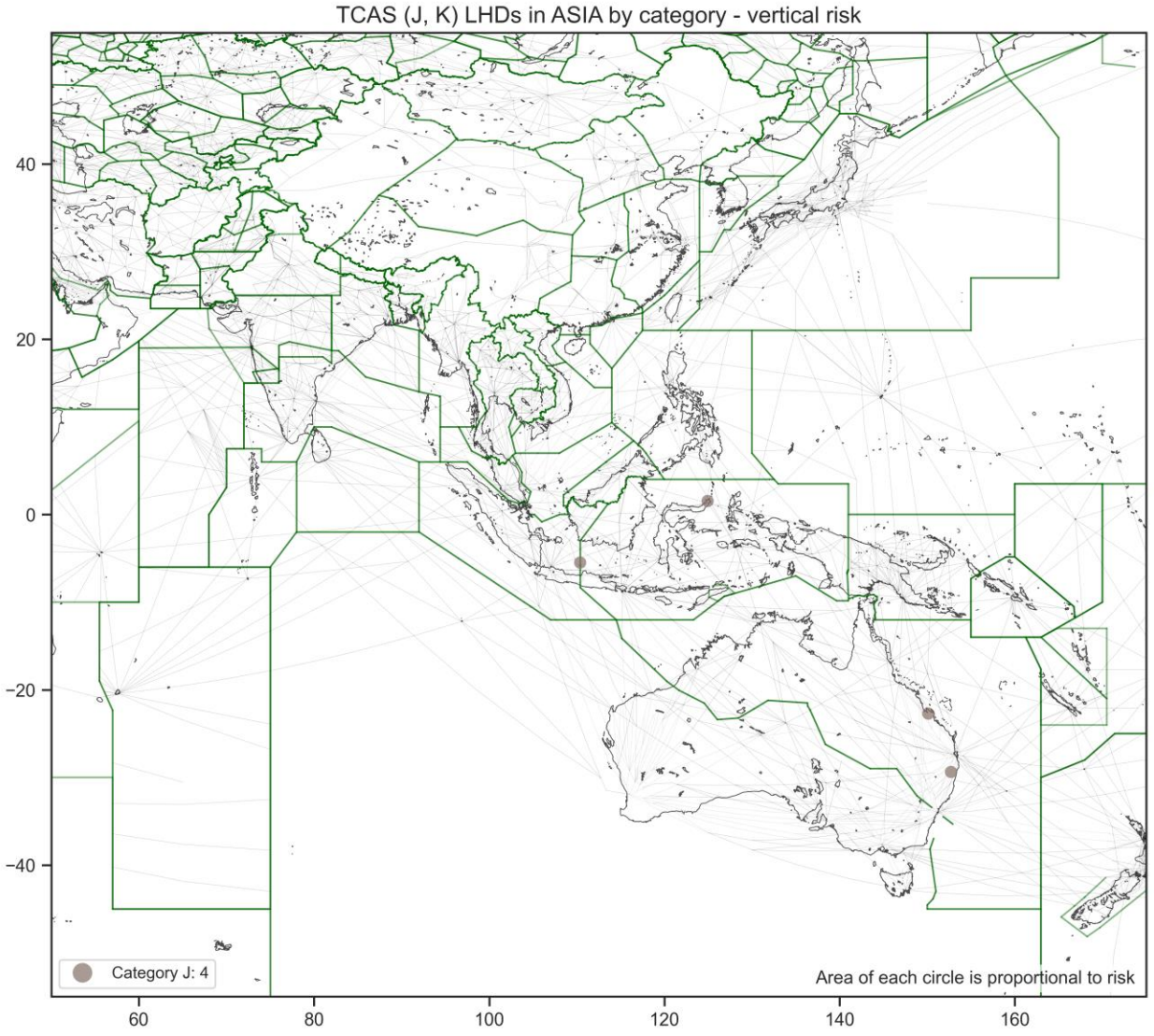


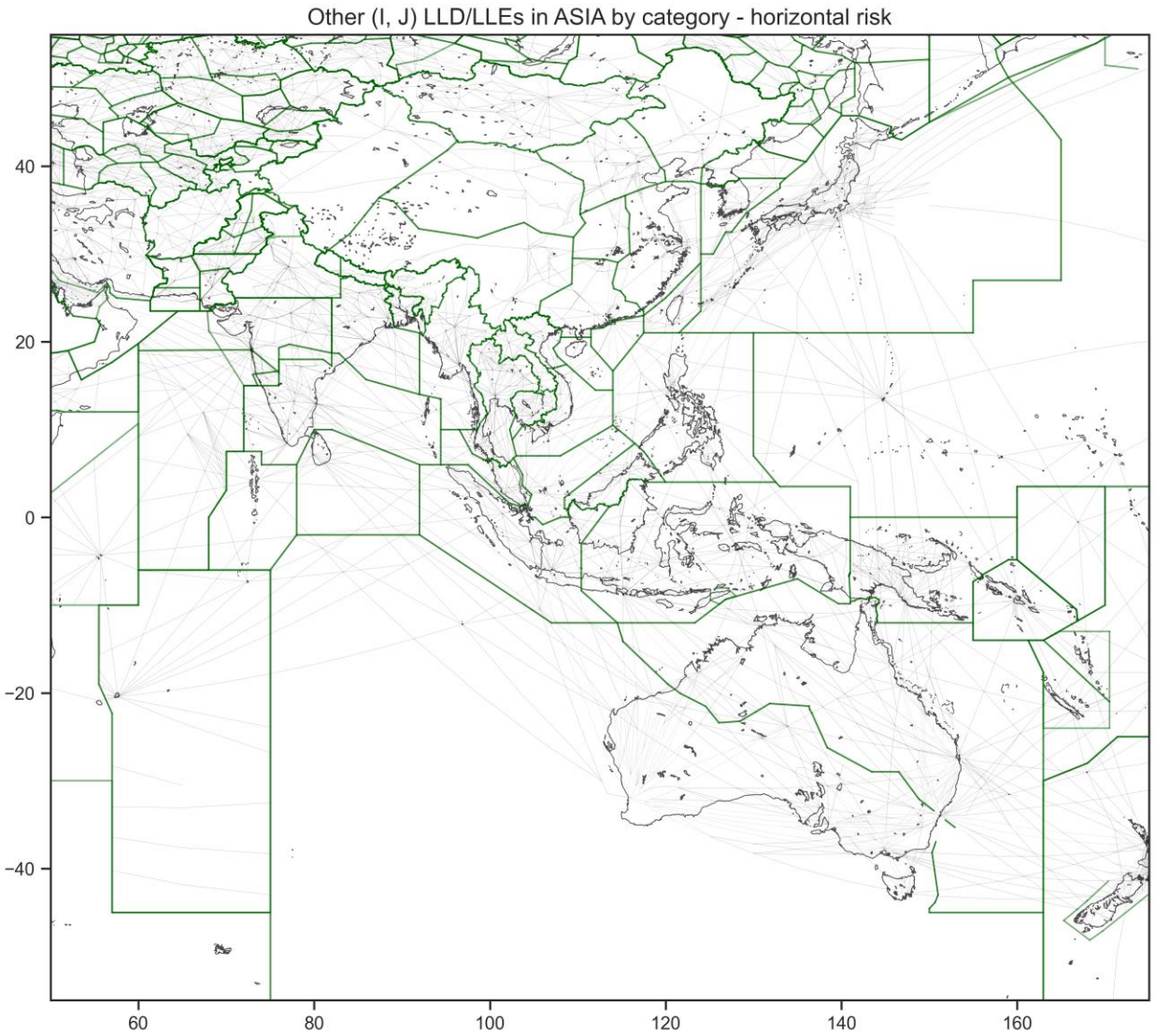
ASIA : Weather/Turbulence (LHD: I; LLD/LLE: H)





ASIA : TCAS (LHD: J, K; LLD/LLE: I, J)





ASIA : Hot Spots

ASIA : LHD Hot Spot A1 (Chennai/Dhaka/Kolkata/Yangon)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors: Gaps in communication and surveillance among Chennai, Kolkata and Yangon ACC.

Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Kolkata/Yangon	11	6	1	0.00	0.00	0.00
Chennai/Yangon	15	6	0	0.06	0.00	0.00

Trend:

-The number of LHDs gradually decreased.

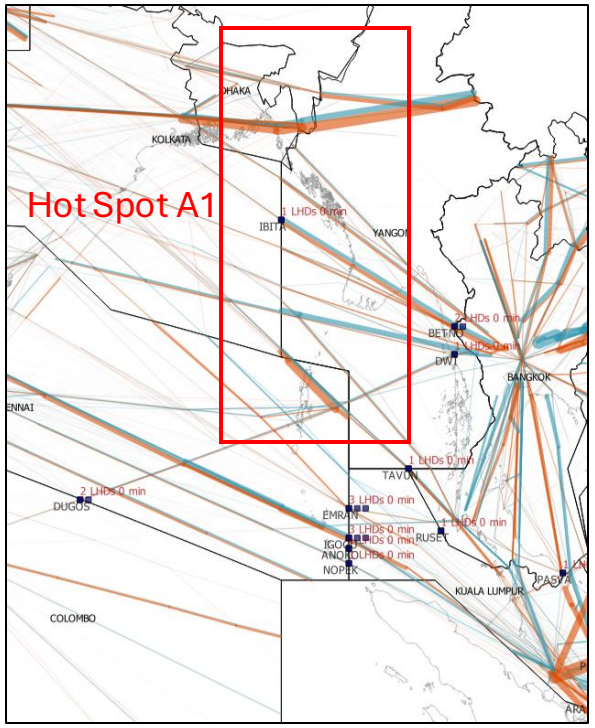
-The operational risk has reduced to zero since 2024.

Mitigations:

- Surveillance has been enhanced by Space-based ADS-B in Indian FIRs and ADS-B data sharing among Kolkata, Chennai, and Yangon ACCs.
- The AIDC was initiated between Kolkata ACC/Chennai ACC and Yangon ACCs, but full operational implementation has not been achieved.

Result from the hot spot identification process:

- Hot Spot A1 does not satisfy the hot spot criteria.
- However, AIDC implementation or other mitigation measures have not been completed.
- Consequently, **Hot Spot A1 remains on the list of hot spots** and should continue to be monitored until further mitigations are implemented.



ASIA : LHD Hot Spot B1

Incheon (Transfer-of-Control Point between Incheon ACC and Shanghai ACC)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors:

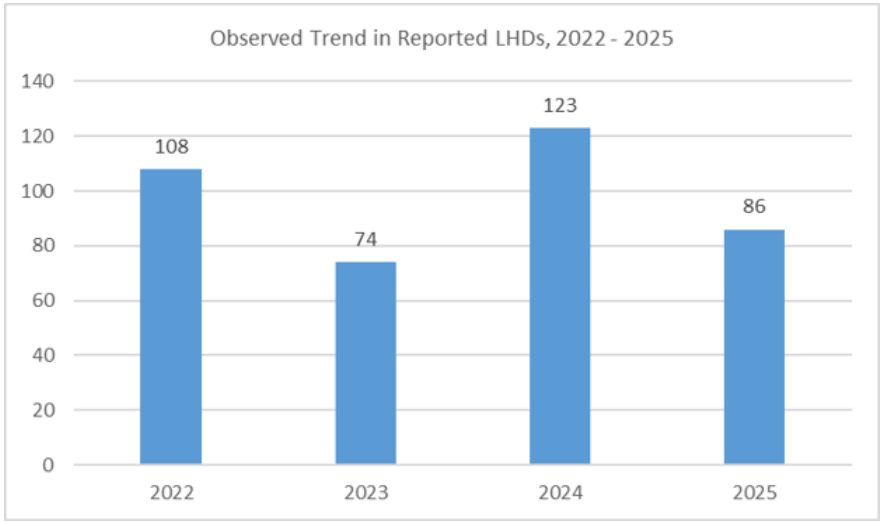
- High traffic volume with limited route capacity

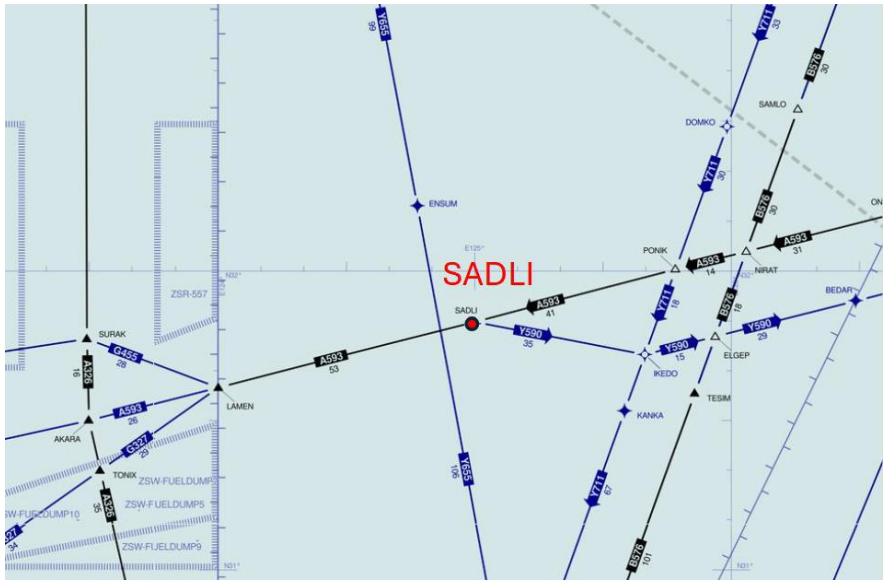
Trend: In 2025, the number of reported LHDs decreased from 2024. The operational risk has been zero since 2021 because all reported occurrences are mitigated by available surveillance and direct speech circuit.

Mitigations: Improvements to process for sharing reported LHD information allows transferring facility to identify underlying causal factors.

Result from the hot spot identification process:

- Hot Spot B1 satisfies the hot spot criteria in terms of the number of LHDs.
- Therefore, **Hot Spot B1 remains on the list of hot spots** and should continue to be monitored until the number of LHDs decreases, and further safety improvement initiatives or mitigation measures are completed.





ASIA : LHD Hot Spot D1 (Fukuoka/Manila)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors :

- Gaps in communication and surveillance
- Complexity in the aircraft transfer procedure from Manila ACC to Fukuoka ACC

Trend:

- The number of LHDs and operational risk decreased.

Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot D1 (Fukuoka/Manila)	4	4	1	0.19	0.07	0.00

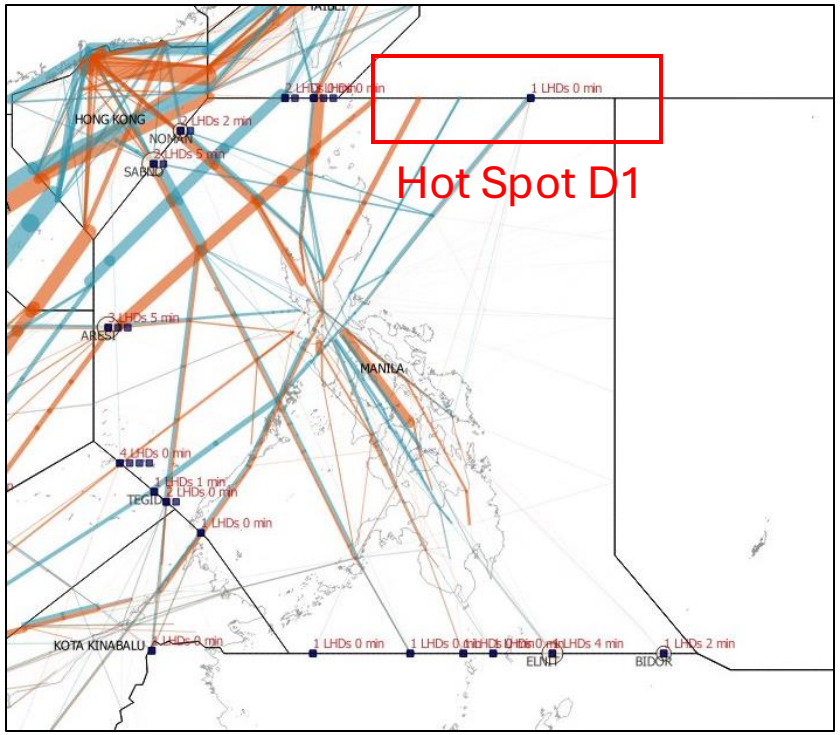
The statistics in this table are derived solely from MAAR's assessment results and do not include assessment results from JASMA.

Mitigations:

- The timing for sending transfer information from Manila ACC to Fukuoka ACC was adjusted from 30 minutes to 20 minutes prior to the estimated time over the FIR boundary. This change reduced the complexity by allowing the transfer to be coordinated within a single sector instead of across two sectors.

Result from the hot spot identification process:

- Hot Spot D1 does not satisfy the hot spot criteria.
- In addition, Fukuoka and Manila ACCs have actively collaborated to investigate the causes and implement mitigations.
- As a result, **Hot Spot D1 is proposed for removal from the list of hot spots, having been marked as a potential non-hot spot in 2024.**



ASIA : LHD Hot Spot D5 (Ho Chi Minh/Manila)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors :

- Gaps in communication and surveillance

Trend:

- The number of LHDs and operational risk decreased.

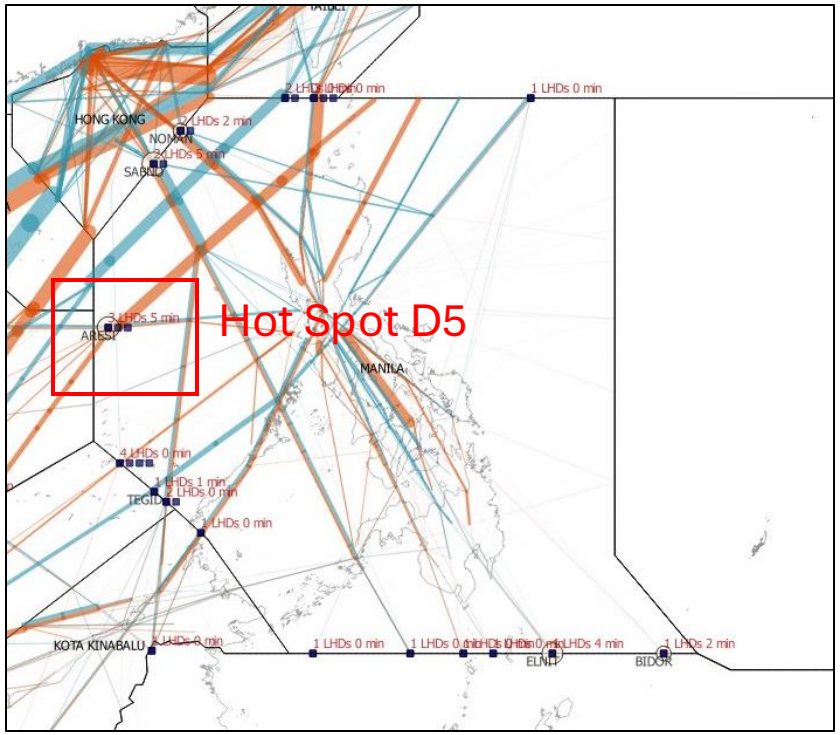
Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot D5 (Ho Chi Minh/Manila)	2	6	3	0.10	0.14	0.09

Mitigations:

- Since 2018, the Philippines has implemented safety improvement initiatives, including a new ATM system, sector redesign, enhanced surveillance and ADS-C/CPDLC coverage, controller training, coordination with adjacent ACCs, and AIDC.

Result from the hot spot identification process:

- Hot Spot D5 does not satisfy the hot spot criteria.
- However, AIDC implementation has not been completed yet.
- Therefore, **Hot Spot D5 remains on the list of hot spots** and should continue to be monitored until further safety improvement initiatives are implemented.



ASIA : LHD Hot Spot D7 (Kota Kinabalu/Manila)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors :
- Gaps in communication and surveillance

Trend:
- The number of LHDs decreased.
- The operational risk decreased to zero.

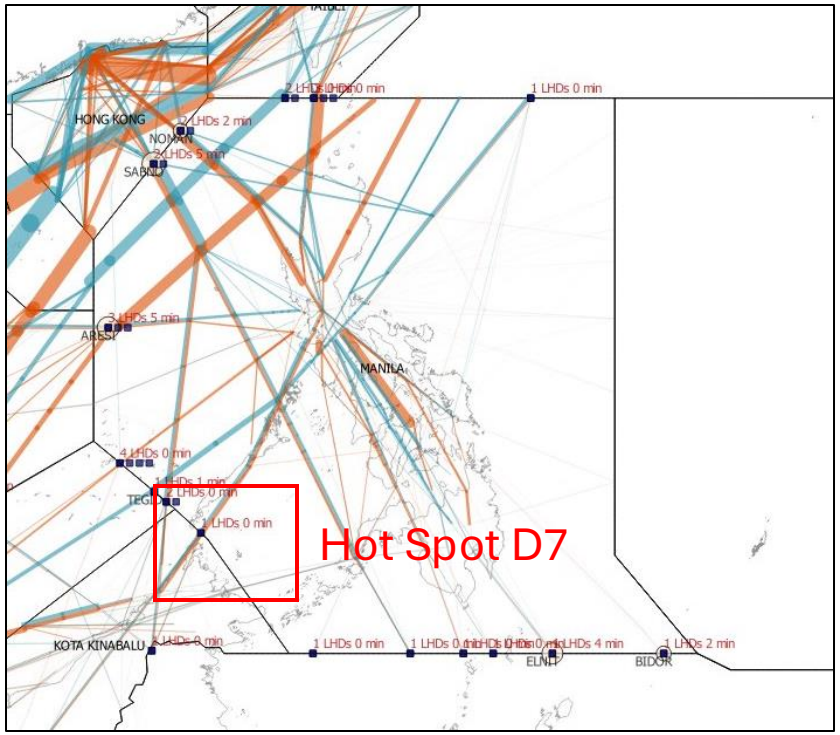
Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot D7 (Kota Kinabalu/Manila)	5	6	3	0.13	0.12	0.00

Mitigations:

- Since 2018, the Philippines has implemented safety improvement initiatives, including new ATM system, sector redesign, enhanced surveillance and ADS-C/CPDLC coverage, controller training, coordination with adjacent ACCs, and AIDC.

Result from the hot spot identification process:

- Hot Spot D7 does not satisfy the hot spot criteria since 2023.
- AIDC has been fully operational between Kota Kinabalu and Manila ACCs.
- Consequently, **Hot Spot D7 is marked as a potential non-hotspot.**



ASIA : LHD Hot Spot D8 (Manila/Ujung Pandang)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors :
- Gaps in communication and surveillance

Trend:
- The number of LHDs slightly decreased.
- The operational risk increased.

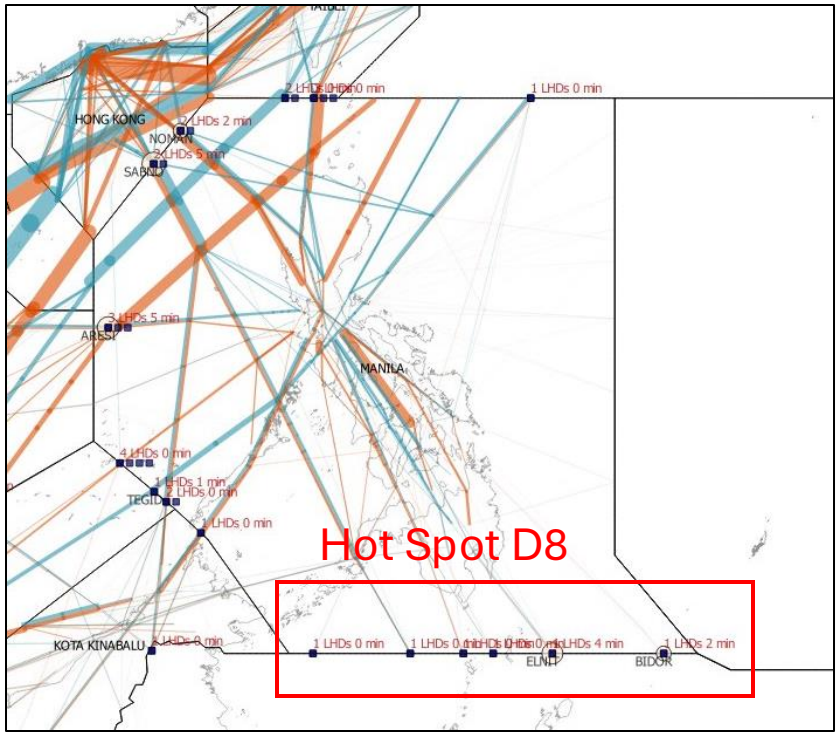
Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot D8 (Manila/Ujung Pandang)	15	8	6	0.41	0.06	0.13

Mitigations:

- Since 2018, the Philippines has implemented safety improvement initiatives, including new ATM system, sector redesign, enhanced surveillance and ADS-C/CPDLC coverage, controller training, coordination with adjacent ACCs, and AIDC.

Result from the hot spot identification process:

- Even though AIDC has been successfully operated since 2020, Hot Spot D8 still satisfies the hot spot criteria in terms of the operational risk.
- Thus, **Hot Spot D8 remains on the list of hot spots.**



ASIA : LHD Hot Spot F (Mogadishu/Mumbai)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

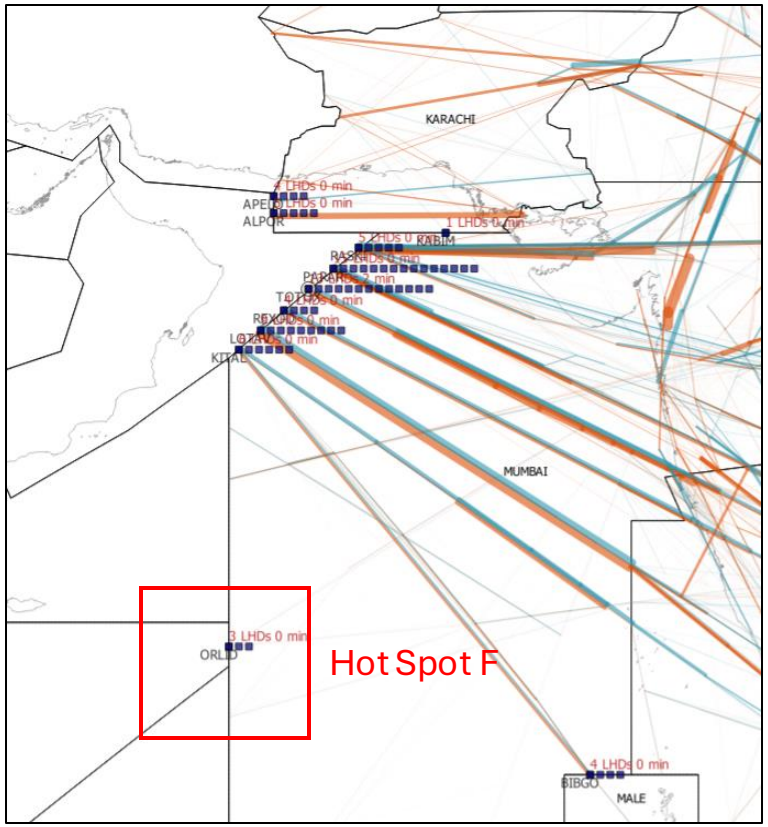
Contributing Factors: Gaps in communication and surveillance between Mogadishu and Mumbai ACC.

Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot F (Mogadishu/Mumbai)	10	7	3	0.00	0.05	0.00

Trend:
- The number of LHDs decreased.
- Operational risk decreased to zero.

Mitigations:
- Surveillance coverage was enhanced through Space-Based ADS-B in Indian FIRs.
- ATM system at Mumbai FIR is in the process of being upgraded, scheduled for 2026. The new ATM system will be ready for AIDC implementation.

Result from the hot spot identification process:
- Hot Spot F does not satisfy the hot spot criteria.
- However, AIDC implementation or other mitigation measures have not been completed yet.
- Thus, **Hot Spot F remains on the list of hot spots.**



ASIA : LHD Hot Spot G1 (Mumbai/Muscat)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors : Gaps in communication and surveillance among Mumbai and Muscat ACCs.

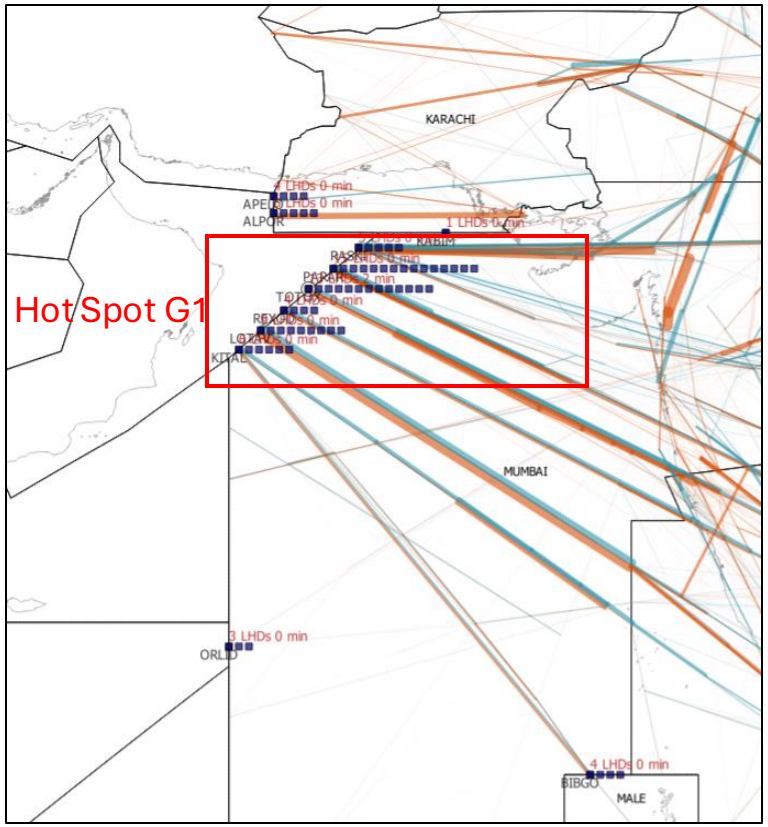
Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot G1 (Mumbai/Muscat)	138	132	52	2.79	1.09	0.04

Trend:
- The number of LHDs and operational risk significantly decreased.

Mitigations:
- Surveillance coverage was enhanced through Space-Based ADS-B in Indian FIRs.
- ATM system at Mumbai FIR is in the process of being upgraded in Q4 of 2026. The new ATM system will be ready for AIDC implementation.

Result from the hot spot identification process:

- Hot Spot G1 satisfies the hot spot criteria in terms of the number of LHDs.
- Therefore, **Hot Spot G1 remains on the list of hot spots** and should continue to be monitored until the number of LHDs decreases and further safety improvement initiatives or mitigation measures, such as AIDC, are completed.



ASIA : LHD Hot Spot G2 (Mumbai/Sanaa)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

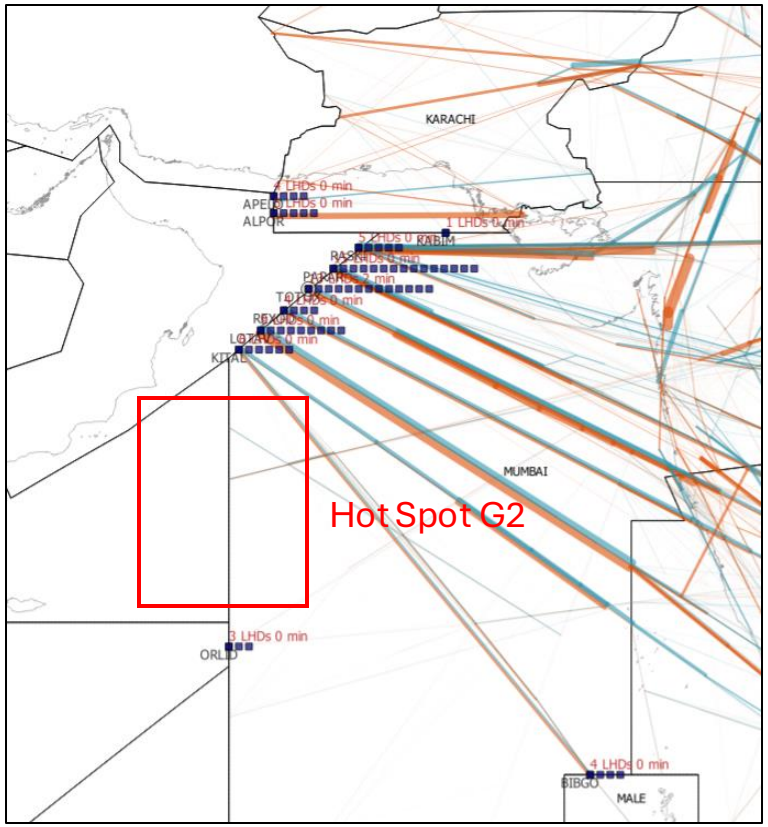
Contributing Factors : Gaps in communication and surveillance among Mumbai and Sanaa ACCs.

Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot G2 (Mumbai/Sanaa)	3	4	0	0.00	0.00	0.00

Trend:
- The number of LHDs reduced to zero.
- Operational risk was zero since 2023.

Mitigations:
- Surveillance coverage was enhanced through Space-Based ADS-B in Indian FIRs.
- ATM system at Mumbai FIR is in the process of being upgraded, scheduled for 2026. The new ATM system will be ready for AIDC implementation.

Result from the hot spot identification process:
- Hot Spot G2 does not satisfy the hot spot criteria.
- However, AIDC implementation or other mitigation measures have not been completed yet.
- Thus, **Hot Spot G2 remains on the list of hot spots.**



ASIA : LHD Hot Spot J (Jakarta/Kota Kinabalu/Singapore)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors : Gaps in communication and surveillance between Jakarta and Singapore ACC.

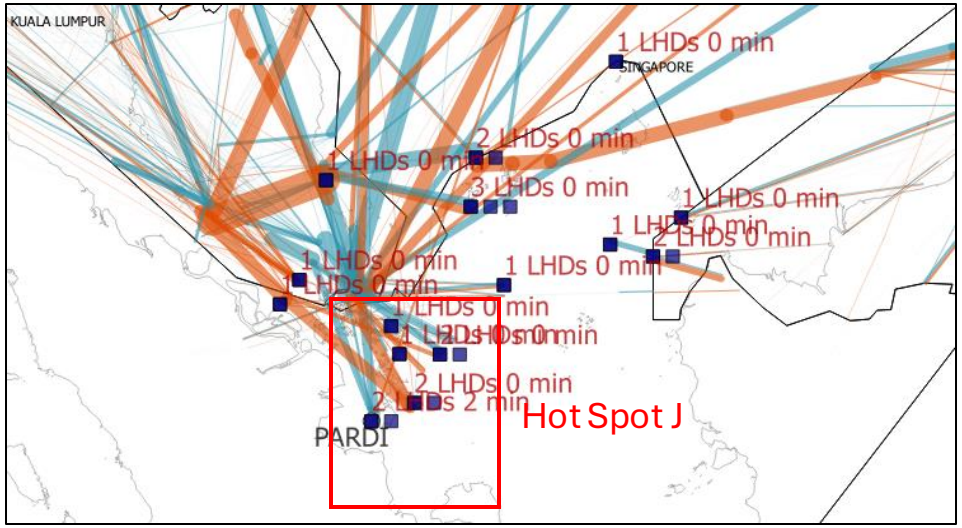
Trend:
- The number of LHDs slightly increased.
- The operational risk significantly decreased.

Mitigations:
- As of 21 March 2024, the FIR boundary between Jakarta and Singapore was realigned. To support the transition and maintain safety, regular operational coordination meetings between both ACCs have been held since 2024.
- The results of the LHD analysis were shared with controllers to enhance safety awareness.

Result from the hot spot identification process:
- Hot Spot J does not satisfy the hot spot criteria.
- In addition, the decrease in the number of LHDs and operational risk reflects the successful implementation of mitigation measures.
- Thus, **Hot Spot J is proposed for removal from the list of hot spots, having been marked as a potential non-hot spot in 2024.**

Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Jakarta/Singapore (Hot Spot J)	27	5	8	0.33	0.12	0.01

The statistics in this table are derived solely from MAAR's assessment results and do not include assessment results from AAMA.



ASIA : LHD Hot Spot O

(Bangkok/Ho Chi Minh/Kuala Lumpur/Singapore)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors: The route structure and ATC procedures of handling crossing traffic over this area can be complex due to the different Transfer of Control and Communication Points and the involvement of multiple ATS units.

Trend:

-The number of LHDs increased but the operational risk decreased.

Mitigations:

-Regular LHD analysis sharing with controllers and operational aids e.g. visual reminders on the Air Situational Display have been implemented for Singapore ACC to enhance situational awareness.

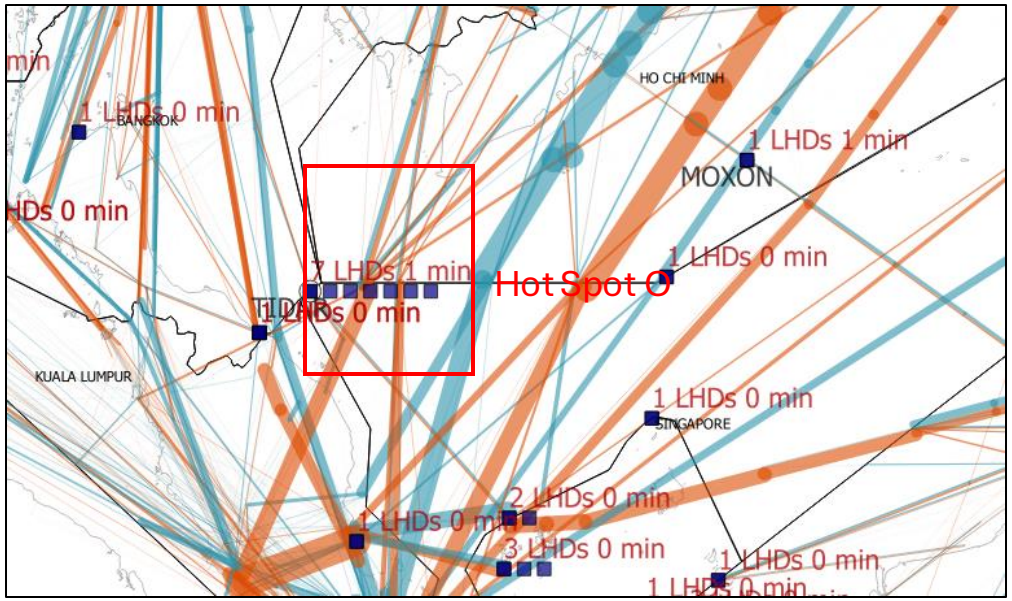
-LHD analysis had been shared to the refresher course for Kuala Lumpur's ATCO. LHD had been included in States's hazard registry. Additionally, the LHD-related Safety Bulletin is planned to be published.

Result from the hot spot identification process:

-Hot Spot O does not satisfy the hot spot criteria. Additionally, safety improvement initiatives or preventive measures have not been initiated by Bangkok ACC.

-Therefore, **Hot Spot O remains on the list of hot spots.**

Area	Number of LHDs			Operational Risk (10^{-9} FAPFH)		
	2023	2024	2025	2023	2024	2025
Hot Spot O (Bangkok/Ho Chi Minh /Kuala Lumpur/ Singapore)	5	3	7	0.51	0.15	0.02



ASIA : LHD Hot Spot P(Jakarta/Ujung Pandang)

Nature of Occurrences: Coordination errors as a result of human factors issues (Category E)

Contributing Factors:

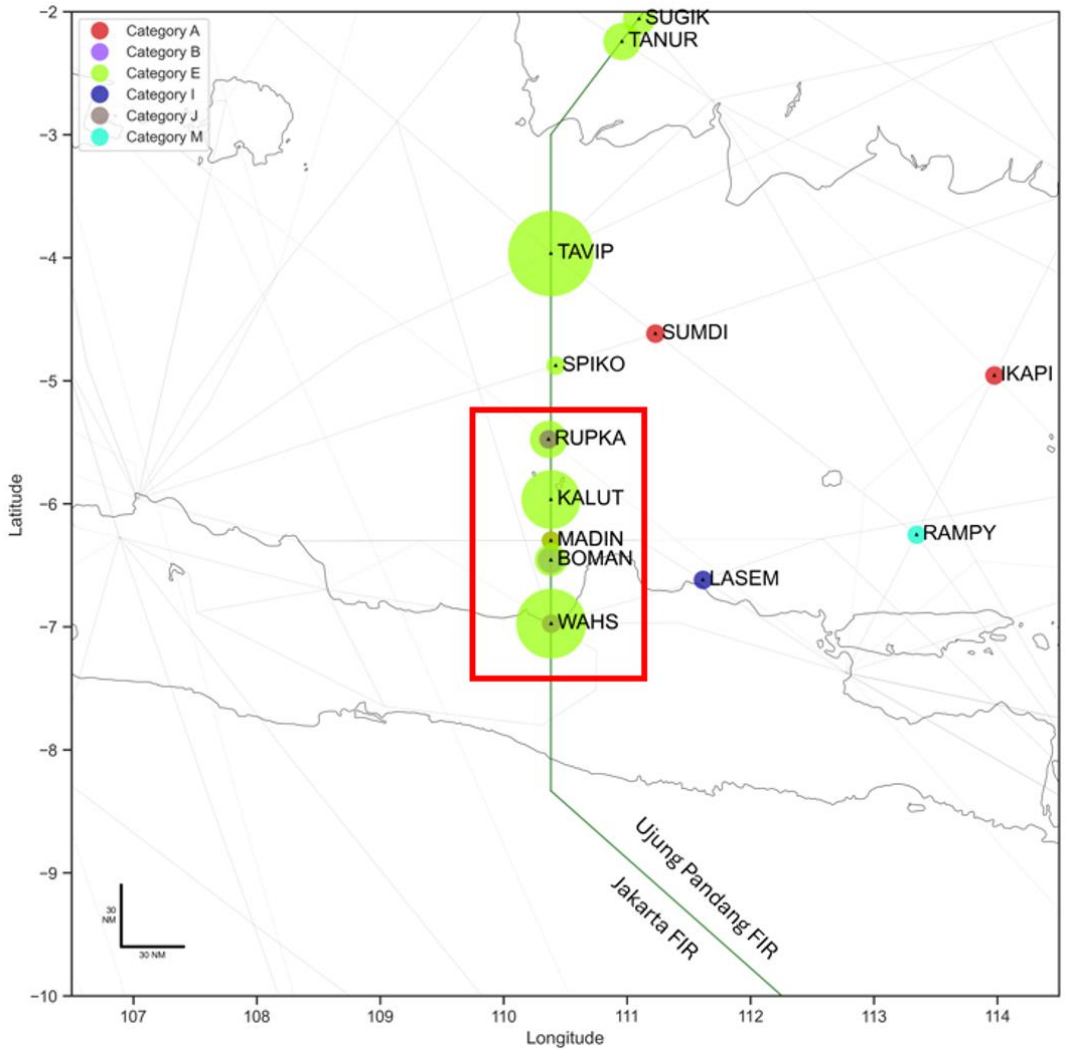
- Gap in communication and high traffic density

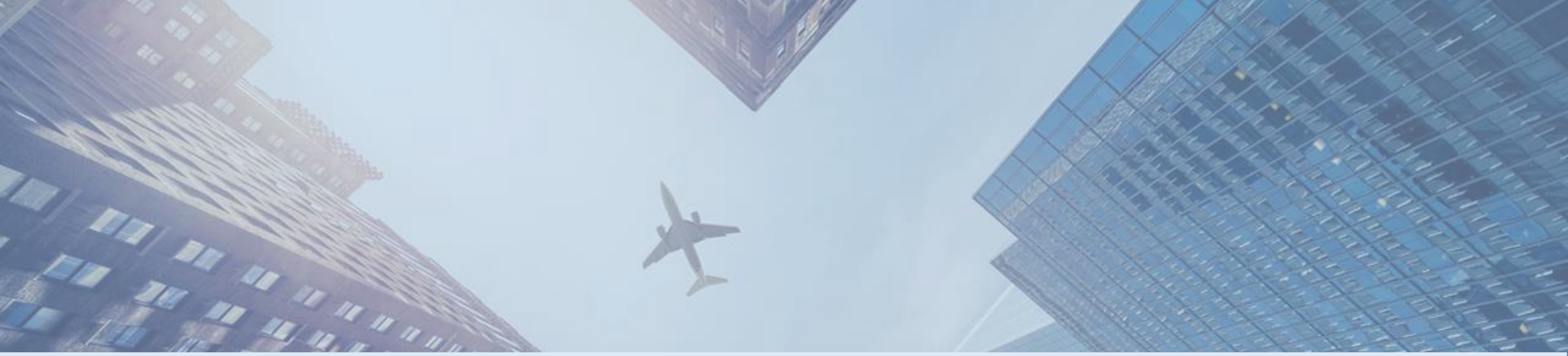
Mitigations:

- The new Jakarta ATC system has been implemented and will be continued with the implementation of AIDC between Jakarta and Ujung Pandang ACCs.
- AirNav Indonesia is working toward re-sectorization of Ujung Pandang ACC.
- The results of the LHD analysis were shared with controllers to enhance safety awareness.

Result from the hot spot identification process:

- Hot Spot P satisfies the hot spot criteria, with 38 LHDs between RUPKA fix and ANY VOR (a 90-Nautical Mile distance)
- The summed operational risk of LHDs in this Hot Spot is 2.68 x 10^{-11} FAPFH





Reporting Rate of LHDs/LLDs/LLEs

Reporting Rate of LHDs/LLDs/LLEs in 2025

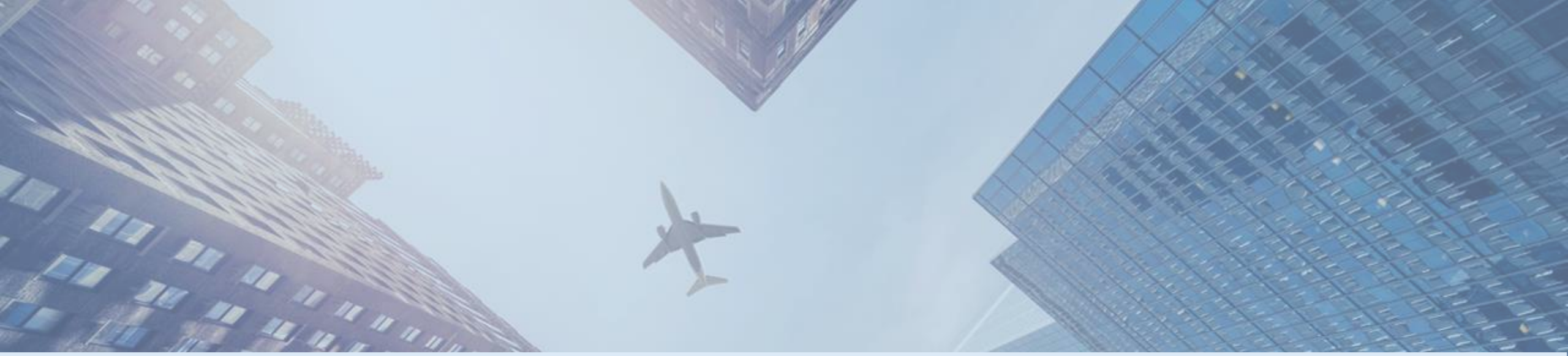
Airspace	Flying Hours	Aircrew/Pilot		ATC		Other		Total	
		# Reports	1 Report : Flying Hrs	# Reports	1 Report : Flying Hrs	# Reports	1 Report : Flying Hrs	# Reports	1 Report : Flying Hrs
DPRK	319	0	-	0	-	0	-	0	-
Mongolia	128,475	1	1: 128,475	0	-	1	1: 128,475	2	1: 64,238
SEA	3,191,884	6	1: 531,981	60	1: 53,198	3	1: 1,063,961	69	1: 46,259
SA/IO	3,734,892	0	-	98	1: 38,111	3	1: 1,244,964	101	1: 36,979
Japan	2,040,204	44	1: 46,368	18	1: 113,345	45	1: 45,338	107	1: 19,067
SW Pacific	1,354,591	49	1: 27,645	61	1: 22,206	13	1: 104,199	123	1: 11,013
China	2,343,365	9	1: 260,374	33	1: 71,011	209	1: 11,212	251	1: 9,336
Pacific	1,955,758	33	1: 59,265	210	1: 9,313	7	1: 279,394	250	1: 7,823
Indonesia	852,382	18	1: 47,355	174	1: 4,899	4	1: 213,095	196	1: 4,349
ROK	182,038	0	-	86	1: 2,117	1	1: 182,038	87	1: 2,092
Total	**15,783,908**	**160**	**1: 98,649**	**740**	**1: 21,330**	**286**	**1: 55,188**	**1,186**	**1: 13,309**

Note:

- DPRK submitted NIL reports for all months in 2025.

Reporting Rate of LHDs/LLDs/LLEs in 2025

Airspace	# Reports							1 Report : Flying Hours						
	2019	2020	2021	2022	2023	2024	2025	2019	2020	2021	2022	2023	2024	2025
DPRK	0	0	0	0	0	0	0	-	-	-	-	-	-	-
Mongolia	2	0	1	0	0	0	2	1: 82,138	-	1: 121,621	-	-	-	1: 64,238
SEA	152	42	70	62	101	74	69	1: 22,275	1: 25,106	1: 15,456	1: 32,620	1: 29,400	1: 42,001	1: 46,259
SA/IO	439	152	135	143	258	204	101	1: 7,955	1: 7,907	1: 11,167	1: 21,018	1: 10,242	1: 20,309	1: 36,979
Japan	77	66	80	75	72	76	107	1: 20,762	1: 14,737	1: 13,528	1: 18,751	1: 23,452	1: 25,387	1: 19,067
SW Pacific	101	46	47	81	65	71	123	1: 9,335	1: 6,954	1: 11,975	1: 5,352	1: 18,186	1: 17,538	1: 11,013
China	79	85	105	72	223	190	251	1: 31,119	1: 26,867	1: 15,477	1: 18,003	1: 10,525	1: 15,149	1: 9,336
Pacific	173	134	176	179	203	234	250	1: 10,139	1: 6,404	1: 6,638	1: 8,280	1: 8,736	1: 8,264	1: 7,823
Indonesia	37	18	41	54	125	102	196	1: 33,321	1: 17,346	1: 7,402	1: 8,060	1: 6,099	1:5,379	1: 4,349
ROK	34	5	24	108	75	126	87	1: 18,959	1: 25,965	1: 6,285	1: 1,056	1: 2,220	1:1,568	1: 2,092
Total	**1,094**	**548**	**679**	**774**	**1122**	**1077**	**1,186**	**1: 14,330**	**1: 13,202**	**1: 11,200**	**1:13,230**	**1:12,135**	**1:14,937**	**1: 13,309**



Conclusion

RVSM TLS Compliance - Vertical

- **The 2025 PAC vertical overall risk is 5.67 x 10^{-9} FAPFH, slightly above the TLS (5.00 x 10^{-9} FAPFH).**
    - The level of risk significantly decreased from **15.53 x 10^{-9} FAPFH in 2024**
    - Majority of the vertical risk was driven by LHDs occurring in the Hawaii CEP/Oakland area. While the ATM system upgrade is in the plan, the ATC intervention procedures, mitigation strategies, and refresher training have contributed to the improved safety performance in this area.
- **The 2025 ASIA vertical overall risk is 1.55 x 10^{-9} FAPFH, below the TLS.**
- **In both areas, the dominant LHD cause is Category E (ATC-to-ATC coordination errors from human factors): 48% of LHDs in PAC and 56% of LHDs in Asia.**

RVSM TLS Compliance - Horizontal

- **All horizontal risk estimates were relatively low and remained below the TLS in both the Pacific and Asia.**

RASMAG's Hot Spot List

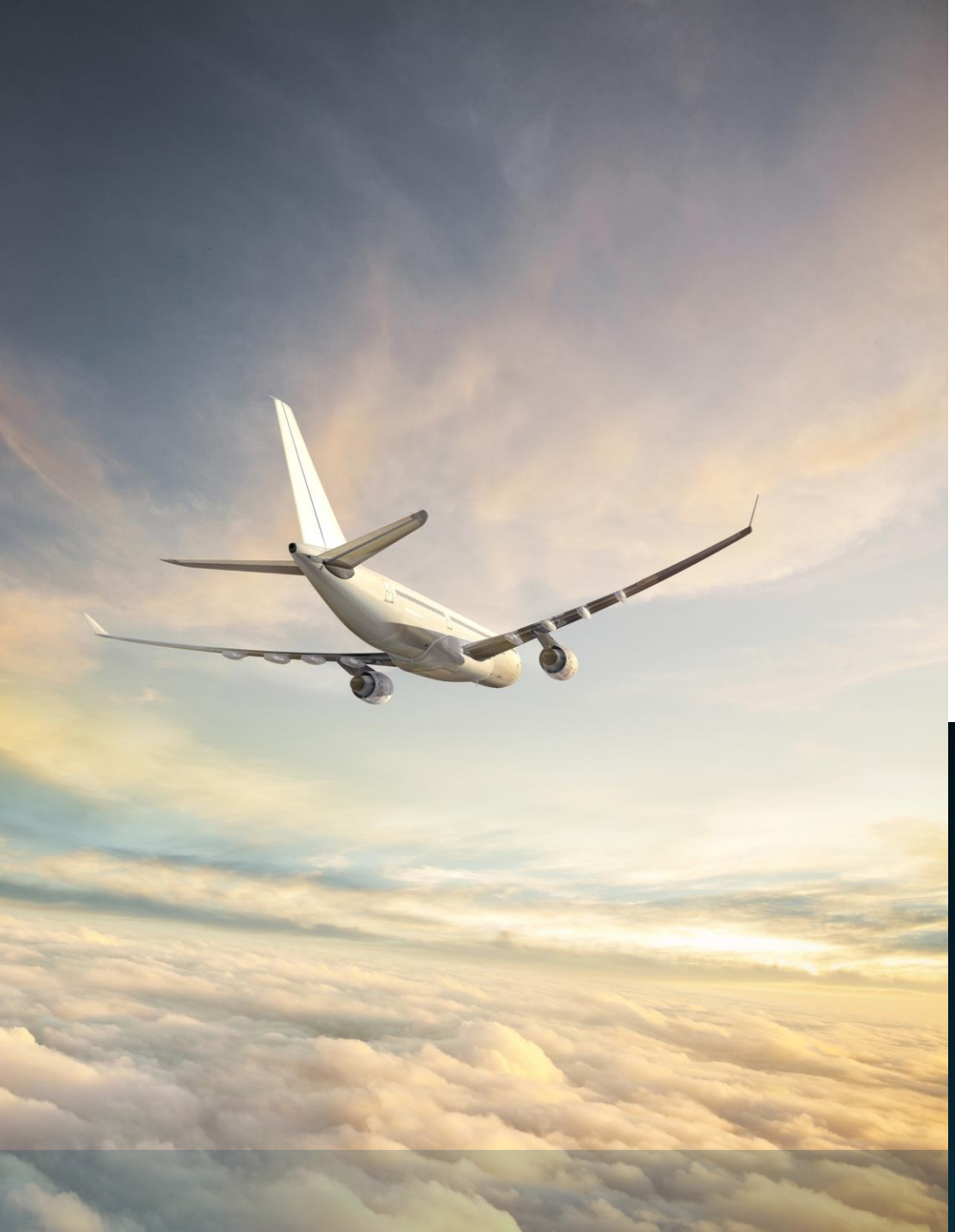
✓ No. of LHDs or Risk Level below **the hot spot criteria**

✗ No. of LHDs or Risk Level exceed **the hot spot criteria**

Hot Spot	Involved FIRs	Identified	Hot Spot Criteria Check list			Remarks
			No. of LHDs	Risk	Mitigations	
A1	Chennai/Dhaka/Kolkata/Yangon	2015	✓	✓	On-going	Continue to be monitored
B1	Incheon (Transfer-of-Control Point between Incheon ACC and Shanghai ACC)	2015	✓	✓	On-going	Continue to be monitored
D1	Fukuoka/Manila	2015	✓	✓	Completed	**Proposed for removal from the list of hot spots.**
D5	Ho Chi Minh/Manila	2015	✓	✓	On-going	Continue to be monitored
D7	Kota Kinabalu/Manila	2015	✓	✓	Completed	**Potential non-hotspot.**
D8	Manila/Ujung Pandang	2015	✓	✗	On-going	Continue to be monitored
F	Mogadishu/Mumbai	2015	✓	✓	On-going	Continue to be monitored
G1	Mumbai/Muscat	2015	✗	✓	On-going	Continue to be monitored
G2	Mumbai/Sanaa	2015	✓	✓	On-going	Continue to be monitored
J	Jakarta/Kota Kinabalu/ Singapore	2018	✓	✓	Completed	**Proposed for removal from the list of hot spots.**
N	Hawaii CEP/Oakland USA	2019	✗	✓	On-going	Continue to be monitored
O	Bangkok/Ho Chi Minh/ Kuala Lumpur/ Singapore	2023	✓	✓	On-going	Continue to be monitored
P	Jakarta/Ujung Pandang	2026	✗	✓	On-going	**New Hot Spot**

Reporting Rate of LHDs/LLDs/LLEs

- **The estimated 15,783,908 flying hours in 2025 were close to the 16,087,567 hours in 2024.**
- **The overall reporting rate of LHDs/LLDs/LLEs slightly improved**, from
  1 report per 14,937 hours in 2024 to
  1 report per 13,309 hours in 2025.
- The reporting rate for **SA/IO significantly dropped in 2025** due to the decrease in the number of LHDs, while the flying hours were closed to the number in 2024.
- The reporting rates for **China and SW Pacific significantly improved in 2025.**
- The reporting rates for **other areas in 2025 were close to 2024 values**.
- The reporting rate for **DPRK could not be calculated**, as there were no reported occurrence. However, DPRK submitted NIL reports for all months, indicating no occurrences at all.



THANK YOU

Thirty-First Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/31)
Bangkok, Thailand
30 June –3 July 2026

Link for RASMAG meeting:
https://www.icao.int/APAC/Meetings/Pages/2025-RASMAG-31.aspx