International Civil Aviation Organization

Middle East Regional Monitoring Agency Board

Twenty-first Meeting (MIDRMA Board/21)
(Cairo, Egypt, 14 – 15 January 2026)

Agenda Item 5: RVSM Monitoring and related Technical Issues

MID RVSM SAFETY MONITORING ACTIVITIES (RESULTS OF THE MID RVSM SMR 2025)

(Presented by the MIDRMA)

SUMMARY

This working paper presents a high-level overview of the key outcomes of the MID RVSM Safety Monitoring Report (SMR) 2025, prepared by the Middle East Regional Monitoring Agency (MIDRMA). The report confirms that RVSM operations within the ICAO Middle East (MID) Region continue to operate safely and in compliance with ICAO safety objectives. Both the technical risk and the overall collision risk remain well below the applicable ICAO Target Levels of Safety (TLS).

At the same time, the SMR 2025 highlights persistent challenges related to incomplete Traffic Data Sample (TDS) submissions and inadequate Large Height Deviation (LHD) reporting from several Member States, which continue to limit confidence in the operational risk assessment. The paper also outlines progress achieved toward the implementation of the ADS-B Height Monitoring System (AHMS) and identifies areas requiring continued attention and action.

Action by the meeting is at paragraph 3.

REFERENCES

- ICAO Docs 9574 (Third Edition) and 9937
- MIDRMA Board /20 meeting Report *(Muscat, Oman, 11 – 12 November 2024)*
- MIDANPIRG/22 & RASG-MID/12 meeting report *(Doha, Qatar, 4 – 8 May 2025)*

1. INTRODUCTION

1.1 The meeting may wish to recall that the Middle East Regional Monitoring Agency (MIDRMA) is responsible for monitoring the safety of RVSM operations within the ICAO MID Region in accordance with ICAO Annexes, Doc 9574, Doc 9937, and related guidance material. As part of this mandate, the MIDRMA prepares an annual RVSM Safety Monitoring Report to assess compliance with ICAO safety objectives and to identify any safety-related issues requiring corrective or preventive action.

1.2 The SMR 2025 is based on the analysis of Traffic Data Samples collected during the agreed monitoring period and Large Height Deviation (LHD) reports received throughout the 2025 calendar year. The assessment was conducted using the ICAO Collision Risk Model (CRM) supported by MIDRMA risk-analysis software (MID RAS).

2. DISCUSSION

2.1 The meeting may wish to note that the results of the SMR 2025 confirm that RVSM Safety Objective No. 1 (technical height-keeping performance) and Safety Objective No. 2 (overall collision risk) have been achieved. The calculated technical risk and overall risk values remain significantly below the ICAO Target Levels of Safety, indicating that aircraft height-keeping performance and regional RVSM operations remain stable and safe.

2.2 The meeting may wish to note that the report identifies a continued deficiency in the submission of Large Height Deviation (LHD) reports, particularly in operationally critical categories related to flight crew actions, ATC errors, and TCAS events. This under-reporting significantly reduces the confidence level of the operational risk component and limits the ability to identify emerging safety trends. Similar challenges persist with incomplete or late Traffic Data Sample (TDS) submissions, especially from high-traffic FIRs, which affects the accuracy of exposure calculations.

2.3 The meeting may wish to note that the SMR 2025 also highlights persistent coordination-related safety issues at specific FIR interfaces, notably at the eastern boundaries of Muscat FIR and within the Sana'a FIR coordination environment. Despite existing safety protocols, these issues continue to generate a high volume of coordination-related deviations, indicating the need for strengthened corrective actions.

2.4 The meeting may wish to review the details of the SMR2025 report at **Appendix A**.

2.5 On a positive note, significant progress was achieved in 2025 toward the implementation of the ADS-B Height Monitoring System (AHMS), developed in cooperation with MAAR and FAA/NARMO. Several Member States have provided archived ADS-B data to support system validation. Full operational implementation is expected once the required decisions are endorsed and regular data submission arrangements are in place, anticipated by January 2026.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the results of the MID RVSM Safety Monitoring Report (SMR) 2025, confirming that RVSM operations in the MID Region continue to meet ICAO safety objectives;

b) express concern regarding the continued lack of timely and complete Large Height Deviation (LHD) reporting and Traffic Data Sample (TDS) submissions from several Member States;

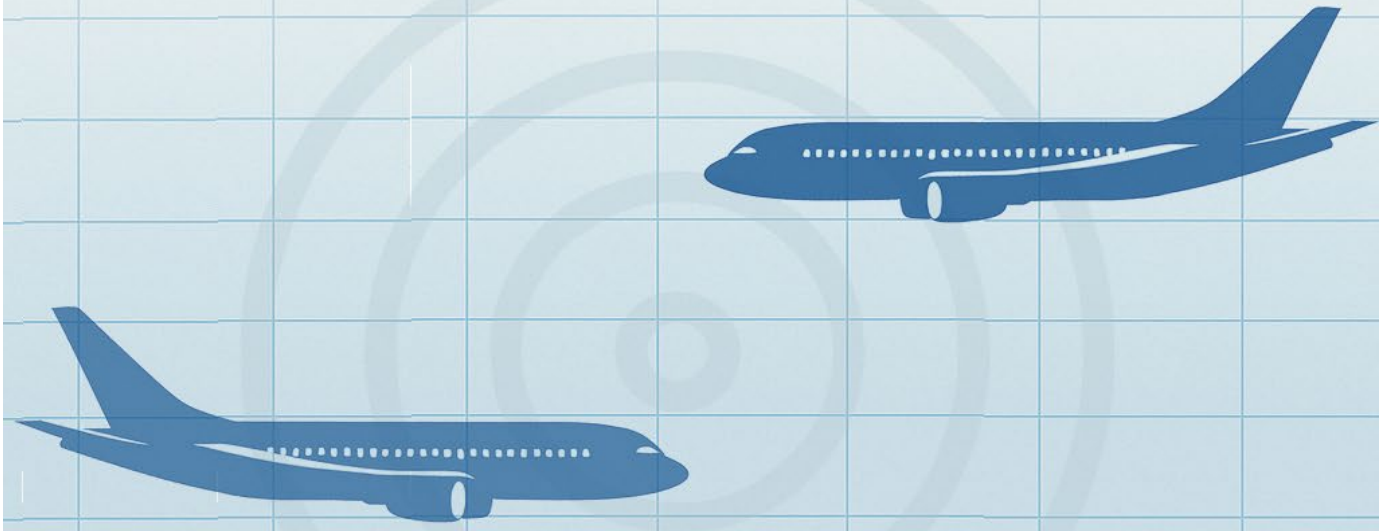
c) urge Member States to fully comply with RVSM safety monitoring requirements, including regular submission of LHD reports and complete TDS data; and

d) endorse continued progress toward the implementation of the ADS-B Height Monitoring System (AHMS) and encourage Member States to support the provision of archived ADS-B data to enable full operational deployment.

MIDRMA
MIDDLE EAST REGIONAL MONITORING AGENCY

MID RVSM Safety Monitoring Report 2025

Middle East Regional Monitoring Agency



03 January 2025

ICAO Middle East Region

EXECUTIVE SUMMARY– MID RVSM SMR 2025

The Middle East Regional Monitoring Agency (MIDRMA) continues its mandate to ensure that operations within the ICAO Middle East Reduced Vertical Separation Minimum (MID RVSM) airspace maintain the highest safety standards established by ICAO. This report, the MID RVSM Safety Monitoring Report 2025 (SMR 2025), presents the outcomes of the annual safety assessment conducted by the MIDRMA and demonstrates that RVSM operations in the Region remained safe and compliant throughout the reporting period.

The safety analysis draws upon two main data sources: the Traffic Data Sample (TDS) collected between 01 May and 31 May 2025, and all Large Height Deviation (LHD) reports received for the period 1 January – 31 December 2025. Using these inputs with other data related to aircraft ASE parameters, the MIDRAS AI software enhanced with advanced analytical capabilities was employed to calculate the vertical collision risk in accordance with the ICAO collision risk model (CRM).

Objective 1 : *The risk of collision in MID-RVSM airspace due solely to technical height-keeping performance meets the ICAO target level of safety (TLS) of* $\boldsymbol{2.5 \times 10^{-9}}$ *fatal accidents per flight hour.*

The results confirm that the technical risk associated with aircraft height-keeping performance is $\boldsymbol{8.932 \times 10^{-11}}$ *fatal accidents per flight hour, remaining well below the ICAO Target Level of Safety (TLS) of* $\boldsymbol{2.5 \times 10^{-9}}$.

Objective 2 : *The overall risk of collision due to all causes, which includes the technical risk and all risks due to operational errors and in-flight contingencies in the MID-RVSM airspace, meets the ICAO overall TLS of* $\boldsymbol{5 \times 10^{-9}}$ *fatal accidents per flight hour.*

The overall risk, which includes both technical and operational factors, was assessed at $\boldsymbol{9.278 \times 10^{-10}}$*, also significantly below the ICAO TLS of* $\boldsymbol{5 \times 10^{-9}}$.

Objective 3 : *Address any safety-related issues raised in the SMR by recommending improved procedures and practices and propose safety level improvements to ensure that any identified serious or risk-bearing situations do not increase and, where possible, that they decrease. This should set the basis for a continuous assurance that the operation of RVSM will not adversely affect the risk of en-route mid-air collision over the years.*

Despite these positive results, incomplete LHD reporting remains a persistent concern. The limited number of reports received from several high-density FIRs continues to reduce confidence in the operational component of the CRM. The MIDRMA reiterates the importance of accurate and timely LHD reporting from all Member States to preserve the integrity of the regional safety assessment.

During 2025, the MIDRMA also recorded steady progress toward the implementation of the ADS-B Height Monitoring System (AHMS), developed in collaboration with MAAR, and the FAA/NAARMO. Building on previous achievements, several States—including Bahrain, Oman and Kuwait, shared

archived ADS-B data to support system validation. The full operational phase of AHMS is expected to begin once the necessary archived ADSB data is officially submitted and the related decisions is endorsed by the Middle East Civil Aviation Authorities, anticipated by January 2026.

In summary, the SMR 2025 demonstrates that the Middle East RVSM airspace continues to meet all ICAO safety objectives. Nevertheless, ongoing attention to LHD data quality, timely TDS submissions and quality, and sustained cooperation among MID States remain critical to ensure that RVSM operations in the Region continue to achieve an acceptable and sustainable level of safety.

The findings reaffirm that the Middle East RVSM airspace continues to operate safely, maintaining a comfortable safety margin comparable to previous years.

KEY OBJECTIVES

Objective	Description	Status
1	Technical risk of collision due to height-keeping performance meets ICAO TLS (2.5×10^{-9} fatal accidents per flight hour)	**Achieved**
2	Overall risk (technical + operational) meets ICAO TLS (5×10^{-9} fatal accidents per flight hour)	**Achieved**
3	Address safety issues, recommend improvements, and ensure risk does not increase	**Ongoing**

SAFETY ANALYSIS HIGHLIGHTS

Technical Risk: **8.932×10^{-11}** fatal accidents per flight hour (well below ICAO TLS)

Overall Risk: **9.278×10^{-10}** fatal accidents per flight hour (well below ICAO TLS)

Average Aircraft Speed: 464.44 kts

Risk Type	Risk Estimation	ICAO TLS	Remarks
Technical Risk	8.932×10^{-11}	2.5×10^{-9}	**Below ICAO TLS**
Overall Risk	9.278×10^{-10}	5×10^{-9}	**Below ICAO TLS**

MAJOR FINDINGS

a. RVSM operations in the MID Region remain safe and stable.
b. Technical and overall risks are significantly below ICAO targets.
c. Incomplete Large Height Deviation (LHD) reporting from several high-density FIRs reduces confidence in operational risk assessment.
d. Progress continues on the ADS-B Height Monitoring System (AHMS), with full implementation expected by January 2026.
e. Persistent coordination challenges at Muscat–Mumbai FIR boundary and Sana'a FIR interfaces require dedicated technical meetings.

RECOMMENDATIONS

a. Improve LHD Reporting: All Member States must submit timely and accurate LHD reports to enhance safety assessment confidence.
b. Support AHMS Implementation: Continued cooperation and data sharing are essential for the successful rollout of AHMS.
c. Enhance Regional Coordination: Face-to-face technical meetings are recommended to resolve outstanding safety protocol issues.

AIRSPACE DESCRIPTION

a. All MID States have implemented RVSM in accordance with ICAO Annex 11, the PANS-ATM (Doc 4444), and ICAO Doc 7030 Regional Supplementary Procedures. RVSM operations in the Region are supported by a mix of conventional and modern surveillance systems including radar, Mode-S, ADS-B, multilateration, and various automated coordination tools used by the Area Control Centers (ACCs).

b. The MID RVSM airspace constitutes one of the world's busiest and most complex cross-regional interfaces, with major traffic flows connecting Europe, Asia, Africa, and North America. Daily operations involve a high volume of long-haul traffic, military activity, and dense overflight movements, particularly within the FIRs of Bahrain, Muscat, Jeddah, Kuwait, Tehran, Baghdad, Amman, Cairo, and Emirates.

c. To ensure continued safe and efficient RVSM operations, Member States are required to comply with the data submission obligations established by the MIDRMA, including the provision of annual Traffic Data Samples (TDS), Large Height Deviation (LHD) reports, and height-monitoring results. These inputs form the foundation of the annual safety assessment and allow the MIDRMA to monitor adherence to ICAO safety objectives.

TRAFFIC DATA SAMPLE (TDS) REVIEW

Submission Status and Quality Review

The annual Traffic Data Sample (TDS) remains one of the key inputs required for the MIDRMA to conduct a reliable regional RVSM safety assessment. In accordance with MIDANPIRG Conclusions and established MIDRMA procedures, all MID States are required to submit a complete TDS covering

the agreed monitoring period for each year. For the SMR 2025, the designated period for TDS collection was 01 May – 31 May 2025.

TDS Submission Status

a. The majority of MID States demonstrated good cooperation by submitting their TDS within or close to the expected timeframe. However, a number of FIRs either submitted their data late, incomplete or did not provide a TDS at all. Missing or incomplete TDS inputs reduce the regional accuracy of aircraft exposure estimates and place a heavier dependency on interpolated or historical data trends.

b. As in previous years, the most significant gaps continue to originate from high-volume traffic FIRs. These FIRs handle large flows of international traffic, and therefore their absence or incomplete TDS has a measurable impact on CRM model fidelity. The MIDRMA reiterates that complete TDS submission by all States is essential to maintain confidence in the annual risk estimations.

TDS Format and Technical Quality

Most States submitted data in formats compatible with the MIDRMA's automated processing tools. The technical quality of these files varied, with some containing:

a. Missing altitude information
b. Duplicate or overlapping TDS.
c. Incorrect flight levels and time sequencing
d. Flights excluded from the designated RVSM altitude band
e. Although such issues were resolved through manual cleaning and automated filtering using MIDRAS AI, they nevertheless increase processing time and may introduce uncertainty into the CRM exposure calculations.

Incomplete TDS submissions directly affect:

a. Accuracy of flight-hours estimation
b. Exposure calculations within the CRM
c. Confidence levels of the overall safety assessment
d. To ensure the sustainability of the RVSM safety monitoring program, the MIDRMA stresses the importance of timely, complete, and high-quality TDS submissions from all MID States.

Impact on Safety Assessment

Despite several gaps, the MIDRMA was able to process a sufficiently large and representative dataset to conduct the 2025 RVSM safety analysis. However, the reliability of the model would be considerably improved with full compliance from all FIRs, especially those with high traffic density or major cross-regional flow segments.

CONCLUSIONS

1. The analysis performed by the Middle East Regional Monitoring Agency (MIDRMA) confirms that the overall safety of RVSM operations within the ICAO MID Region remained well within internationally accepted limits during 2025. Both the technical and overall risk values are significantly below the ICAO Target Levels of Safety (TLS), reaffirming that the Region continues to operate a safe and stable RVSM environment.

2. The technical risk, representing the probability of vertical collision arising solely from aircraft height-keeping performance, was calculated at **8.932×10^{-11}** fatal accidents per flight hour, comfortably below the ICAO TLS of **2.5×10^{-9}**. This confirms that aircraft altimetry systems and maintenance standards across the Region continue to deliver excellent performance and remain consistent with global benchmarks.
3. The overall risk, encompassing both technical errors and operational deviations, including coordination, communication, and contingency events, was assessed at **9.278×10^{-10}** fatal accidents per flight hour, remaining well below the ICAO overall TLS of **5×10^{-9}**. These results reflect continued compliance with RVSM Safety Objective 2.

4. However, the confidence level associated with the operational risk element remains constrained by the insufficient number of Large Height Deviation (LHD) reports received from several Member States. The absence of consistent reporting, particularly for Categories **A, B, C, D, J**, and **K**, limits the accuracy of the Collision Risk Model (CRM) and may mask localized risk trends. The MIDRMA once again emphasizes that systematic and timely submission of LHD reports is a fundamental component of the regional safety assurance process.

5. The ADS-B Height Monitoring System (AHMS) initiative advanced considerably during 2025. Technical coordination with FAA/NARMO and MAAR succeeded toward the formal transfer of the ADS-B ASE processing software. Multiple States (Bahrain, Oman and Kuwait) provided archived ADS-B data supporting successful trial analyses. Once the decision related to regular submission of the archived ADSB data by the member states is endorsed and completed—expected by January 2026—the AHMS will enable large RVSM height monitoring for all MID States.

6. Persistent coordination challenges along the Muscat–Mumbai FIR boundary and within the Sana'a FIR interfaces continue to generate a share of the reported LHDs. The MIDRMA strongly recommends holding a dedicated, face-to-face technical meeting between the concerned ACCs, ICAO MID, and the MIDRMA to finalize long-term solutions and close the outstanding RVSM Safety Protocols.

7. Overall, the results of SMR 2025 reaffirm that the Middle East RVSM airspace continues to meet ICAO's safety requirements. Continued collaboration among all Member States, full participation in data submission programmes, and active support for AHMS implementation will ensure the sustained safety and efficiency of RVSM operations throughout the Region.

TECHNICAL HEIGHT-KEEPING PERFORMANCE RISK ASSESSMENT

RVSM SAFETY OBJECTIVE NO. 1

The risk of collision in MID RVSM airspace is due solely to technical height-keeping performance, which meets the ICAO target level of safety (TLS) of **2.5×10^{-9}** fatal accidents per flight hour.

The value computed for technical height risk is estimated **8.932×10^{-11}**

This safety objective addresses the technical risk of collision in the MID RVSM airspace that arises solely from aircraft height-keeping performance. This objective focuses on ensuring that aircraft altimetry systems, when operating under RVSM approval, maintain the required level of accuracy and stability to support the reduced vertical separation of 1000 ft.

The objective is evaluated by verifying that the probability of loss of vertical separation due to technical height-keeping errors remains within the ICAO Target Level of Safety (TLS) of **2.5×10^{-9}** fatal accidents per flight hour, as defined by ICAO.

This safety objective is concerned exclusively with technical performance factors, including altimetry system design, installation integrity, maintenance practices, and long-term system stability. Operational factors, human errors, and air traffic control-related events are explicitly excluded from this objective and are addressed separately under Safety Objective No. 2.

SCOPE:

The geographic scope of the MID RVSM Safety Monitoring Report for 2025 covers the MID RVSM airspace, which comprises the following FIRs/UIRs:

Amman	Bahrain	Beirut	Baghdad	Cairo	Damascus*	Doha	Emirates
Jeddah	Kuwait	Khartoum	Muscat	Sana'a	Tehran	Tripoli	

T-1: FIRs/UIRs of the Middle East RVSM Airspace

*Note: **Damascus FIR** excluded from the RVSM safety analysis due to lack of data

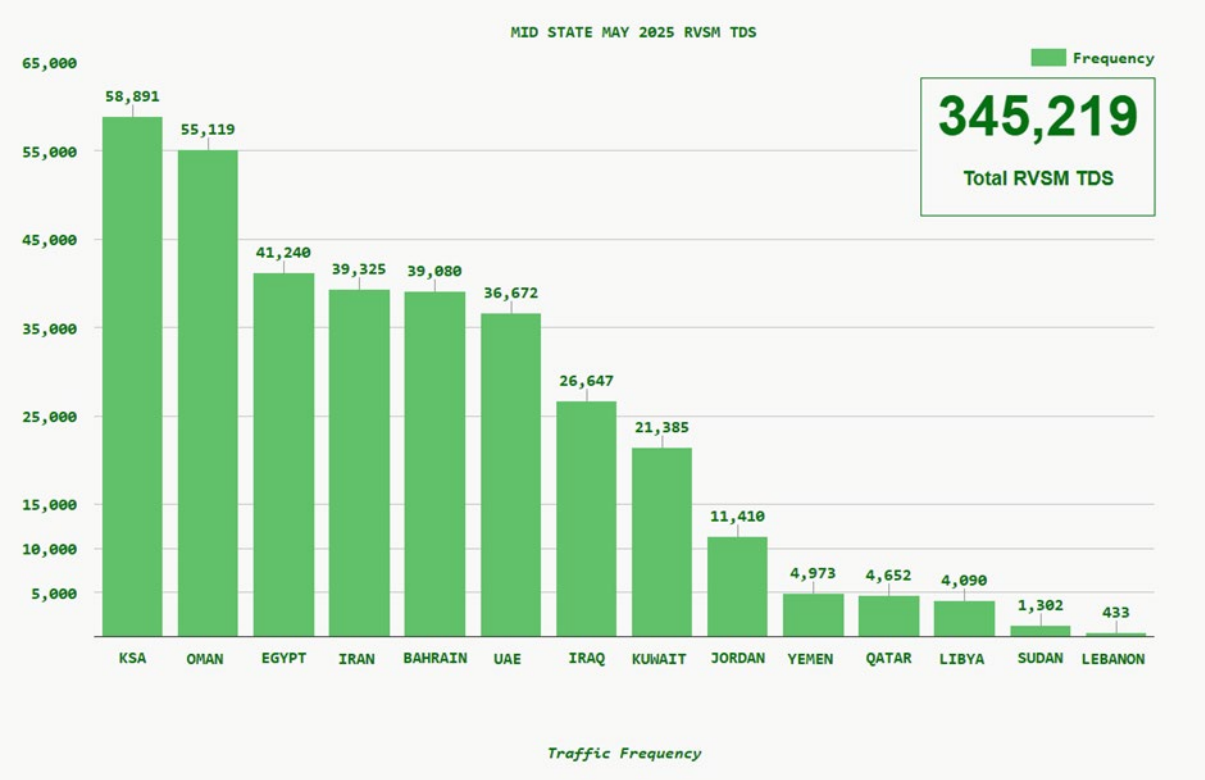
The Data Sampling periods covered by SMR 2025 are as displayed in the table below:

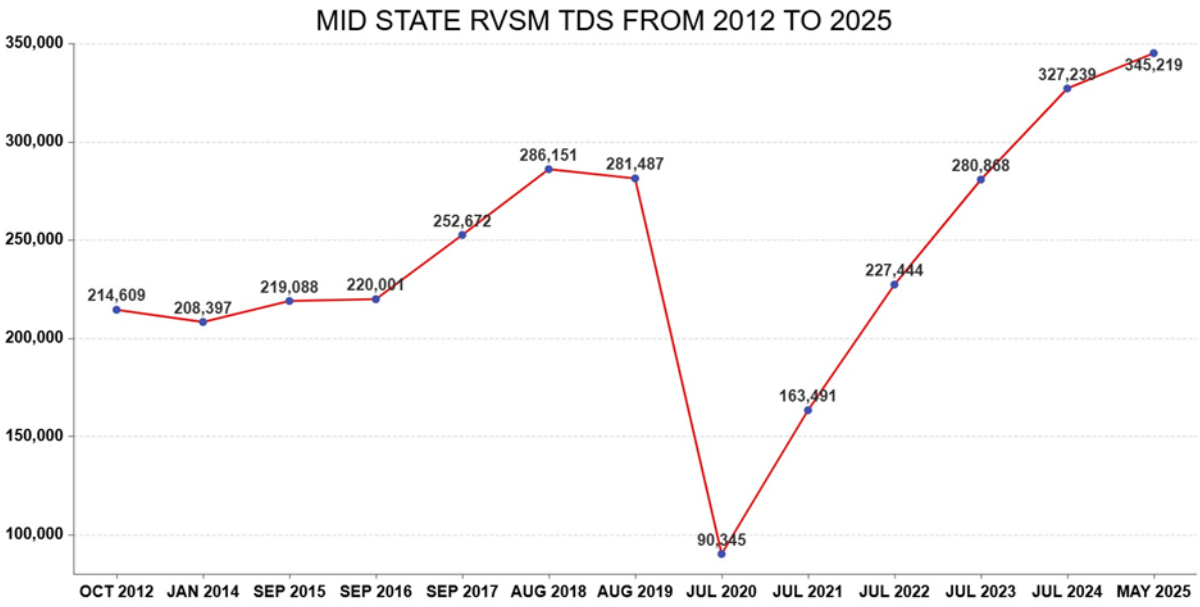
Report Elements	Time Period
Traffic Data Sample	01/05/2025 - 31/05/2025
Operational & Technical Errors	01/01/2025 - 31/12/2025

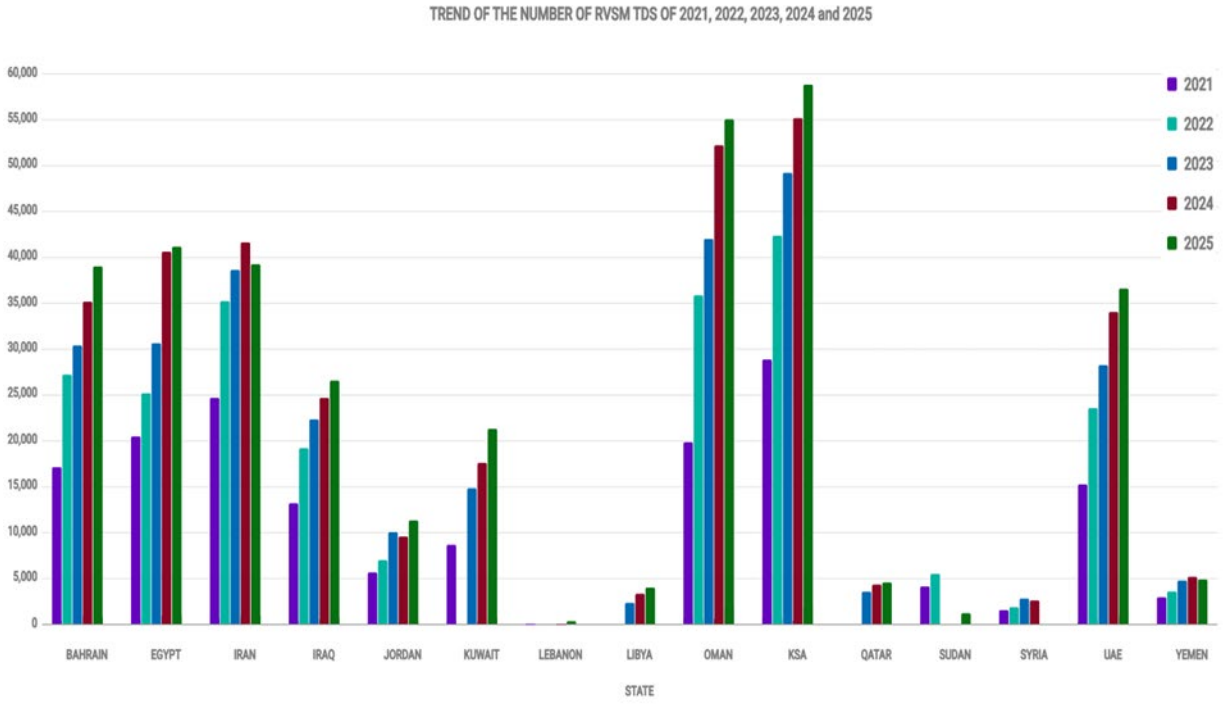
Despite the encouraging results, the MIDRMA reiterates that the incomplete and improperly formatted TDS submissions from several States, combined with the near absence of LHD reports, continue to undermine the confidence level of the final risk estimation. This issue remains a serious obstacle to maintaining a reliable safety monitoring process.

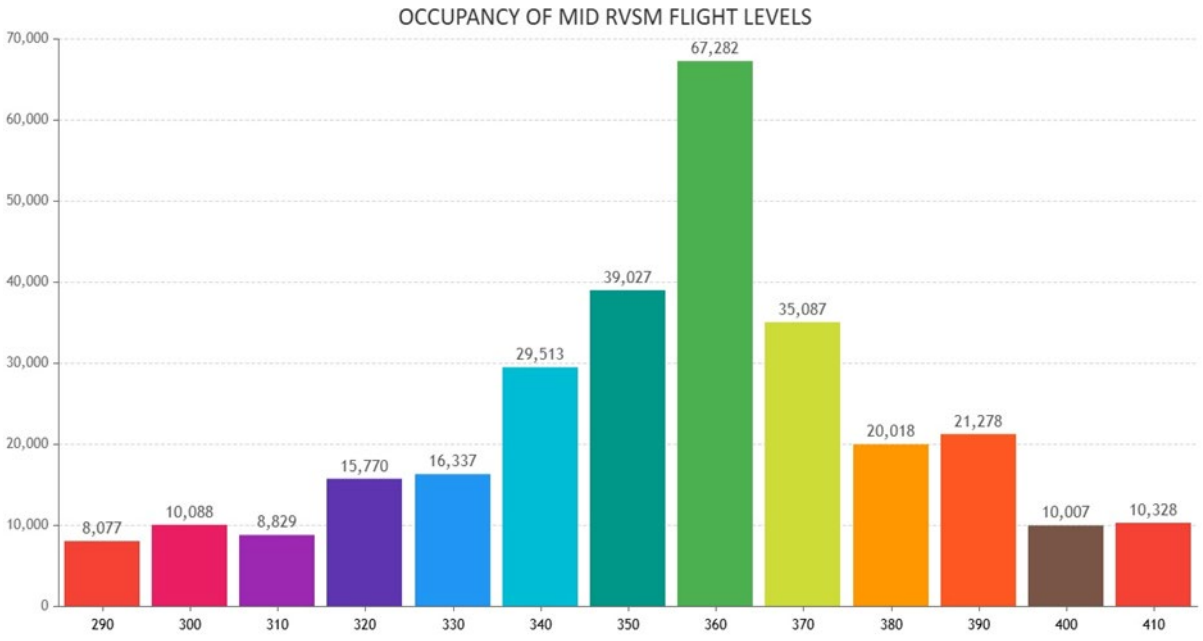
MID States	Received Date	No. of Flights
BAHRAIN	7/3/2025	39080
EGYPT	6/30/2025	41240
IRAN	7/28/2025	39325
IRAQ	6/12/2025	26647
JORDAN	7/1/2025	11410
KUWAIT	6/13/2025	21385
LEBANON	9/3/2025	433
LIBYA	6/30/2025	4090
OMAN	6/19/2025	55119
KSA	6/29/2025	58891
QATAR	6/23/2025	4652
SUDAN	7/20/2025	1302
SYRIA	No data submitted *Excluded from SMR 2025	
UAE	6/11/2025	36672
YEMEN	6/30/2025	4973
Total	**345219**	

The graphs below illustrate the distribution of submitted Traffic Data Samples (TDS) across all MID States, the overall number of flights analyzed, and the long-term trend of TDS submissions from 2012 to 2025. These visuals reflect a steady increase in total data volume.






TREND OF THE NUMBER OF RVSM TDS OF 2021, 2022, 2023, 2024 and 2025
60,000
55,000
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2021
2022
2023
2024
2025
BAHRAIN
EGYPT
IRAN
IRAQ
JORDAN
KUWAIT
LEBANON
LIBYA
OMAN
KSA
QATAR
SUDAN
SYRIA
UAE
YEMEN
STATE


OCCUPANCY OF MID RVSM FLIGHT LEVELS
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
8,077
10,088
8,829
15,770
16,337
29,513
39,027
67,282
35,087
20,018
21,278
10,007
10,328
290
300
310
320
330
340
350
360
370
380
390
400
410

#	Route	Frequency	FIR
1	DAVUS-TASMI	9799	Kuwait
2	RATVO-SIDAD	8383	Baghdad
3	TUMAK-DAVUS	6756	Bahrain
4	TASMI-NINVA	6576	Baghdad
5	ALPOB-ULADA	5947	Bahrain
6	RABAP-OBNET	5444	Bahrain
7	ULINA-DEESA	4577	Amman
8	SIDAD-RABAP	4576	Kuwait
9	DAROR-NALPO	4546	Bahrain
10	SIDAD-LONOS	3893	Kuwait
11	RASKI-MENSA	3507	Muscat
12	TASMI-KABAN	3466	Baghdad
13	LONOS-GIRMO	2762	Bahrain
14	TONVO-RASKI	2693	Muscat
15	HECA-ULINA	2506	Cairo
16	RASKI-PASOV	2351	Muscat
17	KUPRO-TONVO	2268	Emirates
18	PARAR-MENSA	2180	Muscat
19	TONVO-PARAR	2164	Muscat
20	OEJN-OERK	1985	Jeddah

Top 20 Busiest Routes

TECHNICAL RISK ESTIMATION FOR 2025

The technical height-keeping performance risk for the MID RVSM airspace during the 2025 monitoring period was estimated using the Collision Risk Model (CRM), in accordance with ICAO-approved RVSM safety monitoring methodology.

The CRM integrates aircraft height-keeping performance characteristics with regional traffic data to estimate the technical vertical collision risk **($N_a z$)**. This risk represents the likelihood of a fatal mid-air collision attributable solely to technical height-keeping errors between aircraft operating at adjacent RVSM flight levels.

For the 2025 monitoring period, the calculated technical vertical risk for the MID Region is:

$$N_a z = 8.932 \times 10^{-11} \text{ fatal accidents per flight hour}$$

This value remains significantly below the ICAO TLS, providing strong evidence that aircraft operating within the MID RVSM airspace continue to exhibit satisfactory technical height-keeping performance.

The result also demonstrates the continued effectiveness of RVSM approval, monitoring, and corrective processes implemented across the region.

TRAFFIC DATA AND AIRCRAFT PARAMETERS USED

The technical risk assessment for 2025 is based on a comprehensive set of Traffic Data Samples (TDS) and aircraft geometric parameters representative of operations throughout the MID RVSM airspace.

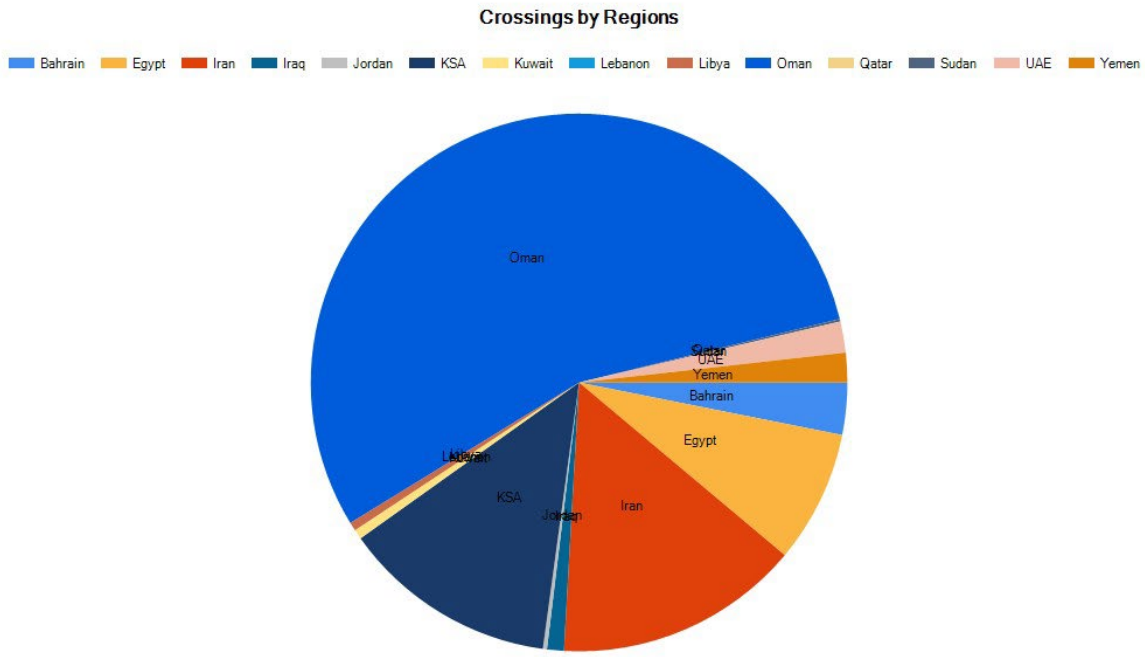
These data include aircraft movement statistics, flight times, distances flown, and average operating speeds, combined with representative aircraft dimensions used to model collision geometry within the CRM. The derived parameters reflect the diversity of aircraft types and traffic patterns present in the region.

For the 2025 assessment, the key parameters used were:

- **Average aircraft diameter (λxy):** 0.027573 NM (167.53 ft)
- **Average aircraft wingspan (λy):** 0.025412 NM (154.41 ft)
- **Average aircraft height (λz):** 0.0079215 NM (48.13 ft)
- **Number of flights analysed:** 345,219
- **Total flying time:** 213,085 hours
- **Total flying distance:** 98,230,253 NM
- **Average ground speed:** 464.11 kt
- **Average passing frequency:** 1.246×10^{-1}

These parameters were used consistently across all regional computations and are considered statistically representative of MID RVSM operations during the 2025 monitoring cycle.

Note: MIDRMA's analysis indicates that Muscat FIR continues to operate within an increasingly complex and highly congested traffic environment in the ICAO Middle East RVSM airspace and, for the fourth consecutive year, remains the most complex and congested FIR in the Middle East Region. During the reporting period, a noticeable increase in technical risk indicators has been observed within the Oman FIR RVSM airspace, largely attributable to the sustained growth in traffic density and operational complexity. Notwithstanding these challenges, the overall safety performance of the airspace remains robust, reflecting the continued commitment and professionalism of Oman's Air Traffic Services in maintaining RVSM operations at a high standard. The observed trends highlight the importance of continued vigilance, proactive risk mitigation measures, and close coordination among all stakeholders, to ensure that safety levels are preserved as traffic demand continues to evolve.



ASSUMPTIONS AND VALIDITY OF THE ASSESSMENT

To ensure that the estimated technical risk values are reliable and meaningful, a number of key assumptions underpinning the CRM computations were examined and confirmed to be valid for the 2025 assessment.

These assumptions include the validity of the estimated **frequency of horizontal overlap**, the representativeness of the traffic samples used, and the continued compliance of aircraft with ICAO height-keeping performance specifications. In particular:

a. The calculated probability of vertical overlap due to technical height-keeping errors, Pz(1000) = $\mathbf{1.86 \times 10^{-9}}$, is well below the ICAO maximum allowable value of 1.7×10^{-8}.

b. Aircraft operating at 1000 ft RVSM separation comply with the Global Height-Keeping Performance Specification.

c. Individual aircraft meet the required performance limits for the components of Total Vertical Error (TVE).

d. The MID RVSM height-monitoring programme remains active, systematic, and effective.

e. The input data used by the CRM has been validated and screened for consistency and accuracy.

f. Established procedures exist to identify, investigate, and correct any deficiencies in aircraft technical height-keeping performance.

g. The assessment methodology remains aligned with ICAO-approved practices and is periodically reviewed to ensure continued applicability.

Collectively, these conditions confirm that the technical risk results for 2025 are robust and credible.

PROBABILITY OF LATERAL OVERLAP – PY(0)

The **probability of lateral overlap, Py(0)** represents the likelihood that two aircraft operating nominally at adjacent RVSM flight levels are laterally overlapped while flying along the same or closely spaced routes. This parameter is a critical input to the CRM, as it directly influences the estimation of vertical collision risk.

For the 2025 monitoring period, Py(0) values were computed for each MIDRMA Member State using the ICAO-approved methodology implemented through the MID Risk Analysis Software. The calculations take into account traffic density, route structure, and aircraft passing frequencies within each FIR.

a. The results indicate that:

b. Py(0) values across the MID RVSM airspace remain within expected and acceptable ranges

c. No abnormal lateral overlap characteristics were identified in any FIR

d. The average regional passing frequency was calculated as 1.24565×10^{-1}, supporting the validity of the lateral overlap assumptions used in the CRM

Accordingly, the lateral overlap component of the 2025 technical risk assessment is considered appropriate and representative of actual operations within the MID RVSM airspace.

COMPLIANCE WITH PZ(1000) REQUIREMENT

The **Pz(1000)** parameter represents the probability that two aircraft operating at adjacent RVSM flight levels lose vertical separation due to technical height-keeping errors.

For the MID RVSM airspace in 2025:

a. **$Pz(1000) = 1.86 \times 10^{-9}$**

b. This value fully complies with the ICAO Global System Performance Specification limit of **1.7×10^{-8}**

This result confirms that aircraft height-keeping performance continues to meet ICAO requirements throughout the MID Region.

CONCLUSION – SAFETY OBJECTIVE NO. 1

The 2025 technical risk assessment demonstrates that Safety Objective No. 1 (Technical Height-Keeping Performance) continues to be satisfied within the MID RVSM airspace.

The analysis confirms that:

a. The calculated technical risk remains significantly below the ICAO TLS

b. Aircraft height-keeping performance remains stable and compliant

c. No evidence of systemic technical degradation was identified

Accordingly, the MID RVSM airspace continues to operate at an acceptable and compliant level of technical safety with respect to aircraft height-keeping performance.

Note 1: MIDRMA continues to distribute the Minimum Monitoring Requirements (MMRs) using its automated MMR software. This software is designed to provide member states with updated monitoring requirements based on the most recent RVSM approvals.

Note 2: All member states must review and adhere to their MMRs, which are accessible on the MIDRMA website (*www.midrma.com*).

RECOMMENDATIONS FOR RVSM SAFETY OBJECTIVE NO. 1:

1. **Sustain Height-Monitoring Activities**
   MIDRMA should continue to conduct systematic RVSM height-monitoring activities in accordance with ICAO requirements to ensure the ongoing verification of aircraft height-keeping performance. Particular attention should be given to newly approved aircraft types and fleets with limited monitoring history to confirm continued compliance with the Global Height-Keeping Performance Specification.

2. **Enhance the Use of ADS-B–Based Height Monitoring (AHMS)**
   Member States are encouraged to actively support the transition toward ADS-B–based height monitoring by facilitating the regular provision of archived ADS-B data to MIDRMA. Once fully implemented, AHMS will significantly expand monitoring coverage, improve detection capability, and strengthen confidence in regional technical risk assessments.

3. **Maintain Compliance with Minimum Monitoring Requirements (MMRs)**
   All Member States should ensure that aircraft operators comply with the Minimum Monitoring Requirements (MMRs) issued by MIDRMA. States are encouraged to regularly review their national RVSM oversight processes to ensure that aircraft subject to monitoring obligations are tracked, monitored, and followed up in a timely manner.

4. **Early Identification and Corrective Action for Height-Keeping Deviations**
   MIDRMA, in coordination with States and operators, should continue to promptly identify aircraft exhibiting unsatisfactory height-keeping performance and ensure that appropriate corrective actions are taken without delay. This includes verification of altimetry system maintenance, configuration, and calibration before the aircraft continues unrestricted RVSM operations.

5. **Promote Preventive Maintenance and Continued Airworthiness**
   States should emphasize preventive maintenance practices and strict adherence to altimetry system maintenance standards as part of their continuing airworthiness oversight.

This proactive approach will help sustain the high level of technical performance observed across the MID RVSM airspace.

6. Strengthening Technical Awareness and Training

MIDRMA, in cooperation with ICAO and relevant partners, should continue to support technical workshops and awareness activities for State inspectors, maintenance organizations, and operators, focusing on height-keeping performance, Total Vertical Error (TVE) components, and the interpretation of monitoring results.

7. Maintain Alignment with ICAO Global Practices

MIDRMA should continue to align its technical risk assessment methodology with ICAO guidance material and global best practices, ensuring consistency with other Regional Monitoring Agencies and supporting the credibility of the MID RVSM safety monitoring programme.

OVERALL SAFETY (OPERATIONAL AND TECHNICAL RISK)

Safety objective no. 2 aims to ensure that the overall risk of collision due to all causes including technical risk, operational errors, and in-flight contingencies within the icao middle east (mid) rvsm airspace remains at or below the icao established overall target level of safety (tls) **of 5×10^{-9}** fatal accidents per flight hour.

Based on the safety assessment conducted for the 2025 reporting cycle, the **estimated overall collision risk** for the mid rvsm airspace was calculated to be **9.278×10^{-10}** fatal accidents per flight hour. This computed value continues well below the icao overall tls, thereby indicating that rvsm safety objective no. 2 has been formally satisfied for the reporting period.

While the calculated result demonstrates compliance with icao safety targets, it must be interpreted with caution due to the limitations associated with the availability and quality of operational safety data, particularly large height deviation (lhd) reports, which remain a critical input to the overall risk assessment.

LARGE HEIGHT DEVIATION (LHD) REPORTS – 2025

a. The MIDRMA continues to express serious concern regarding the persistently inadequate submission of Large Height Deviation (LHD) reports across the ICAO MID Region. Despite sustained efforts by the Agency, including formal correspondence, repeated monthly reminders, and continuous coordination with designated focal points in all Member States, the level of LHD reporting during 2025 remained critically insufficient.

b. Throughout the twelve-month reporting period of 2025, only three (3) LHD reports were received. Of these, two reports were submitted by Emirates ATC, whose proactive engagement and consistent cooperation with regional safety monitoring requirements are highly acknowledged and appreciated. The remaining single report was received from Jeddah ATC.

c. It is important to highlight that this reporting deficiency specifically affects **LHD categories** of direct operational relevance to RVSM safety, namely **Categories A, B, C, D, J, and K**, which represent events associated with flight crew actions, ATC errors, and TCAS-related occurrences. These categories are essential for accurately assessing operational risk and validating compliance with Safety Objective No. 2.

d. The continued absence of meaningful LHD data severely undermines the robustness of the operational risk assessment and significantly reduces the confidence level associated with the calculated overall collision risk. From a regional safety oversight perspective, this situation remains unacceptable and necessitates urgent corrective action by all MIDRMA Member States to ensure compliance with ICAO reporting obligations.

DISTRIBUTION OF REPORTED LHDS BY MID FIRS

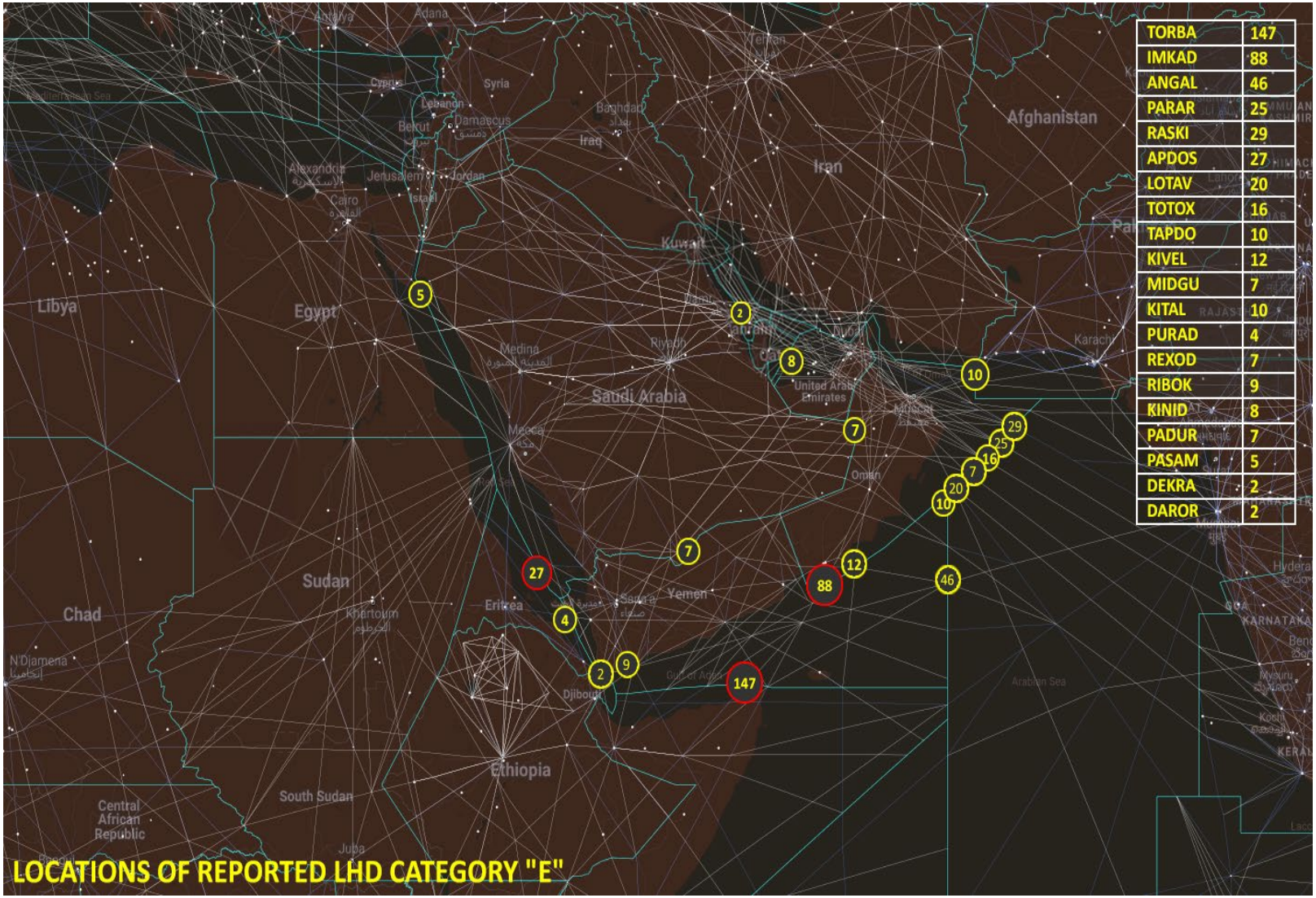
a. The table below presents the number of reported LHDs and related LHDs across MID FIRs during the 2025 reporting cycle. The figures clearly demonstrate substantial disparities in reporting practices among FIRs, further reinforcing concerns regarding the completeness and representativeness of the available data.

MID FIRs	No. of Reported LHDs	No. of Related LHDs
Bahrain	8	5
Baghdad	2	-
Amman	-	2
Tehran	-	3
Cairo	9	3
Damascus	-	2
Khartoum	-	-
Kuwait	-	1
Muscat	83	95
Jeddah/ Riyadh	11	59
Qatar	14	-
Tripoli	-	-
Emirates	2	5
Sana'a	337	8

MID FIRs	Related to other Adjacent FIRs	No. of Related LHDs
Sana'a	Addis Ababa	148
Sana'a	Asmara	6
Sana'a	Djibouti	0
Sana'a	Mumbai	46
Muscat	Karachi	10
Muscat	Mumbai	60

LHD Reports Related to other Regions

b. Several FIRs reported no LHDs at all, while others submitted large volumes of coordination-related reports **category E** , This imbalance further complicates the regional operational risk assessment and limits the ability to derive statistically reliable conclusions. The map below illustrates the locations of reported LHD Cat. E


TORBA 147
IMKAD 88
ANGAL 46
PARAR 25
RASKI 29
APDOS 27
LOTAV 20
TOTOX 16
TAPDO 10
KIVEL 12
MIDGU 7
KITAL 10
PURAD 4
REXOD 7
RIBOK 9
KINID 8
PADUR 7
PASAM 5
DEKRA 2
DAROR 2
LOCATIONS OF REPORTED LHD CATEGORY "E"

OPERATIONAL RISK ASSOCIATED WITH LHD CATEGORIES

a. The validated LHD reports for the 2025 Safety Monitoring Report cycle were classified according to standard ICAO LHD categories and used as inputs for the calculation of the overall vertical collision risk under Safety Objective No. 2.

b. While a large number of coordination-related LHD Category E reports were exchanged between specific FIR interfaces, only three (3) validated LHD occurrences affecting RVSM safety objectives were eligible for inclusion in the overall collision risk model. Notably, no LHDs were reported under Categories B, C, D, J, or K, which are typically associated with the most severe operational safety implications in RVSM airspace.

Note: The LHD reports in this table were validated for the whole SMR 2025 reporting cycle:

LHD Cat. Code	Large Height Deviation (LHD) Categories	No. of LHDs	LHD Duration (Sec.)
A	The flight crew fails to climb or descend the aircraft as cleared.	**1**	**7**
B	Flight crew climbing or descending without ATC clearance.	**-**	**-**
C	Incorrect operation or interpretation of airborne equipment	**-**	**-**
D	ATC system loop error	**-**	**-**
E	ATC transfer of control coordination errors due to human factors	**-**	**-**
F	ATC transfer of control coordination errors due to technical issues	**-**	**-**
G	Aircraft contingency leading to a sudden inability to maintain level	**-**	**-**
H	Airborne equip. Failure and unintentional or undetected FL change	**1**	**28**
I	Turbulence or other weather-related cause	**-**	**-**
J	TCAS resolution advisory and flight crew correctly responds	**-**	**-**
K	TCAS resolution advisory and flight crew incorrectly responds	**-**	**-**
L	ACFT being provided with RVSM separation is not RVSM-approved	**-**	**-**
M	Other	**1**	**60**
	Total	**3**	**95**

SUMMARY OF OPERATIONAL RISK ASSOCIATED WITH LARGE HEIGHT DEVIATION REPORTS FOR SMR 2025 REPORTING CYCLE

Note 1: For the second time, an RVSM Safety Monitoring Report (SMR) has been issued with such a low number of Large Height Deviation (LHD) reports, raising serious concerns about the accuracy of the overall risk assessments. Particularly alarming is the complete absence of reports for LHD categories that have a severe impact on RVSM operations.

Note 2: The **hotspots and the airways occupancy** of all MIDRMA member states are available for review in Appendix C of this Safety Monitoring Report.

The absence of LHDs in critical categories raises serious concerns regarding under-reporting rather than an absence of operational deviations.

The limited dataset substantially constrains the ability to accurately assess operational risk trends and validate the calculated overall collision risk.

For the second time, an RVSM Safety Monitoring Report has been issued with such a low number of LHD reports, highlighting a systemic reporting deficiency rather than an isolated occurrence.

RVSM SAFETY PROTOCOL – EASTERN BOUNDARIES OF MUSCAT FIR

a. The most recent review of RVSM safety at the eastern boundaries of Muscat FIR confirms that concerns related to Large Height Deviations between Muscat and Mumbai ATC units persist throughout 2025.

b. Although several corrective and preventive measures have been implemented since the introduction of the RVSM safety protocol, the number of exchanged LHD reports remains unacceptably high. While a slight reduction was observed during the first half of 2025 compared with 2024, the figures continue to exceed acceptable safety thresholds.

c. This sustained trend indicates that the issue is systemic rather than sporadic, suggesting that existing mitigation measures have not yet achieved their intended safety outcomes. Without the implementation of more robust and sustained corrective actions, the situation will continue to pose a significant safety risk to RVSM operations at this critical FIR interface.

d. Enhanced coordination procedures, improved data-sharing mechanisms, and strengthened monitoring and investigation processes are urgently required to ensure that corrective actions result in measurable and lasting safety improvements.

e. Further details related to Muscat–Mumbai LHD exchanges are provided in **Appendix A** of this report.

RVSM SAFETY PROTOCOL – SANA'A FIR

a. A comparative analysis of the first nine months of 2024 and 2025 indicates a continued and concerning increase in LHD reports involving Sana'a FIR and its adjacent FIRs. During the corresponding period in 2024, 218 LHDs were reported, compared with 265 LHDs in 2025, representing an increase of approximately 73%.

b. The most significant increases were observed in coordination with Addis Ababa FIR and Muscat FIR, while a reduction was noted with Jeddah FIR. This uneven distribution suggests that while localized improvements have been achieved in some interfaces, systemic coordination challenges persist in others.

Sanaa Related To ---►	Addis Ababa	Asmara	Jeddah	Mumbai	Muscat	TOTAL
Jan-25	18	2	2	8	17	**47**
Feb-25	7	0	2	2	10	**21**
Mar-25	7	0	3	0	8	**18**
Apr-25	4	1	1	4	7	**17**
May-25	2	0	2	4	7	**15**
Jun-25	11	0	2	10	10	**33**
Jul-25	20	1	4	3	3	**31**
Aug-25	34	1	2	4	13	**54**
Sep-25	20	0	4	3	2	**29**
Oct 2025	10	0	13	6	9	**38**
Nov 2025	15	1	6	2	7	**31**
Dec 2025	23	1	6	9	5	**44**
Total Report	**171**	**7**	**47**	**55**	**98**	**378**

LHD Reports filed by Sana'a ATC related to adjacent FIRs

c. The continuing rise in LHD occurrences, particularly between Sana'a and Muscat FIRs, reflects unresolved deficiencies in handover coordination, flight level verification, and real-time communication procedures. Unless decisive corrective actions are implemented,

these deviations may compromise the long-term safety of RVSM operations within the affected airspace.

RVSM APPROVALS AND COMPLIANCE MONITORING

a. In accordance with **ICAO Documents 9574 and 9937**, the MIDRMA continues to perform systematic monitoring of RVSM operational compliance to ensure that aircraft operating within the MID RVSM airspace hold valid State RVSM approvals.

b. Due to limitations in obtaining comprehensive traffic data from all Member States, compliance monitoring is primarily conducted using monthly RVSM traffic data provided by Bahrain, Baghdad, and Emirates FIRs. The MIDRMA expresses its sincere appreciation to the Civil Aviation Authorities of Bahrain, Iraq, and the United Arab Emirates for their consistent and high-quality data submissions, which remain essential for effective regional safety oversight.

c. A limited number of non-RVSM-approved aircraft were identified during the 2025 monitoring cycle. These cases were generally attributed to administrative delays or temporary lapses in approval validity, rather than intentional non-compliance. Member States are therefore urged to ensure that RVSM approval databases are maintained accurately and updated promptly.

d. Detailed results related to non-RVSM-approved aircraft are presented in **Appendix B** of this report.

CONCLUSIONS – RVSM SAFETY OBJECTIVE NO. 2

1. The estimated overall collision risk within the ICAO Middle East RVSM airspace for the 2025 Safety Monitoring Report reporting cycle remains below the ICAO Overall Target Level of Safety (TLS) of 5×10^{-9} fatal accidents per flight hour, thereby indicating formal compliance with RVSM Safety Objective No. 2.

2. The calculated overall risk value reflects the combined contribution of technical risk, operational errors, and in-flight contingencies; however, the reliability of this assessment is significantly affected by limitations in the availability and quality of operational safety data, particularly Large Height Deviation (LHD) reports.

3. The extremely low number of LHD reports received during the 2025 reporting period, especially those associated with operationally critical LHD categories (A, B, C, D, J, and K), raises serious concerns regarding the completeness and representativeness of the operational risk component used in the overall collision risk calculation.

4. The continued absence of standardized and timely LHD reporting from the majority of MIDRMA Member States substantially reduces the confidence level of the operational risk assessment and limits the ability to accurately identify regional safety trends and emerging operational hazards.

5. Persistent LHD hotspots identified at specific FIR interfaces, notably at the eastern boundaries of Muscat FIR and within the Sana'a FIR coordination environment, indicate that systemic operational and coordination deficiencies remain unresolved despite the implementation of existing safety protocols.

6. The observed increase in LHD occurrences under established RVSM safety protocols demonstrates that current corrective and preventive measures have not yet achieved the desired and sustained level of safety improvement, necessitated further review and strengthening of coordination, communication, and monitoring arrangements.

7. While the MIDRMA continues to conduct monitoring of RVSM approval compliance in accordance with ICAO Documents 9574 and 9937, the effectiveness of this activity remains constrained by incomplete traffic data submissions from several Member States.

8. The MIDRMA considers the ongoing deficiencies in Traffic Data Sample (TDS) submissions and LHD reporting to constitute a serious regional safety oversight concern, which requires urgent and coordinated corrective action by all Member States, supported by the ICAO MID Office.

RVSM SAFETY OBJECTIVE NO. 3 – SAFETY IMPROVEMENT, RECOMMENDATIONS, AND CONTINUOUS ASSURANCE

Objective 3: Address any safety-related issues raised in the SMR by recommending improved procedures and practices and propose safety level improvements to ensure that any identified serious or risk-bearing situations do not increase and, where possible, that they decrease. This should set the basis for a continuous assurance that the operation of RVSM will not adversely affect the risk of en-route mid-air collision over the years.

a. RVSM Safety Objective No. 3 aims to ensure that safety-related issues identified through the RVSM safety monitoring process are effectively addressed through corrective actions, strengthened procedures, and continuous engagement with Member States. This objective is qualitative in nature and is not assessed through numerical indicators; instead, its achievement is demonstrated through the existence and effective operation of a structured and sustainable safety improvement process.

b. Throughout the reporting period, the Middle East Regional Monitoring Agency (MIDRMA) has systematically reviewed the outcomes of RVSM safety monitoring activities and translated identified safety concerns into clear observations, conclusions, and recommendations. These outcomes have been formally communicated to the concerned States through the

Safety Monitoring Report, bilateral coordination, and relevant regional safety forums, ensuring that safety issues are clearly highlighted and appropriately addressed at both operational and regulatory levels.

c. The MIDRMA has maintained continuous coordination with Member States to support the implementation of safety improvements related to RVSM operations. Particular attention has been given to issues associated with inter-FIR coordination, the management and reporting of Large Height Deviations (LHDs), the quality and consistency of Traffic Data Sample (TDS) submissions, and the continued oversight of RVSM approvals. This proactive and structured approach ensures that identified safety issues are not left unresolved and that preventive measures are implemented in a timely manner to avoid the escalation of risk.

d. In addition, the consistent application of ICAO-approved monitoring methodologies has ensured that safety improvement remains an integral component of the RVSM oversight framework in the Middle East Region. The established cycle of monitoring, analysis, reporting, and follow-up provides assurance that safety observations lead to tangible improvements in operational practices and oversight arrangements, thereby preventing the accumulation of latent risks over time.

e. As part of its continuous efforts to further enhance regional safety oversight, the MIDRMA has also focused on strengthening its risk analysis capabilities through the development of the Middle East Risk Assessment Software with ADS-B Integration and Response (MIDRAS-AIR), as detailed in a dedicated working paper. This initiative represents a strategic enhancement of the MIDRMA's analytical framework by leveraging advanced data integration and automation to support more robust and proactive safety assessments. In parallel, the MIDRMA is implementing an upgrade to the online Large Height Deviation (LHD) reporting system, aimed at improving usability, consistency, and reporting efficiency. All RVSM focal points will be fully briefed well in advance of the upgrade to ensure a smooth transition and the continued effectiveness of regional LHD reporting.

f. Based on the above, the MIDRMA considers that **RVSM Safety Objective No. 3 has been successfully achieved**. A robust and effective mechanism is in place to ensure that safety issues identified through RVSM monitoring are systematically reviewed, communicated, and addressed. This continuous safety improvement process provides confidence that RVSM operations in the Middle East Region are actively managed and that emerging safety concerns are mitigated in a timely manner.

g. The achievement of RVSM Safety Objective No. 3 complements the outcomes of Safety Objectives No. 1 and No. 2 by ensuring that technical and operational risks identified through monitoring activities are followed by appropriate corrective and preventive actions. Together, these objectives provide comprehensive assurance that the RVSM system in the Middle East Region continues to operate safely and in accordance with ICAO provisions.

RECOMMENDATIONS

1. In order to sustain and further strengthen the achievements under RVSM Safety Objective No. 3, the MIDRMA recommends that Member States continue to actively support the regional safety improvement process by maintaining close coordination with the MIDRMA on all RVSM-related safety matters. Particular emphasis should be placed on timely and effective follow-up of safety observations and recommendations arising from the RVSM Safety Monitoring Report.
2. Member States are encouraged to ensure that operational procedures at FIR boundaries remain clearly defined, regularly reviewed, and effectively implemented, with special attention given to coordination practices that have the potential to generate Large Height Deviations (LHDs). Continued awareness and reinforcement of proper LHD reporting practices are essential to support accurate safety oversight and the identification of emerging safety trends.
3. States should also continue to support initiatives aimed at enhancing regional risk analysis capabilities, including the development and future implementation of advanced analytical tools such as MIDRAS-AIR. Active participation in system briefings, training activities, and consultations related to new tools and system upgrades, including the online LHD reporting platform, will be essential to ensure their effective and consistent use across the region.

CONCLUSIONS

1. RVSM Safety Objective No. 3 addresses the critical need for a continuous and structured approach to safety improvement within the Middle East RVSM airspace. While this objective is not assessed through quantitative measures, its achievement is demonstrated through the establishment and sustained operation of effective mechanisms for identifying, communicating, and addressing safety-related issues.

2. Based on the actions undertaken during the reporting period, the MIDRMA concludes that RVSM Safety Objective No. 3 has been successfully achieved. Safety issues identified through RVSM monitoring activities are systematically reviewed and translated into practical recommendations, supported by continuous engagement with Member States and the ongoing enhancement of analytical and reporting tools.

3. The continued application of this safety improvement framework, together with sustained collaboration between the MIDRMA and Member States, provides strong assurance that RVSM operations in the Middle East Region will remain safe, resilient, and aligned with ICAO provisions over the long term.

Appendix A

LHD REPORTS SUBMITTED BY MUSCAT ACC RELATED TO MUMBAI ACC

#	ID	Date of Occ	Reported By	Related to	Location	Nature of the occurrence:	Category
1	12299	Jan 1, 2025	Muscat	Mumbai	TOTOX	Revised FL Not Coordinated	E
2	12347	Jan 3, 2025	Muscat	Mumbai	PARAR	ACFT Entered FIR Without Coordination	E
3	12348	Mar 3, 2025	Muscat	Mumbai	KITAL	ACFT Entered FIR Without Coordination	E
4	12349	Mar 3, 2025	Muscat	Mumbai	LOTAV	ACFT Entered FIR Without Coordination	E
5	12350	Mar 5, 2025	Muscat	Mumbai	PARAR	ACFT Entered FIR Without Coordination	E
6	12351	Mar 6, 2025	Muscat	Mumbai	PARAR	ACFT Entered FIR Without Coordination	E
7	12352	Mar 9, 2025	Muscat	Mumbai	PARAR	ACFT Entered FIR Without Coordination	E
8	12353	Mar 9, 2025	Muscat	Mumbai	TOTOX	ACFT Entered FIR Without Coordination	E
9	12354	Mar 12, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
10	12355	Mar 15, 2025	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E
11	12356	Mar 22, 2025	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
12	12357	Mar 24, 2025	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
13	12358	Mar 25, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
14	12385	April 5, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
15	12386	April 6, 2025	Muscat	Mumbai	RASKI	Revised Estimate Not Coordinated	E
16	12477	June 6, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
17	12478	June 5, 2025	Muscat	Mumbai	RASKI	Revised Estimate Not Coordinated	E
18	12479	June 5, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
19	12480	June 6, 2025	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E
20	12481	June 13, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
21	12482	June 13, 2025	Muscat	Mumbai	LOTAV	ACFT Entered FIR Without Coordination	E
22	12483	June 14, 2025	Muscat	Mumbai	TOTOX	ACFT Entered FIR Without Coordination	E
23	12484	June 14, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
24	12485	June 15, 2025	Muscat	Mumbai	PARAR	ACFT Entered FIR Without Coordination	E
25	12486	June 17, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
26	12487	June 18, 2025	Muscat	Mumbai	TOTOX	ACFT Entered FIR Without Coordination	E
27	12488	June 18, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
28	12489	June 20, 2025	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
29	12490	June 22, 2025	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E

30	12491	June 24, 2025	Muscat	Mumbai	PARAR	ACFT Entered FIR Without Coordination	E
31	12492	June 24, 2025	Muscat	Mumbai	ASPUX	ACFT Entered FIR Without Coordination	E
32	12493	June 24, 2025	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
33	12494	June 25, 2025	Muscat	Mumbai	TOTOX	ACFT Entered FIR Without Coordination	E
34	12495	June 26, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
35	12496	June 28, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
36	12497	June 29, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
37	12498	June 30, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
38	12499	Jun 26, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
39	12652	Oct 01, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
40	12653	Oct 01, 2025	Muscat	Mumbai	KITAL	ACFT Entered FIR Without Coordination	E
41	12654	Oct 02, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
42	12655	Oct 02, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
43	12656	Oct 02, 2025	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
44	12657	Oct 02, 2025	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
45	12658	Oct 02, 2025	Muscat	Mumbai	TOTOX	ACFT Entered FIR Without Coordination	E
46	12659	Oct 03, 2025	Muscat	Mumbai	KITAL	ACFT Entered FIR Without Coordination	E
47	12660	Oct 04, 2025	Muscat	Mumbai	KITAL	ACFT Entered FIR Without Coordination	E
48	12661	Oct 04, 2025	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E
49	12662	Oct 04, 2025	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E
50	12663	Oct 05, 2025	Muscat	Mumbai	ASPUX	Revised FL Not Coordinated	E
51	12664	Oct 07, 2025	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
52	12665	Oct 07, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
53	12666	Oct 07, 2025	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E
54	12673	Oct 08, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
55	12674	Oct 08, 2025	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
56	12675	Oct 08, 2025	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E
57	12676	Oct 09, 2025	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
58	12677	Oct 10, 2025	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
59	12678	Oct 10, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
60	12679	Oct 10, 2025	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E

LHD REPORTS SUBMITTED BY MUMBAI RELATED TO MUSCAT

#	ID	Date of Occ	Reported By	Related to	Location	Nature of the occurrence:	Category
1	LHD003030	30-1-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
2	LHD003031	3-1-2025	Mumbai	Muscat	PARAR	No transfer information	E
3	LHD003032	4-1-2025	Mumbai	Muscat	RASKI	No or late FL revision	E
4	LHD003033	7-1-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
5	LHD003034	7-1-2025	Mumbai	Muscat	TOTOX	No or late FL revision	E
6	LHD003035	13-1-2025	Mumbai	Muscat	TOTX	No or late FL revision	E
7	LHD003037	18-1-2025	Mumbai	Muscat	RASKI	No or late FL revision	E
8	LHD003038	19-1-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
9	LHD003039	21-1-2025	Mumbai	Muscat	TOTOX	No or late FL revision	E
10	LHD003040	28-1-2025	Mumbai	Muscat	RASKI	No or late FL revision	E
11	LHD003067	9-2-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
12	LHD003068	9-2-2025	Mumbai	Muscat	KITAL	No or late FL revision	E
13	LHD003069	12-2-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
14	LHD003109	3-3-2025	Mumbai	Muscat	PARAR	No transfer information	E
15	LHD003110	3-3-2025	Mumbai	Muscat	PARAR	No transfer information	E
16	LHD003111	8-3-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
17	LHD003112	9-3-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
18	LHD003113	24-3-2025	Mumbai	Muscat	KITAL	No or late FL revision	E
19	LHD003114	24-3-2025	Mumbai	Muscat	REXOD	No or late FL revision	E
20	LHD003153	3-4-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
21	LHD003154	5-4-2025	Mumbai	Muscat	RASKI	No or late FL revision	E
22	LHD003155	5-4-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
23	LHD003156	11-4-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
24	LHD003157	17-4-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
25	LHD003158	21-4-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
26	LHD003159	23-4-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
27	LHD003176	5-5-2025	Mumbai	Muscat	TOTOX	No or late FL revision	E
28	LHD003178	8-5-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
29	LHD003179	14-5-2025	Mumbai	Muscat	REXOD	No or late FL revision	E

30	LHD003180	22-5-2025	Mumbai	Muscat	TOTOX	No or late FL revision	E
31	LHD003181	22-5-2025	Mumbai	Muscat	TOTOX	No or late FL revision	E
32	LHD003182	27-5-2025	Mumbai	Muscat	REXOD	No or late FL revision	E
33	LHD003183	27-5-2025	Mumbai	Muscat	TOTOX	No transfer information	E
34	LHD003217	29-6-2025	Mumbai	Muscat	KITAL	No transfer information	E
35	LHD003218	27-6-2025	Mumbai	Muscat	KITAL	No or late FL revision	E
36	LHD003253	4-7-2025	Mumbai	Muscat	KITAL	No estimate time revi.	E
37	LHD003254	9-7-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
38	LHD003255	23-7-2025	Mumbai	Muscat	PARAR	No transfer information	E
39	LHD003256	3-7-2025	Mumbai	Muscat	LOTAV	No or late estimate rev.	E
40	LHD003305	3-8-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
41	LHD003306	22-8-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
42	LHD003307	29-8-2025	Mumbai	Muscat	LOTAV	No or late estimate rev.	E
43	LHD003308	30-9-2025	Mumbai	Muscat	PARAR	No or late FL revision	E
44	LHD003309	24-8-2025	Mumbai	Muscat	RASKI	No or late FL revision	E
44	LHD003381	29-11-2025	Mumbai	Muscat	LOTAV	No or late FL revision	E
45	LHD003380	18-11-2025	Mumbai	Muscat	TOTOX	No transfer information	E
46	LHD003379	14-11-2025	Mumbai	Muscat	TOTOX	No or late FL revision	E
47	LHD003348	30-10-2025	Mumbai	Muscat	ANGAL	No or late FL revision	E
48	LHD003347	29-10-2025	Mumbai	Muscat	ANGAL	No or late FL revision	E
49	LHD003331	20-10-2025	Mumbai	Muscat	ANGAL	No or late FL revision	E
50	LHD003330	7-10-2025	Mumbai	Muscat	ANGAL	No or late FL revision	E
51	LHD003309	24-08-20205	Mumbai	Muscat	RASKI	No or late FL revision	E

Appendix B

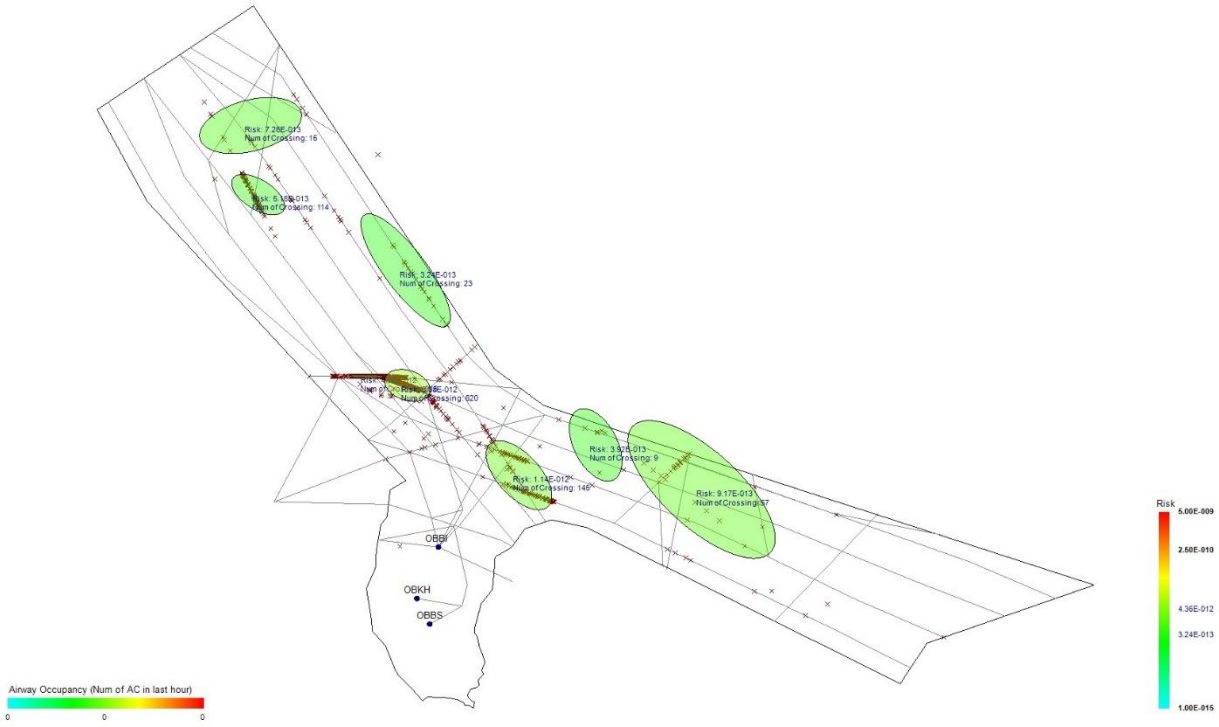
NON-RVSM APPROVED AIRCRAFT

#	Registration of Violating ACFT	ICAO Type	First Observed on	RMA Observed	STATE/RMA Responsible
1	PKLSW	B739	08-03-23	MIDRMA	AAMA
2	PKLVF	B739	20-01-23	MIDRMA	AAMA
3	PKSTD	A320	19-01-23	MIDRMA	AAMA
4	PKLSV	B739	21-12-22	MIDRMA	AAMA
5	PKBGZ	B738	13-12-22	MIDRMA	AAMA
6	PKBKM	A320	30-11-22	MIDRMA	AAMA
7	PKLSU	B739	27-11-22	MIDRMA	AAMA
8	PKSTH	A320	27-11-22	MIDRMA	AAMA
9	PKSJH	A320	06-11-22	MIDRMA	AAMA
10	60208A	C17	30-03-20	MIDRMA	AAMA
11	40001A	C17	25-01-20	MIDRMA	AAMA
12	9SPRR	IL76	09-06-24	MIDRMA	AFIRMA
13	XTEBO	IL76	07-06-24	MIDRMA	AFIRMA
14	5NBYJ	E290	06-06-24	MIDRMA	AFIRMA
15	TTDAB	H25B	31-05-24	MIDRMA	AFIRMA
16	5NADM	B744	28-05-24	MIDRMA	AFIRMA
17	5YFQC	B734	20-05-24	MIDRMA	AFIRMA
18	5HTCP	B39M	19-05-24	MIDRMA	AFIRMA
19	5NBBN	B772	18-05-24	MIDRMA	AFIRMA
20	5HONE	GLF5	15-05-24	MIDRMA	AFIRMA
21	5HTCQ	B39M	15-05-24	MIDRMA	AFIRMA
22	5NHMM	B744	15-05-24	MIDRMA	AFIRMA
23	5YFQA	B734	15-05-24	MIDRMA	AFIRMA
24	5NBOD	GLF4	28-01-22	MIDRMA	AFIRMA
25	5YFAN	CRJ2	15-07-20	MIDRMA	AFIRMA
26	5YWBH	C56X	14-07-20	MIDRMA	AFIRMA
27	ETATF	B350	08-07-20	MIDRMA	AFIRMA
28	ZSCQP	CRJ9	07-07-20	MIDRMA	AFIRMA
29	CCBGV	B789	08-06-22	MIDRMA	CARSAM
30	FAB2857	KC39	22-05-22	MIDRMA	CARSAM

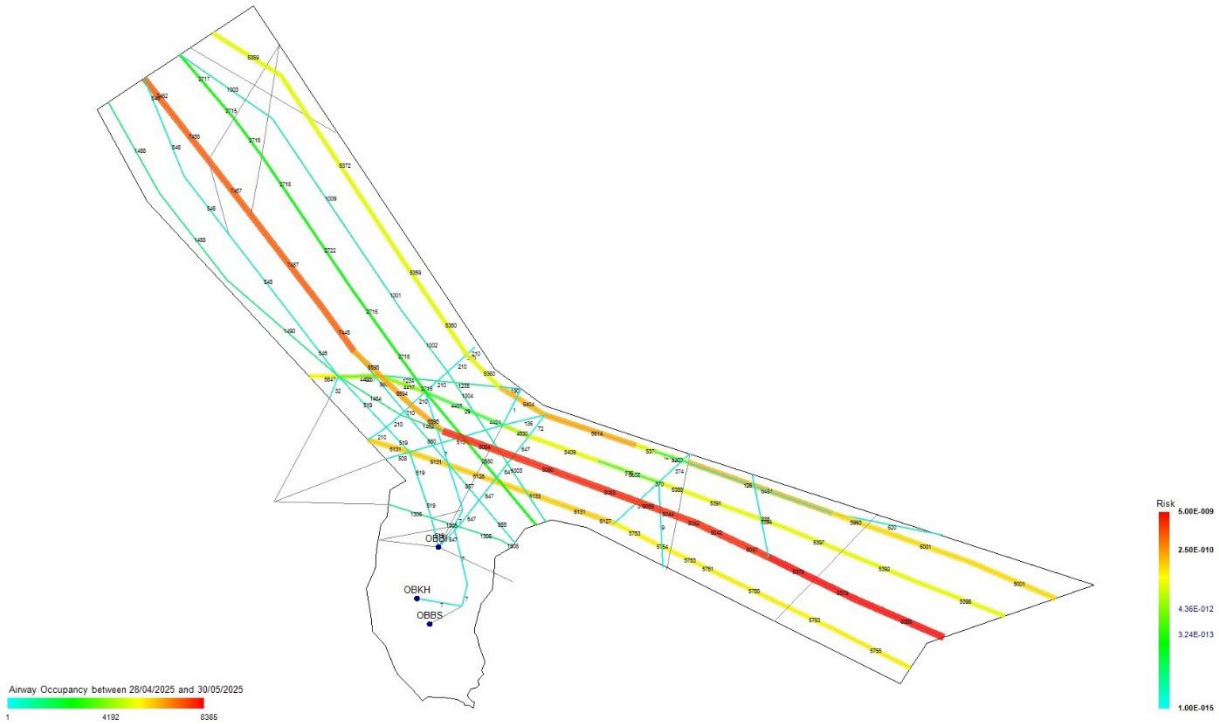
31	21140	IL76	19-06-22	MIDRMA	CHINARMA
32	ICJSN	C25C	15-05-23	MIDRMA	EURRMA
33	URFSE	IL76	11-12-22	MIDRMA	EURRMA
34	URAZR	B77W	03-02-22	MIDRMA	EURRMA
35	URAZN	B753	01-02-22	MIDRMA	EURRMA
36	URAZO	B753	01-02-22	MIDRMA	EURRMA
37	URFSD	IL76	24-12-21	MIDRMA	EURRMA
38	URFSC	IL76	05-12-21	MIDRMA	EURRMA
39	EW550TH	IL76	04-12-21	MIDRMA	EURRMA
40	URSQO	B738	02-12-21	MIDRMA	EURRMA
41	URFSA	IL76	09-05-21	MIDRMA	EURRMA
42	UR11316	AN12	22-07-20	MIDRMA	EURRMA
43	IN307	IL38	03-12-20	MIDRMA	MAAR
44	KJ3452	IL76	03-08-20	MIDRMA	MAAR
45	CB8001	C17	29-07-20	MIDRMA	MAAR
46	CB8004	C17	24-07-20	MIDRMA	MAAR
47	80002A	C17	23-07-20	MIDRMA	MAAR
48	K3604	E35L	17-07-20	MIDRMA	MAAR
49	KJ3454	IL76	16-03-20	MIDRMA	MAAR
50	STPSA	F900	18-10-23	EURRMA	MIDRMA
51	5ALEX	BE200	09-07-22	EURRMA	MIDRMA
52	STALL	CRJ1	11-06-22	MIDRMA	MIDRMA
53	N993JA	A333	18-03-25	MIDRMA	NAARMO
54	N993JA	A333	18-03-25	MIDRMA	NAARMO
55	N882RR	PC12	10-03-25	MIDRMA	NAARMO
56	N505MS	C55B	03-06-24	MIDRMA	NAARMO
57	N788DP	B737	25-02-24	MIDRMA	NAARMO
58	N890DA	GLF5	25-02-23	MIDRMA	NAARMO
59	N800AJ	CL60	10-02-23	MIDRMA	NAARMO
60	N651CV	C650	21-11-22	MIDRMA	NAARMO
61	N320MK	GLF3	24-09-22	MIDRMA	NAARMO
62	N46HB	F9000	22-08-22	MIDRMA	NAARMO
63	N411VP	EA50	01-05-22	MIDRMA	NAARMO
64	N605AS	PC12	11-04-22	MIDRMA	NAARMO
65	N981DB	H25B	05-04-22	MIDRMA	NAARMO

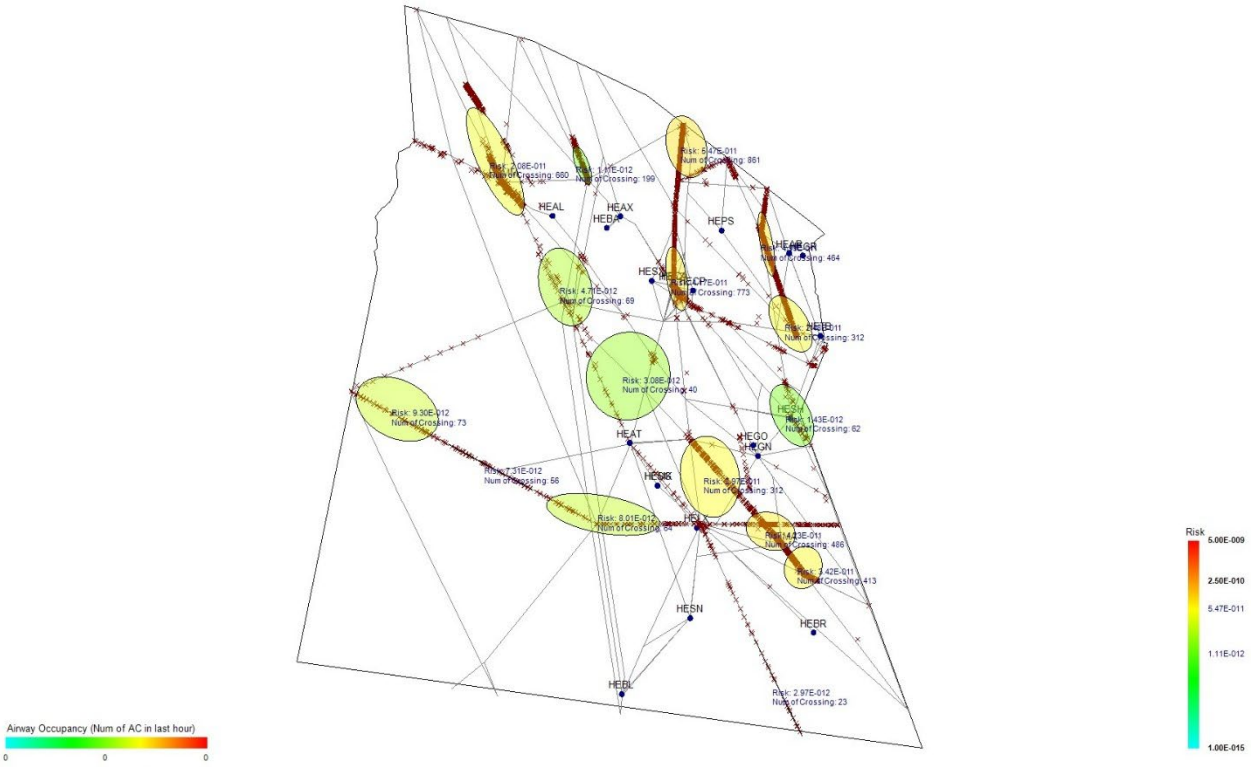
66	N981DB	H25B	05-04-22	MIDRMA	NAARMO
67	N145DB	E35L	22-01-22	MIDRMA	NAARMO
68	N685MF	GLF4	08-12-21	MIDRMA	NAARMO
69	N298RB	GLF4	14-05-21	MIDRMA	NAARMO
70	N1112B	B350	16-07-20	MIDRMA	NAARMO
71	N44UA	CL60	07-06-20	MIDRMA	NAARMO

MID RVSM SMR 2025 HOTSPOTS AND AWYS OCCUPANCY

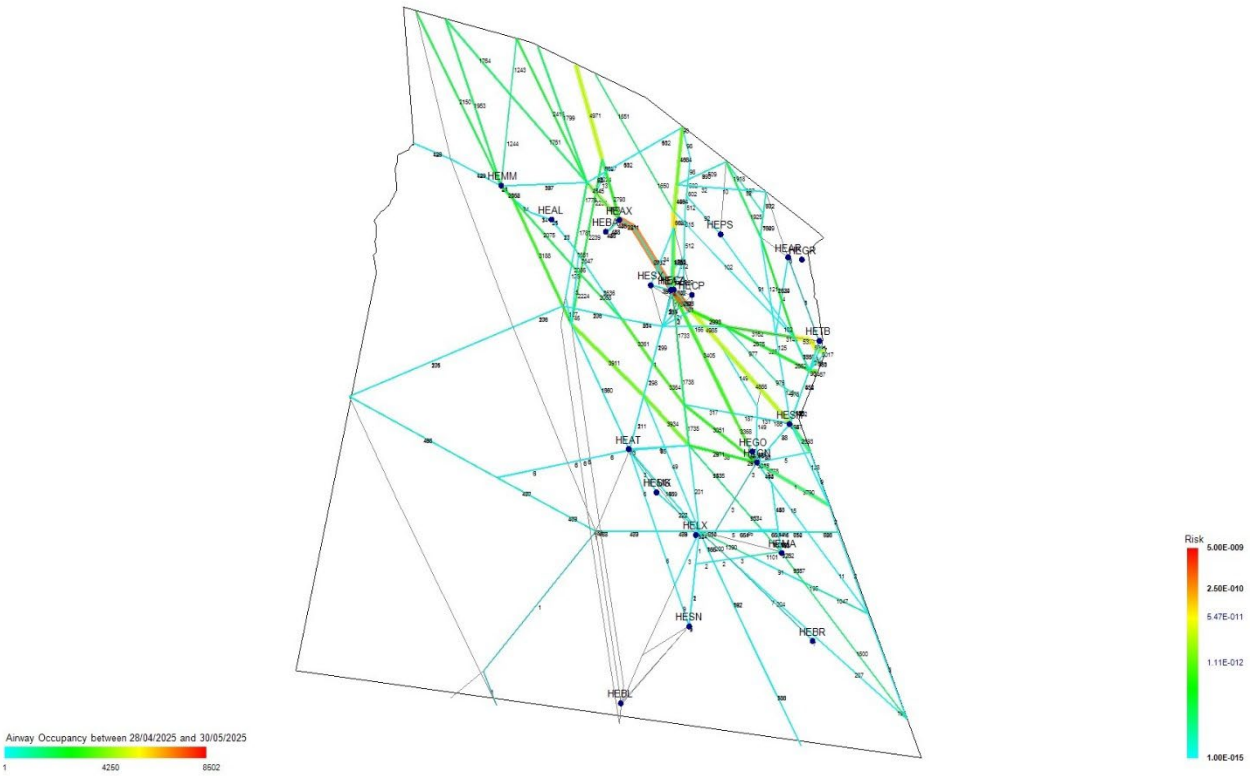


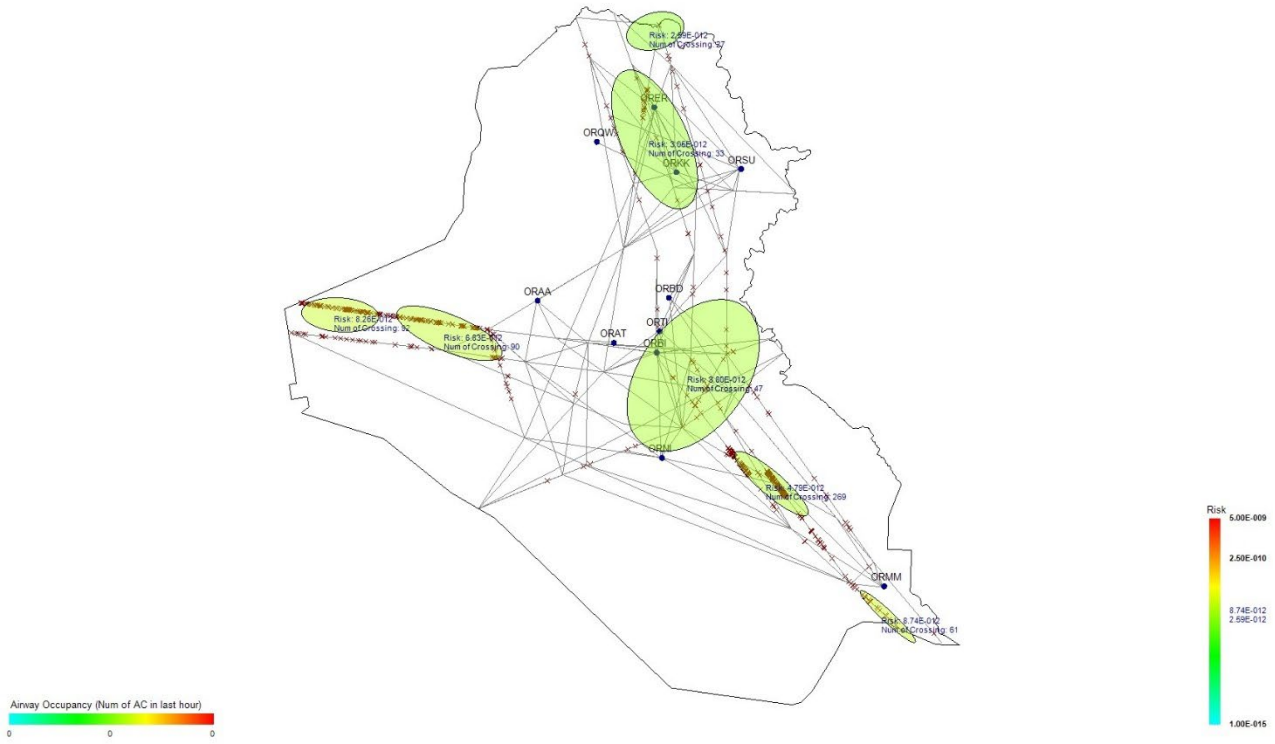
BAHRAIN FIR



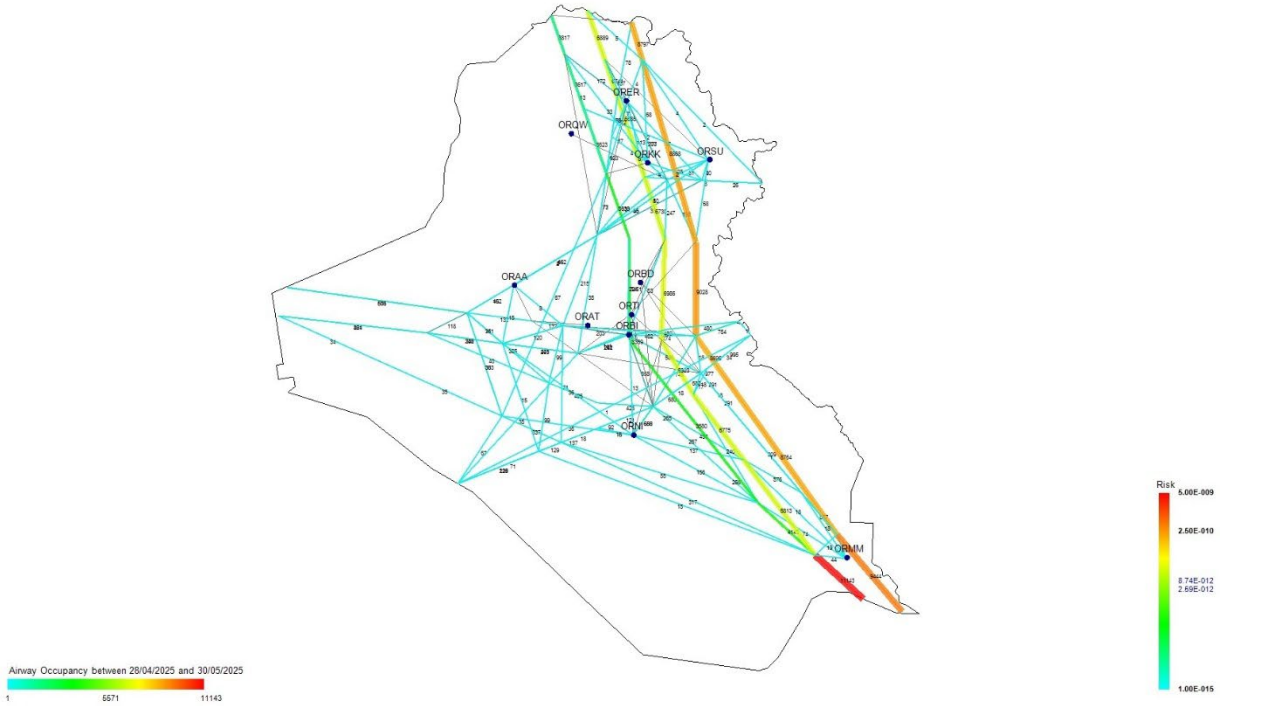

Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
5.47E-011
1.11E-012
1.00E-015
HEAL
HEAX
HEBA
HEPS
HEARGR
HESN
HEARCP
HETB
HEAT
HEGO
HEGN
HEBR
HEBL
Risk: 9.30E-012
Num of Crossing: 73
Risk: 7.31E-012
Num of Crossing: 56
Risk: 8.01E-012
Num of Crossing: 63
Risk: 3.08E-012
Num of Crossing: 40
Risk: 4.71E-012
Num of Crossing: 69
Risk: 2.97E-012
Num of Crossing: 23

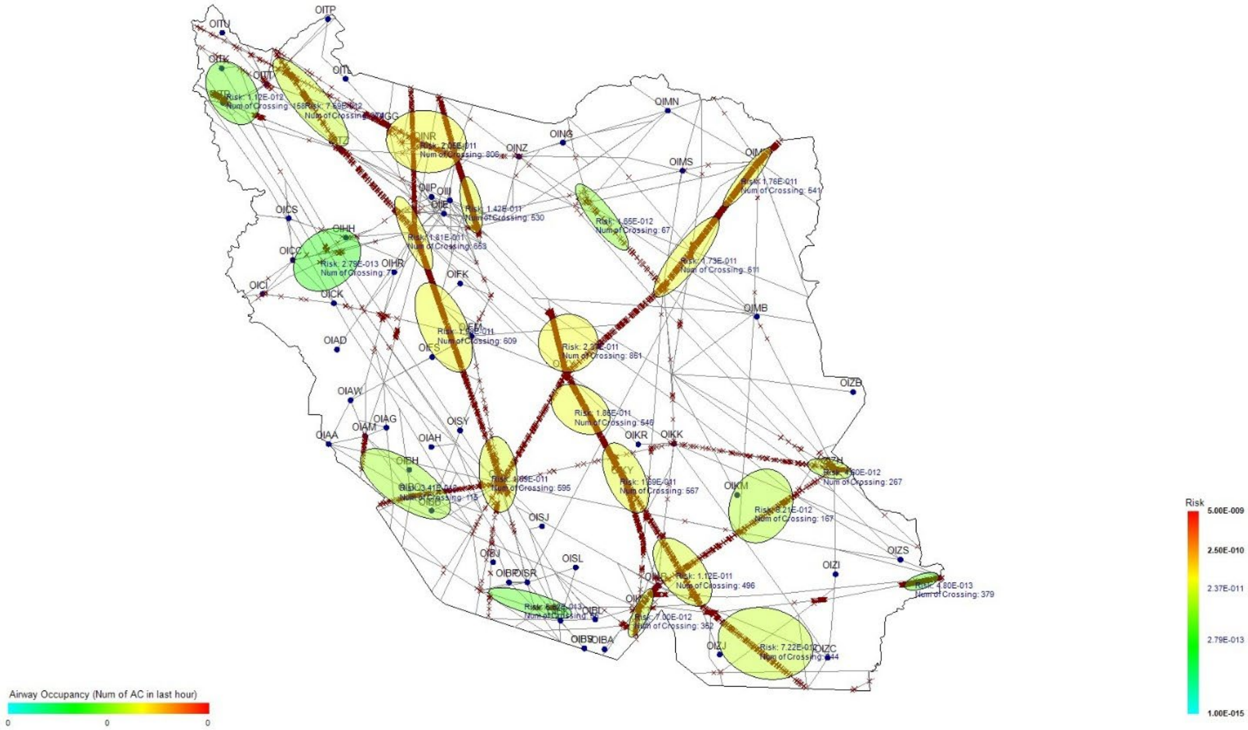
CAIRO FIR


Airway Occupancy between 28/04/2025 and 30/05/2025
1
4260
8502
Risk
5.00E-009
2.50E-010
5.47E-011
1.11E-012
1.00E-015
HEMM
HEAL
HEAX
HEBA
HEPS
HEARGR
HETB
HEAT
HEGO
HEGN
HEBR
HEBL
HELX

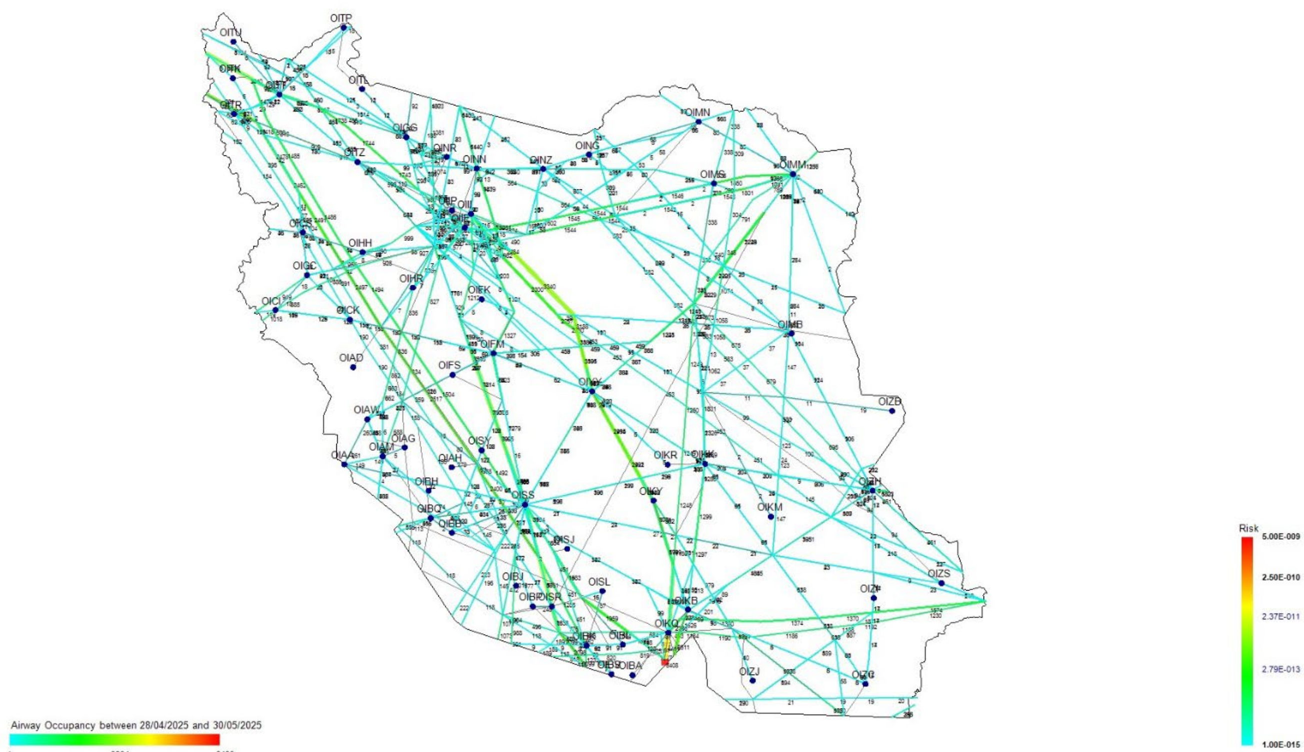

ORER
ORQW
ORSU
ORNK
ORAA
ORBD
ORTI
ORAT
ORBI
ORNI
ORMM
Risk: 2.69E-012
Num of Crossing: 97
Risk: 3.06E-012
Num of Crossing: 33
Risk: 8.26E-012
Num of Crossing: 92
Risk: 6.83E-012
Num of Crossing: 90
Risk: 3.60E-012
Num of Crossing: 47
Risk: 8.74E-012
Num of Crossing: 269
Risk: 8.74E-012
Num of Crossing: 61
Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
8.74E-012
2.69E-012
1.00E-015

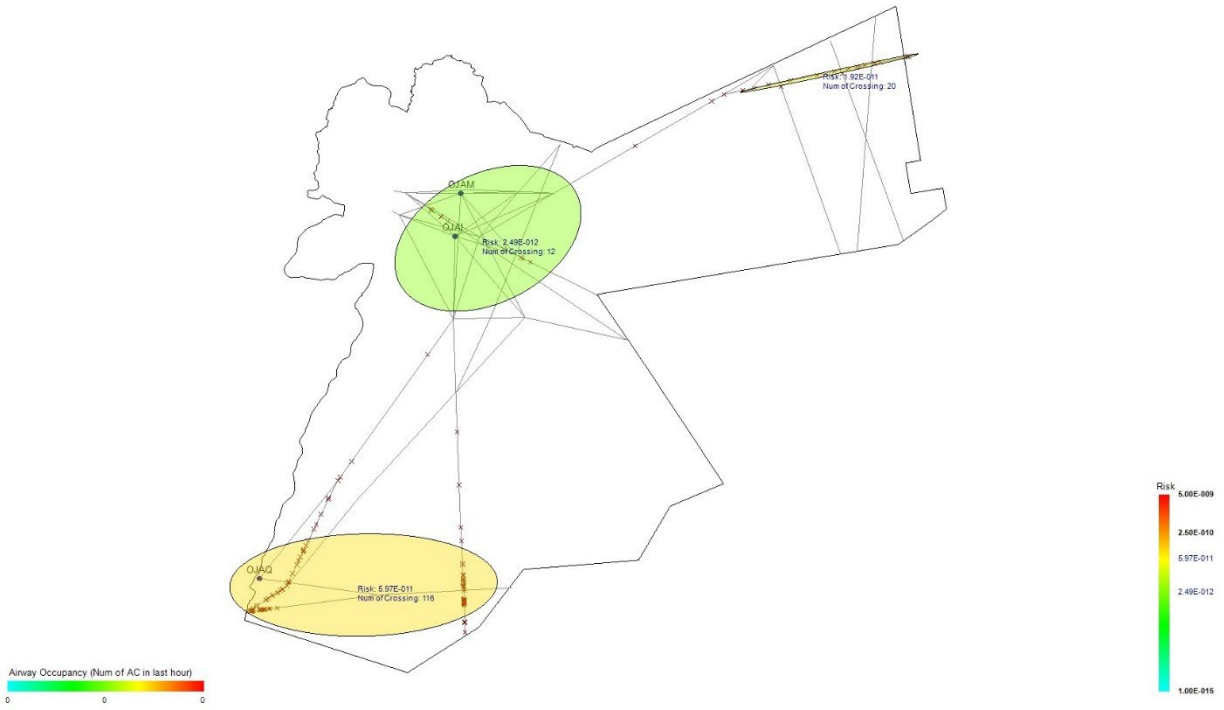
BAGHDAD FIR


ORER
ORQW
ORSU
ORNK
ORAA
ORBD
ORTI
ORAT
ORBI
ORNI
ORMM
Airway Occupancy between 28/04/2025 and 30/05/2025
1
6571
11143
Risk
5.00E-009
2.50E-010
8.74E-012
2.69E-012
1.00E-015

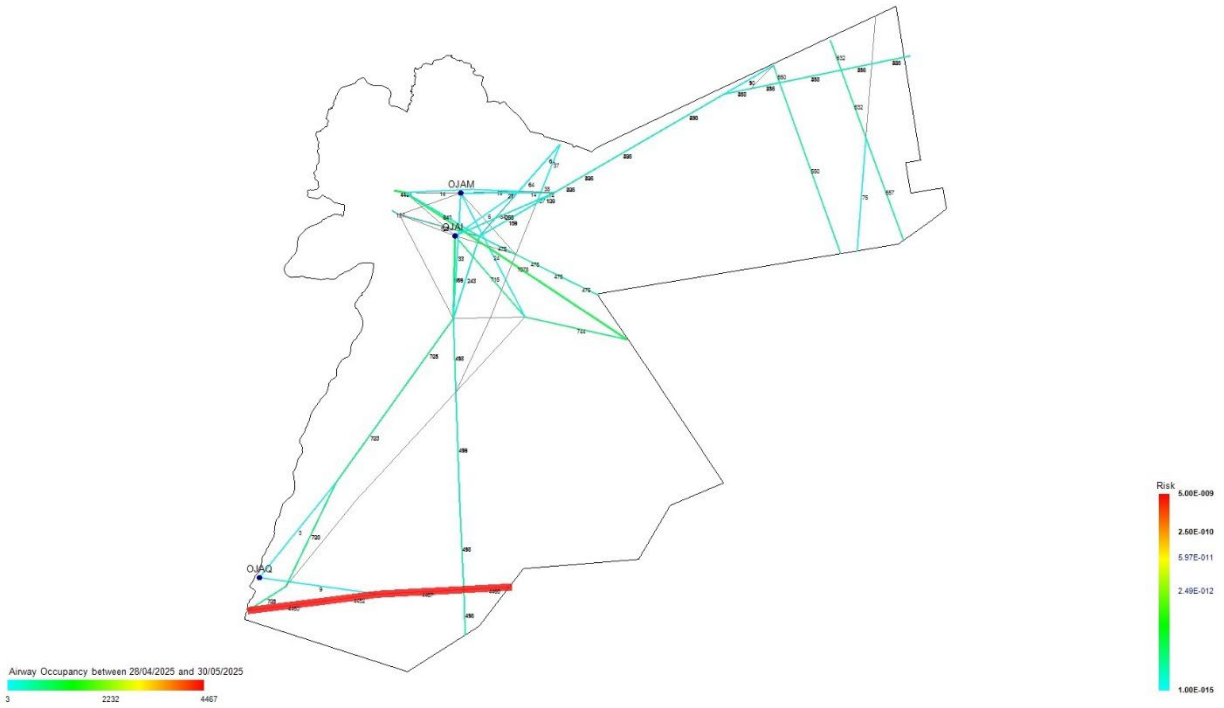

Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
2.37E-011
2.79E-013
1.00E-015

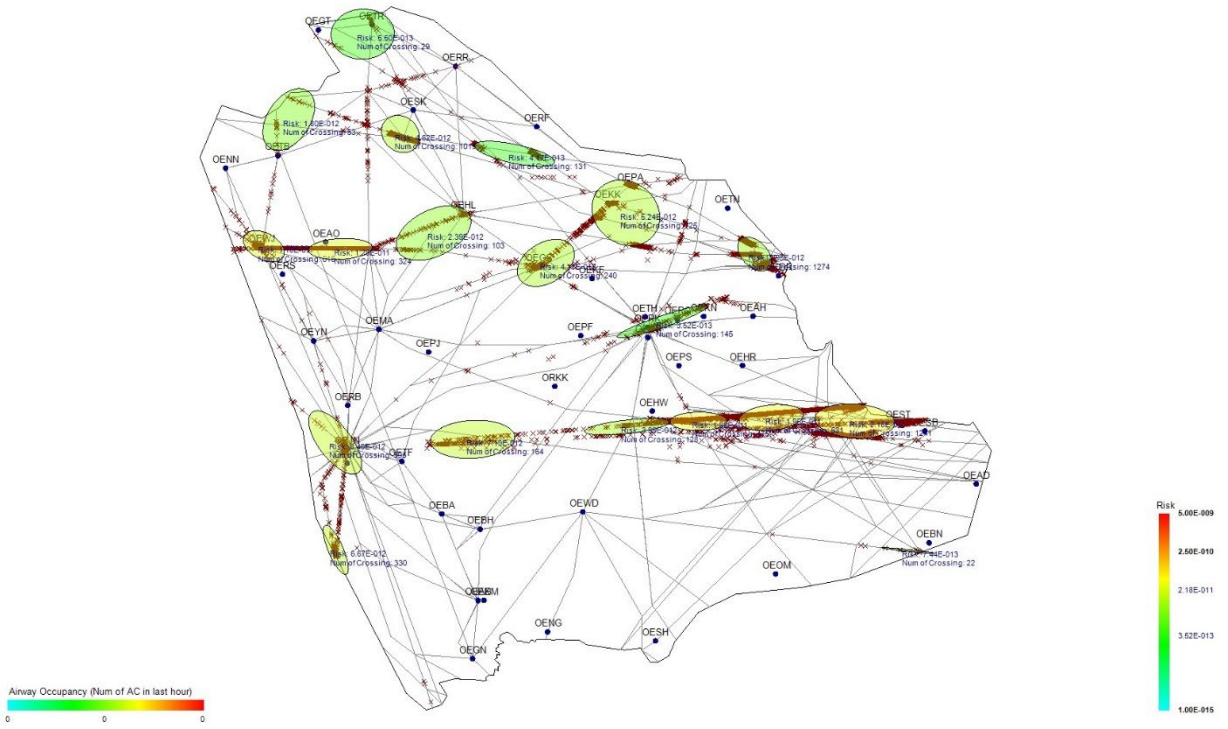
TEHRAN FIR


Airway Occupancy between 28/04/2025 and 30/05/2025
1
3204
6408
Risk
5.00E-009
2.50E-010
2.37E-011
2.79E-013
1.00E-015

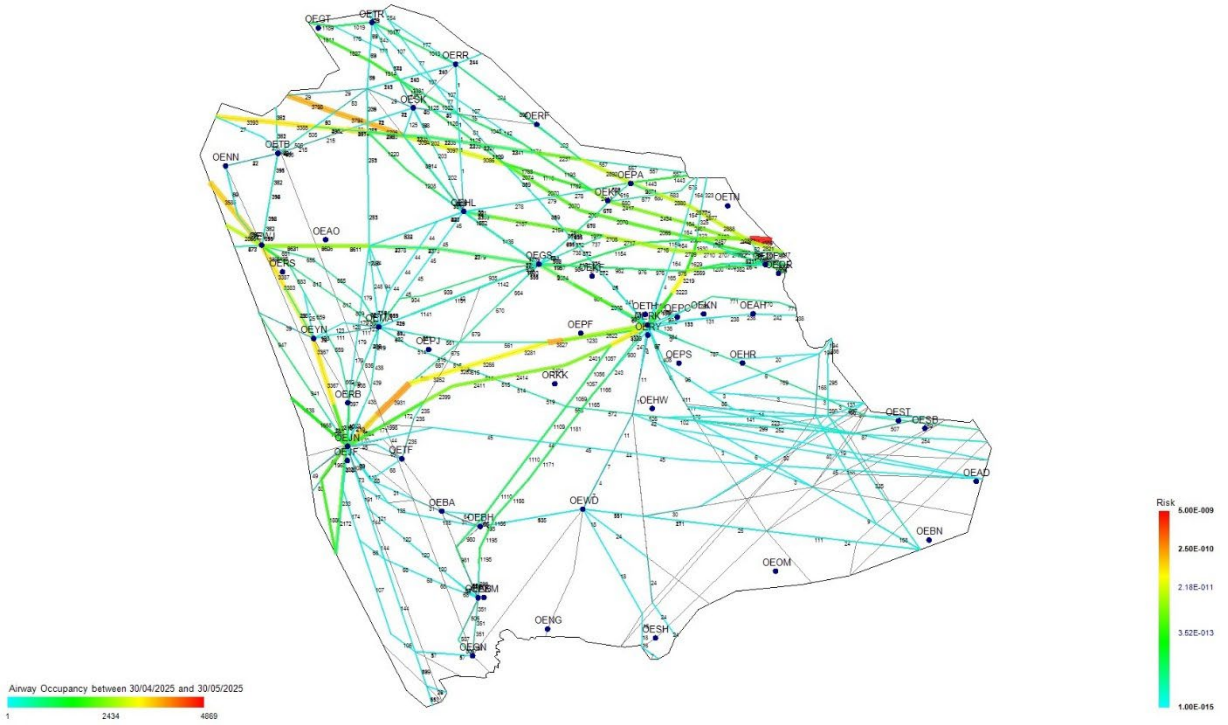

OJAM
OJAI
Risk: 2.49E-012
Num of Crossing: 12
Risk: 1.92E-011
Num of Crossing: 20
OJAQ
Risk: 5.97E-011
Num of Crossing: 116
Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
5.97E-011
2.49E-012
1.00E-015

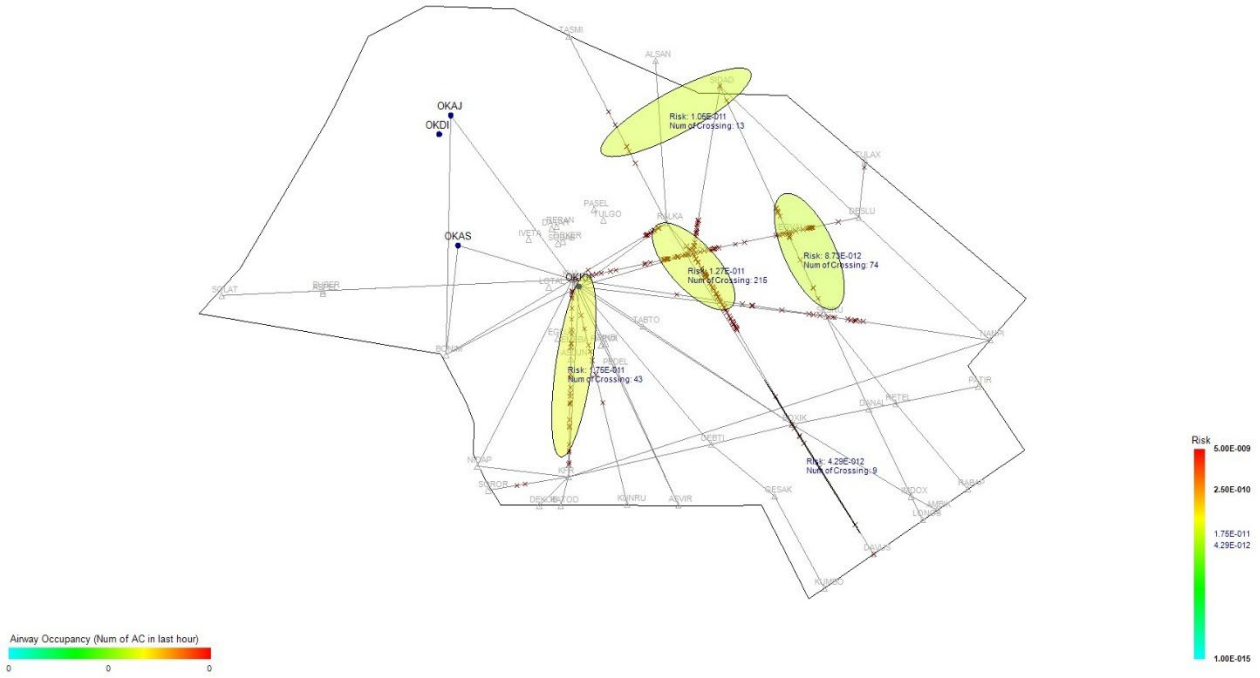
AMMAN FIR


OJAM
OJAI
OJAQ
Airway Occupancy between 28/04/2025 and 30/05/2025
3
2232
4467
Risk
5.00E-009
2.50E-010
5.97E-011
2.49E-012
1.00E-015

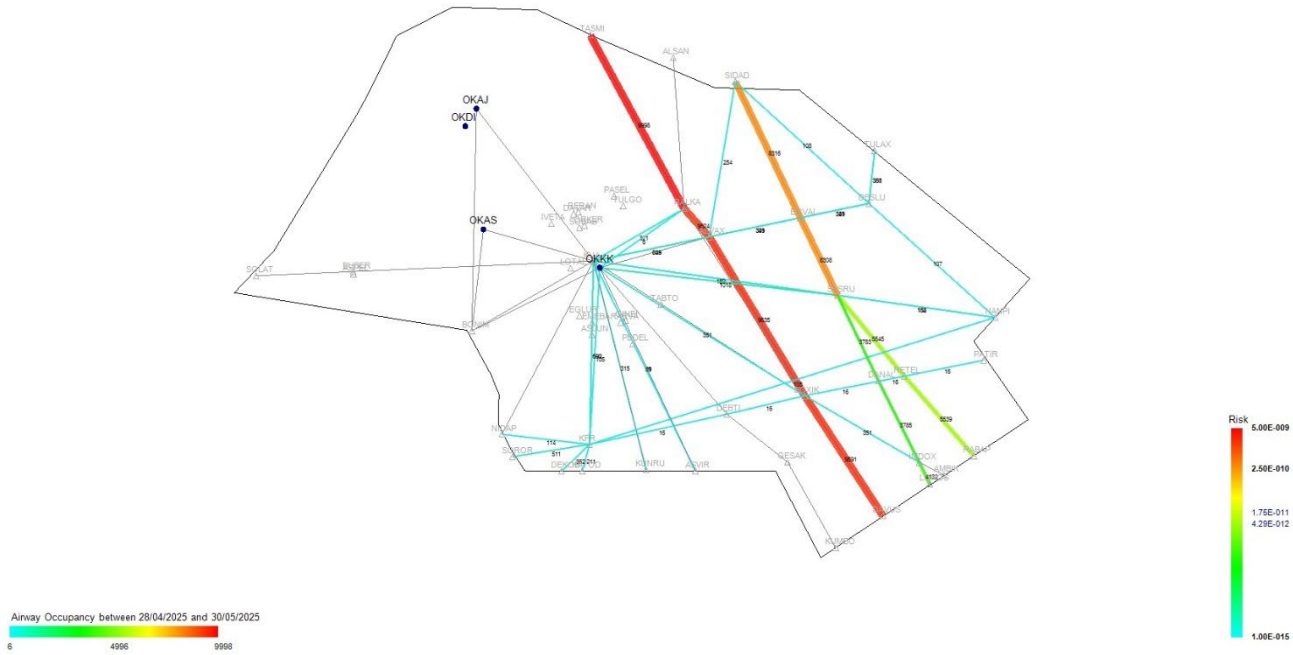

OEGT
OETR
OERR
OESK
OERF
OETB
OENN
OEPA
OEKK
OETM
OEHL
OEAO
OERS
OEGS
OEAH
OEMA
OEYN
OEPJ
OEPF
OEPS
OEHR
ORKK
OERB
OEHW
OEST
OESB
OEAD
OEBA
OEWD
OEBH
OEBN
OEOM
OEBM
OENG
OESH
OEGN
Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
2.18E-011
3.62E-013
1.00E-015

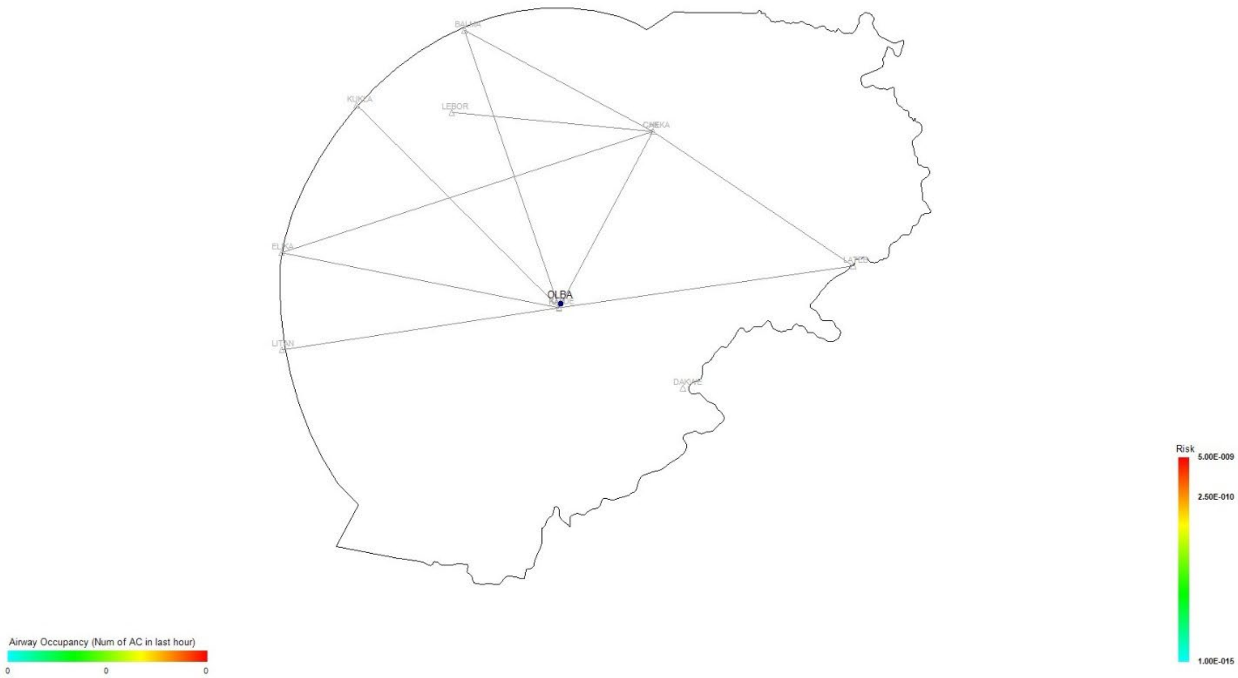
JEDDAH FIR


OEGT
OETR
OERR
OESK
OERF
OETB
OENN
OEPA
OEKK
OETM
OEHL
OEAO
OERS
OEGS
OEAH
OEYN
OEPJ
OEPF
OEPS
OEHR
ORKK
OERB
OEHW
OEST
OESB
OEAD
OEBA
OEWD
OEBH
OEBN
OEOM
OEBM
OENG
OESH
OEGN
Airway Occupancy between 30/04/2025 and 30/05/2025
1
2434
4869
Risk
5.00E-009
2.50E-010
2.18E-011
3.62E-013
1.00E-015

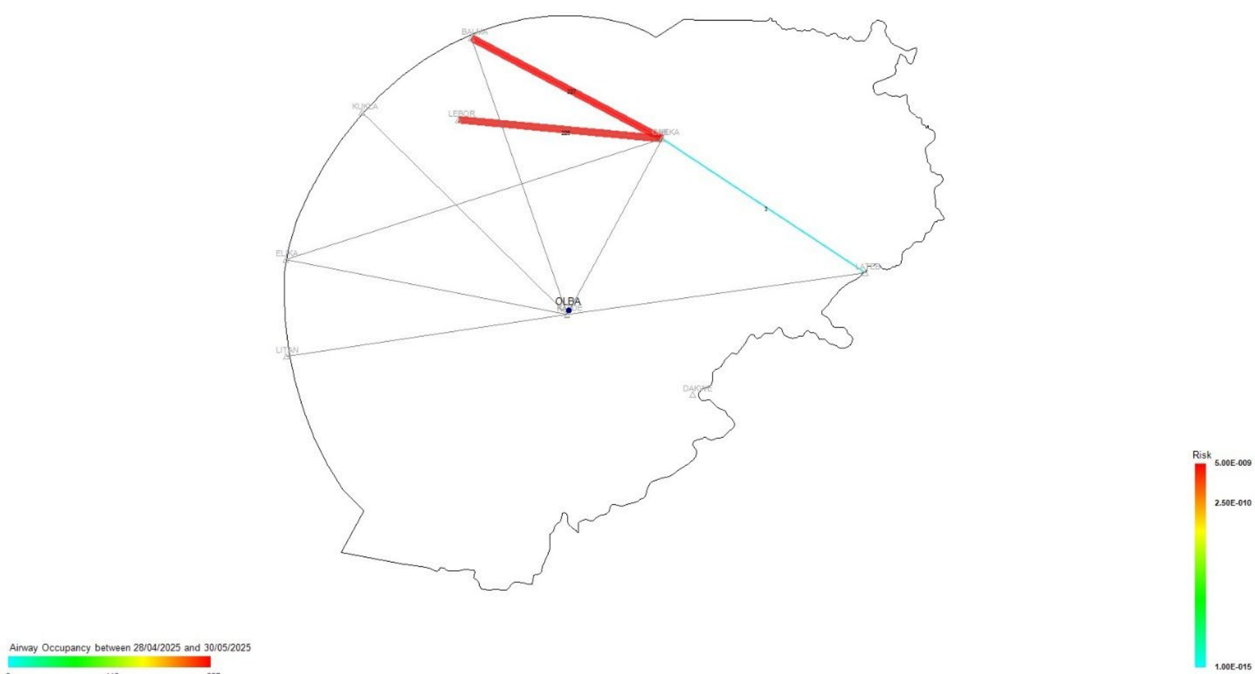

OKAJ
OKDI
OKAS
OKKK
Risk: 1.05E-011
Num of Crossing: 13
Risk: 1.27E-011
Num of Crossing: 216
Risk: 8.73E-012
Num of Crossing: 74
Risk: 1.75E-011
Num of Crossing: 43
Risk: 4.29E-012
Num of Crossing: 9
Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
1.75E-011
4.29E-012
1.00E-015

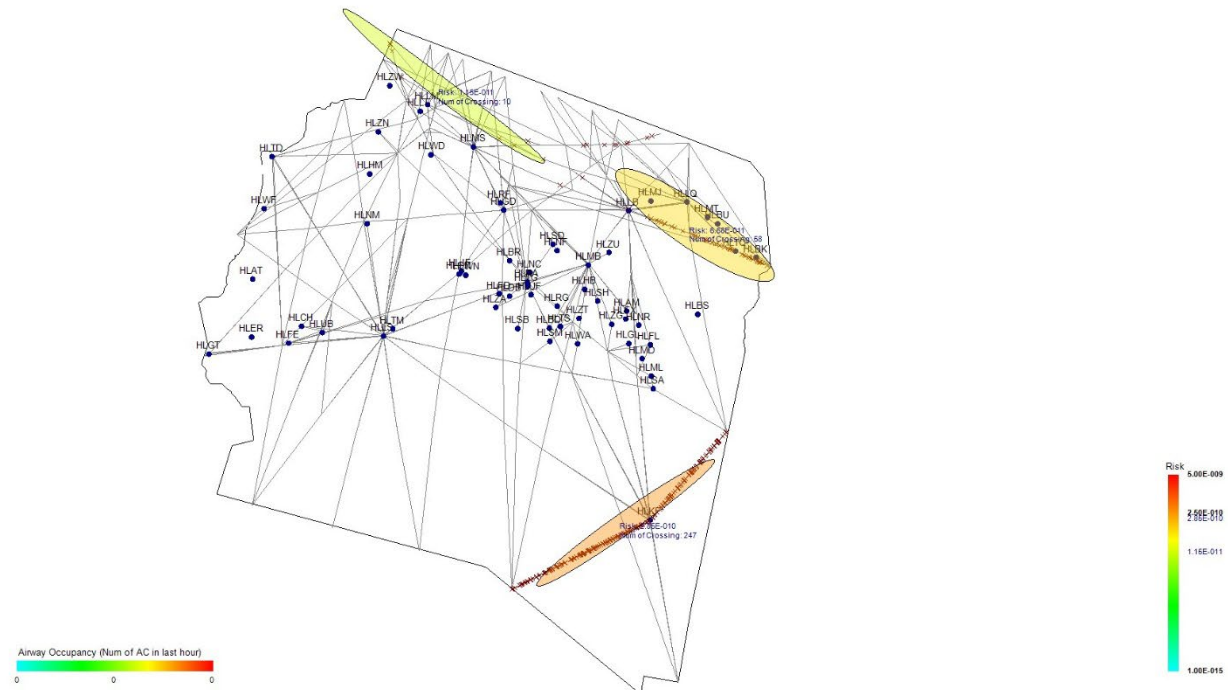
KUWAIT FIR


OKAJ
OKDI
OKAS
OKKK
Airway Occupancy between 28/04/2025 and 30/05/2025
6
4996
9998
Risk
5.00E-009
2.50E-010
1.75E-011
4.29E-012
1.00E-015


LEBOR
OLBA
Risk
5.00E-009
2.50E-010
1.00E-015
Airway Occupancy (Num of AC in last hour)
0
0
0

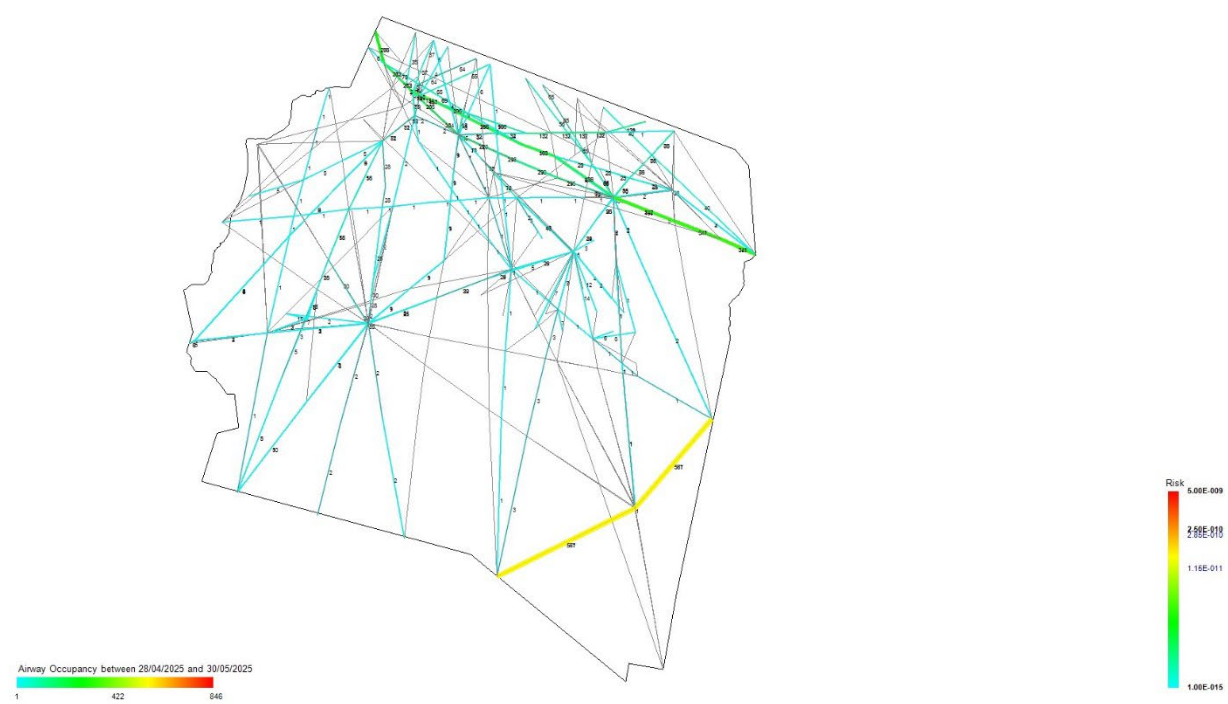
BEIRUT FIR


LEBOR
OLBA
Risk
5.00E-009
2.50E-010
1.00E-015
Airway Occupancy between 28/04/2025 and 30/05/2025
3
112
227

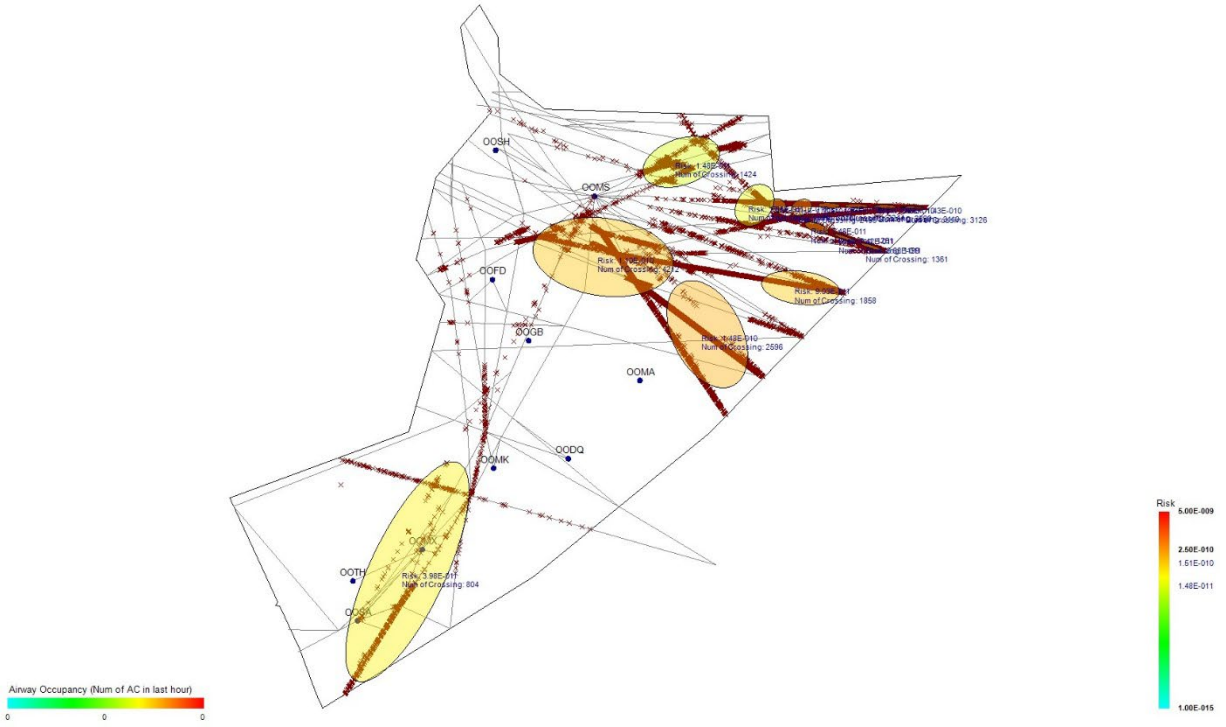


Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
2.86E-010
1.16E-011
1.00E-015
HLZW
HLZN
HLTD
HLHM
HLWD
HLMS
HLWF
HLNM
HLAT
HLER
HLCH
HLUB
HLFE
HLGT
HLTM
HLMJ
HLLB
HLZU
HLMB
HLBR
HLNC
HLBS
HLSB
HLSM
HLWA
HLML
HLSA
HLFL
Risk: 6.68E-011

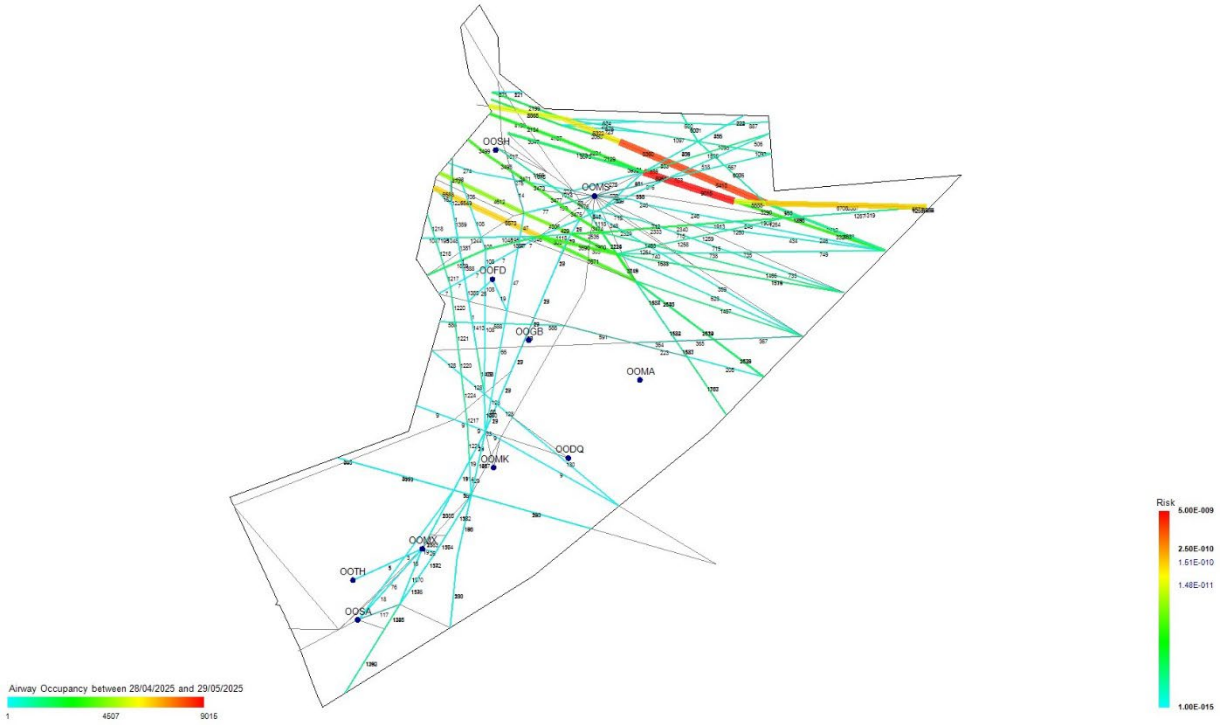
TRIPOLI FIR

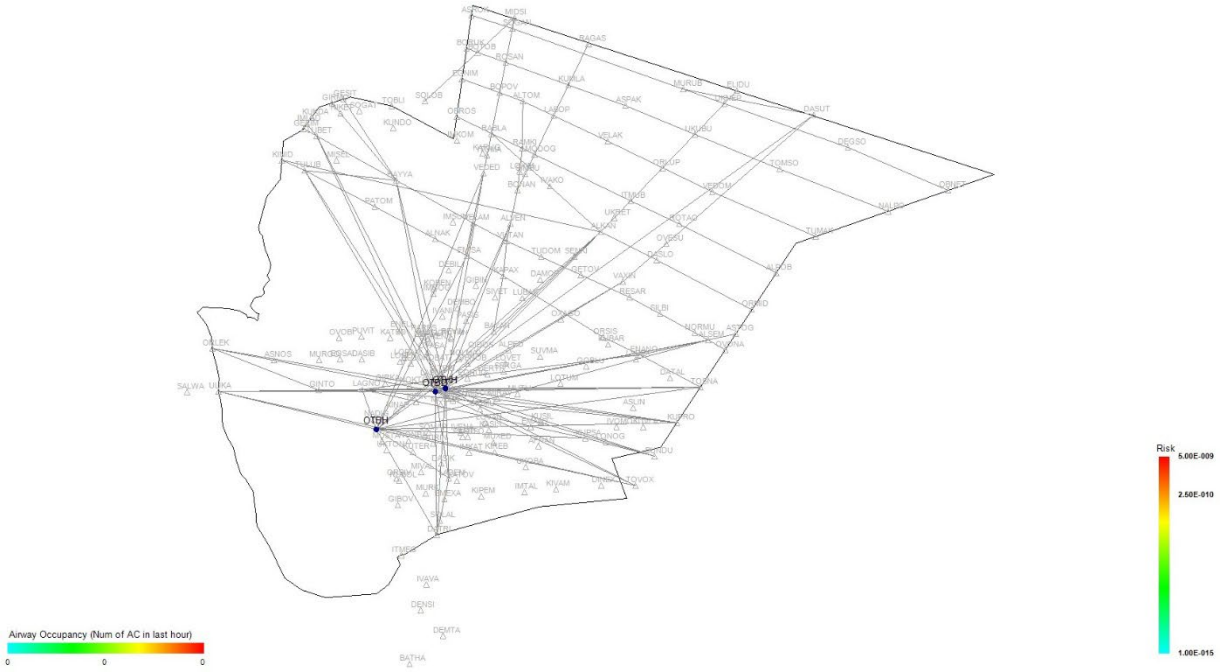


Airway Occupancy between 28/04/2025 and 30/05/2025
1
422
846
Risk
5.00E-009
2.50E-010
2.86E-010
1.16E-011
1.00E-015

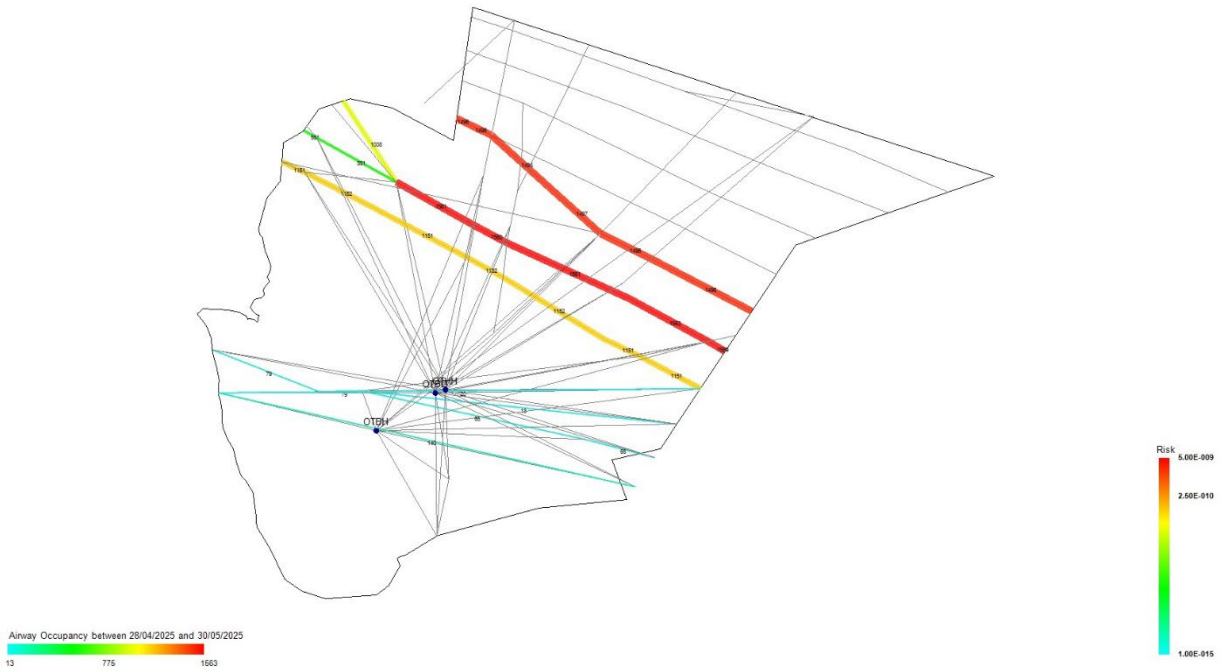

OOSH
OOMS
OOFD
OOGB
OOMA
OODQ
OOMK
OOMX
OOTH
OOSA
Num of Crossing: 1424
Num of Crossing: 3126
Num of Crossing: 1361
Num of Crossing: 1958
Num of Crossing: 2696
Num of Crossing: 804
Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
1.51E-010
1.48E-011
1.00E-015

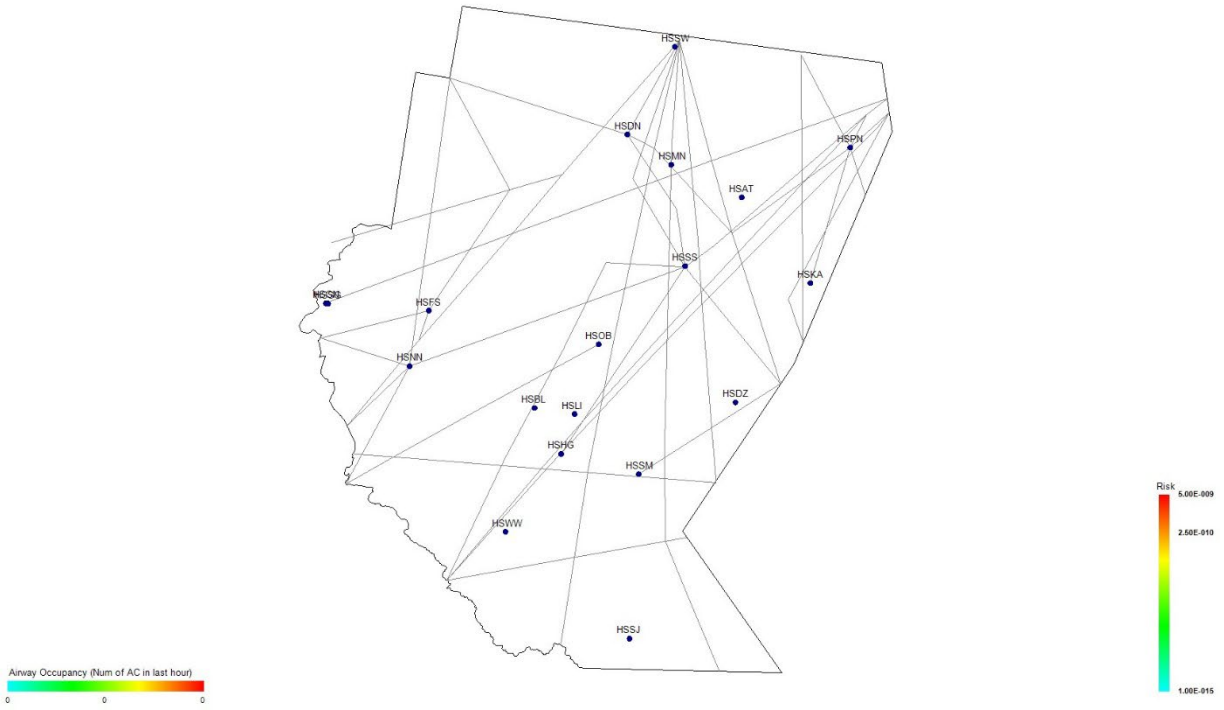
MUSCAT FIR


OOSH
OOMS
OOFD
OOGB
OOMA
OODQ
OOMK
OOMX
OOTH
OOSA
Airway Occupancy between 28/04/2025 and 29/05/2025
1
4507
9014
Risk
5.00E-009
2.50E-010
1.51E-010
1.48E-011
1.00E-015

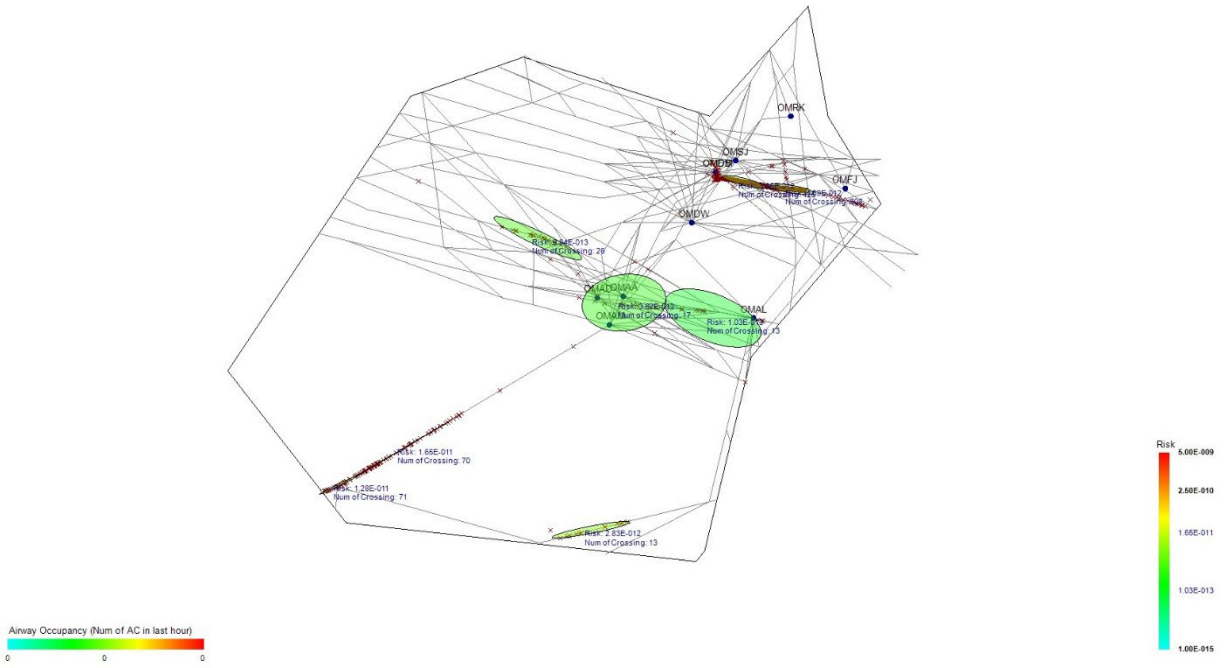

Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
1.00E-015

DOHA FIR

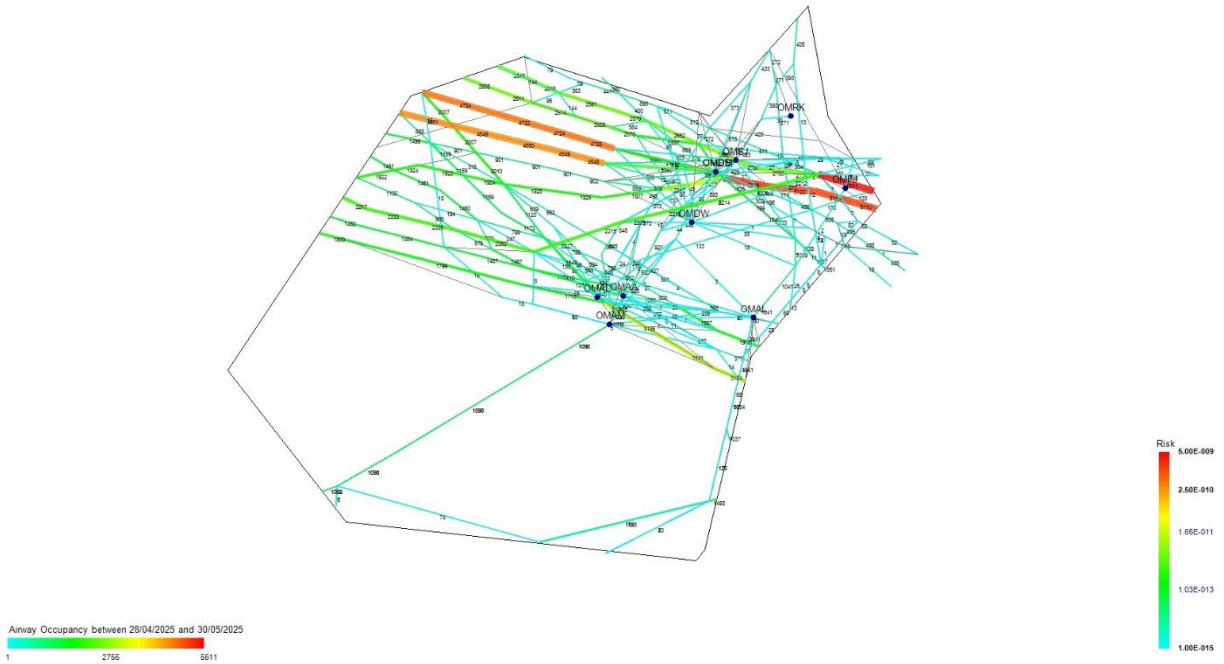

Airway Occupancy between 28/04/2025 and 30/05/2025
13
775
1663
Risk
5.00E-009
2.50E-010
1.00E-015

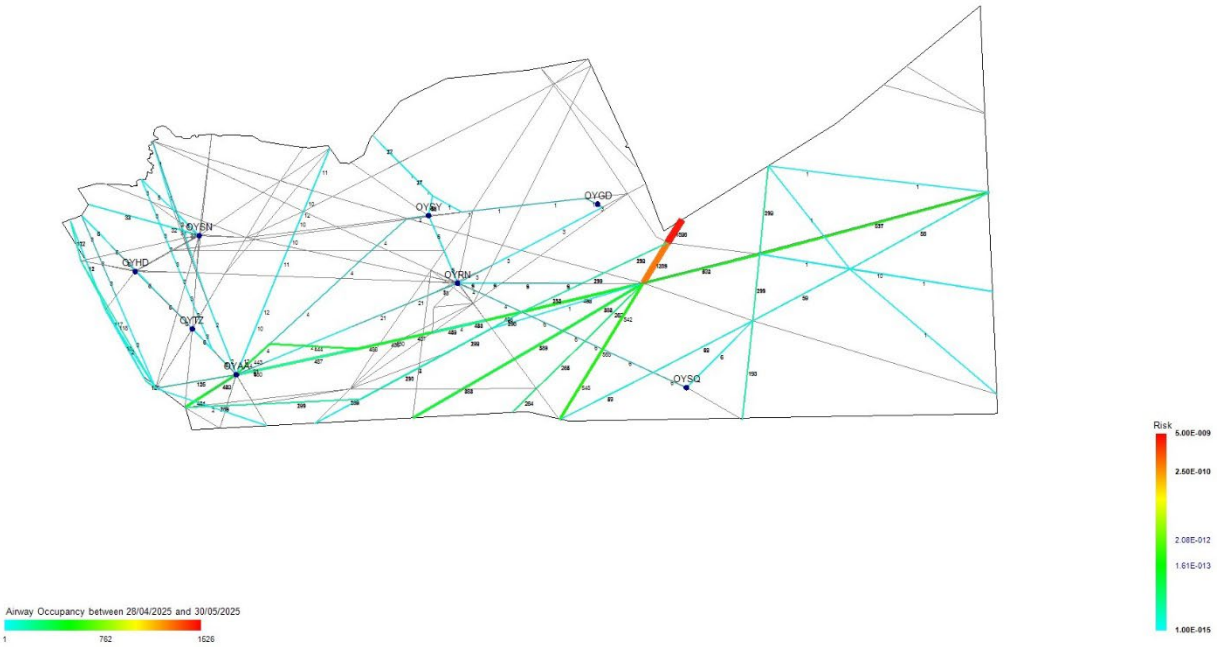


KHARTOUM FIR

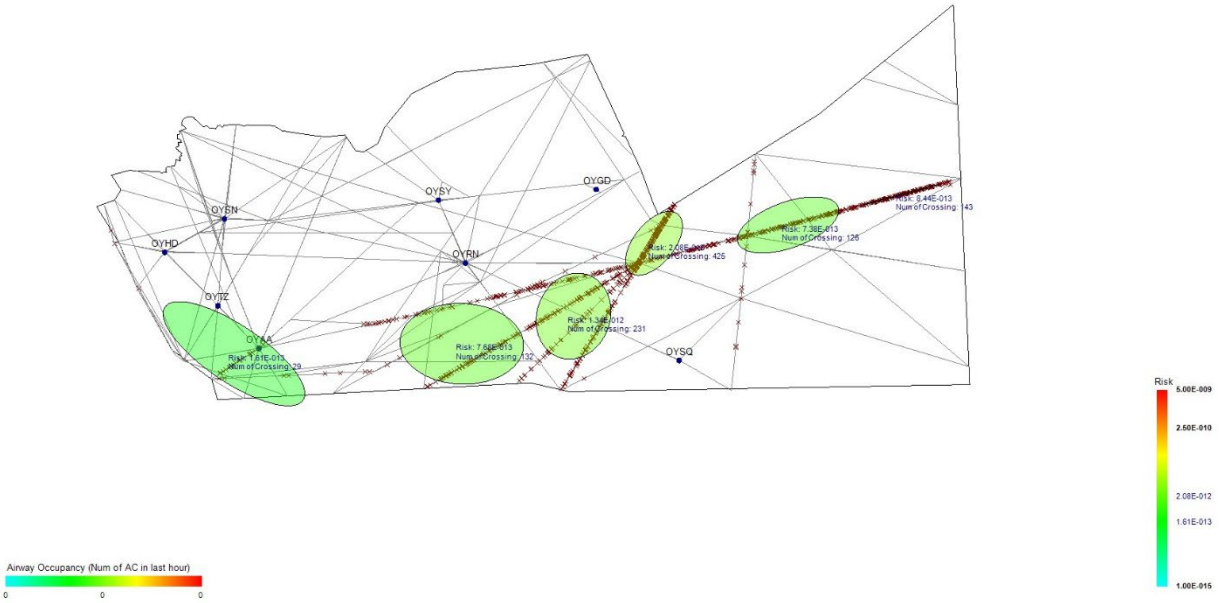


EMIRATES FIR




OYGD
OYSY
OYSN
OYHD
OYRN
OYTZ
OYAA
OYSQ
Airway Occupancy between 28/04/2025 and 30/05/2025
1
762
1626
Risk
5.00E-009
2.50E-010
2.08E-012
1.61E-013
1.00E-015

SANA'A FIR


OYGD
OYSY
OYSN
OYHD
OYRN
OYTZ
OYAA
OYSQ
Risk: 8.44E-013
Num of Crossing: 143
Risk: 7.38E-013
Num of Crossing: 126
Risk: 2.08E-012
Num of Crossing: 426
Risk: 1.34E-012
Num of Crossing: 231
Risk: 7.58E-013
Num of Crossing: 132
Risk: 1.81E-013
Num of Crossing: 29
Airway Occupancy (Num of AC in last hour)
0
0
0
Risk
5.00E-009
2.50E-010
2.08E-012
1.61E-013
1.00E-015

MID RVSM MINIMUM MONITORING REQUIREMENTS (MMRS)

Seq	MID States	RVSM APPROVED A/C	HAVE RESULTS OR COVERED	NOT COVERED	NOT COVERED IN %	A/C MMR
1	Bahrain	76	73	3	4%	2
2	Egypt	172	161	11	6%	10
3	Iran	240	228	12	5%	6
4	Iraq	56	49	7	13%	4
5	Jordan	51	49	2	4%	2
6	KSA	377	377	0	0%	0
7	Kuwait	71	68	3	4%	1
8	Lebanon	29	29	0	0%	0
9	Libya	48	39	9	19%	9
10	Oman	62	61	1	2%	1
11	Qatar	329	328	1	0%	1
12	Sudan	16	2	14	88%	10
13	Syria	18	13	5	28%	4
14	UAE	645	622	23	4%	13
15	Yemen	8	0	8	100%	4
Total		**2198**	**2099**	**98**	**4%**	**67**

- END -