



*International Civil Aviation Organization*

**MIDANPIRG/21 & RASG-MID/11 Meetings**

*(Abu Dhabi, United Arab Emirate 04 – 08 March 2024)*

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**Agenda Item 5.3: ANS (AIM, PBN, AGA-AOP, ATM-SAR, CNS and MET**

**MID RVSM SAFETY MONITORING REPORT (SMR) 2023**

*(Presented by the MIDRMA)*

**SUMMARY**

The aim of the MID RVSM Safety Monitoring Report 2023 is to provide airspace safety review of the MID RVSM airspace and to highlight by means of arguments and supporting evidence that the implementation of RVSM in the ICAO Middle East Region is acceptably safe.

The MID RVSM Safety Monitoring Report 2023 demonstrates, according to the data used that the key safety objectives of the SMR in accordance with ICAO Doc 9574 (2nd Edition) so far were met in operational service. The calculated technical risk of en-route mid-air collision in RVSM airspace is estimated to be  $1.012 \times 10^{-10}$  fatal accidents per flight hour which satisfies the Target Level of Safety and Safety Objective 1. The overall risk of en-route mid-air collision in RVSM airspace is estimated to be  $6.530 \times 10^{-10}$  fatal accidents per flight hour which satisfies the Target Level of Safety and Safety Objective 2, the final conclusions of the data processed have been severely limited by the continued NIL reporting of Large Height Deviations (LHDs) from some member states which does not support a high confidence in this result.

In addition, the MID RVSM SMR 2023 includes the MMR for all MIDRMA Member States, and an assessment made of the non-RVSM approved aircraft that have been observed operating within the ICAO Middle East RVSM airspace.

**1. Introduction**

1.1 The Middle East Regional Monitoring Agency (MIDRMA) issues the MID RVSM Safety Monitoring Report (SMR) on an annual basis, with endorsement from the Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG).

1.2 The report aims to present evidence that all safety objectives outlined in the MID RVSM Safety Policy, in accordance with ICAO Doc 9574 (2nd Edition), continue to be met in operational services. However, for the SMR 2023, MIDRMA did not receive the required traffic data sample from Lebanon and Sudan ATC focal points. Additionally, it did not receive the routing options from the Libyan ATC focal points, forcing MIDRMA to exclude these three member states from the RVSM risk analysis.

## 2. DISCUSSION

2.1 The results of the MID RVSM SMR 2023 reflect the success in achieving the three RVSM safety objectives. This contrasts with the failure to reach this goal in SMR 2022, attributed to an isolated event involving a violation of the MID RVSM airspace, leading to the failure of achieving safety objective No. 2.

2.2 In summarizing the present state of RVSM operations, it is imperative that the three safety objectives, as endorsed by MIDANPIRG, are fulfilled:

**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  $2.5 \times 10^{-9}$  fatal accidents per flight hour.

The value computed for technical height risk is estimated  $1.012 \times 10^{-10}$  this meets RVSM Safety Objective 1.

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

The value computed for the overall risk is estimated  $6.530 \times 10^{-10}$  this is below the ICAO overall TLS.

**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.

The Conclusions and Recommendations listed in 2.4.1 and 2.4.2 in the SMR satisfied the needs of achieving this objective.

2.3 The final conclusions of the data processed have been severely limited by the continued NIL reporting of Large Height Deviations (LHDs) from some member states which does not support a high confidence in the results, the MIDRMA is reiterating the importance of submitting such reports especially from FIRs with high volume of traffic.

2.4 Muscat Eastern FIR Boundaries RVSM Safety Protocol:

2.4.1 MIDRMA has diligently upheld its vigilance in monitoring Large Height Deviation (LHD) reports along the eastern boundaries of Muscat FIR, as filed by Mumbai and Muscat ACCs. The Muscat/Mumbai RVSM safety protocol, which has been open since 2017, is currently under ongoing review. It is imperative to make a decision regarding the closure of this protocol, as the associated risks should either be eliminated or minimized to the absolute minimum. Unfortunately, MIDRMA does not anticipate this occurring without confirmation of the installation of OLDI/AIDC systems in both ACCs.

## 2.5 Sana'a and Mogadishu FIRs RVSM Safety Protocol:

2.5.1 MIDRMA Board/18 (Doha, Qatar, 19 - 20 September 2022) opened RVSM Safety Protocol between Sanaa and Mogadishu FIRs in response to the increasing number of LHD reports submitted by Sana'a ACC related to Mogadishu and to its neighboring FIRs. It's worth noting that the first coordination meeting, organized by ICAO MID and attended by ICAO ESAF ARMA, MIDRMA, IATA and relevant ATM representatives near the Horn of Africa, discussed the surge in LHD reports from Sana'a ACC concerning its neighboring FIRs. During this meeting, the ATM representatives attended this meeting were briefed of the escalating risk associated with the rising number of LHD reports and their impact on the overall ICAO TLS within the MID region. They were urged to promptly implement corrective measures to resolve this problem as soon as possible.

## 2.6 Status Report on the Monitoring the Iranian RVSM approved Aircraft (OFAC License)

2.6.1 The subject was formally addressed during MIDRMA Board/18 meeting held in Doha, Qatar, 19 - 20 September 2022 and MIDRMA Board/19 held in Bahrain 10-11 October 2023. The primary agenda was the renewal request made by MIDRMA for the OFAC License and impending expiration of the license for the Iranian aircraft by the end of January 2023, and the status of the application pending since October 2021. During MIDRMA Board/18 meeting, exhaustive discussions took place to explore potential solutions to the problem. The FAA representative was invited to facilitate an urgent meeting with OFAC to convey the critical nature of the situation and the risks associated with the lack of known height monitoring. However, despite several attempts, MIDRMA did not receive any update. While Iran Civil Aviation Authority (ICAA) has displayed a positive stance and readiness to conduct height monitoring for all their RVSM-approved aircraft, the MIDRMA remains unable to respond positively to the Iran Civil Aviation Authority request due to the absence of the OFAC license.

*Note: The current Minimum Monitoring Requirements for Iran CAA RVSM approved aircraft. Currently, 45% of their approved aircraft don't meet the height monitoring requirements, and this percentage is expected to increase to 79% by the end of May 2024. However, this represents a significant percentage of non-compliant aircraft in RVSM operations, posing a serious threat to other approved aircraft within the RVSM airspace.*

## 3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) review and endorse the MID RVSM SMR 2023;
- b) determine appropriate actions in response to the non-submission of required data required for the development of SMR 2023 by Lebanon, Sudan, and Libya; and
- c) discuss the necessary measures to facilitate the issuance of the OFAC License for monitoring approved Iranian RVSM aircraft.

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## MID RVSM SAFETY MONITORING REPORT 2023 (SMR 2023)

Prepared by the Middle East Regional Monitoring Agency (MIDRMA)

### 1. Executive Summary

The MID RVSM Safety Monitoring Report is issued by the Middle East Regional Monitoring Agency (MIDRMA) for endorsement by the Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG).

The report presents evidence that according to the data and methods used, all safety objectives set out in the MID RVSM Safety Policy in accordance with ICAO Doc 9574 (2nd Edition) continue to be met in operational services within the Middle East RVSM airspace.

#### 1.1 Results of the MID RVSM SMR 2023:

1.1.1 Implementation of RVSM should be based on a safety assessment that demonstrates the continued fulfillment of all RVSM safety objectives outlined in the MID-RVSM Safety Policy, in accordance with ICAO Doc 9574, within the operational services of the Middle East RVSM airspace.

1.1.2 To conclude on the current safety of RVSM operations, the three key safety objectives endorsed by MIDANPIRG have to be met:

**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  $2.5 \times 10^{-9}$  fatal accidents per flight hour.

The value computed for technical height risk is estimated  $1.012 \times 10^{-10}$  this meets RVSM Safety Objective 1.

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

The value computed for the overall risk is estimated  $6.530 \times 10^{-10}$  this is below the ICAO overall TLS.

**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.

1.2 Conclusions:

- (i) The estimated risk of collision associated with aircraft height- keeping performance is  **$1.012 \times 10^{-10}$**  and meets the ICAO TLS of  **$2.5 \times 10^{-9}$**  fatal accidents per flight hour (RVSM Safety Objective1).
- (ii) The estimated overall risk of collision due to all causes which includes the technical risk and all risk due to operational errors and in-flight contingencies is  **$6.530 \times 10^{-10}$**  this value is below the ICAO overall TLS of  **$5 \times 10^{-9}$**  fatal accidents per flight hour (RVSM Safety Objective 2)
- (iii) based on currently available information (Except for Tripoli, Khartoum, and Beirut FIRs), there is no evidence available to MIDRMA that the continued operations of RVSM adversely affects the overall vertical risk of collision during the SMR reporting cycle.
- (iv) The vertical risk estimation due to atypical errors has been demonstrated to be the major contributor in the overall vertical-risk estimation for the MID RVSM airspace, The final conclusions of the data processed have been severely limited by the continued NIL reporting of Large Height Deviations (LHDs) from some member states which does not support a high confidence in the results, the MIDRMA is reiterating the importance of submitting such reports especially from FIRs with high volume of traffic.

**1.2 Considerations on the Safety Objectives for MID RVSM SMRs**

1.2.1 When considering the three safety objectives for RVSM, the following considerations should be borne in mind:

- 1- The assessment of risk against the TLS, both for technical and overall risk estimates, relies on height keeping performance data to assess the risk in the vertical plane and studies of traffic density to calculate the risk in the horizontal plane. There is a number of assumptions that must be verified to ensure the reliability of the risk assessment. Verifying these assumptions deals primarily with monitoring of aircraft performance issues.
- 2- Aircraft performance is assessed by individual airframe and by monitoring group. A monitoring group consists of aircraft that are nominally of the same type with identical performance characteristics that are made compliant with RVSM technical requirements using a common compliance method. Monitoring group analysis is necessary to verify that the Minimum Aviation System Performance Standards (MASPS) for that group are valid. Aircraft that are made compliant with RVSM technical requirements on an individual basis are termed non-group.

- 3- RVSM Safety Objective 2, dealing with overall risk, takes into account the technical risk together with the risk from all other causes. In practice, this relates to human factors and the assessment of this parameter relies on adequate reporting of Large Height Deviation (LHD) Reports and the correct interpretation of events for input for CRM analysis.
- 4- RVSM Safety Objective 3 requires the RMA to monitor long-term trends and to identify potential future safety issues. This involves comparing the level of incidents that pose a risk for the current reporting period and highlighting any issues that should be carried forward as recommendations for future reports.

**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  $2.5 \times 10^{-9}$  fatal accidents per flight hour.

The value computed for technical height risk is estimated  $1.012 \times 10^{-10}$  this meets RVSM Safety Objective 1.

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

The value computed for the overall risk is estimated  $6.530 \times 10^{-10}$  this is below the ICAO overall TLS.

**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.

Middle East RVSM Airspace			
Average Aircraft Speed = 440.3 kts			
Risk Type	Risk Estimation	ICAO TLS	Remarks
Technical Risk	$1.012 \times 10^{-10}$	$2.5 \times 10^{-9}$	Below ICAO TLS
Overall Risk	$6.530 \times 10^{-10}$	$5 \times 10^{-9}$	Below ICAO TLS

**2. Scope:**

2.1 The geographic scope of the MID RVSM Safety Monitoring Report 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*			

FIRs/UIRs of the Middle East RVSM Airspace

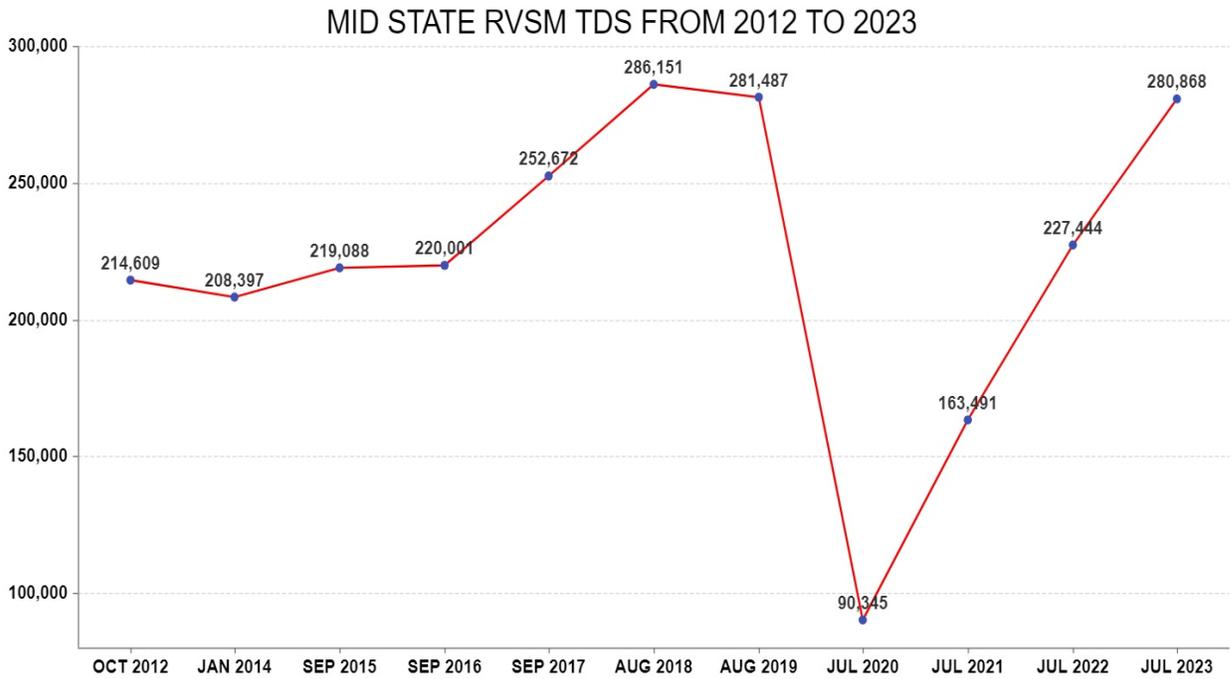
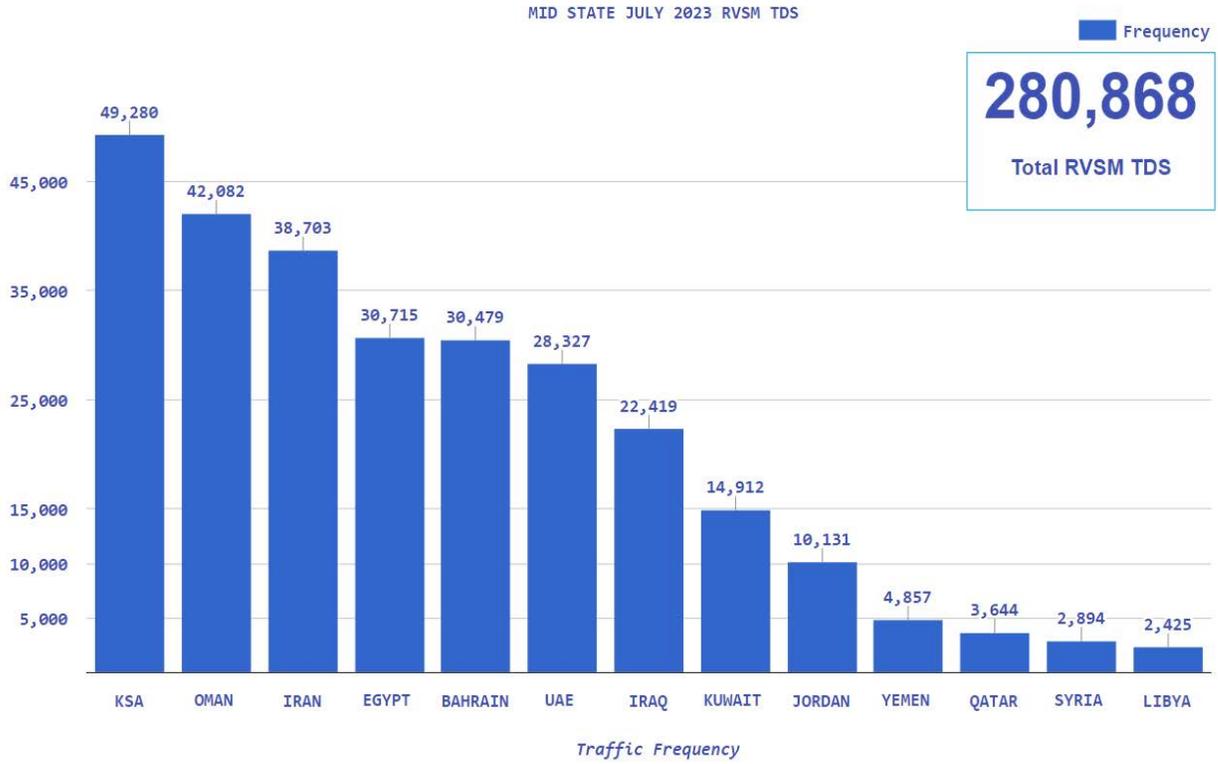
**\*Note: Beirut and Khartoum FIRs were excluded from the RVSM safety analysis due to lack of TDS, while Tripoli FIR excluded due to lack of their routing options.**

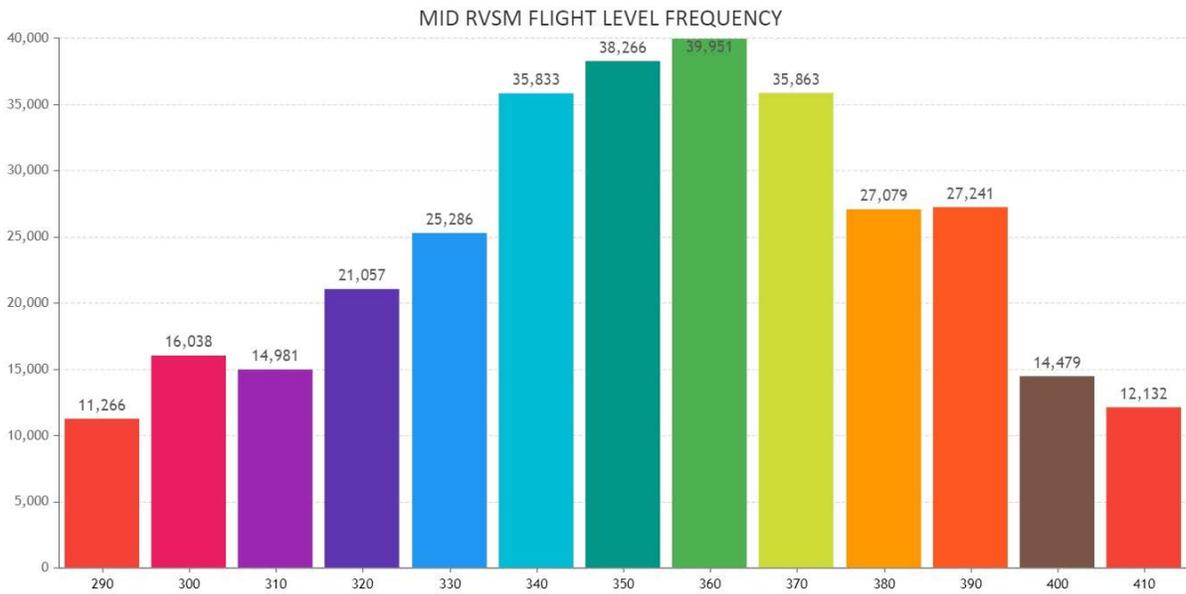
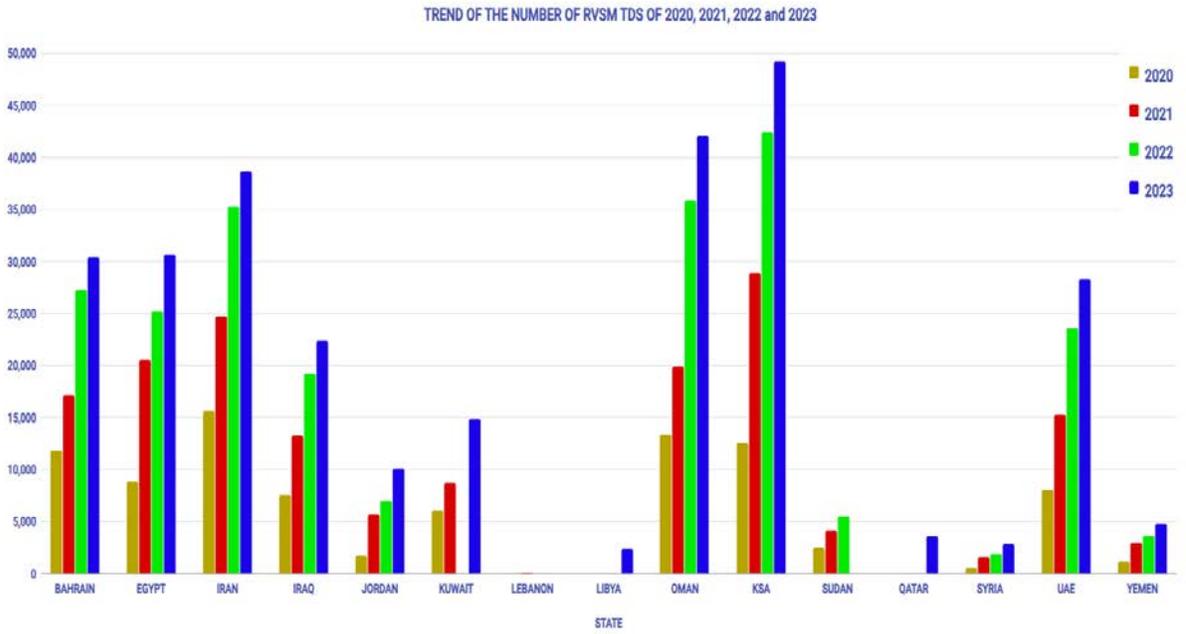
2.2 The Data Sampling periods covered by SMR 2023 are as displayed in the below table.

Report Elements	Time Period
Traffic Data Sample	01/06/2023 - 30/06/2023
Operational & Technical Errors	01/01/2023 - 31/12/2023

2.3 The descriptions of the traffic data collected from each MIDRMA Member State are depicted in table below:

MID States	No. of Flights	Received Date	Status
<b>BAHRAIN</b>	30479	2023-07-09	
<b>EGYPT</b>	30715	2023-08-06	
<b>IRAN</b>	38703	2023-09-25	
<b>IRAQ</b>	22419	2023-07-07	
<b>JORDAN</b>	10131	2023-07-05	
<b>KUWAIT</b>	14912	2023-07-03	
<b>LEBANON</b>			No Data Submitted
<b>LIBYA</b>	2425	2023-08-01	
<b>OMAN</b>	42082	2023-07-30	
<b>KSA</b>	49280	2023-08-01	
<b>QATAR</b>	3644	2023-08-07	
<b>SUDAN</b>			No Data Submitted
<b>SYRIA</b>	2894	2023-07-12	
<b>UAE</b>	28327	2023-07-25	
<b>YEMEN</b>	4857	2023-08-02	
<b>Total</b>	<b>280,868</b>		





#	WAYPOINT	FIR	FREQ
1	TASMI	BAGHDAD/KUWAIT	9943
2	DAVUS	BAHRAIN/KUWAIT	8280
3	NINVA	BAGHDAD/ANKARA	7388
4	SIDAD	BAGHDAD/KUWAIT	7018
5	TUMAK	BAHRAIN/EMIRATES	6781
6	RATVO	BAGHDAD/ANKARA	6670
7	ULINA	CAIRO/AMMAN	5761
8	ULADA	BAHRAIN/JEDDAH	5701
9	GABKO	EMIRATES/TEHRAN	5591
10	PASAM	CAIRO/JEDDAH	5440
11	ALPOB	BAHRAIN/EMIRATES	5359
12	BONAM	TEHRAN/ANKARA	4820
13	DEESA	AMMAN/JEDDAH	4792
14	RASKI	MUSCAT/MUMBAI	4737
15	DAROR	BAHRAIN/JEDDAH	4531
16	NALPO	BAHRAIN/EMIRATES	4507
17	SODEX	EMIRATES/MUSCAT	4418
18	MENSA	EMIRATES/MUSCAT	4409
19	DASIS	TEHRAN/ANKARA	4278
20	KITOT	CAIRO/JEDDAH	3996

**Table 1 - Top 20 Busiest Points in the ICAO Middle East RVSM Airspace**

2.4 Technical Vertical Collision Risk Assessment – Safety Objective 1

- 2.4.1 Technical vertical risk represents the risk of a collision between aircraft on adjacent flight levels due to normal or typical height deviations of RVSM approved aircraft. It is attributable to the height-keeping errors that result from the combination of altimetry system errors (ASE) and autopilot performance in the vertical dimension.
- 2.4.2 The risk of collision in MID RVSM airspace due solely to technical height-keeping performance meets the ICAO target level of safety (TLS) of  $2.5 \times 10^{-9}$  fatal accidents per flight hour.
- 2.4.3 The value computed for technical height risk is estimated  $1.019 \times 10^{-10}$  this meets RVSM Safety Objective 1.
- 2.4.4 From June 2023 TDS, the following were calculated:
- Average Aircraft Diameter (lambda xy): 0.028105 NM 170.77 ft
  - Average Aircraft Wingspan (lambda y): 0.025974 NM 157.82 ft
  - Average Aircraft Height (lambda z): 0.0080583 NM 48.963 ft
  - Number of Flights involved: 280,868.
  - Flying Time: 200,254 hours
  - Flying Distance: 91,279,794 NM
  - Average Speed: 440.45 kts
  - Average Passing Frequency: 1.34738E-001

2.4.5 To demonstrate that the result is reliable, it is necessary to demonstrate that the following assumptions are true:

- a. The estimated value of the frequency of horizontal overlap, used in the computations of vertical-collision risk, is valid.
- b.  $P_z(1000)$  – the probability of vertical overlap due to technical height-keeping performance, between aircraft flying 1000 ft. separation in MID RVSM airspace is estimated  $2.053 \times 10^{-9}$  valid and is less than the ICAO requirement of  $1.7 \times 10^{-8}$ .
- c. The monitoring target for the MID RVSM height-monitoring programme is an on-going process.
- d. The input data used by the CRM is valid.
- e. An adequate process is in place to investigate and correct problems in aircraft technical height-keeping performance.

## 2.5 Calculating the Probability of Lateral Overlap ( $P_y(0)$ )

The probability of lateral overlap  $P_y(0)$  is the probability of two aircraft being in lateral overlap which are nominally flying on (adjacent flight levels of) the same route. The calculation of the  $P_y(0)$  for the SMR 2021 has the following to consider:

- a. The MIDRMA continued to calculate the probability of lateral overlap  $P_y(\mathbf{0})$  for all the MID RVSM airspace as per the ICAO methodology developed for this purpose and derived by the MID Risk Analysis Software (MIDRAS).
- b. The MIDRMA calculated the probability of lateral overlap  $P_y(\mathbf{0})$  for each MIDRMA Member State and found all the results are valid :

### 1- Bahrain FIR

Passing Frequency (n\_equiv): 1.512E-002  
Probability of Lateral Overlap ( $P_y(0)$ ): 0.16965

### 2- Cairo FIR

Passing Frequency (n\_equiv): 2.979E-001  
Probability of Lateral Overlap ( $P_y(0)$ ): 0.16139

### 3- Baghdad FIR

Passing Frequency (n\_equiv): 2.787E-002  
Probability of Lateral Overlap ( $P_y(0)$ ): 0.17396

### 4- Doha FIR:

Passing Frequency (n\_equiv): 0.00000E+000  
Probability of Lateral Overlap ( $P_y(0)$ ): 0.14947

### 5- Tehran FIR

Passing Frequency (n\_equiv): 1.041E-001  
Probability of Lateral Overlap ( $P_y(0)$ ): 0.16325

### 6- Amman FIR

Passing Frequency (n\_equiv): 4.597E-002  
Probability of Lateral Overlap ( $P_y(0)$ ): 0.14495

**7- Muscat FIR**

Passing Frequency (n\_equiv): 3.406E-001  
Probability of Lateral Overlap (Py(0)): 0.1699

**8- Jeddah FIR**

Passing Frequency (n\_equiv): 5.274E-002  
Probability of Lateral Overlap (Py(0)): 0.15326

**9- Kuwait FIR**

Passing Frequency (n\_equiv): 7.257E-003  
Probability of Lateral Overlap (Py(0)): 0.18248

**10- Damascus FIR**

Passing Frequency (n\_equiv): 1.743E-001  
Probability of Lateral Overlap (Py(0)): 0.12272

**11- Emirates FIR**

Passing Frequency (n\_equiv): 2.010E-002  
Probability of Lateral Overlap (Py(0)): 0.16256

**12- Sana'a FIR**

Passing Frequency (n\_equiv): 2.961E-001  
Probability of Lateral Overlap (Py(0)): 0.18051

c. Overall, the results are considered to be valid.

Average Passing Frequency: **1.3474E-001**

Note: MIDRMA's assessment has identified Muscat FIR as the most complex and congested FIR within the ICAO Middle East RVSM airspace. Despite its complexity and congestion, no discernible upward trend in risk values has been observed.

## 2.6 Pz(1000) Compliance

3.6.1 The Pz(1000) is the probability that two aircraft at adjacent RVSM flight levels will lose vertical separation due to technical height keeping errors. The value of the probability of vertical overlap Pz(1000), based on the actual observed ASE and typical AAD data is estimated to be of **2.053 x 10<sup>-9</sup>**

3.6.2 This value meets the Global System Performance Specification that the probability that two aircraft will lose procedural vertical separation of 1000ft should be no greater than **1.7x10<sup>-8</sup>**.

3.6.3 The MIDRMA continues to issue the minimum monitoring requirements (MMRs) through the automated MMR software which is programmed to address the MIDRMA member states with their updated monitoring requirements according to the latest RVSM approvals received, the MMR table valid for 12<sup>th</sup> February 2024 can be found in **Attachment D** of the SMR.

Note: All member states are required to check and comply with their MMR through the MIDRMA website ([www.midrma.com](http://www.midrma.com)).

2.7 Conclusions on Technical Vertical Collision Risk:

- a. The current computed vertical-collision risk due to technical height-keeping performance meets the ICAO TLS.
- b. The probability of vertical-overlap estimate,  $P_z(1000)$ , satisfies the global system performance specification.
- c. Most monitoring groups are complying with ICAO TVE component requirements (also known as technical height-keeping group requirements).

2.7.1 Recommendations for Safety Objective 1:

- a. The MIDRMA shall continue to review the content and structure of its aircraft monitoring groups (on going task).
- b. The MIDRMA will continue to keep the methods of calculating the technical CRM parameters and the risk due to technical height keeping errors under review and update all parameters and data used in the MID Risk Analysis Software (MIDRAS AI) this is included the parameters for the new Doha FIR.

Note: New Upgraded MIDRAS AI is fully operational and used by the MIDRMA for the risk analysis

- c. The MIDRMA shall carry out continuous height monitoring survey and investigation concerning aircraft flying within the MID RVSM airspace by collecting the TDS from member states offered to submit their RVSM TDS on a monthly basis.
- d. More MIDRMA Member states other than Bahrain, Iraq and UAE are encouraged to send their monthly RVSM traffic data to explore more possible violations to the MID RVSM airspace.

2.8 Assessment of overall risk due to all causes against the TLS of  $5 \times 10^{-9}$  fatal accidents per flight hour **RVSM Safety Objective 2**

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

2.8.2 The value computed for the overall risk is estimated  $6.530 \times 10^{-10}$  this is below the ICAO overall TLS.

2.9 Large Height Deviation Reports (LHDs) 2023

2.9.1 The estimation of the total risk, encompassing Safety Objective 2, integrates the outcomes of Safety Objective 1 with the evaluation of risks originating from various other factors. This secondary component, often referred to as operational risk, is contingent on a multitude of factors, including airspace configuration, traffic density, ATC procedures, individual controller and pilot actions, and specific operational characteristics of sectors. The assessment of operational risk relies on the analysis of event magnitude and duration extracted from operational incident reports, which are subsequently transformed into Large Height Deviation reports.

2.9.2 MIDRMA has observed a decrease in Large Height Deviation (LHD) reporting from certain member states, particularly those with high traffic volumes, despite the continuous issuance of monthly reminders to all member states. The level of reporting has remained exceedingly low. The table below illustrates the reports received from all member states for the period from January 1st to December 31st, 2023.

<b>MID FIRs</b>	<b>No. of Reported LHDs</b>	<b>No. of Related LHDs</b>
Bahrain	6	5
Baghdad	1	-
Amman	1	2
Tehran	-	3
Cairo	27	9
Damascus	-	1
Khartoum	1	4
Kuwait	-	4
Muscat	90	48
Jeddah/ Riyadh	9	77
Tripoli	-	1
Emirates	4	5
Sana'a	181	11
Doha	6	-

Large Height Deviation Received from Member States from 01<sup>st</sup> Jan 2023 until 31<sup>st</sup> Dec 2023

Note 1: In reference to the table above, there are member states that didn't report any LHD for a long time, such as Kuwait, and Iran, while Iraq ATC reported only ONE LHD during the reporting cycle of SMR 2023.

2.9.3 Some MIDRMA Member States with large volume of traffic have submitted a small number of LHD reports during the SMR 2023 reporting cycle which is a continuous problem addressed in the previous SMRs, the MIDRMA can't see much improvement in the level of reporting LHDs especially with critical categories such as A, and B.

Note 2: the deficiency in reporting, especially in high-traffic states, raises doubts about the accuracy of safety data and diminishes confidence in the overall risk value assessment. MIDRMA urge immediate action to address and rectify reporting issues, ensuring transparency and upholding the credibility of safety assessments.

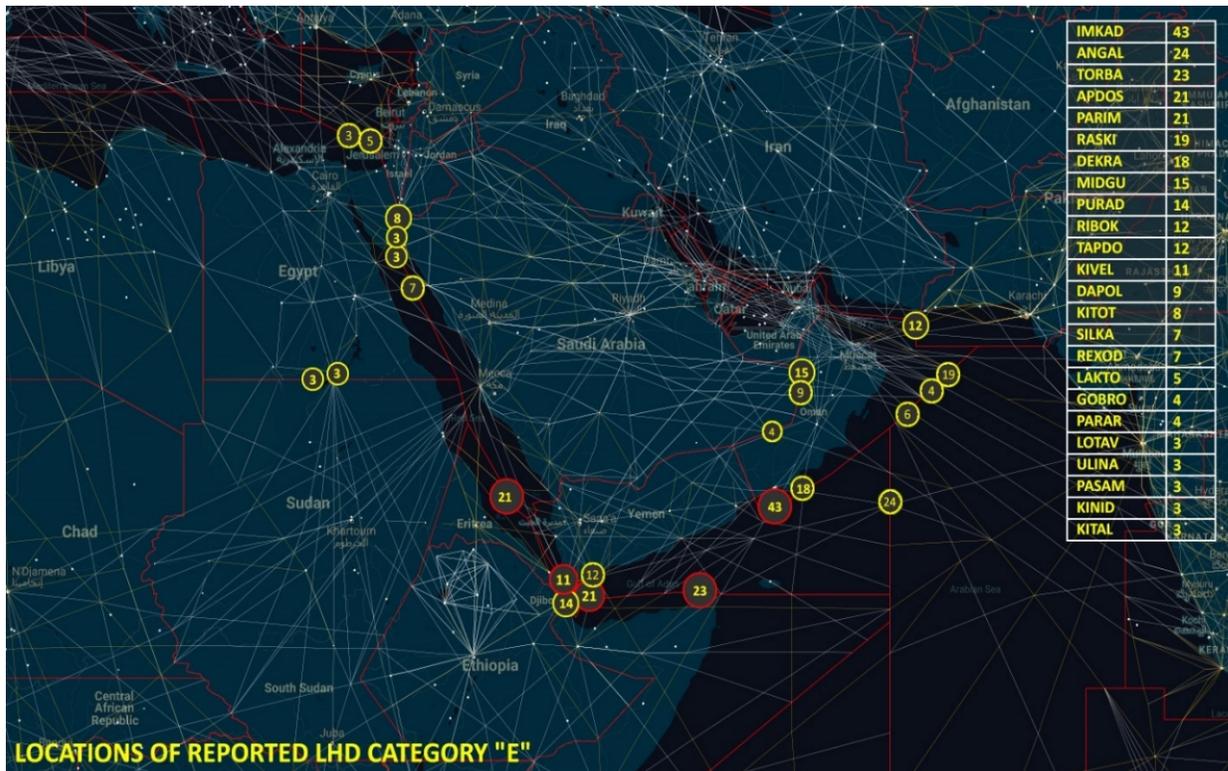
Note 3: The extreme majority of the received LHD reports are related to ATC transfer of control coordination errors due to human factors (Cat. E) and did not have severe impact on the RVSM airspace operations.

2.9.4 The table below provides a summary of operational risk associated with Large Height Deviation (LHD) reports, categorized by LHD categories. These reports are used to calculate the overall vertical collision risk, which is presented for Safety Objective No. 2.

<b>LHD Cat.</b>	<b>Large Height Deviation (LHD) Categories</b>	<b>No. of LHDs</b>	<b>LHD Duration (Sec.)</b>
A	Flight crew fails to climb or descend the aircraft as cleared	-	-
B	Flight crew climbing or descending without ATC clearance	-	-
C	Incorrect operation or interpretation of airborne equipment	4	<b>65</b>
D	ATC system loop error	-	-
E	ATC transfer of control coordination errors due to human factors	5	<b>360</b>
F	ATC transfer of control coordination errors due to technical issues	-	-
G	Aircraft contingency leading to sudden inability to maintain level	-	-
H	Airborne equip. failure and unintentional or undetected FL change	-	-
I	Turbulence or other weather-related cause	3	<b>70</b>
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		
	<b>Total</b>	<b>12</b>	<b>495</b>

Summary of Operational Risk associated with Large Height Deviation Reports

2.9.5 During MIDRMA Board/19 meeting, MIDRMA highlighted the issue of non-responsiveness to the received Large Height Deviation (LHD) reports, particularly in relation to the feature allowing direct responses to the reporting unit. This feature is crucial for ensuring that all responses are properly documented and can be readily referenced when necessary. Regrettably, the vast majority of Member States persist in neglecting the utilization of this feature and do not make the effort to investigate and provide replies to the LHD reports they receive.



### 3 Safety Protocols

3.1 RVSM Safety Protocol for Muscat and Mumbai FIRs and the Increased Number of LHD reports Submitted by Mumbai ATCU Related to Muscat ATCU:

3.1.1 MIDRMA has maintained its vigilance in monitoring the Large Height Deviation (LHD) reports along the eastern boundaries of Muscat FIR, as filed by Mumbai and Muscat ACCs. The ongoing status of the Muscat/Mumbai RVSM safety protocol, which has remained open since 2017. It is imperative that a decision be made to close this protocol, given that the associated risks should either be eliminated or reduced to the absolute minimum. Regrettably, MIDRMA does not perceive this happening without confirmation of the installation of OLDI/AIDC systems in both ACCs.

3.1.2 Oman reported during MIDRMA Board/19 meeting that LHD filed by Mumbai were received late at Muscat ACC, as the mechanism of reporting through Monitoring Agency of Asia Region (MAAR) and the MIDRMA; This delay hindered the prompt investigation of LHD events and timely corrective actions. However, Oman CAA called for ATM coordination meeting in Aug 2023, Mumbai ACC is now sending monthly LHD report via email directly to Muscat ACC, which enabled a timely response to mitigate the raising issues. Additionally, Oman CAA has developed and implemented an internal mechanism for investigating LHD reports on a regular basis and is also following up on corrective actions with the relevant parties. Reference to the AIDC connection implementation between Mumbai and Muscat ACCs; AIDC tests were conducted in September 2019, March 2021, February 2023, and August 2023.

3.1.3 The most recent test (involved testing ABI, EST, TOC, and AOC parameters) was reported success in all parameters tested except ABI. Next for AIDC test is pending the readiness of Mumbai ACC. Successful implementation of AIDC connection for flight information exchange between Muscat and Mumbai ATS units is considered effective in reducing such LHDs. Oman CAA and Airports Authority of India (AAI) agreed to organize coordination meetings in regular basis, to be address the LHD events in timely manner and to mitigate he route cause in timely manner.

3.1.4 a comprehensive account of Large Height Deviation (LHD) reports, as filed by both Air Traffic Control Units (ATCUs), from January 1st to December 31st, 2023 is at **Attachment A**, is provided. It is noteworthy that a significant and abrupt surge in LHD reporting from Mumbai related to Muscat, has been observed during this period.

Note 4: MIDRMA Board/19 Decided to keep the RVSM Safety Protocol open until the installation of OLDI/AIDC between the two ACCs.

3.1.5 The table below provides a comparison of the number of LHD reports submitted by Mumbai and Muscat ATCUs in 2022 and 2023.

YEAR	LHD Reported by Muscat	LHD Reported by Mumbai
2022	16	41
2023	40	142

3.2 RVSM Safety Protocol for Sanaa and Mogadishu FIRs.

3.2.1 The MIDRMA Board/18 has decided to open an RVSM Safety Protocol between Sanaa and Mogadishu FIRs in response to the increasing number of LHD reports submitted by Sana'a ACC related to Mogadishu and to its neighbouring FIRs. It's worth noting that the first coordination meeting, organized by ICAO MID and attended by ICAO ESAF ARMA, MIDRMA, IATA and relevant ATM representatives near the Horn of Africa, discussed the surge in LHD reports from Sana'a ACC concerning its neighbouring FIRs. During this meeting, the ATM representatives attended this meeting were briefed of the escalating risk associated with the rising number of LHD reports and their impact on the overall ICAO TLS within the MID region. They were urged to promptly implement corrective measures to resolve this problem as soon as possible.

3.2.2 No LHD reports were filed by Sanaa related to Mogadishu from January 1st until December 31st, 2023. Therefore, MIDRMA sees no reason to keep the safety protocol open and requests to close it, however MIDRMA Board/19 meeting decided to keep this protocol open because of the continuous increase in the LHD reports by the other surrounding FIRs.

3.2.3 The table below displays all the LHD reports filed by Sanaa ACC related to its neighbouring ACCs, indicating a significant decrease in the number of reports compared to the year 2022 especially related to Mogadishu FIR.

Months	Addis Ababa	Asmara	Djibouti	Jeddah	Mogadishu	Mumbai	Muscat	Total
1-2023	1	0	2	1	0	1	9	14
2-2023	2	1	0	3	0	4	3	13
3-2023	0	1	4	3	0	0	16	24
4-2023	2	2	2	1	0	3	2	12
5-2023	2	2	2	1	0	0	0	7
6-2023	2	5	2	5	0	1	0	15
7-2023	3	10	2	6	0	4	0	25
8-2023	4	3	5	3	0	3	0	18
9-2023	4	1	2	4	0	1	4	16
10-2023	1	3	2	2	0	3	4	15
11-2023	0	2	1	2	0	3	3	11
12-2023	1	1	0	4	0	2	3	11
<b>Total</b>	<b>22</b>	<b>31</b>	<b>24</b>	<b>35</b>	<b>0</b>	<b>25</b>	<b>44</b>	<b>181</b>

#### 4 Assessment of Non-RVSM Approved Aircraft 2023

4.1 The MIDRMA, in accordance with its role as a Regional Monitoring Agency (RMA), as specified in ICAO Doc 9937 and 9574, conducts systematic reviews to assess operator compliance with State RVSM approvals within the ICAO Middle East Region. This essential function is carried out to safeguard the safety of the RVSM airspace by identifying aircraft that operate within it without the required approvals.

4.2 While it would be ideal to conduct daily compliance monitoring across the entire ICAO Middle East airspace, challenges in collecting traffic information render this impractical. In alignment with the guidelines set forth in ICAO Doc 9937, the responsible RMA is mandated to monitor full airspace compliance for a minimum of 30 days annually. In fulfilling this obligation, MIDRMA conducts monthly assessments.

4.3 MIDRMA relies on RVSM traffic data from Bahrain, Baghdad, and Emirates FIRs as the primary source for monitoring non-RVSM approved aircraft within its area of responsibility. This approach is necessitated by the challenge of obtaining monthly traffic data from all Member States. In light of this, MIDRMA wishes to express its sincere appreciation to the Bahrain Civil Aviation Authority, the Iraq Civil Aviation Authority, and the UAE General Civil Aviation Authority for their unwavering commitment to providing their FIRs' RVSM traffic data on a monthly basis. The data received from these Member States is consistently comprehensive and conforms to the required format.

4.4 The tables in **Attachment B** of the SMR reflect the MIDRMA Bulletin of Non-RVSM Approved aircraft observed operating within the ICAO MID RVSM airspace and within the RVSM airspace of other RMAs. The expectation derived from this analysis is that States exercising operational authority will take proactive steps to address approval issues well in advance, ensuring that approved aircraft operate within the RVSM airspace. This proactive approach aims to prevent undesirable actions against legitimate operators. Furthermore, it is expected that States encountering such aircraft operating within their airspace will take appropriate measures.

## **5 Status Report on the Monitoring the Syrian RVSM approved Aircraft (OFAC License)**

5.1 Due to the recently escalating number of operations of the RVSM-approved aircraft registered by the Syrian Civil Aviation Authority within the ICAO Middle East Region, MIDRMA formally submitted a request on September 2021 for an OFAC License to both the FAA and the US Department of Treasury. This license is sought for the purpose of conducting RVSM height monitoring using Enhanced GMU equipment. Successfully, this license application was approved in September 2023 and the MIDRMA granted a permission to use the EGMU equipment to monitor the Syrian RVSM approved aircraft.

Note: the proactive step taken by the Syrian Civil Aviation Authorities to ensure the timely monitoring of their registered aircraft by sending them to overfly HMUs (Height Monitoring Units) available in Europe to obtain height monitoring results. This pragmatic approach enabled the certificate holders to renew their RVSM Approvals without waiting for the OFAC license, the timing of which remained uncertain. Nevertheless, we express our profound gratitude to the FAA for their invaluable assistance and unwavering support in obtaining this license which is valid for two years.

## **6 Status Report on the Monitoring the Iranian RVSM approved Aircraft (OFAC License)**

6.1 The process of securing an OFAC License from the Department of the US Treasury, specifically for the utilization of EGMU Equipment to monitor the Iranian RVSM approved aircraft, was initiated in October 2021. It is important to note that by January 2021, the OFAC license had already received approval, and the request for its renewal was diligently submitted well in advance of the impending expiration date, which was scheduled for January 31, 2023. Despite the early request, MIDRMA faced significant challenges in obtaining updates regarding the license. Over the course of nearly 22 months, the MIDRMA continually inquires the FAA representative for updated information about the status of the license. This prolonged delayed communication led to growing concerns within the MIDRMA about the risk associated with the impending expiration of the license.

6.2 The subject was formally addressed during MIDRMA Board/18 meeting held in Doha, Qatar, 19 - 20 September 2022 and MIDRMA Board/19 held in Bahrain 10-11 October 2023. The primary agenda was the renewal request made by MIDRMA for the OFAC License and impending expiration of the license for the Iranian aircraft by the end of January 2023, and the status of the application pending since October 2021. During MIDRMA Board/18 meeting, exhaustive discussions took place to explore potential solutions to the problem. The FAA representative was invited to facilitate an urgent meeting with OFAC to convey the critical nature of the situation and the risks associated with the lack of known height monitoring. However, despite several attempts, MIDRMA did not receive any update. While Iran Civil Aviation Authority (ICAA) has displayed a positive stance and readiness to conduct height monitoring for all their RVSM-approved aircraft, the MIDRMA remains unable to respond positively to the Iran Civil Aviation Authority request due to the absence of the OFAC license.

6.3 The table below illustrates the current Minimum Monitoring Requirements for Iran CAA RVSM approved aircraft. Currently, 45% of their approved aircraft don't meet the height monitoring requirements, and this figure is expected to increase to 79% by the end of May 2024. However, this represents a significant percentage of non-compliant aircraft in RVSM operations, posing a serious threat to other approved aircraft within the RVSM airspace.

STATE	RVSM APPROVED A/C	HAVE RESULTS OR COVERED	NOT COVERED	NOT COVERED IN %	Number of ACFT Required Monitoring
Iran MMR – February 2024	168	93	75	45%	49
Iran MMR – May 2024	168	36	132	79%	78

#### Status of Iran RVSM Minimum Monitoring Requirement

### 7 Conclusions for Achieving Safety Objective 2:

- ICAO Compliance to the Overall Risk :** Meeting the ICAO overall TLS of  $5 \times 10^{-9}$  fatal accidents per flight hour demonstrates full compliance with international aviation standards, affirming the commitment to safety at a global level.
- Enhanced Operational Safety:** The accomplishment of Safety Objective 2 directly translates to enhanced operational safety, ensuring that the risk of collisions due to all causes, including technical aspects and operational errors, is maintained within globally accepted safety thresholds. Nevertheless, there are apprehensions regarding certain Flight Information Regions (FIRs) characterized by high traffic volume, as they may not consistently report the necessary LHD categories such as A, B, C, and D. This inconsistency poses a challenge to fostering high confidence in the overall risk estimation.
- Reduction in Collision Risk:** Meeting the ICAO TLS signifies a tangible reduction in the overall risk of collision within the MID RVSM airspace, providing a safer environment for air traffic operations.

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4. **Safety Assurance for Stakeholders:** The achievement of the safety objective assures stakeholders, including aviation authorities, airlines, and passengers, that safety is a top priority, fostering confidence in the reliability of air travel in the RVSM airspace.
5. **Improved Airspace Management:** The successful outcome of Safety Objective 2 reflects positively on the effectiveness of airspace management practices, demonstrating the ability to balance air traffic density while maintaining a high standard of safety.
6. **Continuous Improvement Culture:** The achievement of Safety Objective 2 fosters a culture of continuous improvement, where safety standards are not just met but actively monitored and refined over time to adapt to evolving aviation landscapes.

Overall, the positive conclusions drawn from achieving RVSM Safety Objective 2 highlight the successful management of collision risks and the establishment of a high standard of safety in the MID RVSM airspace.

## 8 Safety 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.

### 8.1 Recommendations for Safety Objective 3

- 1- Member States with the capability to submit their RVSM traffic data on a monthly basis are strongly encouraged to fulfill this request. This action will assist MIDRMA in scrutinizing the data for potential violations of RVSM airspace by non-approved aircraft and in calculating monthly risk values to identify any emerging trends for future assessment.
- 2- Member States employing ADS-B for surveillance are urged to share their archived ADS-B data with MIDRMA to facilitate trials for RVSM height monitoring. This request is applicable to all aircraft equipped with ADS-B Out operating within the RVSM airspace.
- 3- To enhance the reporting of Large Height Deviations and address various aspects related to RVSM implementation within the ICAO Middle East RVSM airspace, MIDRMA conducted an RVSM Seminar. Representatives from Member States, focal points for ATC and Airworthiness, as well as Airline Operators and neighboring Regional Monitoring Agencies, were invited to participate. The goal was to raise awareness regarding RVSM implementation and its requirements.

Note: MIDRMA requests any member state interested in conducting a similar seminar privately within their country to contact the ICAO MID office and MIDRMA for the coordination and arrangement of this event.

9 Conclusions of Achieving Safety Objective 3:

1. **Improved Risk Management Processes:** Demonstrating improvements in risk management processes, such as enhanced identification, assessment, and mitigation of potential safety hazards, showcases a proactive approach to ensuring the safety of RVSM operations.
2. **Enhanced Reporting and Communication:** Improved reporting mechanisms and communication channels regarding safety issues signify a positive shift towards a more transparent and collaborative safety culture, facilitating timely responses to potential risks.
3. **Regulatory Compliance:** Verification of compliance with relevant aviation regulations and standards associated with RVSM operations confirms that the safety enhancements align with industry requirements, promoting confidence in the overall safety framework.

By addressing the recommendations in 2.4.1 and showcasing these positive conclusions, Safety Objective 3 has been achieved, leading to a safer and more secure RVSM operational environment.

**Attachment A**

**LHD Reports Submitted by Muscat related to Mumbai**

#	ID	Date of Occ	Reported By	Related to	Location	Nature of the occurrence:	Category
1	11226	03-Mar-23	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
2	11227	03-Mar-23	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
3	11228	04-Apr-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
4	11229	04-Apr-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
5	11230	04-Apr-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
6	11231	07-Apr-23	Muscat	Mumbai	KITAL	ACFT Entered FIR Without Coordination	E
7	11232	12-Apr-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
8	11375	03-Aug-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
9	11376	04-Aug-23	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
10	11377	05-Aug-23	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
11	11378	06-Aug-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
12	11379	07-Aug-23	Muscat	Mumbai	REXOD	Revised FL Not Coordinated	E
13	11380	08-Aug-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
14	11381	09-Aug-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
15	11382	09-Aug-23	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
16	11383	10-Aug-23	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
17	11384	12-Aug-23	Muscat	Mumbai	REXOD	Revised FL Not Coordinated	E
18	11385	16-Aug-23	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
19	11386	18-Aug-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
20	11387	19-Aug-23	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
21	11388	22-Aug-23	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
22	11389	28-Aug-23	Muscat	Mumbai	PARAR	ACFT Entered FIR Without Coordination	E
23	11390	30-Aug-23	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
24	11391	30-Aug-23	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
25	11392	30-Aug-23	Muscat	Mumbai	REXOD	ACFT Entered FIR Without Coordination	E
26	11432	03-Sep-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
27	11433	03-Sep-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
28	11484	03-Oct-23	Muscat	Mumbai	REXOD	Revised FL Not Coordinated	E
29	11485	04-Oct-23	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E
30	11486	08-Oct-23	Muscat	Mumbai	TOTOX	Revised FL Not Coordinated	E
31	11487	08-Oct-23	Muscat	Mumbai	LOTAV	Revised FL Not Coordinated	E

32	11496	02-Nov-23	Muscat	Mumbai	KITAL	Revised FL Not Coordinated	E
33	11497	02-Nov-23	Muscat	Mumbai	KITAL	Revised FL Not Coordinated	E
34	11498	04-Nov-23	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
35	11521	05-Nov-23	Muscat	Mumbai	PARAR	Revised FL Not Coordinated	E
36	11524	07-Nov-23	Muscat	Mumbai	TOTOX	ACFT Entered FIR Without Coordination	E
37	11525	07-Nov-23	Muscat	Mumbai	KITAL	Revised FL Not Coordinated	E
38	11526	11-Nov-23	Muscat	Mumbai	RASKI	Revised FL Not Coordinated	E
39	11527	11-Nov-23	Muscat	Mumbai	RASKI	ACFT Entered FIR Without Coordination	E
40	11528	13-Nov-23	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	LHD001819	06/01/2023	Mumbai	Muscat	KITAL	No or late estimate time revision	E
2	LHD001820	15/01/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
3	LHD001859	02/02/2023	Mumbai	Muscat	BIBGO	No transfer information	E
4	LHD001863	08/02/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
5	LHD001864	14/02/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
6	LHD001865	16/02/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
7	LHD001866	19/02/2023	Mumbai	Muscat	PARAR	No transfer information	E
8	LHD001867	10/03/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
9	LHD001868	14/03/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
10	LHD001869	16/03/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
11	LHD001870	16/03/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
12	LHD001877	16/03/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
13	LHD001878	19/03/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
14	LHD001879	20/03/2023	Mumbai	Muscat	LOTAV	No transfer information	E
15	LHD001880	24/03/2023	Mumbai	Muscat	PARAR	No or late route revision	E
16	LHD001881	24/03/2023	Mumbai	Muscat	PARAR	No or late route revision	E
17	LHD001882	24/03/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
18	LHD001883	24/03/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
19	LHD001884	24/03/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
20	LHD001885	26/03/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
21	LHD001886	29/03/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
22	LHD001887	31/03/2023	Mumbai	Muscat	REXOD	No or late FL revision	E
23	LHD001963	08/04/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
24	LHD001964	17/04/2023	Mumbai	Muscat	SAPNA	No transfer information	E
25	LHD001965	18/04/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
26	LHD001966	27/04/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
27	LHD001967	30/04/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
28	LHD002011	04/05/2023	Mumbai	Muscat	RASKI	No transfer information	E
29	LHD002012	13/05/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
30	LHD002013	18/05/2023	Mumbai	Muscat	ANGAL	No or late FL revision	E
31	LHD002014	23/05/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
32	LHD002015	25/05/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
33	LHD002016	25/05/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
34	LHD002017	30/05/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
35	LHD002018	31/05/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
36	LHD002019	06/06/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
37	LHD002020	19/06/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
38	LHD002021	23/06/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
39	LHD002022	26/06/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E

40	LHD002038	04/07/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
41	LHD002039	05/07/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
42	LHD002040	21/07/2023	Mumbai	Muscat	PARAR	No transfer information	E
43	LHD002041	26/07/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
44	LHD002042	29/07/2023	Mumbai	Muscat	ORLID	No or late estimate time revision	E
45	LHD002043	29/07/2023	Mumbai	Muscat	ORLID	No or late estimate time revision	E
46	LHD002091	05/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
47	LHD002092	07/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
48	LHD002093	08/08/2023	Mumbai	Muscat	REXOD	No or late FL revision	E
49	LHD002094	10/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
50	LHD002095	13/08/2023	Mumbai	Muscat	REXOD	No or late FL revision	E
51	LHD002096	14/08/2023	Mumbai	Muscat	PARAR	No transfer information	E
52	LHD002097	15/08/2023	Mumbai	Muscat	TOTOX	No or late estimate time revision	E
53	LHD002098	15/08/2023	Mumbai	Muscat	REXOD	No or late FL revision	E
54	LHD002099	16/08/2023	Mumbai	Muscat	ORLID	No transfer information	E
55	LHD002101	17/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
56	LHD002102	17/08/2023	Mumbai	Muscat	REXOD	No or late FL revision	E
57	LHD002103	18/08/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
58	LHD002104	19/08/2023	Mumbai	Muscat	ORLID	No or late estimate time revision	E
59	LHD002105	20/08/2023	Mumbai	Muscat	RASKI	No or late estimate time revision	E
60	LHD002106	20/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
61	LHD002107	20/08/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
62	LHD002108	21/08/2023	Mumbai	Muscat	KITAL	No or late estimate time revision	E
63	LHD002109	22/08/2023	Mumbai	Muscat	ANGAL	No transfer information	E
64	LHD002110	23/08/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
65	LHD002111	23/08/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
66	LHD002112	23/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
67	LHD002113	23/08/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
68	LHD002114	24/08/2023	Mumbai	Muscat	ORLID	No or late FL revision	E
69	LHD002115	24/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
70	LHD002116	24/08/2023	Mumbai	Muscat	ORLID	No or late FL revision	E
71	LHD002117	24/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
72	LHD002118	25/08/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
73	LHD002119	25/08/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
74	LHD002120	25/08/2023	Mumbai	Muscat	RASKI	No or late estimate time revision	E
75	LHD002121	27/08/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
76	LHD002122	29/08/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
77	LHD002123	29/08/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
78	LHD002124	31/08/2023	Mumbai	Muscat	RASKI	No or late FL revision	E

79	LHD002125	31/08/2023	Mumbai	Muscat	KITAL	No or late estimate time revision	E
80	LHD002192	01/10/2023	Mumbai	Muscat	REXOD	No or late estimate time revision	E
81	LHD002193	02/10/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
82	LHD002194	04/10/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
83	LHD002195	05/10/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
84	LHD002196	08/10/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
85	LHD002197	20/10/2023	Mumbai	Muscat	LOTAV	No or late estimate time revision	E
86	LHD002198	22/10/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
87	LHD002199	23/10/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
88	LHD002200	23/10/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
89	LHD002201	24/10/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
90	LHD002203	24/10/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
91	LHD002204	26/10/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
92	LHD002205	26/10/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
93	LHD002206	26/10/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
94	LHD002207	26/10/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
95	LHD002208	28/10/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
96	LHD002209	29/10/2023	Mumbai	Muscat	PARAR	No transfer information	E
97	LHD002210	30/10/2023	Mumbai	Muscat	KITAL	No or late FL revision	E
98	LHD002292	03/11/2023	Mumbai	Muscat	ORLID	No or late FL revision	E
99	LHD002293	03/11/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
100	LHD002294	04/11/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
101	LHD002295	05/11/2023	Mumbai	Muscat	ORLID	No or late FL revision	E
102	LHD002296	07/11/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
103	LHD002297	08/11/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
104	LHD002298	09/11/2023	Mumbai	Muscat	TOTOX	No or late estimate time revision	E
105	LHD002299	12/11/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
106	LHD002300	12/11/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
107	LHD002301	13/11/2023	Mumbai	Muscat	ANGAL	No transfer information	E
108	LHD002302	14/11/2023	Mumbai	Muscat	KITAL	No transfer information	E
109	LHD002303	17/11/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
110	LHD002304	19/11/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
111	LHD002305	20/11/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
112	LHD002306	23/11/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
113	LHD002307	23/11/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
114	LHD002308	24/11/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
115	LHD002309	26/11/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
116	LHD002310	26/11/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E

117	LHD002311	28/11/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
118	LHD002353	03/12/2023	Mumbai	Muscat	REXOD	No or late FL revision	E
119	LHD002354	05/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
120	LHD002355	07/12/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
121	LHD002356	07/12/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
122	LHD002359	10/12/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
123	LHD002360	11/12/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
124	LHD002361	11/12/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
125	LHD002362	11/12/2023	Mumbai	Muscat	REXOD	No transfer information	E
126	LHD002363	11/12/2023	Mumbai	Muscat	REXOD	No transfer information	E
127	LHD002364	12/12/2023	Mumbai	Muscat	REXOD	No or late FL revision	E
128	LHD002365	15/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
129	LHD002366	15/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
130	LHD002367	16/12/2023	Mumbai	Muscat	TOTOX	No or late FL revision	E
131	LHD002368	18/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
132	LHD002369	19/12/2023	Mumbai	Muscat	PARAR	No or late FL revision	E
133	LHD002370	19/12/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
134	LHD002371	23/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
135	LHD002372	23/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
136	LHD002373	24/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
137	LHD002374	24/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
138	LHD002375	25/12/2023	Mumbai	Muscat	ASPUX	No or late FL revision	E
139	LHD002376	28/12/2023	Mumbai	Muscat	LOTAV	No or late FL revision	E
140	LHD002377	30/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
141	LHD002378	30/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E
142	LHD002379	31/12/2023	Mumbai	Muscat	RASKI	No or late FL revision	E

**Attachment B**

**NON-RVSM approved aircraft – Responsibility of MIDRMA Member States**

#	Observed RVSM in	Operating	ACFT Reg.	ICAO Type	First Observed on	Responsible State
1	Jeddah		STALL	CRJ1	11-06-2022	SUDAN
2	EURRMA		5ALEX	BE200	09-07-2022	LIBYA

**NON-RVSM approved aircraft – Responsibility of other RMAs**

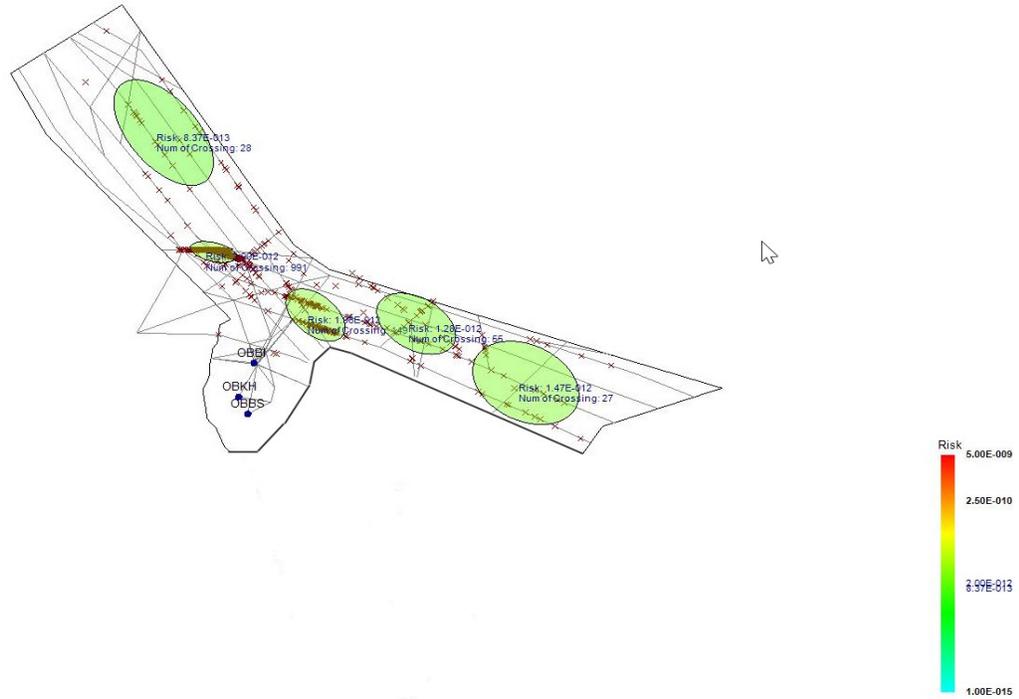
#	ACFT Reg.	ICAO Type	First Observed on	Responsible RMA
1	PKSJH	A320	06-11-2022	AAMA
2	PKLSW	B739	08-03-2023	AAMA
3	PKBGZ	B738	13-12-2022	AAMA
4	PKSTD	A320	19-01-2023	AAMA
5	PKLVF	B739	20-01-2023	AAMA
6	PKLSV	B739	21-12-2022	AAMA
7	40001A	C17	25-01-2020	AAMA
8	PKLSU	B739	27-11-2022	AAMA
9	PKSTH	A320	27-11-2022	AAMA
10	60208A	C17	30-03-2020	AAMA
11	PKBKM	A320	30-11-2022	AAMA
12	ZSCQP	CRJ9	07-07-2020	AFIRMA
13	ETATF	B350	08-07-2020	AFIRMA
14	5YWBH	C56X	14-07-2020	AFIRMA
15	5YFAN	CRJ2	15-07-2020	AFIRMA
16	5NBOD	GLF4	28-01-2022	AFIRMA
17	CCBGV	B789	08-06-2022	CARSAM
18	FAB2857	KC39	22-05-2022	CARSAM
19	21140	IL76	19-06-2022	CHINARMA
20	URAZN	B753	01-02-2022	EURRMA
21	URAZO	B753	01-02-2022	EURRMA
22	URSQO	B738	02-12-2021	EURRMA
23	URAZR	B77W	03-02-2022	EURRMA
24	EW550TH	IL76	04-12-2021	EURRMA
25	URFSC	IL76	05-12-2021	EURRMA
26	URFSA	IL76	09-05-2021	EURRMA
27	URFSE	IL76	11-12-2022	EURRMA
28	ICJSN	C25C	15-05-2023	EURRMA
29	UR11316	AN12	22-07-2020	EURRMA
30	URFSD	IL76	24-12-2021	EURRMA

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31	KJ3452	IL76	03-08-2020	MAAR
32	IN307	IL38	03-12-2020	MAAR
33	KJ3454	IL76	16-03-2020	MAAR
34	K3604	E35L	17-07-2020	MAAR
35	80002A	C17	23-07-2020	MAAR
36	CB8004	C17	24-07-2020	MAAR
37	CB8001	C17	29-07-2020	MAAR
38	N411VP	EA50	01-05-2022	NAARMO
39	N267LG	GLF4	02-01-2023	NAARMO
40	N981DB	H25B	05-04-2022	NAARMO
41	N980BA	GLEX	05-11-2022	NAARMO
42	N44UA	CL60	07-06-2020	NAARMO
43	N685MF	GLF4	08-12-2021	NAARMO
44	N800AJ	CL60	10-02-2023	NAARMO
45	N605AS	PC12	11-04-2022	NAARMO
46	N866G	GALX	14-02-2022	NAARMO
47	N298RB	GLF4	14-05-2021	NAARMO
48	N28JV	PRM1	15-05-2023	NAARMO
49	N1112B	B350	16-07-2020	NAARMO
50	XAASP	CL60	17-11-2022	NAARMO
51	N920SA	F2TH	18-02-2021	NAARMO
52	N651CV	C650	21-11-2022	NAARMO
53	N145DB	E35L	22-01-2022	NAARMO
54	N46HB	F9000	22-08-2022	NAARMO
55	N320MK	GLF3	24-09-2022	NAARMO
56	N890DA	GLF5	25-02-2023	NAARMO
57	N604DT	CL60	26-02-2022	NAARMO
58	XAAYL	GLEX	26-04-2023	NAARMO
59	N405LL	H25B	29-05-2022	NAARMO

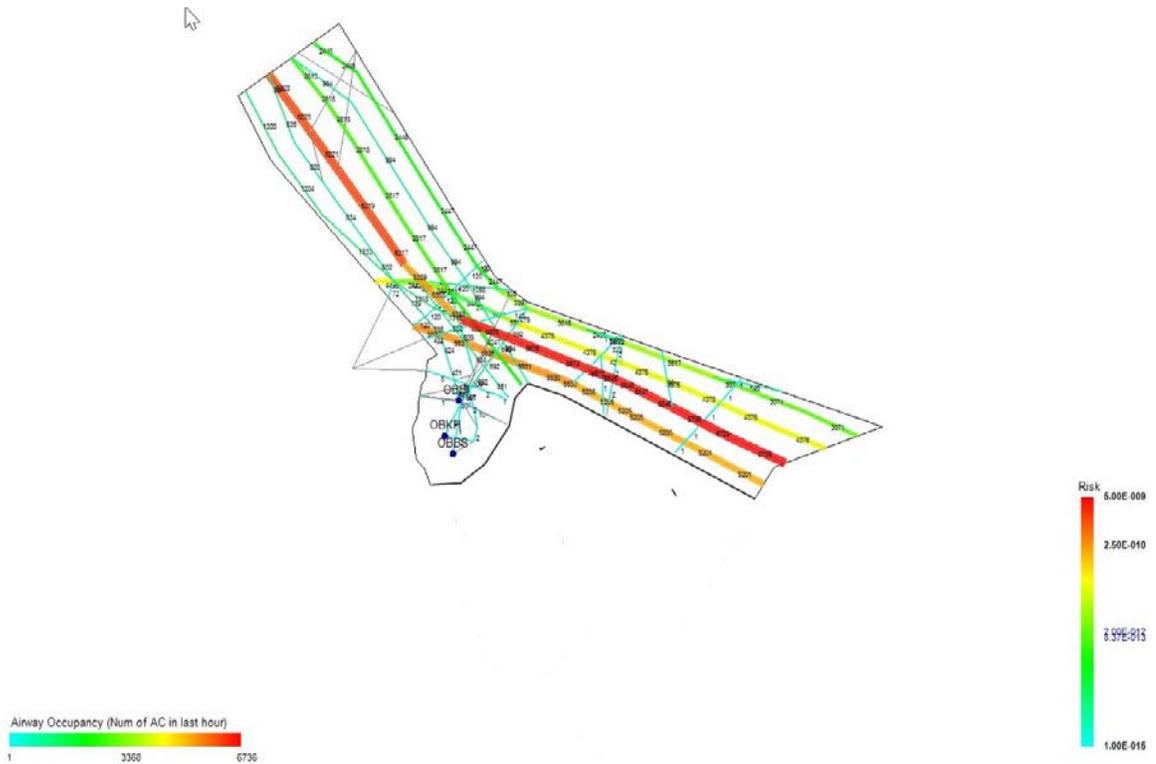
Attachment C

**MID FIRs RVSM Airspace Hotspots & AWYs Occupancy**



Bahrain FIR Hotspots – MID RVSM SMR 2023

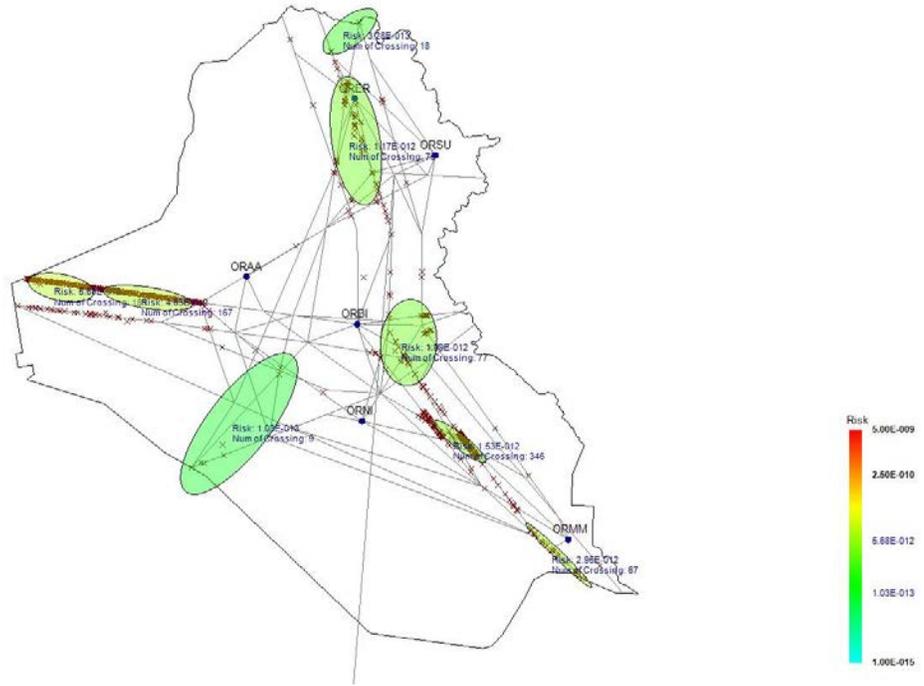
Note: Bahrain's southern FIR boundaries drawn by MIDRMA in approximate locations



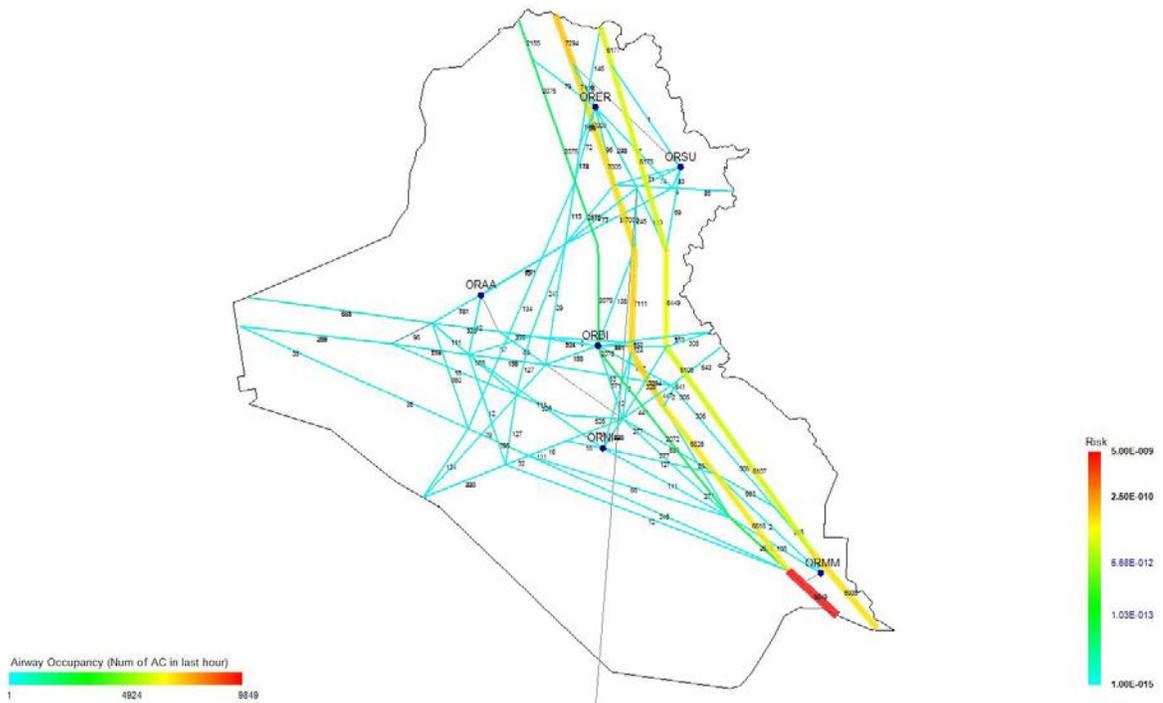
Bahrain FIR AWYs Occupancy – MID RVSM SMR 2023



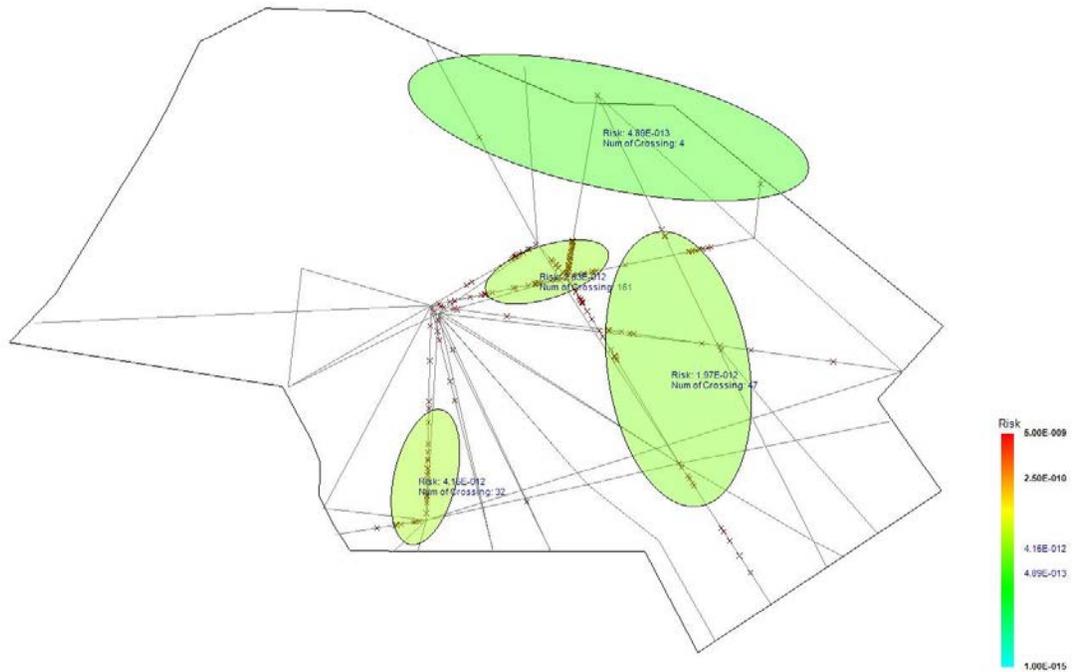




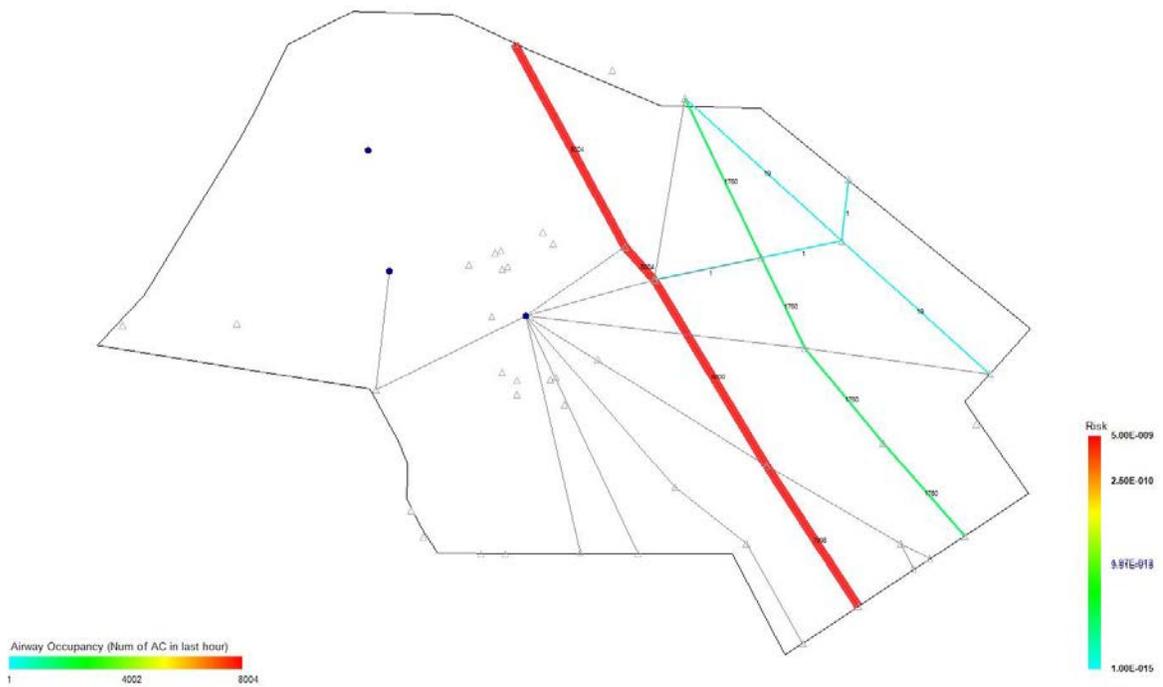
BAGHDAD FIR Hotspots – MID RVSM SMR 2023



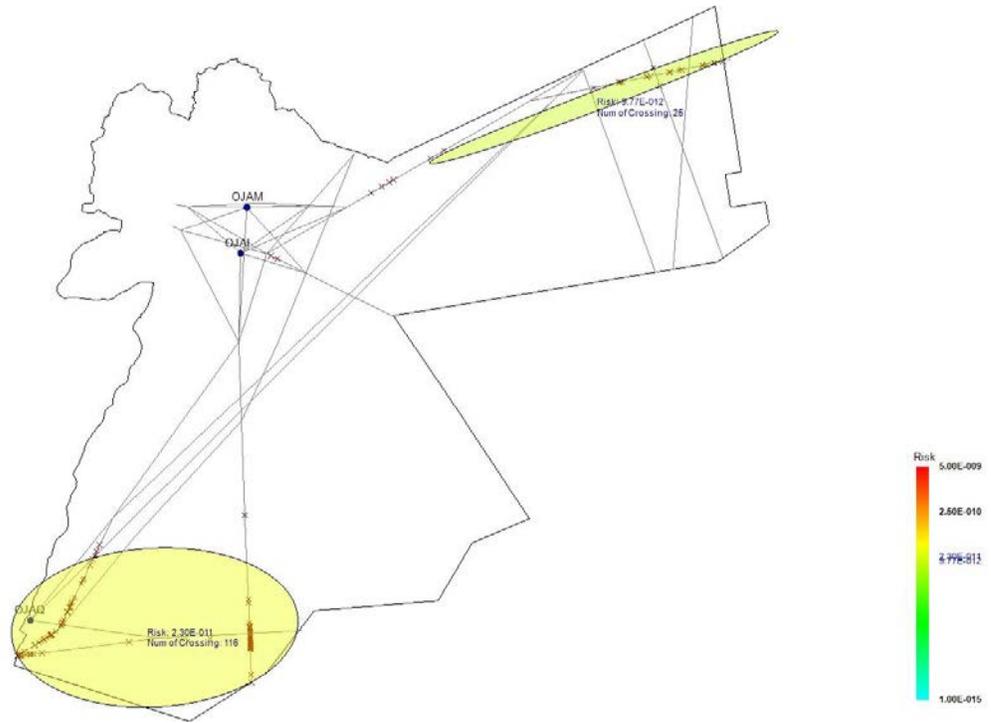
BAGHDAD FIR AWYs Occupancy – MID RVSM SMR 2023



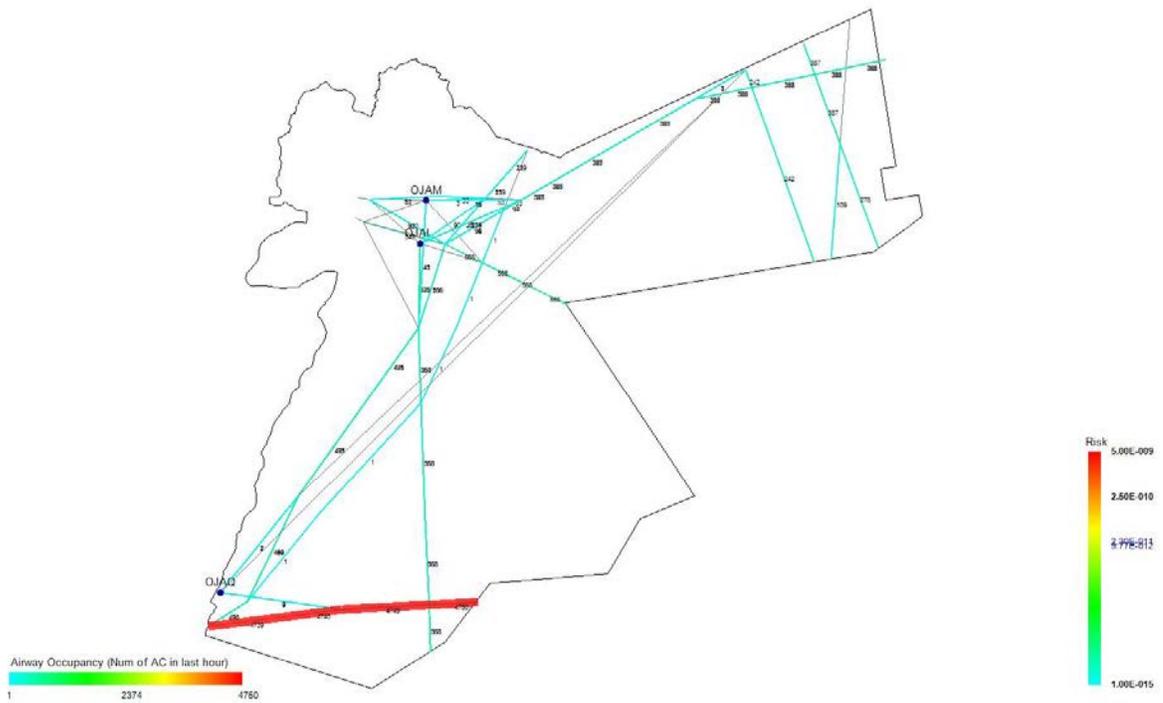
KUWAIT FIR Hotspots – MID RVSM SMR 2023



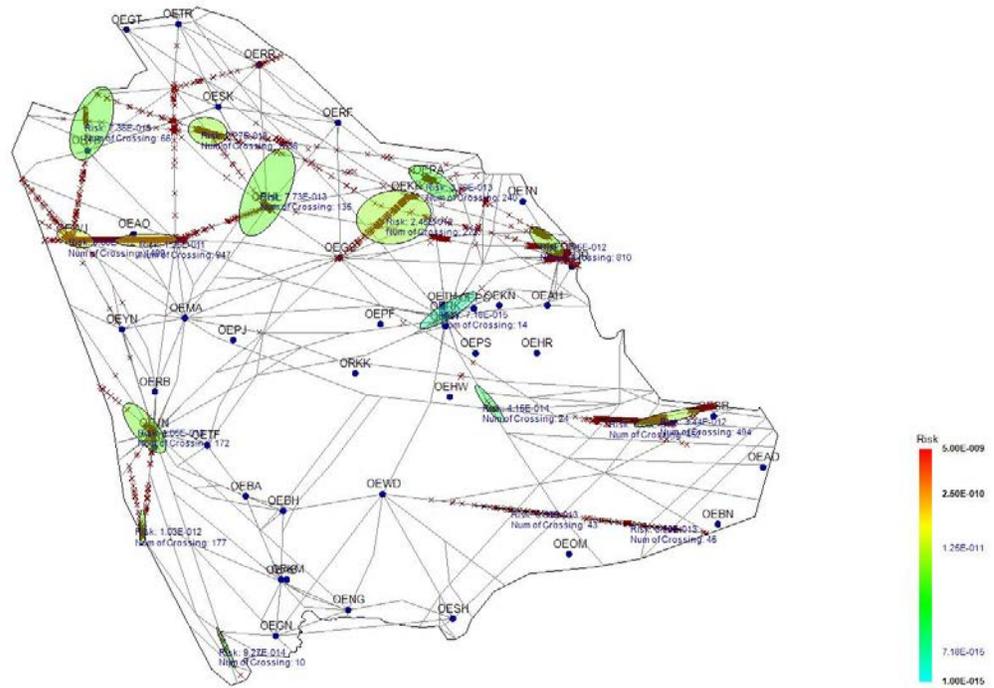
KUWAIT FIR AWYs Occupancy – MID RVSM SMR 2023



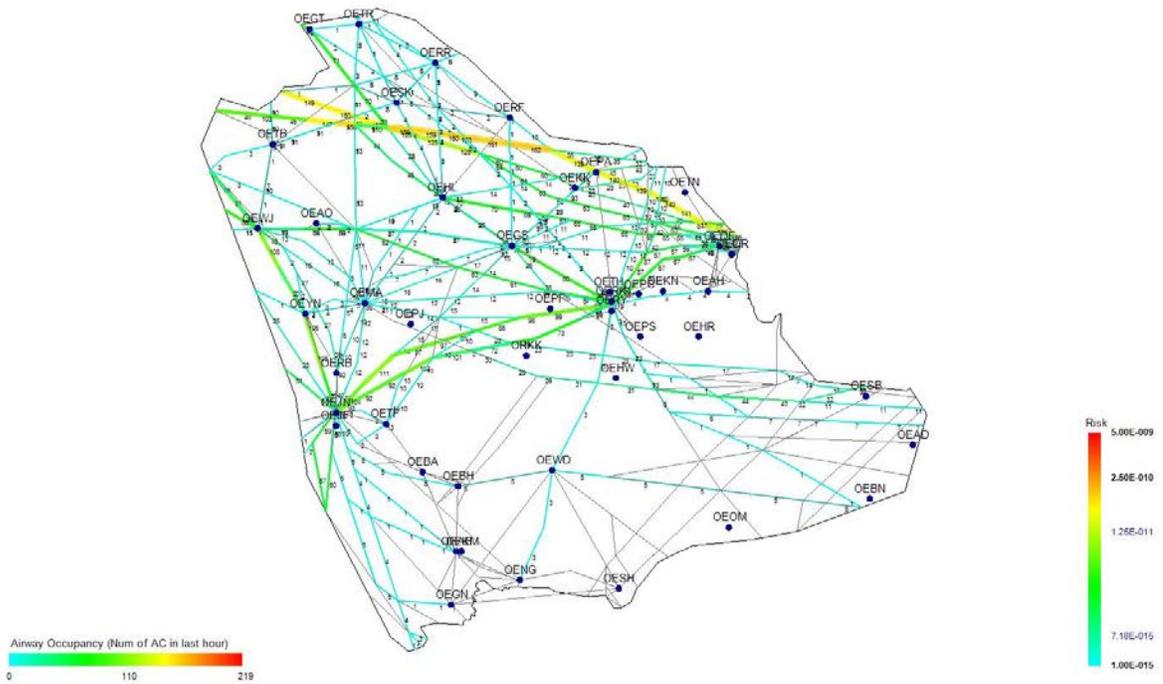
AMMAN FIR Hotspots – MID RVSM SMR 2023



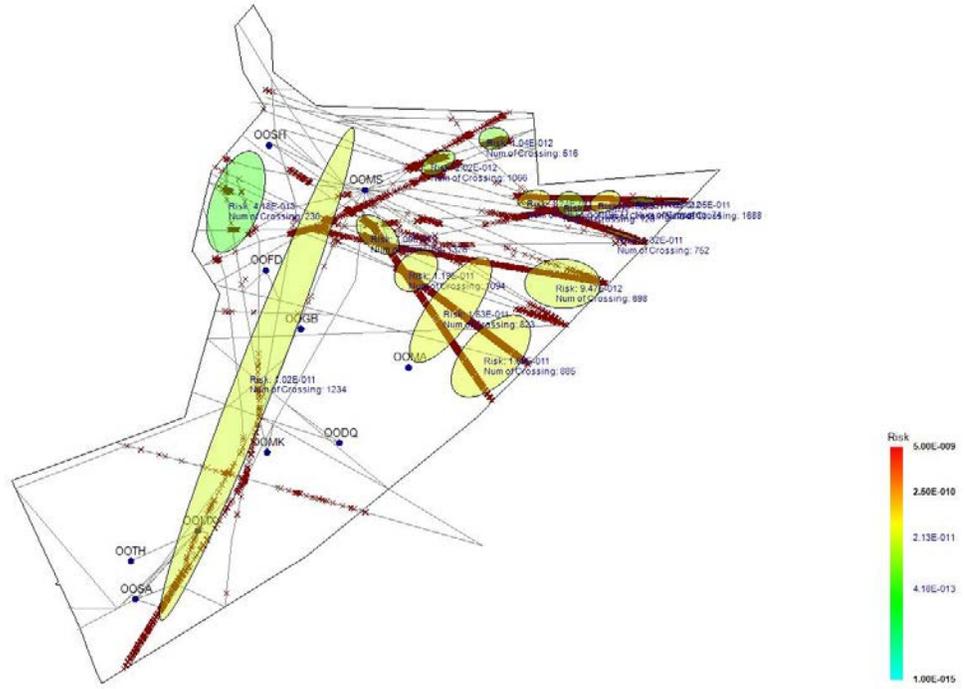
AMMAN FIR AWYs Occupancy – MID RVSM SMR 2023



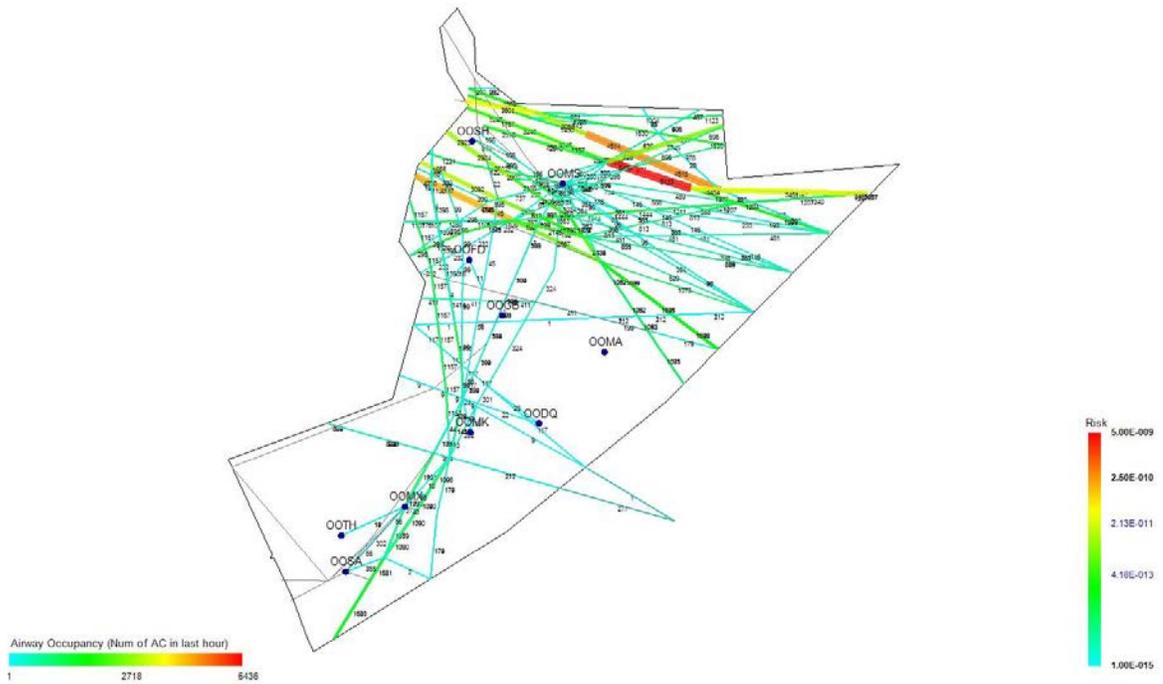
JEDDAH FIR Hotspots – MID RVSM SMR 2023



JEDDAH FIR AWYs Occupancy – MID RVSM SMR 2023

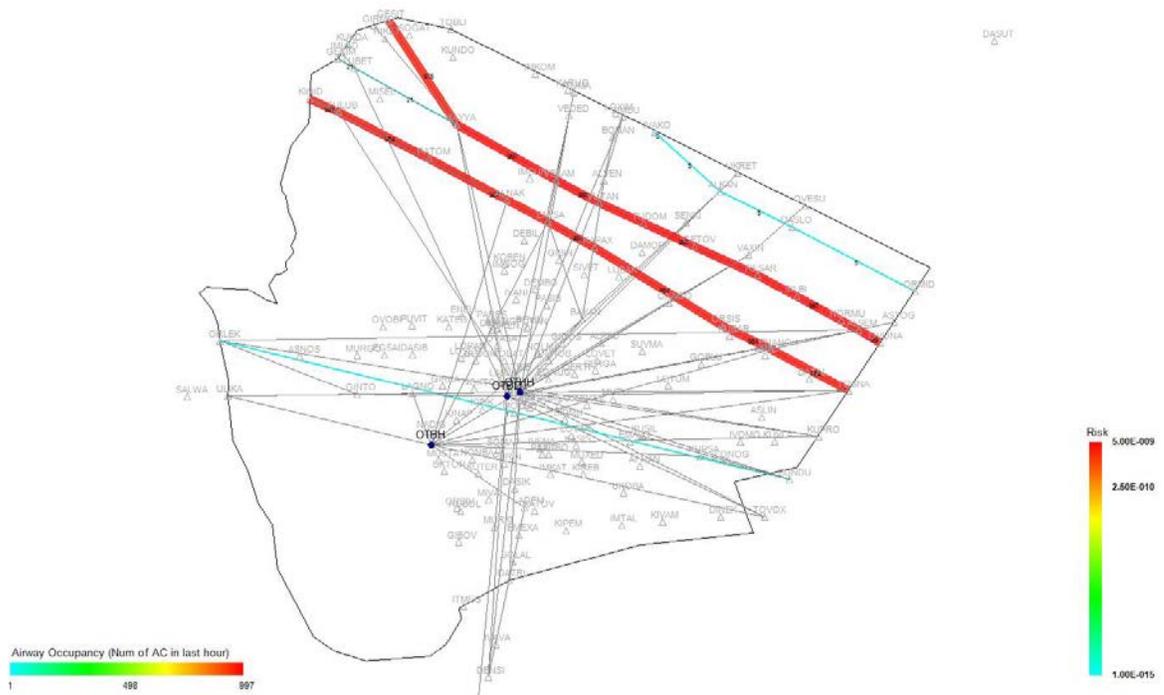


MUSCAT FIR Hotspots – MID RVSM SMR 2023

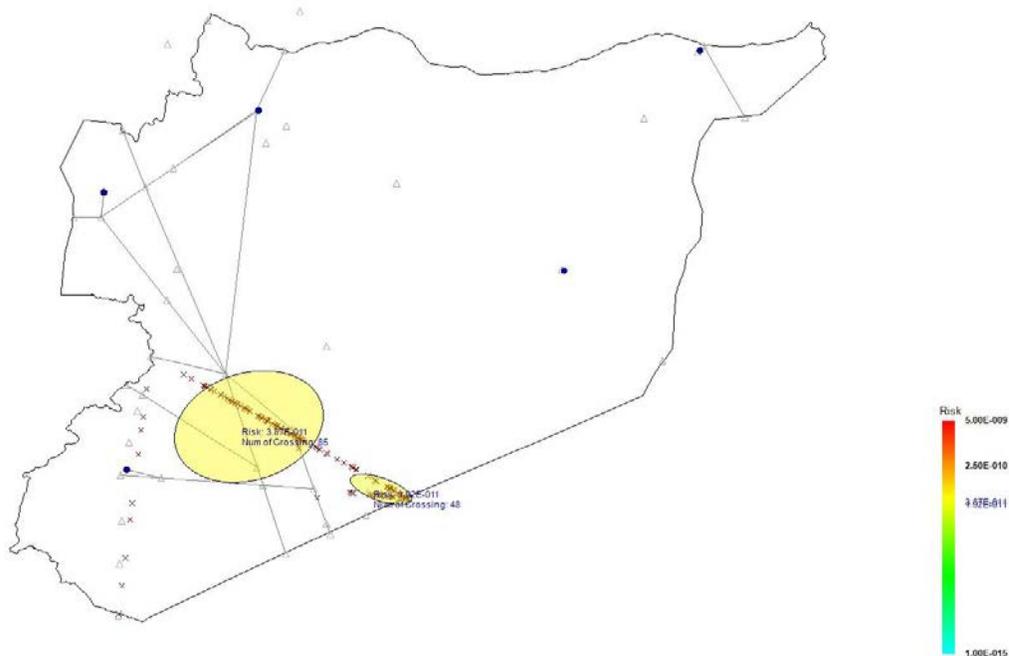


MUSCAT FIR AWYs Occupancy – MID RVSM SMR 2023

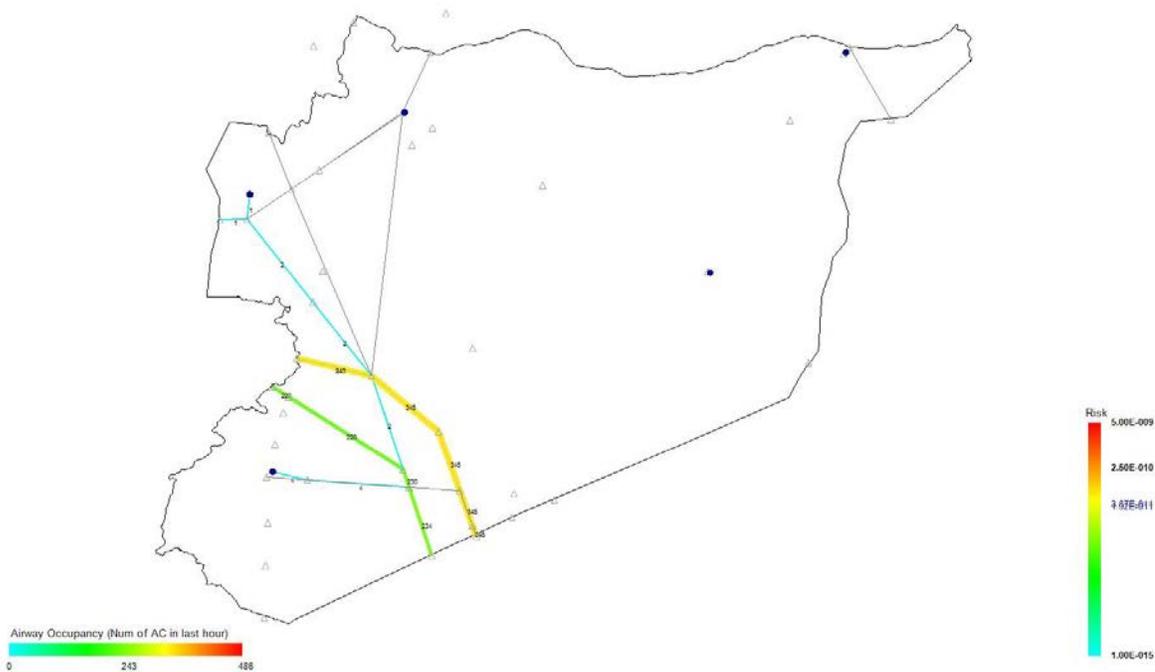
No Observation of Hotspots within the RVSM Airspace of DOHA FIR



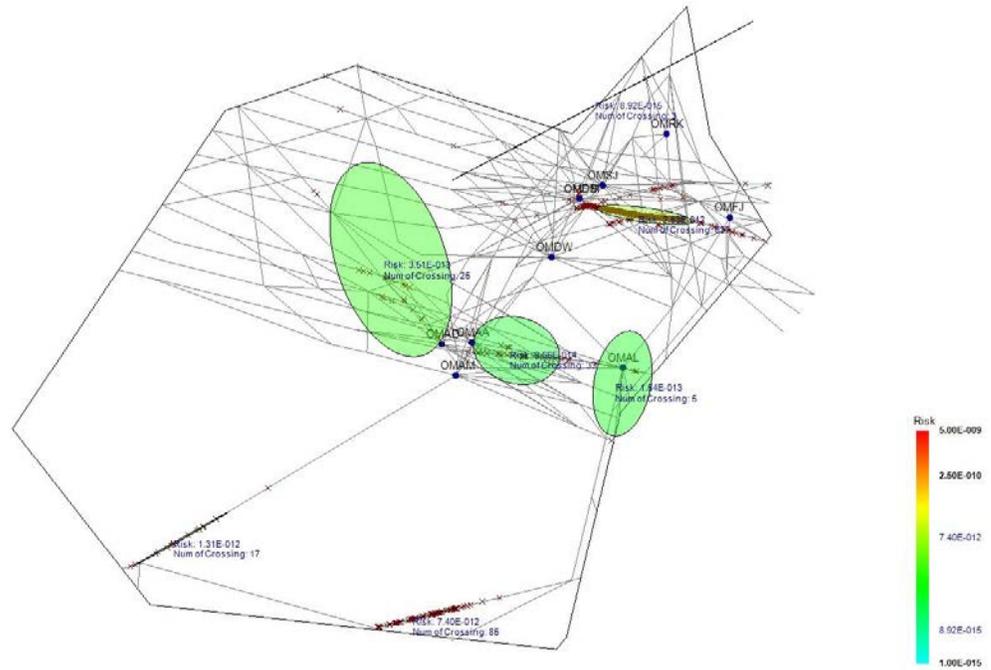
DOHA FIR RVSM Airspace AWYs Occupancy – MID RVSM SMR 2023



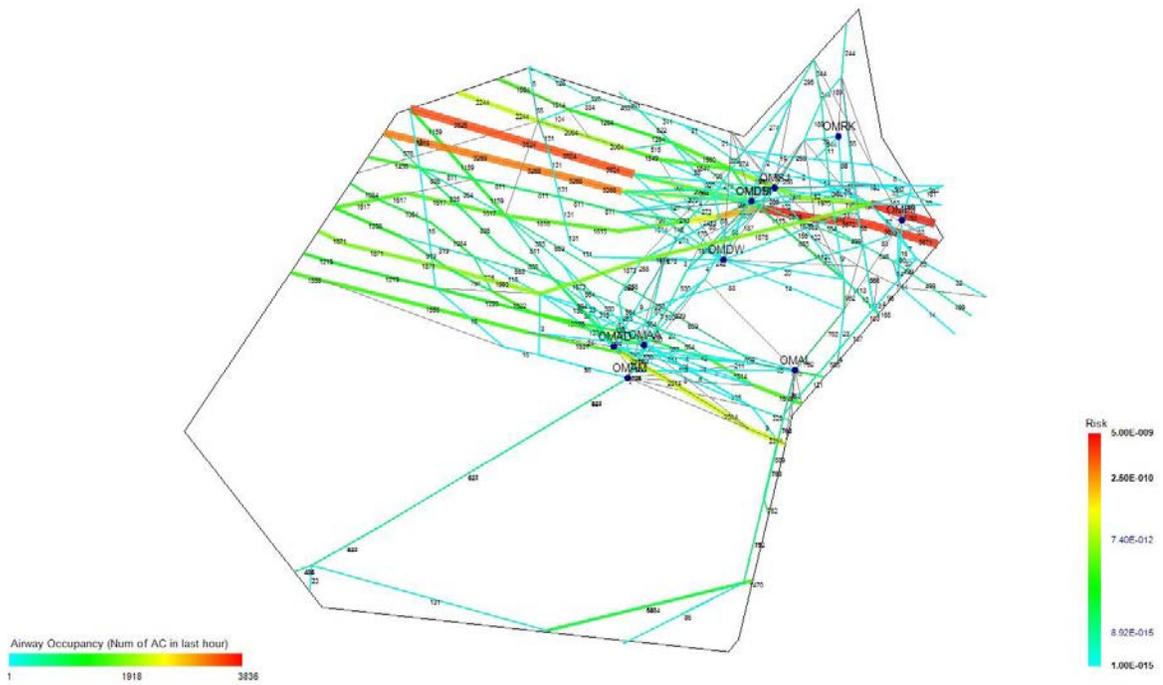
DAMASCUS FIR Hotspots – MID RVSM SMR 2023



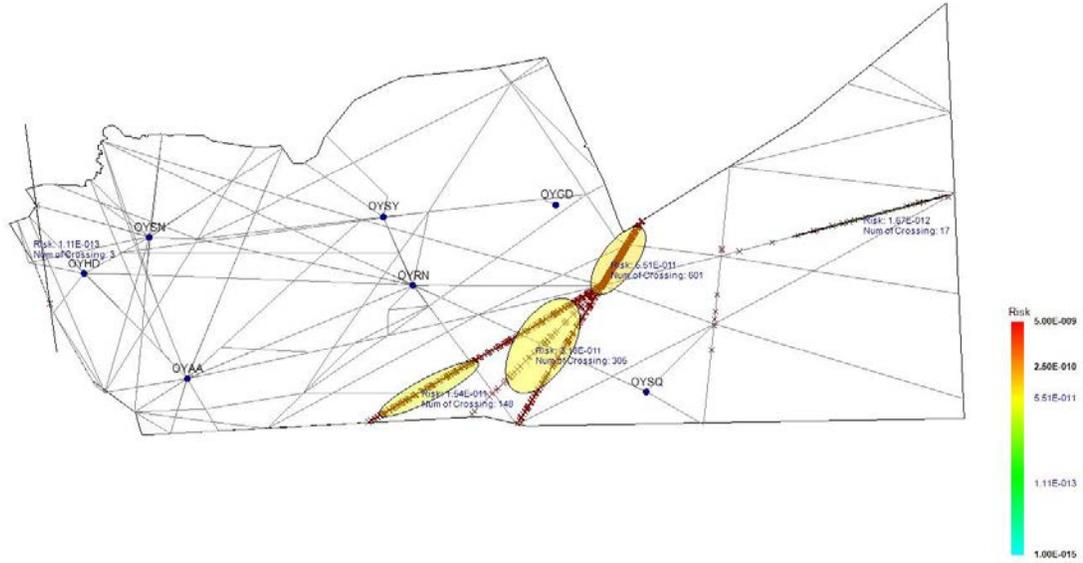
DAMASCUS FIR AWYs Occupancy – MID RVSM SMR 2023



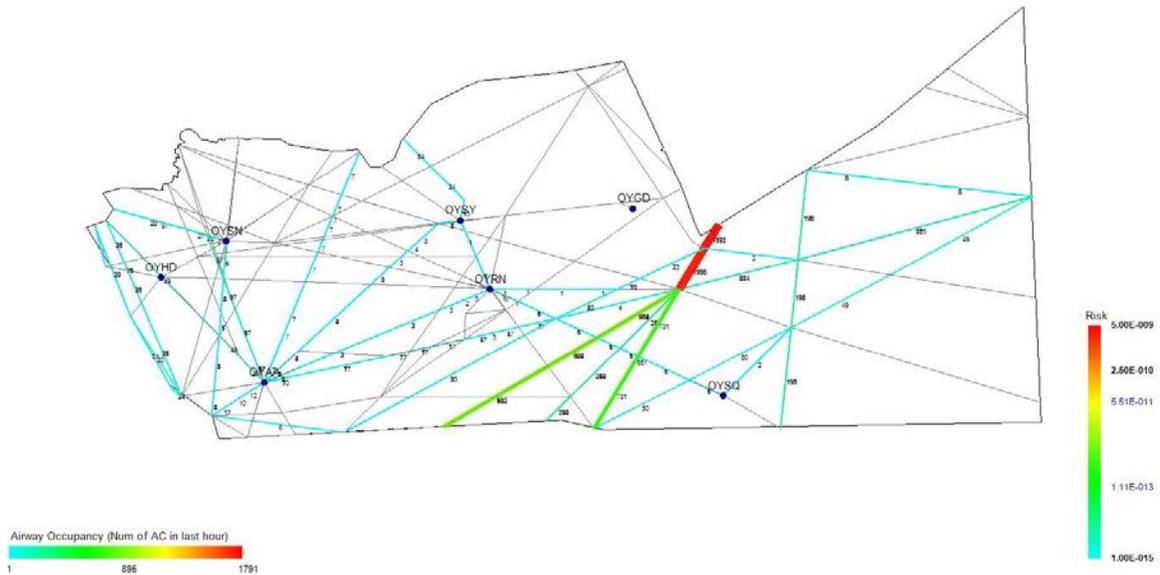
EMIRATES FIR Hotspots – MID RVSM SMR 2023



EMIRATES FIR AWYs Occupancy – MID RVSM SMR 2023



SANA'A FIR Hotspots – MID RVSM SMR 2023



SANA'A FIR AWYs Occupancy – MID RVSM SMR 2023

**Attachment D**

**MIDRMA Member States ICAO RVSM Minimum Monitoring Requirements (MMR)**

**Valid as for 12<sup>th</sup> February 2024**

<b>MID STATES</b>	<b>RVSM APPROVED A/C</b>	<b>HAVE RESULTS OR COVERED</b>	<b>NOT COVERED</b>	<b>NOT COVERED IN %</b>	<b>A/C MMR</b>
<b>Bahrain</b>	69	68	1	1%	1
<b>Egypt</b>	159	152	7	4%	5
<b>Iran</b>	168	93	75	<b>45%</b>	49
<b>Iraq</b>	59	58	1	2%	1
<b>Jordan</b>	44	41	3	7%	3
<b>KSA</b>	324	313	11	3%	5
<b>Kuwait</b>	73	69	4	5%	3
<b>Lebanon</b>	31	31	0	0%	0
<b>Libya</b>	49	30	19	<b>39%</b>	17
<b>Oman</b>	79	79	0	0%	0
<b>Qatar</b>	295	295	0	0%	0
<b>Sudan</b>	16	5	11	<b>69%</b>	8
<b>Syria</b>	15	13	2	13%	1
<b>UAE</b>	591	556	35	6%	17
<b>Yemen</b>	6	5	1	17%	1
<b>TOTAL</b>	<b>1978</b>	<b>1808</b>	<b>170</b>	<b>9%</b>	<b>111</b>

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