MIDANPIRG/18

RASG-MID/8

VIRTUAL MEETINGS

15-22 February 2021

MIDANPIRG/18 and RASG-MID/8 Virtual Meetings

(15 - 22 February 2020)

ICAO MID

MIDANPIRG/18, Agenda item 3:
Coordination between MIDANPIRG and RASG-MID

RVSM Operations and Monitoring Activities in the MID Region

Presented by the secretariat/MIDRMA

MIDRMA Board/16 meeting (14 – 16 January 2020) outcomes

MIDRMA Board/16 Draft Conclusion		MSG/7	MIDANPIRG/18
16/1	REPORTING OF LHDS	Replaced and superseded by MSG Conclusion 7/4	
16/2	LHDS REPORTING CAMPAIGN	Replaced and superseded by MSG Conclusion 7/5	
16/3	PROCEDURE FOR PROCESSING SAFETY PROTOCOL		To be presented for review/endorsement
16/4	PROCEDURE FOR GRANTING TEMPORARY RVSM APPROVAL		To be presented for review/endorsement
16/5	MID RVSM SMR 2020		To be presented for review/endorsement
16/6	SOFTWARE TO COVER THE AIRSPACE FROM FL150 TO FL490		Related to MIDANPIRG 17/24, FWC2022
16/7	PERFORMANCE BASED COMMUNICATION AND SURVEILLANCE (PBCS)		To be presented for review/endorsement

PROCEDURE FOR PROCESSING SAFETY PROTOCOL

- Large Height Deviations (LHDs) have had significant influence on the outcome of safety assessments of RVSM implementation.
- RMAs play a key role in the collection and processing of reports of such occurrences. And need to establish the means for collecting and organizing the pertinent data and other information that is needed to adequately assess all the relevant airspace factors.
- It is very important for the MIDRMA to review and assess very carefully all LHD reports received from all member states and from all the ATCUs neighboring the Middle East region to evaluate their effects in RVSM implementation.
- For that, procedure for processing safety protocol, as in **Appendix A** was established.

MID RVSM SAFETY PROTOCOL PROCEDURE

Why	Collect, review and assess very carefully all LHD reports received from all member states
What	MID RVSM SAFETY PROTOCOL PROCEDURE
Who	MIDRMA
When	MIDANPIRG/18

DRAFT MIDANPIRG CONCLUSION 18/XX: MID RVSM SAFETY PROTOCOL PROCEDURE

That, the MID RVSM Safety Protocol Procedure at **Appendix A**, is endorsed.

PROCEDURE FOR TEMPORARY RVSM APPROVAL

- The RVSM approval is issued by the State of Registry of the aircraft or by the State responsible of the airline operator, the process of issuing the RVSM approval will require the responsible authority to gather and examine elements necessary for issuing the approval as per ICAO Annex 6 Part 1, such as aircraft compliance for height monitoring which is a vital element of granting the full RVSM approval valid for two years.
- The MIDRMA actively involved with gathering the RVSM approvals from all MIDRMA member states to update the region database for all aircraft granted full RVSM approvals with all other related information such as aircraft types, aircraft manufacture serial numbers (MSNs), Mode S and operator names; the requirement to obtain these information are agreed between all the RMAs in the world and published under a unified format.
- The initial process of granting RVSM approval for new aircraft type not previously part of the operator fleet is not mentioned by ICAO and there is no procedure to guide the responsible authority to follow in this case, therefore and due to the increased enquiries recently received from several airworthiness inspectors of any guidance materials available for them to follow, the MIDRMA thought of establishing a procedure of granting Temporary RVSM Approval to the concerned airline operator under certain conditions.

PROCEDURE FOR TEMPORARY RVSM APPROVAL

- The method of issuing Temporary RVSM Approval must be applied by all MIDRMA Member States to ensure all airline operators in the region are fully aware of the requirements and the steps to be followed to obtain a Temporary RVSM Approval is the same in all MIDRMA Member States.
- The procedure is proposed by the MIDRMA as in **Appendix B.**

PROCEDURE FOR TEMPORARY RVSM APPROVAL

Why	Harmonized process for temporary RVSM Approval in the MID Region
What	PROCEDURE FOR TEMPORARY RVSM APPROVAL
Who	MID States/MIDRMA
When	MIDANPIRG/18

DRAFT MIDANPIRG CONCLUSION 18/XX: PROCEDURE FOR TEMPORARY RVSM APPROVAL

That, the procedure for temporary RVSM approval at **Appendix B**, is endorsed.

PROCEDURE FOR TEMPORARY RVSM APPROVAL

- The Performance-Based Communication and Surveillance (PBCS) concept provides objective operational criteria to evaluate different and emerging communication and surveillance technologies, intended for evolving air traffic management (ATM) operations. Once these criteria have been established and accepted, implementation of a specific ATM operation including its technical and human performance may be evaluated against these operational criteria to assess their viability. The PBCS concept and guidelines are applicable to any air traffic services (ATS) system change that is predicated on communication and/or surveillance performance.
- The PBCS concept is aligned with that of performance-based navigation (PBN). While the PBN concept applies required navigation performance (RNP) and area navigation (RNAV) specifications to the navigation element, the PBCS concept applies required communication performance (RCP) and required surveillance performance (RSP) specifications to communication and surveillance elements, respectively. Each RCP/RSP specification includes allocated criteria among the components of the communication and surveillance systems involved.

DRAFT MIDANPIRG CONCLUSION 18/XX: PERFORMANCE BASED COMMUNICATION AND SURVEILLANCE (PBCS)

That,

a) States provide the MIDRMA on monthly basis with the information related to the aircraft complying with PBCS requirements;

b) the MIDRMA is authorized to coordinate and share information with other RMAs with respect to PBCS compliant aircraft and follow-up with MID States, as required; and

c) the MIDRMA functions and responsibilities be amended accordingly; and d) the PBCS be addressed by the RASG-MID, ATM SG and CNS SG for appropriate actions.

RVSM Operations and Monitoring Activities in the MID Region

Development of SMR 2018, 2019 and 2020

- MSG/7 (1 – 3 September 2020) through Conclusion 7/3 endorsed the SMR2018; where it found to be meeting the RVSM safety objectives.
- MSG/7 meeting was apprised of the challenges related to the provision of the data necessary for the development of the RVSM SMRs by MID States, with the concern raised regarding the representativeness of the data received in particular the LHD Reports Categories A, B, C, D, J, H and K.
- MSG Conclusion 7/4: urged States to comply with the provisions of the MIDANPIRG Conclusion 14/35, in particular the States with high volume of traffic.
- MSG Conclusion 7/5: tasked MIDRMA to provide Training/awareness on RVSM LHD reporting and other MIDRMA duties.
- MID Office (State Letter Ref.: AN 6/5.10.15A – 20/137, dated 29 June 2020); urging States to provide the FPL/Traffic data and LHDs reports for the development of the SMR2019 and SMR2020, the level of provision of LHD Reports Categories A, B, C, D, J, H and K had been far below expectation.

RVSM Operations and Monitoring Activities in the MID Region

- ICAO MID Office in cooperation with MIDRMA conducted the Training/Awareness webinar on 4 Nov 2020.
- 128 Participants from 14 MID States attended the Webinar.
- The Webinar addressed many subjects related to RVSM safety monitoring, in particular the requirement for LHD reporting for the development of the Annual RVSM Safety Monitoring Reports (SMRs); and the use of the MIDRMA online LHD Reporting tool for that purpose.
- As a result, the number of LHD reports for 2019 and 2020 was greatly improved and was reflected in more representative data. The MIDRMA was able for the first time to calculate the overall risk for the MID RVSM airspace with LHD reports covering nearly most of its area of responsibility.

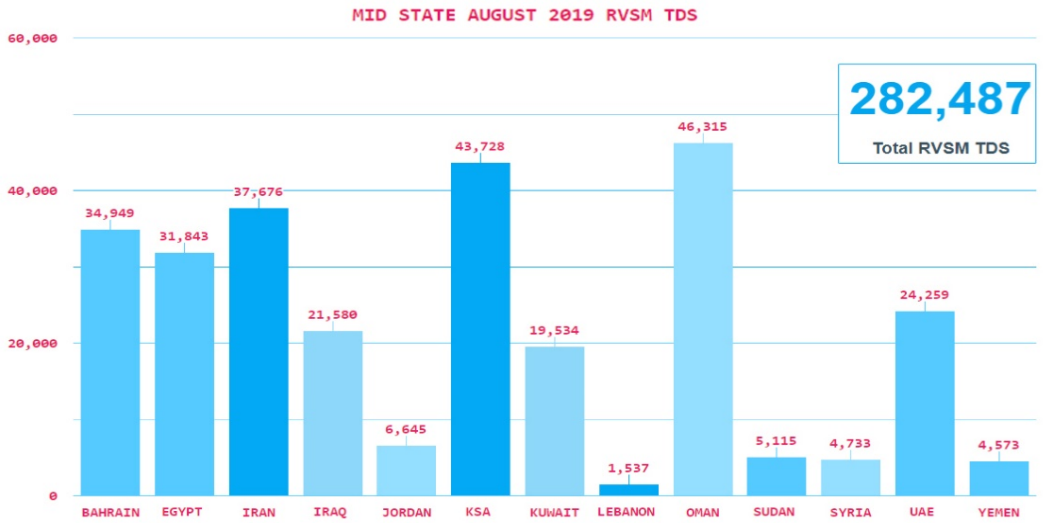
SMR2019

- Reporting period: 1 Aug 2019 – 31 July 2020
- TDS for the period: 1 – 31 Aug 2019
- TDS reporting status: ALL, **except Tripoli**
- LHD reporting status: All CATs : 24

MID States	Status	Remarks
Bahrain FIR	Accepted	-
Cairo FIR	Accepted	-
Amman FIR	Accepted	-
Muscat FIR	Accepted	-
Tehran FIR	Accepted	-
Khartoum FIR	Accepted	-
Emirates FIR	Accepted	-
Damascus FIR	Accepted	-
Sana'a FIR	Accepted	-
Jeddah FIR	Accepted	-
Beirut FIR	Accepted	-
Baghdad FIR	Accepted	-
Kuwait FIR	Accepted	-
Tripoli FIR	No TDS	Excluded

LHD Cat. Code	Large Height Deviation (LHD) Category	No. of LHDs	LHD Duration (Sec.)
A	Flight crew fails to climb or descend the aircraft as cleared	5	174
B	Flight crew climbing or descending without ATC clearance	3	81
C	Incorrect operation or interpretation of airborne equipment		
D	ATC system loop error	1	120
E	ATC transfer of control coordination errors due to human factors	8	295
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	2	50
I	Turbulence or other weather related cause	1	20
J	TCAS resolution advisory and flight crew correctly responds	2	50
K	TCAS resolution advisory and flight crew incorrectly responds		
L	An aircraft being provided with RVSM separation is not RVSM approved		
M	Other	2	50
Total		**24**	**840**

SMR2019



MID RVSM SMRs Technical Risk Values					
Year 2006	**Year 2008**	**Year 2010**	**Year 2011**	**Year 2012/13**	**Year 2014**
$2.17x10^{-14}$	$1.93x10^{-13}$	$3.96x10^{-15}$	$5.08x10^{-14}$	$6.37x10^{-12}$	$3.18x10^{-12}$
Year 2015	**Year 2016**	**Year 2017**	**Year 2018**	**Year 2019**	
$3.056x10^{-10}$	$6.347x10^{-11}$	$4.966x10^{-11}$	$1.562x10^{-11}$	$2.012x10^{-13}$	

SN	Reporting Point	FIRs	No of Flights
1	SIDAD	BAGHDAD/KUWAIT	9447
2	TASMI	BAGHDAD/KUWAIT	9298
3	DAVUS	KUWAIT/BAHRAIN	8941
4	NINVA	ANKARA/BAGHDAD	8326
5	RATVO	ANKARA/BAGHDAD	7748
6	TUMAK	BAHRAIN/EMIRATES	7234
7	LONOS	KUWAIT/BAHRAIN	5918
8	PASAM	JEDDAH/CAIRO	5166
9	ULADA	BAHRAIN/JEDDAH	5137
10	OBNET	BAHRAIN/EMIRATES	5106
11	RABAP	KUWAIT/BAHRAIN	5106
12	TAPDO	MUSCAT/KARACHI	5042
13	ALPOB	BAHRAIN/EMIRATES	4774
14	PASOV	MUSCAT/EMIRATES	4502
15	ULINA	AMMAN/CAIRO	4496
16	SALUN	ATHINAI/CAIRO	4470
17	ALPOR	MUSCAT/KARACHI	4402
18	TARDI	EMIRATES/MUSCAT	4345
19	DASUT	BAHRAIN/TEHRAN	4019
20	RASKI	MUSCAT/MUMBAI	3848

DRAFT MIDANPIRG CONCLUSION 18/XX: MID RVSM SAFETY MONITORING REPORT (SMR- 2019)

That, the MID RVSM Safety Monitoring Report (SMR – 2019) at **Appendix C,** is endorsed.

SMR2020

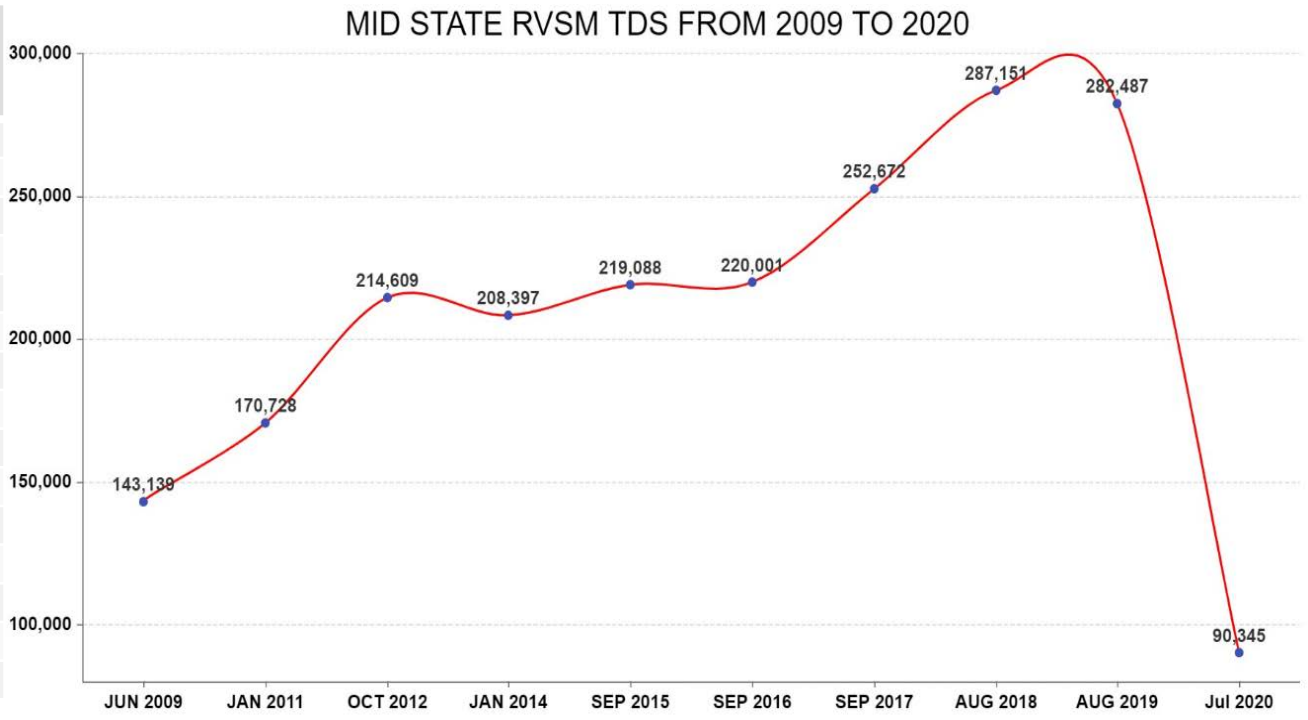
- Reporting period: 1 Jan 2020 – 31 Dec 2020
- TDS for the period: 1 – 31 Jul 2020
- TDS reporting status: ALL, **except Tripoli**
- LHD reporting status: All CATs : 17

MID States	Status	Remarks
Bahrain FIR	Accepted	-
Cairo FIR	Accepted	-
Amman FIR	Accepted	-
Muscat FIR	Accepted	-
Tehran FIR	Accepted	-
Khartoum FIR	Accepted	-
Emirates FIR	Accepted	-
Damascus FIR	Accepted	-
Sana'a FIR	Accepted	-
Jeddah FIR	Accepted	-
Beirut FIR	Accepted	-
Baghdad FIR	Accepted	-
Kuwait FIR	Accepted	-
Tripoli FIR	No TDS	Excluded

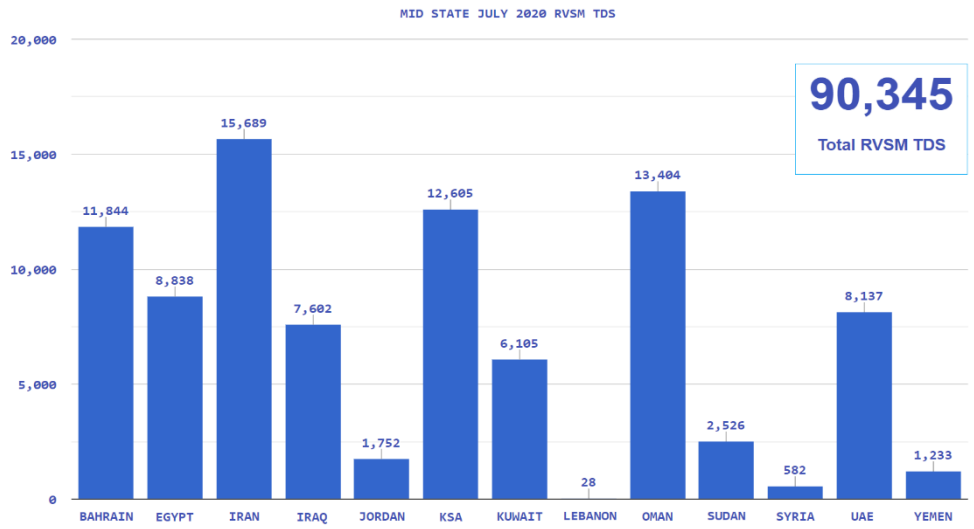
LHD Cat. Code	Large Height Deviation (LHD) Category	No. of LHDs	LHD Duration (Sec.)
A	Flight crew fails to climb or descend the aircraft as cleared	2	60
B	Flight crew climbing or descending without ATC clearance	1	45
C	Incorrect operation or interpretation of airborne equipment	3	125
D	ATC system loop error	1	15
E	ATC transfer of control coordination errors due to human factors	2	150
F	ATC transfer of control coordination errors due to technical issues		
G	Aircraft contingency leading to sudden inability to maintain level	1	40
H	Airborne equip. failure and unintentional or undetected FL change	2	50
I	Turbulence or other weather related cause		
J	TCAS resolution advisory and flight crew correctly responds	3	89
K	TCAS resolution advisory and flight crew incorrectly responds		
L	An aircraft being provided with RVSM separation is not RVSM approved		
M	Other	2	40
	Total	**17**	**614**

SMR2020

#	MID FIRs	No of TDS Aug 2019	No of TDS July 2020	TDS Difference 2019 vs 2020	% of TDS Difference 2019 vs 2020
1	Bahrain FIR	34949	11844	-23105	-66.11
2	Cairo FIR	31843	8838	-23005	-72.25
3	Amman FIR	6645	1752	-4893	-73.63
4	Muscat FIR	46315	13404	-32911	-71.06
5	Tehran FIR	37676	15689	-21987	-58.36
6	Khartoum FIR	5115	2526	-2589	-50.62
7	Emirates FIR	24259	8137	-16122	-66.46
8	Damascus FIR	4733	582	-4151	-87.7
9	Sana'a FIR	4573	1233	-3340	-73.04
10	Jeddah FIR	43728	12605	-31123	-71.17
11	Beirut FIR	1537	28	-1509	-98.18
12	Baghdad FIR	21580	7602	-13978	-64.77
13	Kuwait FIR	19534	6105	-13429	-68.75
14	Tripoli FIR	NO TDS	NO TDS	-	-
	Total	282,487	90,345	-192,142	**-68.02%**



SMR2020



MID RVSM SMRs Technical Risk Values					
Year 2006	**Year 2008**	**Year 2010**	**Year 2011**	**Year 2012/13**	**Year 2014**
$2.17x10^{-14}$	$1.93x10^{-13}$	$3.96x10^{-15}$	$5.08x10^{-14}$	$6.37x10^{-12}$	$3.18x10^{-12}$
Year 2015	**Year 2016**	**Year 2017**	**Year 2018**	**Year 2019**	**Year 2020**
$3.056x10^{-10}$	$6.347x10^{-11}$	$4.966x10^{-11}$	$1.562x10^{-11}$	$2.012x10^{-13}$	$9.185x10^{-13}$

#	Reporting Point	FIRs	No of Flights
1	SIDAD	BAGHDAD / KUWAIT	3751
2	RATVO	BAGHDAD / ANKARA	3271
3	TASMI	BAGHDAD / KUWAIT	3220
4	DAVUS	BAHRAIN / KUWAIT	3093
5	LONOS	BAHRAIN / KUWAIT	2720
6	NINVA	BAGHDAD / ANKARA	2089
7	DASUT	BAHRAIN / TEHRAN	2052
8	TAPDO	MUSCAT/KARACHI	1876
9	ULADA	BAHRAIN / JEDDAH	1771
10	ALPOR	MUSCAT/KARACHI	1726
11	TUMAK	BAHRAIN / EMIRATES	1680
12	PASOV	MUSCAT/EMIRATES	1621
13	ALPOB	BAHRAIN / EMIRATES	1616
14	NALPO	BAHRAIN / EMIRATES	1575
15	KITOT	CAIRO/JEDDAH	1555
16	RASKI	MUSCAT/MUMBAI	1514
17	MENSA	EMIRATES/MUSCAT	1416
18	ULINA	CAIRO/AMMAN	1403
19	DAROR	BAHRAIN / JEDDAH	1313
20	RABAP	BAHRAIN / KUWAIT	1308

SMR2020

- For the sixth consecutive RVSM Safety Monitoring Report (since Libya joint the MIDRMA), Tripoli FIR has not been included in the RVSM safety analysis due to lack of TDS and LHD reports. This issue requires MIDANPIRG attention and decision on the way forward.
- With the monthly TDS data continuously provided by Bahrain, Iraq and UAE, the MIDRMA observed an increase of traffic up to 30% for the month of January 2021. The effect of future traffic growth on the vertical collision risk can be evaluated on the assumption of a linear relationship between traffic growth and frequency of horizontal overlap, which will directly affect the two components of the risk: the risk due to technical height-keeping performance and due to atypical operational errors. With the current uncertainty over traffic growth this issue will be revisited when the Middle East economic/aviation conditions return to more normal growth, and will be included in the SMR 2021.

DRAFT MIDANPIRG CONCLUSION 18/XX: MID RVSM SAFETY MONITORING REPORT (SMR- 2020)

That, the MID RVSM Safety Monitoring Report (SMR – 2020) at **Appendix D,** is endorsed.

DRAFT MIDANPIRG CONCLUSION 18/XX: MID RVSM SMR 2021

That,

a) the FPL/traffic data for the period **1 – 31 July 2021** and LHD Reports for the period **1 January 2021 to 31 December 2021** be used for the development of the MID RVSM Safety Monitoring Report (SMR 2021);

b) only the appropriate Traffic Data as per MIDRMA requirements shall be submitted; any corrupted traffic data will be rejected;

c) the traffic data must be submitted to the MIDRMA before **31 August 2021**; and

d) the final version of the MID RVSM SMR 2021 be ready for presentation to and endorsement by MIDANPIRG/19.

ACTION BY THE MEETING

The meeting is invited to:

a) note the progress made in LHD report provision by MID States;

b) endorse the draft Conclusion 18/x: MID RVSM SAFETY PROTOCOL PROCEDURE;

c) endorse the draft Conclusion 18/x: PROCEDURE FOR TEMPORARY RVSM APPROVAL;

d) endorse the draft Conclusion 18/x: PERFORMANCE BASED COMMUNICATION AND SURVEILLANCE (PBCS)

e) endorse the Draft Conclusion 18/x: RVSM SMR 2019;

f) endorse the Draft Conclusion 18/x: RVSM SMR 2020; and

g) endorse the Draft Conclusion 18/x: MID RVSM SMR2021.

MID RVSM Safety Protocol Procedure

1- MIDRMA presents evidence concerning the safety case which required immediate attention consisting of the following:

   a) Valid LHD reports including all archived reports for the same case, and or

   b) Overall Operational Risk results.

2- Name the responsible ATCUs to overcome the risk effecting RVSM implementation.

3- Effects of the occurrence to RVSM implementation.

4- Review and evaluate all the above and agree in opening the MID RVSM Safety Protocol.

5- Decide a time frame and a working schedule to present a plan for closing the MID RVSM Safety Protocol.

6- MIDRMA oversees all concerned parties responsible for closing the MID RVSM Safety Protocol and shall keep them informed of their success/failure in meeting the time frame or complying with the working schedule.

7- MIDRMA shall inform ICAO MID Office and MIDRMA Board Chairman with the progress of closing of the MID RVSM Safety Protocol whenever it is deemed necessary.

8- Closing the MID RVSM Safety Protocol must be approved by MIDRMA after consulting the MIDRMA Board Chairman and the ICAO MID Office and shall reflect the closing process and the enhancement achieved in the MID RVSM Safety Monitoring Report.

TEMPORARY RVSM APPROVAL PROCEDURE

The Procedure below is for the issuance of Temporary RVSM approval by MIDRMA Member States Civil Aviation Airworthiness Authorities:

1. The responsible Airworthiness Authority must issue Airworthiness Approval first before granting the Temporary RVSM approval for the concerned operator aircraft type.

2. The responsible Airworthiness Authority must make sure the temporary RVSM approval is granted for new aircraft type not previously operated by the airline operator, or for the remaining number of the same aircraft type if already approved one aircraft from the same type, and incase the operator is fully compliant for height monitoring and add aircraft type already in service then the authority might grant full RVSM approval valid for two years.

   Note1: Aircraft Category 1, operator required to height monitor two aircraft every two years.

   Note2: Aircraft Category 2, operator required to height monitor 60% of their fleet.

   Note3: Aircraft Category 3, Operators of aircraft types contained in this category shall have 100% of airframes monitored every2 years.

3. The validity of the Temporary RVSM approval must not exceed **90 days**, during this period the responsible airworthiness authority shall instruct the operator to contact the MIDRMA to conduct height monitoring.

   Note1: this period is not subject to extension unless the operator provide evidence to the responsible authority to justify their failure to comply.

   Note2: in case there is a need to extend the validity of the Temporary RVSM Approval, the extended validity must not exceed another 30 days, further failure will result cancelling the RVSM Approval and withdrawal the aircraft from the state official RVSM approval list.

4. The MIDRMA shall keep the responsible authority aware of the progress of height monitoring of aircraft granted Temporary RVSM approval and update the height monitoring compliance status once the monitoring is successfully completed with valid result.

MID RVSM SAFETY MONITORING REPORT 2019 (SMR2019)

Prepared by the Middle East Regional Monitoring Agency (MIDRMA)

SUMMARY

The aim of the MID RVSM Safety Monitoring Report 2019 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 Middle East is acceptably safe.

1. Introduction:

1.1 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, however there are some remarks concerning Safety Objective No. 2 which are addressed in the recommendations section of this objective.

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 **2.5×10^{-9}** fatal accidents per flight hour.

The value computed for technical height risk is estimated **2.012×10^{-13}** 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 **5×10^{-9}** fatal accidents per flight hour.

The value computed for the overall risk is estimated **8.345×10^{-10}** this meets RVSM Safety Objective 2.

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 Estimated Annual Flying Hours = (2,389,128) Average Aircraft Speed = 450.07 kts			
Risk Type	**Risk Estimation**	**ICAO TLS**	**Remarks**
Technical Risk	**2.012×10^{-13}**	**2.5×10^{-9}**	**Below ICAO TLS**
Overall Risk	**8.345×10^{-10}**	**5×10^{-9}**	**Below ICAO TLS**

1.2 Conclusions:

(i) The estimated risk of collision associated with aircraft height- keeping performance is **2.012×10^{-13}** and meets the ICAO TLS of **2.5×10^{-9}** fatal accidents per flight hour (RVSM Safety Objective 1),

(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 **8.345×10^{-10}** meets the ICAO overall TLS of **5×10^{-9}** fatal accidents per flight hour (RVSM Safety Objective 2),

(iii) Based on currently-available information (Except for Tripoli FIR), there is no evidence available to MIDRMA that the continued operations of RVSM adversely affects the overall vertical risk of collision.

1.3 Considerations on the RVSM Safety Objectives for MID RVSM SMRs

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 are numbers of assumptions that must be verified to satisfy the reliability of the risk assessment, the verification of these assumptions deals primarily with monitoring of aircraft performance issues.
2. The 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 technically RVSM compliant using a common compliance method. Monitoring group analysis is necessary to verify that the Minimum Aviation System Performance Standards (MASPS) for that group is valid. Aircraft that are made RVSM compliant on an individual basis are termed non-group.

3. The 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 the human influence and assessment of this parameter relies on adequate reporting of Large Height Deviation (LHD) Reports, and the correct interpretation of events for input to the CRM.

4. RVSM Safety Objective 3 requires the RMA to monitor long-term trends and to identify potential future safety issues, this compare the level of risk bearing incidents for the current reporting period. It also highlights if there are issues that should be carried forward as recommendations to be adopted for future reports.

2.1 Discussion

Scope:

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	Emirates
Jeddah	Kuwait	Khartoum	Muscat	Sana’a	Tehran	Tripoli*

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

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

The Data Sampling periods covered by SMR 2019 are as displayed in the below table

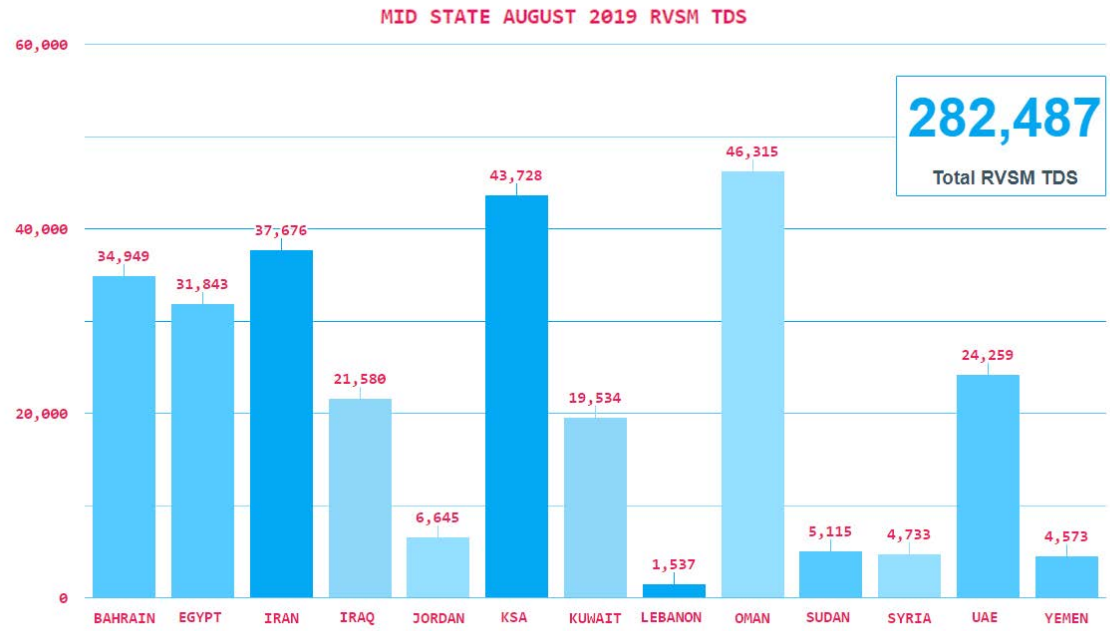
Report Elements	Time Period
Traffic Data Sample	01/08/2019 - 31/08/2019
Operational & Technical Errors	01/08/2019 - 31/07/2020

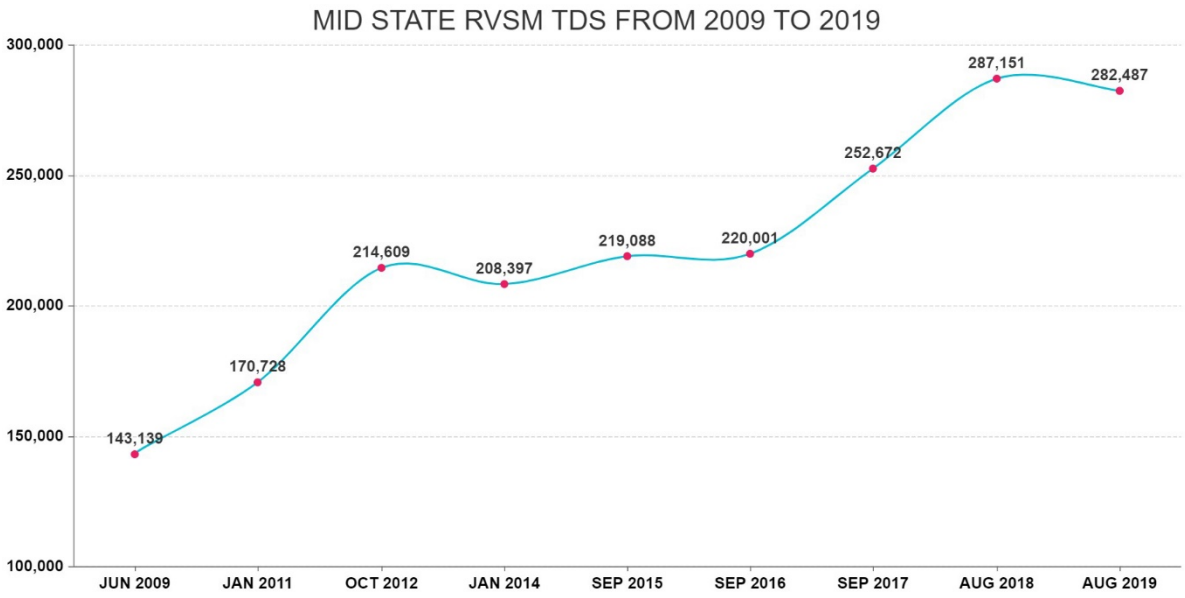
T-2: Time Period for the Reported Elements

MID States	Status	Remarks
Bahrain FIR	Accepted	-
Cairo FIR	Accepted	-
Amman FIR	Accepted	-
Muscat FIR	Accepted	-
Tehran FIR	Accepted	-
Khartoum FIR	Accepted	-
Emirates FIR	Accepted	-
Damascus FIR	Accepted	-
Sana'a FIR	Accepted	-
Jeddah FIR	Accepted	-
Beirut FIR	Accepted	-
Baghdad FIR	Accepted	-
Kuwait FIR	Accepted	-
Tripoli FIR	**No TDS**	**Excluded**
Total	13 FIRs	

Table 1; Status of the MID States RVSM Traffic Data Sample (TDS) for August 2019

2.1.1 The description of the traffic data processed for each MIDRMA member ~~s~~State by the MID Risk Analysis Software (MIDRAS) is depicted in the graph below, a total of **282'487** flights were processed for the 13 FIRs, these flights were evaluated and processed very carefully to ensure accurate results according to the data submitted.





SN	MID FIRs	No of TDS Aug 2018	No of TDS Aug 2019	Sep 2018 vs Aug 2019
1	Bahrain FIR	30703	**34949**	**+ 13.83**
2	Cairo FIR	31094	**31843**	**+ 2.41**
3	Amman FIR	6845	**6645**	**- 2.92**
4	Muscat FIR	40403	**46315**	**+ 14.63**
5	Tehran FIR	55628	**37676**	**-32.27**
6	Khartoum FIR	7303	**5115**	**-29.96**
7	Emirates FIR	23457	**24259**	**+ 3.42**
8	Damascus FIR	No TDS	**4733**	**-**
9	Sana'a FIR	4498	**4573**	**+ 1.67**
10	Jeddah FIR	48926	**43728**	**-10.62**
11	Beirut FIR	No TDS	**1537**	**-**
12	Baghdad FIR	21621	**21580**	**-0.19**
13	Kuwait FIR	16673	**19534**	**+ 17.16**
14	Tripoli FIR	No TDS	**No TDS**	**-**
Total		**287,151**	**282,487**	**-1.62**

MID States RVSM TDS 2018 VS 2019

SN	Reporting Point	FIRs	No of Flights
1	**SIDAD**	BAGHDAD/KUWAIT	**9447**
2	**TASMI**	BAGHDAD/KUWAIT	**9298**
3	**DAVUS**	KUWAIT/BAHRAIN	**8941**
4	**NINVA**	ANKARA/BAGHDAD	**8326**
5	**RATVO**	ANKARA/BAGHDAD	**7748**
6	**TUMAK**	BAHRAIN/EMIRATES	**7234**
7	**LONOS**	KUWAIT/BAHRAIN	**5918**
8	**PASAM**	JEDDAH/CAIRO	**5166**
9	**ULADA**	BAHRAIN/JEDDAH	**5137**
10	**OBNET**	BAHRAIN/EMIRATES	**5106**
11	**RABAP**	KUWAIT/BAHRAIN	**5106**
12	**TAPDO**	MUSCAT/KARACHI	**5042**
13	**ALPOB**	BAHRAIN/EMIRATES	**4774**
14	**PASOV**	MUSCAT/EMIRATES	**4502**
15	**ULINA**	AMMAN/CAIRO	**4496**
16	**SALUN**	ATHINAI/CAIRO	**4470**
17	**ALPOR**	MUSCAT/KARACHI	**4402**
18	**TARDI**	EMIRATES/MUSCAT	**4345**
19	**DASUT**	BAHRAIN/TEHRAN	**4019**
20	**RASKI**	MUSCAT/MUMBAI	**3848**

TDS 2019 Top 20 Busiest FIR Entry / Exit Points

2.1.3 For the fifth consecutive Safety Monitoring Report (since Libya joint the MIDRMA), Tripoli FIR has not been included in the RVSM safety analysis due to lack of TDS and LHD reports. This issue requires MIDANPIRG attention and decision on the way forward.

2.2 The Collision Risk Model (CRM)

2.2.1 The risk of collision to be modelled is that due to the loss of vertical separation between aircraft flying between FL290 and FL410 in a given portion of an airspace. One collision between two aircraft is counted as the occurrence of two accidents. The risk of collision depends both on the total number and types of aircraft flying in the system and the system characteristics.

2.2.2 The CRM provides an estimate of the number of accidents within an airspace system that might occur per aircraft flight hour due to aircraft collisions resulting from the loss of vertical separation in an RVSM environment analysis, is expressed in terms of quantifiable parameters. In the vertical dimension the CRM can be broken down in order to separately model a single route on which aircraft are flying in the same or opposite directions at adjacent flight levels, pairs of crossing routes and combinations of individual and intersecting routes, this model is applied equivalently to vertical, lateral and longitudinal separation.

2.2.3 Three parameters used within the CRM:

a. The Vertical Overlap Probability, denoted as $P_z(1\ 000)$.

b. The Lateral Overlap Probability, denoted as $P_y(0)$.

c. The aircraft Passing Frequency are the most important quantities in determining the vertical collision risk. Of these, the vertical overlap probability is also an important parameter to calculate.

2.3 TECHNICAL HEIGHT KEEPING PERFORMANCE RISK ASSESSMENT

RVSM Safety 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 **2.5×10^{-9}** fatal accidents per flight hour.

2.3.1. Direct evidence of compliance with TLS for Technical Height-Keeping Error

The result shows the risk of collision due to technical height-keeping performance is estimated to be **2.012×10^{-13}** fatal accidents per flight hour, which is less than the ICAO TLS **2.5×10^{-9}**.

2.3.2 Supporting evidence of compliance with TLS for technical height-keeping performance

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. Pz(1000) – the probability of vertical overlap due to technical height-keeping performance, between aircraft flying 1000 ft. separation in MID RVSM airspace is estimated 3.257×10^{-11} valid and is less than the ICAO requirement of 1.7×10^{-8},

c. All aircraft flying with 1000ft vertical separation in MID RVSM airspace meet the ICAO Global Height Keeping Performance specifications for RVSM (All MID RVSM approved aircraft are part of the MID RVSM Height keeping Performance Program),

d. All aircraft flying 1000ft vertical separation in MID RVSM airspace meet the individual ICAO performance specification for the components of total vertical error (TVE),

e. The monitoring target for the MID RVSM height-monitoring programme is an on-going process,

f. The input data used by the CRM is valid,

g. An adequate process is in place to investigate and correct problems in aircraft technical height-keeping performance.

2.3.3 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 2018 has the following to consider:

a. The MIDRMA continued to calculate the probability of lateral overlap $\boldsymbol{P_y(0)}$ 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 average of the probability of lateral overlap $\boldsymbol{P_y(0)}$ for the whole MID RVSM airspace is estimated to be **1.145×10^{-10}.**

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

2.3.4 Pz(1000) Compliance

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 **3.257x10^{-11}** . 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^{-8}**.

The MIDRMA continue to issue the minimum monitoring requirements (MMRs) through the automated MMR software which is programmed to address the MIDRMA member states with their updated requirements according to the latest RVSM approvals received, the MMR table valid for October 2020 is available in **Appendix B**.

Note: All member ~~s~~States are required to check and comply with their MMR through the MIDRMA website (www.midrma.com).

MID RVSM SMRs Technical Risk Values					
Year 2006	**Year 2008**	**Year 2010**	**Year 2011**	**Year 2012/13**	**Year 2014**
2.17x10^{-14}	1.93x10^{-13}	3.96x10^{-15}	5.08x10^{-14}	6.37x10^{-12}	3.18x10^{-12}
Year 2015	**Year 2016**	**Year 2017**	**Year 2018**	**Year 2019**	
3.056x10^{-10}	6.347x10^{-11}	4.966x10^{-11}	1.562x10^{-11}	2.012x10^{-13}	

According to the technical risk values as shown in the above table the TLS values still, meet the ICAO TLS.

2.3.5 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, Pz(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).

2.3.6 Recommendations for Safety Objective 1:

a. The MIDRMA shall continue to review the content and structure of its aircraft monitoring groups.

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 explore more options to enhance the MID Risk Analysis Software (MIDRAS).

c. The MIDRMA shall carry out continuous survey and investigation concerning aircraft flying within the MID RVSM airspace by collecting the TDS from member ~~s~~States offering~~ed~~ to submit their RVSM TDS on a monthly basis.

2.4 ASSESSMENT OF OVERALL RISK DUE TO ALL CAUSES AGAINST THE TLS OF 5x10^{-9} FATAL ACCIDENTS PER FLIGHT HOUR

RVSM Safety 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 **5x10^{-9}** fatal accidents per flight hour.

The computed value for the overall risk is **8.345x10^{-10}** this meets RVSM Safety Objective 2.

Overall Risk Values					
Year 2006	**Year 2008**	**Year 2010**	**Year 2011**	**Year 2012/13**	**Year 2014**
Not calculated	$4.19x10^{-13}$	$6.92x10^{-12}$	$1.04x10^{-11}$	$3.63x10^{-11}$	$4.91x10^{-11}$
Year 2015	**Year 2016**	**Year 2017**	**Year 2018**	**Year 2019**	
$7.351x10^{-10}$	$5.691x10^{-10}$	$4.518x10^{-11}$	$9.845x10^{-11}$	$8.345x10^{-10}$	

2.4.1 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, In the previous SMRs the processed data were severely influenced by either NIL reporting of Large Height Deviations (LHDs) or no reports of categories A, B, C, D, J and K, as without these reports especially from FIRs with high volume of traffic and complexity, the provided data was found to be not representative to assess accurately the compliance with the ICAO overall TLS of **$5x10^{-9}$** fatal accidents per flight hour with the lack of the said LHD categories reports.

2.4.2 The MIDRMA presented the progress made in the development of the SMR 2019 to MSG/7 Virtual meeting (01 - 03 September 2020), and highlighted serious concerns due to the lack of LHD Reports Categories A, B C, D, H, J and K, especially from the States/FIRs with high volume of Traffic. Therefore, the MIDRMA was unable to calculate the overall risk related to RVSM Safety Objective 2 before MSG/7. Accordingly, the meeting urged States to provide the MIDRMA with the required LHD Reports before 15 October 2020, in order for the MIDRMA to finalize the SMR-2019 and present it to the ATM SG (Virtual Meeting) before presentation to MIDANPIRG/18 for endorsement and agreed to the following MSG Conclusion:

MSG CONCLUSION 7/4: RVSM DATA PROVISION TO THE MIDRMA

That,

in order to allow the MIDRMA to finalize the development of the SMR-2019 & 2020:

a) States are urged to comply with the provisions of the MIDANPIRG Conclusion 14/35; and

b) States with high volume of traffic be included in the list of air navigation deficiencies, if LHD reports are not provided before 15 October 2020.

2.4.3 The majority of the MIDRMA Member States complied with the above Conclusion and coordinated with the MIDRMA to file all LHD reports from various categories for the reporting cycle of SMR 2019. Therefore, the MIDRMA was able to calculate the overall risk for the MID RVSM airspace with LHD reports covering nearly most of its area of responsibility.

2.4.4 The MIDRMA continued to monitor the LHD reports at the eastern FIR boundary of Muscat FIR filed by Mumbai. The MIDRMA indicated in SMR 2017 the level of LHD reports filed by Muscat, Mumbai and Karachi ATCUs related to each other at their transfer of control points reached to a dangerous level and started to effect the ICAO TLS of RVSM implementation in the MID and APAC Regions. Therefore, the MIDRMA requested from the MIDRMA Board/15 meeting (Muscat, Oman; 29 – 31 January 2018) to open a Safety Protocol for the purpose of resolving this issue as soon as possible.

2.4.5 However, the MIDRMA can't see much improvement for SMR 2019 as the level of reporting LHDs between Mumbai and Muscat remains high and the safety concern still exist at the common FIR boundary points while the level of reporting LHDs between Karachi and Muscat remains in its normal reporting level.

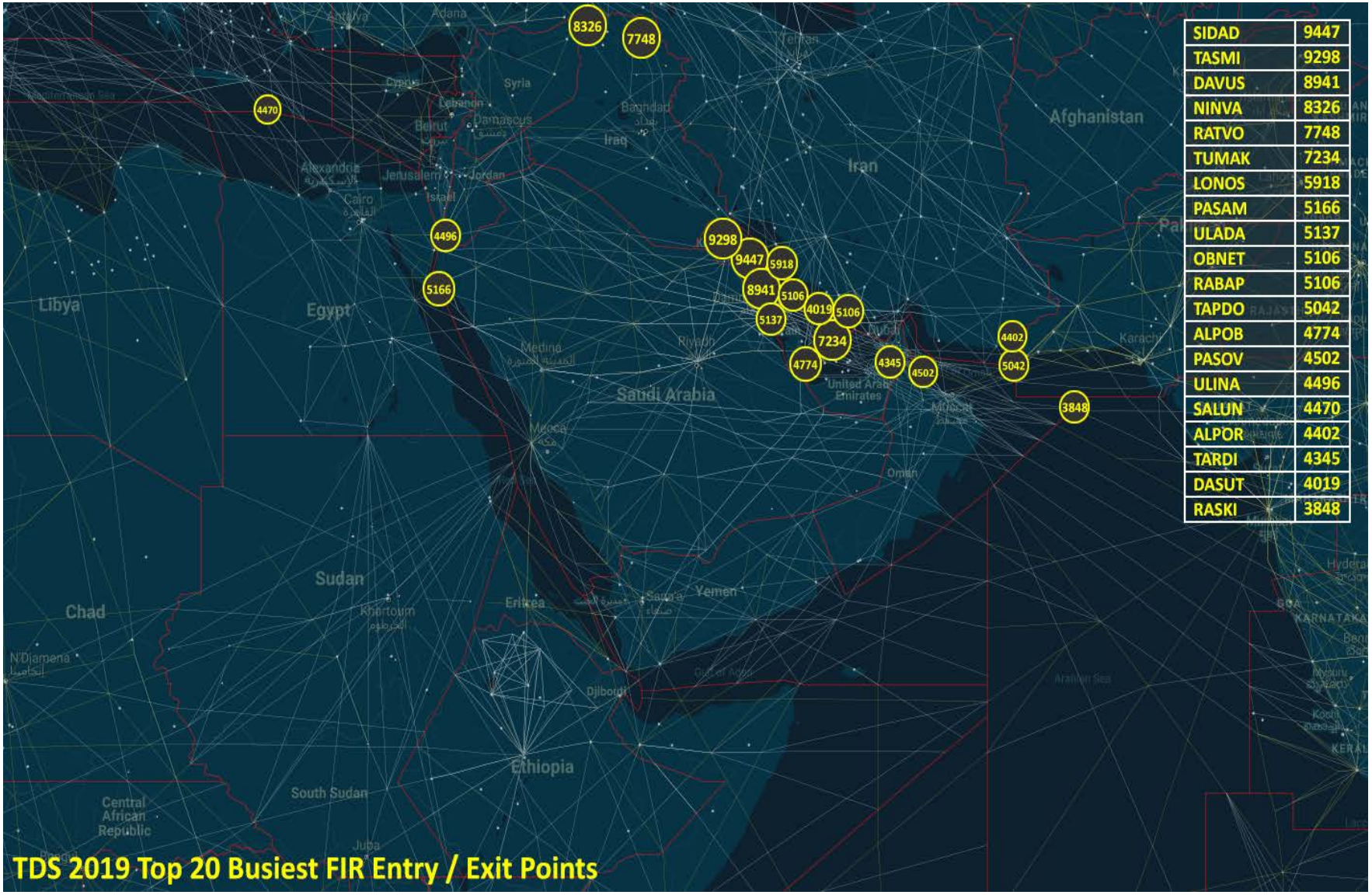
Note: A Safety Protocol is a critical safety issue effecting the implementation of RVSM operations which require the concerned authority an immediate action to rectify/resolve the problem in a certain period of time under the supervision of MIDRMA and ICAO MID Office.

2.4.6 The Safety Protocol is under continuous review by MIDRMA and MAAR and the LHD reports filed by all concerned ATC Units are investigated and evaluated through the MIDRMA online LHD system and further update will be addressed to the next MIDRMA Board and ATM SG meetings.

2.4.7 The Table below presents a summary of operational risk associated with Large Height Deviation (LHD) reports by LHD categories, these reports used to calculate the overall vertical collision risk for the MID RVSM airspace.

LHD Cat. Code	Large Height Deviation (LHD) Category	No. of LHDs	LHD Duration (Sec.)
A	Flight crew fails to climb or descend the aircraft as cleared	**5**	**174**
B	Flight crew climbing or descending without ATC clearance	**3**	**81**
C	Incorrect operation or interpretation of airborne equipment		
D	ATC system loop error	**1**	**120**
E	ATC transfer of control coordination errors due to human factors	**8**	**295**
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	**2**	**50**
I	Turbulence or other weather related cause	**1**	**20**
J	TCAS resolution advisory and flight crew correctly responds	**2**	**50**
K	TCAS resolution advisory and flight crew incorrectly responds		
L	An aircraft being provided with RVSM separation is not RVSM approved		
M	Other	**2**	**50**
Total		**24**	**840**

Summary of Operational Risk associated with Large Height Deviation



SIDAD	9447
TASMI	9298
DAVUS	8941
NINVA	8326
RATVO	7748
TUMAK	7234
LONOS	5918
PASAM	5166
ULADA	5137
OBNET	5106
RABAP	5106
TAPDO	5042
ALPOB	4774
PASOV	4502
ULINA	4496
SALUN	4470
ALPOR	4402
TARDI	4345
DASUT	4019
RASKI	3848

2.4.8 Effects of Future Traffic Growth

The effect of future traffic growth on the vertical collision risk can be evaluated on the assumption of a linear relationship between traffic growth and frequency of horizontal overlap, which will directly affect the two components of the risk: the risk due to technical height-keeping performance and due to atypical operational errors.

It is clear that even for the most optimistic forecast range of 13%, the overall risk of collision will continue to meet the TLS at least until 2022. With the current uncertainty over traffic growth this issue will be revisited when the Middle East economic conditions return to more normal growth.

2.4.9 Conclusions on the overall vertical risk:

a. 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, estimated from the operational and technical vertical risks calculated with LHD reports from most of the member States, the computed result for this SMR is considered to be representative for the MID RVSM airspace.

b. The effect of future traffic growth on the vertical collision risk can be evaluated on the assumption of a linear relationship between traffic growth and frequency of horizontal overlap, which will directly affect the two components of the risk: the risk due to technical height-keeping performance and due to atypical operational errors. It is clear that even for the most optimistic forecast range of 13%, the overall risk of collision will continue to meet the TLS at least until 2022.

2.4.10 Recommendations Applicable to Safety Objective 2:

a. MIDRMA to present the successful progress made concerning the receipt of the LHD reports other than category E to the next MIDANPIRG and MIDRMA board meetings

b. The MIDRMA shall continue to encourage States to provide Large Height Deviation Reports (LHD) of all categories and not only related to handover issues.

c. The MIDRMA, in coordination with concerned States, assure that incidents and violations which have direct impact on the implementation of RVSM within the MID Region are reported in a continuous basis through the MIDRMA LHD online reporting system in due time for operational safety assessment analysis.

2.5 ASSESSMENT OF SAFETY-RELATED ISSUES RAISED IN THIS REPORT

RVSM 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.

2.5.1 The identified safety-related issues are:

a. Confirmation of the approval status of aircraft filling RVSM flight plan (W in field 10), this is done through Bahrain and Emirates TDS received on a monthly basis.

b. Identification of operators requiring monitoring and address the minimum monitoring requirements to all MIDRMA member States.

2.5.2 Conclusions for Safety Objective 3

a. The MIDRMA started to conduct studies and researches for implementing height monitoring using ADSB data.

b. The MIDRMA address the Hot Spots of each MID FIR generated by the (MIDRAS) Software (for information only).

c. Current risk-bearing situations have been identified by using the MIDRAS and the MID Visualization and Simulation of Air Traffic and actions will be taken to ensure resolving all violations to RVSM airspace by non-approved aircraft.

2.5.3 Recommendations for Safety Objective 3

a. The MIDRMA will continue to coordinate with Member States, which have ADS-B to provide the ADS-B archived data for RVSM height monitoring.

b. MIDRMA will continue to enhance the (MIDRAS) Software and shall include new features to overcome the issue of corrupted TDS (Traffic Data Sample).

c. The MIDRMA will coordinate with ICAO MID Office to include in its work program to deliver awareness courses concerning RVSM risk analysis to brief Air Traffic Controllers and Airworthiness Inspectors of MIDRMA Member States to ensure their follow up with ICAO requirements for RVSM implementation and give briefing of updated ICAO requirements, these courses will be delivered as necessary or when requested by any Member State.

d. The MIDRMA shall continue to carry out continuous survey and investigation on the number and causes of non-approved aircraft operating in the MID RVSM airspace.

e. The MIDRMA will continue to encourage States to submit their Large Height Deviation Reports using the MIDRMA online reporting tool which has been upgraded to improve the level of reporting.

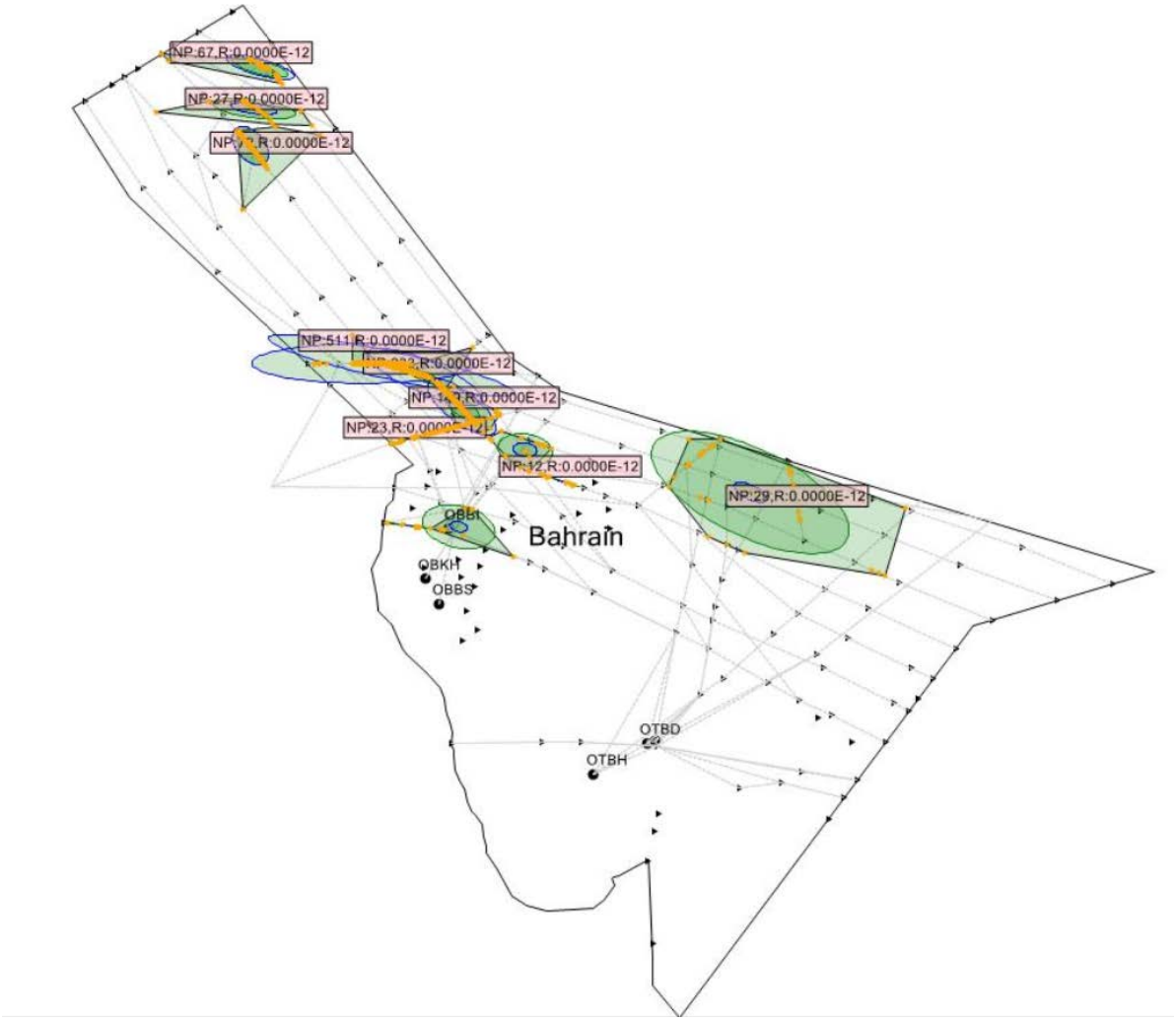
Therefore, it is concluded that this Safety Objective is currently met.

APPENDIX B

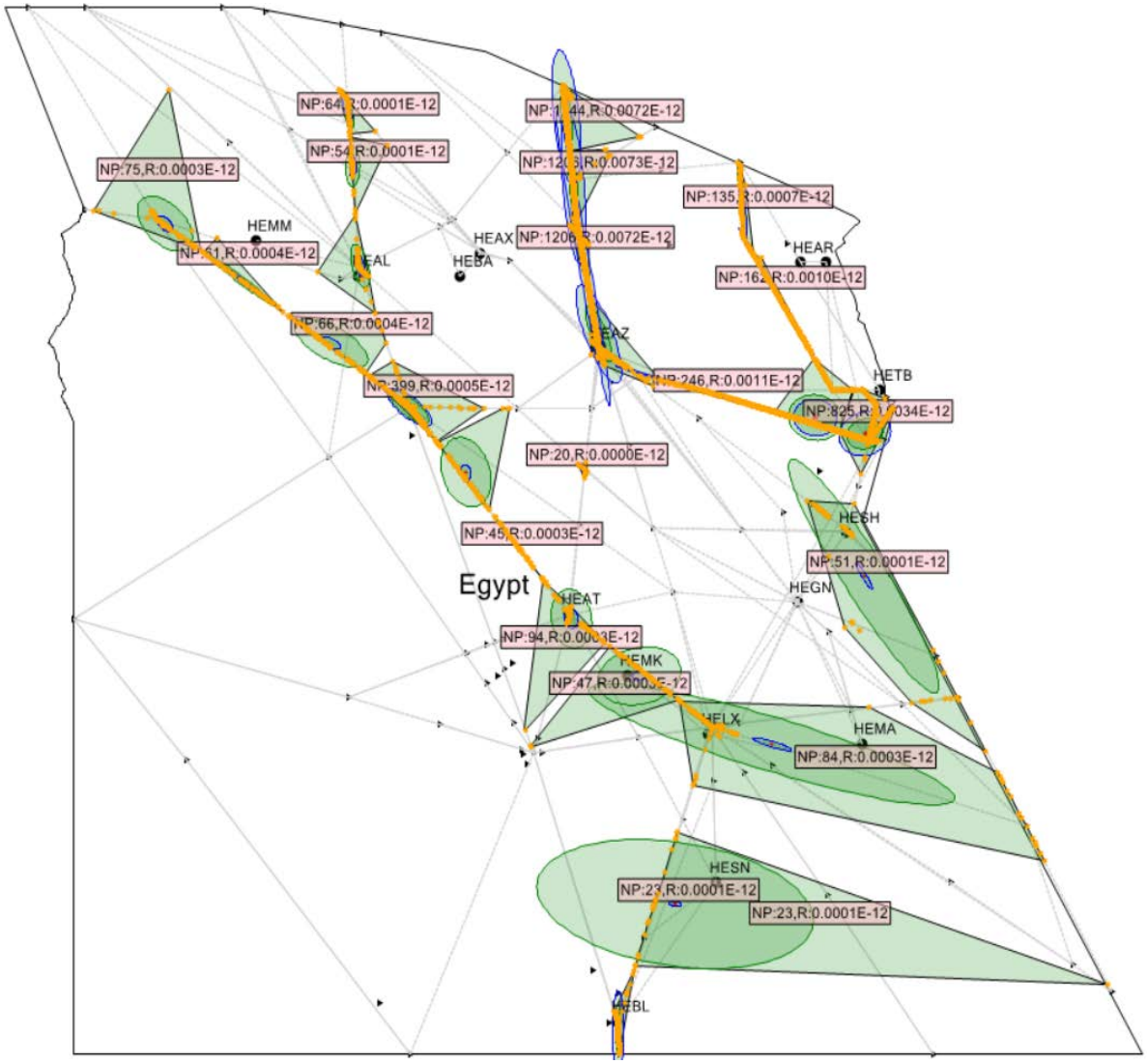
THE MID MMR as of October 2020

STATE	RVSM APPROVED A/C	NOT COVERED
BAHRAIN	54	1
EGYPT	167	15
IRAN	233	50
IRAQ	39	8
JORDAN	44	5
KSA	269	7
KUWAIT	65	6
LEBANON	31	0
LIBYA	30	13
OMAN	72	8
QATAR	280	0
SUDAN	29	15
SYRIA	15	8
UAE	589	16
YEMEN	6	3

<u>APPENDIX C</u> –MIDRMA Member States Hot Spots Generated from September 2019 TDS (for information ONLY)



Bahrain FIR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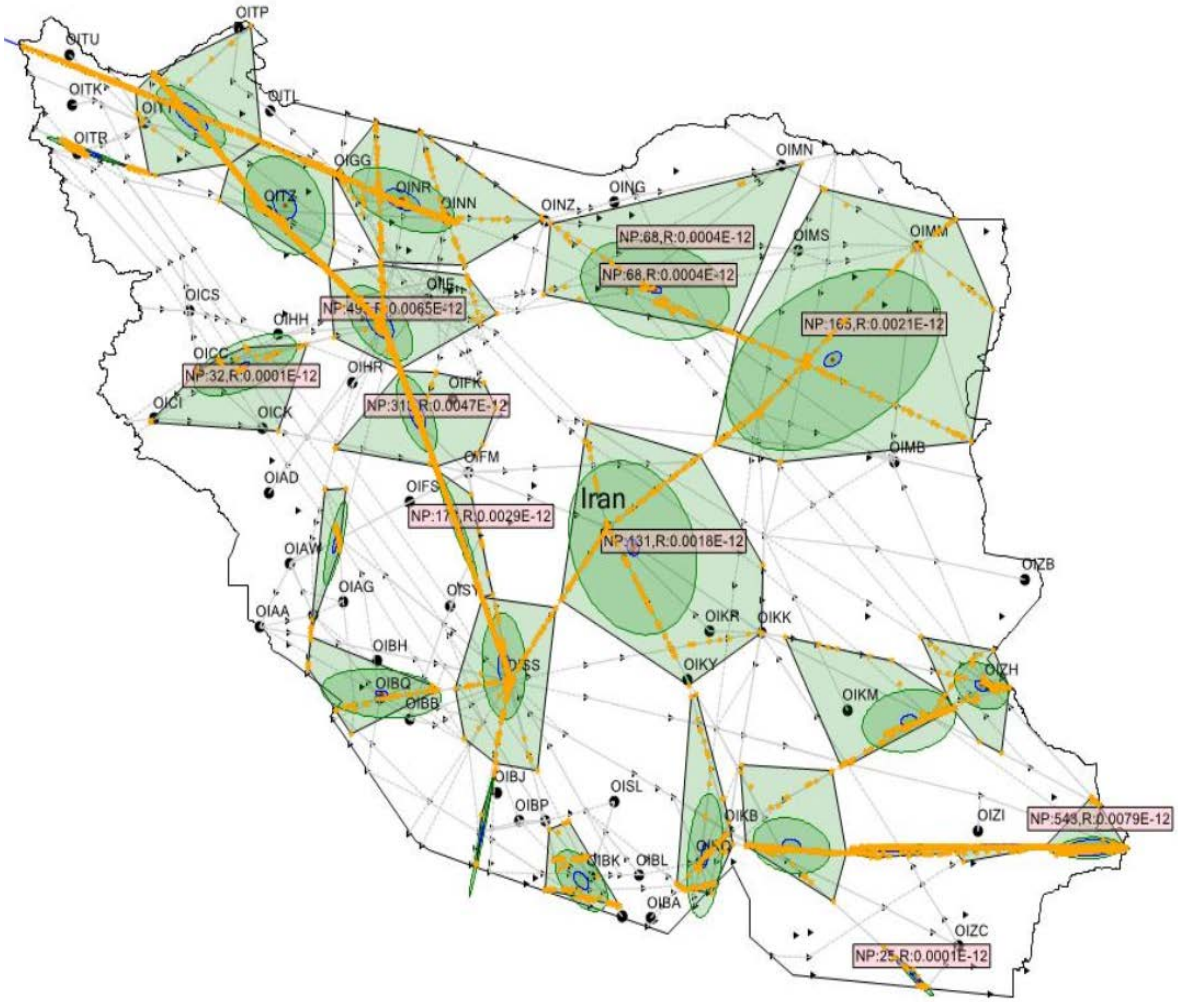
Cairo FIR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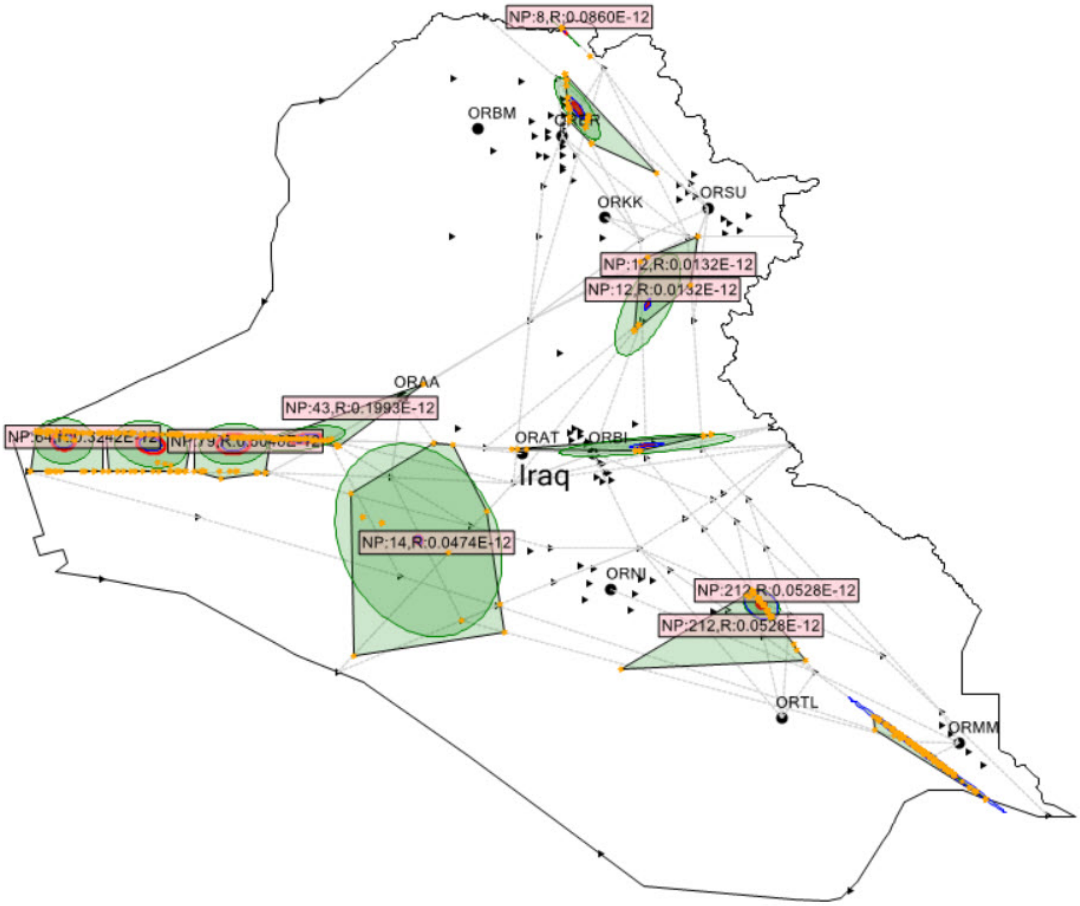
Tehran FIR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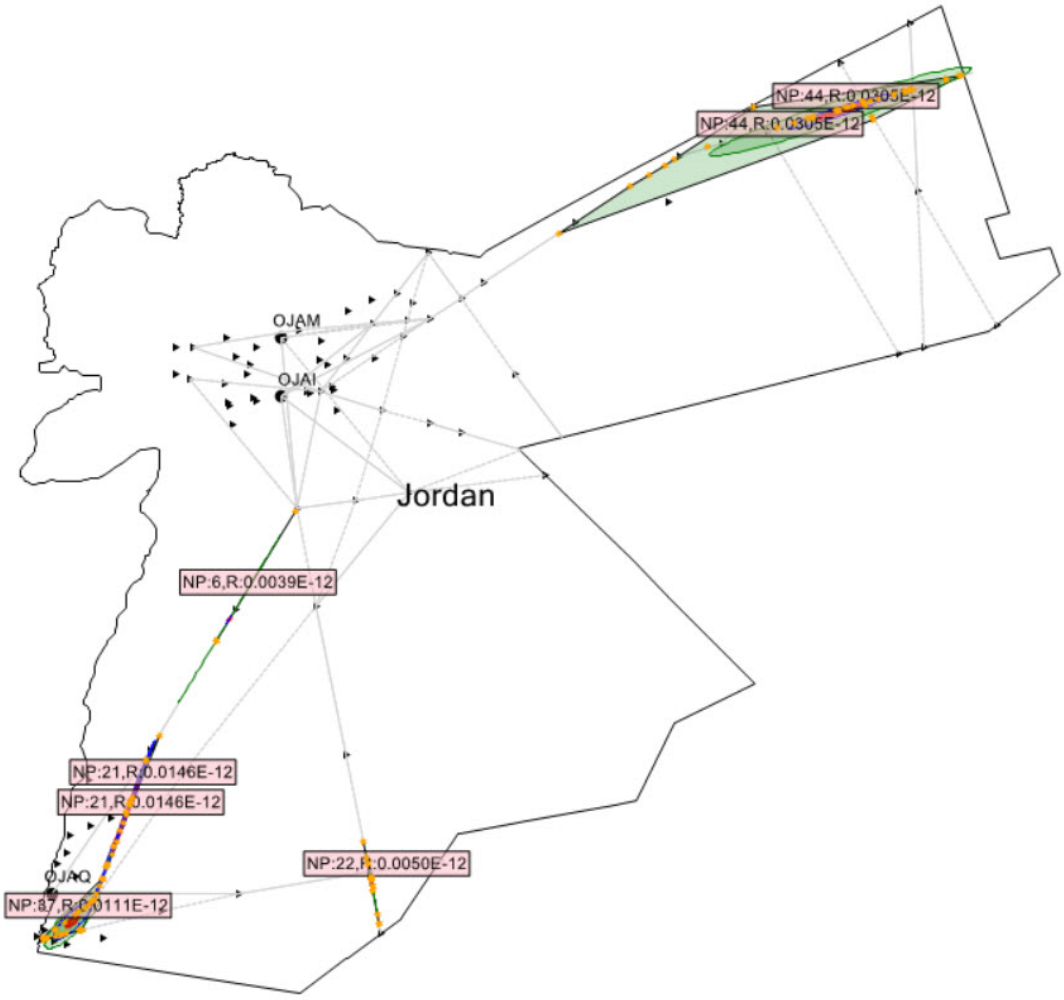
Baghdad FIR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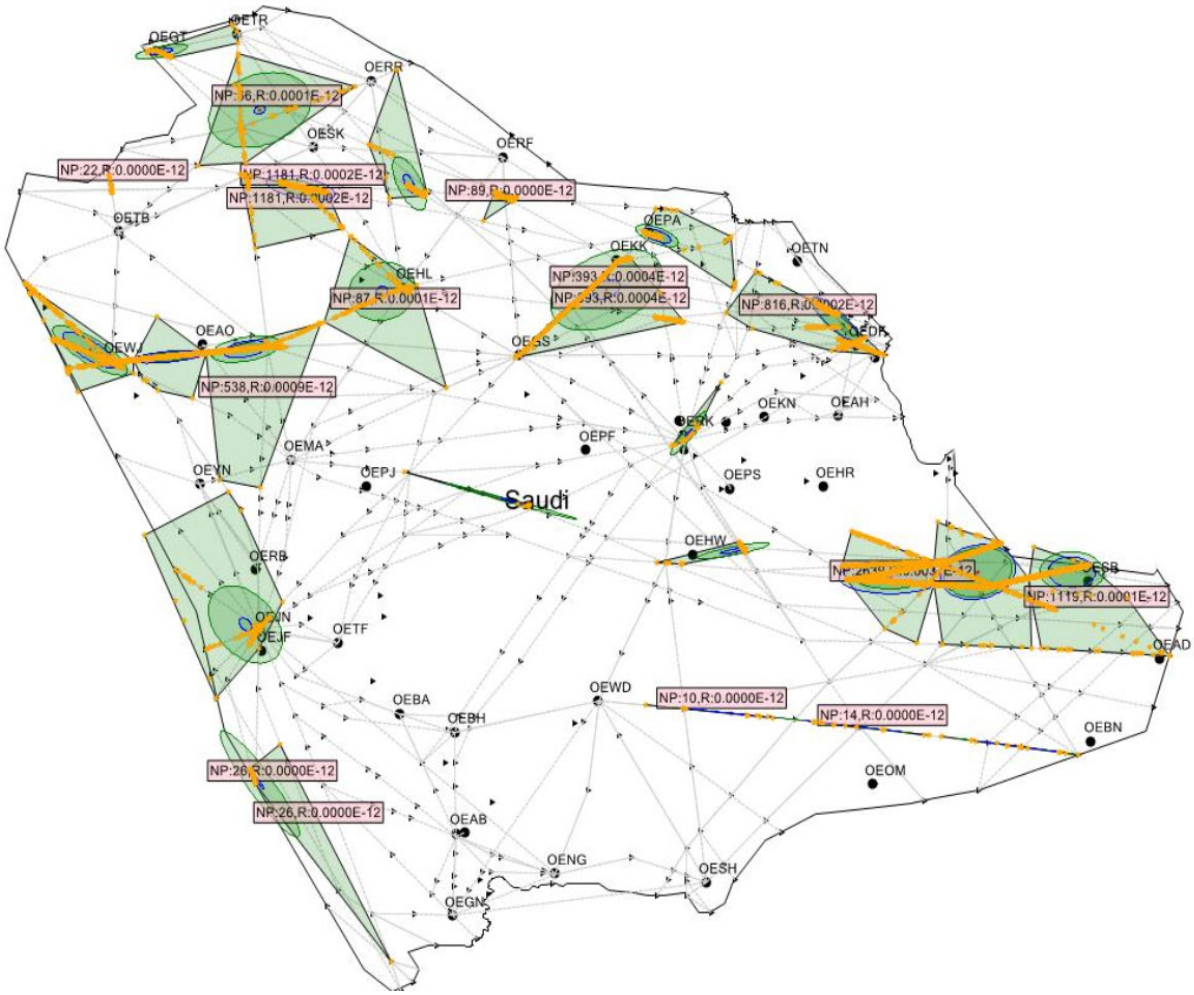
Amman FIR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OENG
OESH
OEGN

Jeddah FIR


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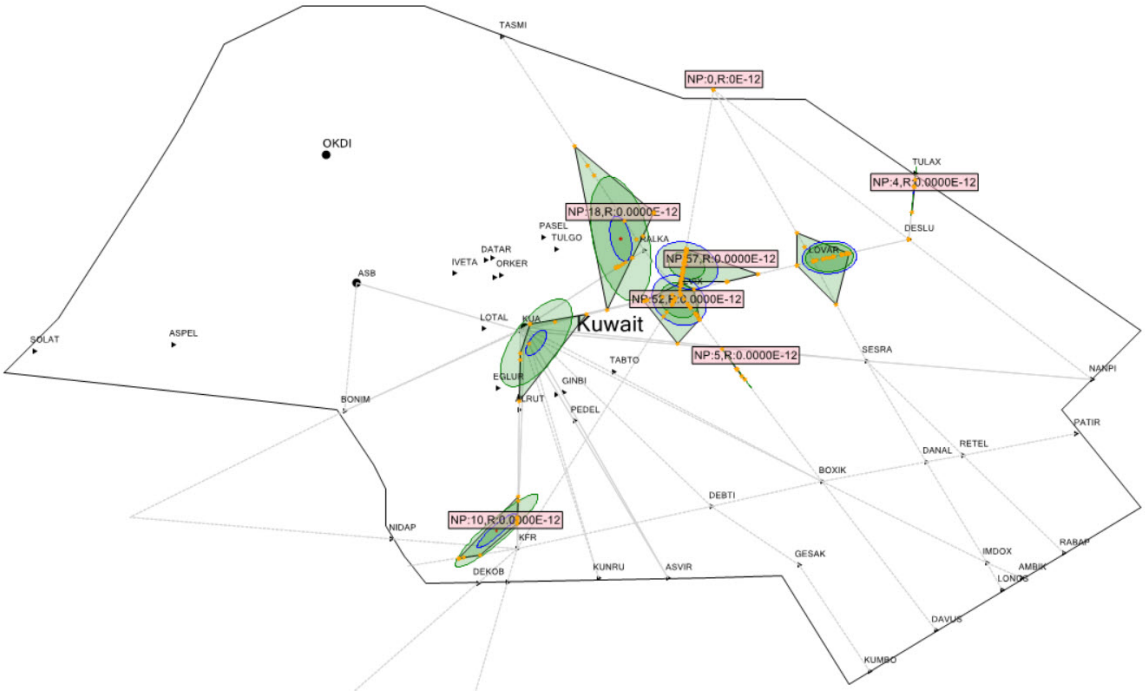
Muscat FIR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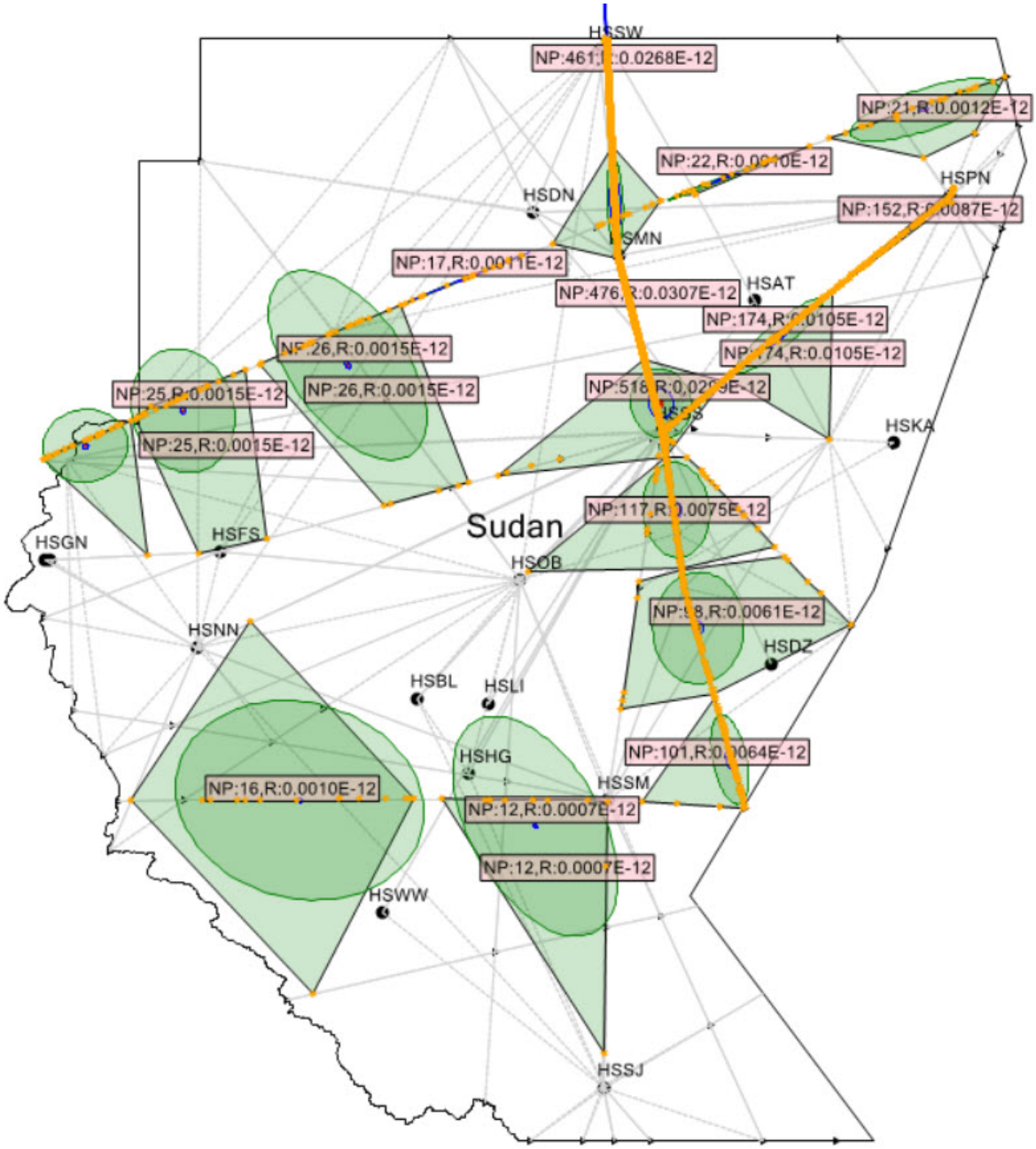
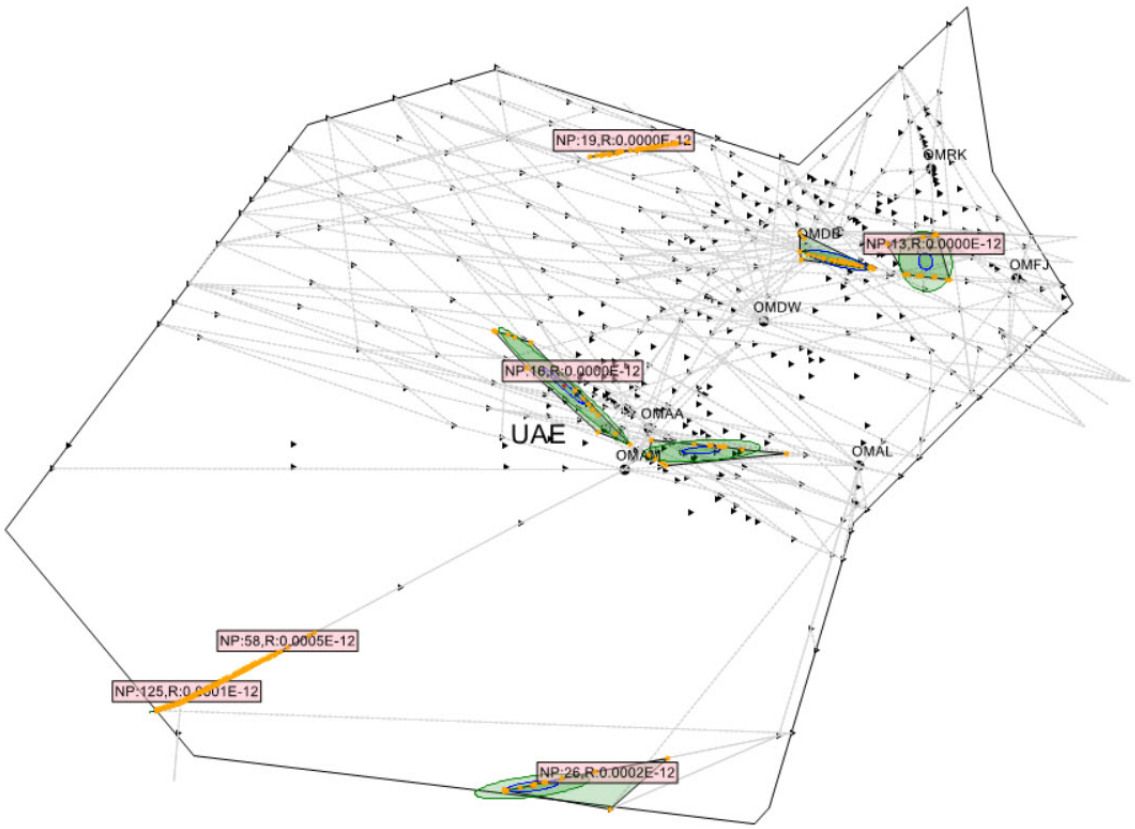
KUMBO

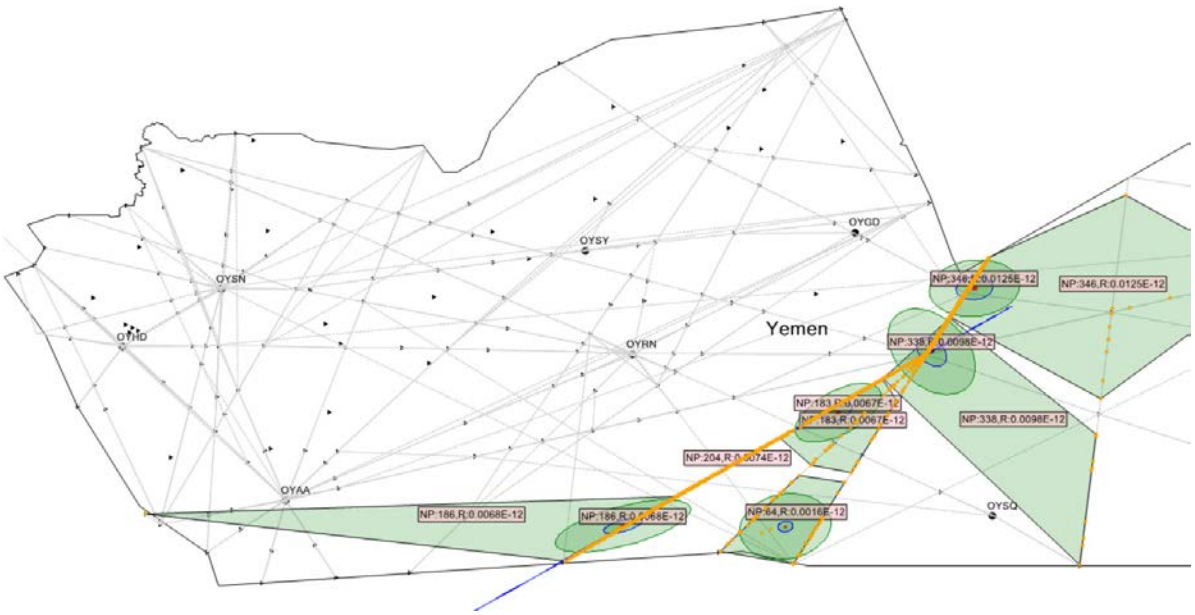
Kuwait FIR



Khartoum FIR



Emirates FIR



Sana’a FIR

- END -

MID RVSM SAFETY MONITORING REPORT 2020 (SMR 2020)

Prepared by the Middle East Regional Monitoring Agency (MIDRMA)

SUMMARY

The aim of the MID RVSM Safety Monitoring Report 2020 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.

1. Introduction:

1.1 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 with some reservation for Safety Objective 3 which is under continuous monitoring by MIDRMA.

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 **2.5×10^{-9}** fatal accidents per flight hour.

The value computed for technical height risk is estimated **9.185×10^{-13}** 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 **5×10^{-9}** fatal accidents per flight hour.

The value computed for the overall risk is estimated **5.206×10^{-10}** this meets RVSM Safety Objective 2.

Middle East RVSM Airspace Estimated Annual Flying Hours = (718,296) Average Aircraft Speed = 458.15 kts			
Risk Type	**Risk Estimation**	**ICAO TLS**	**Remarks**
Technical Risk	**9.185×10^{-13}**	**2.5×10^{-9}**	**Below ICAO TLS**
Overall Risk	**5.206×10^{-10}**	**5×10^{-9}**	**Below ICAO 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 **9.185×10^{-13}** which meets the ICAO TLS of **2.5×10^{-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 **5.206×10^{-10}** which meets the ICAO overall TLS of **5×10^{-9}** fatal accidents per flight hour (RVSM Safety Objective 2)

(iii) Based on currently-available information (Except for Tripoli FIR), there is no evidence available to MIDRMA that the continued operations of RVSM adversely affects the overall vertical risk of collision other than the violation of Non-RVSM approved aircraft to the MID RVSM airspace which is under continuous monitoring and review by MIDRMA. (More details in para 2.5)

1.3 Considerations on the RVSM Safety Objectives for MID RVSM SMRs

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 are numbers of assumptions that must be verified to satisfy the reliability of the risk assessment, the verification of these assumptions deals primarily with monitoring of aircraft performance issues.

2. The 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 technically RVSM compliant using a common compliance method. Monitoring group analysis is necessary to verify that the Minimum Aviation System Performance Standards (MASPS) for that group is valid. Aircraft that are made RVSM compliant on an individual basis are termed non-group.

3. The 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 the human influence and assessment of this parameter relies on adequate reporting of Large Height Deviation (LHD) Reports, and the correct interpretation of events for input to the CRM.

4. RVSM Safety Objective 3 requires the RMA to monitor long-term trends and to identify potential future safety issues, this compare the level of risk bearing incidents for the current reporting period. It also highlights if there are issues that should be carried forward as recommendations to be adopted for future reports.

2.1 Discussion

Scope:

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	Emirates
Jeddah	Kuwait	Khartoum	Muscat	Sana'a	Tehran	Tripoli*

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

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

The Data Sampling periods covered by SMR 2020 are as displayed in the below table

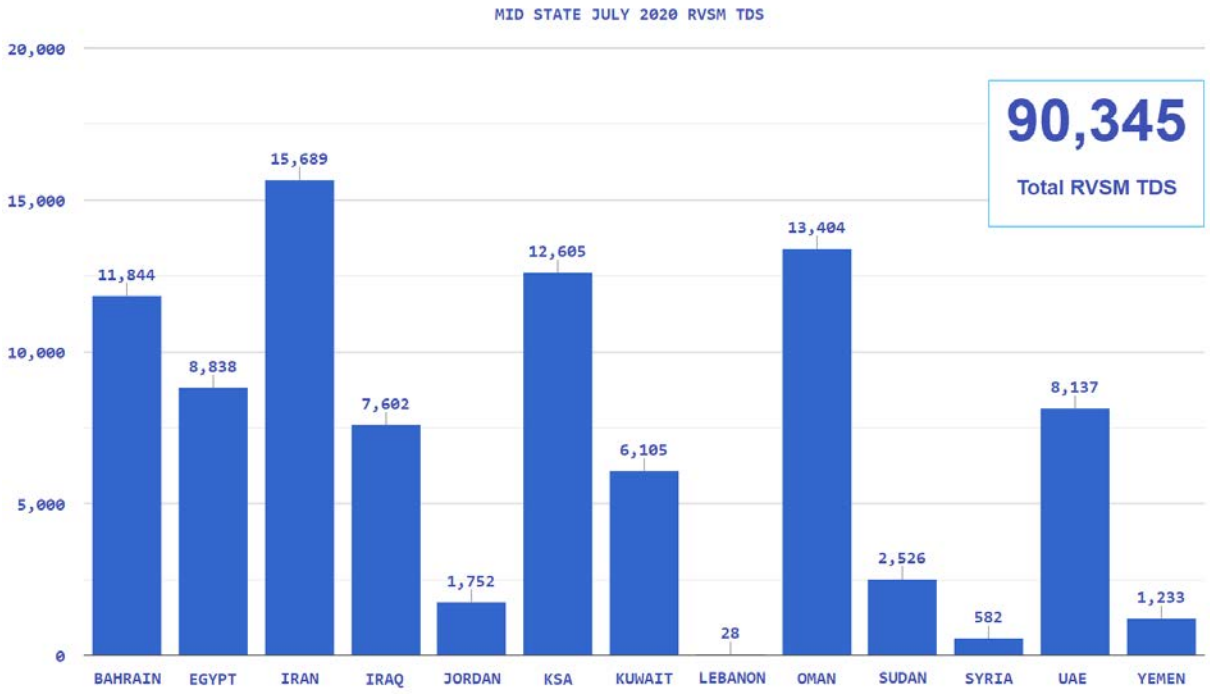
Report Elements	Time Period
Traffic Data Sample TDS	01/07/2020 - 31/07/2020
Operational & Technical Errors	01/01/2020 - 31/12/2020

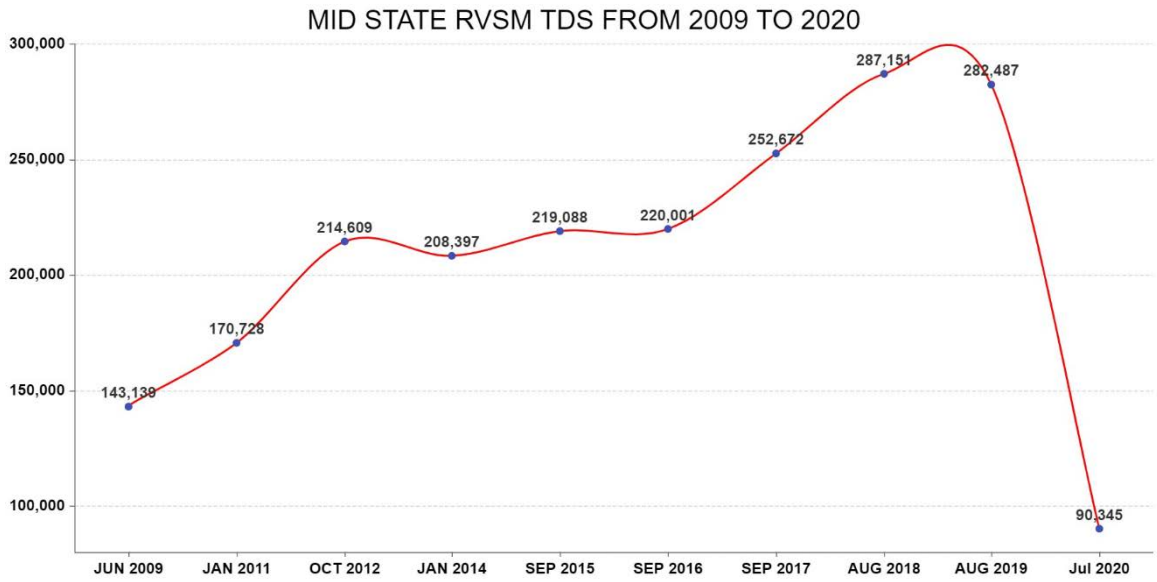
T-2: Time Period for the Reported Elements

MID States	Status	Remarks
Bahrain FIR	Accepted	-
Cairo FIR	Accepted	-
Amman FIR	Accepted	-
Muscat FIR	Accepted	-
Tehran FIR	Accepted	-
Khartoum FIR	Accepted	-
Emirates FIR	Accepted	-
Damascus FIR	Accepted	-
Sana'a FIR	Accepted	-
Jeddah FIR	Accepted	-
Beirut FIR	Accepted	-
Baghdad FIR	Accepted	-
Kuwait FIR	Accepted	-
Tripoli FIR	**No TDS**	**Excluded**
Total	13 FIRs	

Table 1: Status of the MID States RVSM Traffic Data Sample (TDS) for July 2020.

2.1.1 The description of the traffic data processed for each MIDRMA member State by the MID Risk Analysis Software (MIDRAS) is depicted in the graph below, a total of **90,345** flights were processed for the 13 FIRs, these flights were evaluated and processed very carefully to ensure accurate results according to the data submitted.





2.1.2 The COVID-19 pandemic has had a significant impact on the aviation industry worldwide due to travel restrictions and a slump in demand among travelers. The dramatic drop in demand for air transport passengers (and freight, to a lesser extent) due to this pandemic and containment measures resulted in a huge reduction in the number of the total traffic data compared with SMR 2019 TDS by 68.02 %.

#	MID FIRs	No of TDS Aug 2019	No of TDS July 2020	TDS Difference 2019 vs 2020	% of TDS Difference 2019 vs 2020
1	**Bahrain FIR**	34949	11844	-23105	-66.11
2	**Cairo FIR**	31843	8838	-23005	-72.25
3	**Amman FIR**	6645	1752	-4893	-73.63
4	**Muscat FIR**	46315	13404	-32911	-71.06
5	**Tehran FIR**	37676	15689	-21987	-58.36
6	**Khartoum FIR**	5115	2526	-2589	-50.62
7	**Emirates FIR**	24259	8137	-16122	-66.46
8	**Damascus FIR**	4733	582	-4151	-87.7
9	**Sana'a FIR**	4573	1233	-3340	-73.04
10	**Jeddah FIR**	43728	12605	-31123	-71.17
11	**Beirut FIR**	1537	28	-1509	-98.18
12	**Baghdad FIR**	21580	7602	-13978	-64.77
13	**Kuwait FIR**	19534	6105	-13429	-68.75
14	**Tripoli FIR**	NO TDS	NO TDS	-	-
	Total	**282,487**	**90,345**	**-192,142**	**-68.02%**

MID States RVSM TDS 2019 VS 2020

#	Reporting Point	FIRs	No of Flights
1	**SIDAD**	BAGHDAD / KUWAIT	**3751**
2	**RATVO**	BAGHDAD / ANKARA	**3271**
3	**TASMI**	BAGHDAD / KUWAIT	**3220**
4	**DAVUS**	BAHRAIN / KUWAIT	**3093**
5	**LONOS**	BAHRAIN / KUWAIT	**2720**
6	**NINVA**	BAGHDAD / ANKARA	**2089**
7	**DASUT**	BAHRAIN / TEHRAN	**2052**
8	**TAPDO**	MUSCAT/KARACHI	**1876**
9	**ULADA**	BAHRAIN / JEDDAH	**1771**
10	**ALPOR**	MUSCAT/KARACHI	**1726**
11	**TUMAK**	BAHRAIN / EMIRATES	**1680**
12	**PASOV**	MUSCAT/EMIRATES	**1621**
13	**ALPOB**	BAHRAIN / EMIRATES	**1616**
14	**NALPO**	BAHRAIN / EMIRATES	**1575**
15	**KITOT**	CAIRO/JEDDAH	**1555**
16	**RASKI**	MUSCAT/MUMBAI	**1514**
17	**MENSA**	EMIRATES/MUSCAT	**1416**
18	**ULINA**	CAIRO/AMMAN	**1403**
19	**DAROR**	BAHRAIN / JEDDAH	**1313**
20	**RABAP**	BAHRAIN / KUWAIT	**1308**

TDS 2020 Top 20 Busiest FIR Entry / Exit Points in the ICAO MID RVSM Airspace

2.1.3 For the sixth consecutive Safety Monitoring Report (since Libya joint the MIDRMA), Tripoli FIR has not been included in the RVSM safety analysis due to lack of TDS and LHD reports. This issue requires MIDANPIRG attention and decision on the way forward.

2.2 The Collision Risk Model (CRM)

2.2.1 The risk of collision to be modelled is that due to the loss of vertical separation between aircraft flying between FL290 and FL410 in a given portion of an airspace. One collision between two aircraft is counted as the occurrence of two accidents. The risk of collision depends both on the total number and types of aircraft flying in the system and the system characteristics.

2.2.2 The CRM provides an estimate of the number of accidents within an airspace system that might occur per aircraft flight hour due to aircraft collisions resulting from the loss of vertical separation in an RVSM environment analysis, is expressed in terms of quantifiable parameters. In the vertical dimension the CRM can be broken down in order to separately model a single route on which aircraft are flying in the same or opposite directions at adjacent flight levels, pairs of crossing routes and combinations of individual and intersecting routes, this model is applied equivalently to vertical, lateral and longitudinal separation.

2.2.3 Three parameters used within the CRM:

a. The Vertical Overlap Probability, denoted as $P_z(1\ 000)$.

b. The Lateral Overlap Probability, denoted as $P_y(0)$.

c. The aircraft Passing Frequency are the most important quantities in determining the vertical collision risk. Of these, the vertical overlap probability is also an important parameter to calculate.

2.3 TECHNICAL HEIGHT KEEPING PERFORMANCE RISK ASSESSMENT

RVSM Safety 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 **2.5×10^{-9}** fatal accidents per flight hour.

2.3.1. Direct evidence of compliance with TLS for Technical Height-Keeping Error

The result shows the risk of collision due to technical height-keeping performance is estimated to be **9.185×10^{-13}** fatal accidents per flight hour, which is less than the ICAO TLS **2.5×10^{-9}**.

2.3.2 Supporting evidence of compliance with TLS for technical height-keeping performance

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. Pz(1000) – the probability of vertical overlap due to technical height-keeping performance, between aircraft flying 1000 ft. separation in MID RVSM airspace is estimated **6.581×10^{-10}** valid and is less than the ICAO requirement of **1.7×10^{-8}**;

c. All aircraft flying with 1000ft vertical separation in MID RVSM airspace meet the ICAO Global Height Keeping Performance specifications for RVSM (All MID RVSM approved aircraft are part of the MID RVSM Height keeping Performance Program);

d. All aircraft flying 1000ft vertical separation in MID RVSM airspace meet the individual ICAO performance specification for the components of total vertical error (TVE);

e. The monitoring target for the MID RVSM height-monitoring programme is an on-going process;

f. The input data used by the CRM is valid;

g. An adequate process is in place to investigate and correct problems in aircraft technical height-keeping performance.

2.3.3 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 Py (0) for the SMR 2020 has the following to consider:

a. The MIDRMA continued to calculate the probability of lateral overlap $\boldsymbol{P_y(0)}$ 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 average of the probability of lateral overlap $\boldsymbol{P_y(0)}$ for the whole MID RVSM airspace is estimated to be **6.112×10^{-11}**

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

2.3.4 $P_z(1000)$ Compliance

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 $P_z(1000)$, based on the actual observed ASE and typical AAD data is estimated to be of **6.581×10^{-10}** . 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 **1.7×10^{-8}**.

The MIDRMA continue to issue the minimum monitoring requirements (MMRs) through the automated MMR software which is programmed to address the MIDRMA member states with their updated requirements according to the latest RVSM approvals received, the MMR table valid for December 2020 is available in **Appendix B**.

Note: All member States are required to check and comply with their MMR through the MIDRMA website (www.midrma.com).

MID RVSM SMRs Technical Risk Values					
Year 2006	**Year 2008**	**Year 2010**	**Year 2011**	**Year 2012/13**	**Year 2014**
2.17×10^{-14}	1.93×10^{-13}	3.96×10^{-15}	5.08×10^{-14}	6.37×10^{-12}	3.18×10^{-12}
Year 2015	**Year 2016**	**Year 2017**	**Year 2018**	**Year 2019**	**Year 2020**
3.056×10^{-10}	6.347×10^{-11}	4.966×10^{-11}	1.562×10^{-11}	2.012×10^{-13}	9.185×10^{-13}

According to the technical risk values as shown in the above table the TLS values still, meet the ICAO TLS.

2.3.5 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).

2.3.6 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 explore more options to enhance the MID Risk Analysis Software (MIDRAS),

Note: new project has started to include more features in the MIDRAS (will be presented to the next MIDRMA Board meeting for approval).

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 the member States that 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 RVSM traffic data to the MIDRMA on monthly basis to explore more possible violations to the MID RVSM airspace.

2.4 ASSESSMENT OF OVERALL RISK DUE TO ALL CAUSES AGAINST THE TLS OF $5X10^{-9}$ FATAL ACCIDENTS PER FLIGHT HOUR

RVSM Safety 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 **$5x10^{-9}$** fatal accidents per flight hour.

The computed value for the overall risk is **$5.206x10^{-10}$,** this meets RVSM Safety Objective 2.

Overall Risk Values					
Year 2006	**Year 2008**	**Year 2010**	**Year 2011**	**Year 2012/13**	**Year 2014**
Not calculated	$4.19x10^{-13}$	$6.92x10^{-12}$	$1.04x10^{-11}$	$3.63x10^{-11}$	$4.91x10^{-11}$
Year 2015	**Year 2016**	**Year 2017**	**Year 2018**	**Year 2019**	**Year 2020**
$7.351x10^{-10}$	$5.691x10^{-10}$	$4.518x10^{-11}$	$9.845x10^{-11}$	$8.345x10^{-10}$	$5.206x10^{-10}$

2.4.1 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 MSG/7 Virtual meeting (01 – 03 September 2020) requested the MIDRMA to organize training/awareness in RVSM LHD Reporting, and agreed on the following MSG Conclusion:

MSG CONCLUSION 7/5: TRAINING/AWARENESS ON RVSM LHD REPORTING

That,

a) the MIDRMA to organize, as soon as possible and in any case before December 2020, a Webinar on LHD reporting;

b) States are encouraged to participate actively in the Webinar on LHD Reporting; and coordinate with the MIDRMA for the provision of additional training/assistance on any RVSM safety assessment issues (including LHD reporting), as required; and

c) the MIDRMA to develop and distribute relevant training/awareness guidance on LHD reporting (leaflets, brochures, posters, etc.).

2.4.2 The MIDRMA, with the support of the ICAO MID Office, conducted on 4 November 2020 a Training/Awareness webinar for RVSM LHD Reporting and other MIDRMA tasks and responsibilities, resulting in a positive response from the States by providing LHD reports in all categories; the problem was solved and the necessary LHD reports were received on time for SMR2020 nearly from all MIDRMA focal points.

2.4.3 The MIDRMA continue to monitor the LHD reports at the eastern FIR boundary of Muscat FIR filed by Mumbai, The MIDRMA indicated in SMR2017 the level of LHD reports filed by Muscat and Mumbai ATCUs related to each other at their transfer of control points reached to a dangerous level and started to effect the ICAO TLS of RVSM implementation in the MID and APAC Regions, Therefore, the MIDRMA requested from the MIDRMA Board/15 meeting (Muscat, Oman; 29 – 31 January 2018) to open a Safety Protocol for the purpose of resolving this issue as soon as possible.

2.4.3 Although, the traffic level reduced at the common FIR boundary points for Muscat and Mumbai, the MIDRMA can't see much improvement for SMR2020 as the safety concern still exist and more works required from both ATCUs to close this safety protocol such as the implementation of OLDI/AIDC which is still ambiguous at this stage and required follow up from MIDANPIRG.

Note: A Safety Protocol is a critical safety issue effecting the implementation of RVSM operations which require the concerned authority an immediate action to rectify/resolve the problem in a certain period of time under the supervision of MIDRMA and ICAO MID Office.

2.4.4 The Safety Protocol is under continuous review by MIDRMA and MAAR and the LHD reports filed by all concerned ATC Units are investigated and evaluated through the MIDRMA online LHD system and further update will be addressed to the next MIDRMA Board and ATM SG meetings.

2.4.5 The Table below presents a summary of operational risk associated with Large Height Deviation (LHD) reports by LHD categories, these reports used to calculate the overall vertical collision risk for the MID RVSM airspace. Summary of Operational Risk associated with Large Height Deviation

LHD Cat. Code	Large Height Deviation (LHD) Category	No. of LHDs	LHD Duration (Sec.)
A	Flight crew fails to climb or descend the aircraft as cleared	**2**	**60**
B	Flight crew climbing or descending without ATC clearance	**1**	**45**
C	Incorrect operation or interpretation of airborne equipment	**3**	**125**
D	ATC system loop error	**1**	**15**
E	ATC transfer of control coordination errors due to human factors	**2**	**150**
F	ATC transfer of control coordination errors due to technical issues		
G	Aircraft contingency leading to sudden inability to maintain level	**1**	**40**
H	Airborne equip. failure and unintentional or undetected FL change	**2**	**50**
I	Turbulence or other weather related cause		
J	TCAS resolution advisory and flight crew correctly responds	**3**	**89**
K	TCAS resolution advisory and flight crew incorrectly responds		
L	An aircraft being provided with RVSM separation is not RVSM approved		
M	Other	**2**	**40**
	Total	**17**	**614**

Summary of Operational Risk associated with Large Height Deviation

SIDAD	3751
RATVO	3271
TASMI	3220
DAVUS	3093
LONOS	2720
NINVA	2089
DASUT	2052
TAPDO	1876
ULADA	1771
ALPOR	1726
TUMAK	1680
PASOV	1621
ALPOB	1616
NALPO	1575
KITOT	1555
RASKI	1514
MENSA	1416
ULINA	1403
DAROR	1313
RABAP	1308

2.4.6 Effects of Future Traffic Growth

The recent COVID-19 outbreak and the relevant precautionary measures to limit its spreading are having clear impacts on human mobility at global scale. This provoked a reduction of domestic and international volumes of air passenger traffic worldwide, such effects are currently being observed in the Middle East Region. This has clear implications for the aviation industry as well as indirect consequences to several sectors (e.g. tourism) and the economy at large as well as the society. The MIDRMA is continuously monitoring the traffic growth from the RVSM traffic data provided on a monthly basis from Bahrain, Iraq and UAE and found the traffic growth compared with the July 2020 has increased by 25% - 30%. These range from a rapid and full recovery to less optimistic scenarios of slower or even incomplete recovery will depend on the duration and intensity of the lock-downs and the spread of this virus in the MIDRMA member states.

The effect of future traffic growth on the vertical collision risk can be evaluated on the assumption of a linear relationship between traffic growth and frequency of horizontal overlap, which will directly affect the two components of the risk: the risk due to technical height-keeping performance and due to atypical operational errors.

With the current uncertainty over traffic growth this issue will be revisited when the Middle East economic/aviation conditions return to more normal growth.

2.4.7 Conclusions on the overall vertical risk:

a. 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, estimated from the operational and technical vertical risks calculated with LHD reports from most of the member States, the computed result for this SMR is considered to be representative for the MID RVSM airspace.

b. The effect of future traffic growth on the vertical collision risk can be evaluated on the assumption of a linear relationship between traffic growth and frequency of horizontal overlap, which will directly affect the two components of the risk: the risk due to technical height-keeping performance and due to atypical operational errors. It is very clear the MID region is suffering sever reduction in the traffic growth which is keeping the estimation of overall risk in safe side.

2.4.8 Recommendations Applicable to Safety Objective 2:

a. MIDRMA to present the successful progress made concerning the provision of LHD reports other than category E to the next MIDRMA board meetings.

b. The MIDRMA shall continue to encourage States to provide Large Height Deviation Reports (LHD) of all categories and not only related to handover issues.

c. Due to the failure of replying related LHD reports by some member states, the **MIDRMA** will upgrade the LHD online reporting system to alert these States who failed to respond with the need to investigate and report their outcomes in the system itself, as soon as possible.

d. The MIDRMA, in coordination with concerned States, assure that incidents and violations which have direct impact on the implementation of RVSM within the MID Region are reported in continuous basis through the MIDRMA LHD online reporting system in due time for operational safety assessment analysis.

2.5 ASSESSMENT OF SAFETY-RELATED ISSUES RAISED IN THIS REPORT

RVSM 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.

2.5.1 The identified safety-related issues are:

a. Confirmation of the approval status of aircraft filling RVSM flight plan (W in field 10), this is done through Bahrain, Iraq and Emirates TDS received on a monthly basis.

Note 1: As part of the duties and responsibilities of the MIDRMA is to “initiate checks of the approval status of aircraft operating in the relevant RVSM airspace, identify non-approved operators and aircraft using RVSM airspace and notify the appropriate State of Registry/State of the Operator and other RMAs, accordingly “the table below reflects the MIDRMA and other RMAs findings of the non-RVSM approved aircraft observed operating within the RVSM airspace without valid RVSM approvals and filling W in their flight plans which is considered a clear violation to the RVSM airspace.

Note 2: All the violating aircraft in the tables below were addressed officially by the MIDRMA to their concerned Airworthiness Authorities to clarify their RVSM approval status, the concerned authorities either failed to provide their approvals or confirmed these aircraft are not RVSM approved.

Note 3 : Non-RVSM approved aircraft operations within RVSM airspace could seriously affect the safety of other RVSM approved aircraft and negatively impact the ICAO's overall TLS, therefor the MIDRMA would like to raise this serious issue to MIDANPIRG for further action as there are some non-RVSM approved aircraft repeatedly violating the RVSM airspace.

#	Observed Operating RVSM In	Registrations of Violating ACFT	ICAO Type	Date of flight	Responsible State	No of flights
1	IRAQ	**152252**	AN72	1/14/2020	**IRAN**	2
2	IRAQ	**152253**	AN74	10/5/2020	**IRAN**	5
3	IRAQ	**152256**	AN72	1/3/2020	**IRAN**	2
4	IRAQ	**152257**	AN72	10/9/2020	**IRAN**	1
5	IRAQ	**152282**	IL76	1/6/2020	**IRAN**	2
6	IRAQ	**EPCPQ**	B703	1/18/2020	**IRAN**	2
7	IRAQ	**EPCQA**	B742	1/4/2020	**IRAN**	2
8	IRAQ	**YKATA**	IL76	1/1/2020	**SYRIA**	12
9	IRAQ	**YKATB**	IL76	1/2/2020	**SYRIA**	13
10	EURRMA	**EPIBO**	A310	29/07/2020	**IRAN**	1
11	EURRMA	**EPMDM**	A300	8/7/2020	**IRAN**	16
12	EURRMA	**5AFLL**	G300	10/7/2020	**LIBYA**	6
13	EURRMA	**5APOL**	IL76	26/09/2020	**LIBYA**	2
14	EURRMA	**STPRB**	AN74	18/08/2020	**SUDAN**	1
15	EURRMA,UAE	**STPSA**	F900	20/09/2020	**SUDAN**	3
16	UAE	**ZAYED17**	A332	5/1/2020	**UAE**	2

Table 1: MIDRMA Member States Non-RVSM Approved Aircraft

b. Identification of operators requiring monitoring and address the minimum monitoring requirements to all MIDRMA member states.

2.5.2 Conclusions for Safety Objective 3

a. The MIDRMA started to conduct studies and researches for implementing height monitoring using ADS-B data.

b. More researches have been conducted to explore more methods of obtaining ADS-B data such as space ADS-B from Aireon.

c. The MIDRMA address the Hot Spots of each MID FIR generated by the (MIDRAS) Software (for information only).

d. Current risk-bearing situations have been identified by using the MIDRAS and the MID Visualization and Simulation of Air Traffic and actions will be taken to ensure resolving all violations to RVSM airspace by non-approved aircraft such as issuing the MID RVSM Violation List which will be distributed to all MIDRMA Member States Air Traffic Control Units.

2.5.3 Recommendations for Safety Objective 3

a. The MIDRMA will continue to coordinate with Member States, which have ADS-B to provide the archived data for RVSM height monitoring.

b. MIDRMA will continue to enhance the (MIDRAS) Software and shall include new features to overcome the issue of corrupted TDS (Traffic Data Sample).

c. The MIDRMA will coordinate with ICAO MID Office to include in its work program to deliver awareness courses concerning RVSM risk analysis to brief Air Traffic Controllers and Airworthiness Inspectors of MIDRMA Member States to ensure their follow up with ICAO requirements for RVSM implementation and give briefing of updated ICAO requirements, these courses will be delivered as necessary or when requested by any Member State. A specialized Training/Awareness courses should be delivered to the concerned officials from Libya for capacity building, prior re-operating the RVSM Airspace in Tripoli FIR, with a close follow up on the implementations, in coordination with the MIDRMA Focal points.

d. The MIDRMA shall continue to carry out continuous survey and investigation on the number and causes of non-approved aircraft operating in the MID RVSM airspace, MIDANPIRG to address the concerned responsible MIDRMA Member States in table No 1 (MIDRMA Member States Non-RVSM Approved Aircraft) to take all necessary measure to stop aircraft under their responsibility from violating the RVSM airspace.

e. The MIDRMA will continue to encourage States to submit their Large Height Deviation Reports using the MIDRMA online reporting tool which has been upgraded to improve the level of reporting.

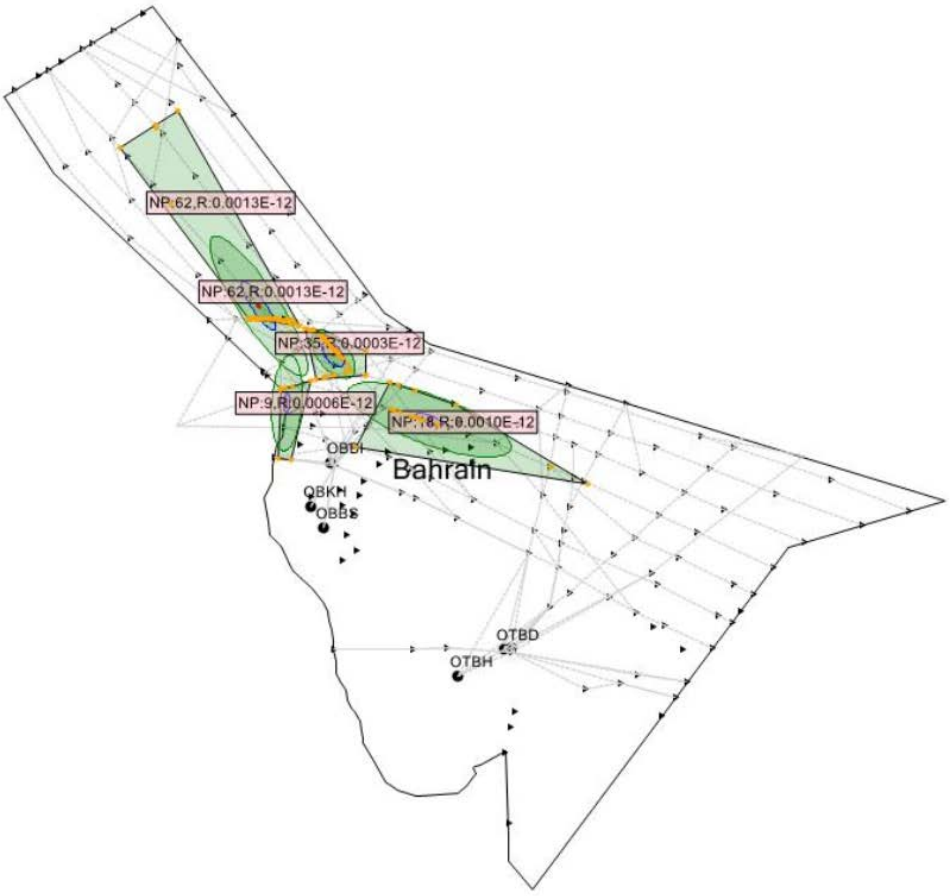
Therefore, it is concluded that this Safety Objective is currently met but with some reservation concerning the violation of the non-RVSM approved to the MID RVSM airspace.

Appendix B

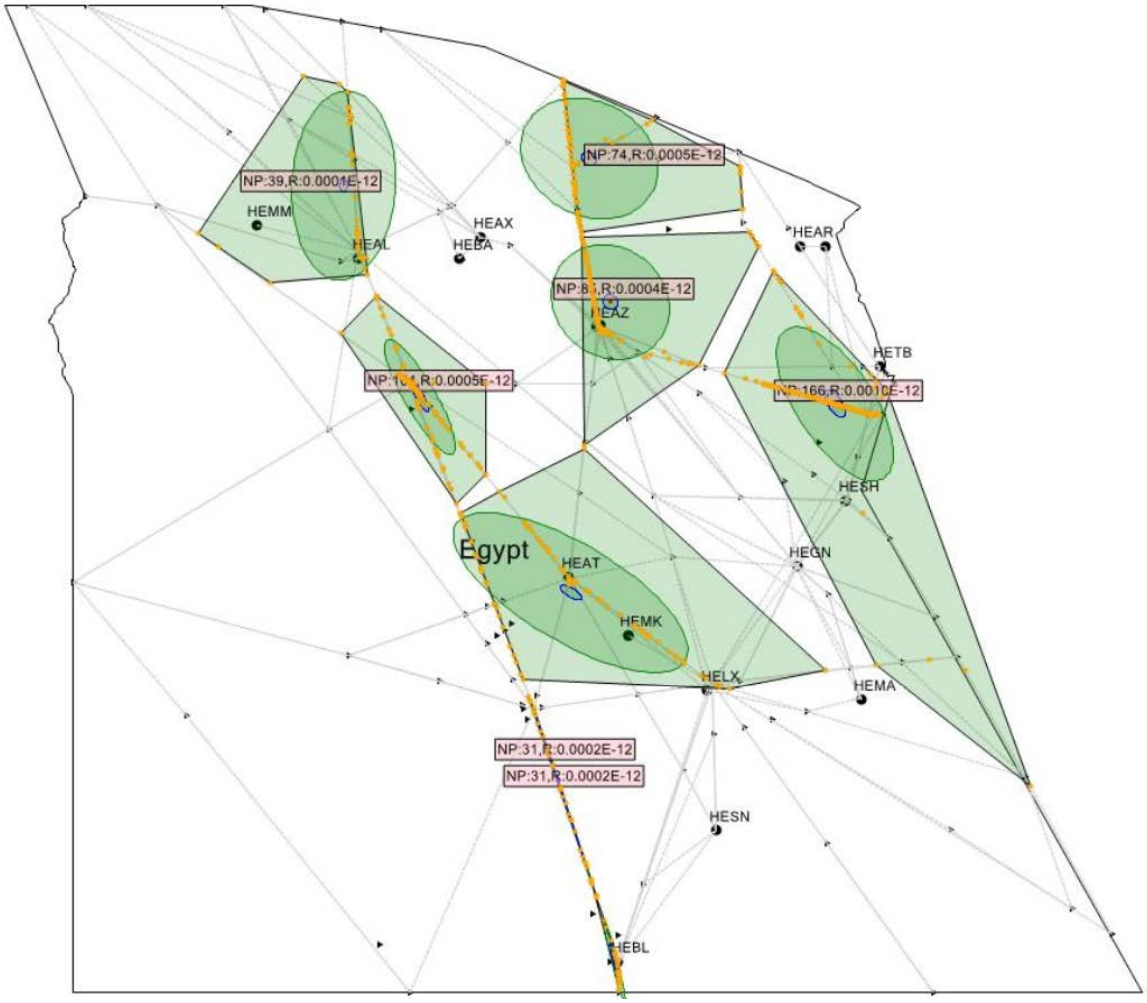
THE MID MMR as of October 2020

STATE	RVSM APPROVED A/C	NOT COVERED
Bahrain	54	1
Egypt	167	25
Iran	233	110
Iraq	40	14
Jordan	44	5
KSA	275	13
Kuwait	67	7
Lebanon	31	0
Libya	30	22
Oman	72	12
Qatar	281	0
Sudan	29	26
Syria	15	14
UAE	593	31
Yemen	6	3
TOTAL	1937	283

<u>APPENDIX C</u> –MIDRMA Member States Hot Spots Generated from September 2019 TDS (for information ONLY)



Bahrain FIR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HEAX
HEBA
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HEAR
NP:8 ,R:0.0004E-12
HEAZ
HETB
NP:166,R:0.0010E-12
HESH
Egypt
HEAT
HEGN
HEMK
HELX
HEMA
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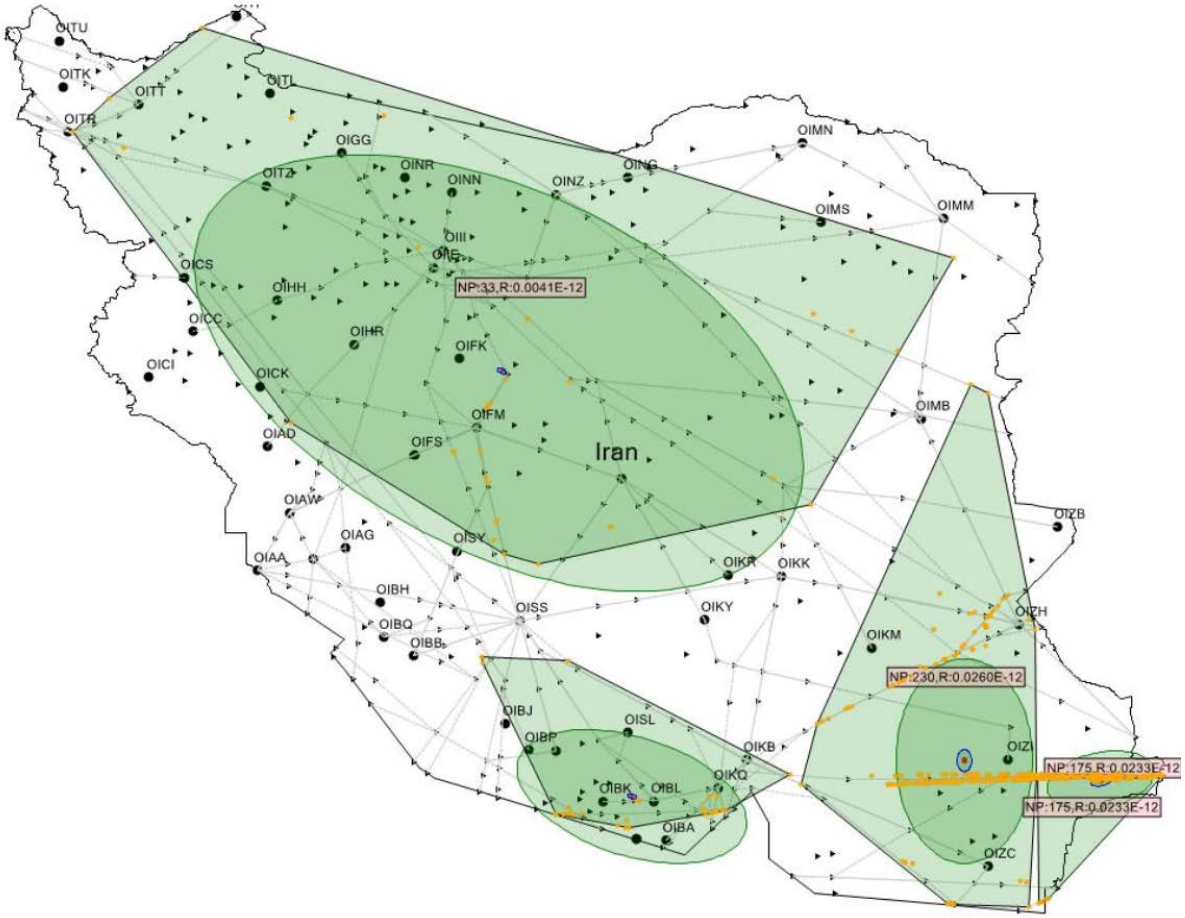
NP:31,R:0.0002E-12
HESN
HEBL

Cairo FIR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OITT
OITR
OITL
OIGG
OINR
OINN
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OIMM
OIII
OIIE
OICS
OIHH
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OIHR
OIFK
OICI
OICK
OIFM
OIAD
OIFS
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OIAW
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OIZH
OIBQ
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OISL
OIBP
OIKB
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OIKQ
OIBK
OIBL
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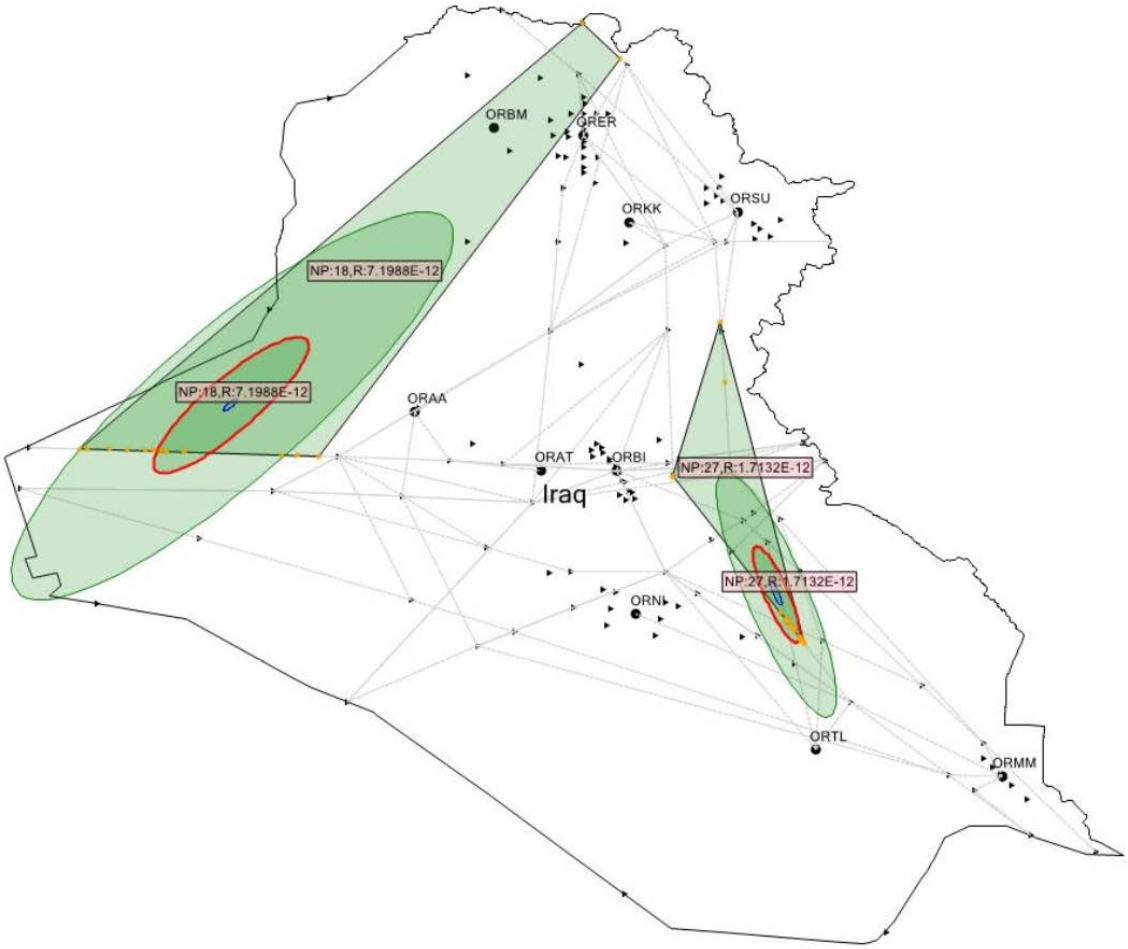
OIBA
OIZC

Tehran FIR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ORKK
ORSU
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ORAA
ORAT
ORBI
Iraq
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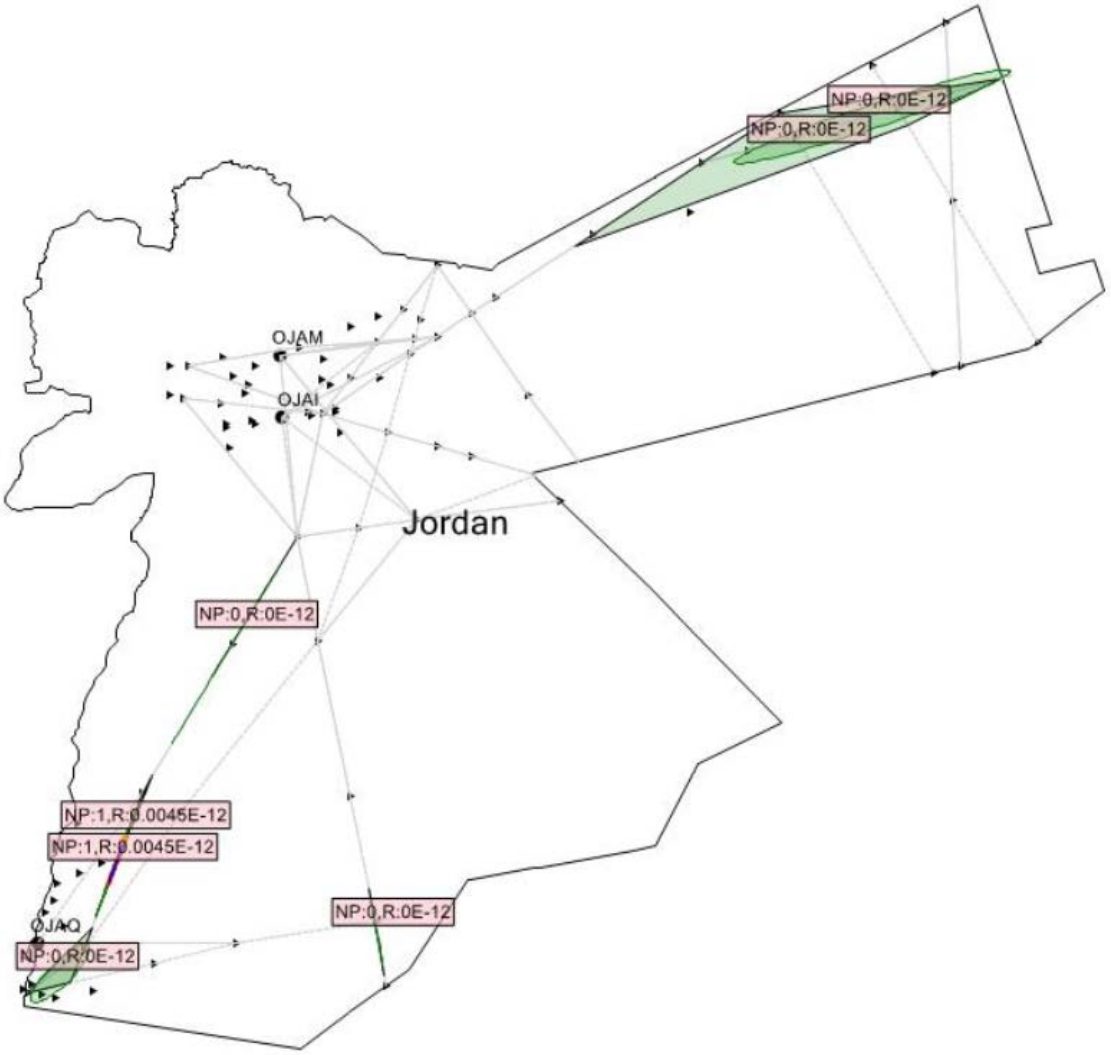
NP:27,R:1.7132E-12
ORNI
ORTL
ORMM

Baghdad FIR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NP:0,R:0E-12
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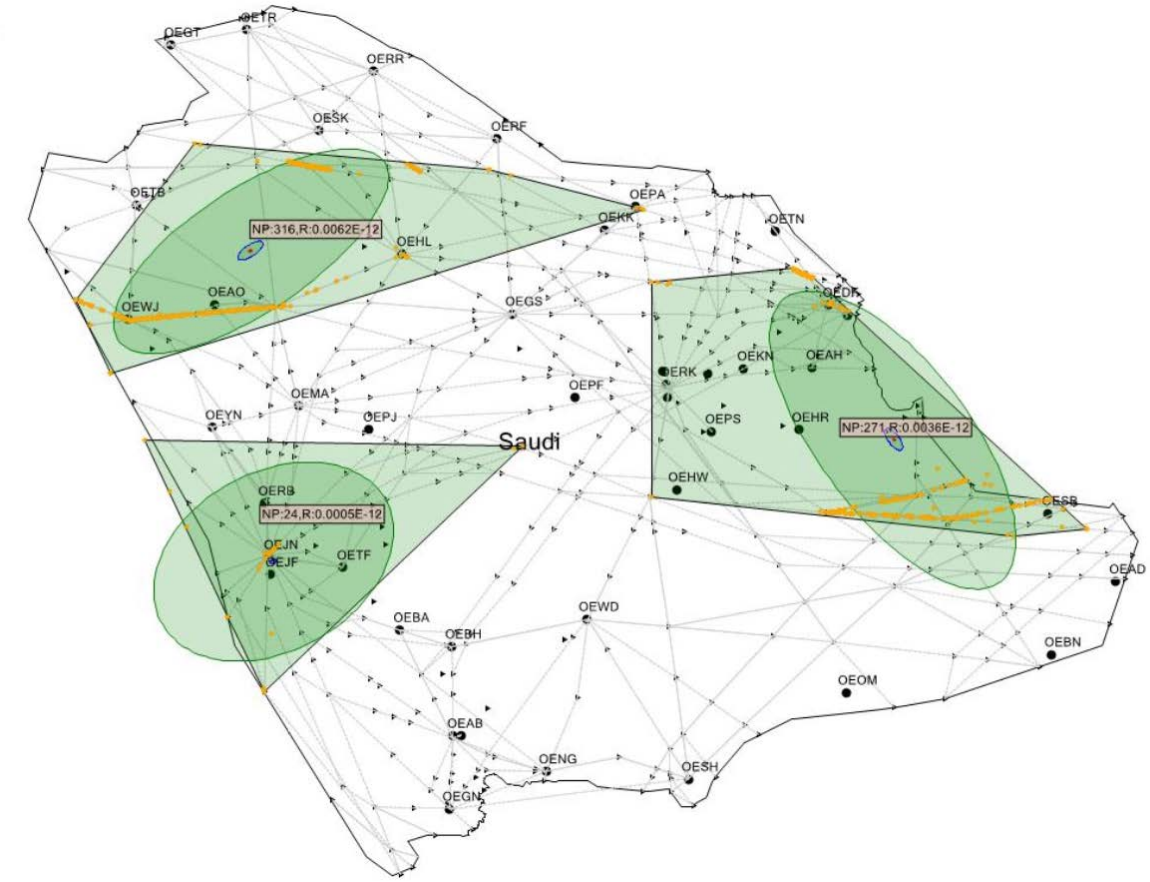
OJAI
Jordan
NP:0,R:0E-12
NP:1,R:0.0045E-12
NP:1,R:0.0045E-12
NP:0,R:0E-12
OJAQ
NP:0,R:0E-12

Amman FIR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OERR
OESK
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OETB
OEPA
OEKK
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OEWJ
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OEYN
OEPJ
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OEHR
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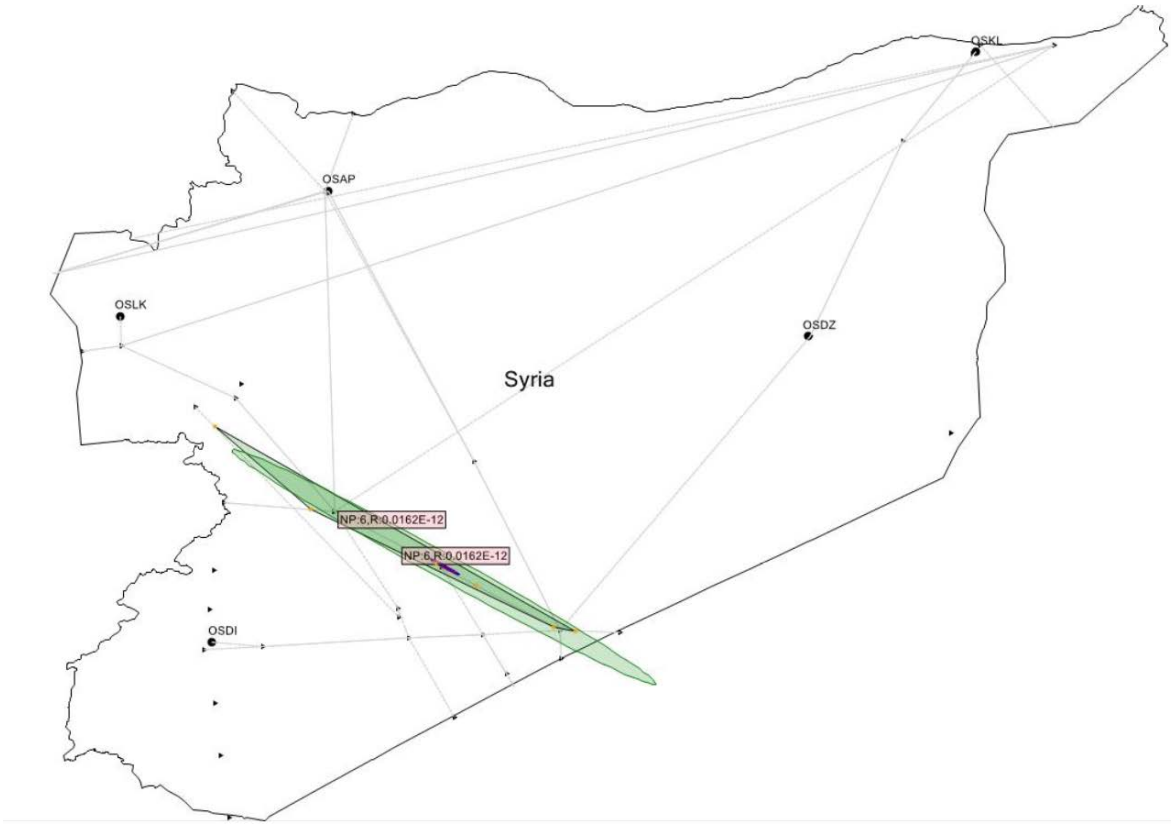
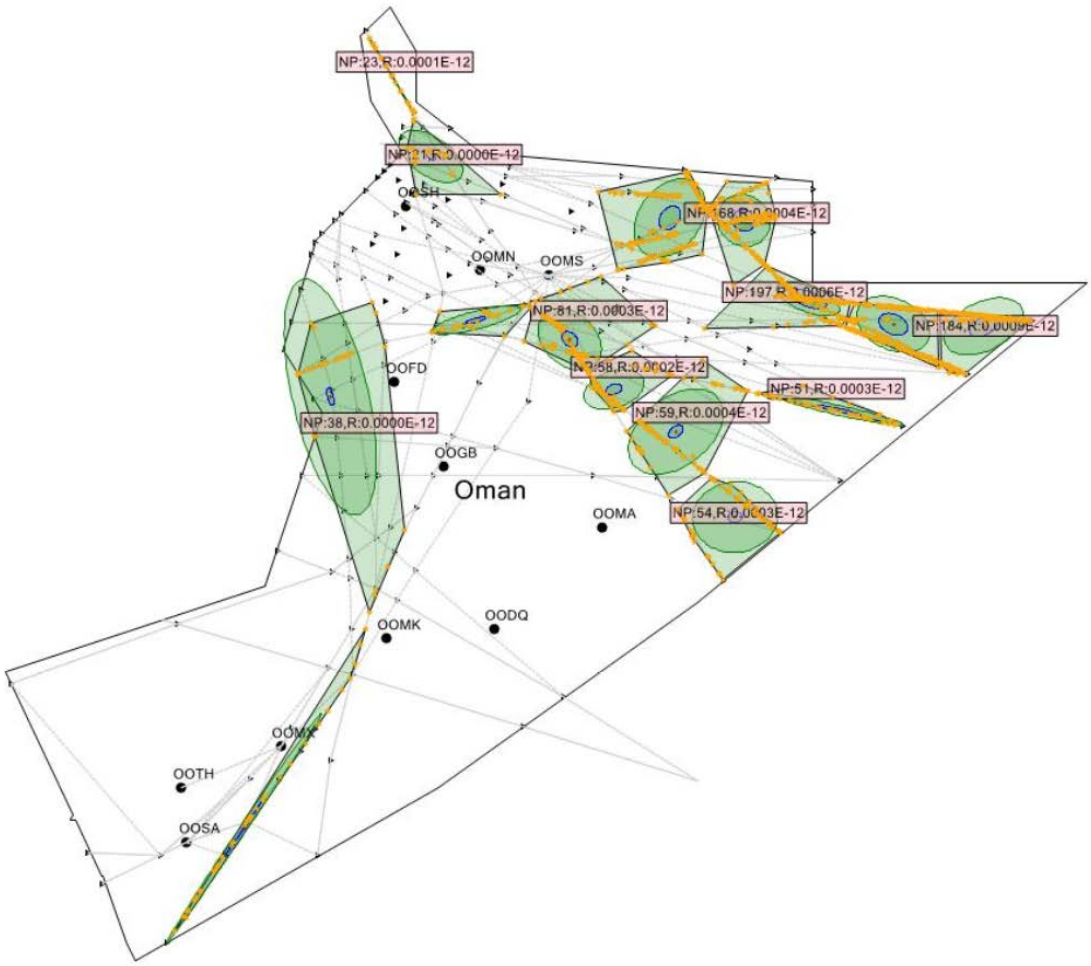
OESH
OEGN

Jeddah FIR



Damascus FIR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OOMN
OOMS
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NP:184,R:0.0009E-12
OOFD
NP:58,R:0.0002E-12
NP:51,R:0.0003E-12
NP:59,R:0.0004E-12
NP:38,R:0.0000E-12
OOGB
Oman
OOMA
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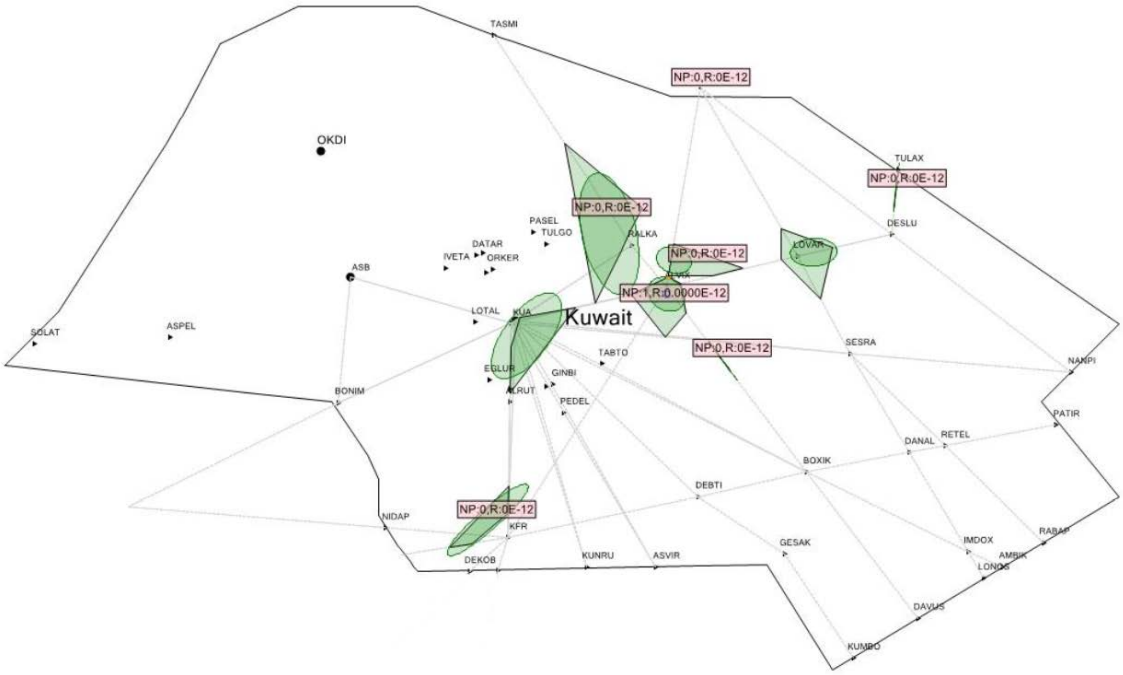
OODQ
OOMK
OOMX
OOTH
OOSA

Muscat FIR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RALKA
DESLU
DATAR
IVETA
ORKER
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LOTAL
KUA
Kuwait
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SESRA
TABTO
NANPI
EGLUR
GINBI
BONIM
AKRUT
PEDEL
PATIR
DANAL
RETEL
BOXIK
DEBTI
NIDAP
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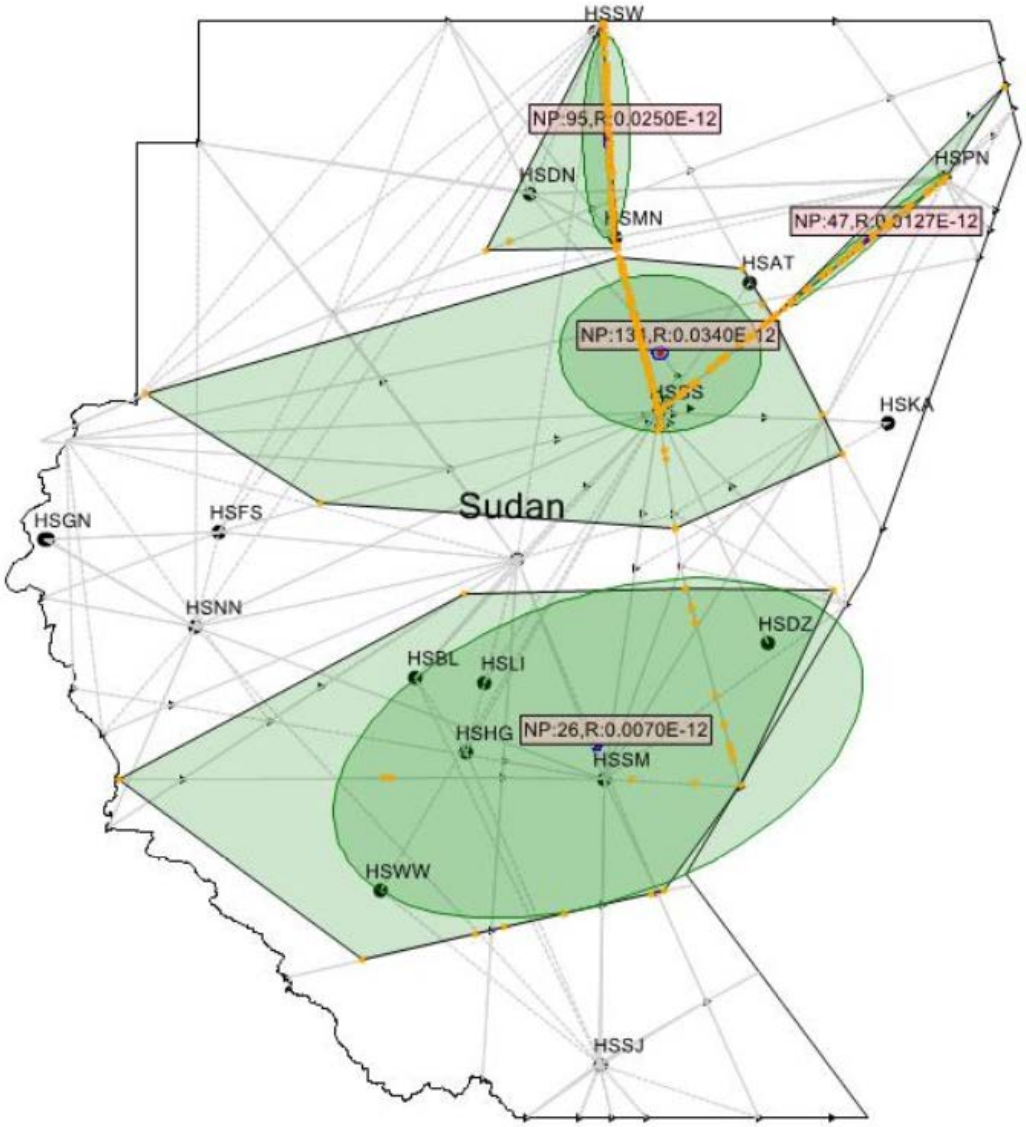
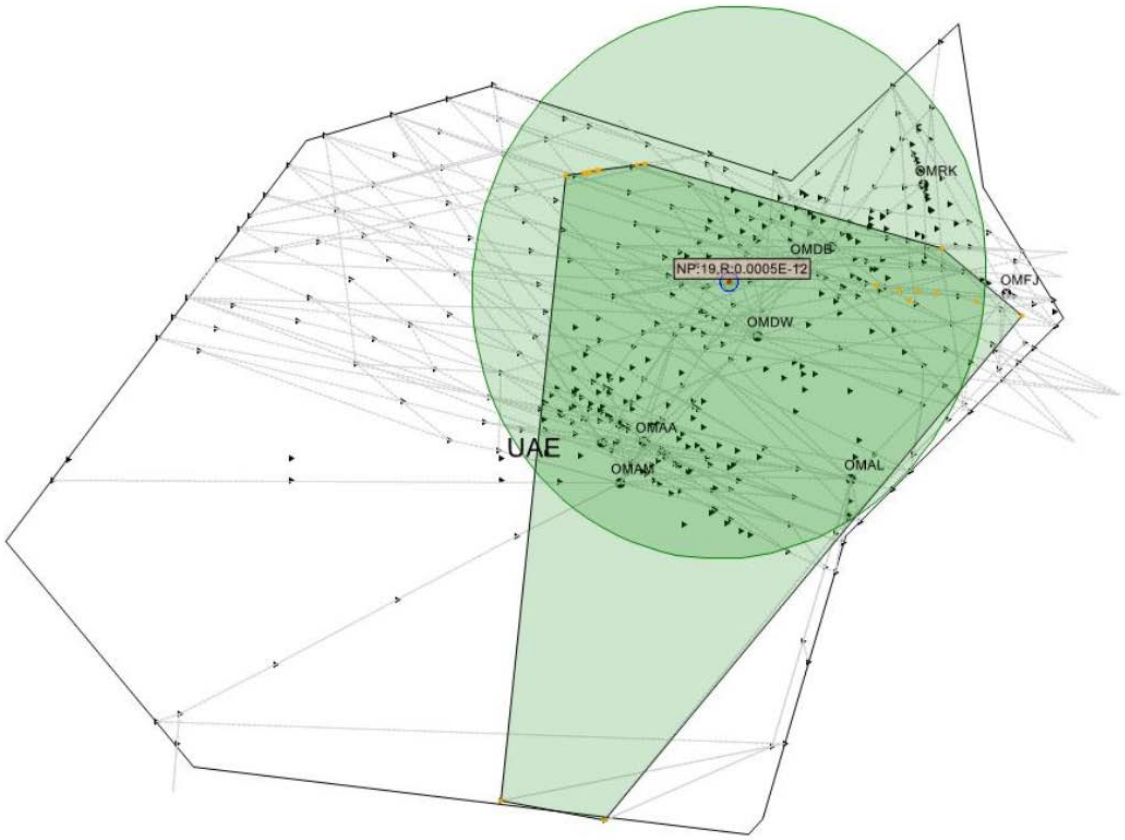
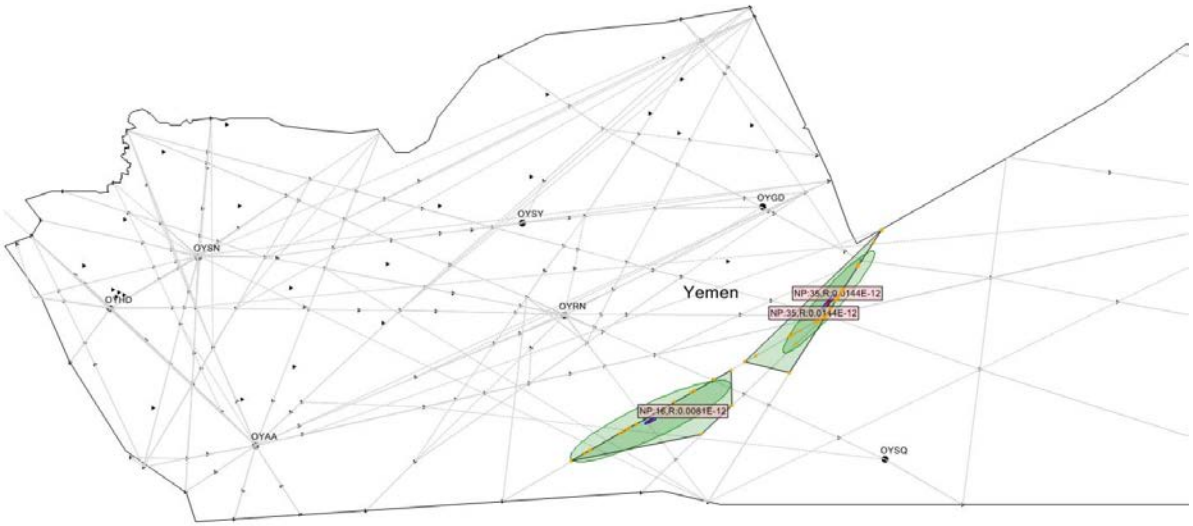
Kuwait FIR



Khartoum FIR



Emirates FIR



Sana’a FIR

- END -