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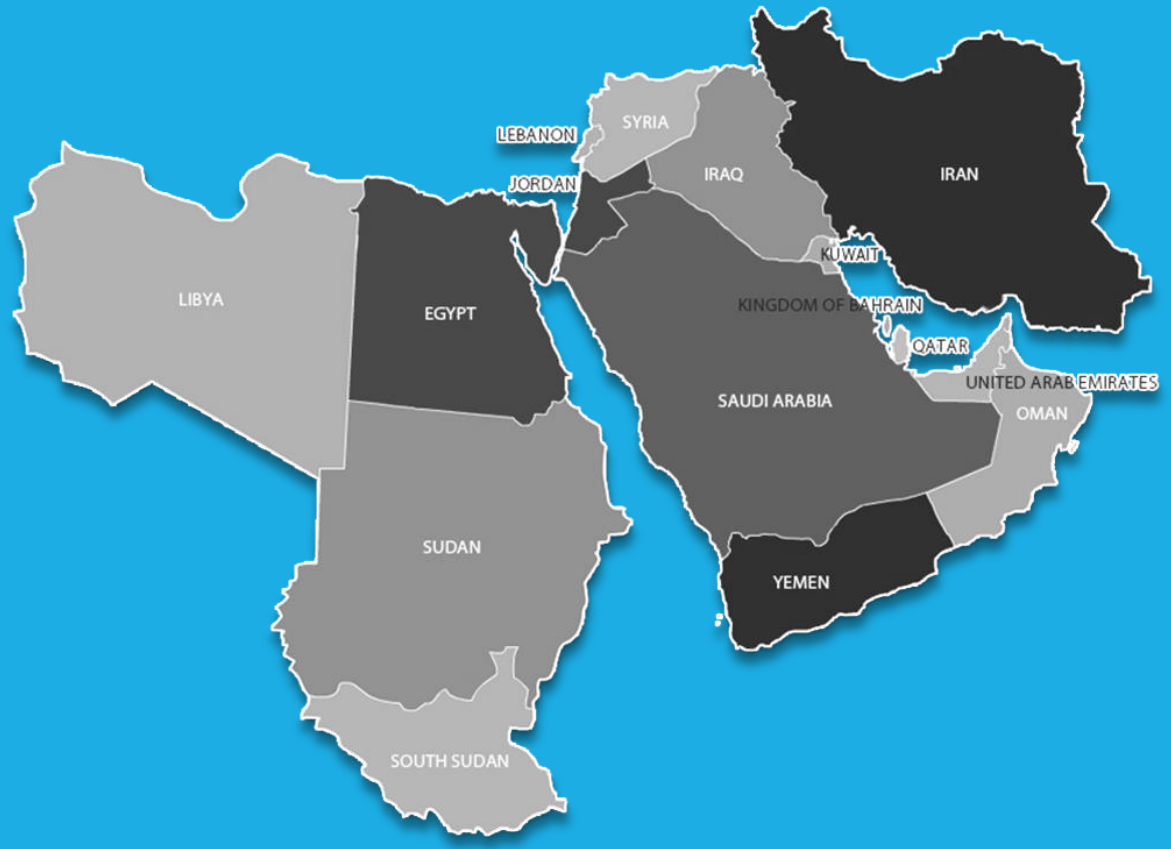
MIDDLE EAST REGIONAL MONITORING AGENCY

الوكالة الإقليمية لرصد الحركة الجوية للشرق الأوسط

MID RVSM Safety Monitoring Report (SMR)

04 November 2020

ICAO Middle East Region



Annual RVSM Safety Monitoring Report

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ICAO Doc 9574, paragraph 6.4.4 and 6.4.5, Responsibilities of an RMA

- One of the duties and responsibilities includes providing annual reports to the Planning and Implementation Regional Group (PIRG) Reports contain assessments of risk in the system against the overall safety objectives to support the continued safe use of the RVSM.

- These reports are provided to the relevant groups within the ICAO Regions

Tools for Safety Assessment

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ICAO Collision Risk Methodology

Used to develop ICAO Doc 9574 global system performance specification, height keeping performance specification and aircraft height keeping performance requirements

- Target Level of Safety (TLS) (=safety objectives),
- Collision risk model (=Risk estimation tool), and
- Agreed means to evaluate risk

Tools for Safety Assessment

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ICAO Collision Risk Methodology Risk model was adapted to account for:

- Aircraft technical risk on same track and on intersecting tracks
- Effect of large height deviations on system risk

Same methodology is used by all RMAs worldwide

Tools for Safety Assessment

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MID Risk Analysis Software (MIDRAS) – Consist of:

- Software to calculate ICAO TLS (Technical and Overall)
- MID RVSM Hotspots
- Fast Simulation

MID RVSM Safety Objectives

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The estimate of vertical collision risk associated with RVSM is compared to the agreed RVSM safety objectives:

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.

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 **5×10^{-9}** fatal accidents per flight hour.

MID RVSM Safety Objectives

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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.

SMR Data Requirements

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Results from aircraft height-keeping performance monitoring systems both from regional monitoring systems and data-sharing with other RMAs.

Collect Reports of:

- Large Height Deviations (LHDs)
- Traffic Data Sample (TDS) from Air Navigation Service Providers (ANSPs)

SMR Risk Categories

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Technical Risk - is the term used to describe the risk of collision associated with aircraft height-keeping performance. Some of the factors which contribute to technical risk are:

a) Errors in aircraft altimetry and automatic altitude control systems;
b) Aircraft equipment failures resulting in unmitigated deviation from the cleared flight level, including those where not following the required procedures further increases the risk; and
c) Responses to false collision avoidance resolution advisories.

SMR Risk Categories

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Operational Error

This term is used to describe any vertical deviation of an aircraft from the correct flight level as a result of incorrect action by ATC or the flight crew.

SMR Risk Categories

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Key Collision Risk Model Parameters

There are two vertical overlap probability parameters that take into account the Altimetry System Error (ASE) performance of the aircraft population

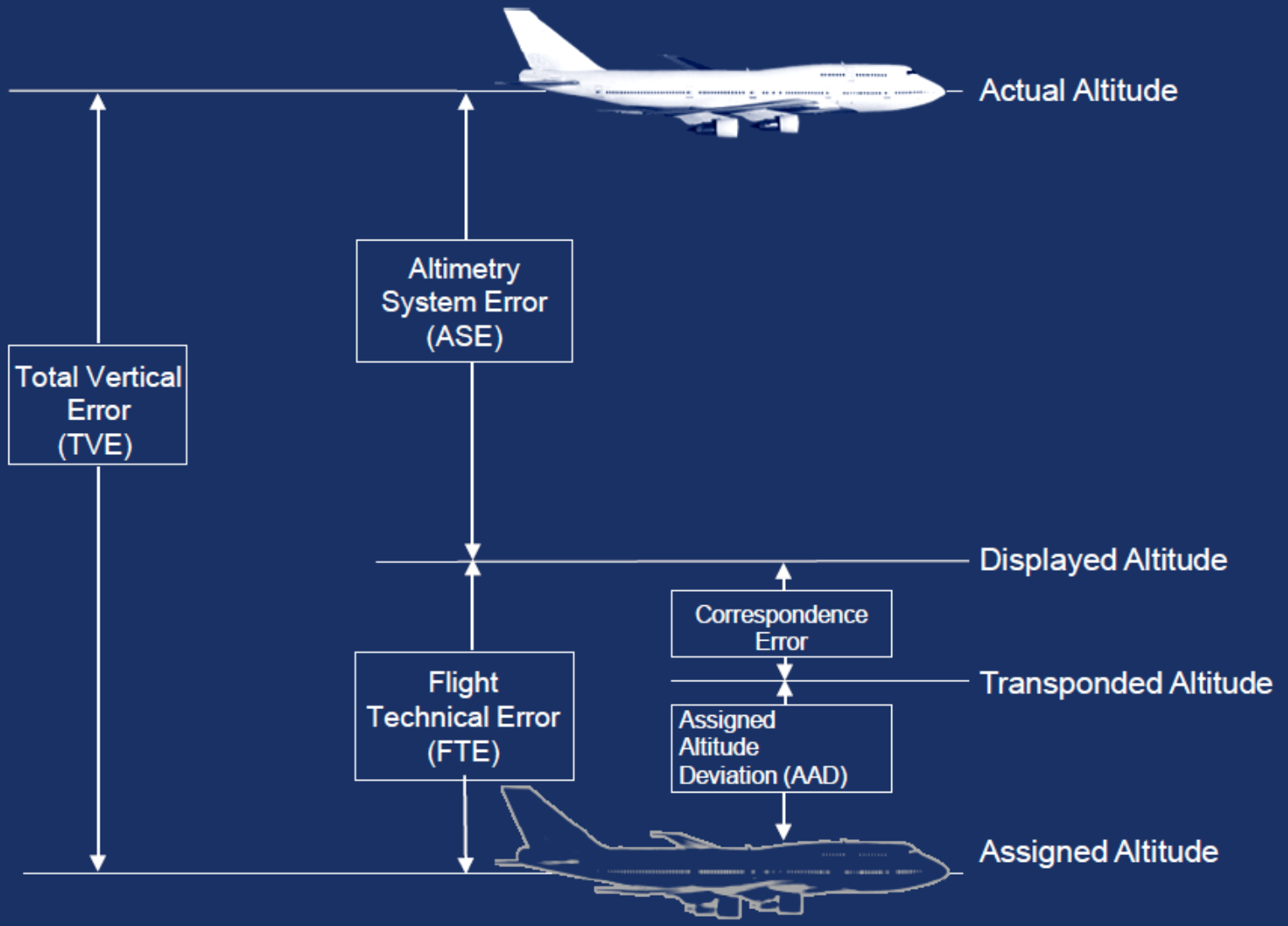
To estimate Technical Risk, risk associated with aircraft technical height-keeping performance, specifically the performance affected by the avionics of the aircraft, not the flight crew.

Pz(1000), is the probability that two aircraft nominally separated by 1 000 ft are in vertical overlap.

To estimate Operational Risk, risk due to all other causes, including the risk due to operational errors

Pz(0), is the probability that two aircraft flying at the same flight level are in vertical overlap.

Aircraft Total Vertical Error (TVE)



SMR Risk Categories

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Vertical Overlap Probability Parameter

The process to assess aircraft total vertical error (TVE) and estimate Pz(1000) and Pz(0) is the same

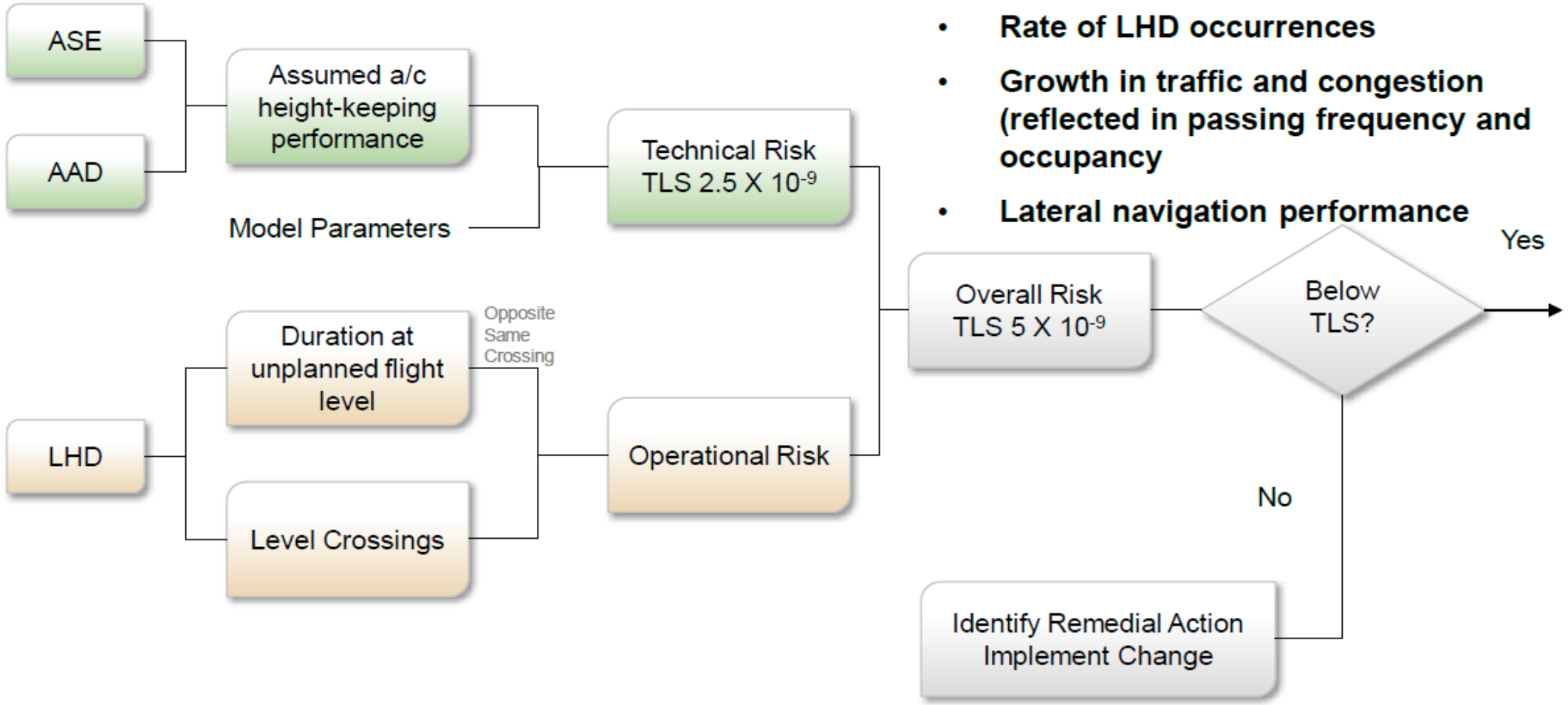
Data required:

- Assigned altitude deviation (AAD)
- Large Height Deviations (LHDs), including events due to turbulence and aircraft equipment failures.
- Aircraft type population.
- ASE performance for the aircraft observed in airspace.

Ongoing Safety Monitoring

Collision risk model (CRM) key parameters

- **Rate of LHD occurrences**
- **Growth in traffic and congestion (reflected in passing frequency and occupancy**
- **Lateral navigation performance**



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Difficulties Facing the Development of the Annual MID RVSM Safety Monitoring Report (SMR):

1. Traffic Data Sample (TDS):
   - Late
   - Wrong format
   - Corrupted
   - Wrong information

2. Large Height Deviations (LHDs):
   - No LHD reports received at all.
   - The extreme majority of the LHD reports are category E only.
   - High Volume traffic FIRs are not filling LHDs of their operational errors (other than category E).

3. MID FIRs waypoints and the routing options are not updated on time by the MIDRMA focal point

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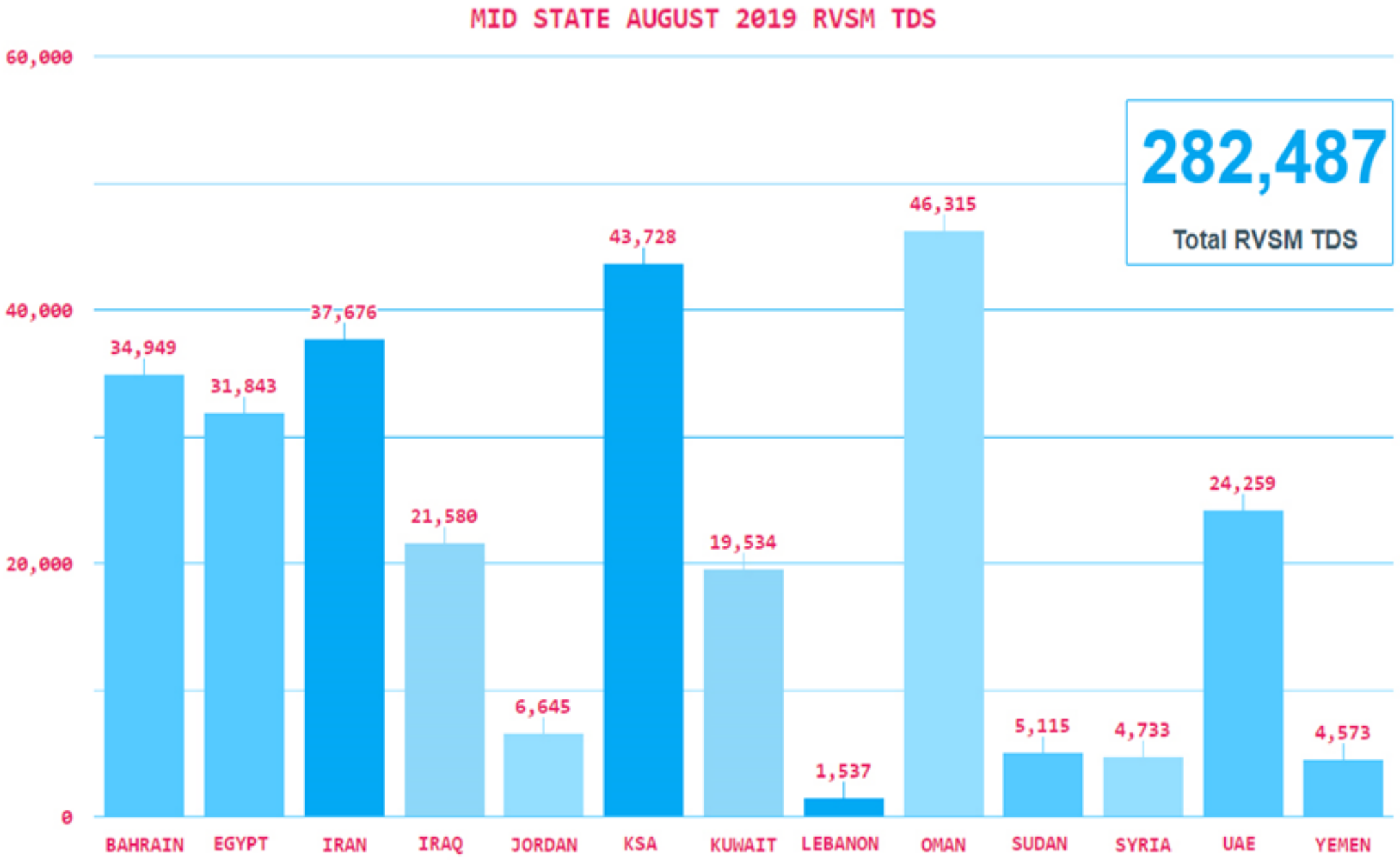
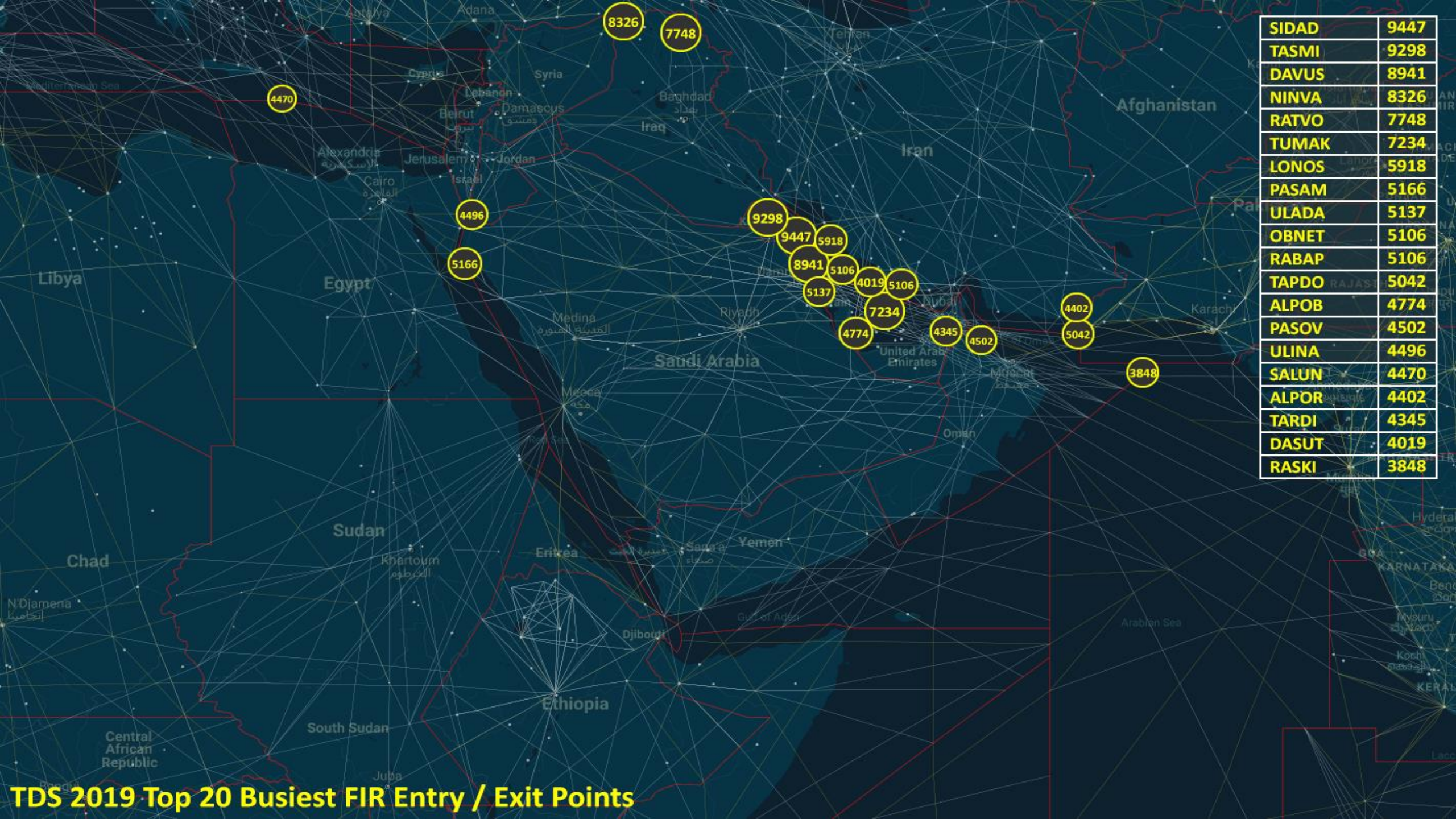
Middle East RVSM Airspace
Estimated Annual Flying Hours = (2,389,128)
Average Aircraft Speed = 450.07 kts

Risk Type	Risk Estimation	ICAO TLS	Remarks
Technical Risk	**2.012×10^{-13}**	2.5×10^{-9}	Below Technical Risk
Overall Risk	**8.345×10^{-10}**	5×10^{-9}	Below Overall Risk


MID STATE AUGUST 2019 RVSM TDS
60,000
40,000
20,000
0
282,487
Total RVSM TDS
34,949
31,843
37,676
21,580
6,645
43,728
19,534
1,537
46,315
5,115
4,733
24,259
4,573
BAHRAIN
EGYPT
IRAN
IRAQ
JORDAN
KSA
KUWAIT
LEBANON
OMAN
SUDAN
SYRIA
UAE
YEMEN



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

TDS 2019 Top 20 Busiest FIR Entry / Exit Points

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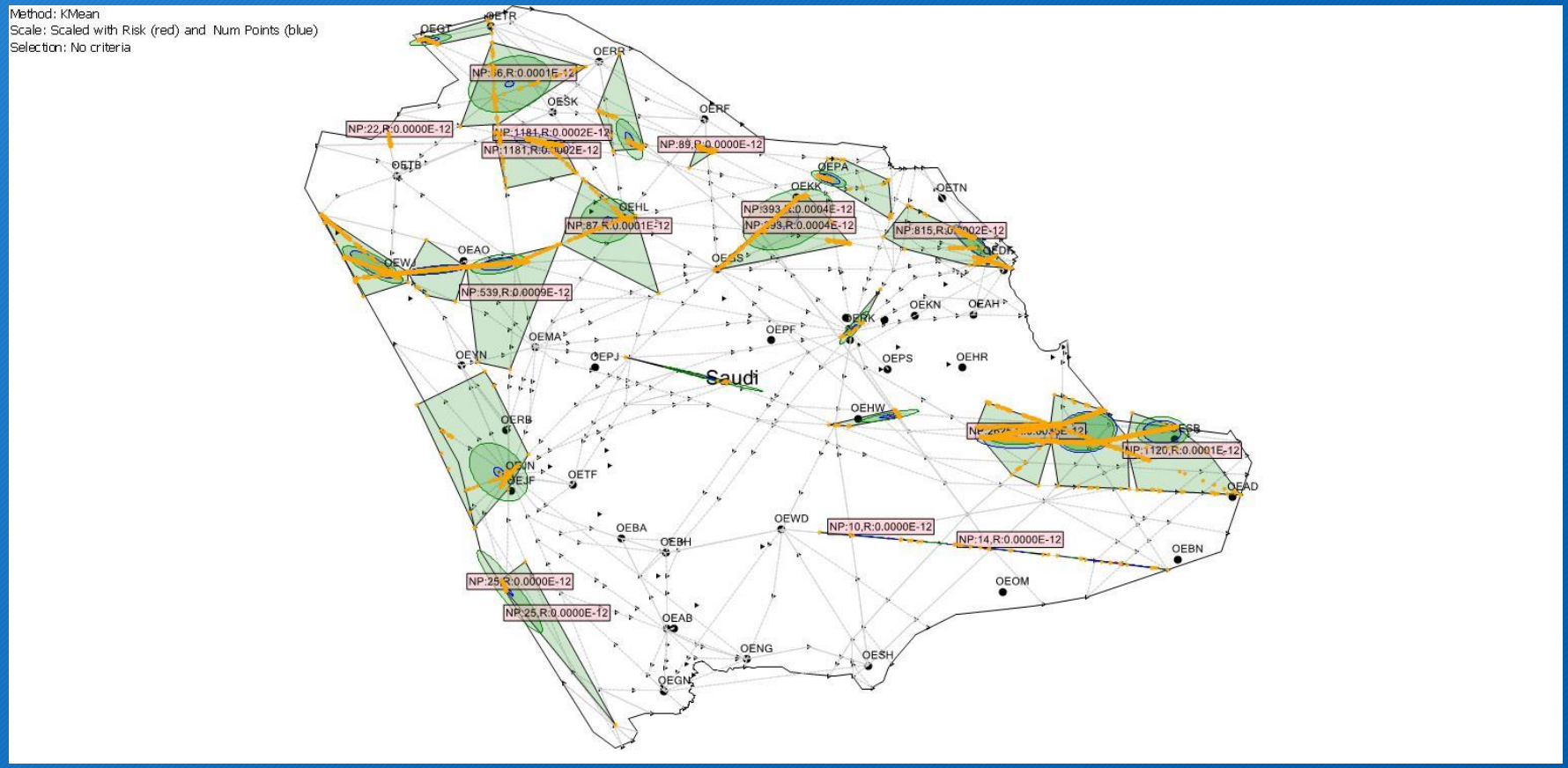
Sample of Hotspots



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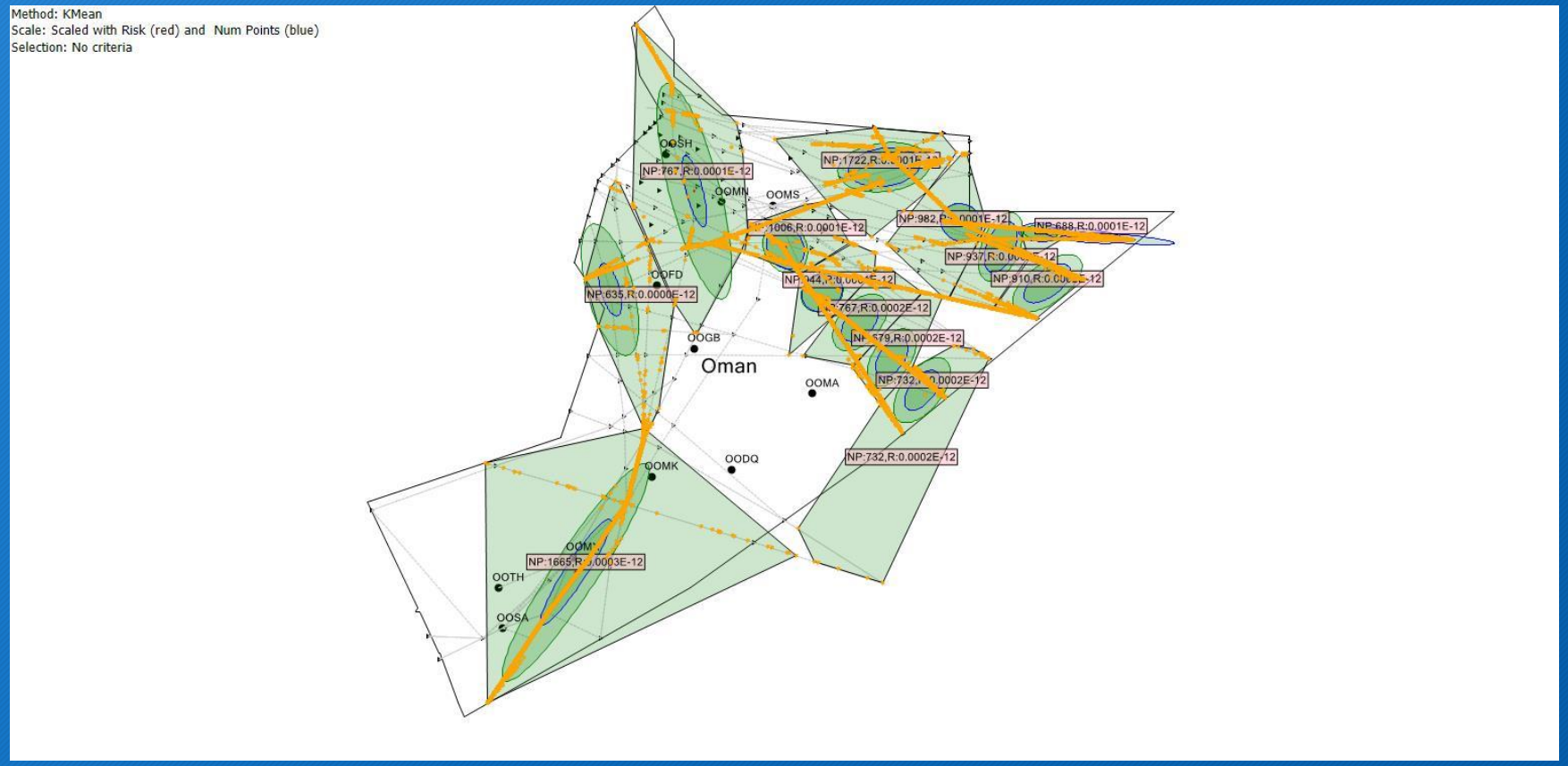

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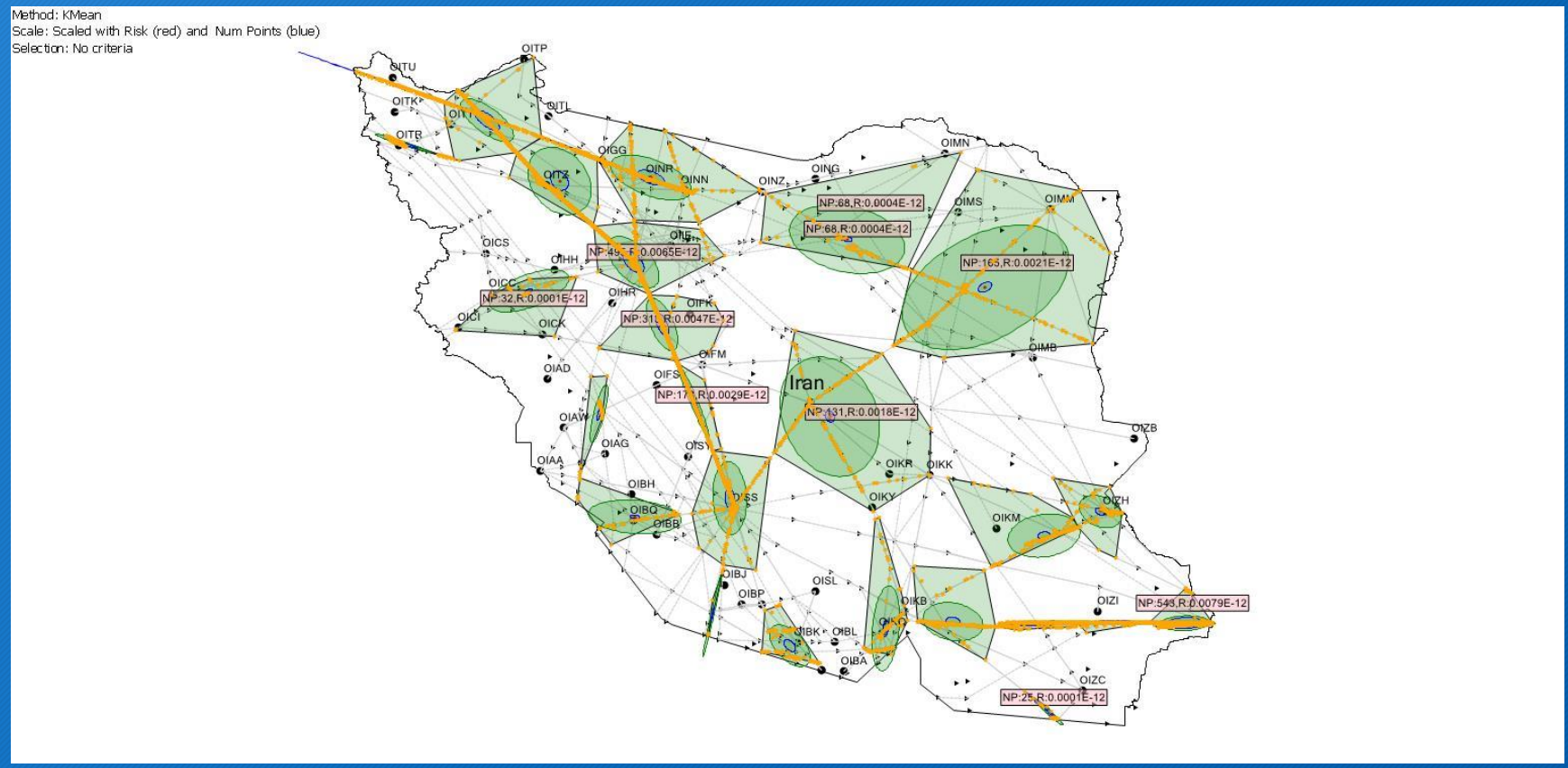
Sample of Hotspots



Any Questions

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