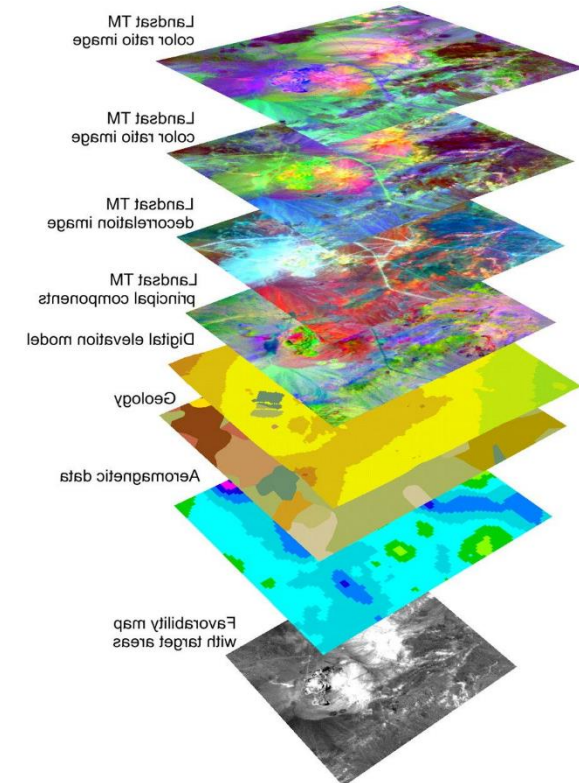
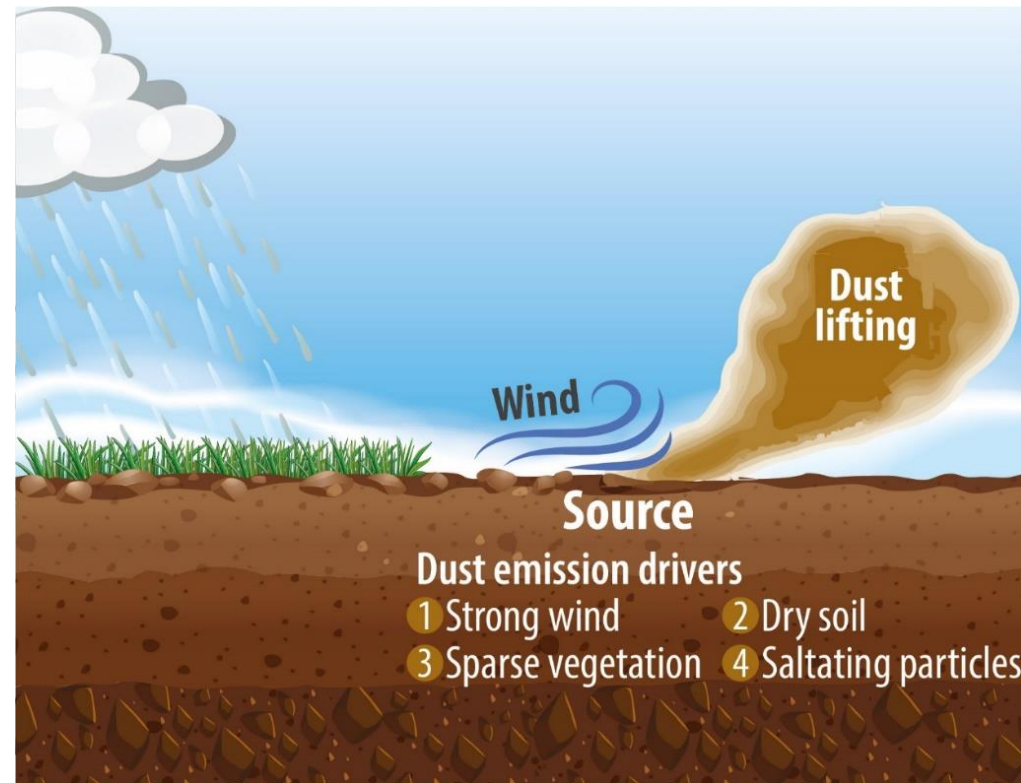
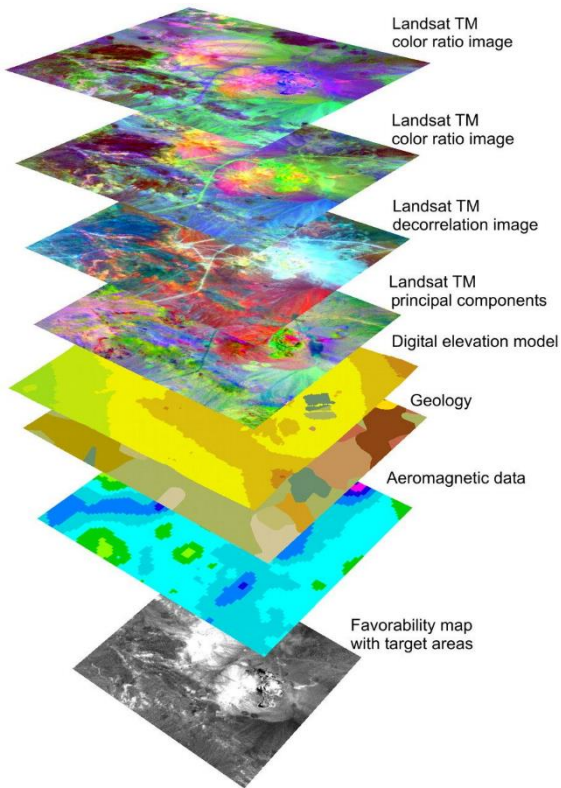


کاربرد GIS و داده کاوی در مدلسازی شناسایی و پایش گردوغبار



ارائه دهنده: رامین پاپی

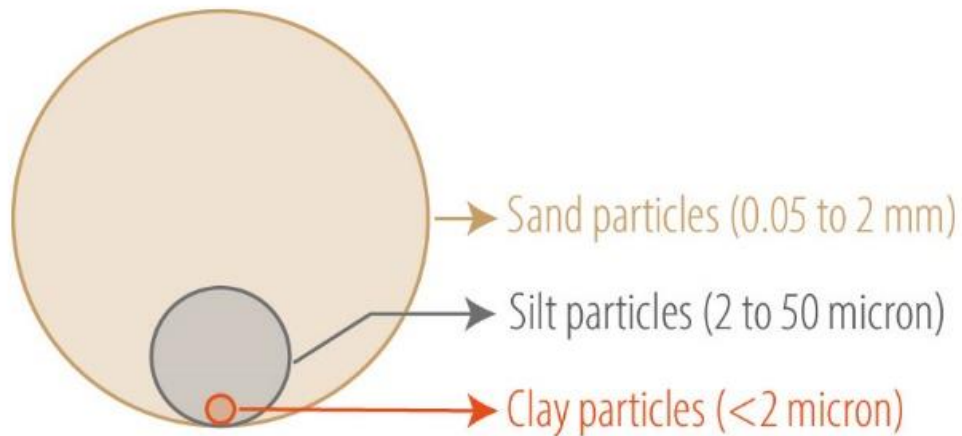
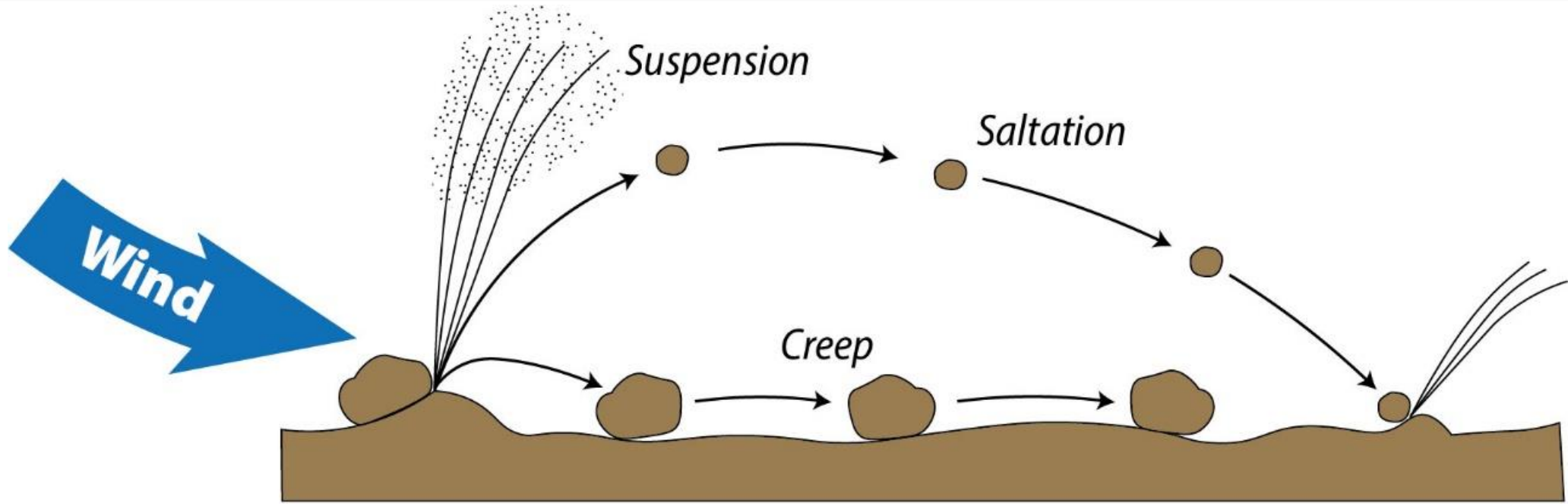
برگزار کننده: سازمان نقشه برداری کشور

اداره کل سامانه های ملی و زیرساخت های اطلاعات مکانی

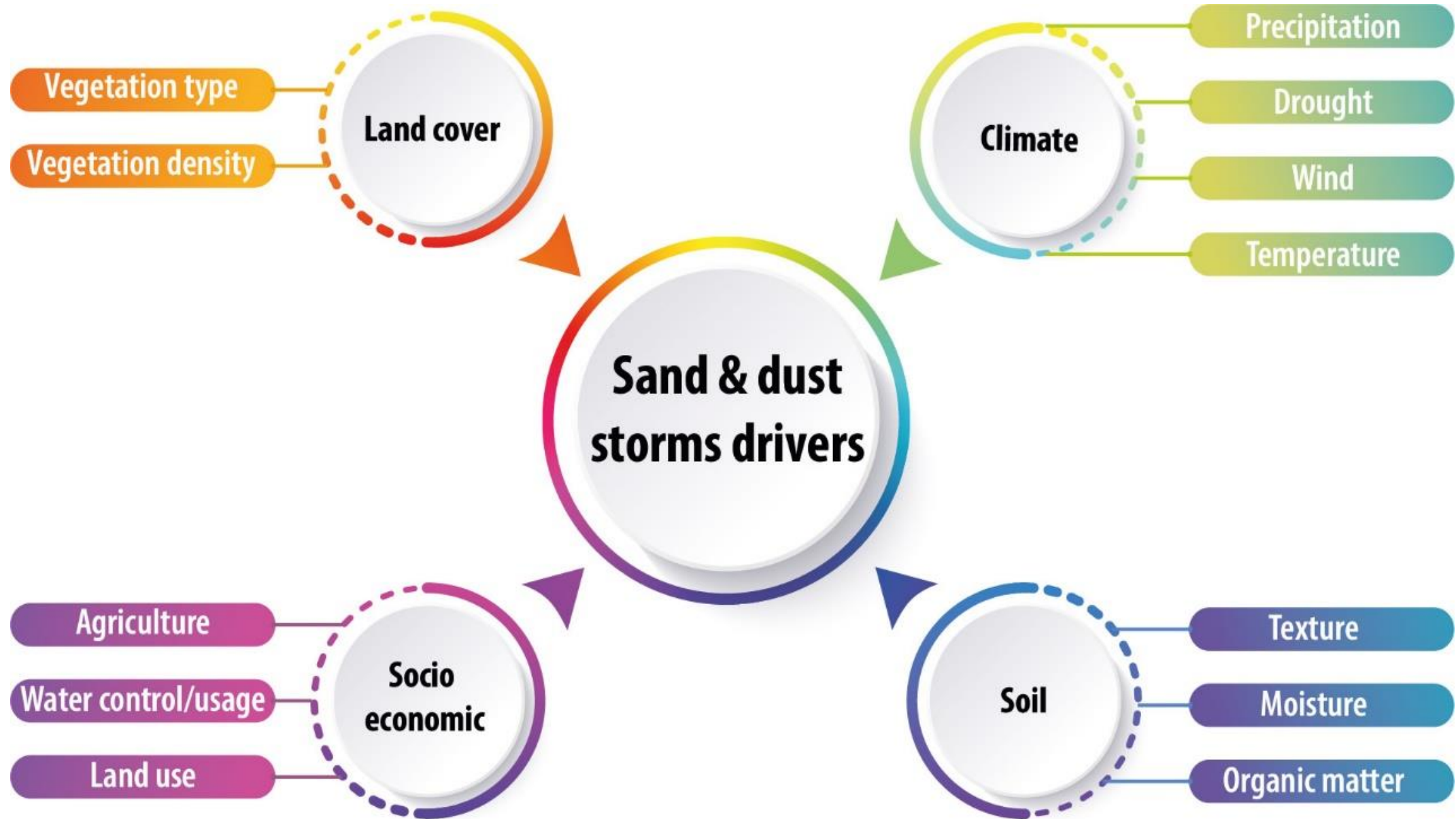
1	Visual interpretation of satellite imagery for hotspot dust sources identification	Remote Sensing Applications Society and Environment
2	Identifying sand and dust storm sources using spatial-temporal analysis of remote sensing data in Central Iran	Ecological Informatics
3	Characterization of Hydrologic Sand and Dust Storm Sources in the Middle East	Sustainability
4	Development of a scenario-based approach using game theory for the restoration of Hawizeh Marsh and dust mitigation	Hydrological Sciences Journal
5	Knowledge discovery of Middle East dust sources using Apriori spatial data mining algorithm	Ecological Informatics
6	Influence of Hamoun Lakes' dry conditions on dust emission and radiative forcing over Sistan plain, Iran	Atmospheric Research

The articles are Q1 and published in 2022 and are affiliated with the NCC

شکل گیری طوفان گردوغبار



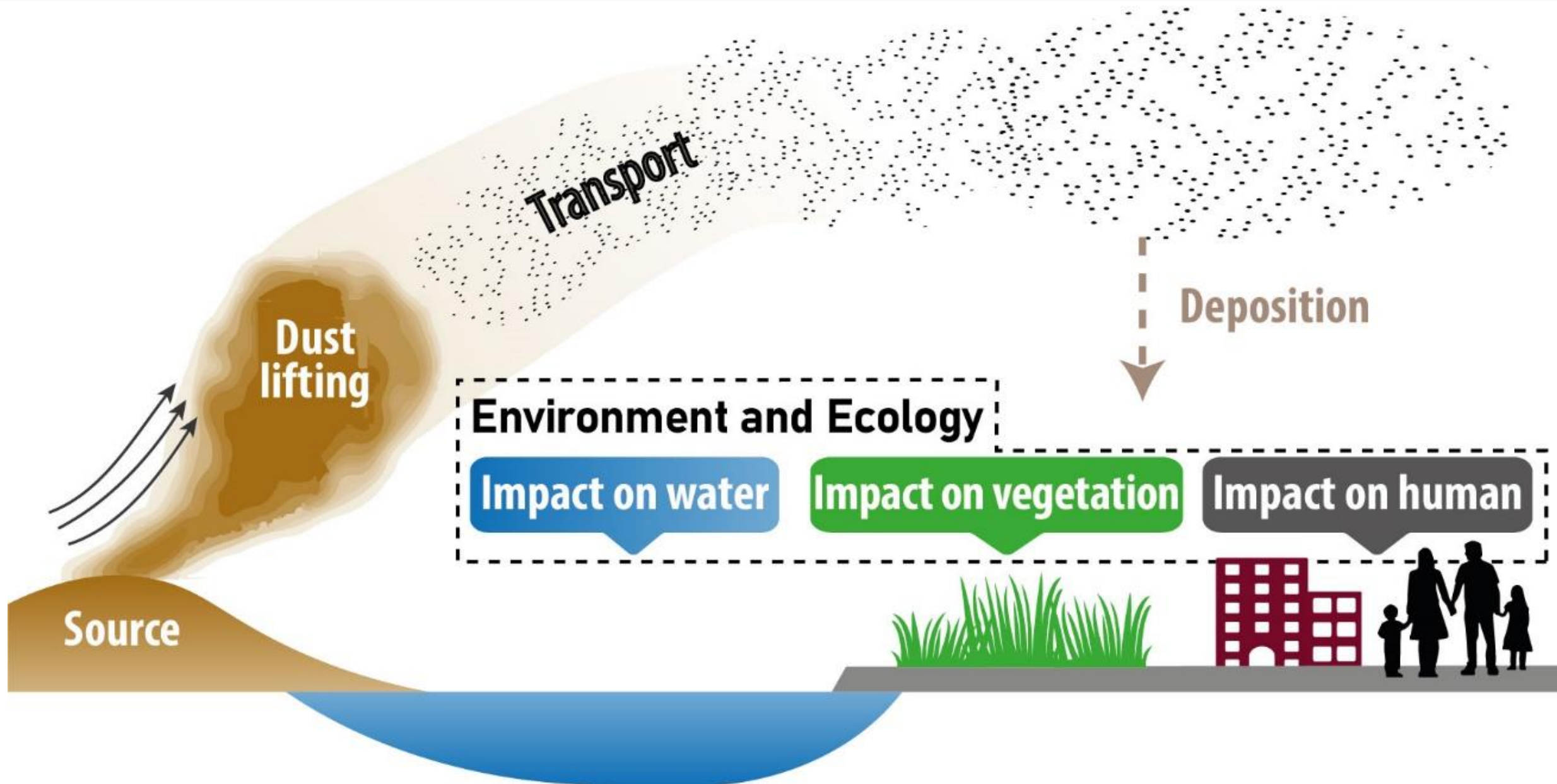
عوامل ایجاد طوفان گردوغبار



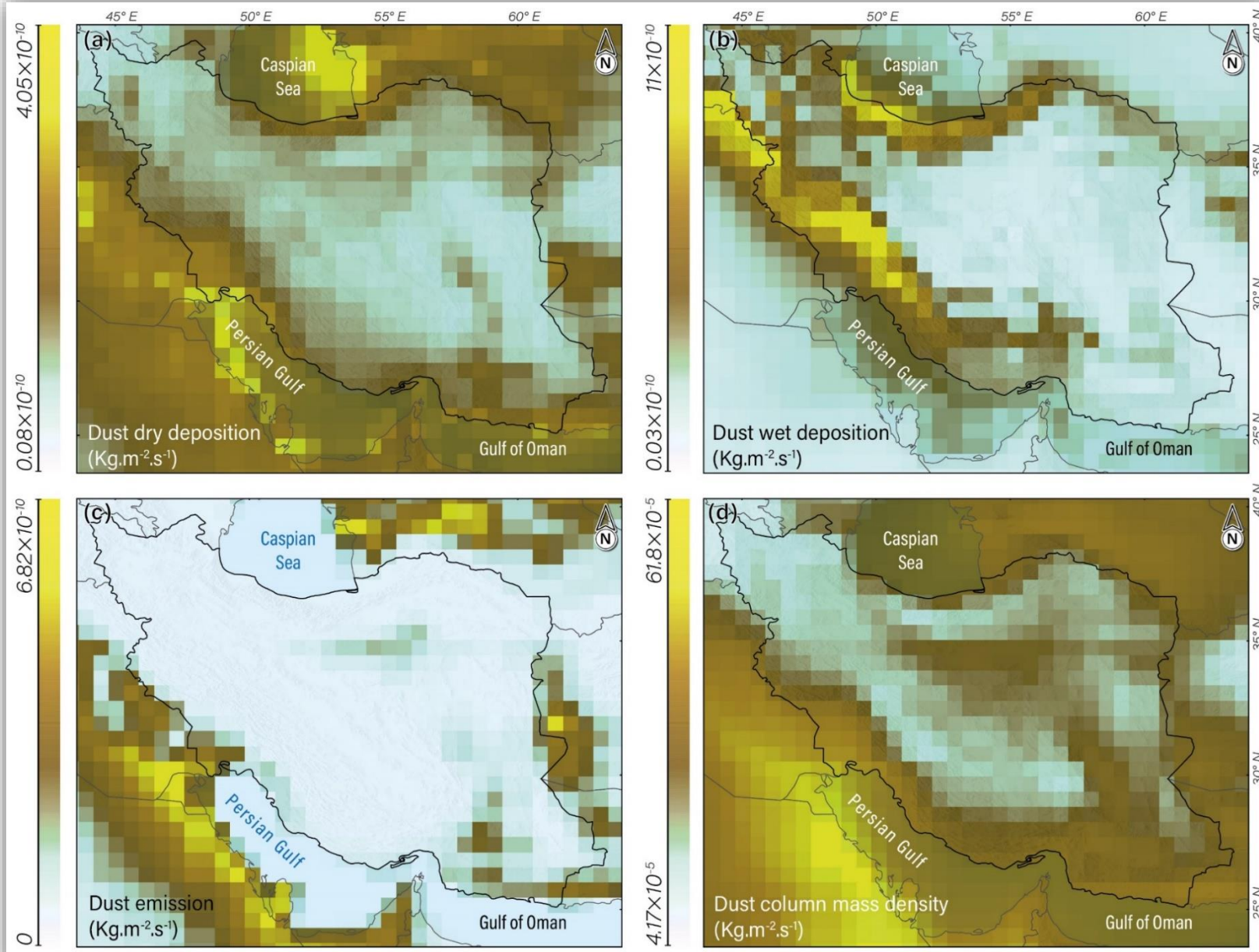
تأثيرات طوفان گردوغبار



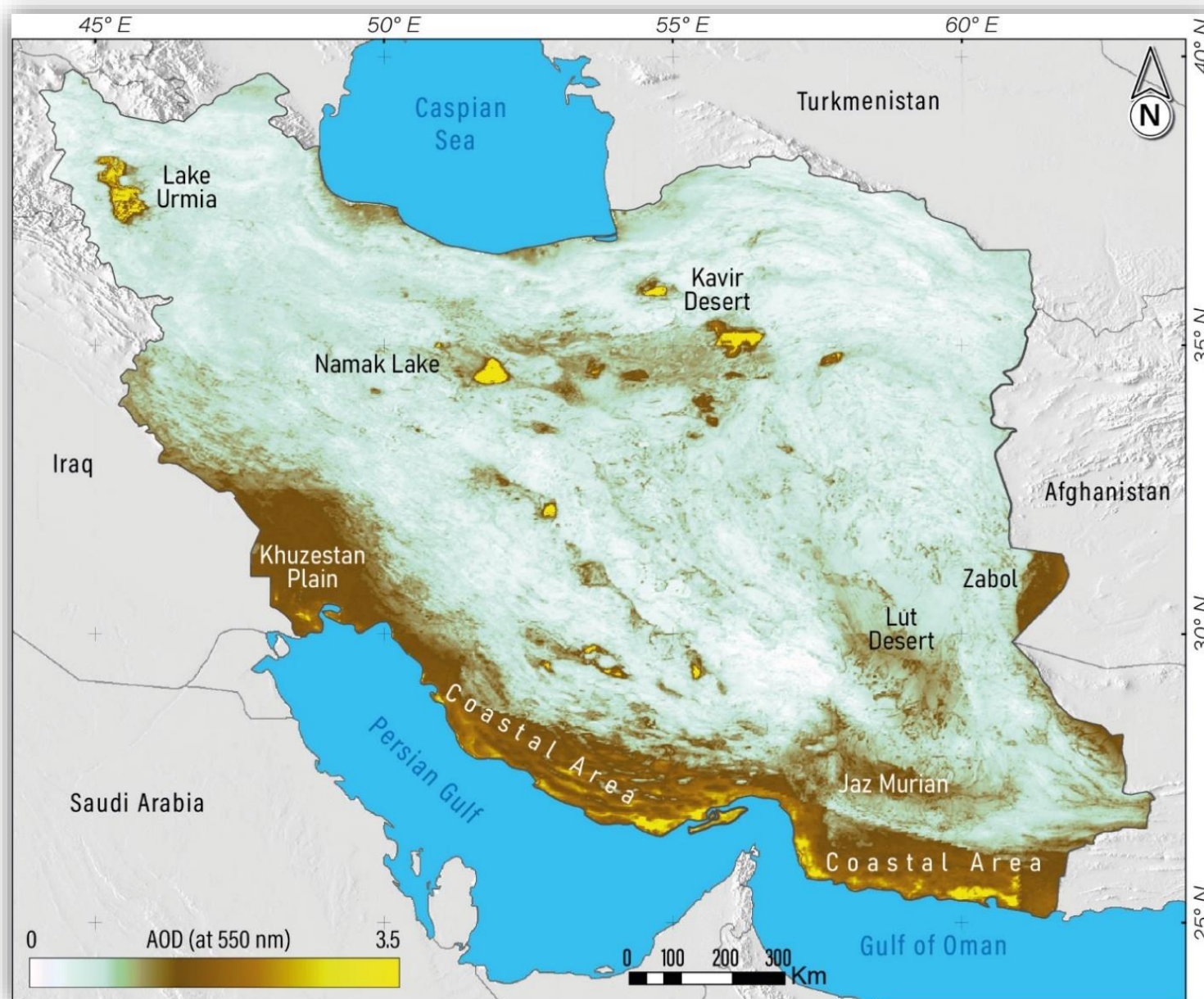
تأثيرات طوفان گردوغبار



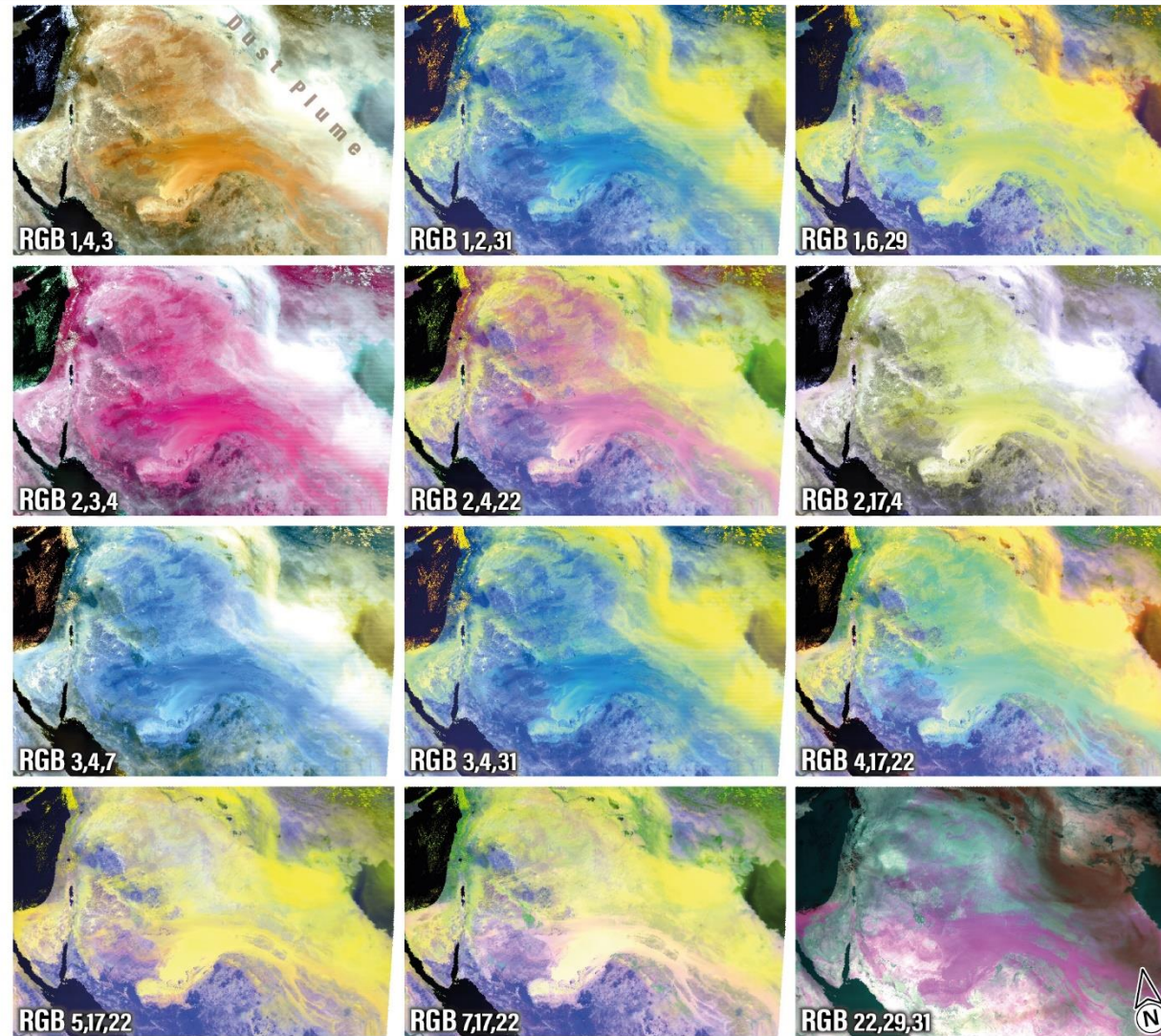
گردوغبار در ایران



گردوغبار در ایران



ترکیبات مختلف تصاویر رنگی کاذب



Visible

Band 1 (0.66 μm)
Band 3 (0.47 μm)
Band 4 (0.55 μm)

Near infrared

Band 2 (0.86 μm)
Band 5 (1.24 μm)

Shortwave infrared

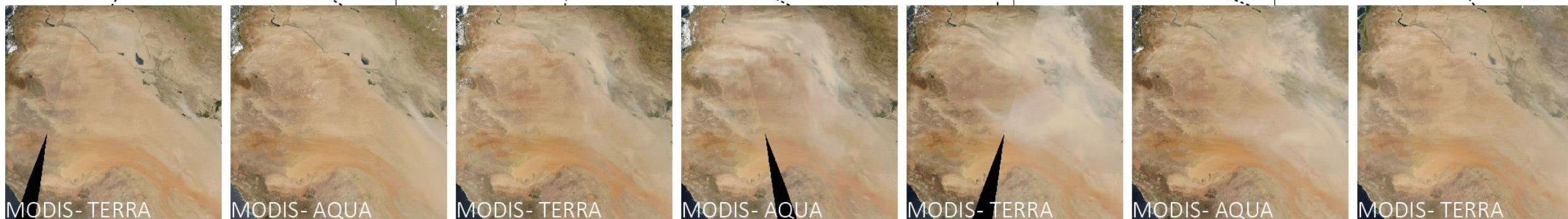
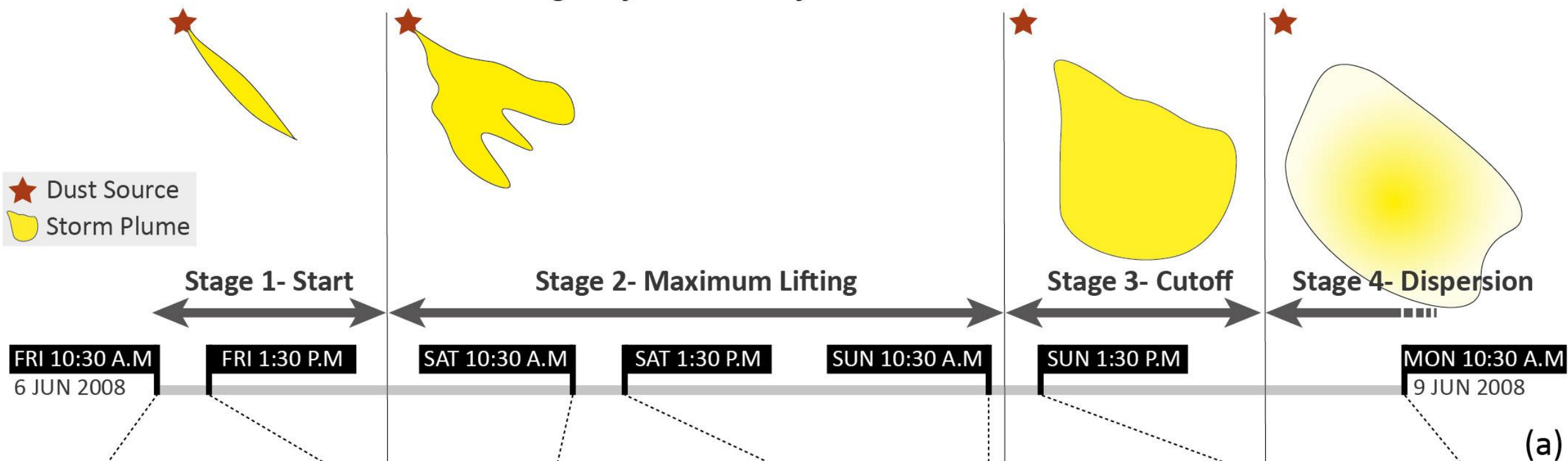
Band 6 (1.64 μm)
Band 7 (2.13 μm)

Thermal infrared

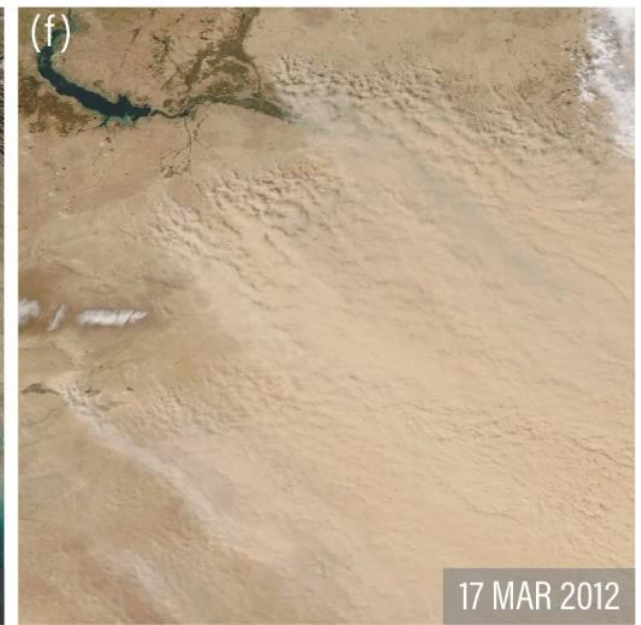
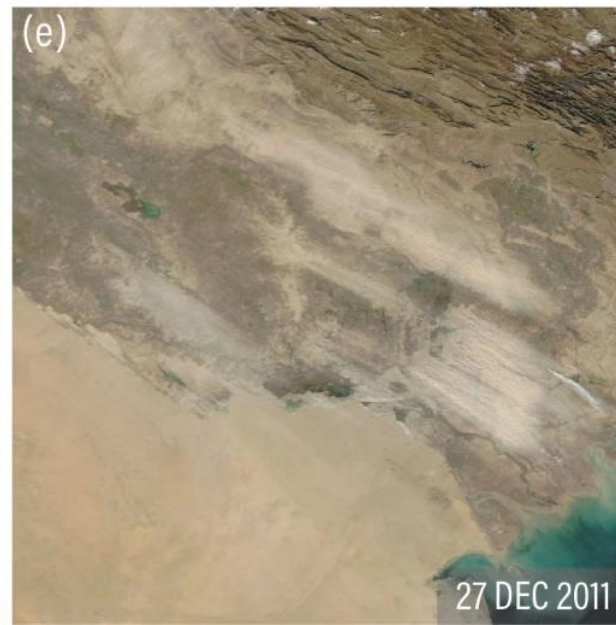
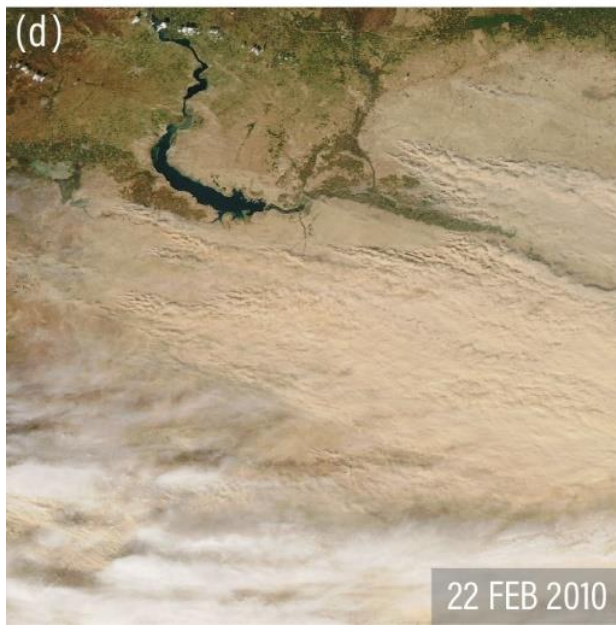
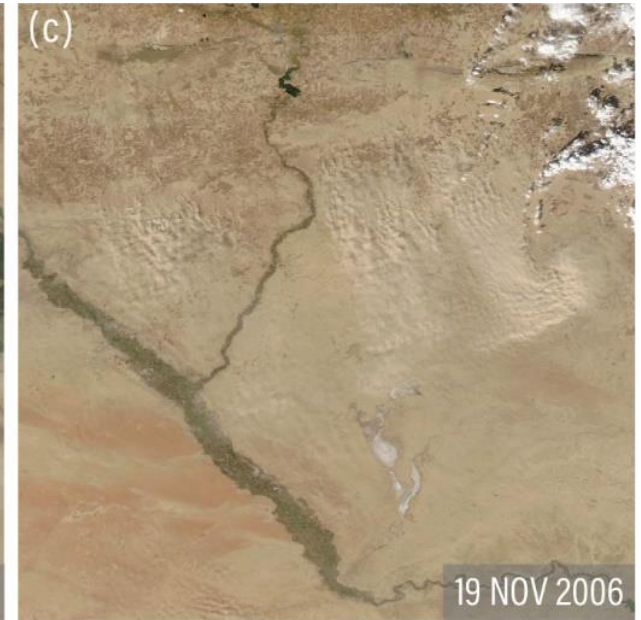
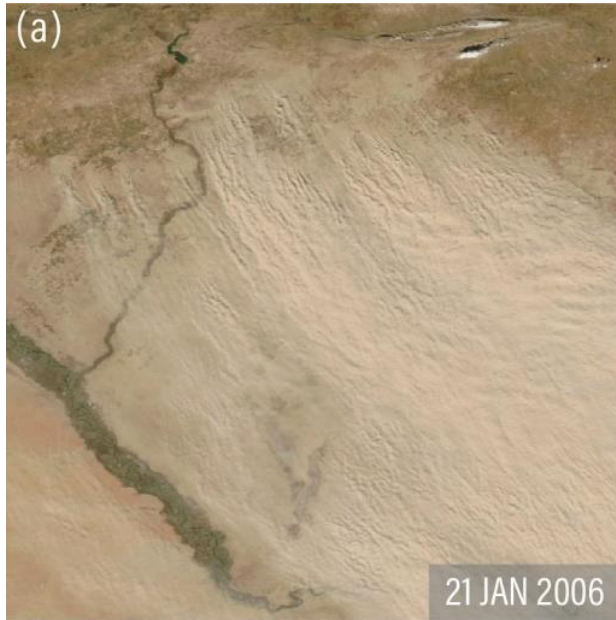
Band 22 (3.96 μm)
Band 29 (8.55 μm)
Band 31 (11.03 μm)

مراحل ۴ گانه شکل گیری گردوغبار

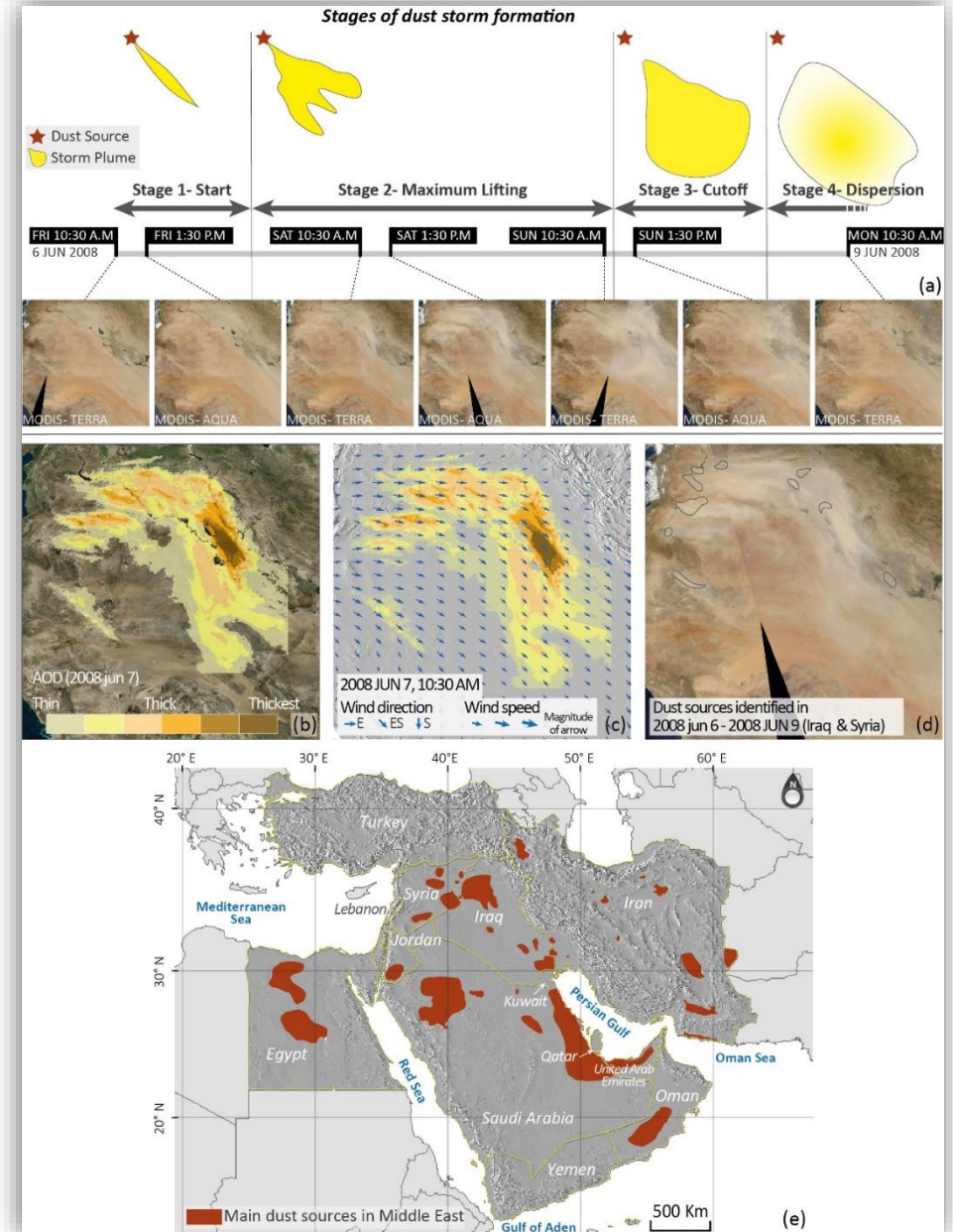
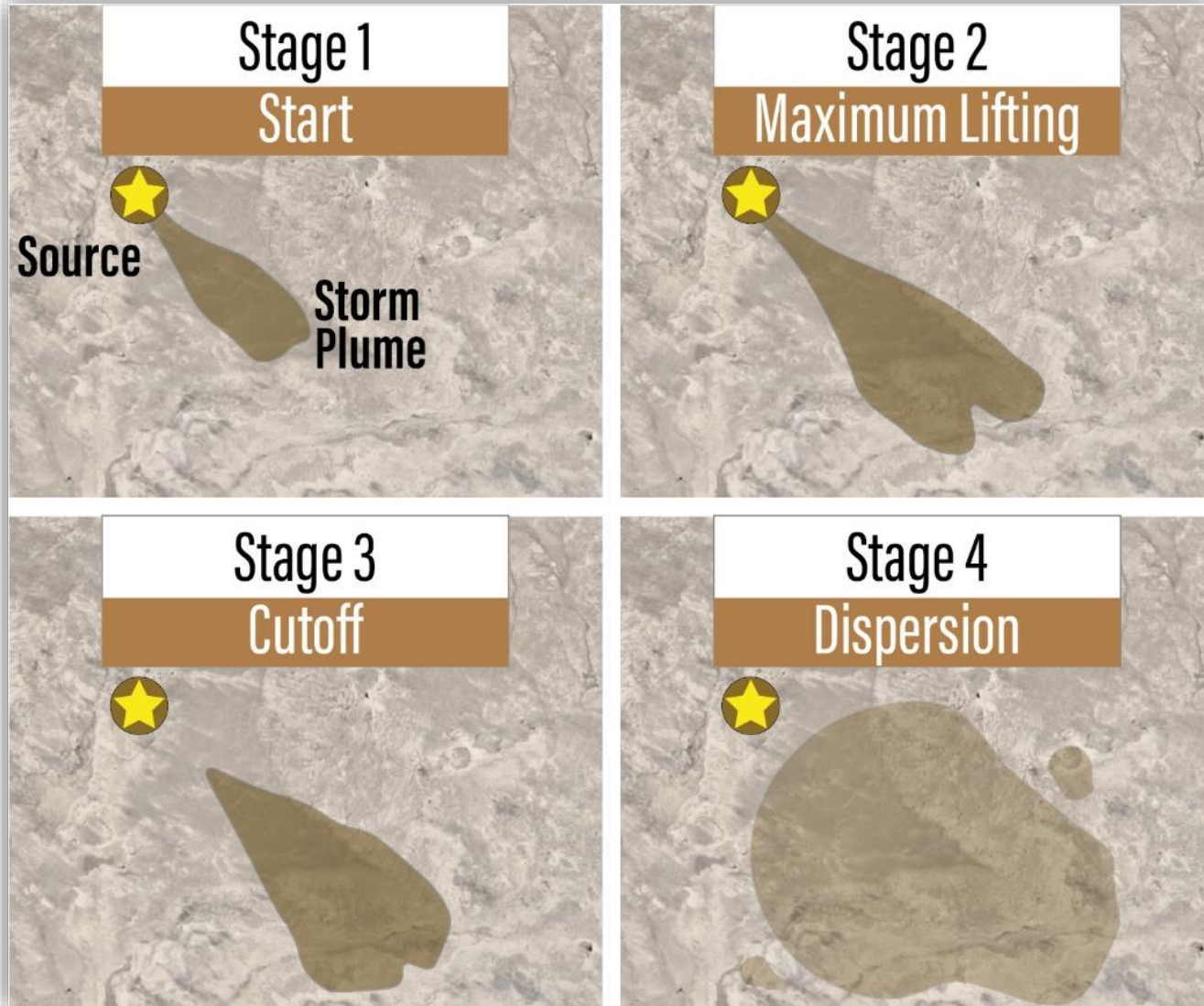
Stages of dust storm formation

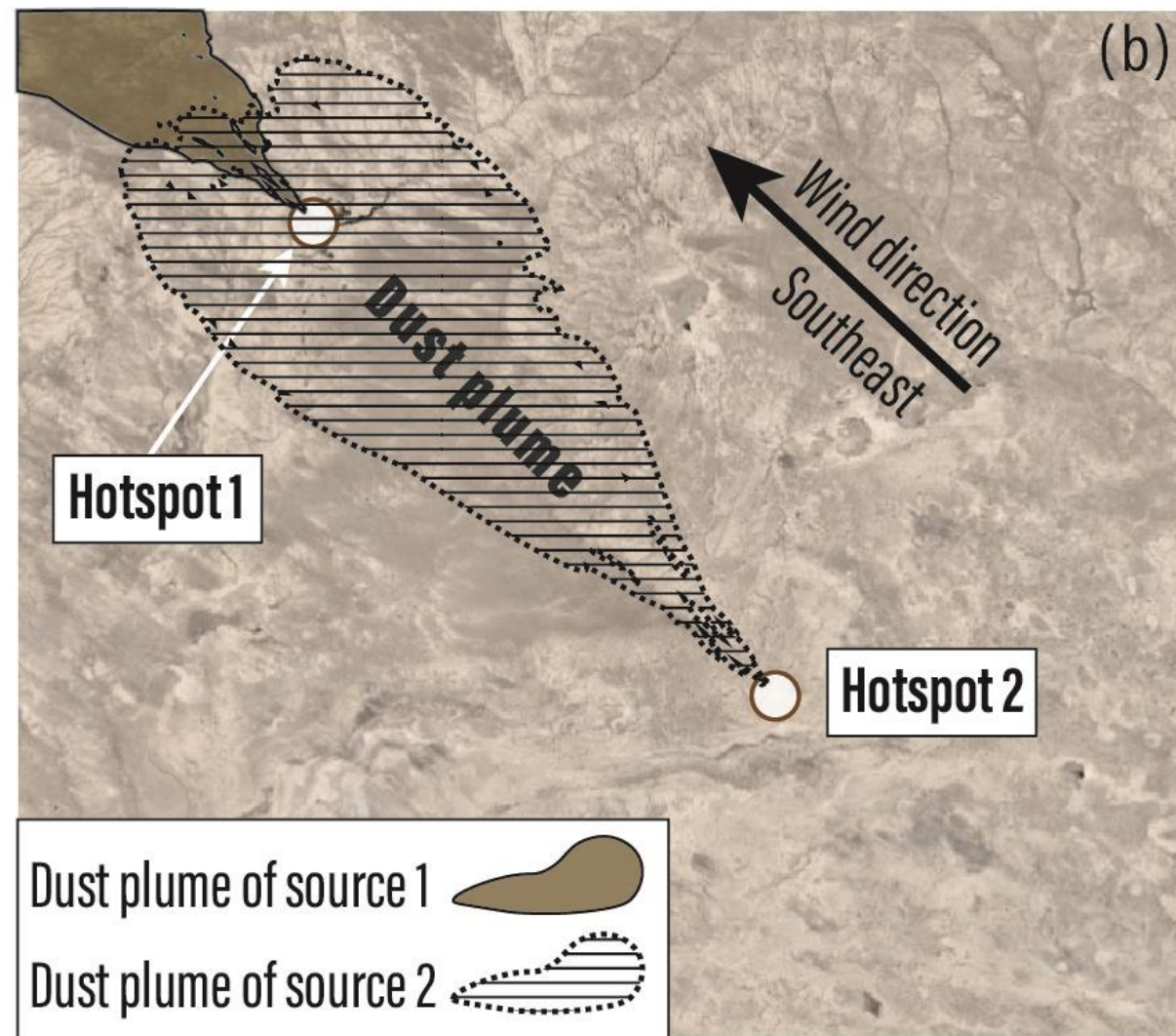
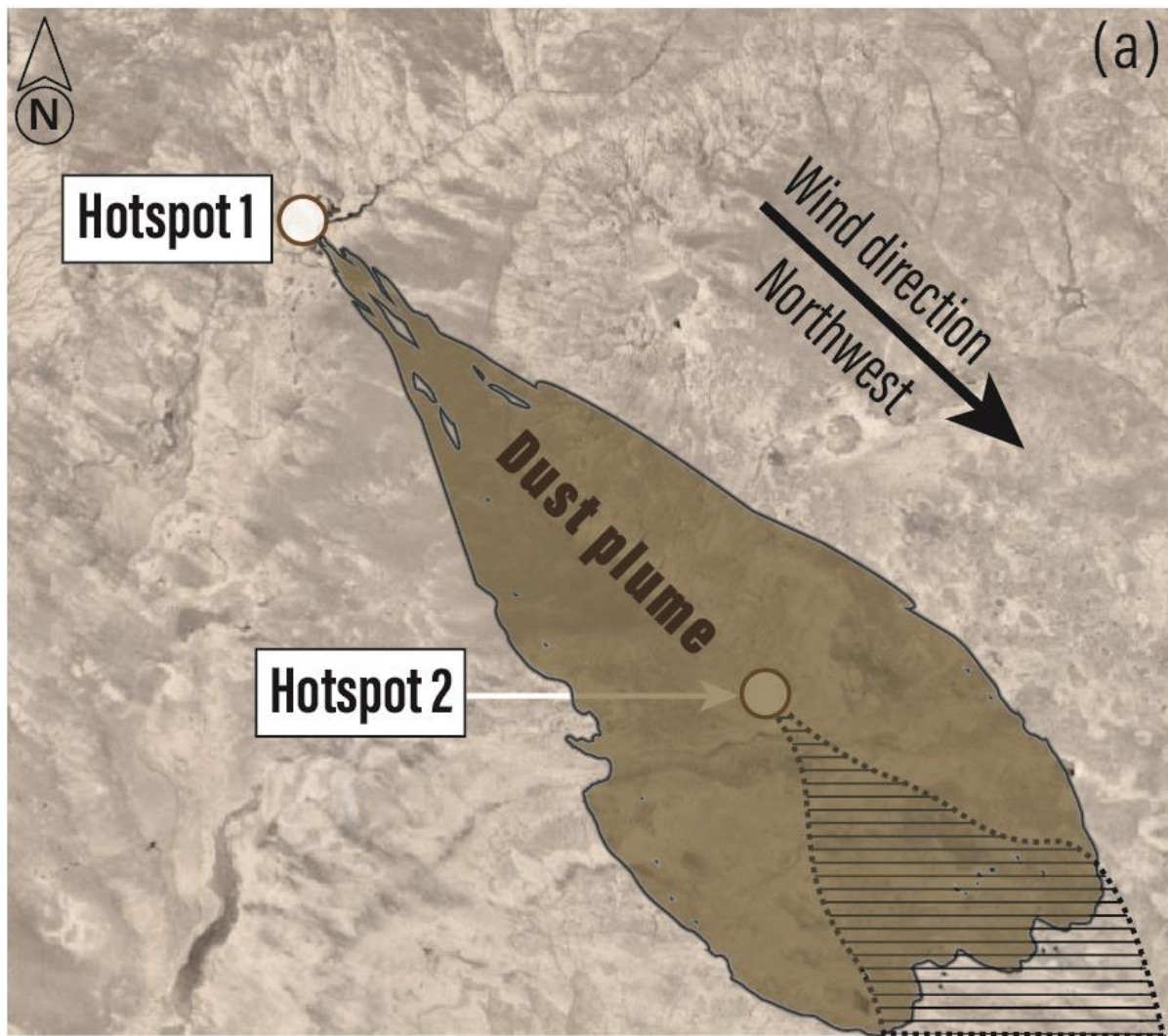


هات اسپات گردوغبار

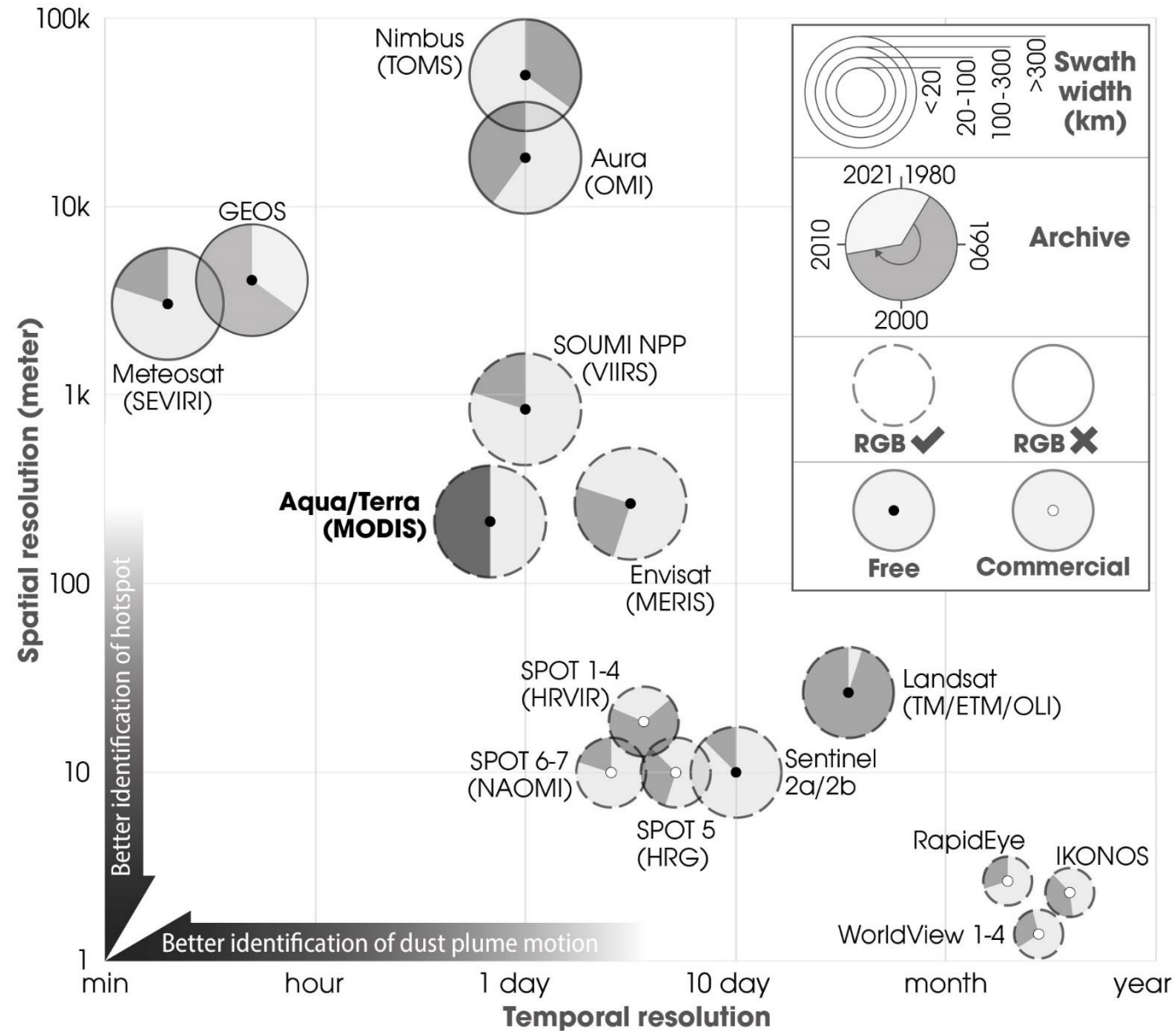


تفسیر چشمی تصاویر سنجش از دور جهت شناسایی منابع شکل گیری گردوغبار

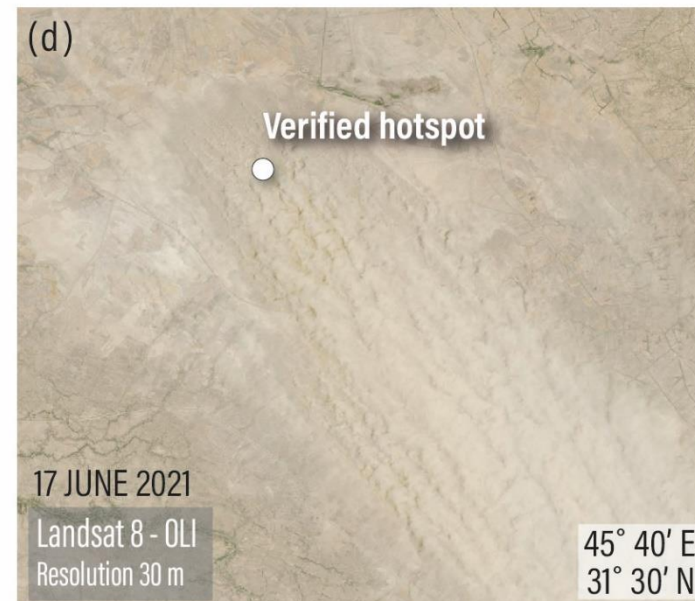
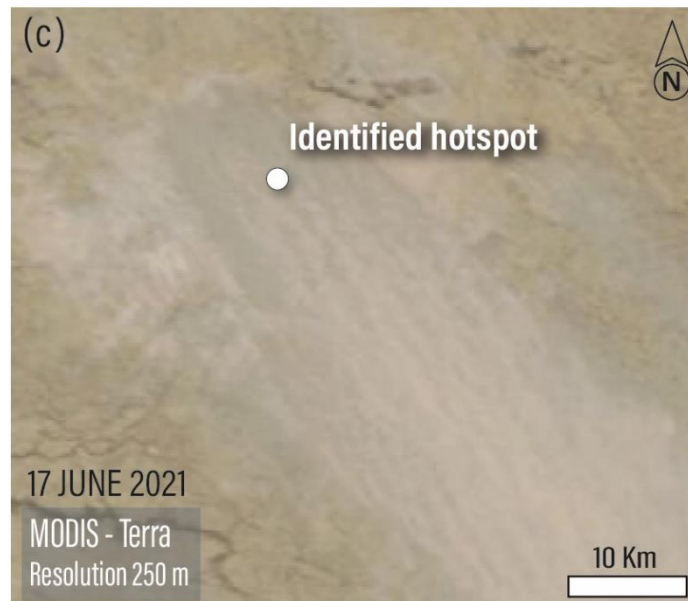
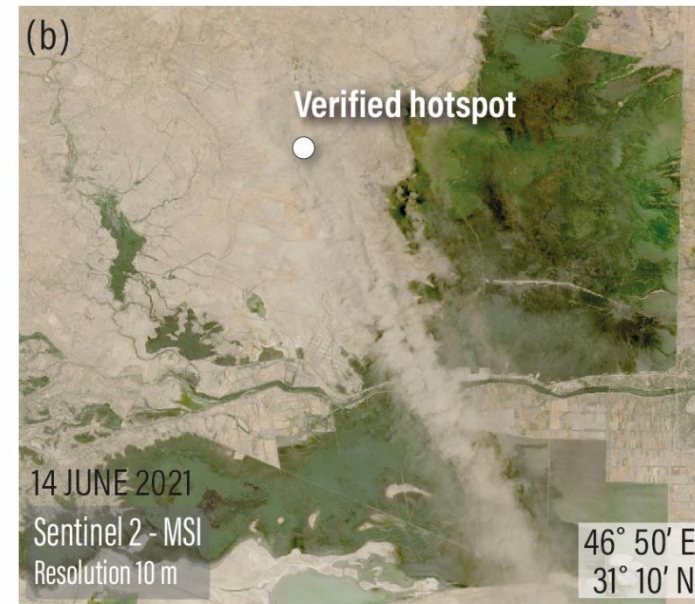
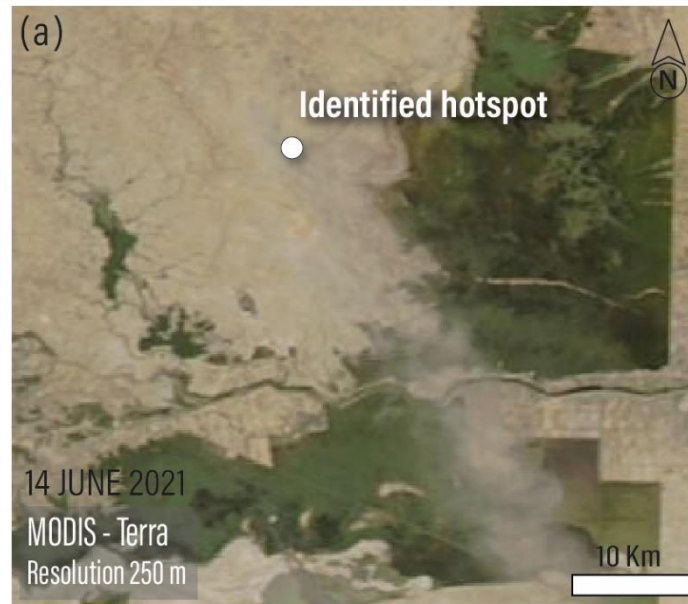




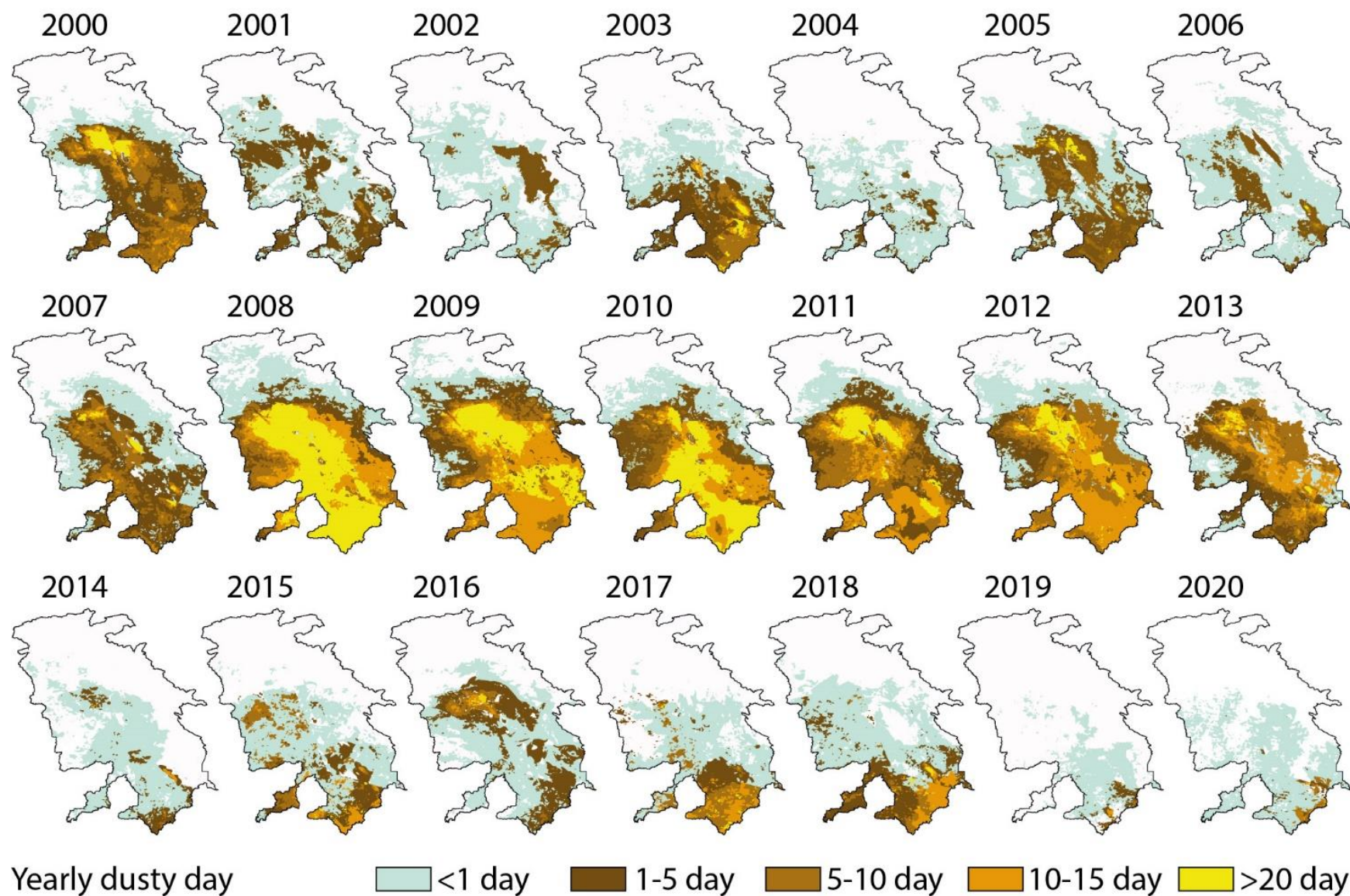
ویژگی سنجنده ها در شناسایی گردوغبار



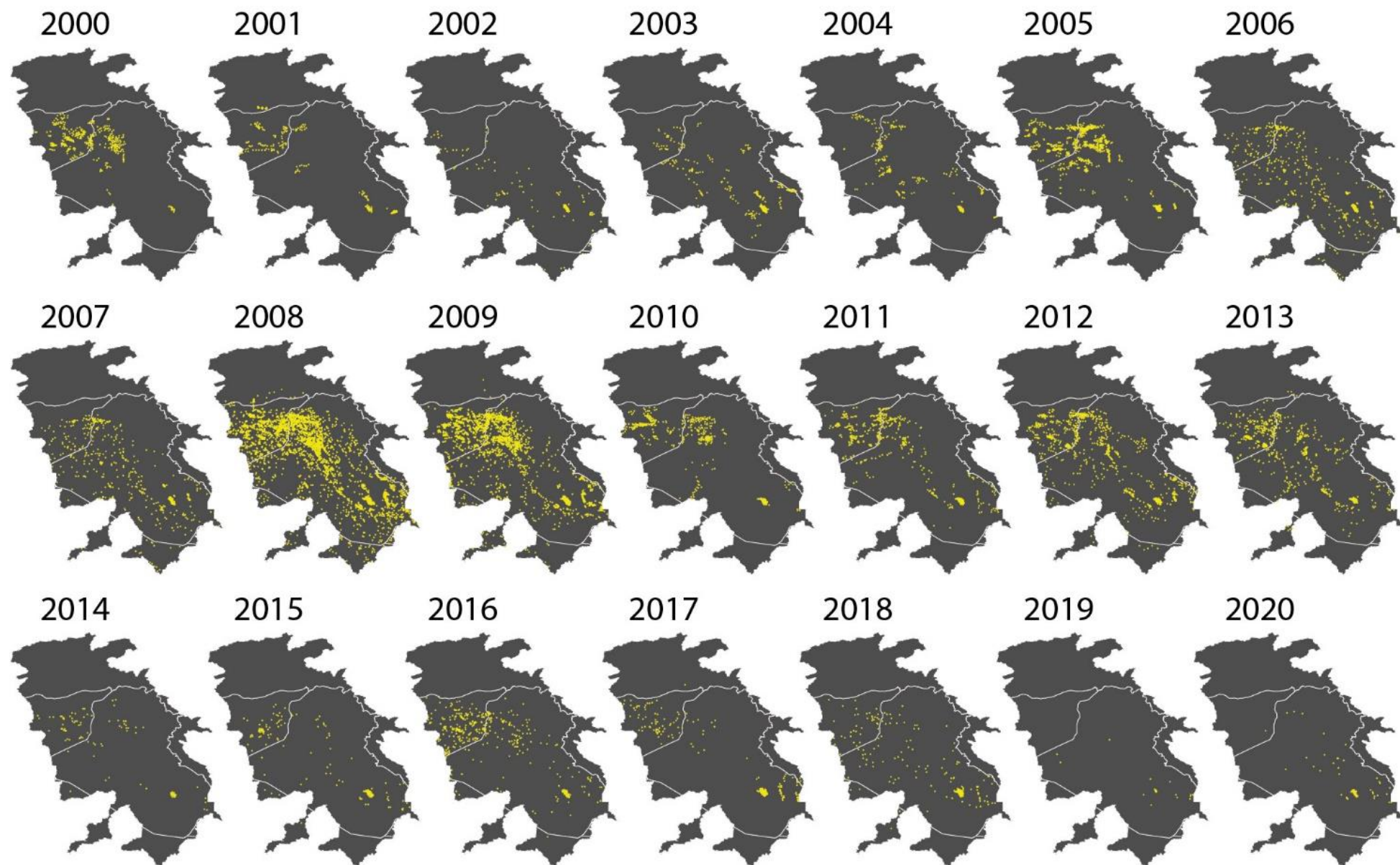
تأثير رزولوشن مكاني بر شناسایی هات اسپات های گردوغبار



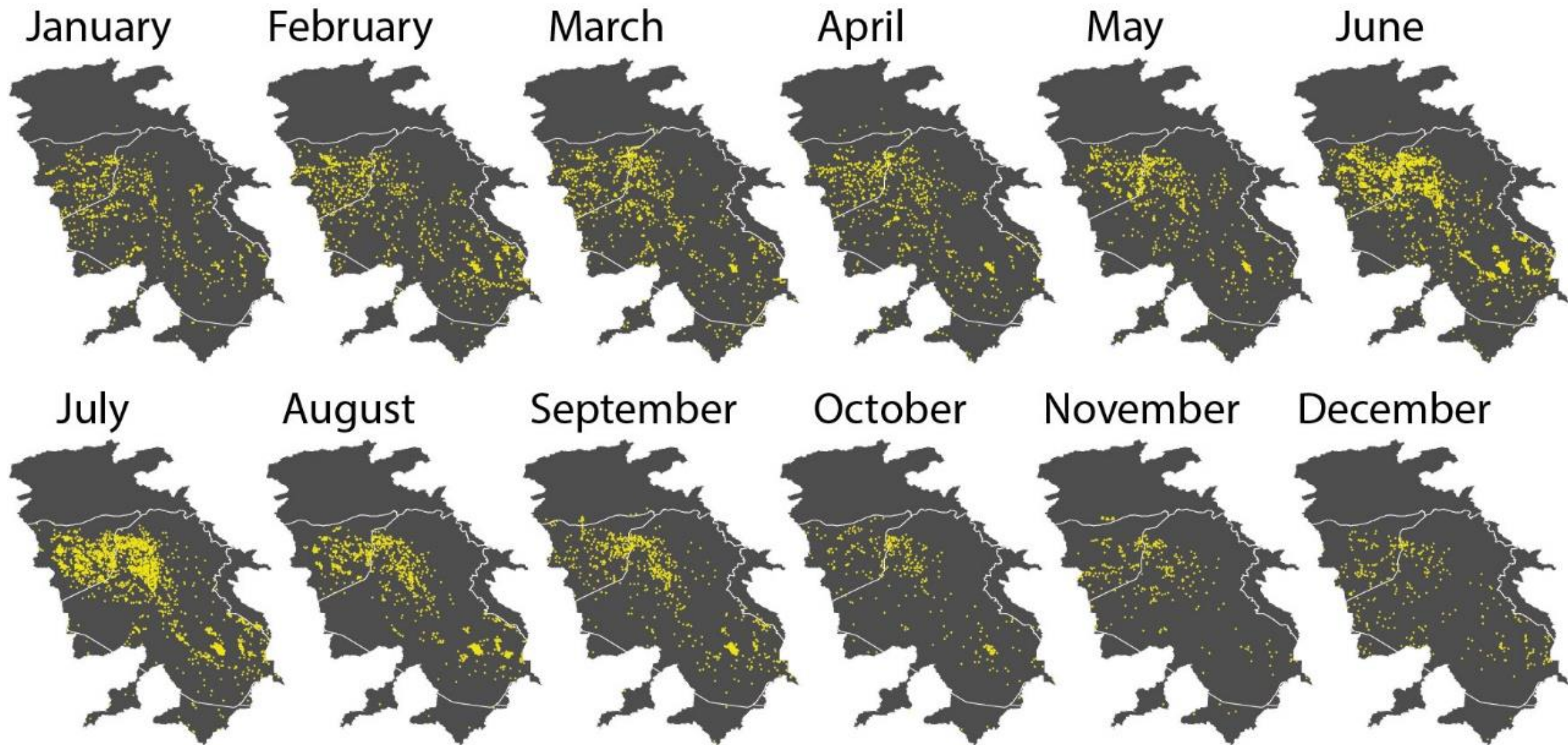
توزیع سالانه روزهای گردوغباری حوضه دجله و فرات



توزیع سالانه هات اسپات های حوضه دجله و فرات

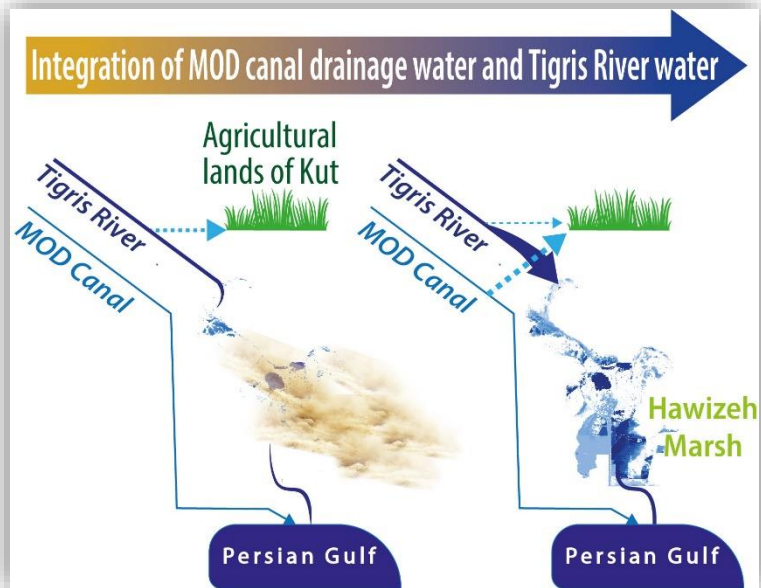


توزیع ماهانه هات اسپات های حوضه دجله و فرات

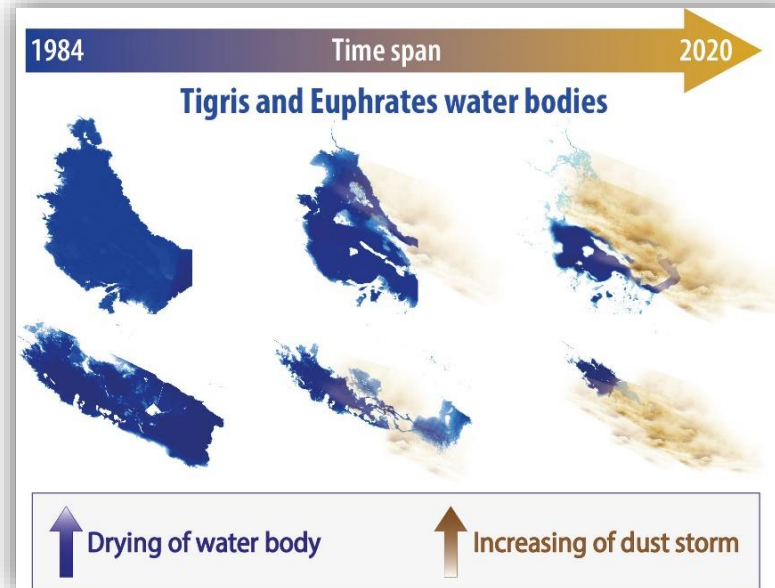


مدیریت منابع آب و گردوغبار

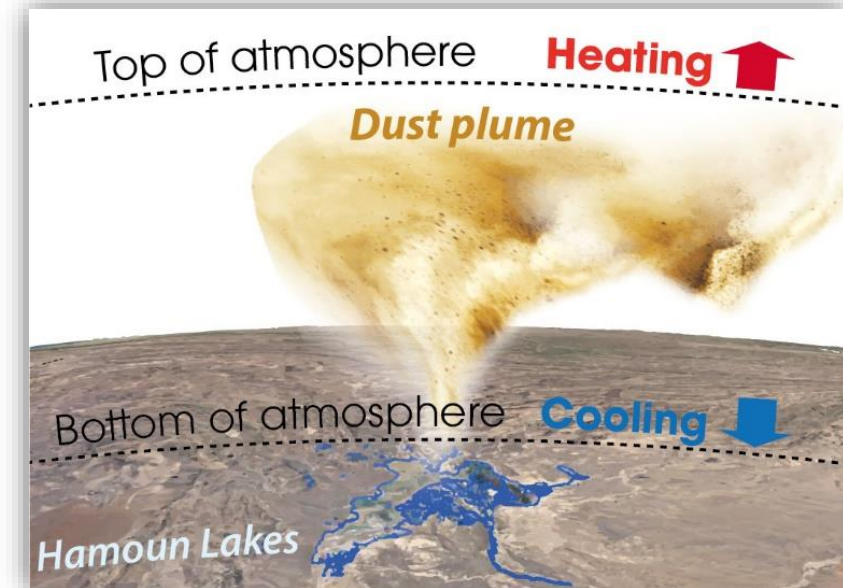
مدیریت منابع آب و گردوغبار در هورالعظیم



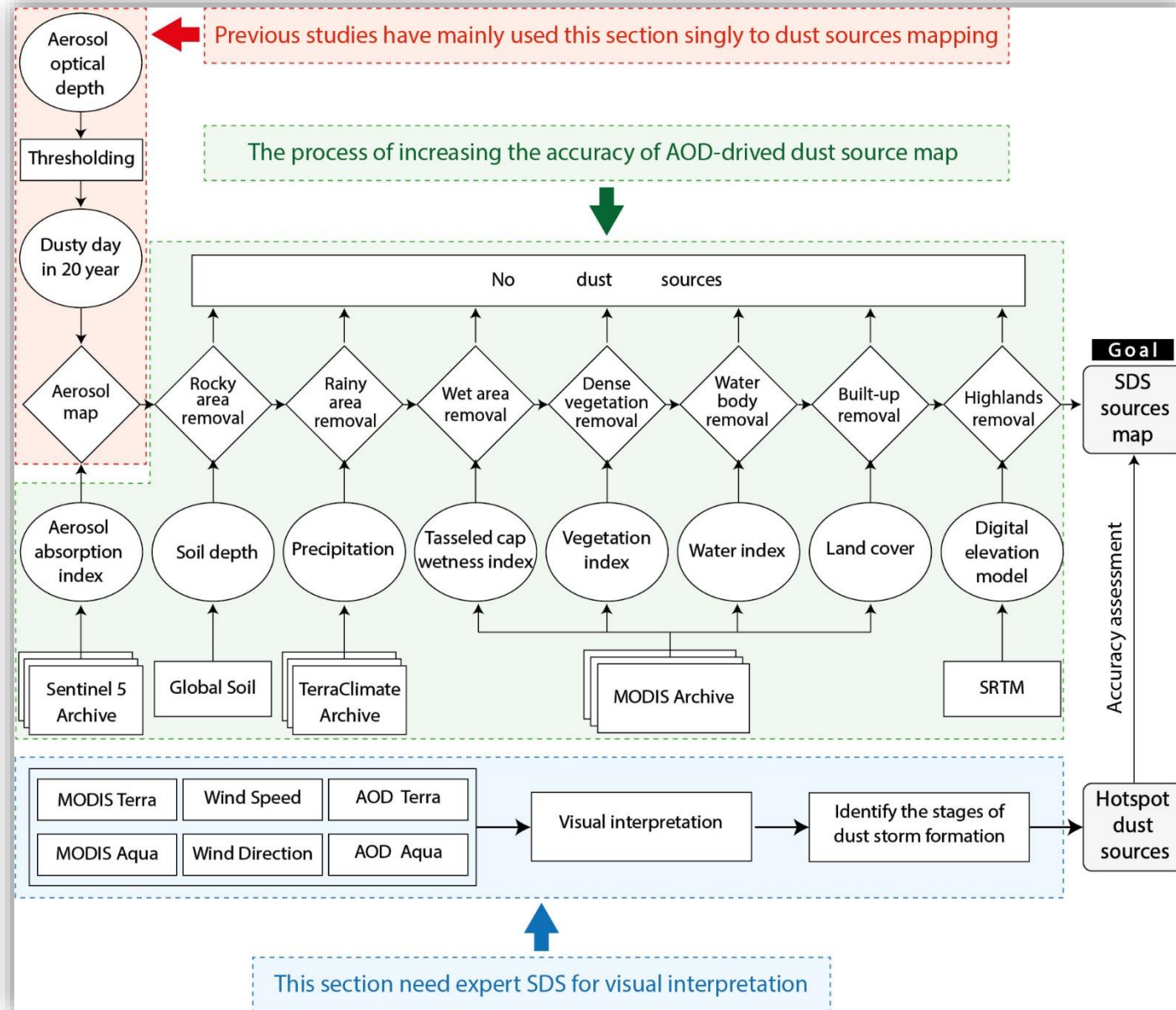
نقش خشک شدن دریاچه ها در ایجاد گردوغبار



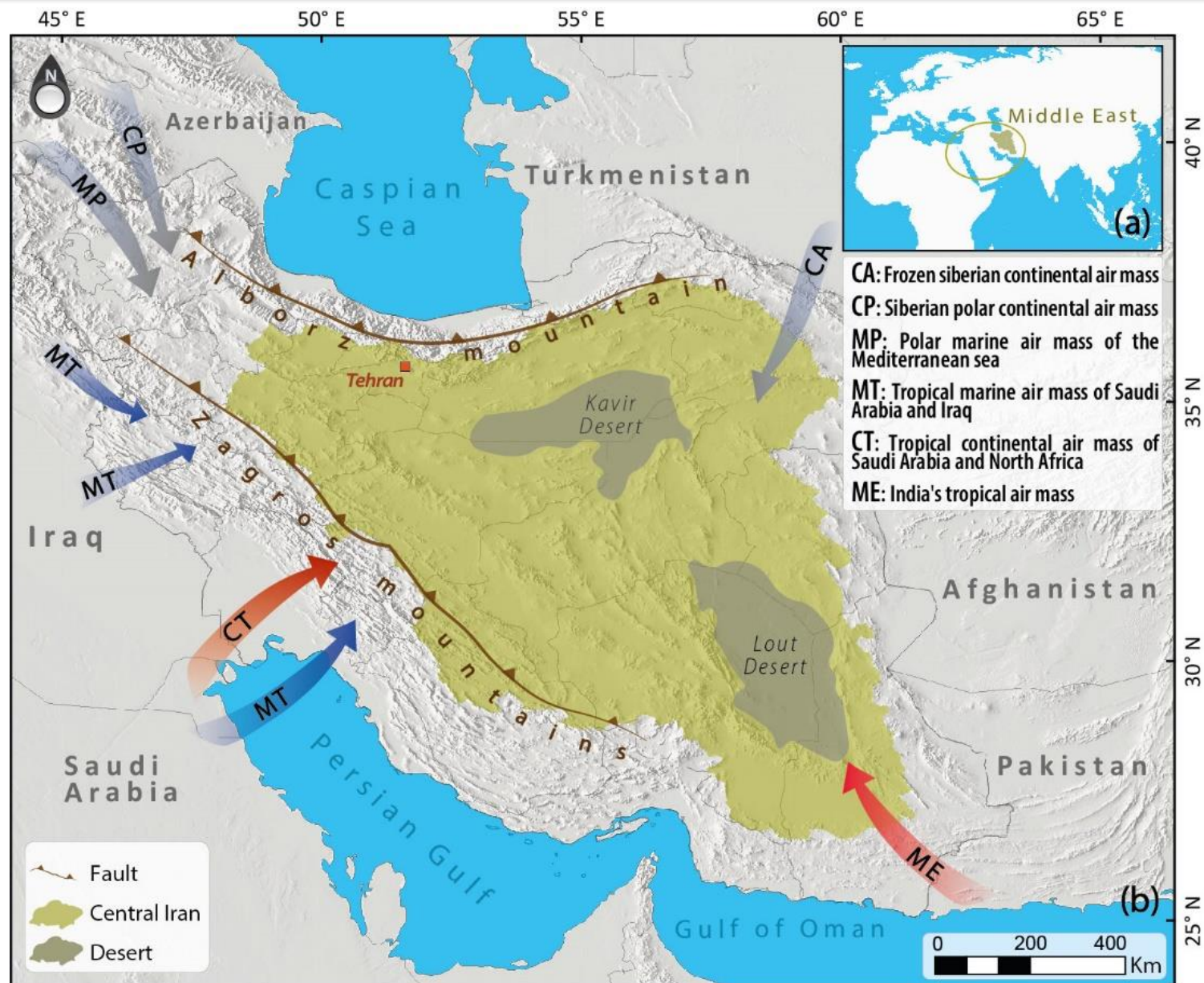
نقش گردوغبار دریاچه هامون در بیلان انرژی



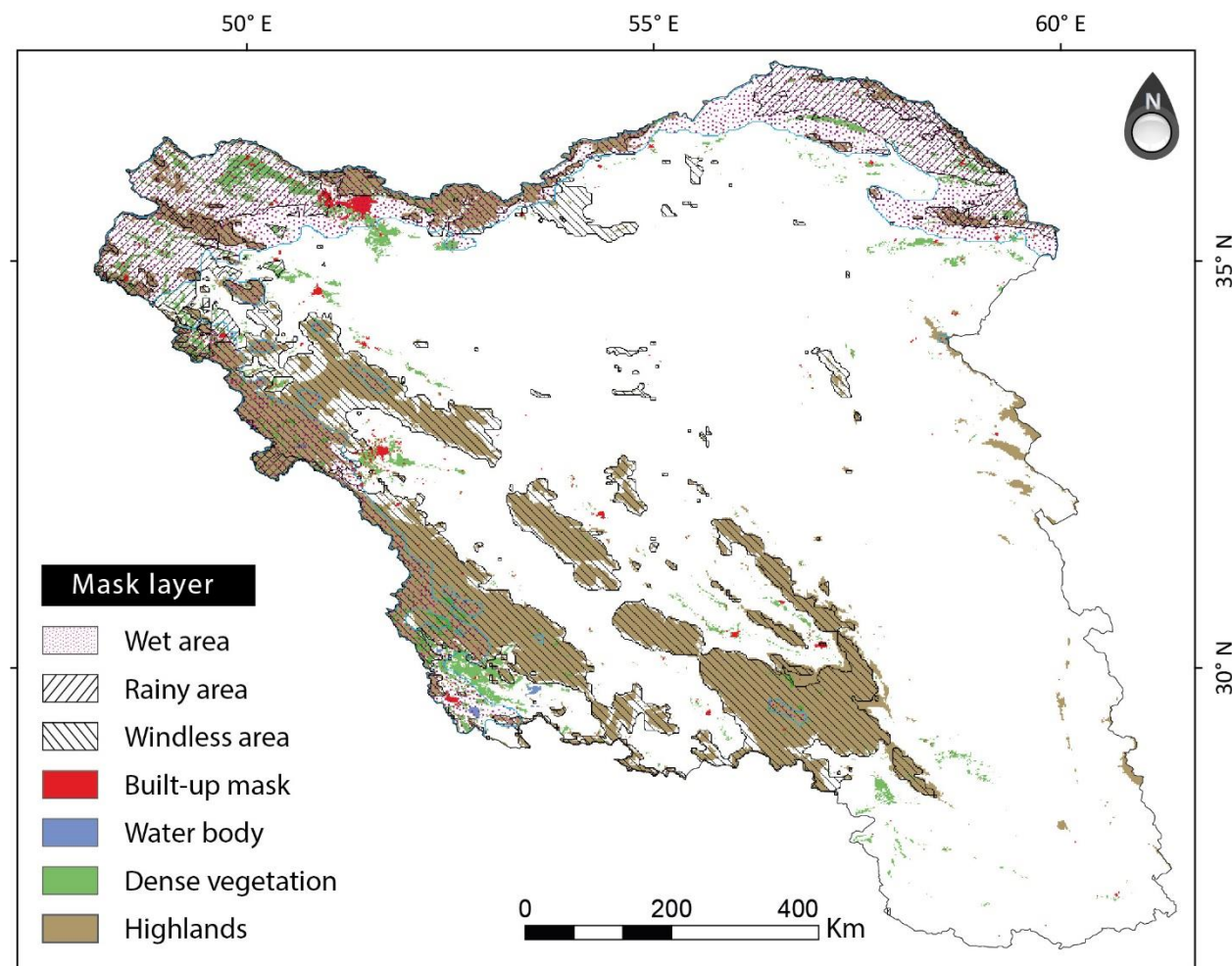
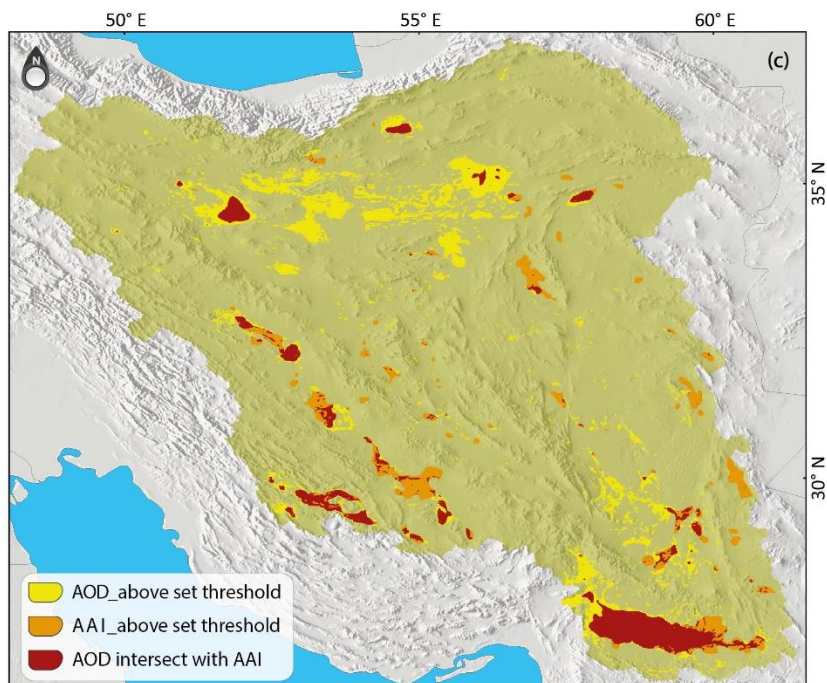
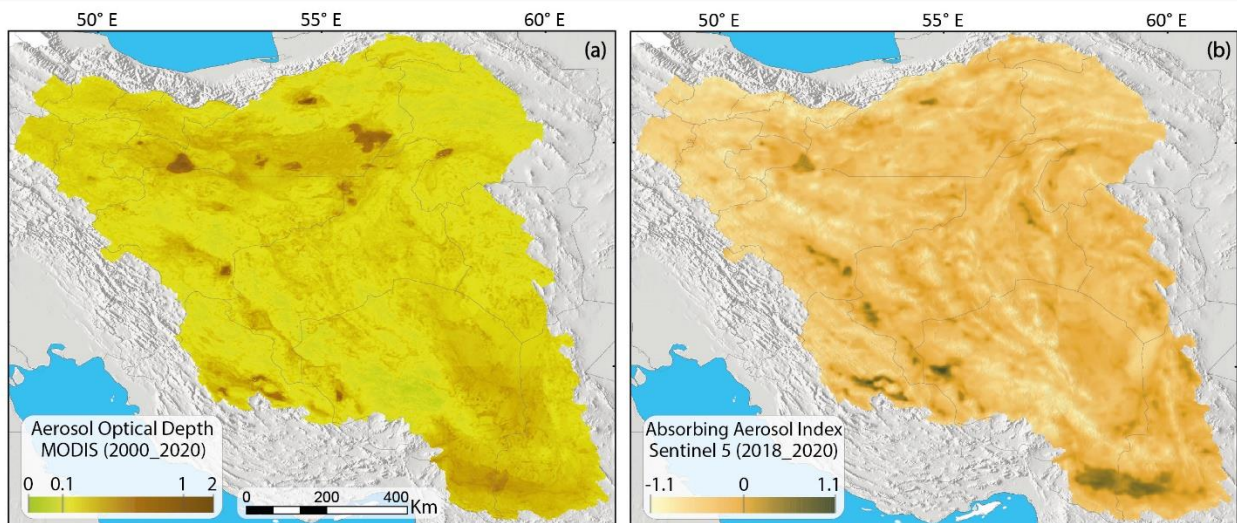
مدلسازی های مکانی گردوغبار



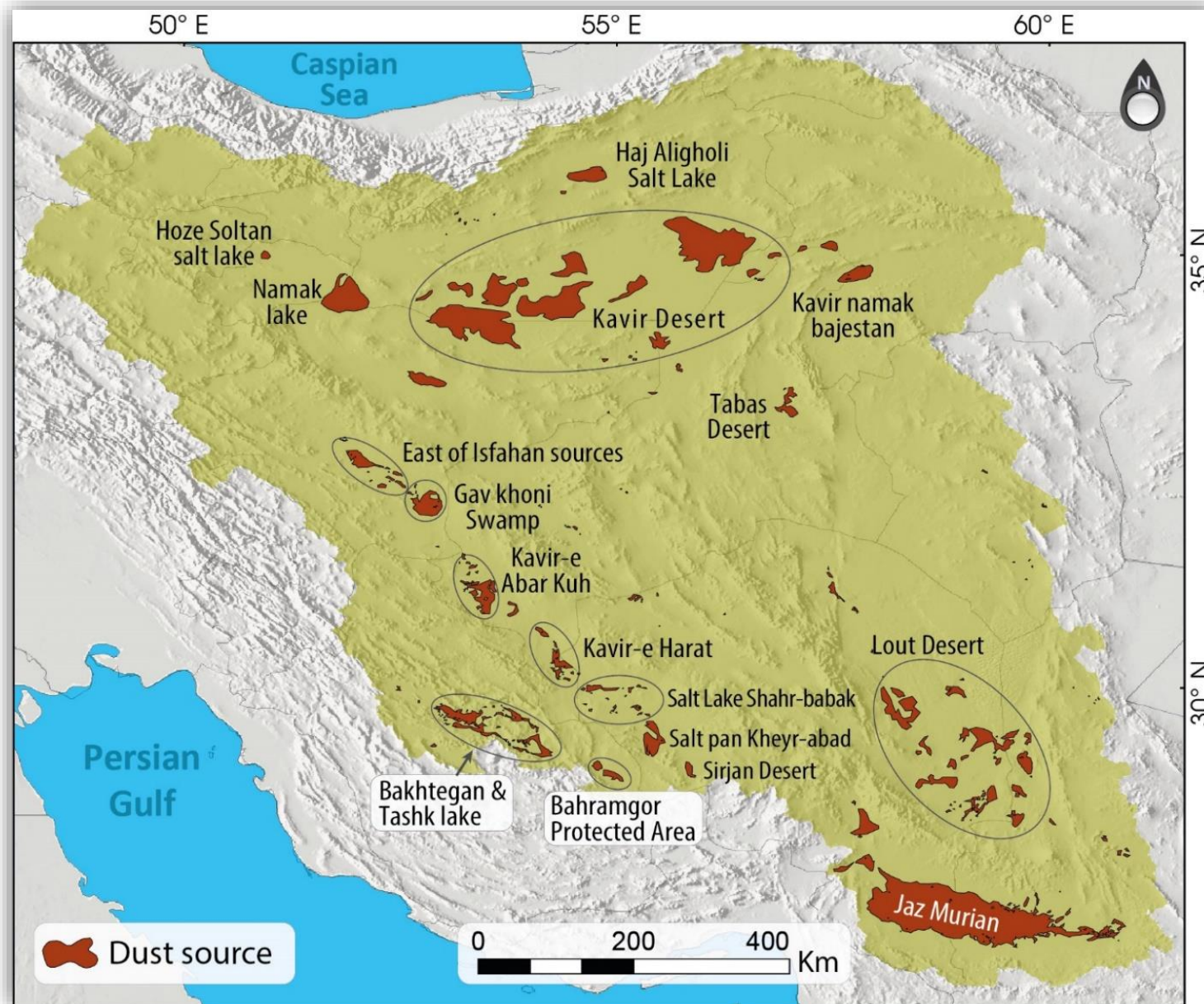
جبهه های هوایی ایران مرکزی



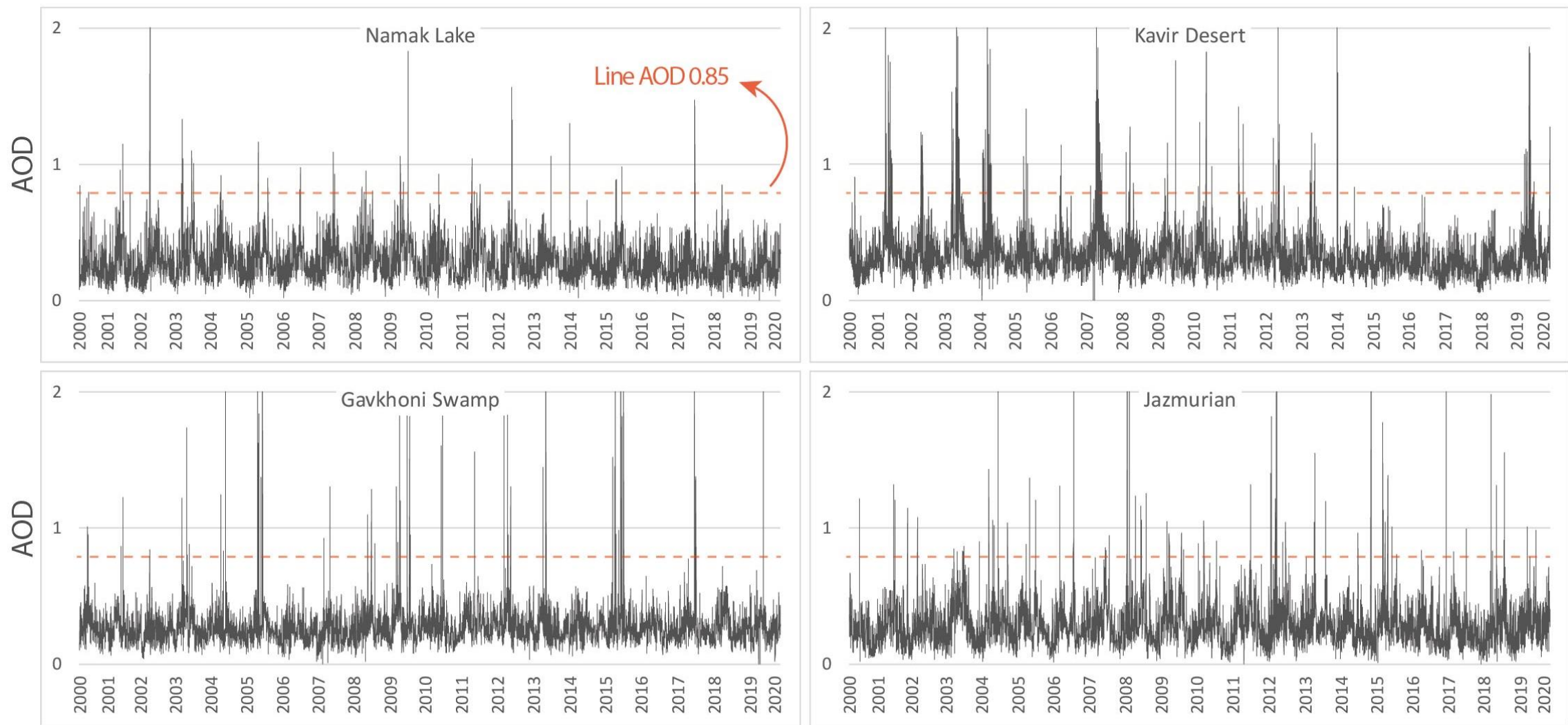
مدلسازی های مکانی منابع گردوغبار



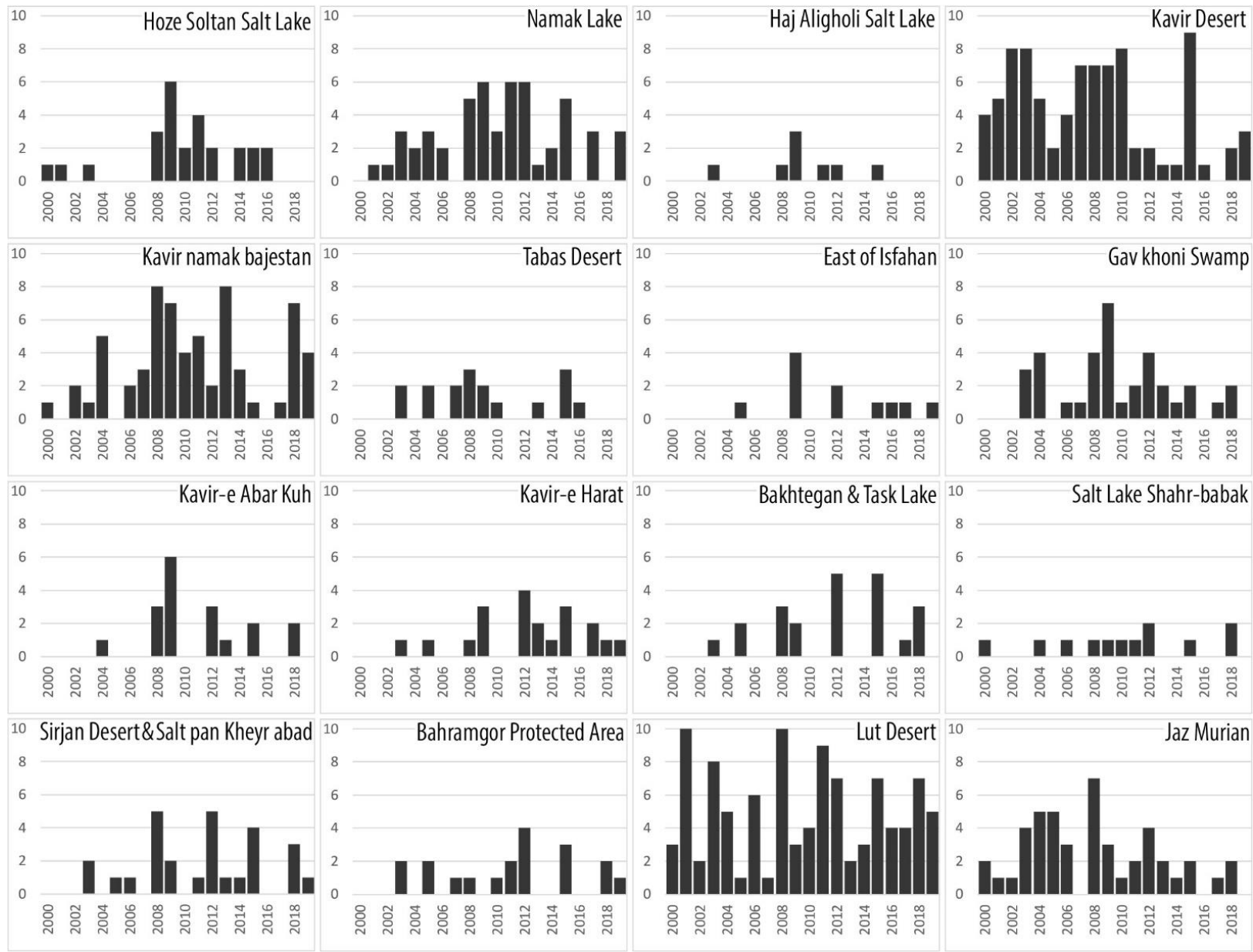
مدلسازی های مکانی منابع گردوغبار



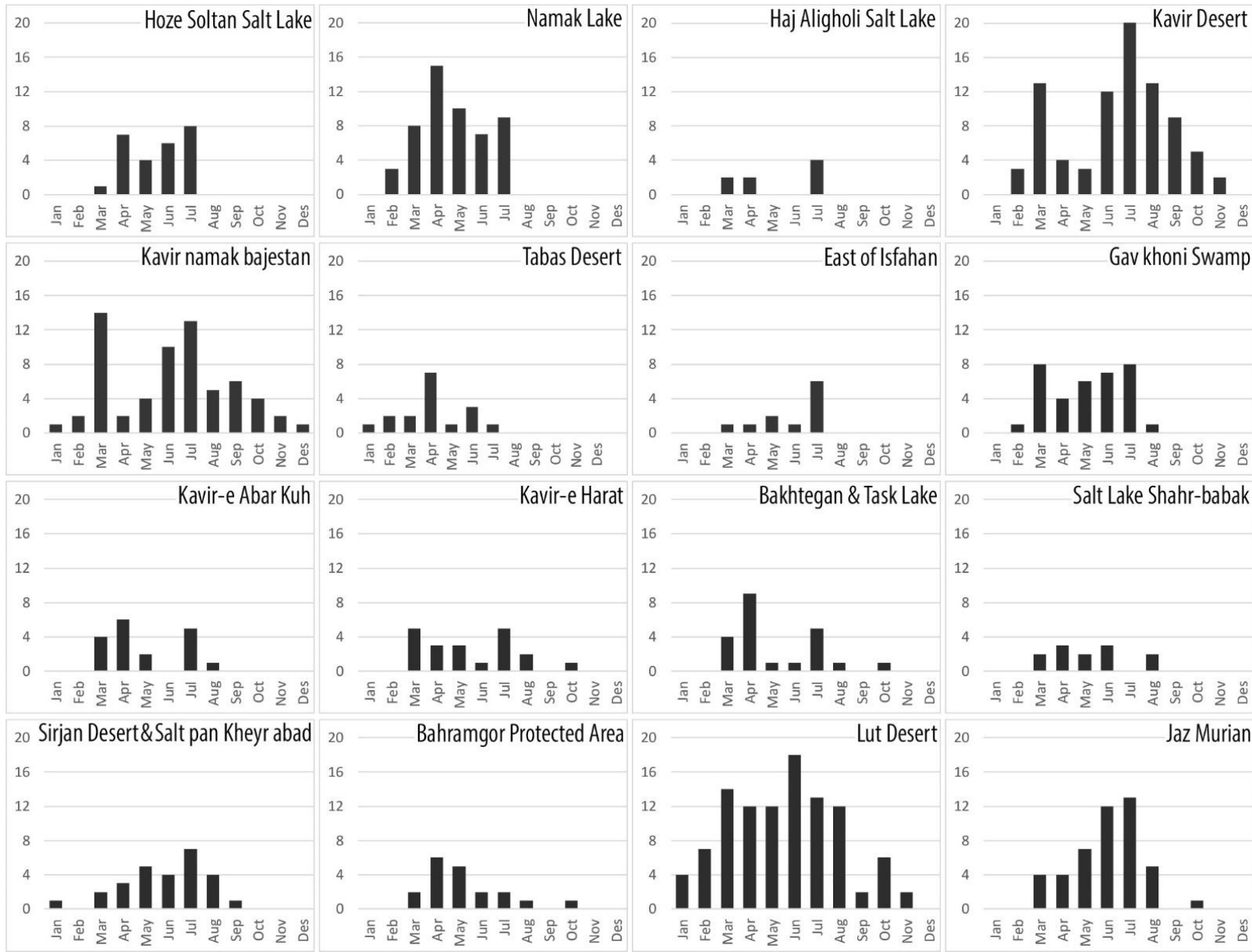
سری زمانی عمق نوری آئروسول



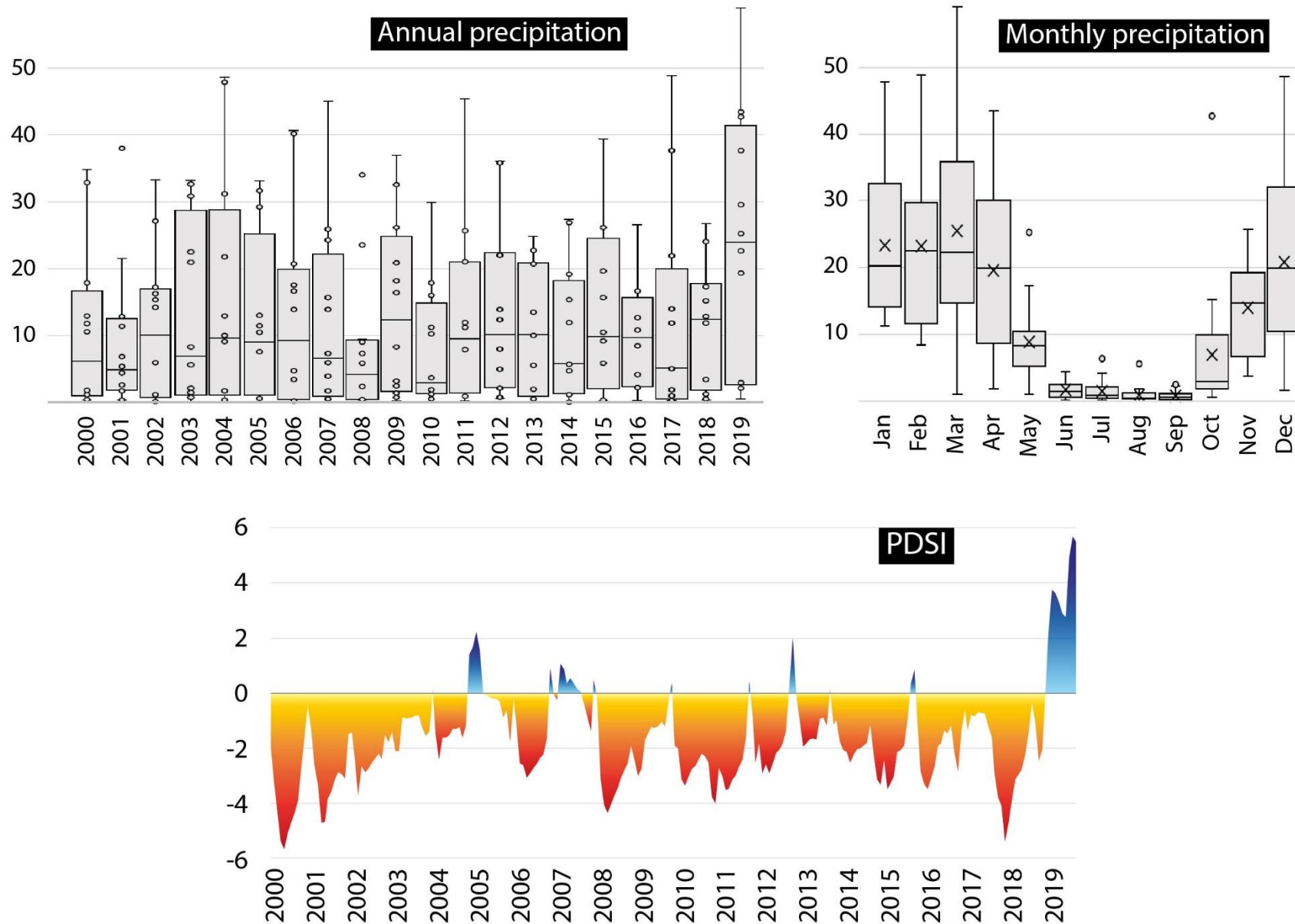
توزیع سالانه رخداد گردوغبار در ایران مرکزی

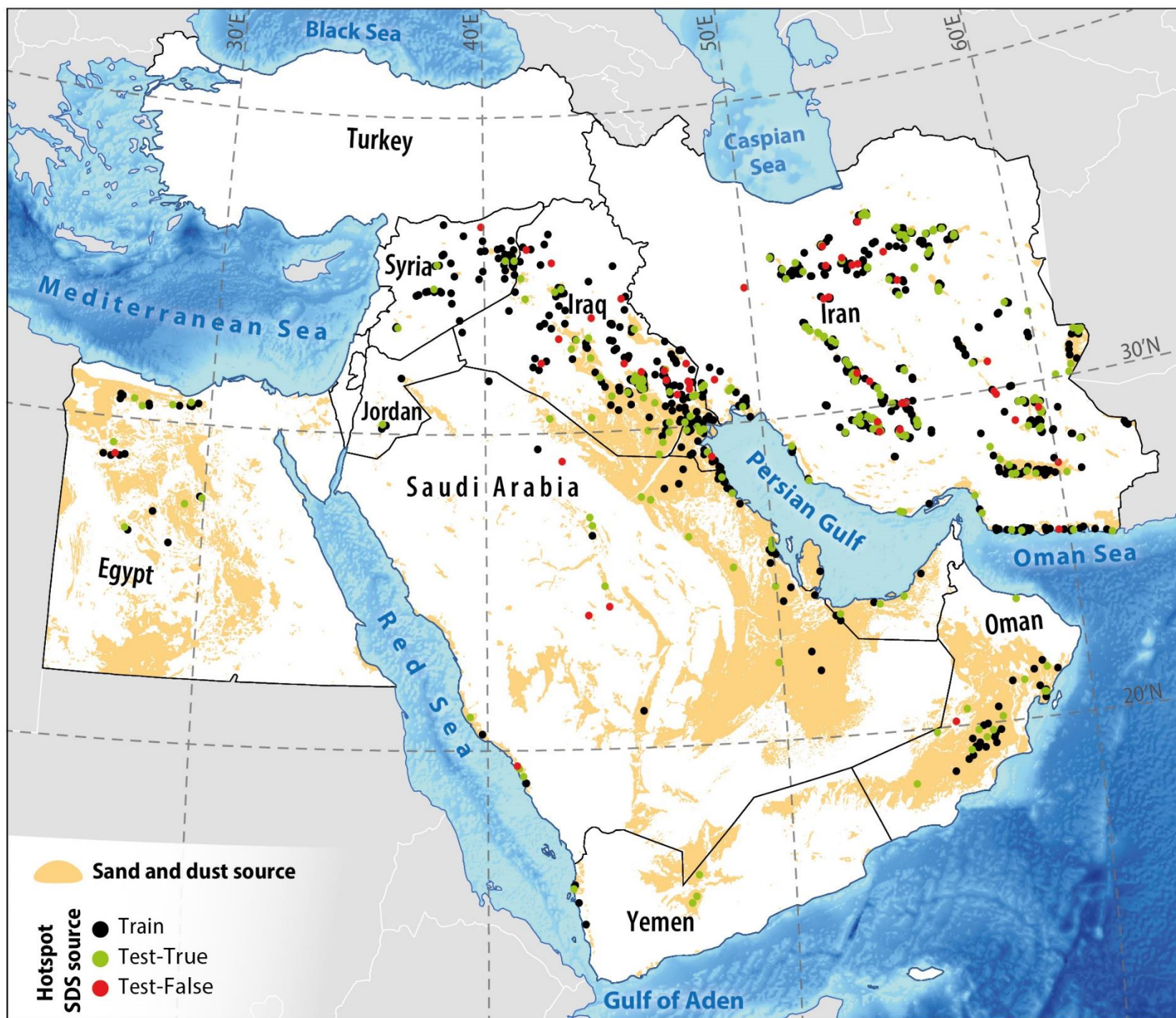


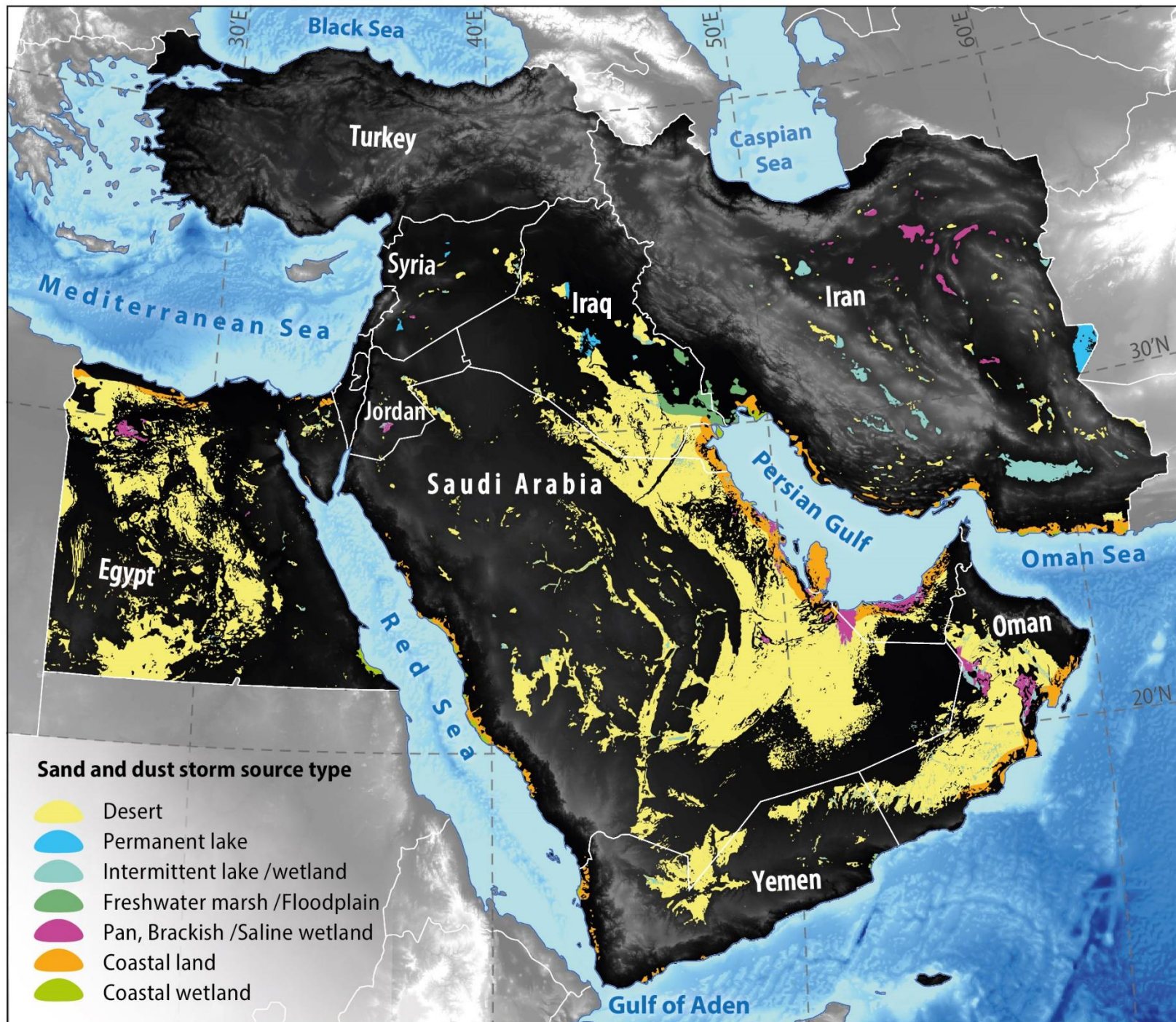
توزیع ماهانه رخداد گردوغبار در ایران مرکزی



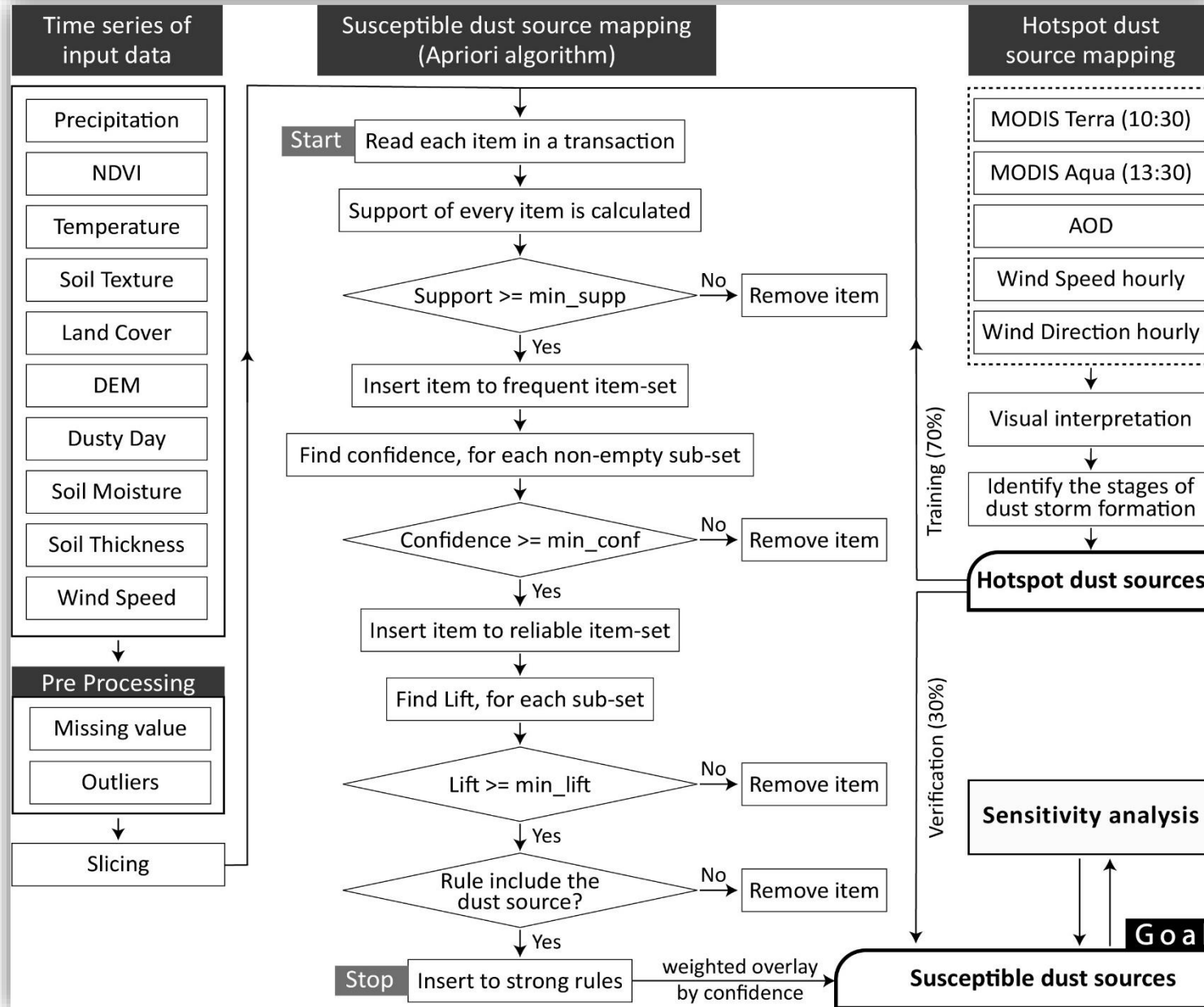
سری زمانی پارامترهای محیطی در ایران مرکزی



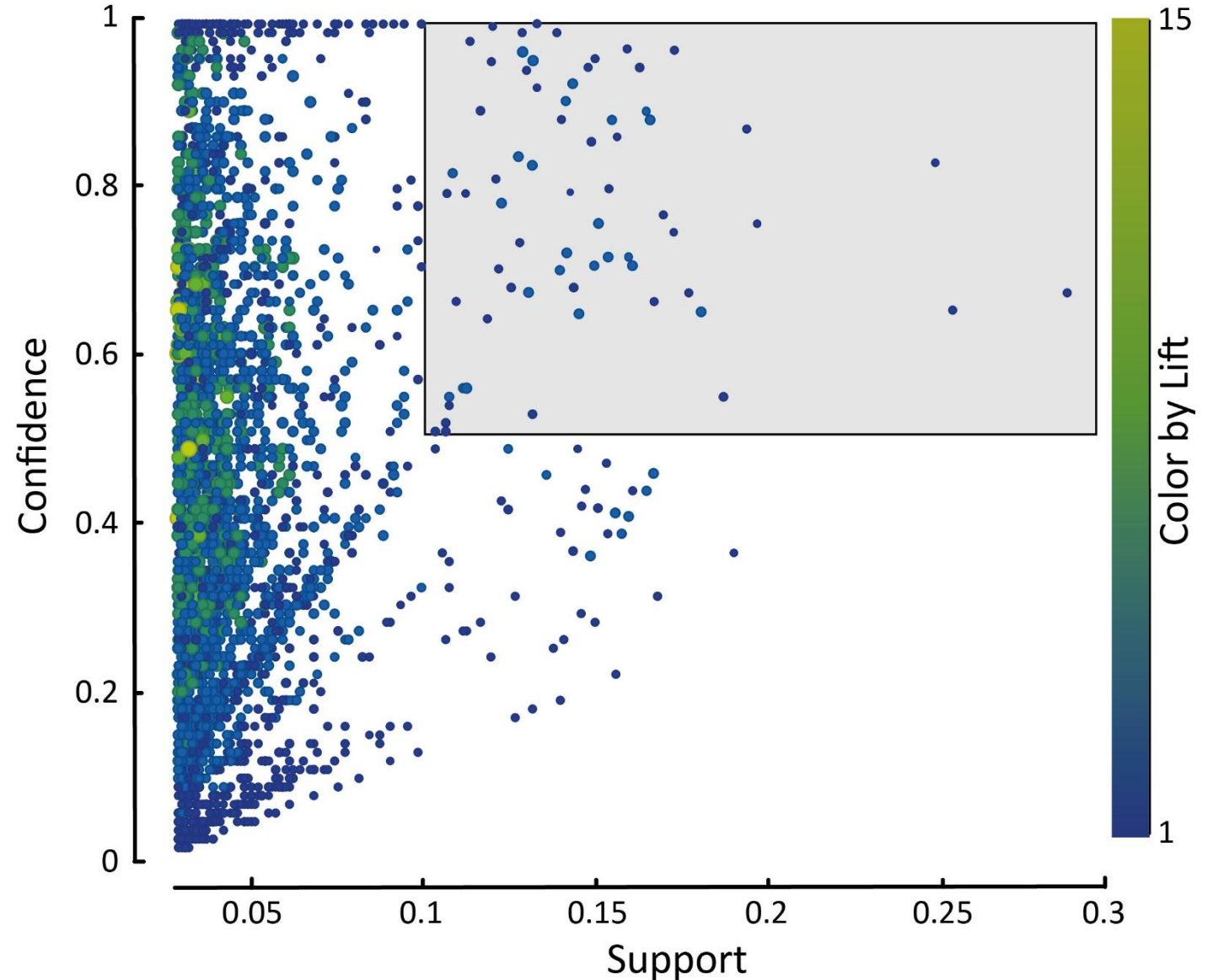
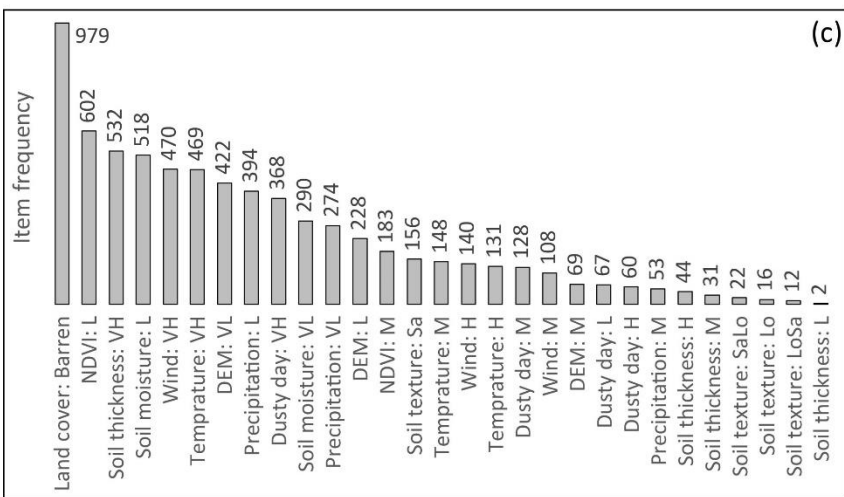
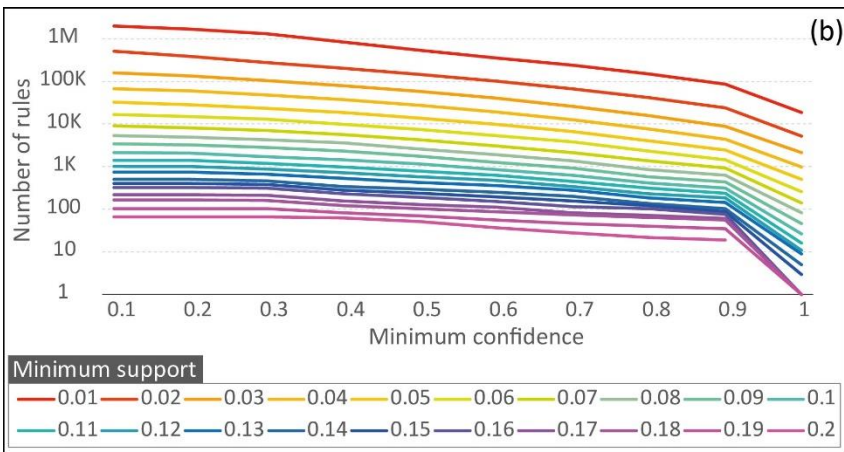
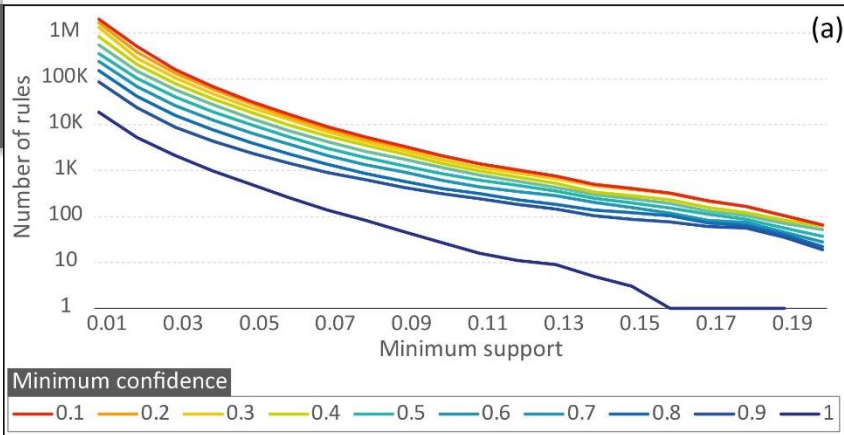




مدلسازی های مکانی گردوغبار (داده کاوی)



تعداد و توزیع قواعد انجمنی



قواعد منتخب

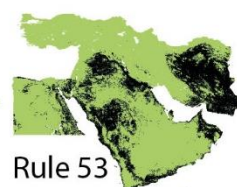
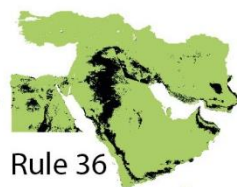
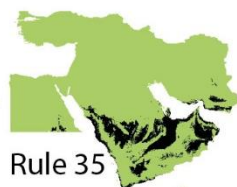
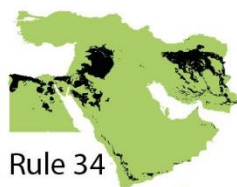
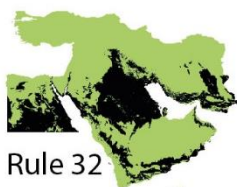
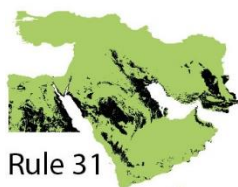
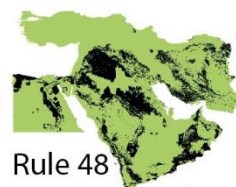
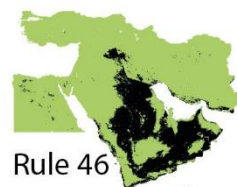
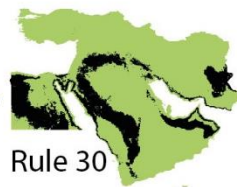
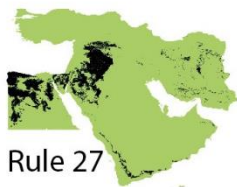
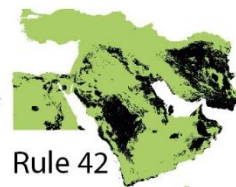
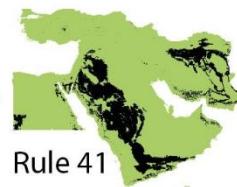
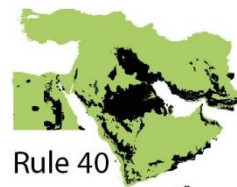
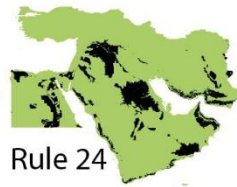
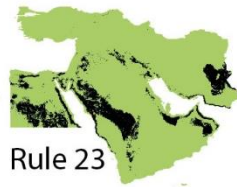
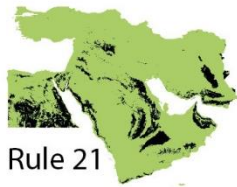
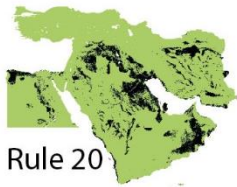
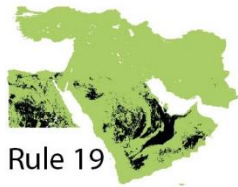
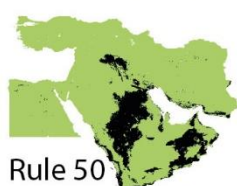
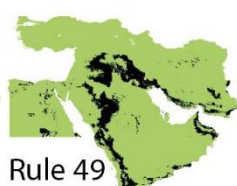
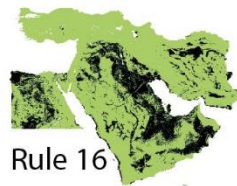
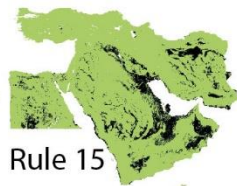
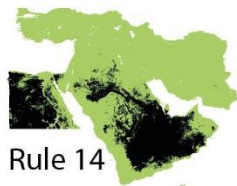
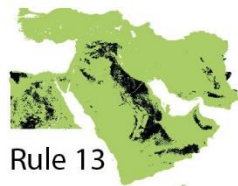
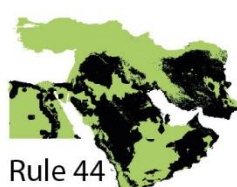
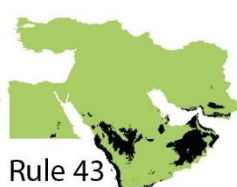
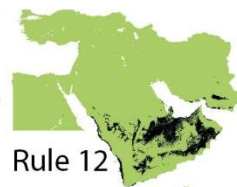
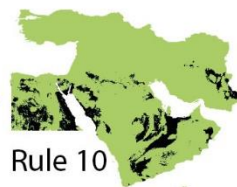
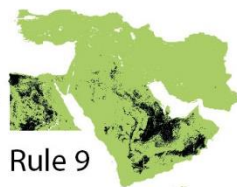
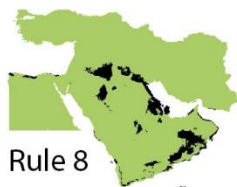
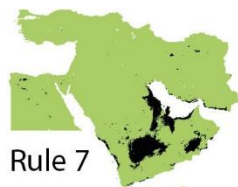
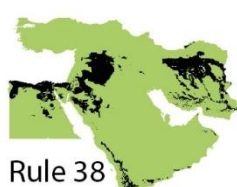
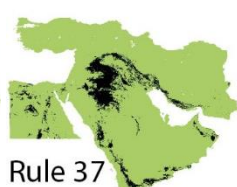
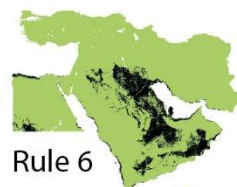
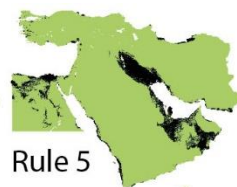
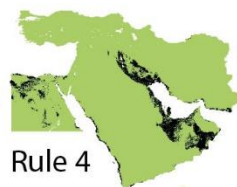
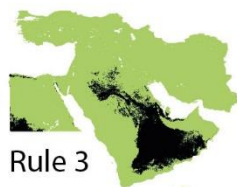
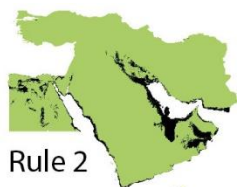
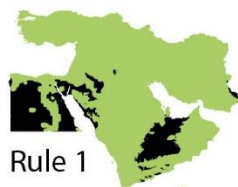
No	Strong rule	Support	Confidence	Lift
1	{Precipitation: VL, Soil moisture: VL}	0.151	1	2.03
2	{NDVI: L, DEM: VL}	0.142	1	2.03
3	{Soil texture: Sand, Land cover type: Barren, Wind speed: VH}	0.138	1	2.03
4	{Land cover type: Barren, Soil depth: VH, DEM: VL}	0.125	1	2.03
5	{Soil depth: VH, DEM: VL}	0.130	1	2.02
6	{Land cover type: Barren, Wind speed: VH, Soil depth: VH}	0.107	1	2.02
7	{Land cover type: Barren, DOD: VH}	0.130	0.99	2.01
8	{Wind speed: VH , Precipitation: L, Soil moisture: L}	0.109	0.99	2.01
9	{Soil texture: Sand, Soil depth: VH}	0.132	0.98	2
10	{Land cover type: Barren, Soil moisture: VL, NDVI: L}	0.112	0.99	2
11	{Wind speed: VH , Precipitation: L}	0.128	0.98	1.99
12	{Temperature: VH, Soil depth: VH}	0.125	0.97	1.97
13	{Land cover type: Barren, Soil depth: VH, DEM: L}	0.108	0.96	1.96
14	{Soil texture: Sand, Land cover type: Barren}	0.282	0.95	1.95
15	{NDVI: L, Soil depth: VH}	0.173	0.95	1.95
16	{Land cover type: Barren, Soil depth: VH}	0.258	0.95	1.93
17	{Soil moisture: L, NDVI: L, Soil depth: VH}	0.115	0.95	1.93
18	{Land cover type: Barren, NDVI: L, DEM: L}	0.112	0.94	1.91
19	{Soil texture: Sand, NDVI: L}	0.173	0.94	1.90
20	{Land cover type: Barren, Soil moisture: L, Soil depth: VH}	0.167	0.94	1.90
21	{NDVI: L, DEM: L}	0.113	0.94	1.90
22	{Soil texture: Sand, Temperature: VH}	0.131	0.92	1.84
23	{Wind speed: H, NDVI: L}	0.130	0.90	1.83
24	{Land cover type: Barren, Soil moisture: L, DEM: L}	0.125	0.89	1.81
25	{Precipitation: L, NDVI: L}	0.130	0.88	1.79
26	{Land cover type: Barren, Temperature: M}	0.191	0.87	1.76
27	{Land cover type: Barren, Temperature: M, NDVI: M}	0.113	0.85	1.73

قواعد منتخب

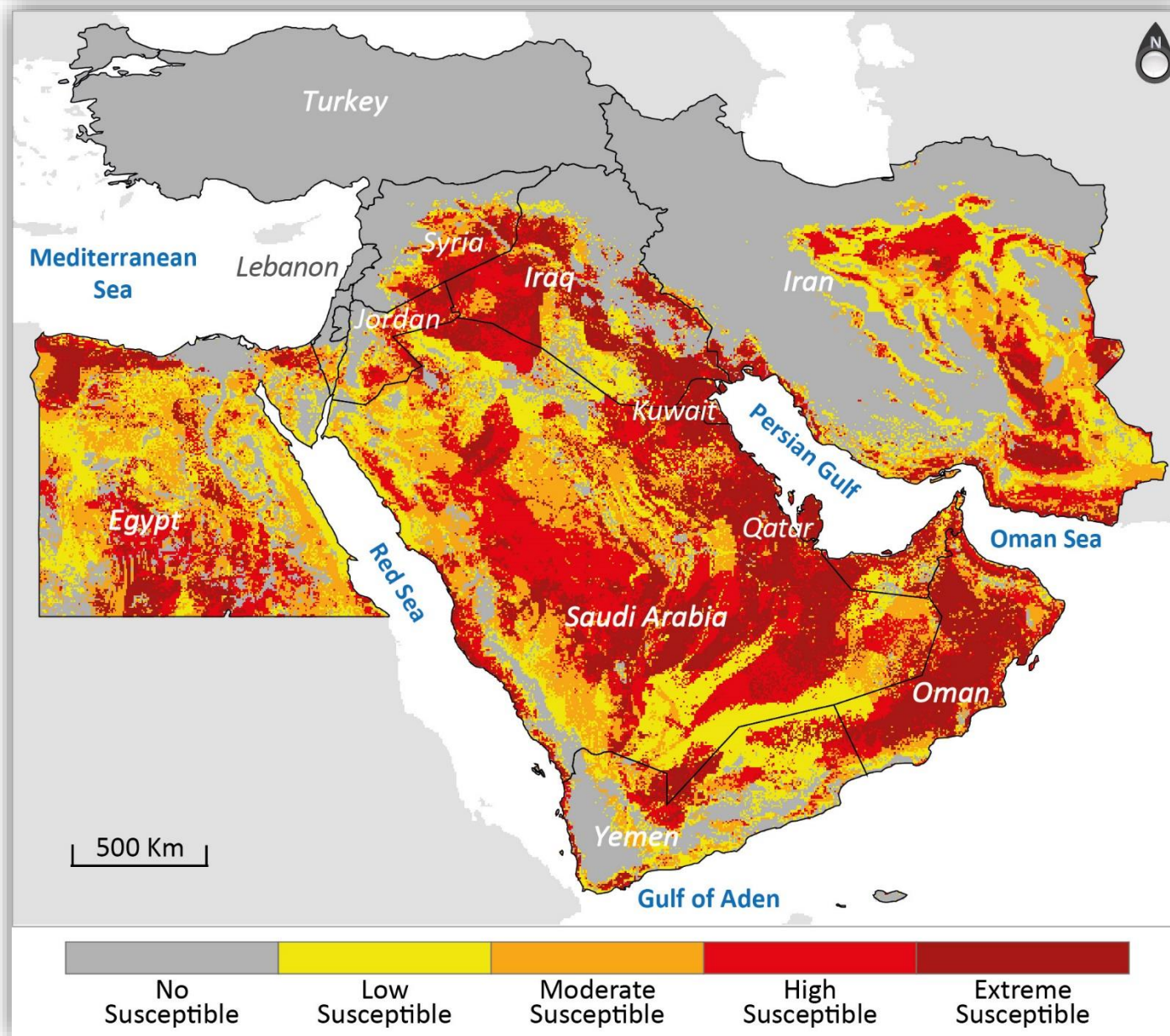
27	{Land cover type: Barren, Temperature: M, NDVI: M}	0.113	0.85	1.73
28	{Land cover type: Barren, Precipitation: L}	0.199	0.84	1.70
29	{Precipitation: L, Soil moisture: L}	0.170	0.82	1.66
30	{Land cover type: Barren, Wind speed: H}	0.189	0.81	1.65
31	{Temperature: H, NDVI: L}	0.113	0.81	1.64
32	{Land cover type: Barren, Temperature: H}	0.189	0.79	1.61
33	{Land cover type: Barren, Temperature: VH}	0.199	0.79	1.60
34	{Land cover type: Barren, Temperature: M, Soil moisture: L}	0.114	0.79	1.59
35	{Temperature: VH, NDVI: L}	0.165	0.77	1.57
36	{Land cover type: Barren, DOD: M}	0.199	0.75	1.53
37	{NDVI: M, DOD: M}	0.122	0.75	1.52
38	{Temperature: M, Soil moisture: L}	0.121	0.75	1.52
39	{Land cover type: Barren, DOD: L}	0.154	0.73	1.48
40	{Temperature: H, Soil moisture: L}	0.144	0.72	1.46
41	{Land cover type: Barren, DEM: M}	0.127	0.70	1.42
42	{Soil moisture: L, NDVI: L}	0.256	0.70	1.41
43	{Temperature: VH, Soil moisture: L}	0.131	0.69	1.41
44	{Land cover type: Barren, Soil moisture: L}	0.415	0.69	1.40
45	{Wind speed: H, Soil moisture: L}	0.117	0.66	1.33
46	{Land cover type: Barren, DOD: H}	0.140	0.65	1.32
47	{Land cover type: Barren, Wind speed: M}	0.179	0.64	1.30
48	{Soil moisture: L, NDVI: M}	0.175	0.63	1.28
49	{Soil moisture: L, DOD: M}	0.146	0.60	1.22
50	{Soil moisture: L, DOD: H}	0.108	0.57	1.16
51	{Land cover type: Barren, Precipitation: M, NDVI: L}	0.127	0.53	1.07
52	{Land cover type: Barren, Precipitation: M, Soil moisture: L}	0.183	0.52	1.06
53	{Soil texture: Sandy loam, Land cover type: Barren}	0.145	0.51	1.03
54	{Land cover type: Barren, Precipitation: M, Soil moisture: L, NDVI: L}	0.120	0.50	1.01

*VL: Very Low, L: Low, M: Moderate, H: High, VH: Very High

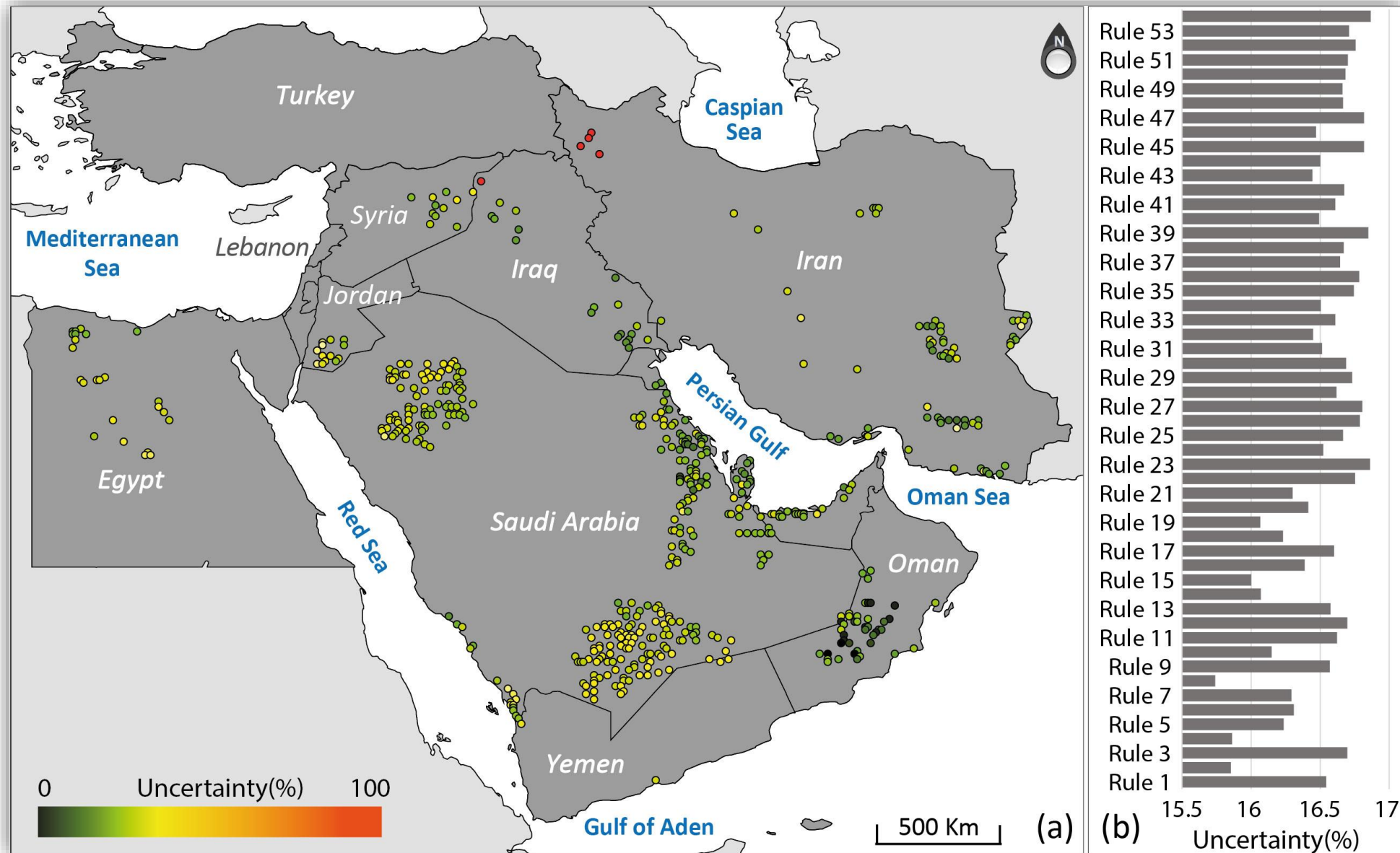
قاعده نقشه ها



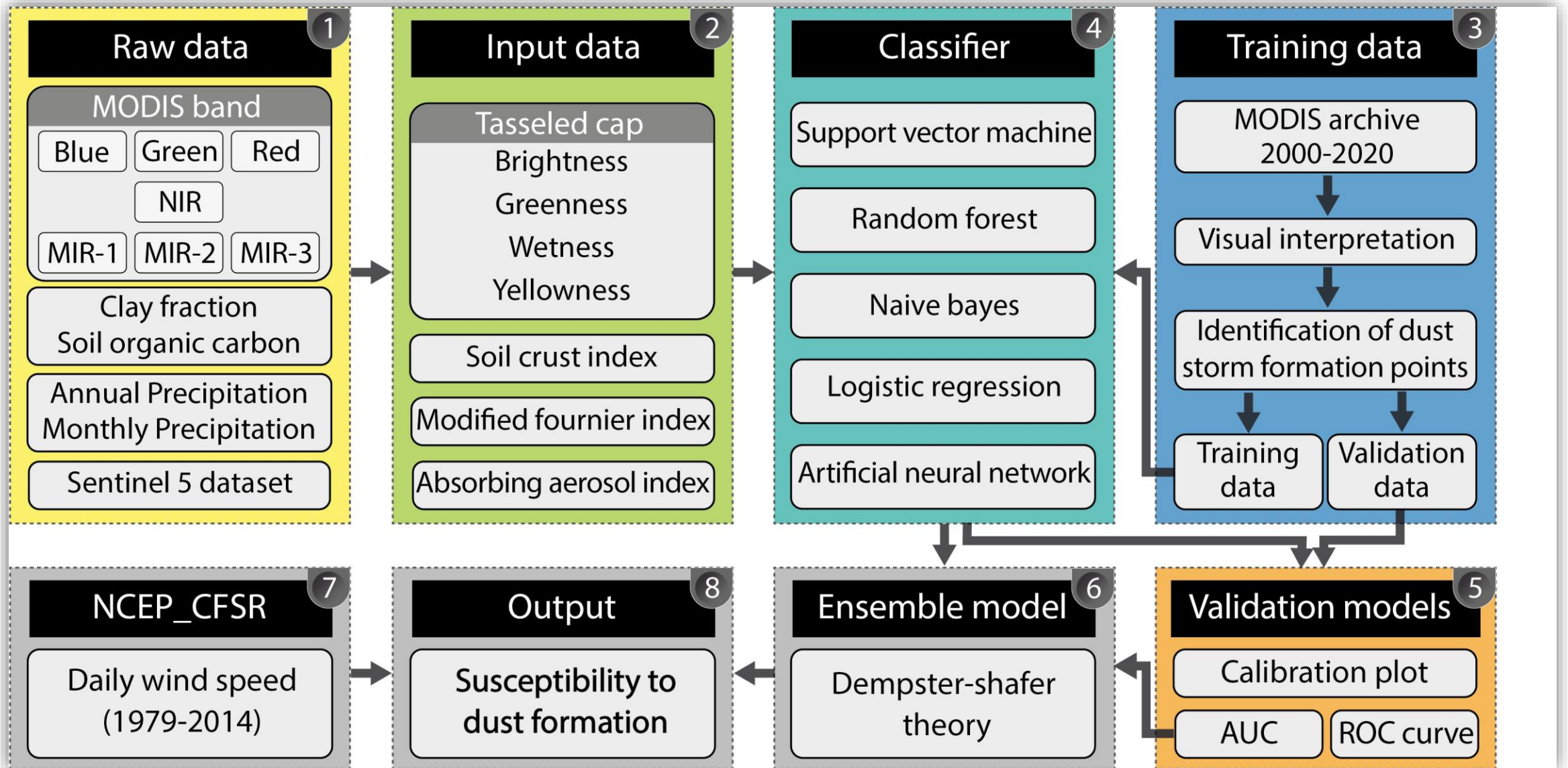
منابع دارای پتانسیل شکل گیری گردوغبار (با استفاده از داده کاوی)



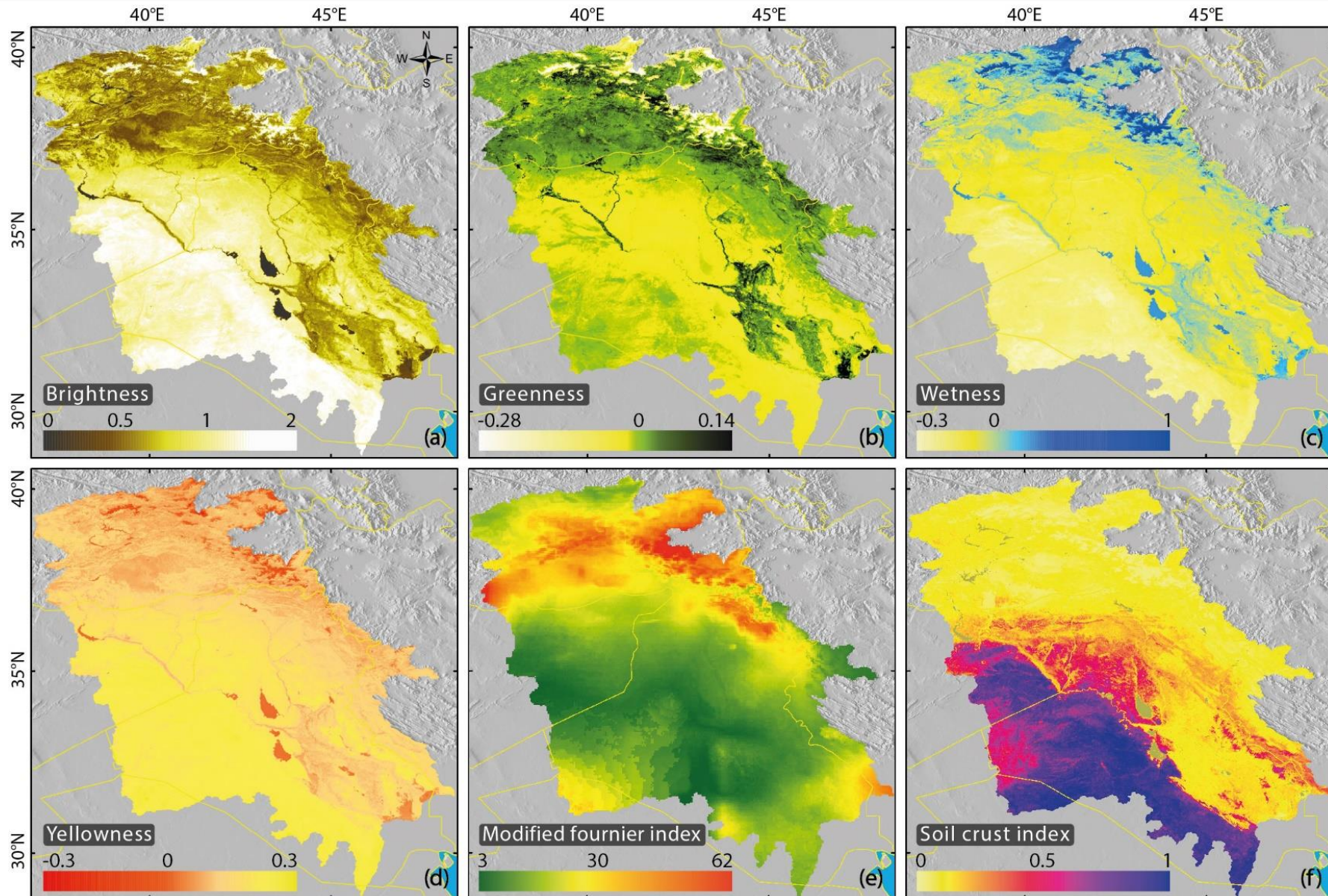
عدم قطعیت و آنالیز حساسیت روش داده کاوی



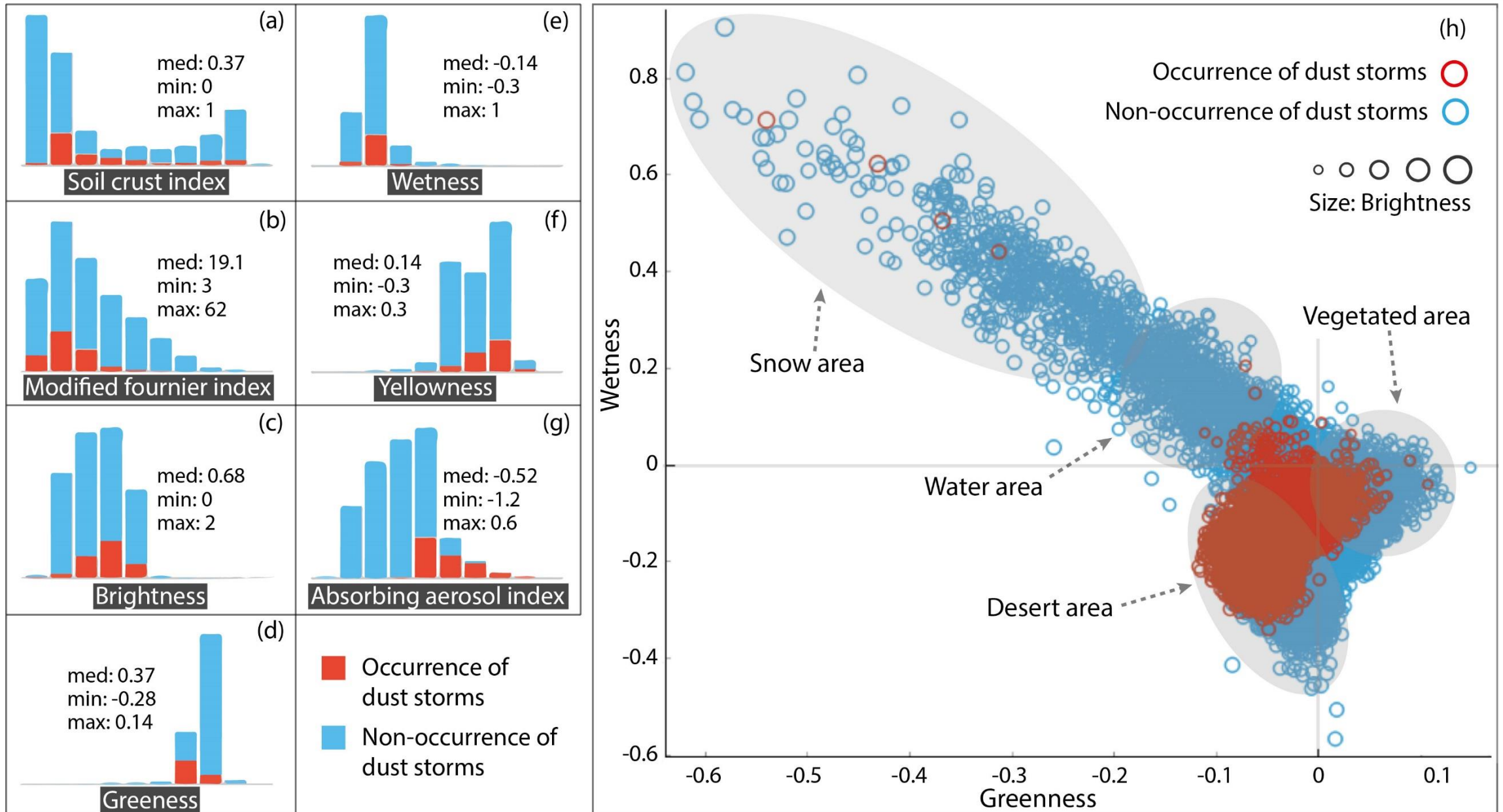
مدلسازی های مکانی گردوغبار (یادگیری ماشینی)



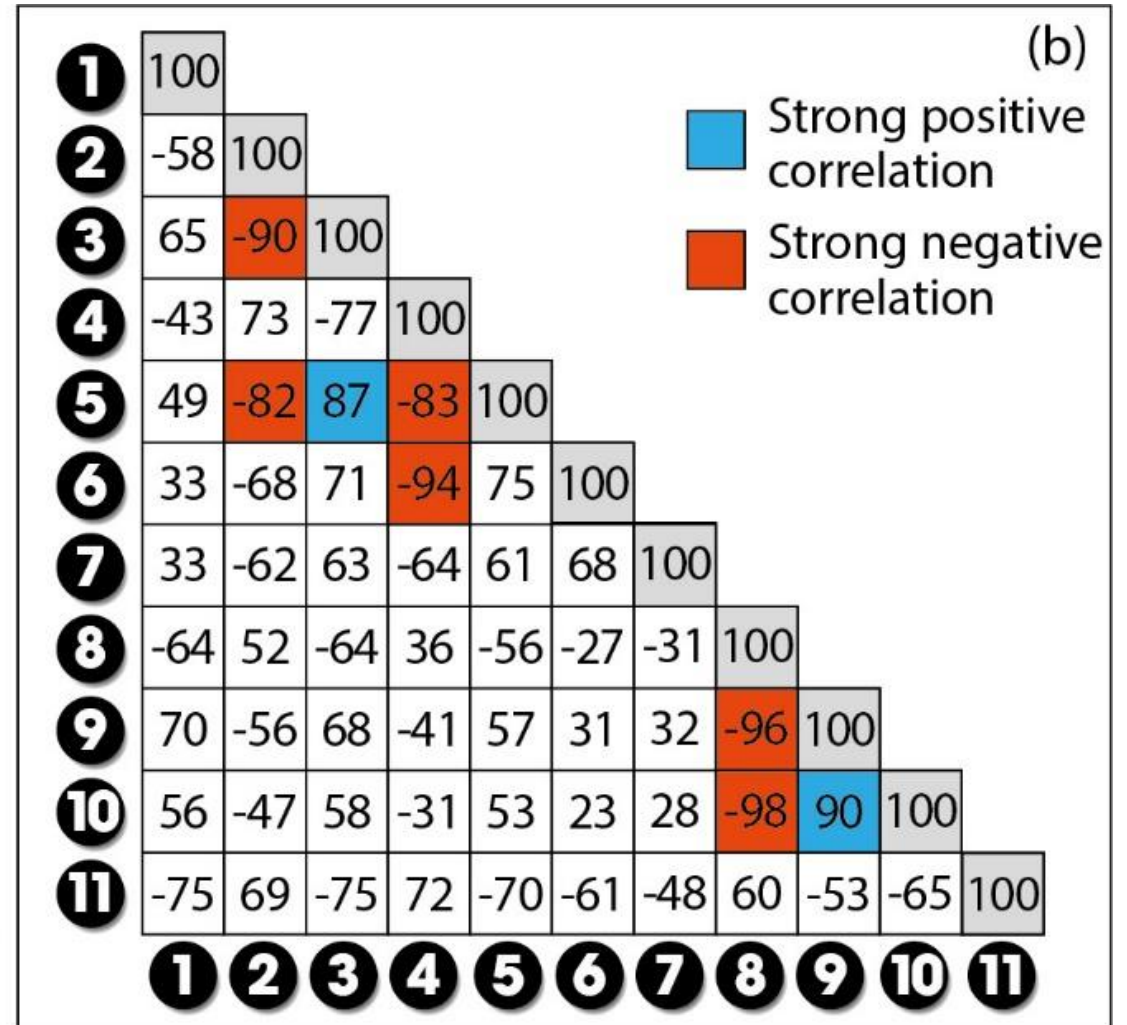
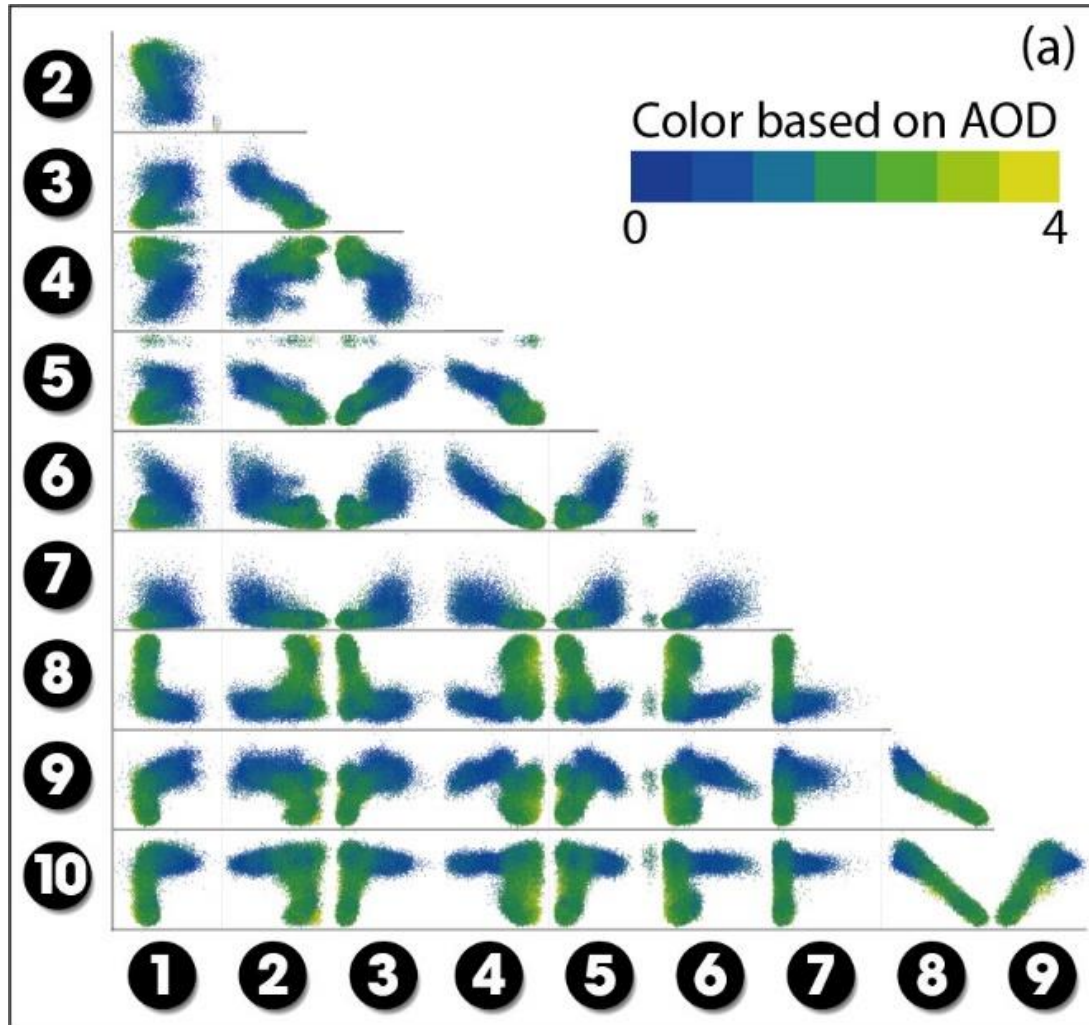
ورودی های مدل سازی مکانی گردوغبار (یادگیری ماشینی)



ارتباط پارامترهای تسلدکپ و گردوغبار



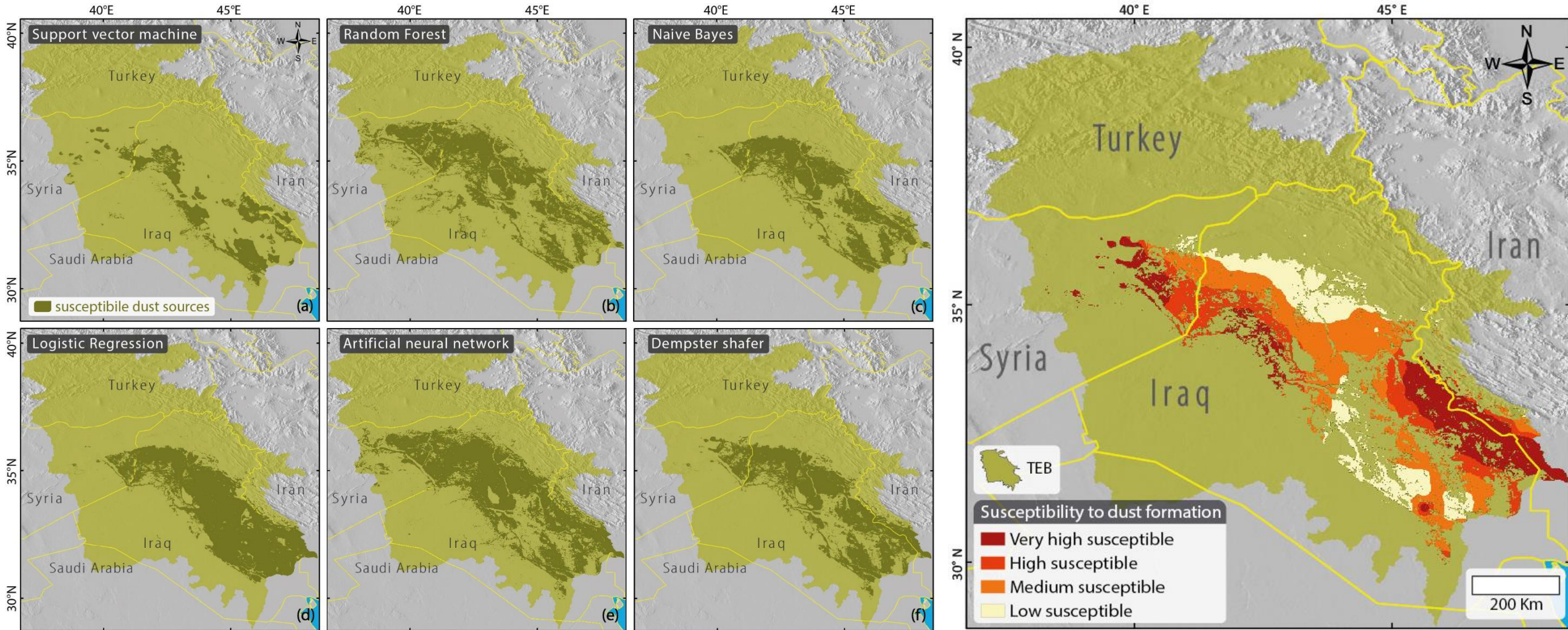
ارتباط پارامترهای محیطی و گردوغبار



NDVI 1 Wind speed 2 Precipitation 3 LST 4 Soil moisture 5 DEM 6

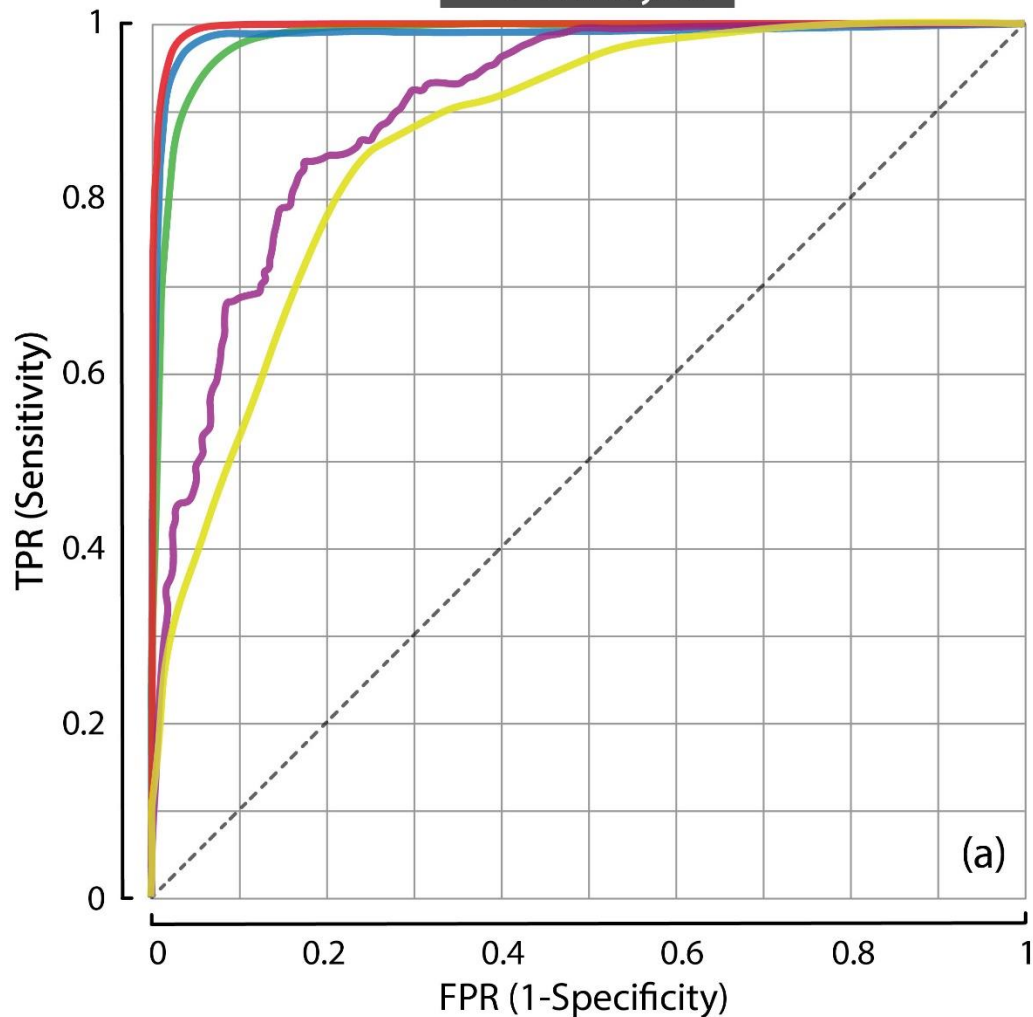
Slope 7 Sand content 8 Clay content 9 Silt content 10 Dusty day 11

مدلسازی های مکانی گردوغبار (یادگیری ماشینی)

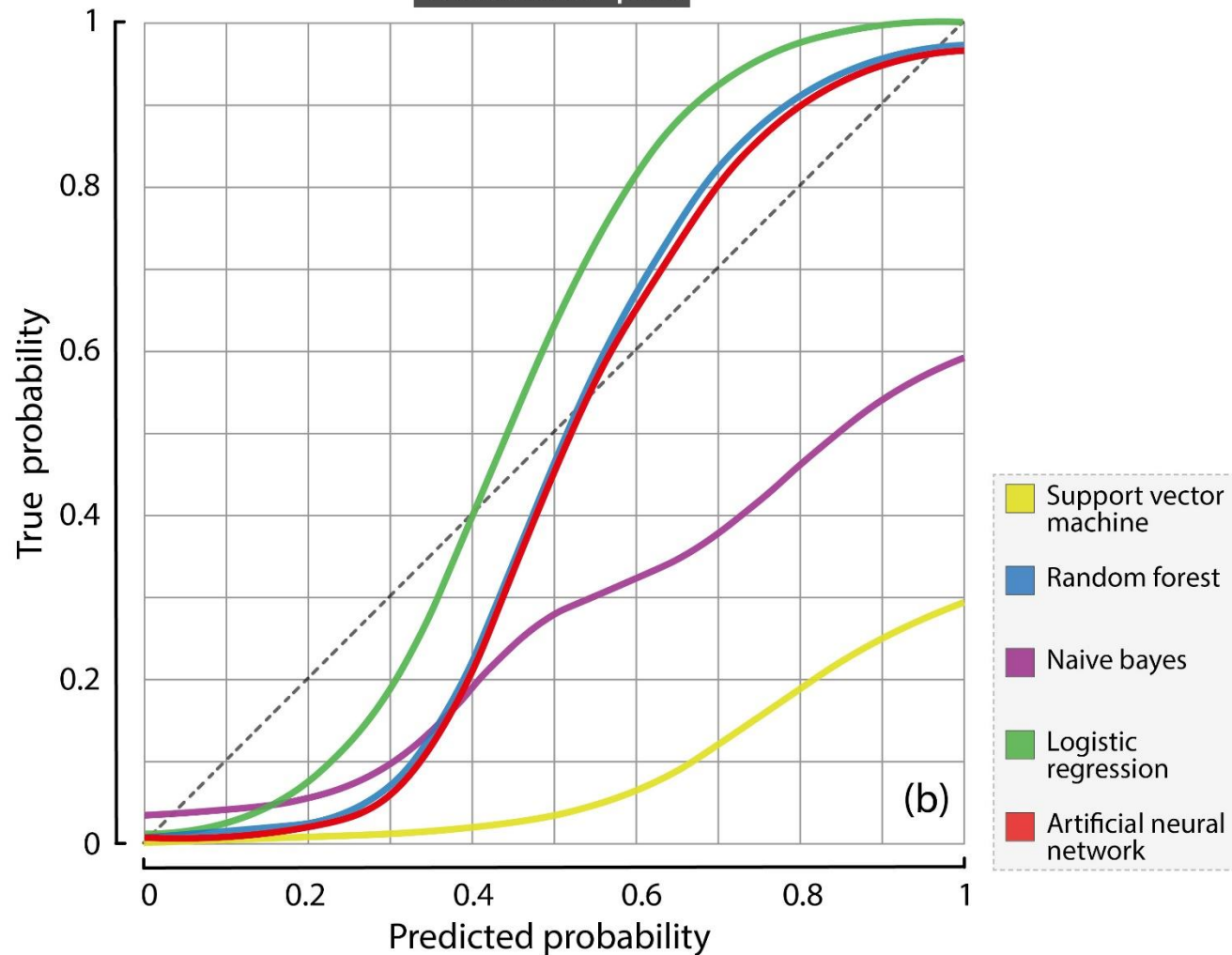


آنالیز حساسیت مدل‌سازی مکانی گردوغبار (یادگیری ماشینی)

ROC Analysis

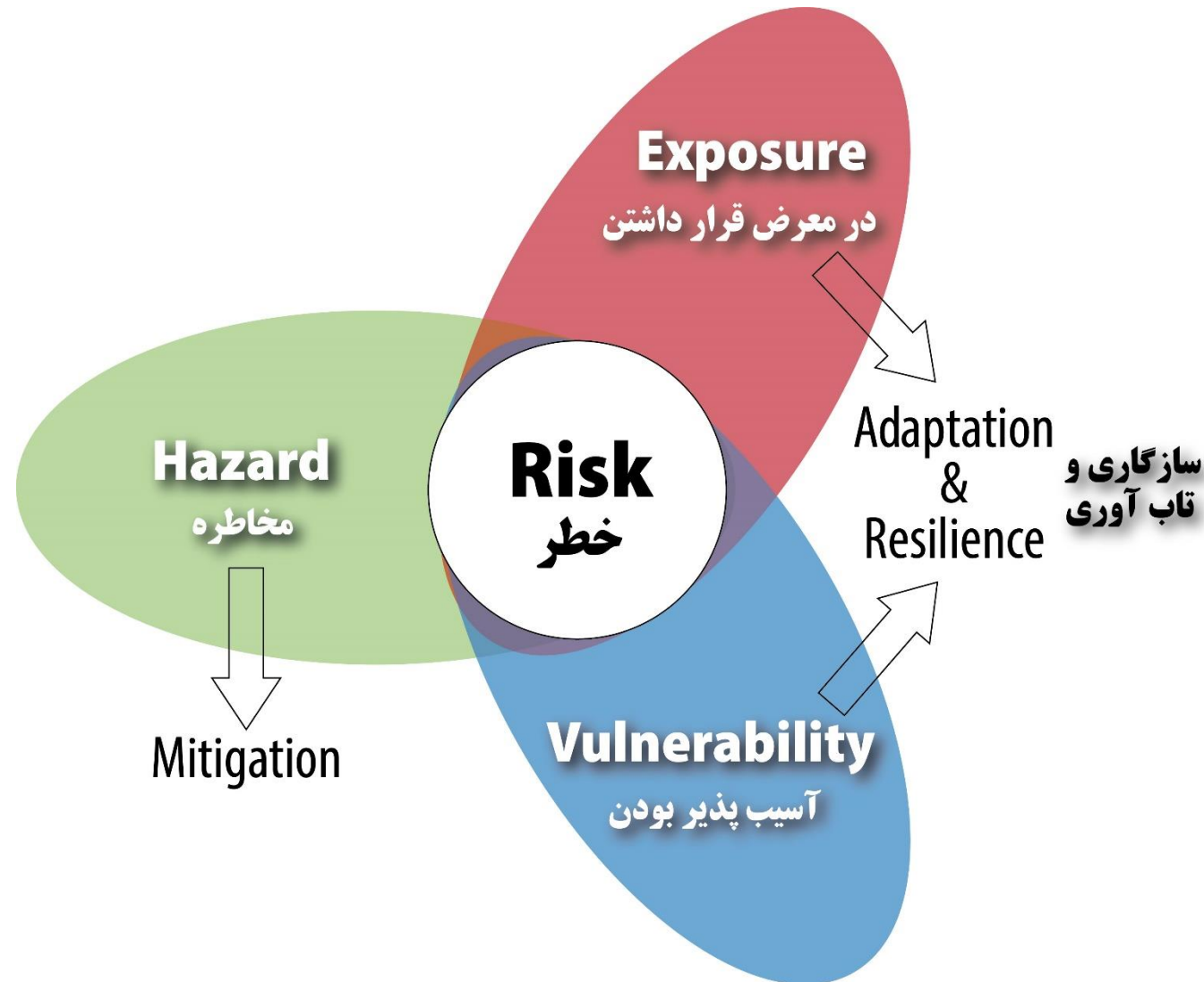


Calibration plot



- Support vector machine
- Random forest
- Naive bayes
- Logistic regression
- Artificial neural network

برنامه ریزی آمایش سرزمین جهت مقابله با گردوغبار



نیاز به
Digital
Twin

برنامه ریزی آمایش سرزمین جهت کاهش ریسک مخاطرات طبیعی

خطر گردوغبار

Vulnerability

آسیب پذیر بودن

تعداد کادر درمان
تعداد تخت بیمارستان
دسترسی به بیمارستان
فضای سبز شهری
دسترسی به فضای سبز

کودکان بی سرپرست
کودکان خیابانی
زنان سرپرست
معتادین
بیماران ریوی و قلبی
سالمندان
نوزادان و کودکان
از کار افتادگان
جانبازان

Hazard

مخاطره

تعداد روزهای گردوغبار
شدت گردوغبار
زمان گردوغبار
گردوغبارهای مداوم

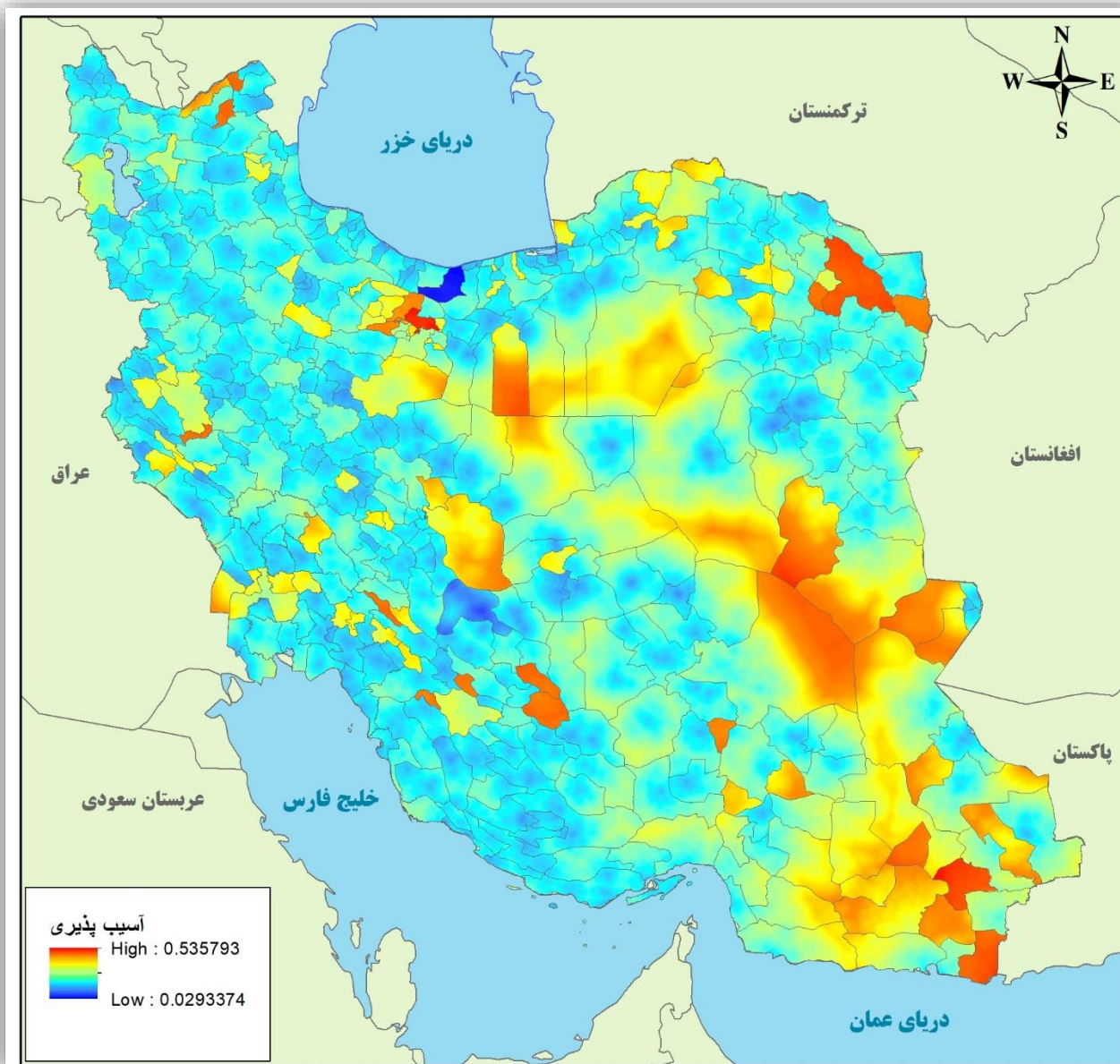
Exposure

در معرض قرار داشتن

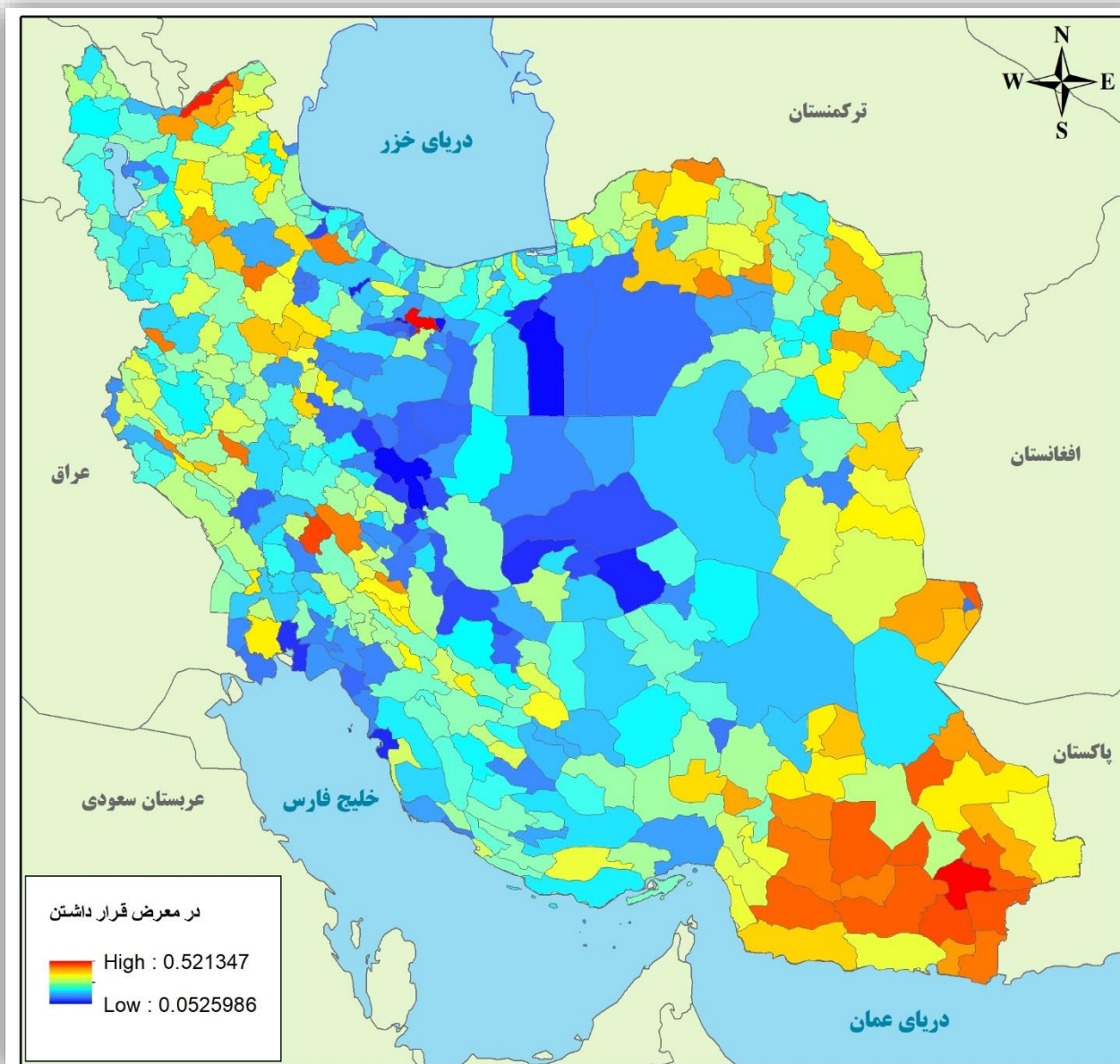
جمعیت
نسبت روستائینی
نرخ باسوادی
میزان مسافرت
مشاغل بیرون از منزل


$$\text{Risk} = \text{Vulnerability} \times \text{Hazard} \times \text{Exposure}$$

آسیب پذیری

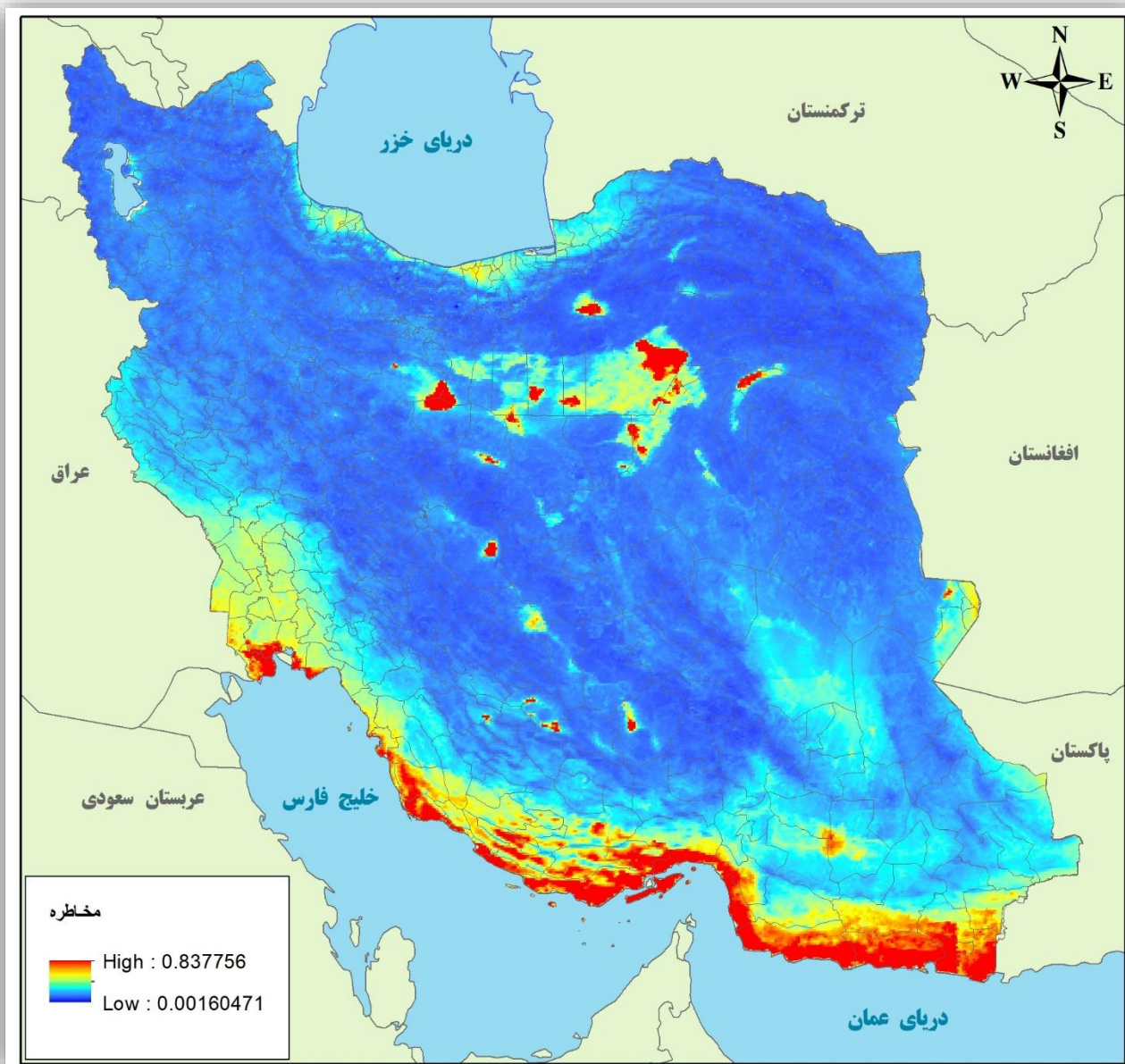


در معرض قرار گرفتن

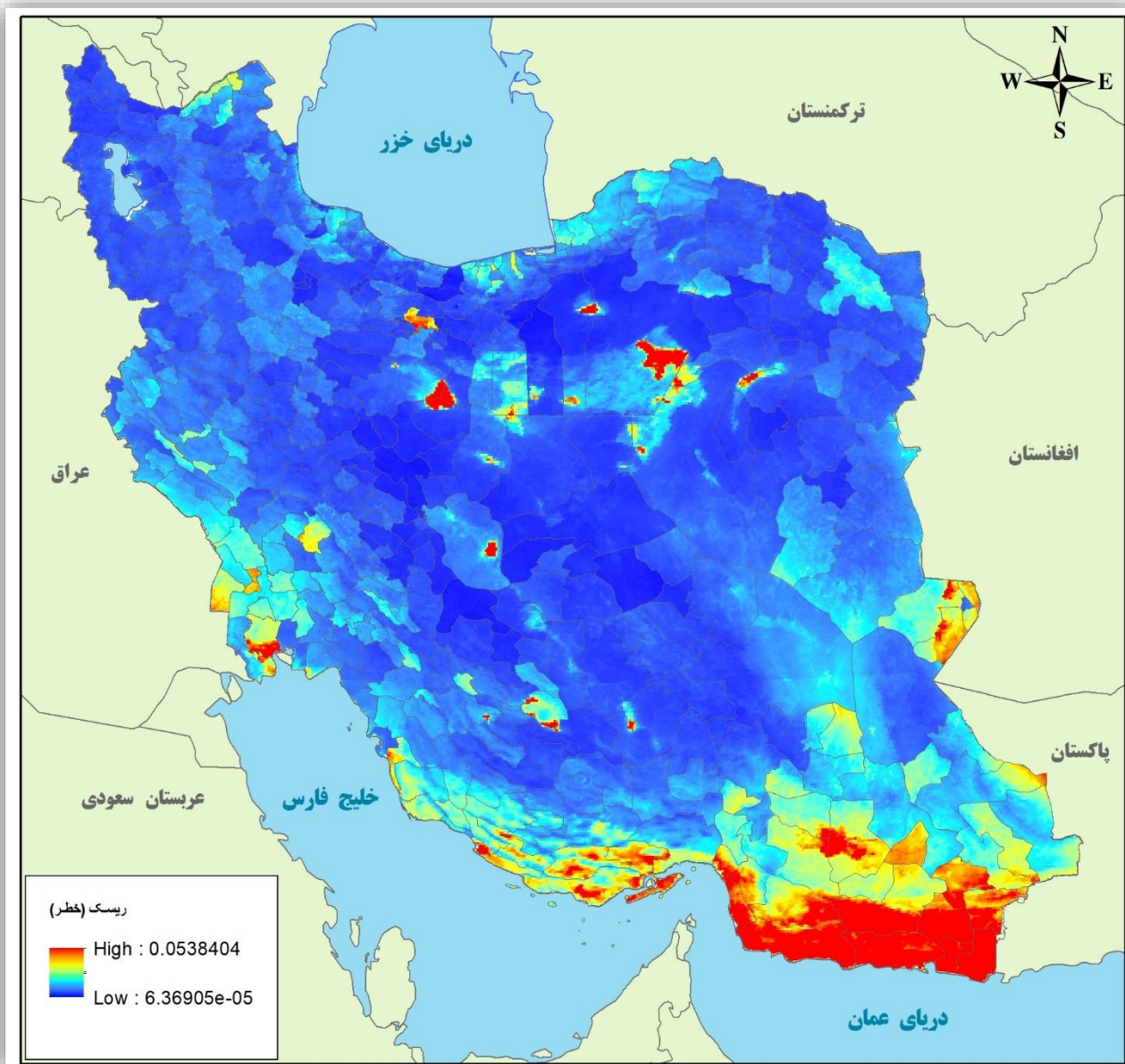


مخاطره (گردوغبار)

شدت
تکرار
طول زمان رخداد



خطر (ریسک)



از توجه شما متشکرم