Investigation of Monsoon Effects on Dust storms in South East of Iran

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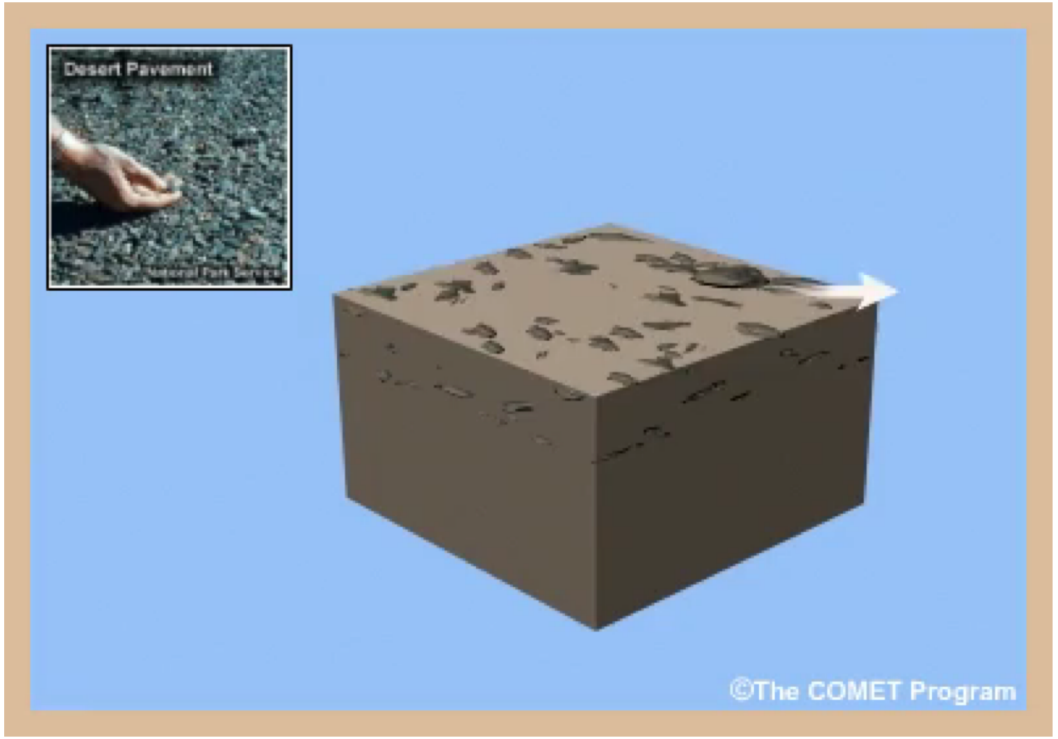
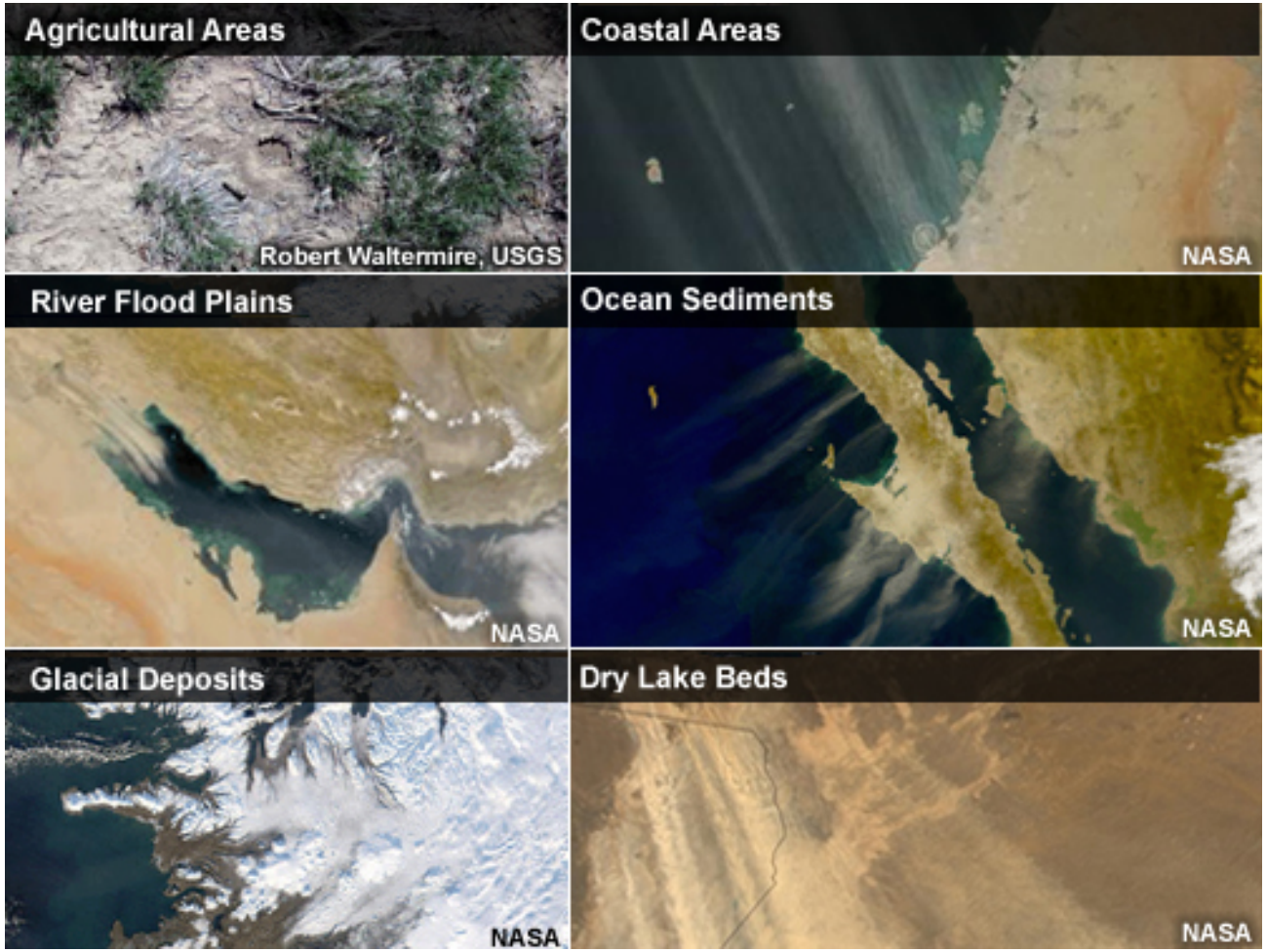
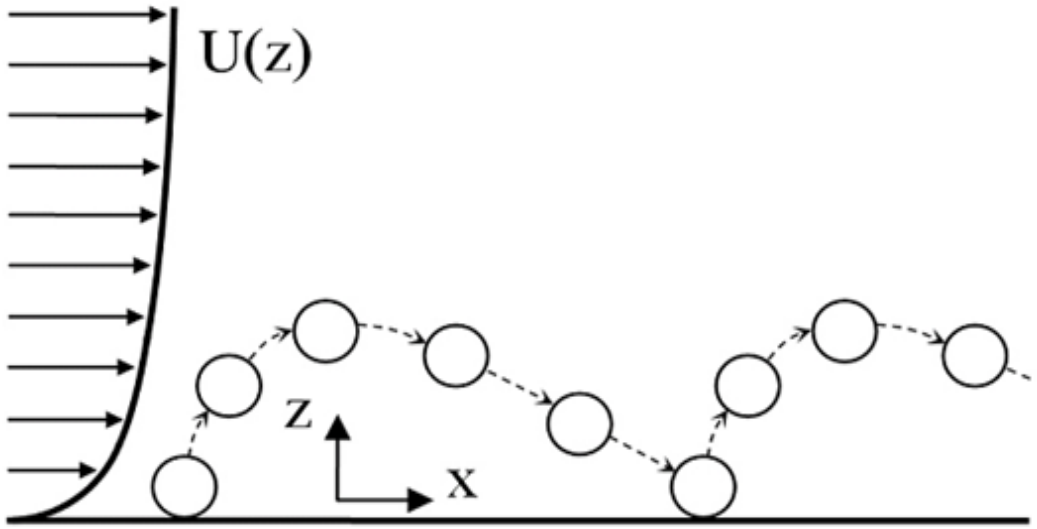
A flood in Shiraz in south of Iran in March 2019

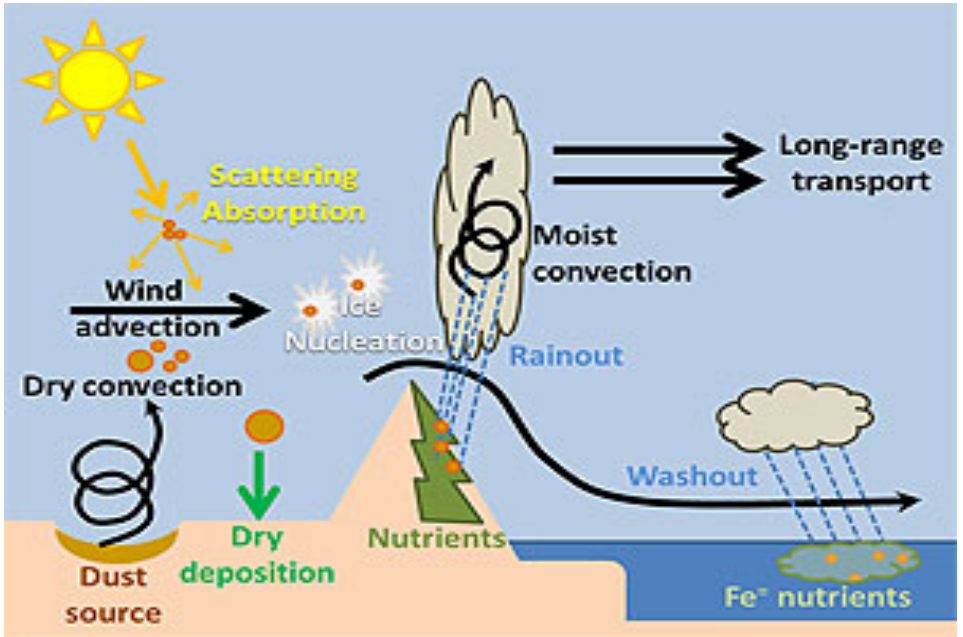
Potential dust sources





Wind effect





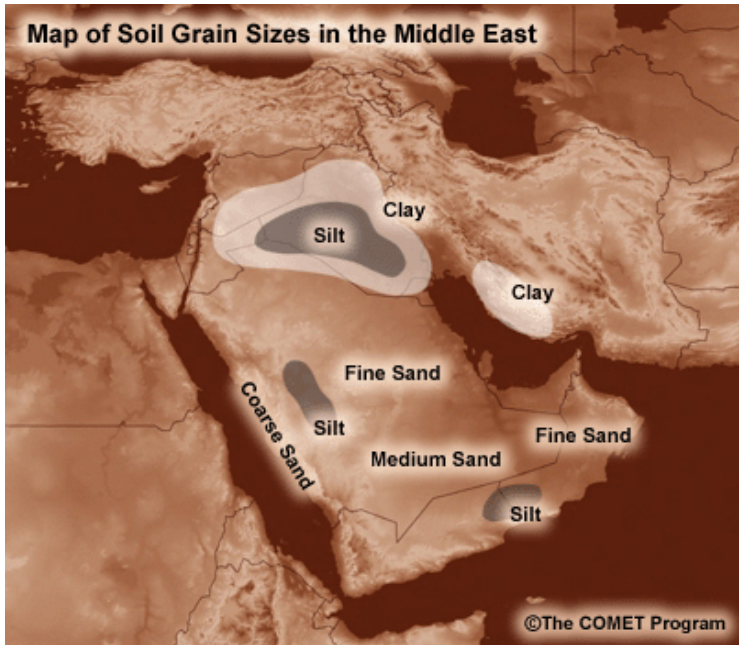
Threshold Dust-Lofting Wind Speeds for Different Desert Environments

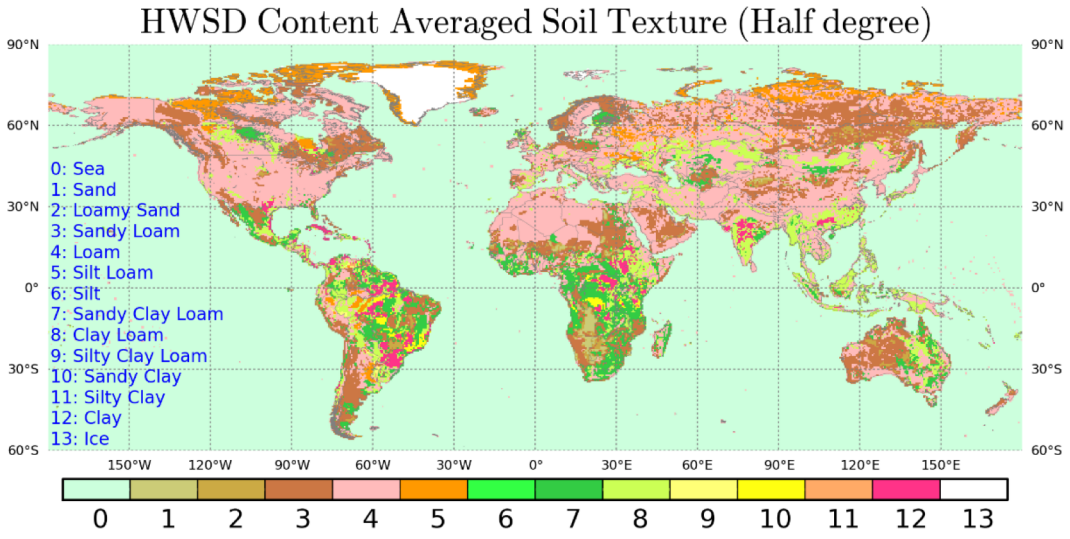
Environment	Threshold Wind Speed
Fine to medium sand in dune-covered areas	4 to 7 m/s (10 to 15 mph)
Sandy areas with poorly developed desert pavement	9 m/s (20 mph)
Fine material, desert flats	9 to 11 m/s (20 to 25 mph)
Alluvial fans and crusted salt flats (dry lake beds)	13 to 16 m/s (30 to 35 mph)
Well-developed desert pavement	18 m/s (40 mph)

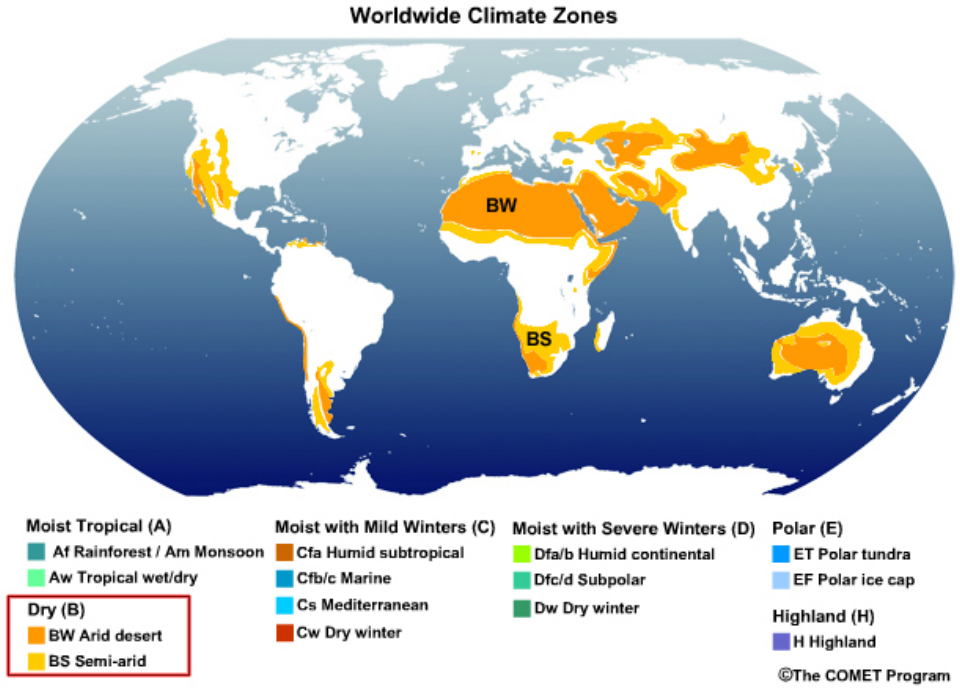
The COMET Program & NASA

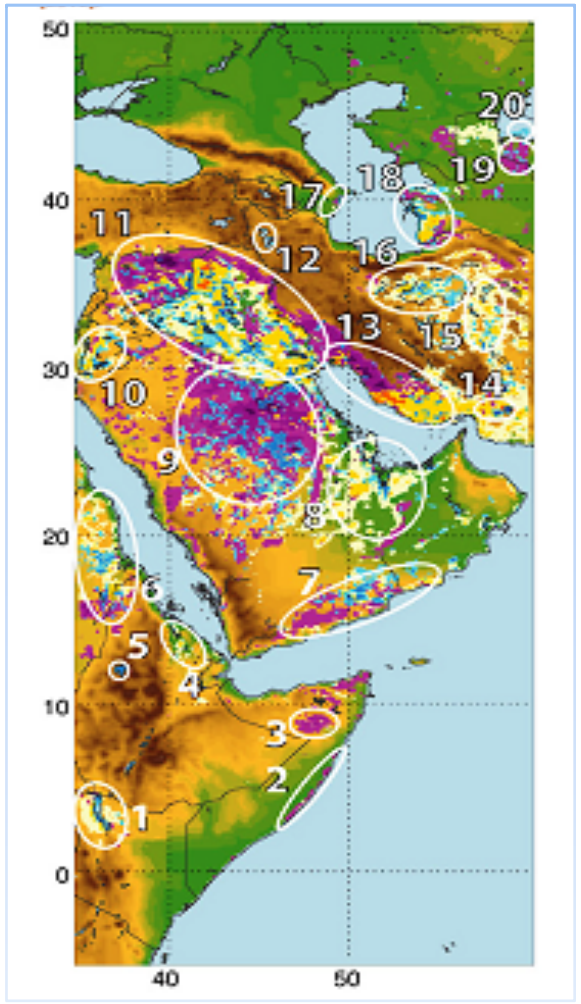
Factors affecting dust Emission

- Soil texture
- Topography
- The climate
- Meteorological factors





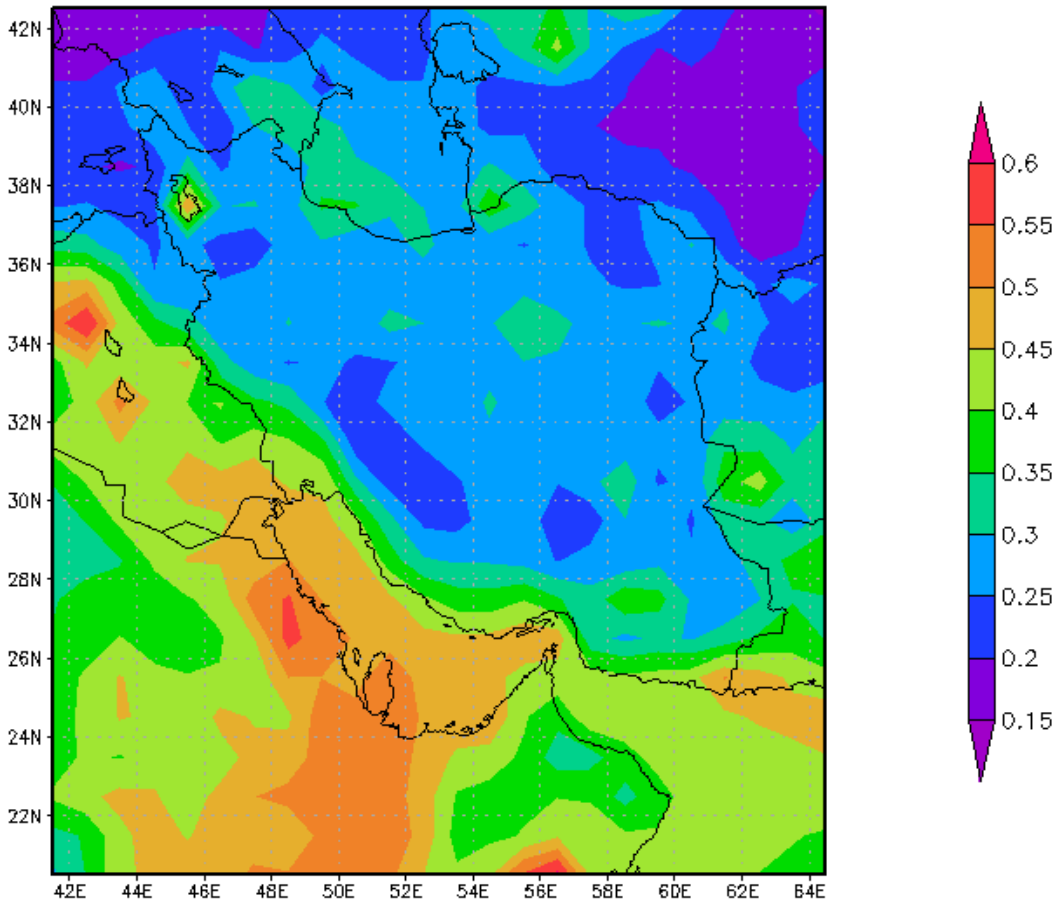




Number of days in spring with AOD>0.2 (UNEP report)

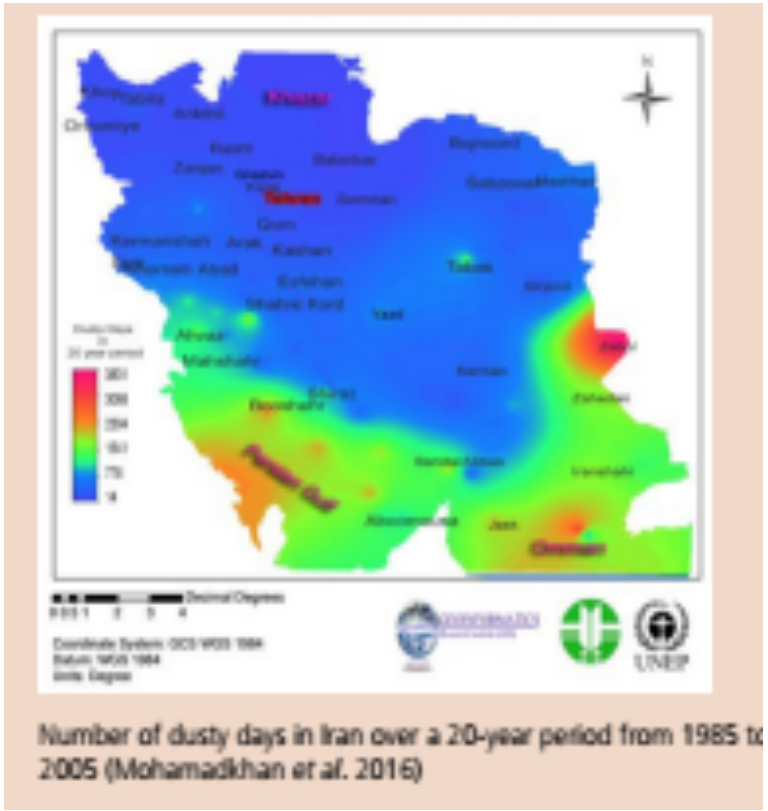
Deserts in The Middle East (Rashki, 2018)

Giovanni



Mean 10 years(2010 -2019) AOD MODIS on Terra

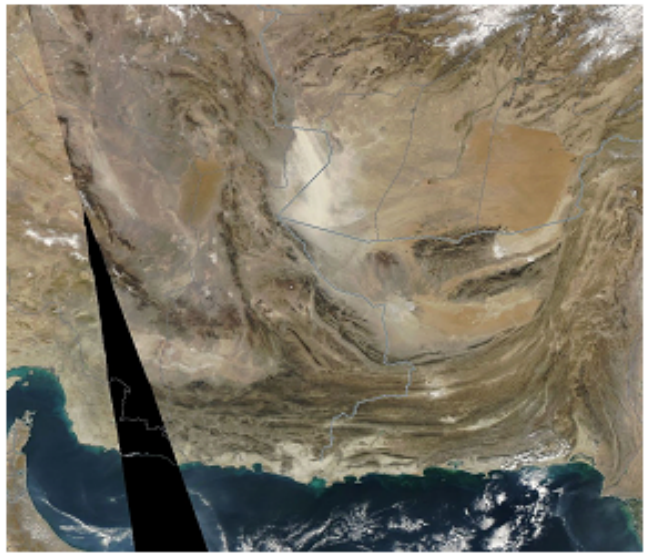
UNEP reports



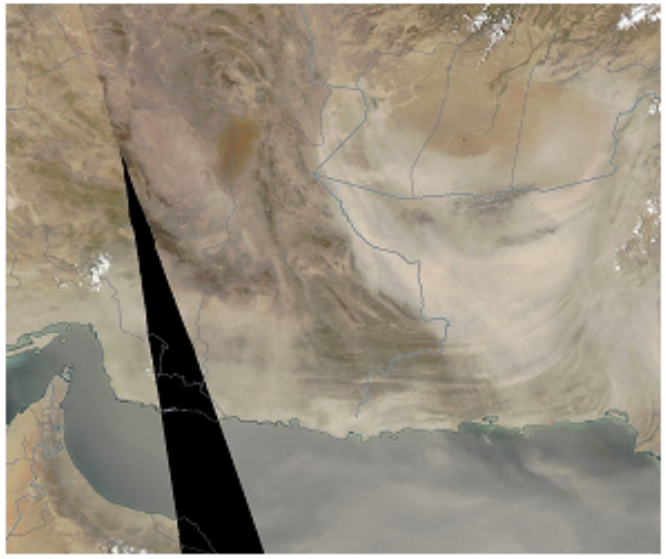
Number of dusty days in Iran over a 20-year period from 1985 to 2005 (Mohamadkhan et al. 2016)

Number of dusty days in 20 years(1985-2005)

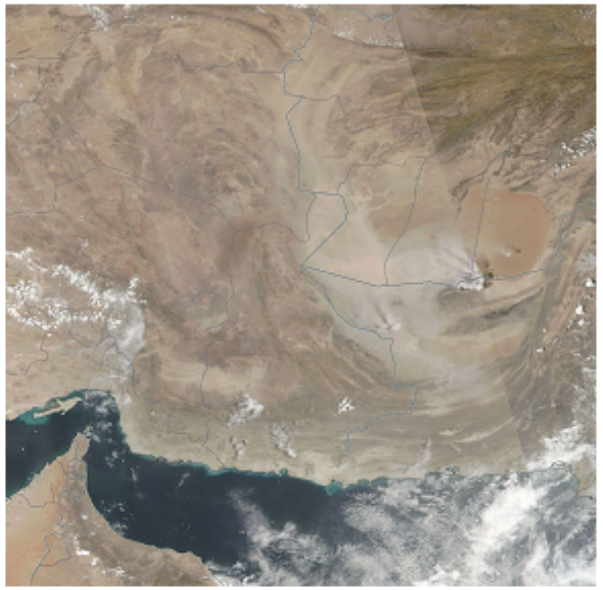
Modis Aqua and Terra satellite true-color images



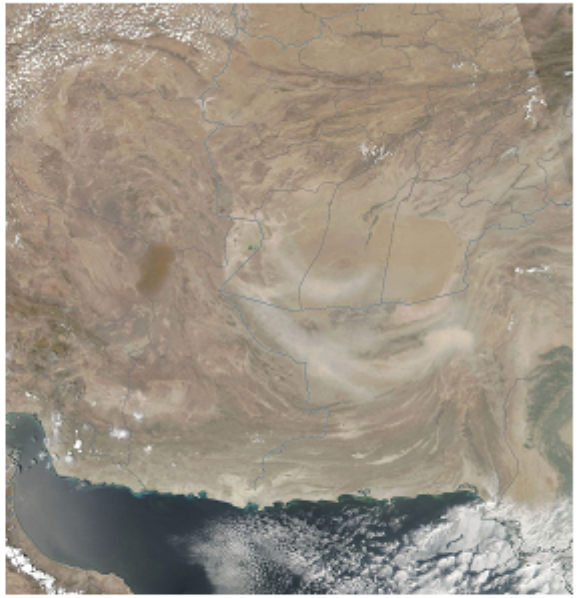
7 January 2010



5 June 2012

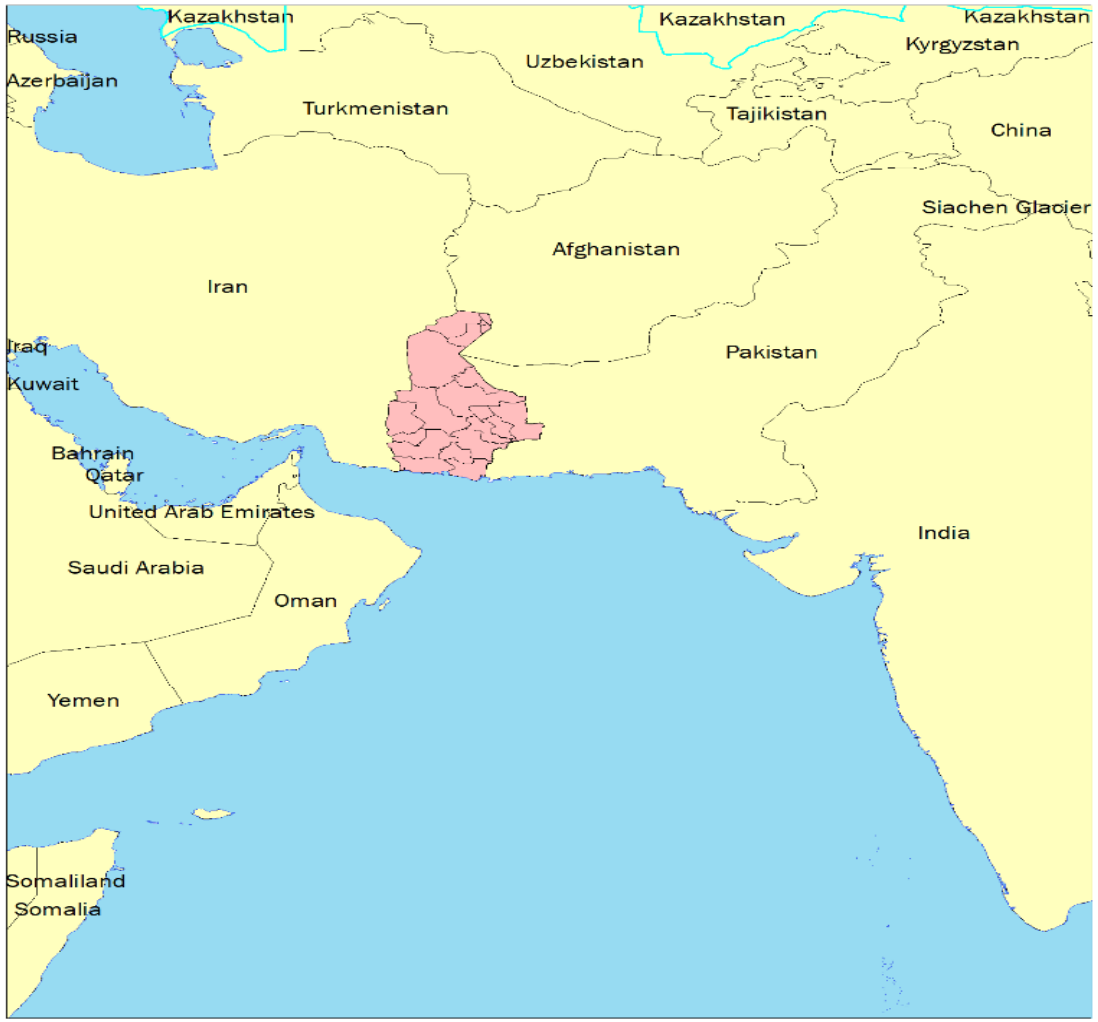


13 July 2016

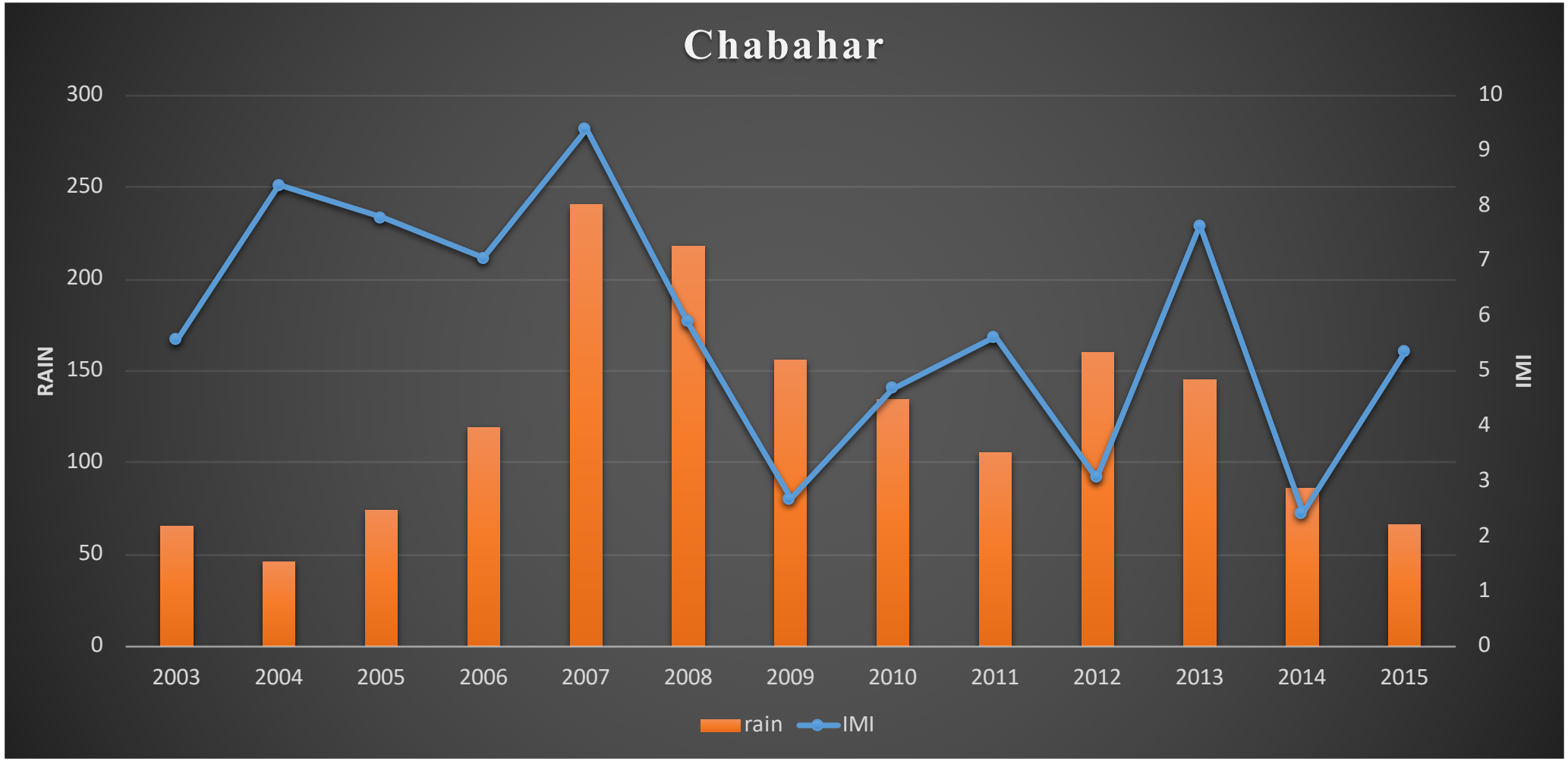


1 August 2017

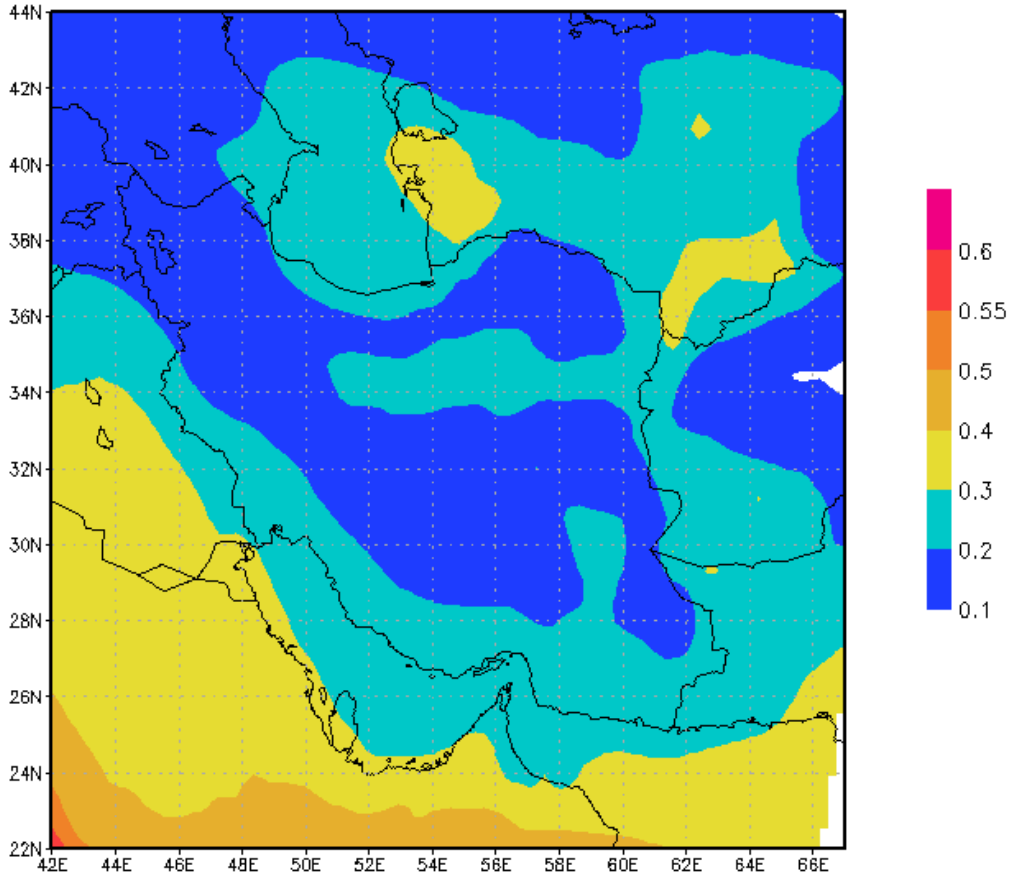
The study area



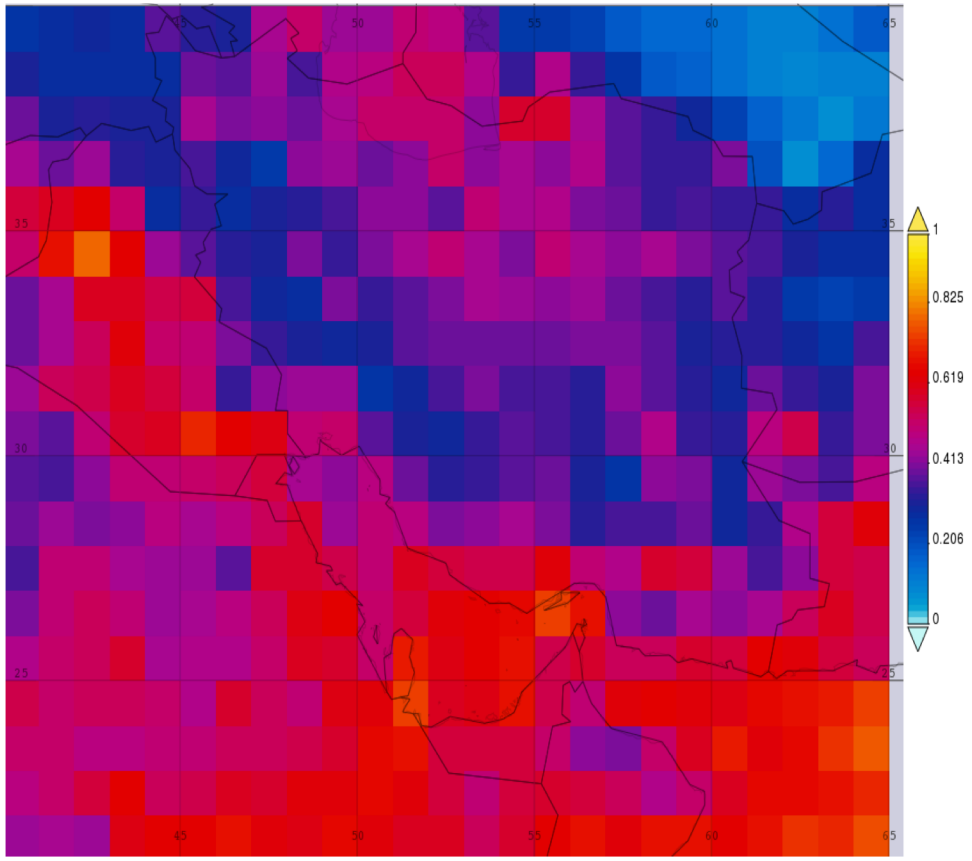
The total rain in Chabahar(meteorological organization data) and IMI



Mean AOD at 550 nm

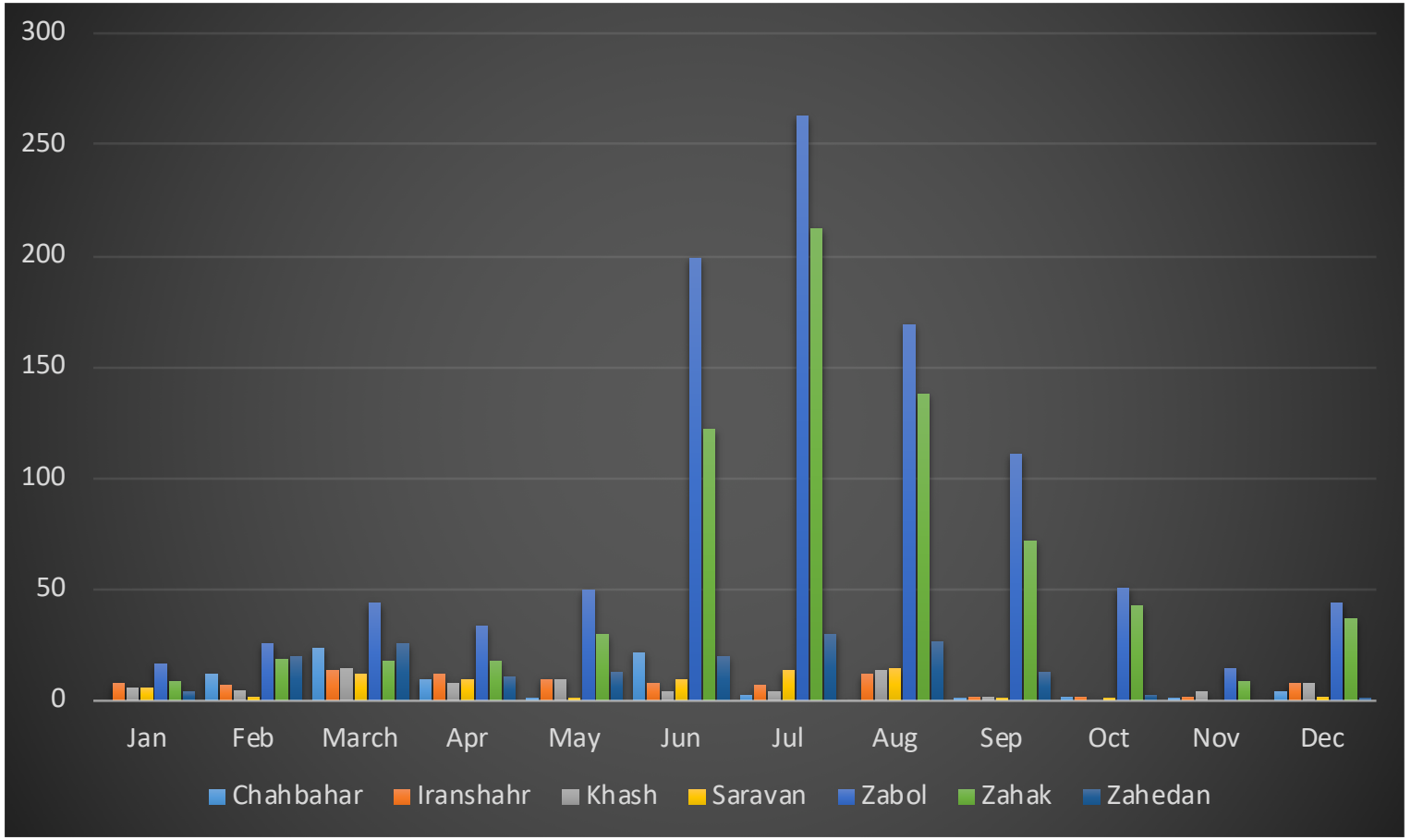


Mean AOD in June 2015 RegCM 4 model output



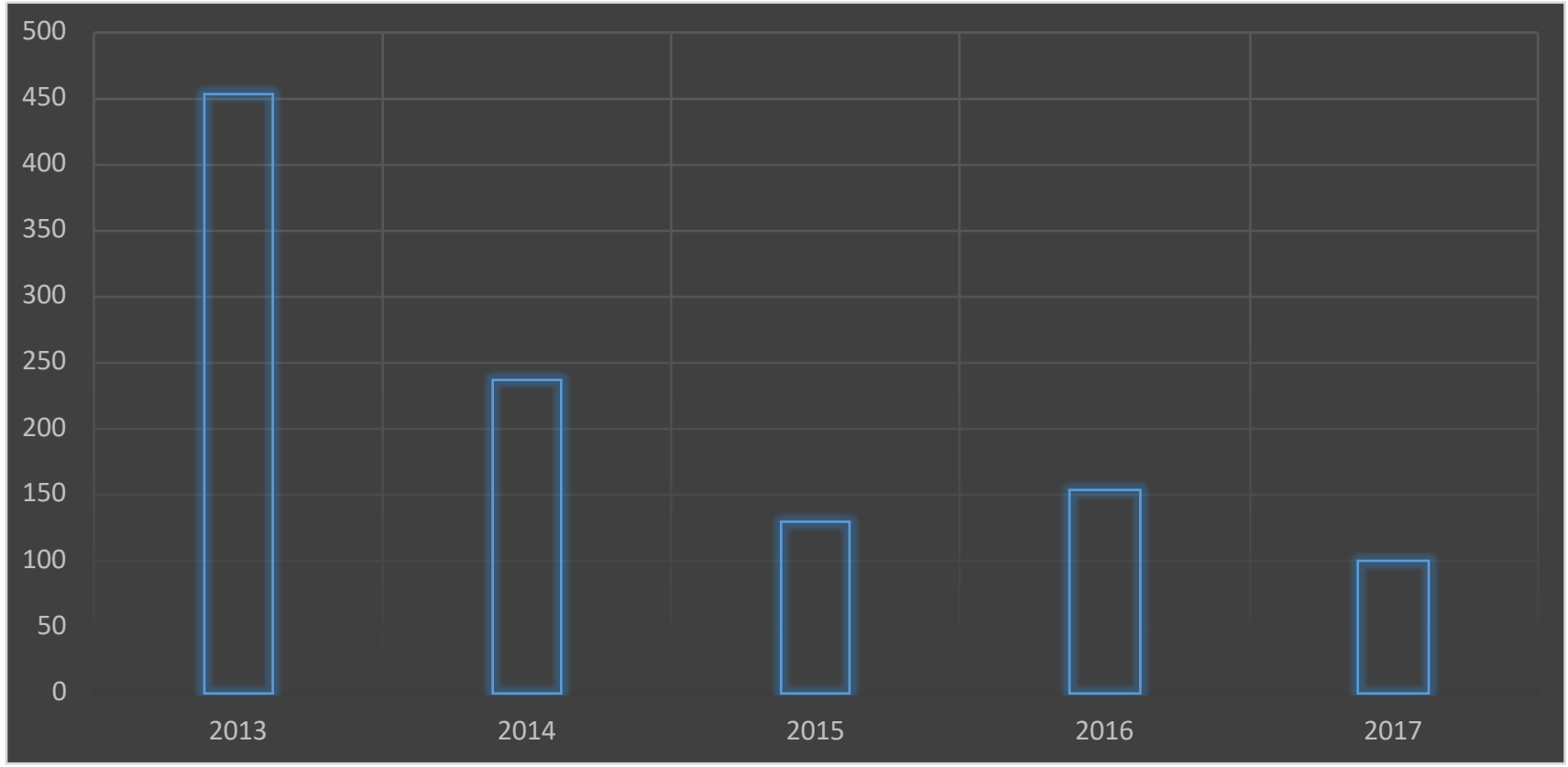
Mean AOD in June 2015 MODIS on Terra (Giovanni)

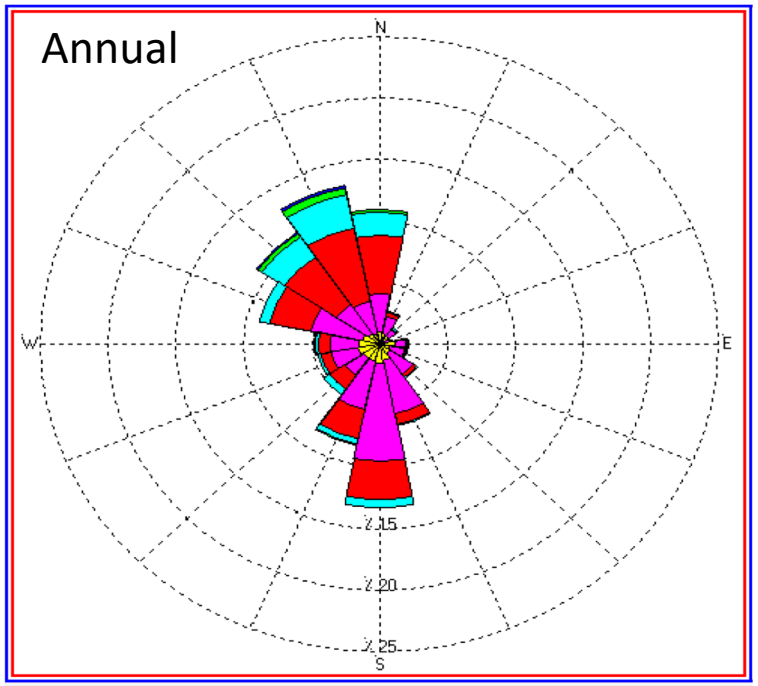
Sistan Province

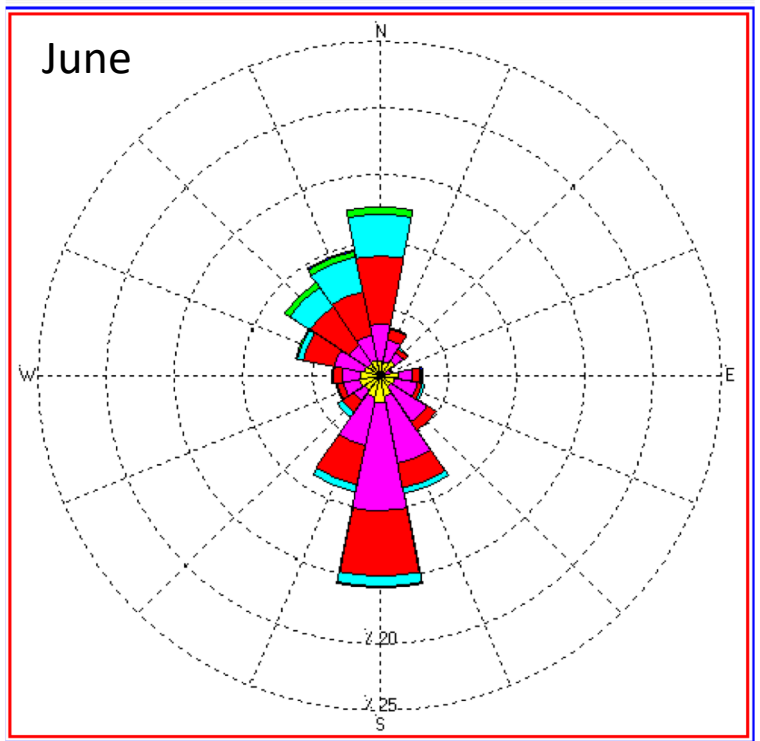


Frequency of dust reports(visibility<1000m) in 2002-2017

Mean PM10 concentration in Zabol station in Autumn

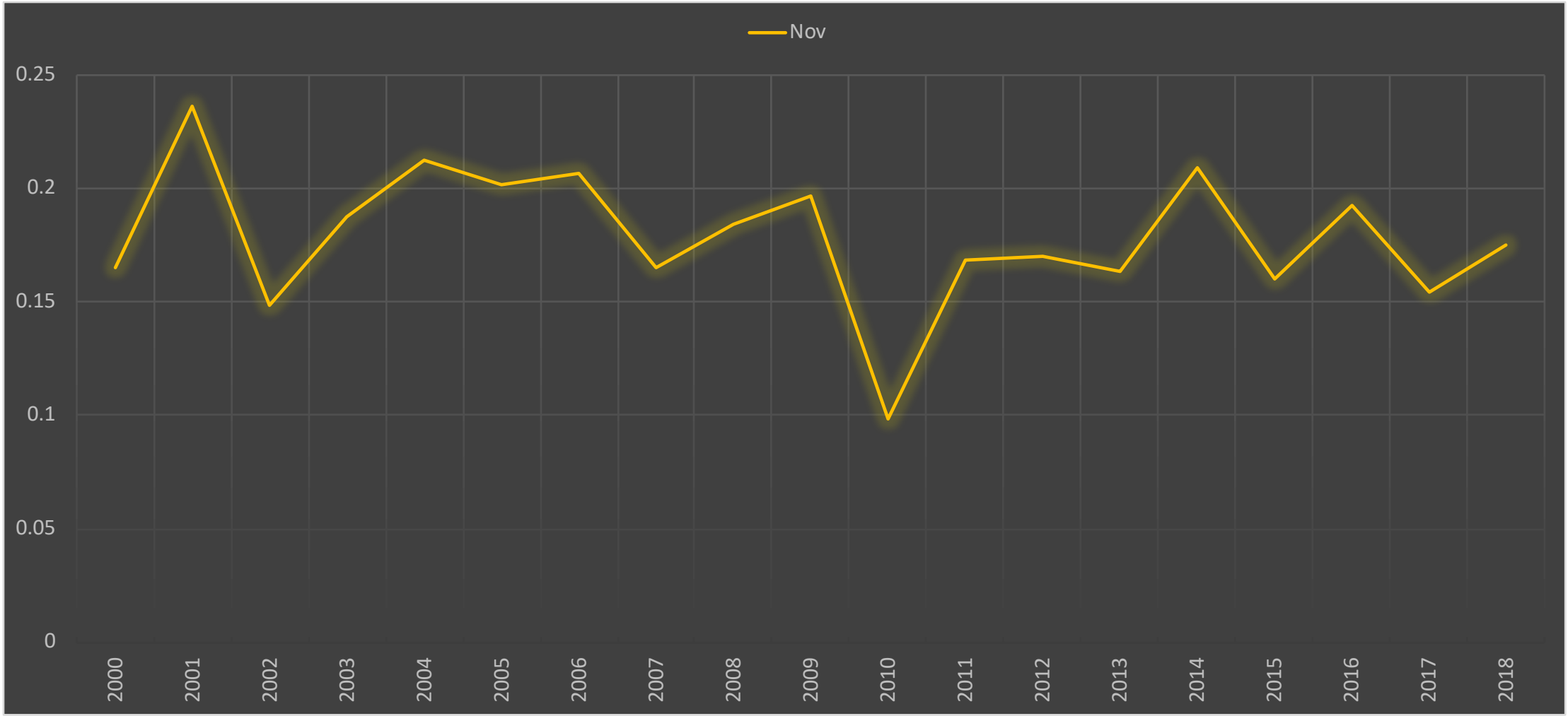




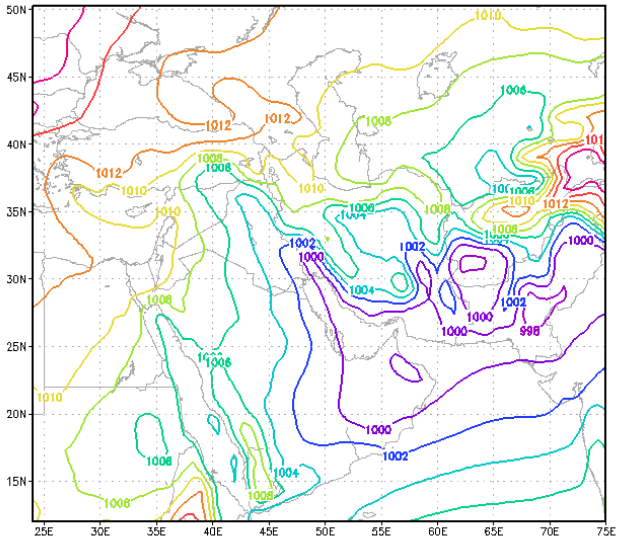


0 - 3
3 - 6
6 - 9
9 - 12
12 - 15
15 - 18
18 - 21
21 - 24
24 - 27

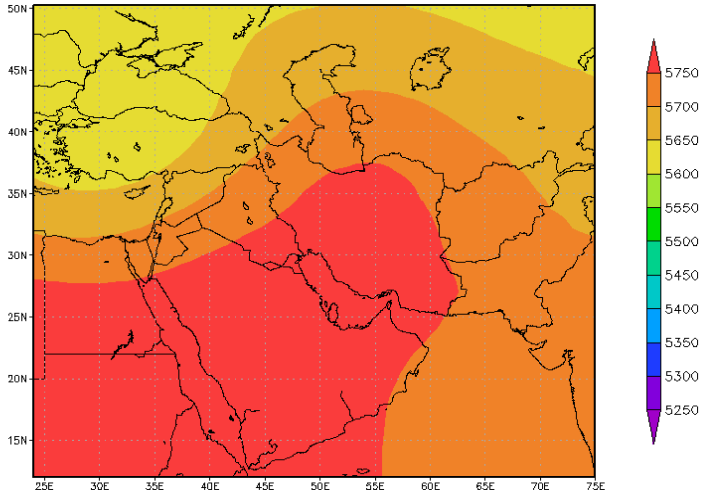
Mean AOD in Sistan plain



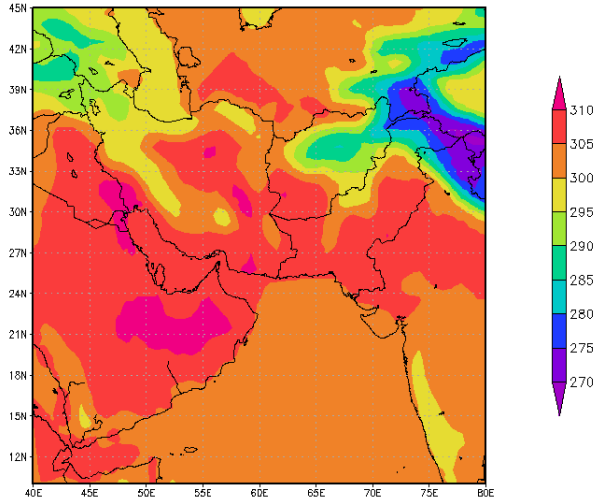
ERA 5 in June 2015



Mean Sea level Pressure

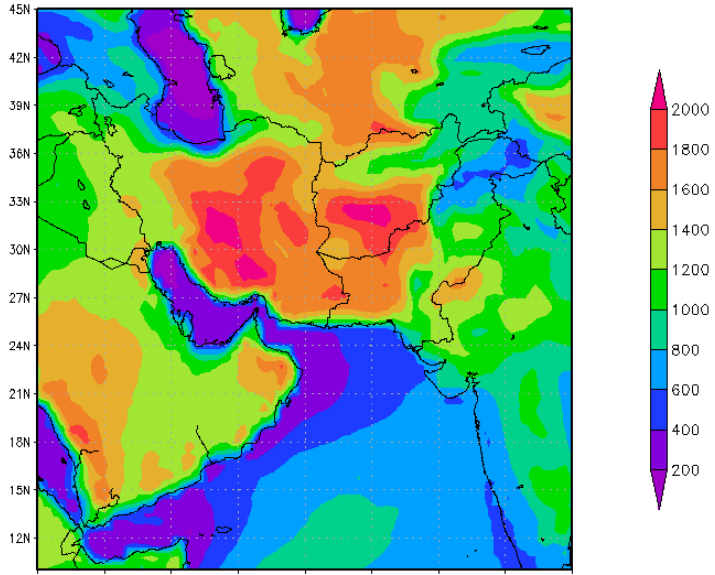


500-hPa Geopotential Height

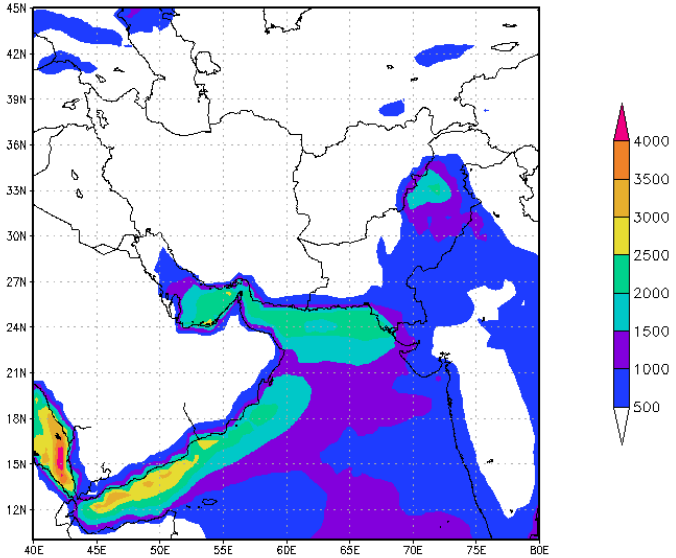


2m Temperature

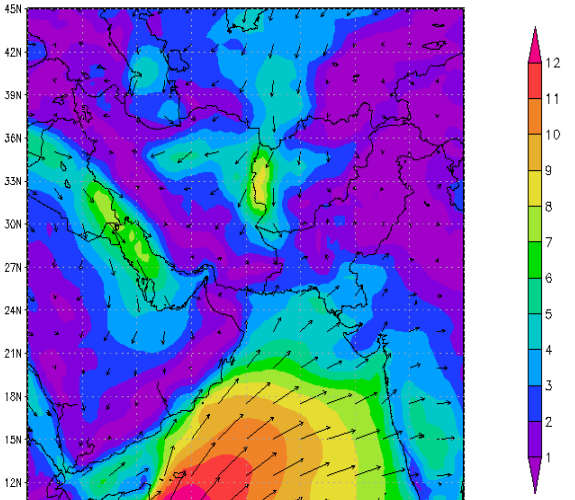
Boundary layer



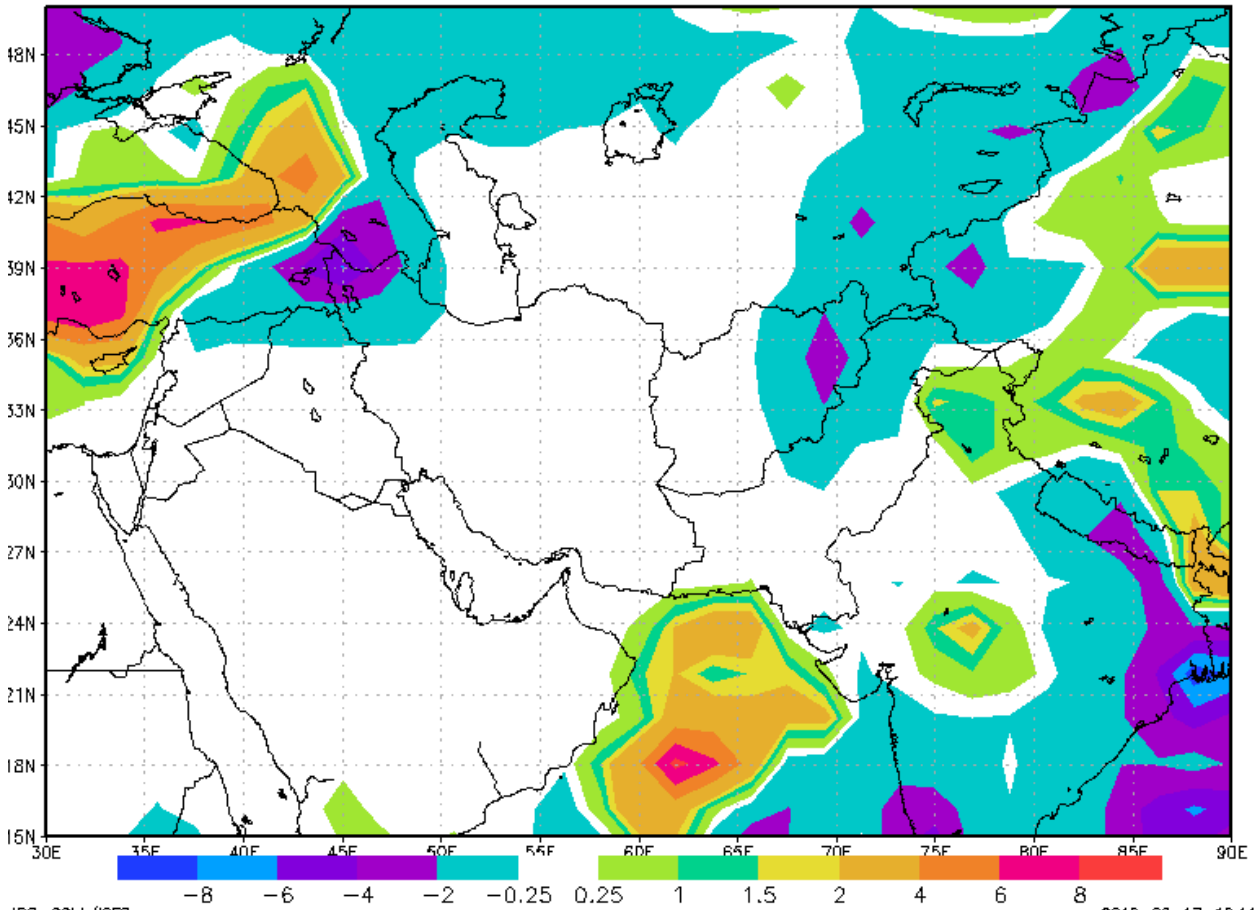
Convective Available Potential Energy



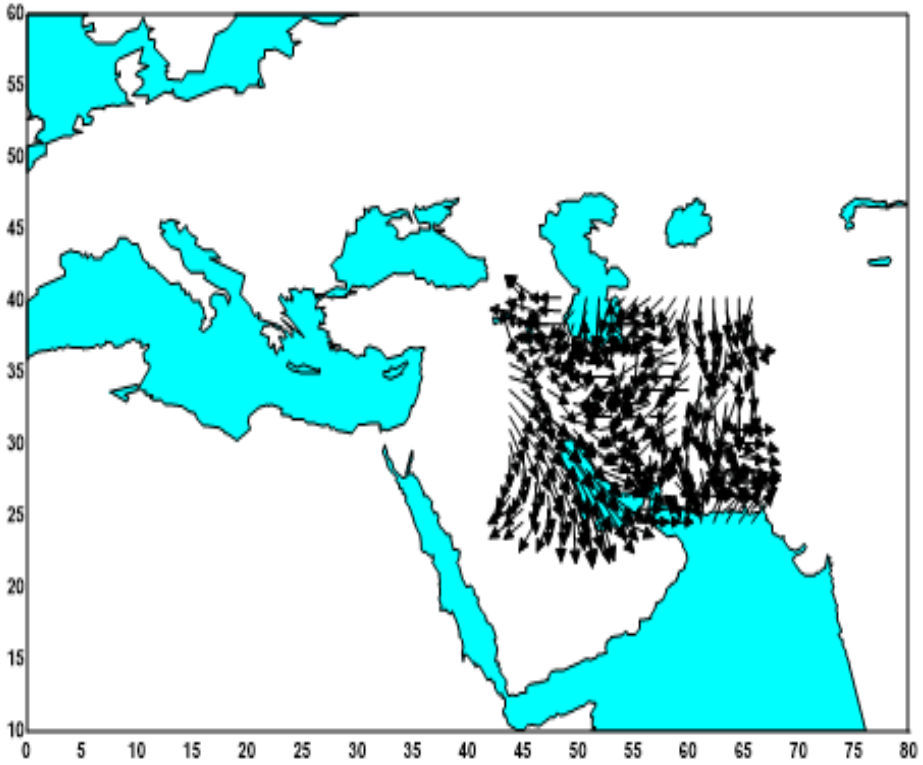
Wind Speed and Direction



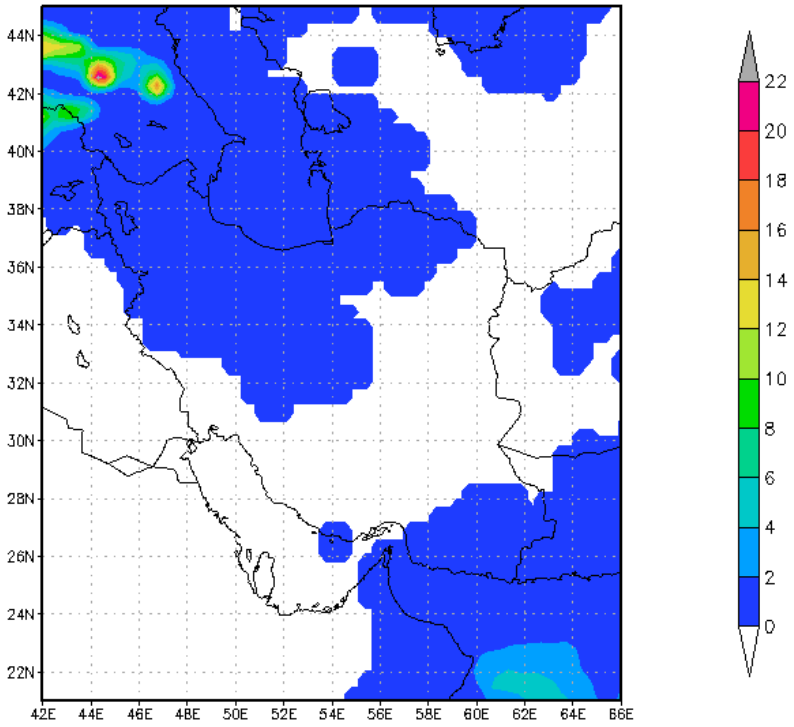
Montly Precipitation Anomaly in June 2015



wind direction of WRF model Output



RegCM4 model output in June 2015



Total Precipitation

Conclusion

- Total annual precipitation in Chabahar in the south east of Sistan province shows that in the most of the years, the changes in total precipitation is coinsident with the change of IMI .
- The mean observational PM10 data in Zabol shows that it reduced in autumn 2015.
- Investigations show the prevailing wind in the southern areas is mostly the southern wind in June and also in the whole of year.
- RegCM model output shows well the propagation of precipitation over Iran in June 2015.
- WRF model with 5 kilometer downscaling shows wind direction was mostly southerly in June 2015.
- Observational data shows that dust storms has fallen in the autumn 2015 compared to the other years.


Thank you for your attention