



## Analysis of the Number of Dusty days in the West and South West of Iran

Saeed Movahedi<sup>1</sup> and Seyede Maryam Afzali<sup>2</sup>

<sup>1</sup>Department of Climatology, University of Isfahan, IRAN

<sup>2</sup>Agricultural Climatology, University of Isfahan, IRAN

Available online at: [www.isca.in](http://www.isca.in), [www.isca.me](http://www.isca.me)

Received 9<sup>th</sup> April 2013, revised 29<sup>th</sup> May 2013, accepted 24<sup>th</sup> June 2013

### Abstract

*In this paper 23 synoptic stations that have longest and complete statistical period are used for analysis the maximum dusty days. Two distinct time periods (2001-2005) & (2006-2010) are analyzed. The results show Maximum dusty days happen in the May, June and July in most stations. Most pollution was observed in Oxidize (Pagan) station. Second period, Clearly shows an increase in the number of days in the dust. In addition, Causes of the Dust are explained with Satellite Images and Range of days with dust was shown by Inverse Distance Weighted (IDW)*

**Keywords:** Dust, wind erosion, inverse distance weighted (IDW).

### Introduction

Dust phenomenon is climatic- atmospheric disasters that various aspects of human life influenced by it. Occurrence of dust in arid and semiarid regions are far more and Living conditions in many arid and semiarid regions of Asia has dramatically affected. Rasoli<sup>1</sup> analyzed trend of occurrence of dust weather in the West Iran by naparametric statistical Man-Kendall. And showed that this system is not homogeneous across the region from north to south and frequency of its occurrence is increasing. Lashkari and Key khosravi<sup>2</sup> expressed Dust storms in Khorasan Razavi province is caused by low pressure in South Khorasan and Afghanistan and high pressure on the Caspian Sea.

Synoptic analysis of Dust systems in Khuzestan province are showed In the cold period of the year, Migratory systems West Wind and Polar front jet stream and in the warm period of the year, thermal low pressure on the earth are The most important factors in creating and shaping the events in Khuzestan<sup>3</sup>. Thus the origin of dust based on satellite imagery and circulation patterns in West Baghdad and Mosul has two main focus is to Bhralml and Hvralzym<sup>4</sup>.

Main cause of dust transport in Lorestan Province, trough of Atmospheric middle level (500 HP), The most important ground pressure systems, low pressure in the Persian Gulf and The flow due to temperature difference from East Turkey and North Iraq to the north-west - south-east of the Persian Gulf blows<sup>5</sup>.

Analysis of the 5 years from 1983 to 1987, Indicate that the Dezful station with an average of 137.4 days had most day with dust and Khoy with 2.6 had lowest dust day<sup>6</sup>.

It also shows a increasing trend in the Sabzevar city and Most likely to occur in May and June months and often occurs in the afternoon<sup>7</sup>.

Achudume and Oladipo<sup>8</sup> considered that dust storms cause severe acute respiratory diseases, asthma, allergies, asthma, and the syndrome is also water pollution.

Wang et al<sup>9</sup> analyze Release and transport of dust in East Asia the synoptically and do numerical simulation. Results indicate that dust storm activity may coincide with synoptic systems in desert areas of north-east Asia, with a wind speed of 6 meters per second expanded.

In another paper, seasonal prediction of spring dust weather frequency (DWF) in Beijing during 1982–2008 has been performed. it is found that climate signals occurring synchronously with spring dust weather, particularly meridional wind at 850 hPa over western Mongolian Plateau, are also linked closely to spring DWF in Beijing<sup>10</sup>.

### Material and Methods

In this study, data from 23 synoptic stations of west and southwest of Iran were used. Stations covers the provinces of Khuzestan, Lorestan, Ilam and Kermanshah. At each of the stations monthly dust days were obtained from the Meteorological Organization. Monthly charts were drawn for the whole stations. In addition, changes the location of maximum and minimum dust days during the period are shown.

The main causes of dust: i. The flows storm in Saudi Arabia and Iraq, ii. Climate change and fluctuation: Increase trend of temperature has caused widespread drought Followed by reduced soil moisture a lot It helps release dirt particles and is capable of transmitting aerosols. iii. Alluvial and flood sediments: Khuzestan plain is covered by alluvial youth deposits that in Quaternary periods, have been brought to the area by the river of Zagros. Going back the Persian Gulf and the humid and semi-humid climate also led to the area, erosion of the river was much higher than today. The rivers in the province due to its

very little mild slope are divided into many branches and Because of this slope decline, massive amounts of sediments in this area have remained. Shift of river ways and The presence of alluvial make areas prone for wind erosion, iv. The lack of vegetation and desertification: The main cause of wind erosion is being bare ground. Dry, due to lack of air rising dominance subtropical high pressure, hot winds and the low thermal expansion, deserts are expanded. v. Because of natural changes can not alter suddenly human changes have more significance in intensify these changes. Factors such as construction of dams on rivers, vegetation and reduce the unethical culture, development, drilling and extraction of oil, including natural ecosystems by humans has led to a greater imbalance.

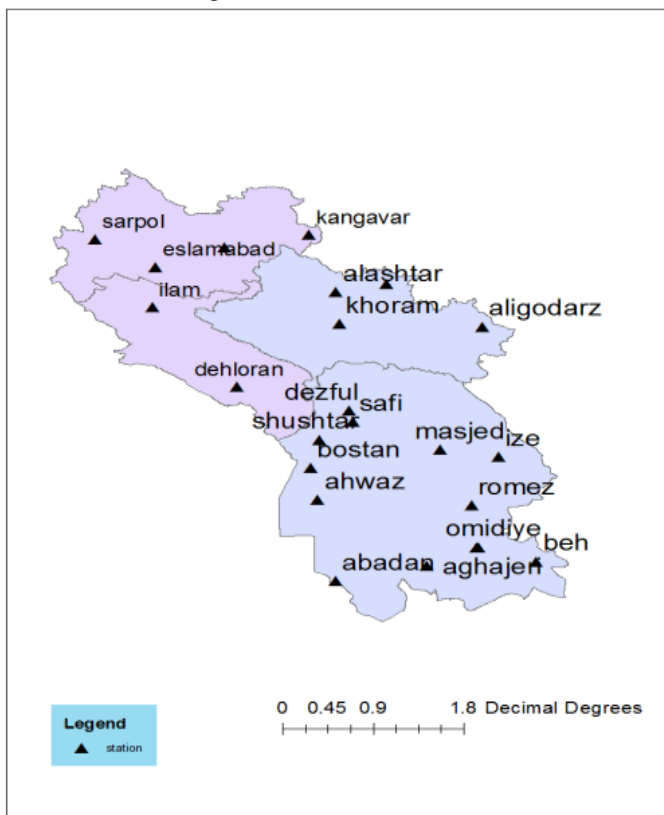


Figure-1

Locatin of the selected Station in west and southwest of Iran

## Results and Discussion

**Statistical analysis:** Studies on the status of the province in dust period (2000 -2010) the following results were obtained: Among the 23 selected stations, station Omidiye (Paygah) with 2023 dust days, is the maximum and Borojerd with 282 days is the least city with dust day, And the years 2001 and 2009, respectively, have the lowest and highest levels of dust.

Monthly studies show that the majority of dust and dust up stations in the months of May, June and July and the minimum in December and January.

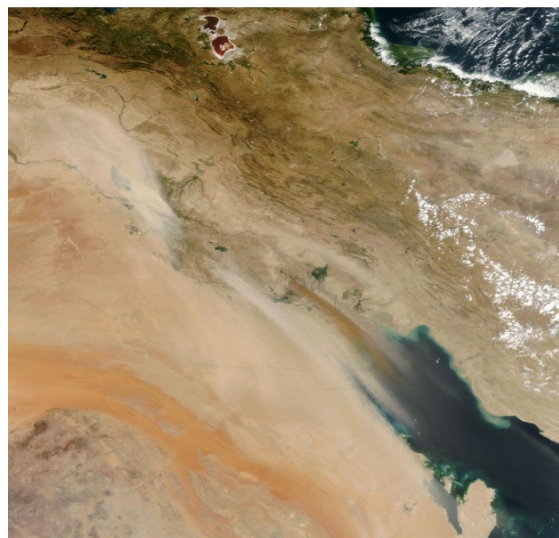


Figure-2

Dust production centers in the western of Iran  
 (Image from Satellite NASA)

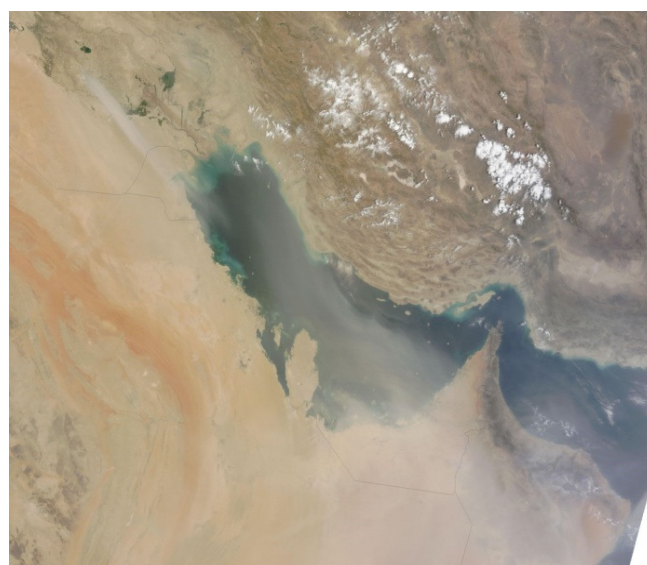
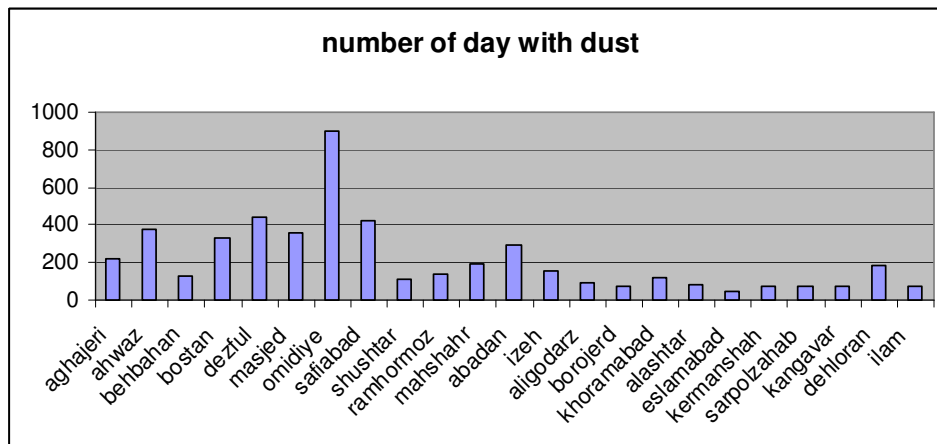


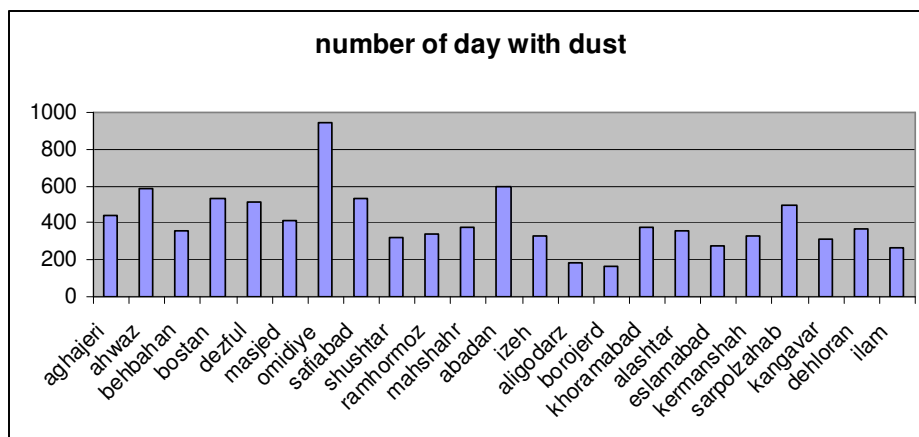
Figure-3

Dust production centers in the western of Iran  
 (Image from Satellite NASA)

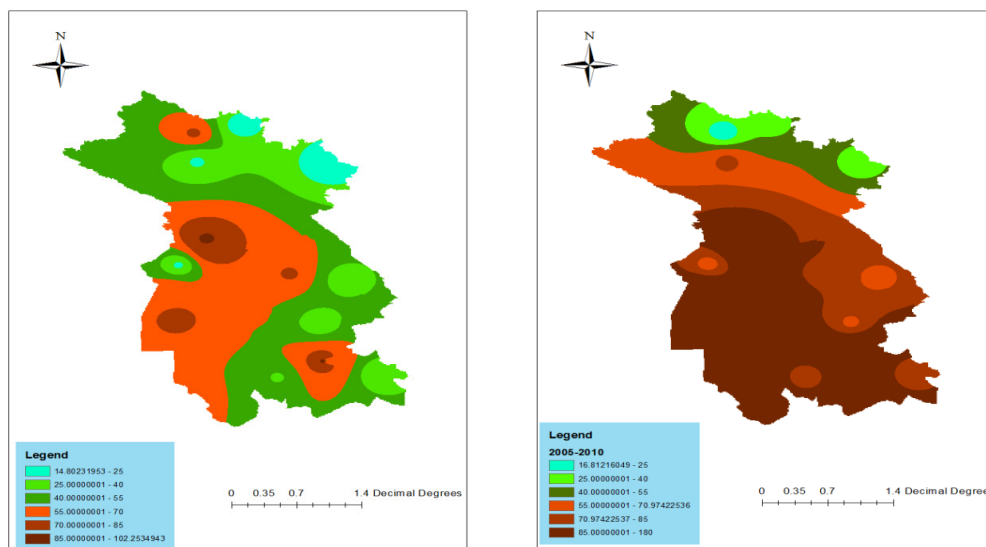
**Spatial Analysis:** Map drawn the province of Khuzestan and Lorestan is indicating that the more southern and western parts of the province, near the center of the dust, have extreme conditions. But in the first period (figure 6), dark brown that are shown maximum days with dust is appearance in spots forms. In second five- year period this color covered large part of these provinces. Light and dark green covered north and east of provinces in first period, but in second period, this color retreated to north and covered just the margins of area. In these photos, significant differences are appearance (only in the space of 5 years).



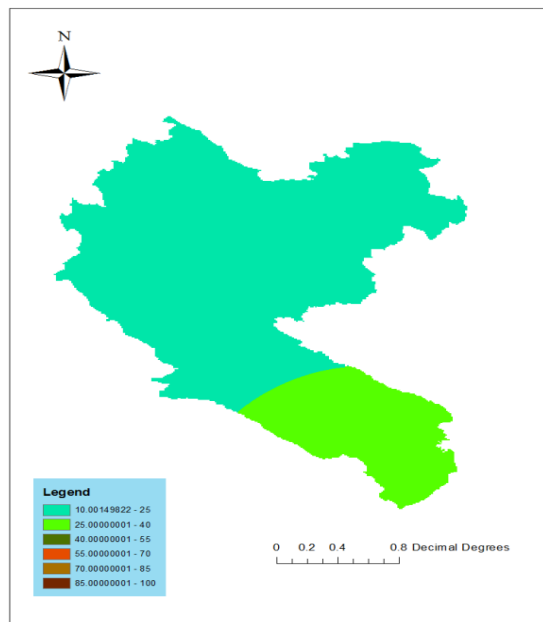
**Figure-4**  
 Number of dusty days during 2001 to 2005



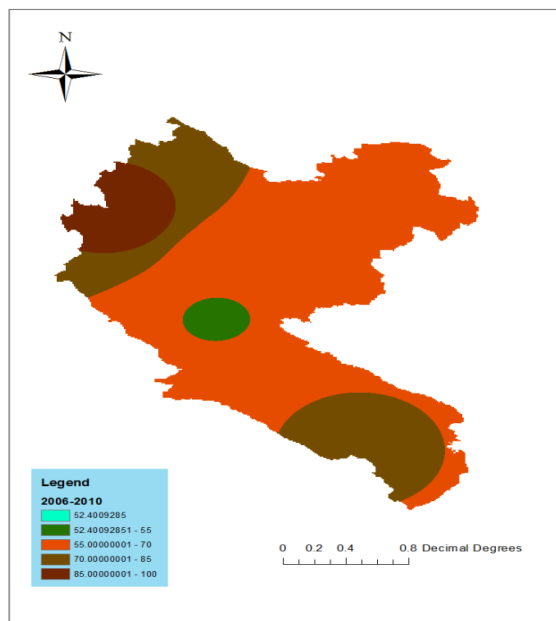
**Figure-5**  
 Number of dusty days during 2005 to 2010



**Figure-6**  
 Map of dusty days (2001-2005) – left, and map of dusty days (2006-2010) – right



**Figure-7**  
 Map of dusty days (2001-2005) in Ilam and Kermanshah



**Figure-8**  
 Map of dusty days (2006-2010) in Ilam and Kermanshah

The map above shows Days of the greatly increased with dust is very high. So that the second five years longer any trace of blue and green light will not be considered. The South West Ilam and

Kermanshah provinces than in other areas have more dusty days.

### Conclusion

The main goal of this study was to show how varied cases such as the flows storm in Saudi Arabia and Iraq, climate change and fluctuation, alluvial and flood sediments, the lack of vegetation and desertification and natural changes cause dust in west and south west providences of Iran. It seems urgent action of government to prevent irreparable damages in humanistic and natural areas is very necessary.

### References

1. Rasoli A., Sarisaraf B. and Hassanmohammadi G., Analysis trend of Dust Phenomenon in west of Iran during recent 55 years by using nonparametric methods, *Journal of natural geography*, third year, **9**, 1-16 (2011)
2. Lashkari H. and Key khosravi G., Synoptic Statistical Analysis Dust storm in Khorasan Razavi province during (1993-2005), *Journal of natural geography researches*, **65**, 17-33 (2008)
3. Tavousi T., Khosravi M., Raispoor K., Synoptic analyze of dusty systems in Khozestan, **20**, 97-118 (2011)
4. Atai H. and Ahmadi F., Analysis dust as one of the environment problems in Islamic world (case study: Khozestan province), *Collection of forth international Islamic Geography World* (2010)
5. Khoshkish A., Alijani B. and Hejazizadeh Z., Synoptic analyze of dusty systems in Lorestan, *Journal of applied geography researches*, **18**, 91-110 (2011)
6. Zolfaghari H. and Abedzadeh H., Synoptic analysis of dusty systems in West of Iran, *Journal of Geography and Development*, 173-188 (2005)
7. Mirshahi D. and Nekonam Z., Statistical analysis of dust phenomen and dusty wind pattern in Sabzevar city, *Journal of Association of Iranian Geographers*, **22**, 83-104 (2009)
8. Achudume A.C., and Oladipo B.O., Effects of dust storms on health in the Nigerian, *Environment Biology and Medicine*, **1(4)**, 21-27 (2009)
9. Wang W. and Fang Z., Numerical simulation and synoptic analysis of dust emission and transport in East Asia, *Global and planetary change*, **52**, 57-70 (2006)
10. Lang X., Seasonal prediction of spring dust weather frequency in Beijing, *Acta Meteorologica Sinica*, **25(5)**, 682-690 (2011)