Use of Seasonal Index of Different Pollutants of Air at Different Location of Jaipur, Rajasthan

Abstract

The capital city of Rajasthan, Jaipur has been recognized as the rank 103 in the polluted city in the world. Pollution Index has reported this as per their findings in 2017 mid-year. In this paper, air pollution data of six centres such as Ajmeri Gate, Boards Office Jhalana Dungri, Chandpole, MIA RIICO Office, RO Jaipur vidhyadhar Nagar, VKIA ofJaipur city has been taken. A Time Series Analysis has been done and find out the month wise seasonal variation of pollutants such as NO_2 , SO_2 and RSPM. It is observed that in the month of August all three pollutants were very less and in the month of January these three pollutants were very high. The comparison of these air pollutants of six centres of Jaipur is also made.

Keywords: Sulfur Dioxides, Nitrogen Oxides, Respirable Suspended Particulate Matter, Air Quality Index, Ambient Air Quality.

Introduction

Anejaet-al (2000) has found out the relationship of NO_2,SO_2 and RSPM in metrological condition.Sliniet-al (2002) has developed an application to forecast the peak Ozone level of metrological and Air quality variable.Jhaet-al (2004) has found out the assessment and monitoring of air quality parameters by Interpolation and Statistical method.Sharma et-al (2004) has formulated a division for rational mitigation strategies for the environmental management.Thilagaraj et-al (2005) has found the atmospheric affect the human health, animal, plants or microbial life.Gupta (2006) has found the monetary benefits to indivisual from health damage avoided as a result on reduction in air pollution.Mathur et-al (2007) has find out the statistical analysis of Indoor Air Pollution.Asadi et-al(2008) has found out the information in a rapidly growing industrial center using Remote Sensing and GIS.Kumar et-al (2009) has found the Spatial Distribution of air pollution in response to recent air quality regulation in Delhi.Kumar et-al (2011) has express the ambient air quality of Jaipur city in the form of Air quality India.Lin et-al (2012) has found regression analysis between recent Air Quality and visibility changes in Megacities at four Haze Regions in China.Sharma et-al has found the predicting violations of national ambient air quality standard using extreme value theory.Prusty (2012) has found the ambient air quality Surveillance and Indexing in and around mining cluster.Waseemet-al (2013) has found the effect of Indoor air pollution on human health.Dholakia et-al (2013) has found mortality impact and interaction with temperature of air pollution.Chaurasia et-al (2013) has make a assessment report of Air quality status on Industrial, commercial and residential area by using AQI.Kala et-al (2014) has found the status on urban roads using Air Quality Index.Ghosh et-al (2015) has wrote a article about Air Pollution and India.Yadav et-al (2015) has found Trend in Air Pollution by using SEN ESTIMATOR method.Majiet-al (2015) has found Air quality assessment and its relation to potential health impact.Ahmad et-al (2015) has found Ambient Air quality on the basis of number of vehicles and petrol pumps.Chouhan et-al (2016) has found out the relationship between RSPM, $NO_2$and SO_2 by using Correlation and Regression method.

Objectives of the Study

The objectives of the present study are to assess the ambient air quality with respect to RSPM, NO_2andSO_2; to study seasonal analysis of pollutants over 2010 to 2017 and also comparison of six stations in which NO_2, $SO_2$and RSPM are high or low.

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Study Area

Jaipur is the capital city of the desert state of Rajasthan, Jaipur massif covers about 484.64 square k.m. of the total area of Rajasthan. The district Jaipur lies in North West portion of Rajasthan state India between 26.9·N & 75.8·W coordinates. The present study area is the Jaipur has six stations which are station of Rajasthan state pollution control board Jaipur, here we take data from all these six stations like
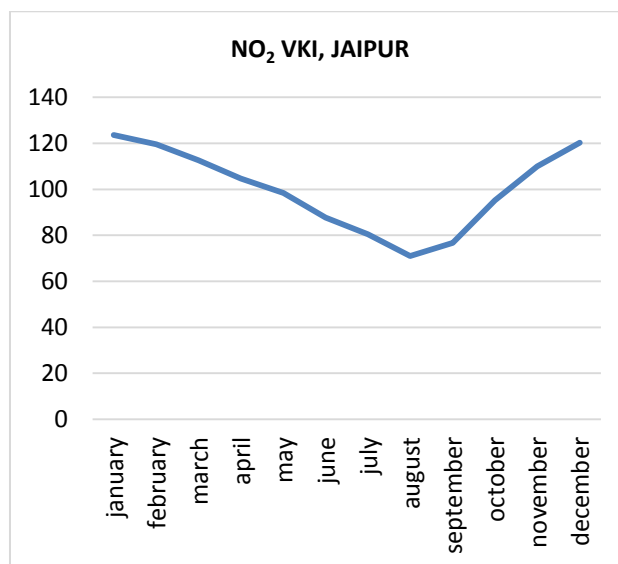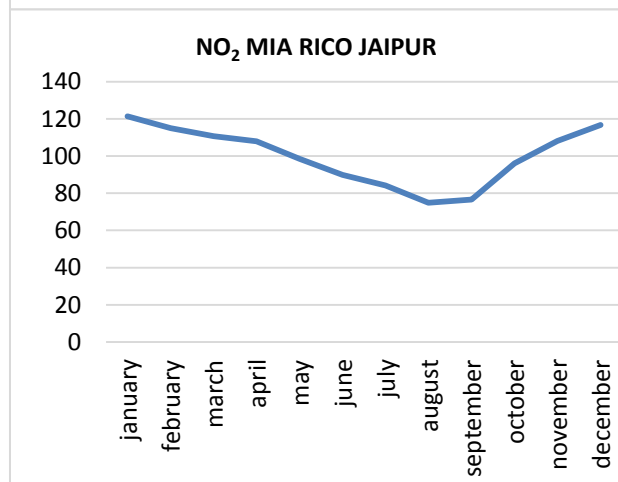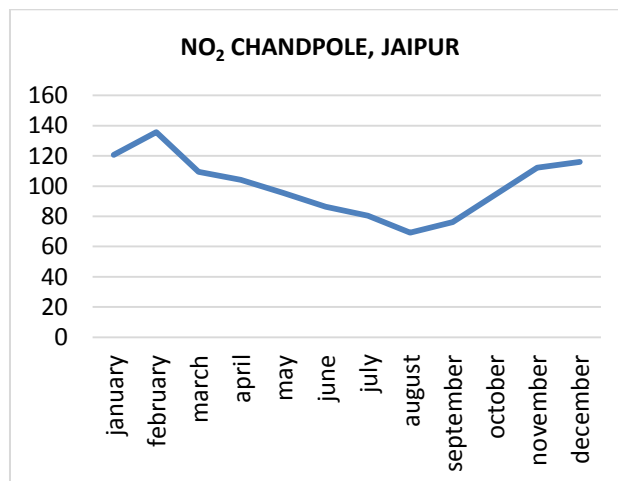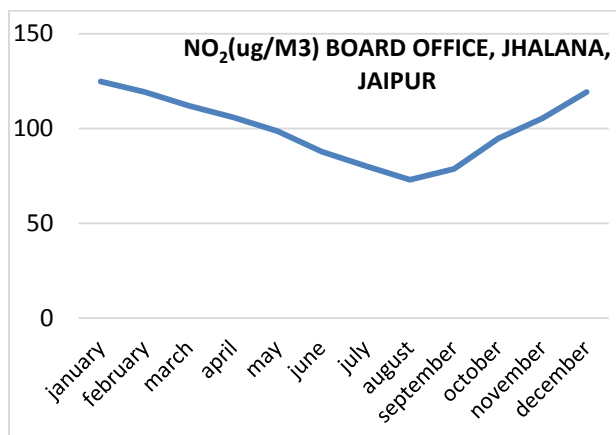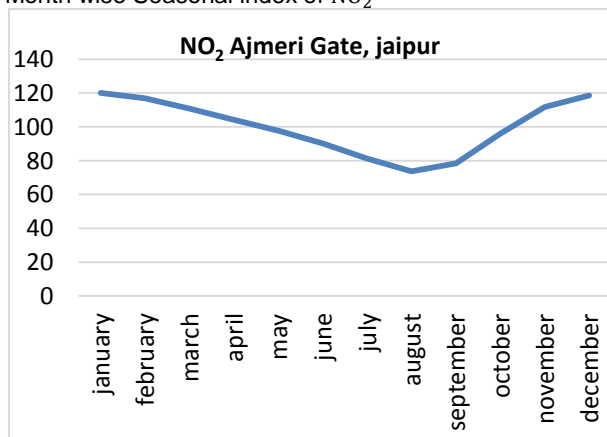
1. Chandpole
2. Vishwakarma Industrial Area
3. RIICO Area
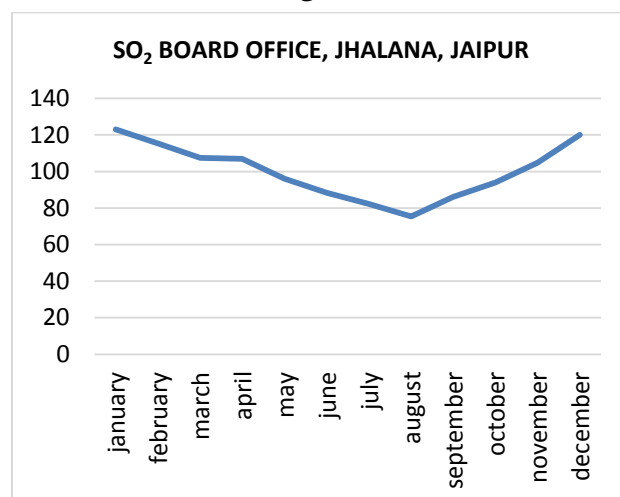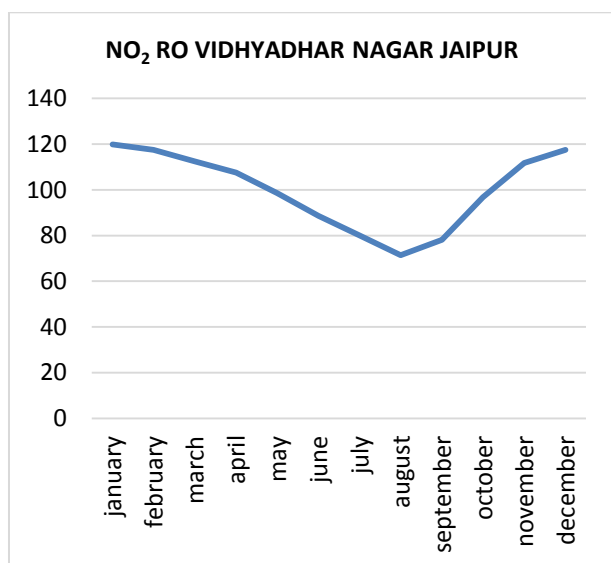4. RO Vidhyadhar Nagar
5. Ajmeri Gate
6. JhalanaDungri

Here we collect the data of data of NO_2, SO_2 and RSPM. These data are available from site of RSPCB, Jaipur and our standard value is taken from CPCB, Delhi.
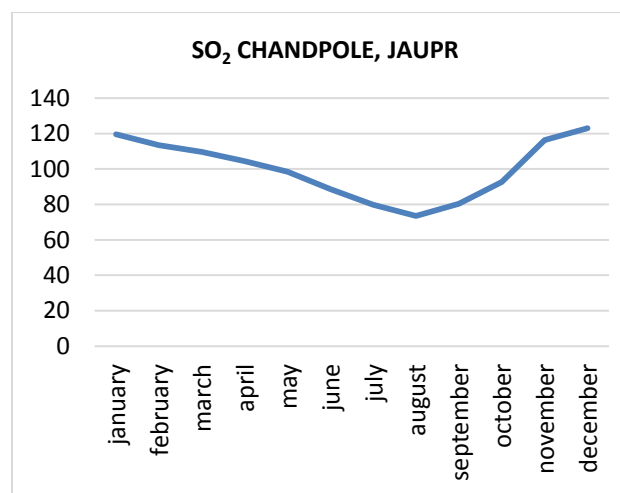
Data Collection and Research Methodology

For the present study eight successive year data from 2010-2017 have been taken into consideration which has been obtained from RSPCB, Jaipur. The climate in Jaipur is varies from extremely hot in summer and cool weather in the winter months. The state of Rajasthan mainly has dry and hot climate. Rajasthan climate can divided into summer, post mansoon, mansoon and winter. The time series analysis to find see the Seasonal variation on the pollutants of different station of Jaipur city.
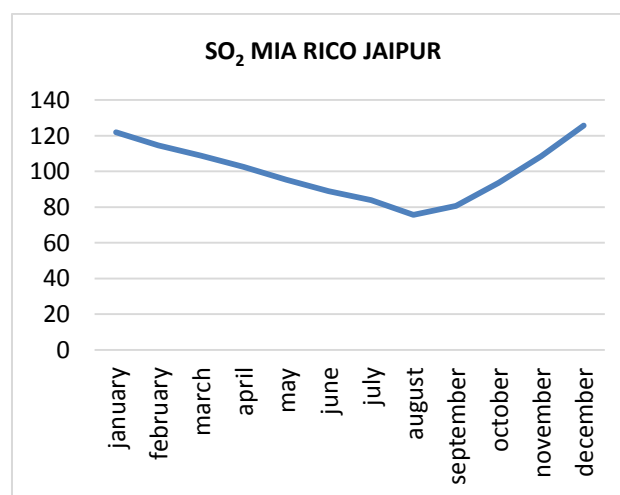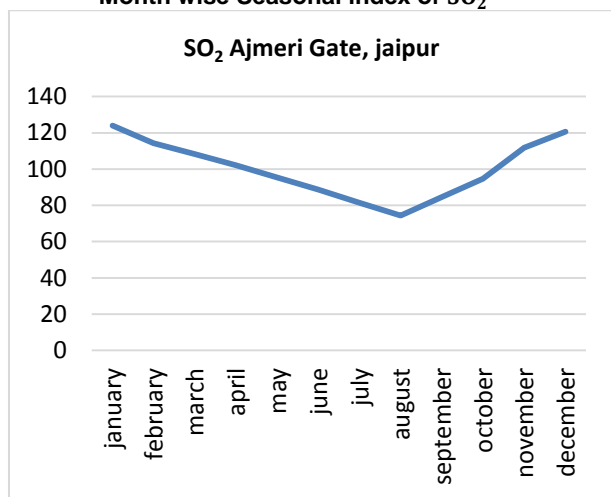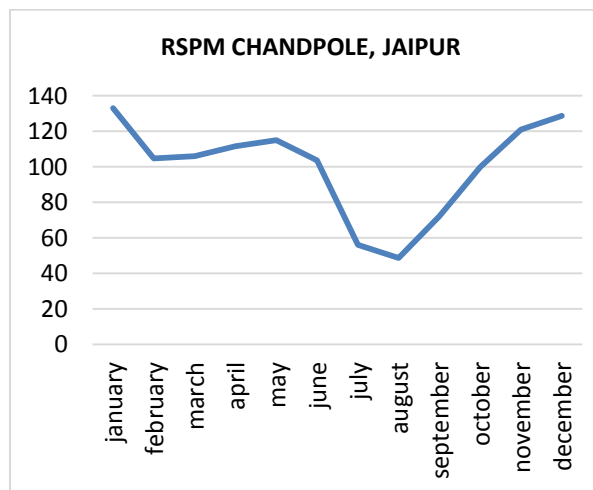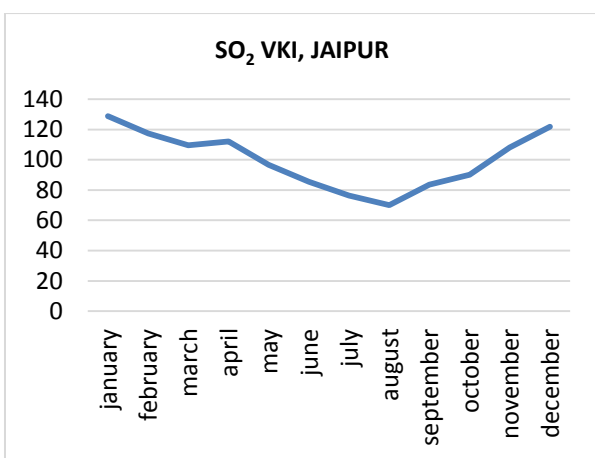
Month wise Seasonal index of NO_2

NO₂ Ajmeri Gate, jaipur

NO₂(ug/M3) BOARD OFFICE, JHALANA, JAIPUR

NO₂ CHANDPOLE, JAIPUR

NO₂ MIA RICO JAIPUR

NO₂ VKI, JAIPUR

NO_2 RO VIDHYADHAR NAGAR JAIPUR

SO_2 BOARD OFFICE, JHALANA, JAIPUR

From the above graph it is observed that in the month of August,NO_2 is the lowest because in the summer season the particles of pollutants are wind up due to being light in the air, where as in the month of JanuaryNO_2 is the highest due to the winter season the particles of pollutants due to being heavy they move in the atmosphere. From the time series analysis the seasonal trend has been obtained in above graph of all six stations. Here January to august graph shows downward in the slow motion taking eight months, but August to January it shows upward and get peak point in four months.

SO_2 CHANDPOLE, JAUPR

Month wise Seasonal index of SO_2

SO_2 Ajmeri Gate, jaipur

SO_2 MIA RICO JAIPUR

Remarking An Analisation

SO$_2$ RO VIDHYADHAR NAGAR JAIPUR

RSPM BOARD OFFICE, JHALANA, JAIPUR

SO$_2$ VKI, JAIPUR

RSPM CHANDPOLE, JAIPUR
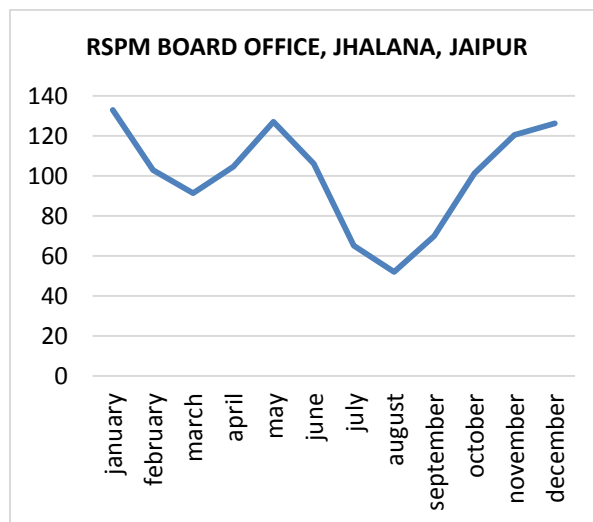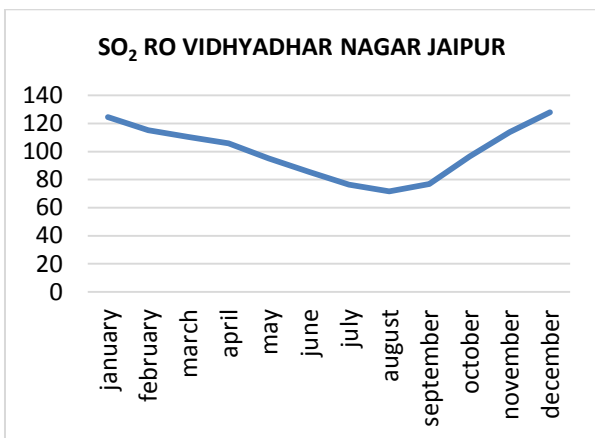

From the above graph it shows that in the month of August SO_2 is the lowest because in the summer season the particles of pollutants are wind up due to being light in the air, where as in the month of JanuarySO_2 is the highest due to the winter season the particles of pollutants due to being heavy they move in the atmosphere. From the time series analysis the seasonal trend has been obtained in above graph of all six stations. Here January to august graph shows downward in the slow motion taking eight months, but August to January it shows upward and get peak point in four months.
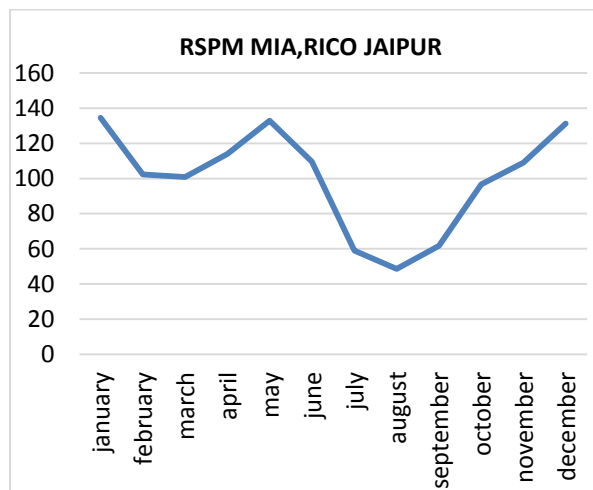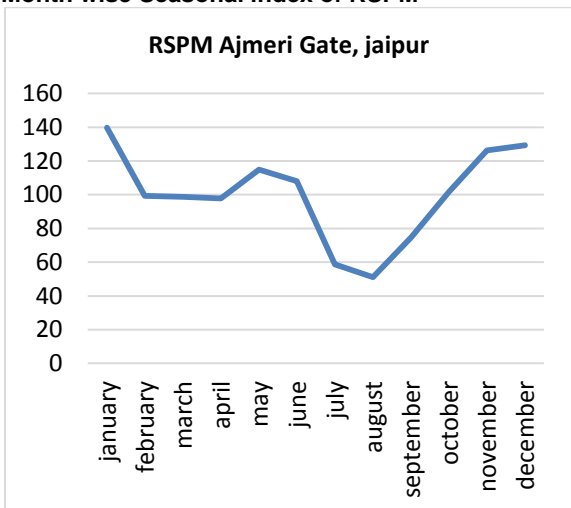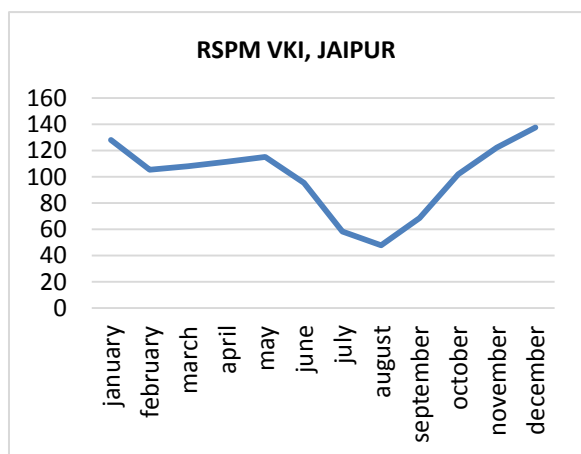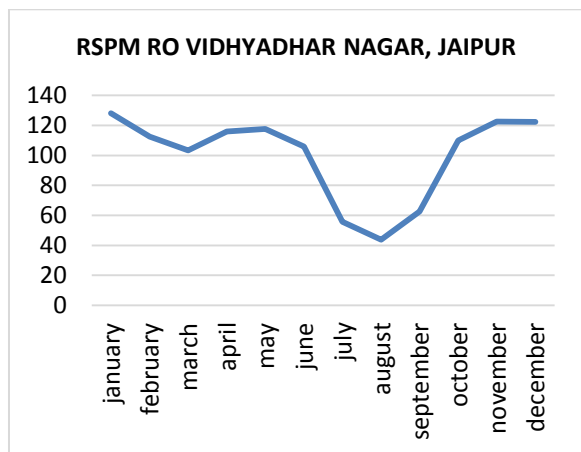
Month wise Seasonal index of RSPM

RSPM Ajmeri Gate, jaipur

RSPM MIA,RICO JAIPUR

RSPM RO VIDHYADHAR NAGAR, JAIPUR

RSPM VKI, JAIPUR

From the above graph it shows that the graph has been two times going down and two times going up because of august is a raining month and also February and March has Mavath raining season so pollutants particals are are wind up due to being light in the air, where as in the month of May RSPM is the highest due to the high summer season. From the time series analysis the seasonal trend has been obtained in above graph of all six stations. Here January to august graph shows downward in the slow motion taking eight months, but August to January it shows upward and get peak point in four months.

Conclusion

From the graph we conclude that the NO_2, SO_2 are move downward in month of January to august and upward in September to December, but RSPM graph show that it moves two times going down and up in a year, first it's going down January to march and going up April to May and then again going down in June to august and going up September to December.

Here important topic is that NO_2 and SO_2 creat one cycle in a year but RSPM create two cycle in a year.

NO_2 is part of group of gaseous air pollutants produced as a result of road traffic and other fossil fuel, No2 is increases in area of heavy traffic.

SO_2 is high due to heavy traffic load and stationery fuel combustion. other than anthropogenic sources, many environmental condition may also result in buildup of high SO_2 concentration in the ambient air.

Rainy season effect mostly to RSPM, because in the rainy days small particles that increase dust in the air, sit down under the rain water, so that the particles cannot spread in the air.

From the correlation and regression model we conclude that NO_2 and SO_2 are high correlated but RSPM shows similarly increase or decrease to NO_2/SO_2 because of only seasonal variation, RSPM does not affected by NO_2/SO_2.

Now we discuss about which place have maximum or minimum particles seasonal index of pollution.

NO_2 has maximum seasonal index in JhalanaDungriwhereas minimum seasonal index in Chandpole.

SO_2 has maximum seasonal index in VKIA whereas also minimum in same place.

RSPM, has maximum seasonal index in MIA, RICO Jaipur whereas minimum in Vidhyadhar Nagar.

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