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RESEARCH PAPER

Correlation Study of Meteorological Parameters and Criteria Air Pollutants in Jiangsu Province, China

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ABSTRACT
Air pollution is a global issue and meteorological factors play an important role in its transportation and regional concentration. The current research is aimed to analyse the variations in meteorological parameters in a seasonal and geographical location context in the Jiangsu province of China, and its correlation with the six criteria air pollutants, and air quality index (AQI). The present analysis will supplement the limited understanding on the relation between the regions prevalent climatic conditions and atmospheric pollution. The meteorological data analysis showed Suzhou city located in the southern region of the Jiangsu province with high average temperature, relative humidity, and rainfall. Maximum values of temperature, UV index, sunshine, relative humidity, and rainfall occurred during summer, while air pressure in winter. High values of all meteorological parameters occurred in the northern and southern region of the province. The data correlation study revealed AQI to have negative correlation with most meteorological parameters, and positive correlation with air pressure in all cities.
Keywords: Air quality index; Data analysis; Relative humidity; Spearmans coefficient; Temperature

INTRODUCTION

Air pollution is becoming an increasing concern throughout the world as the quality of air that we breathe is decreasing. Air pollution is connected to ailments such as stroke, heart disease, chronic obstructive pulmonary disease, lung cancer, acute respiratory infections that result in premature deaths of about 7 million people each year (WHO, 2021). China has the world's largest population (1.44 billion) and is one of the prominent contributors to air pollution (Worldometer, 2021). The concentration of pollutants in the atmosphere varies among the cities and is strongly influenced by meteorological parameters (Jayamurugan et al., 2013; Oji & Adamu, 2020; Mahanta et al., 2021). Pollutant movement is also affected by temperature, where convective current aids the movement of air pollutants to higher altitudes, while thermal inversion exacerbates the effect of pollutants in the atmosphere. A negative relationship between particulate matter and temperature was reported by Kayes et al. (2019). Higher values of UV index and longer sunshine hours results in higher air temperature and promotes the formation of urban ozone (UCAR, 2020). The UV index can be affected by $PM_{2.5}$ and NO_2 air pollutants in the atmosphere (Shamsollahi et al., 2017). Relative humidity has a profound effect on the movement of pollutant particles in the atmosphere and can aid in

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particles settling down and decreases air pollution (Giri et al., 2008; Mkoma & Mjemah, 2011; Kayes et al., 2019). A study by Lou et al. (2017) showed that relative humidity > 45 % had a particulate matter mitigating effect. Rainfall on the other hand has a scrubbing effect on the atmosphere. High and low air pressures in a region can increase or decrease the air pollution concentration, which is further influenced by other meteorological factors (UCAR, 2020). A recent study by Liu et al. (2020) showed that air pollutant concentration is negatively correlated with precipitation, relative humidity and positively correlated with air pressure. In another study AQI was shown to be negatively correlated with temperature, water vapour pressure, precipitation, and sunshine duration (Song et al., 2019).

Literature analysis revealed that most of the studies either focused on specific meteorological parameters or air pollutants, and lacked rigorous analysis with ambiguous findings. Only limited studies exist with direct emphasis on correlation study between the meteorological parameters and criteria air pollutants in the Jiangsu province region. The current study intends to conduct a detailed analysis on the spatial and temporal variation of meteorological parameters in thirteen cities of the Jiangsu Province in China between 2014 and 2018, and subsequently its correlation with the six criteria air pollutants and AQI. Objectives of the study were to determine the seasons and geographical locations in the Jiangsu Province with maximum values of meteorological parameters and the correlation strength with the criteria air pollutants and AQI.

MATERIALS AND METHODS

The Jiangsu Province is situated in the eastern part of China with a total area of 102,600 km^2. The total population is estimated to be 80.5 million according to the Jiangsu Provincial bureau of statistics (City population, 2019). The meteorological data were obtained from worldweatheronline.com, and the monthly average values were used. The meteorological parameters studied were temperature (°C), UV index, sunshine hours (h), relative humidity (%), rain (d) and air pressure (mbar). The air pollution data of $PM_{2.5}$, PM_{10}, O_3, NO_2, SO_2, CO, and AQI were obtained from aqistudy.cn website. Monthly average values were calculated based on the hourly data. The thirteen cities of the Jiangsu Province are Xuzhou (XZ), Lianyungang (LG), Changzhou (CZ), Wuxi (WX), Suzhou (SZ), Yancheng (YC), Nantong (NT), Suqian (SQ), Huai'an (HU), Nanjing (NG), Yangzhou (YZ), Zhenjiang (ZJ) and Taizhou (TZ). The cities were grouped based on their geographical location as follows: Northern cities (Xuzhou, Lianyungang), Southern cities (Changzhou, Wuxi, Suzhou), Eastern cities (Yancheng, Nantong), Western cities (Suqian, Huai'an, Nanjing) and Central cities (Yangzhou, Zhenjiang, Taizhou) as shown in Fig. 1. The climatic characteristics were considered taking into account the four seasons spring (March, April and May), summer (June, July and August), autumn (September, October and November) and winter (December, January and February). The correlation coefficient was interpreted based on the following criteria: 0.90–1.0 very strong correlation; 0.70–0.89 strong correlation; 0.50–0.69 moderate correlation; 0.30–0.49 weak correlation and < 0.30 very weak correlation (Mukaka, 2012). The data correlation analysis was performed using the statistical software SPSS 25. Bivariate associations of meteorological data and air pollution data were performed using Spearman's correlation coefficient.

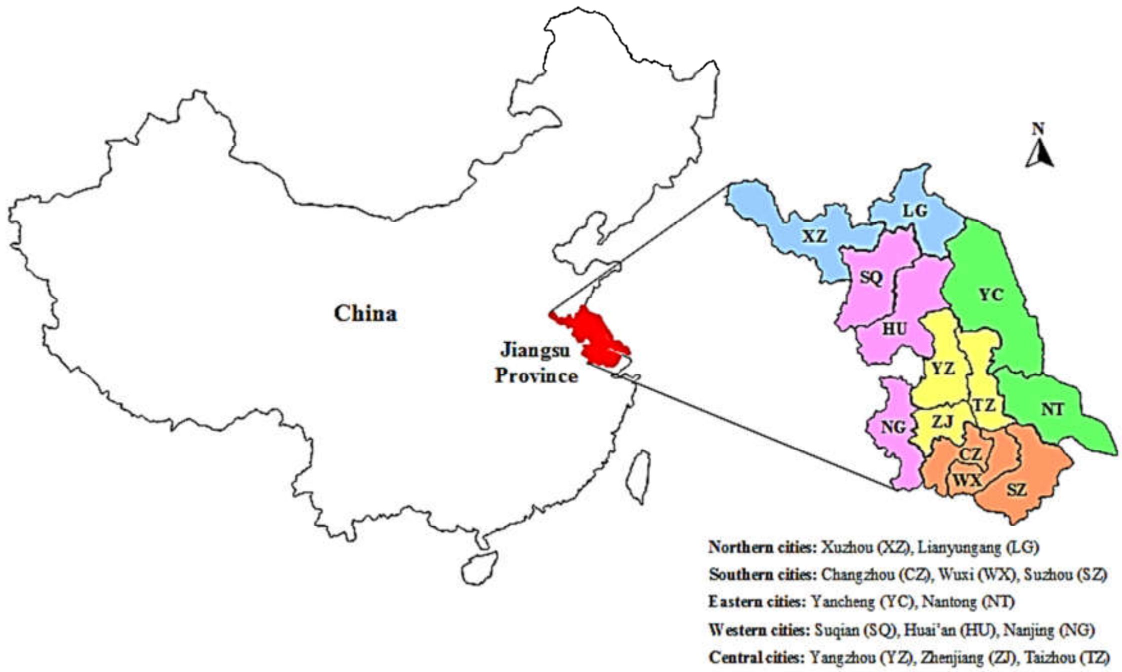

Fig 1. Schematic sketch of Jiangsu province location in China.

RESULTS AND DISCUSSION

Spatial and temporal variation of meteorological parameters

Variation in the meteorological parameters across the cities is presented in Fig. 2. The highest average temperature of 17.2 °C was observed in Suzhou and Wuxi. Other cities had average temperature values ranging from 15 to 17°C. Distribution of rainy days was relatively constant across all the cities in the province with the maximum number of days in Suzhou and minimum in Lianyungang. UV index and air pressure were relatively uniform throughout the region with the average value of 4.5 ± 0.08 and 1016.9 ± 0.25 mbar, respectively. Minor fluctuations were observed with relative humidity values, with high and low values occurring in Suzhou, Nantong and Xuzhou. A 12 % longer duration of sunshine was observed in Lianyungang.

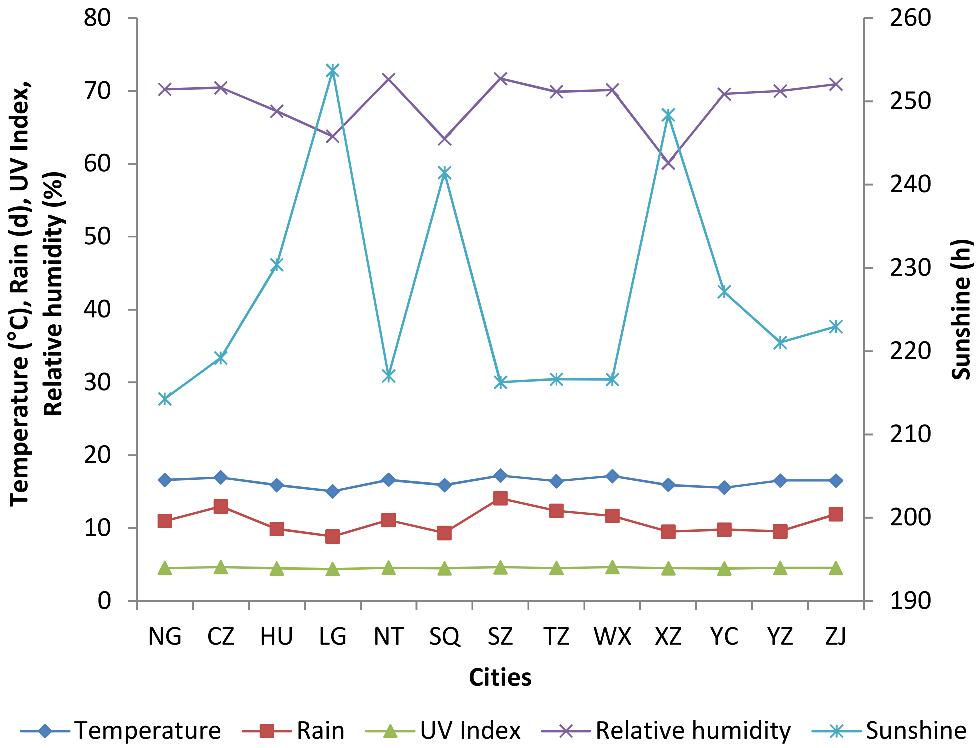

Fig 2. Spatial variation of meteorological parameters in Jiangsu Province cities.

The monthly temporal variations of the meteorological parameters are illustrated in Figs. 3 and 4. The shape of the curves exhibited by temperature, rain, UV index and sunshine shown in Fig. 3 tend to follow a similar trend. The value gradually increased from January onwards reaching its peak in June–August and subsequently declining until December. Minor deviation from the trend is exhibited by the sunshine parameter on both sides of the curve. It can be seen that maximum values tend to be during the summer and minimum during winter except for sunshine hours which was during autumn. This decrease can be attributed to the increase in the rainy days and humidity during the month of November. The variation of relative humidity and air pressure showed an inverse relationship (Fig. 4). Maximum and minimum values were observed in August and December for relative humidity, and December and July for air pressure. This inverse relationship is caused due to condensation of moisture resulting in decrease in air pressure (Radhashyam, 2016).

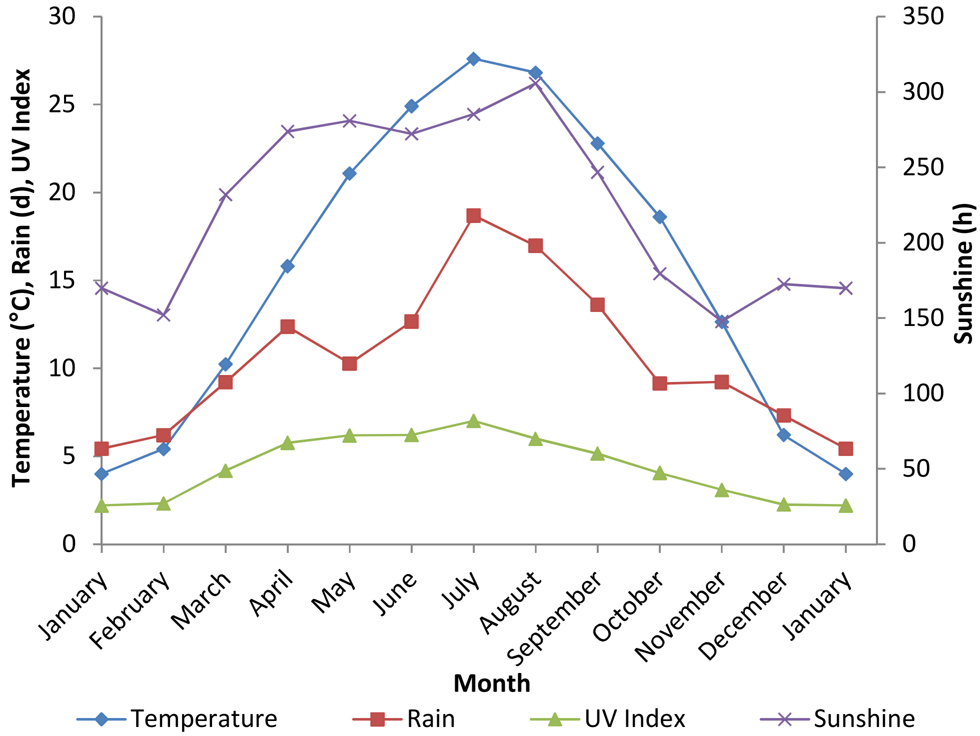

Fig 3. Temporal variation of monthly temperature, rain, UV index and sunshine.

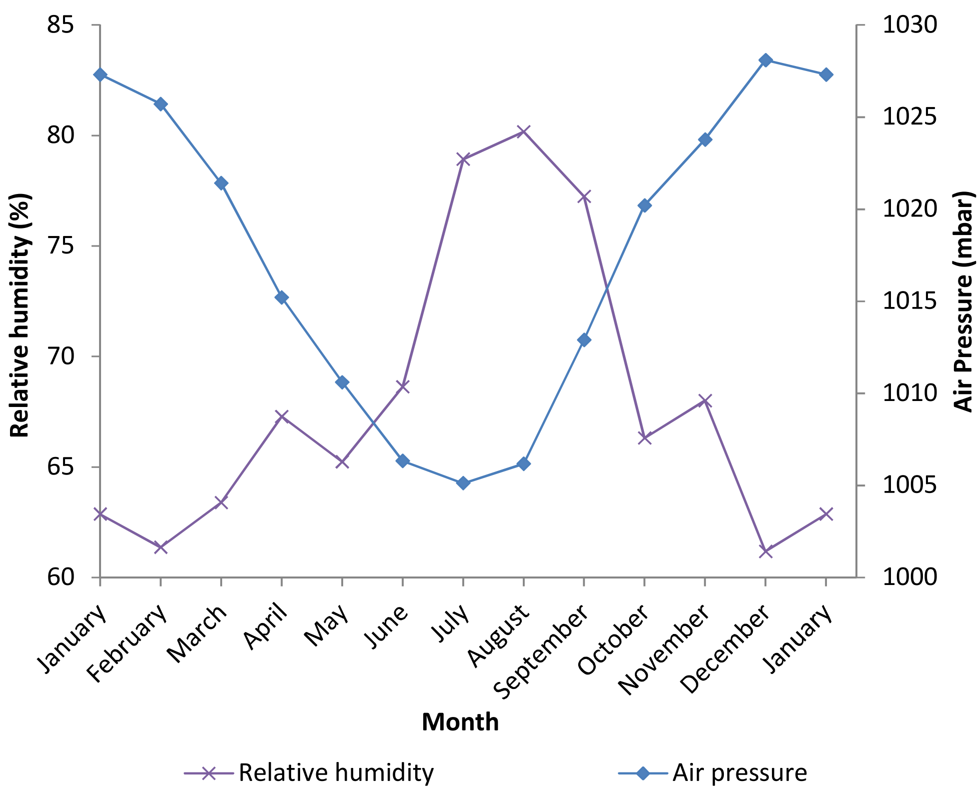

Fig 4. Temporal variation of monthly relative humidity and air pressure.

Meteorological parameters and AQI correlation across cities

In order to determine the relation between various meteorological parameters and AQI across the cities, correlation coefficients were calculated and presented in Fig. 5. The values were grouped based on the geographical location. The temperature showed moderate to weak negative correlation with AQI, with both cities in the north exhibiting moderate correlation. This is because air flow and diffusion of air pollutants are influenced by temperature thereby affecting the air quality (Xiaoping & Zezhou, 2018). UV index relationship with AQI was negative, and the strength of the correlation ranged from moderate to very weak. The effect of air pollutants on UV index can be substantial, as high concentration of air pollutants can reduce the UV index (Shamsollahi et al., 2017). Data analysis indicates an inverse association between AQI and UV index, which suggests a plausible relationship. Similar observation was also made by An et al. (2008) where about 50 % reduction in UV radiation was observed during high levels of air pollution. The correlation coefficients for sunshine hours indicated both positive and negative values, and the correlation strength was weak to very weak. Both relative humidity and rain were negatively correlated with AQI, and the correlation strength ranged from strong to weak. Precipitation can accelerate the diffusion process in air and enhance the air quality (Di & Li, 2019). Relative humidity in Yancheng and rain in Xuzhou and Suqian showed a strong negative correlation with AQI. Air pressure on the other hand had a moderate to weak positive correlation with AQI. Similar observation was made by Xiao et al. (2016) in the meteorological parameter study in Xiamen city. Under high air pressure, there is less air movement resulting in air pollutants buildup causing an increase in AQI, while with low air pressure the weather tend to be windy resulting in dispersion of air pollutants lowering AQI (Air pollution, 2021).

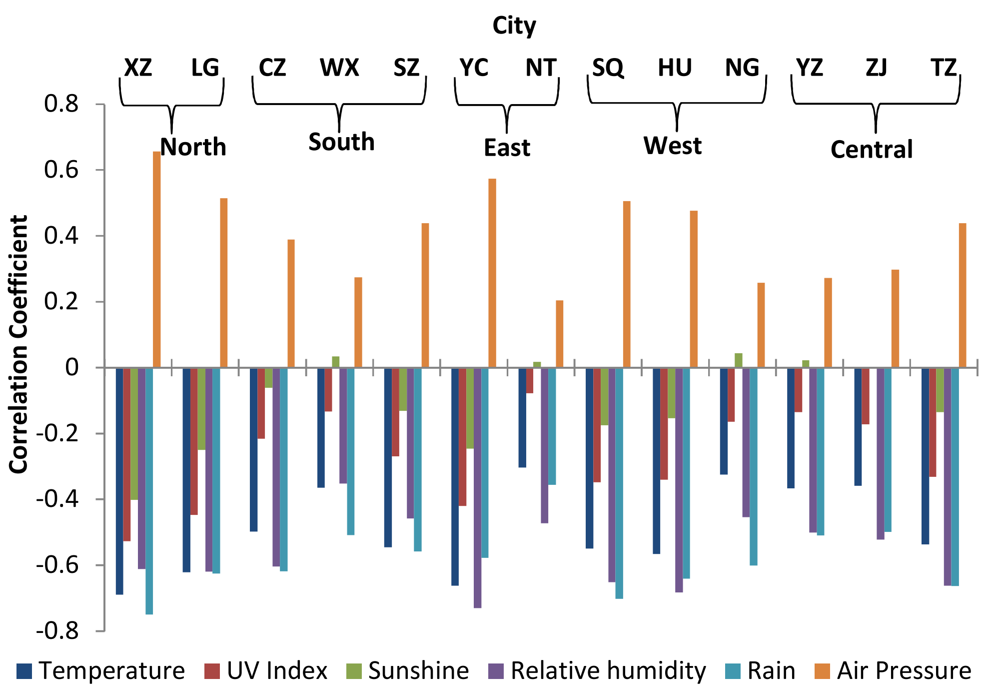

Fig 5. Correlation coefficient between AQI and meteorological parameters across cities in Jiangsu Province.

Meteorological parameters and air pollutants, AQI correlation

Correlation between the various meteorological parameters and air pollutants, AQI are presented in Table 1, and comparison between the seasons in Table 2. Strongly correlated values are bolded. The AQI generally showed a moderate to weak negative relationships with all the meteorological parameters, while varying with the seasons. With respect to temperature, UV index and sunshine, AQI predominantly showed weakly negative relationships during summer and autumn. However, during the spring and winter, the results indicate a positive relationship except for temperature during winter which showed a weak negative correlation with AQI. A negative correlation indicates decrease in pollutants, and positive correlation implies an increase of pollutants with temperature associated with UV index and sunshine. During winter, the average atmospheric temperature is lower resulting in stable weather, which impedes the spread of pollutants. Relative humidity and rain in all seasons showed negative correlation with AQI implying atmospheric cleansing through rain scrubbing effect. A similar observation was also reported in other studies (Cui et al., 2018; Guo & Feng, 2019). Air pressure, on the other hand, had an opposite trend with positive correlation with AQI thereby aiding in pollution intensification. This is consistent with observations by Di and Li (2019).

Table 1. Correlation coefficient between meteorological parameters and criteria air pollutants, AQI in Jiangsu Province.

Meteorological Parameters	AQI	$PM_{2.5}$	PM_{10}	O_3	NO_2	SO_2	CO	Pollutant Parameters
Temperature	-0.481**	**-0.784****	**-0.718****	**0.738****	-0.570**	-0.464**	-0.645**	-
-	1	**0.774****	**0.768****	-0.143**	0.429**	0.531**	0.588**	AQI
UV index	-0.272**	-0.596**	-0.498**	**0.786****	-0.464**	-0.312**	-0.508**	-
-	-	1	**0.918****	-0.565**	0.566**	0.631**	**0.717****	$PM_{2.5}$
Sunshine hours	-0.126**	-0.500**	-0.356**	**0.778****	-0.471**	-0.176**	-0.403**	-
-	-	-	1	-0.449**	0.541**	0.691**	**0.737****	PM_{10}
Relative humidity	-0.560**	-0.558**	-0.649**	0.218**	-0.358**	-0.362**	-0.440**	-
-	-	-	-	1	-0.451**	-0.288**	-0.503**	O_3
Rain days	-0.559**	-0.610**	-0.647**	0.354**	-0.347**	-0.437**	-0.455**	-
-	-	-	-	-	1	0.322**	0.537**	NO_2
Air pressure	0.400**	**0.709****	0.635**	**-0.801****	0.592**	0.388**	0.592**	-
-	-	-	-	-	-	1	0.592**	SO_2

*Correlation significant at the 0.05 level (2-tailed); **Correlation significant at the 0.01 level (2-tailed).

Table 2. Correlation coefficient between meteorological parameters and criteria air pollutants, AQI in Jiangsu Province classified based on seasons.

Meteorological Parameters	Season	Air Pollution Parameters						
		AQI	$PM_{2.5}$	PM_{10}	O_3	NO_2	SO_2	CO
Temperature	Spring	0.169*	-0.439**	-0.255**	**0.738****	-0.205**	-0.192**	-0.221**
	Summer	-0.250**	-0.638**	-0.597**	-0.068	-0.170*	-0.408**	-0.207**
	Autumn	-0.364**	-0.673**	-0.642**	**0.778****	-0.468**	-0.282**	-0.517**
	Winter	-0.222**	-0.258**	-0.261**	-0.053	0.237**	-0.253**	-0.233**
UV index	Spring	0.237**	-0.308**	-0.079	0.671**	-0.216**	-0.022	-0.107
	Summer	-0.032	-0.166*	-0.175*	-0.086	-0.059	-0.159*	-0.212**
	Autumn	-0.222**	-0.447**	-0.464**	0.686**	-0.382**	-0.319**	-0.462**
	Winter	0.137	0.097	0.057	0.110	0.281**	0.071	0.081

Meteorological Parameters	Season	Air Pollution Parameters						
		AQI	$PM_{2.5}$	PM_{10}	O_3	NO_2	SO_2	CO
Sunshine hours	Spring	0.319**	-0.105	0.145*	0.558**	-0.343**	0.163*	-0.067
	Summer	-0.075	-0.495**	-0.413**	0.172*	-0.240**	-0.301**	-0.210**
	Autumn	-0.034	-0.370**	-0.283**	**0.824****	-0.401**	-0.011	-0.373**
	Winter	0.510**	0.409**	0.586**	-0.271**	0.239**	0.568**	0.444**
Relative humidity	Spring	-0.342**	-0.243**	-0.441**	-0.068	0.250**	-0.324**	-0.178*
	Summer	-0.471**	-0.118	-0.214**	-0.571**	-0.095	0.048	-0.066
	Autumn	-0.472**	-0.492**	-0.566**	0.011	-0.379**	-0.091	-0.174*
	Winter	-0.298**	-0.194**	-0.438**	0.160*	0.003	-0.412**	-0.305**
Rain days	Spring	-0.391**	-0.269**	-0.315**	-0.056	0.140	-0.283**	-0.121
	Summer	-0.504**	-0.190**	-0.229**	-0.556**	-0.019	-0.048	0.075
	Autumn	-0.425**	-0.465**	-0.601**	0.017	-0.209**	-0.266**	-0.168*
	Winter	-0.350**	-0.282**	-0.478**	0.038	0.018	-0.454**	-0.299**
Air pressure	Spring	-0.042	0.437**	0.264**	**-0.706****	0.247**	0.184*	0.254**
	Summer	0.083	0.243**	0.233**	0.144*	0.121	0.202**	0.145*
	Autumn	0.351**	0.634**	0.600**	**-0.719****	0.505**	0.117	0.448**
	Winter	0.111	0.013	0.185**	-0.515**	0.284**	0.112	0.111

*Correlation significant at the 0.05 level (2-tailed); **Correlation significant at the 0.01 level (2-tailed).

It can be seen that the correlation between temperature and particulate matter ($PM_{2.5}$ and PM_{10}) is negative, and moderately correlated during summer and autumn. The negative correlation shows that as the temperature increases the particulate matter dilution and dispersion is predominant due to convection currents in the atmosphere (Luo et al., 2017). The results in Table 2 indicate that the negative correlation is stronger during summer and autumn when the concentration of particulate matter in the atmosphere is low. This is because of strong air flow diffusion and heavy rainfall (Ma & Ding, 2020). UV index showed a weak negative correlation with particulate matter ($PM_{2.5}$ and PM_{10}) during spring, summer and autumn and positively weak correlation during winter. A similar trend was observed by Chen et al. (2016) in the correlation between $PM_{2.5}$ and temperature, where the correlation coefficient was negative in summer and autumn, which changed to positive in spring and winter in Nanjing city. The negative correlations can be explained with the thermally-induced convection, leading to increased diffusion of particulate matter in the atmosphere (Hernandez et al., 2017). The positive correlation could suggest an optimum temperature condition favourable for particle nucleation and growth through photochemical reactions between precursors, especially during winter when the concentration of $PM_{2.5}$ (77.9 $\mu g/m^3$) and PM_{10} (116 $\mu g/m^3$) is maximum in the atmosphere (Wang & Ogawa, 2015). Moderate to weak negative correlation (Table 1 and 2) was exhibited between relative humidity, rain and particulate matter. A negative correlation with relative humidity was also reported by Chen et al. (2016) in Nanjing urban area in Jiangsu Province. Increase in the number of rainy days tends to decrease atmospheric particulate concentration as they facilitate the condensation of suspended particles in air. Higher relative humidity percentage in the atmosphere accelerates the growth of particulate matter, especially the PM_{10} particles which are predominantly removed by rainfall (Hernandez et al., 2017; Yoo et al., 2014). A detailed study by Lou et al. (2017) has shown that with relative humidity greater than 45 %, the PM_{10} had a decreasing trend in the atmosphere during summer and autumn. Air pressure had moderate to weak positive correlation with $PM_{2.5}$ and PM_{10} during all seasons. This suggests an increase in the particulate matter concentration in the atmosphere with increase in air pressure. With high pressure, wind speed decreases and facilitates the formation of thermal inversion layers which makes the dilution of pollutants harder and particulate matter accumulates at ground level (Li et al., 2015). Prevalence of high pressure could also impede the movement of pollutants from lower altitude to higher altitude. The air pressure was higher during winter (1027 mbar) and lower (1006 mbar) during summer.

Temperature had a strong positive relationship with O_3 which is expected since temperature is an essential component in the formation of urban ozone, whose concentration reached a maximum during summer (129 μg/m^3). The strong relationship occurred during spring and autumn, which could suggest an optimum temperature range for maximum urban O_3 formation. The temperature range that produced maximum O_3 was determined to be between 26–28 °C. Similar to the temperature parameter, UV index and sunshine parameters showed moderate to strong positive correlation with urban O_3 during spring and autumn, suggesting an increase in urban O_3 formation with increase in UV index and sunshine hours. Maximum temperature and UV index occurred in the southern region of the province. The correlation between O_3, relative humidity and rain were negatively moderate during summer and weak during spring, which agrees with Srivastava et al. (2014). Moisture could have an inhibiting effect in the formation of O_3 in ambient air, predominantly due to the decrease in the photochemical activity caused by the decline in solar radiation (Zalakeviciute et al., 2018). This is in accordance with the observation by Uchiyama et al. (2017), where NO_2, SO_2, and O_3 in the ambient air sharply decreased after heavy rain. However, during autumn and winter the relative humidity and rain correlation coefficient with O_3 turned weakly positive, which could suggest a certain level of humidity and few days of rainfall may not have a significant impact on the urban O_3 formation process. Study of air quality in the south coast air basin of California has shown that in certain regions, with increase in both relative and absolute humidity, the concentration of O_3 increased (Horne & Dabdub, 2016). This suggests that the sensitivity of ozone to relative humidity changes is weak and of variable sign in polluted regions (Lu et al., 2019). Another study by Radaideh (2017) showed a weak positive correlation between relative humidity and ground O_3. Humidity levels and number of rainy days reached maximum during summer. Air pressure showed a strong negative relationship with O_3 during spring and autumn and weak during winter. Data analysis showed that the air pressure was maximum during winter and minimum during summer. Similar observation was made by Fang et al. (2019) in the study of surface O_3 concentration variation in Changchun, the capital of Jilin Province in China. Another study by Shan et al. (2009) in urban Jinan, China also highlighted the negative correlation between O_3 and air pressure. Only during summer positive weak correlation was observed between air pressure and O_3. The O_3 concentration in the atmosphere can be influenced positively or negatively by various meteorological parameters through different mechanisms (Chen et al., 2020).

NO_2 in the atmosphere is predominantly from anthropogenic sources. The correlation between temperature, UV index and sunshine with NO_2 was negatively weak during spring, summer and autumn and positively weak during winter. Similar negative relationships have been reported by other studies (Gasmi et al., 2017; Gorai et al., 2015). The negative relationship can be associated with the formation of O_3 as temperature and NO_2 are essential requirements for the formation of O_3 (Kenty et al., 2007). The concentration of NO_2 in the atmosphere changed with seasons (Table 3), with the highest value in winter (45.2 μg/m^3) and lowest during summer (26.1 μg/m^3). This is because during summer more NO_2 is converted to O_3 through photochemical reactions (Song et al., 2019; Afonso & Pires, 2017). Another reason for NO_2 reduction in the atmosphere has been proposed by Uchiyama et al. (2017) where NO_2 in air is oxidised by hydroxyl radical (OH) to HNO_3 and other hygroscopic aerosols, thereby reducing the concentration of NO_2 in the atmosphere. During winter, temperature, UV index and sunshine parameters were the lowest compared to other seasons which results in the reduction of O_3 production and increase in the concentration of NO_2 in the atmosphere resulting in positive correlation. The correlation between NO_2 and relative humidity and rain is negatively weak (Table 1) and seasonally weak to very weak during summer and autumn (Table 2). This is expected as humidity and rainfall has a cleansing effect decreasing the NO_2 concentration in the air, although NO_2 and O_3 in the ambient air are less sensitive to rainfall (Jayamurugan et al., 2013; Harkey et al., 2015; Wang & Ogawa, 2015). Conversely, a positively weak relationship during spring and winter was observed (Table 2) and similar positive correlations were also found by other studies (Harkey et al., 2015; Ahmad & Aziz, 2013). This may be explained by the inverse relationship between NO_2 and O_3 and insolation, because with increase in relative humidity and rainfall the NO_2 conversion to O_3 could be reduced since the average temperature in these seasons were less than in summer and autumn. Air pressure showed a moderate to weak positive relationship with NO_2, similar observation was made by Delaney and Dowding (1998) with high surface pressure and low wind speeds.

Negatively weak correlation existed between SO_2 and temperature during all seasons, UV index during spring, summer and autumn, and sunshine during summer and autumn. The negative correlation indicates the decrease of SO_2 concentration and can be attributed to the enhanced vertical mixing of the pollutants (Jayamurugan et al., 2013). The sunshine during winter is lower, which results in temperature decrease, vertical mixing, and lowering of the mixing height resulting in positive correlation between sunshine and SO_2 (Jayamurugan et al., 2013). The seasonal correlation coefficients between SO_2 and relative humidity and rain were predominantly weak and negative. This indicates that SO_2 concentration decreases with increase in humidity in the atmosphere and with rain. With increase in air moisture and rain, scavenging of SO_2 from the atmosphere is enhanced (Yoo et al., 2014). A negative correlation has been shown by Pena et al. (1982) between SO_4^{2-} content in rain and SO_2. SO_2 correlation with air pressure was consistently positive and weak, which indicates an increase in anthropogenic SO_2 sources in the region.

CO correlation with temperature was negatively moderate to weak. UV index and sunshine correlation was weakly negative in spring, summer, autumn and weakly positive during winter. The decrease of CO concentration in air with increasing temperature, UV index and sunshine could be because of the thermally-induced convection resulting in the rapid dispersion and its association with the formation of urban O_3 (Yoo et al., 2014; Wang et al., 2008). An increase in CO concentration during winter can be due to vehicles and burning of biomass in the region (Huang et al., 2013). CO correlation with relative humidity and rain were predominantly weak and negative, probably because of rain washout of CO from the atmosphere, although this effect is small due to its low solubility (Yoo et al., 2014). Air pressure correlation with CO was weakly positive, which suggests an increase in the CO source in the region and also through transport from other regions (Wang et al., 2008).

All the meteorological parameters were higher during the summer except for air pressure which peaked in winter (Table 3). Between the five geographical locations considered in the study, high values of the meteorological parameters were observed in the northern and southern region of the Jiangsu Province. Similarly, all air pollutant concentrations and AQI reached maximum values during winter except O_3 which was in summer. Maximum values were observed in northern, southern and eastern regions of the province. The meteorological parameters were ranked based on its influence on the criteria air pollutants, and the overall negative correlation coefficient analysis indicated temperature to have pronounced influence, which was followed by rain, relative humidity, UV index, sunshine, and air pressure.

Table 3. Average values of meteorological parameters, AQI and criteria air pollutants during the four seasons and in five different geographical regions of the Jiangsu Province.

Meteorological Parameters/AQI & Air Pollutants	Spring	Summer	Autumn	Winter	North	South	East	West	Centre
Temperature (°C)	15.7	**26.4**	18	5.2	15.5	**17.1**	16.1	16.2	16.5
UV index	5.4	**6.4**	4.1	2.3	4.4	**4.6**	4.5	4.5	4.5
Sunshine (h)	262.2	**287.8**	191.4	164.8	**251**	217.4	222.1	228.7	220.2
Relative humidity (%)	65.3	**75.9**	70.5	61.8	62	**70.8**	70.6	67	70.3
Rain (d)	11	**16**	11	6	9	**13**	11	10	11
Air pressure (mbar)	1015.7	1005.9	1019	**1027**	**1017.3**	1016.7	1017	1017	1016.8
AQI	92.4	84.1	77.7	**108.4**	**93.9**	90.5	83.7	92.9	91.1
$PM_{2.5}$ ($\mu g/m^3$)	54.5	38.1	45.8	**77.9**	**56.9**	53.3	47.8	55.3	55.9
PM_{10} ($\mu g/m^3$)	97.9	64.7	77.5	**116.3**	**101.1**	83.7	78.2	91.3	91.6
O_3 ($\mu g/m^3$)	121.4	**129.4**	96.8	62.8	101.6	100.9	**106.7**	103.7	101.3
NO_2 ($\mu g/m^3$)	39.5	26.1	37.8	**45.2**	35.9	**45.9**	30.9	35.4	35.1
SO_2 ($\mu g/m^3$)	22.0	15.4	18.2	**26.6**	**26.4**	19.8	19.6	18.1	20.4
CO (mg/m^3)	0.97	0.77	0.86	**1.2**	**1.05**	0.98	0.74	0.99	0.94

CONCLUSION

The comprehensive data analysis has identified the seasons and geographical locations in the Jiangsu Province with high values of meteorological parameters and the correlation strength with the criteria air pollutants and AQI. The analysis indicated relative humidity and rain to be the prominent meteorological parameters influencing the AQI in the region. The eastern cities (Yancheng and Nantong) located along the coastal region had the least AQI among the thirteen cities in the Jiangsu province and relatively low values were observed during mid-autumn.

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The present research did not receive any financial support.

CONFLICT OF INTEREST

The author declares that there is not any conflict of interests regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy have been completely observed by the author.

LIFE SCIENCE REPORTING

No life science threat was practiced in this research.

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