

Research the factors about fog and haze of Tangshan in 2013

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Abstract

With the fog and haze of air pollution have become increasingly prominent, the elimination of climate disasters, improve people's living environment arouse the attention of fog and haze. Based on the formation conditions of the formation of haze on the type of pollution particles, the degree of harm, the movement of this article, the establishment of the colloidal properties of diffusive motion caused by fog and haze particles formed and relevant data Tangshan fog and haze of linear regression analysis, for analysis of the reasons for the formation of haze, hazards, preventive measures to the authorities to provide some suggestions.

Keywords: fog and haze pollution mainly qualitative analysis stratified

1. The basic features of a haze

System consists of a large number of aerosol mist is suspended in the air near the ground is composed of tiny water droplets or ice crystals, and is the product of the air layer near the ground condensation (or sublimation) of. Therefore look into milky white or bluish mist. Haze Haze is, the dust in the air aerosol systems, sulfuric acid, nitric acid, hydrocarbons and other non-aqueous organic composition thereof. Haze particles more in diameter, O. Between 001 to 10 μm . Uniform particle distribution haze, haze particles and relatively small scale, invisible particles floating in the air.

Air, dust, sulfuric acid, nitric acid, hydrocarbons and other organic particles also make atmospheric opacity, blurred vision and lead to the deterioration of visibility, if the visibility is less than 10,000 m level, such a system will result in a non-aqueous aerosol composition composed of RVR disorder known as haze or smog.

Weather haze in the atmosphere is defined as a large number of suspended fine dust, smoke particles or aggregates salt that air pollution, reduced visibility to levels below 10km a weather phenomenon, generally milky haze, which makes color of the object weakened, so that distant objects microstrip bright red and yellow, blue and dark objects microstrip. Haze of tiny particles, cannot distinguish with the naked eye. When atmospheric condensation nuclei grow a variety of reasons can be formed when the haze. In this case, further condensation of water vapor may cause haze turned into mist, fog and clouds. Composed primarily of aerosol haze, which may occur at any time of day.

2. Formations of fog and haze conditions

The reason for its formation summed up in the following points:

1 A low atmospheric air pressure, air circulation is a major factor, because the air does not circulate the air in the small dense particles floating in the air.

2 ground humidity, low air humidity, the ground and the vehicle so that the dust stirred up. So that the water vapor and dust together.

3. Automotive, exhaust gas main reason for the sharp increase in the number of cars in recent years, the construction of a large number of plants, it is to increase the frequency of haze.

4 seasonal characteristics, most of the northern winter heating rely on rough combustion, resulting in a lot of wasted fuel and emissions into the air a lot of polluting particles.

5 urban layout problems, the construction of a city considered the city's air circulation problems.

3. Haze hazard

Clear that in 2012 up to 2.1 million Asians have died from air pollution, and 67 kinds of disease killer in the world lethal hollow pollution in China has lined up fourth According to the British medical journal The Lancet published late last year, "Global Burden of Disease" report bit. Like pneumonia patients over the past decade Beijing has increased by Liu Cheng.

Affect mental health. Haze is easy to generate pessimism, if not adjusted, it is easy to control. Impact on traffic safety, haze occurs when low visibility outdoors, pollution continues, traffic congestion, frequent accidents.

Effects of regional climate make the area frequent extreme weather events, weather disasters again and again. Even more worrying is that the city suffered haze also accelerated ahead of the arrival of photochemical smog.

Photochemical smog is a pale blue smoke, car exhaust and factory emissions in containing large amounts of nitrogen oxides and hydrocarbons, these gases in the sun and ultraviolet light, a photochemical reaction occurs to produce photochemical smog. Its main component is a series of oxidants, such as ozone, aldehydes, ketones, very toxic; the human body has a strong stimulating effect, make people serious breathing difficulties, vision loss, tetany and other phenomena.

Water is a good carrier, aerosol particles is relatively small, large surface area, wide distribution and other characteristics. Transport in the atmosphere may be a source of pollution, and the container may be natural atmospheric chemical reactions. For example: When the haze that day, there will be a lot of air suspended particles can be inhaled, etc., but such SO₂, NO_x and other harmful gases, water vapor will become a case of mist, pollution of the environment, affecting human health. Easy to cause upper respiratory tract infections, bronchitis, asthma, pneumonia, emphysema and other diseases.

4. Tangshan typical characteristics of fog and haze

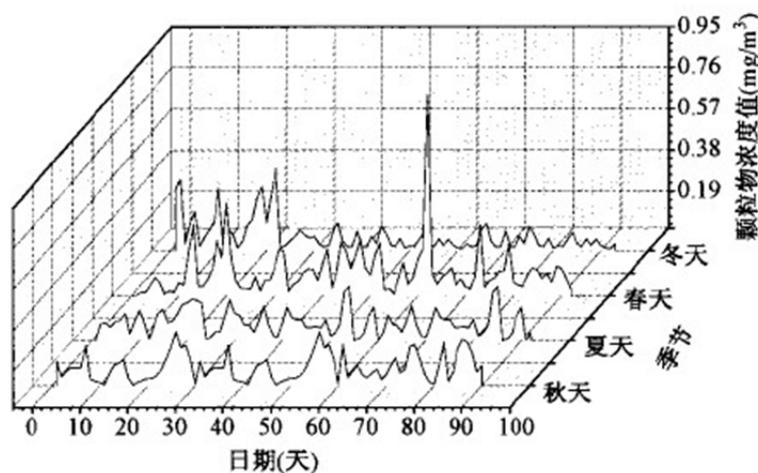


Figure 1 2013 Tangshan seasonal distribution of particle concentration trends

As can be seen in Figure Tangshan average respirable particles in the range of 0.096mg / m. ~

0.143mg / m. Between, there are several peaks in spring, spring is the northern monsoon period, Inner Mongolia, north of sand to a certain extent, there are a lot of not very high autumn peak in the winter, you can see to achieve higher peak winter heating in northern, coal-fired heating to Beijing brings a lot of ways inhalable particles.

Tangshan Municipal Environmental Protection Bureau, said: "Inhaled particles can be contained in the atmosphere in 2013 for three consecutive years wandering in the 0.211 mg / conditions approaching 0.114 milligrams per cubic meter / per cubic meter, down 5%." However, shortly after its release , Dec. 3, 2013, Tangshan City, inhalable particles reach 0.437 mg / m³, a short time to reach severe pollution, according to the Tangshan Municipal Environmental Protection monitoring Center, and rich FENGNAN cumulative maximum of PM10, respectively, 0.52 and 0.559 mg / per cubic meter, according to the records appeared more than once heavily polluted, moderately heavy pollution.

4.1 PM2.5 and PM10 variation of Tangshan

As party to chart data from Tangshan Municipal Environmental Protection Bureau:

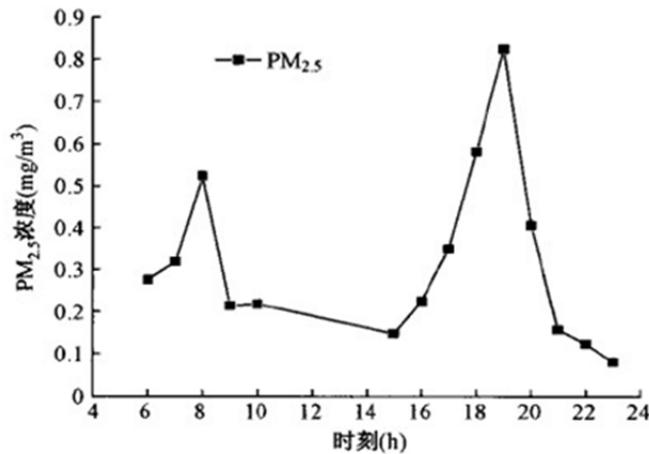


Figure 2 December 28, 2013, Tangshan, PM2.5 concentrations Chart

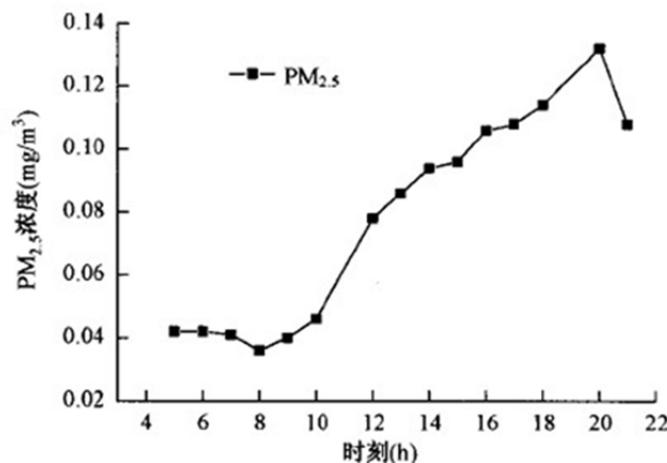
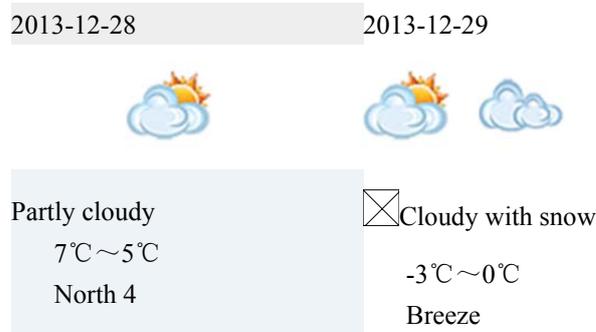


Figure 3 December 29, 2013, Tangshan, PM2.5 concentrations Chart

From the first chart, we can see a chart can be divided into two parts, the first part is sub 6:00 - 9:00, the second part is 15:00 - 21:00 Analysis, as a whole, the two time period is the time to work on the

working-class, car, public transport a large number of full-load operation of the exhaust is discharged into the air, pollute the air and morning low temperatures combined with easy to form water vapor and exhaust haze, the second part of the Evaluation of severe air pollution in weather conditions 28-29 are as follows:

Tangshan weather conditions



A few days to see published data based Tangshan cloudy weather and the breeze is increased haze stay. Seen due to the snow falls, the air can be inhaled particles and other particulate matter PM2.5 significant decline from the second chart. Seen, snow particle pollution can play a role in mitigation. In view of this provides us with a viable means of mitigation. The main substance of air pollutant oxides, nitrogen oxides sulfur. Reduce nitrogen and sulfur compounds can reduce the value of the itch of PM2.5

Eve of Spring Festival for 13 years, first announced in Tangshan Environmental Monitoring Center of PM2.5 and PM10, as shown in Figure

	New Year's Eve (January 30)	Started 1:00	Started 13:00	Fifth 23:00
PM2.5	0.070	0.115	0.040	0.075
PM10	0.016	1.593	0.006	0.195
PM10	0.016	1.593	0.006	0.195

Figure 4 PM2.5 and PM10 changes in units (mg / cubic meter) around 2013 Spring Festival

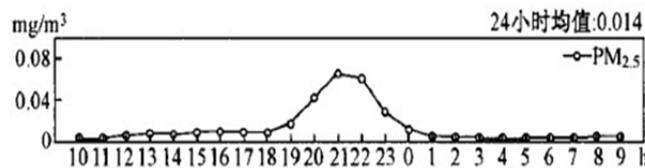


Figure 5 Lantern Festival 2013 PM2.5 changes in Tangshan

As can be seen from the two tables, Eve, and the fifth day of the Lantern Festival fireworks cause transient elevated PM2.5, but because of the holiday period in the particles caused by firecrackers quickly dissipated.

4.2 Influencing factors analysis haze

Fog and haze of the line into and development of meteorological conditions are closely related. Figure 6 is the relative humidity, temperature; wind speed, PM2.5 and visibility scatter relationship in March

2013 to August.

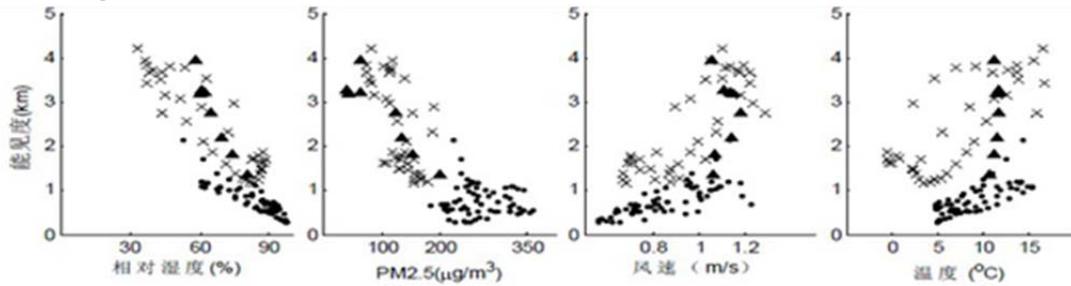


Figure 6: During the haze and visibility of the main meteorological elements scatter plot

		能见度	相对湿度	PM2.5浓度	风速
第1阶段	能见度	1	-.572(**)	-.804(**)	.415(**)
	相对湿度	-.572(**)	1	.311(*)	-.831(**)
	PM2.5浓度	-.804(**)	.311(*)	1	-.066
	风速	.415(**)	-.831(**)	-.066	1
第2阶段	能见度	1	-.908(**)	.006	.759(**)
	相对湿度	-.908(**)	1	-.259(*)	-.747(**)
	PM2.5浓度	.006	-.259(*)	1	.163
	风速	.759(**)	-.747(**)	.163	1

** 表示达到99%的置信度； * 表示达到95%的置信度

The correlation coefficient visibility and relative humidity, PM2.5 concentrations and wind speed

As can be seen, the change in haze and visibility relative humidity, PM2.5 concentration, temperature, wind speed change stage has a good correspondence between the temperature determines the relative humidity level, the relationship between temperature and visibility actually reflects the relative humidity relationship with visibility; PM2.5 from the process point of view and visibility is significantly nonlinear relationship in the first stage of the impact and visibility PM2.5 rate significantly higher than the second stage, and in the second stage, PM2.5 visibility impact on the level of haze remained almost unchanged. Wind speed and visibility is positively related haze linear relationship, on the whole, the greater the wind speed, the better visibility, wind speed linear trend from the point of view of the visibility of the impact, the first phase of wind effects on the visibility is greater than the rate for the second phase of the wind speed visibility impact rate increases visibility stage 3 wind speed increases rapidly, reflecting the wind on the course of this haze turn for the better visibility plays an important role.

Analysis of nearly two years of Tangshan fog and haze let us look at the changes in the 10-year sub-

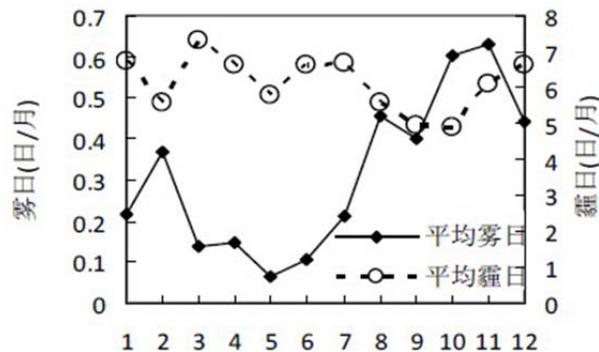


Figure 7: 2008-2013 monthly average numbers of days in the distribution of haze

As can be seen, the average monthly fog moon and interannual variability obvious, and most, which indicates Tangshan fog and haze occurs mainly in autumn and winter, from May to November foggy day

with a significant upward trend in the 10-11 month; while haze average monthly distribution relative to the average number of days an average of 5-7 days per month haze, comparison, Tangshan season fog occurs unevenly distributed and concentrated in the autumn and winter

5. Conclusions and recommendations of the analysis

Haze is composed of water vapor in case of respirable particles at a temperature lower air circulation, seasonal, long stay in the ground, causing reduced visibility, residents travel inconvenience unwell a bad weather conditions. From the recent weather situation, the haze produced with long lasting cold weather, the northern winter heating emit large quantities of respirable dust, a large rise in the number of cars in recent years, government of the people closely related, but also from the long term changes in the weather as we had a warning, telling our attention was the construction of environmental protection and the environment.

The wide range of the northern fog and haze that long-term, should be concluded in the future to strengthen the greening of Tangshan, strengthen controls and even fewer the number of private cars running, reasonable layout make full use of China's energy coal energy, urban architectural layout for the city development of good construction planning. To control fog and haze should make further efforts in Tangshan City.