

Preliminary exploration of the air quality of SRYYL in Qinghai Province

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Abstract: The source region of the Yangtze River, Yellow River and Lancang River is the one of the most important ecological area around the world which have significant impact on the watershed. Since the related River is the mother river of Chinese, the air quality at the source region is more important than other region due to possible pollutant deposition, the damage to plants and so on. We analyzed the automatic monitoring data to show the air quality of the source region of the Yangtze river, Yellow river and Lancang river (SRYYL) and preliminary explore the air quality of the SRYYL.

Introduction

The source region of the Yangtze River, Yellow River and Lancang River locates in Yushu State, Guoluo State and Huangnan State of Qinghai province. The government have set up three air automatic monitoring stations in these three states in 2014. We collected the air quality data from the stations was reported to the government from January 1st, 2015. In this report, we reported the air quality data from January to July, which was the most polluted seasons due to heavy dust storms and anthropogenic emissions.

Sources of data and research methods

Air quality data

In this study, the data was collected from 3 stations located in Yushu State, Guoluo State, and Huangnan State air quality automatic monitoring station in Qinghai, China. The measurement includes SO₂ NO₂ PM₁₀ PM_{2.5} CO and O₃, which was checked and accepted by China Environmental Monitoring Station. With careful maintenance, the data could reflect of the air quality of the SRYYL.

Research methods

Continuous measurements on SO₂ NO₂ PM₁₀ PM_{2.5} CO and O₃ were carried out in these three state from January to July in 2015, the variation and relationship were discussed detailedly. Then, we explored the preliminary reasons and obtained the rule of pollution evolution, which could be an feasible indicator of future pollution predictions and policy decisions.

Apparatus

SO₂ NO₂ PM₁₀ PM_{2.5} CO and O₃ was collected in the three state by automatic monitoring station. All of data were measured between 0 and 2000mg/l, the limit of detection is 0.2 mg/l.

Result

Average concentration of six main pollutants

Table1.The average concentration of six main pollutants

	SO ₂ [$\mu\text{g}/\text{m}^3$]	NO ₂ [$\mu\text{g}/\text{m}^3$]	CO [mg/m^3]	O ₃ [$\mu\text{g}/\text{m}^3$]	PM ₁₀ [$\mu\text{g}/\text{m}^3$]	PM _{2.5} [$\mu\text{g}/\text{m}^3$]
Yushu	24.05	18.91	0.83	91.71	52.76	24.60
Guoluo	23.82	13.47	0.48	104.40	102.48	45.13
Huangnan	21.13	14.43	0.81	95.51	139.18	58.80

In Table1 from January to July , the average concentration of SO₂ were 24.05 $\mu\text{g}/\text{m}^3$, 23.82 $\mu\text{g}/\text{m}^3$, 21.13 $\mu\text{g}/\text{m}^3$ in Yushu Guoluo and Huangnan State, the concentration of NO₂ were 18.91 $\mu\text{g}/\text{m}^3$ 13.47 $\mu\text{g}/\text{m}^3$ 14.43 $\mu\text{g}/\text{m}^3$, the concentration of CO were 0.83 mg/m^3 0.48 mg/m^3 0.81 mg/m^3 , the concentration of O₃ were 91.91 $\mu\text{g}/\text{m}^3$ 104.40 $\mu\text{g}/\text{m}^3$ 95.51 $\mu\text{g}/\text{m}^3$, the concentration of PM₁₀ were 52.76 $\mu\text{g}/\text{m}^3$ 102.48 $\mu\text{g}/\text{m}^3$ and 139.18 $\mu\text{g}/\text{m}^3$, the concentration of PM₁₀ were 24.60 $\mu\text{g}/\text{m}^3$ 45.13 $\mu\text{g}/\text{m}^3$ 58.80 $\mu\text{g}/\text{m}^3$. The concentration of O₃ of the SRYYL is higher than other place, the concentration of PM₁₀ and PM_{2.5} of Huangnan State was the highest in the three place and in Guoluo State was higher. And the concentration in Guoluo and Huangnan State is higher than national standard of PM₁₀ and PM_{2.5}.

Monthly concentration variation of six main pollutants

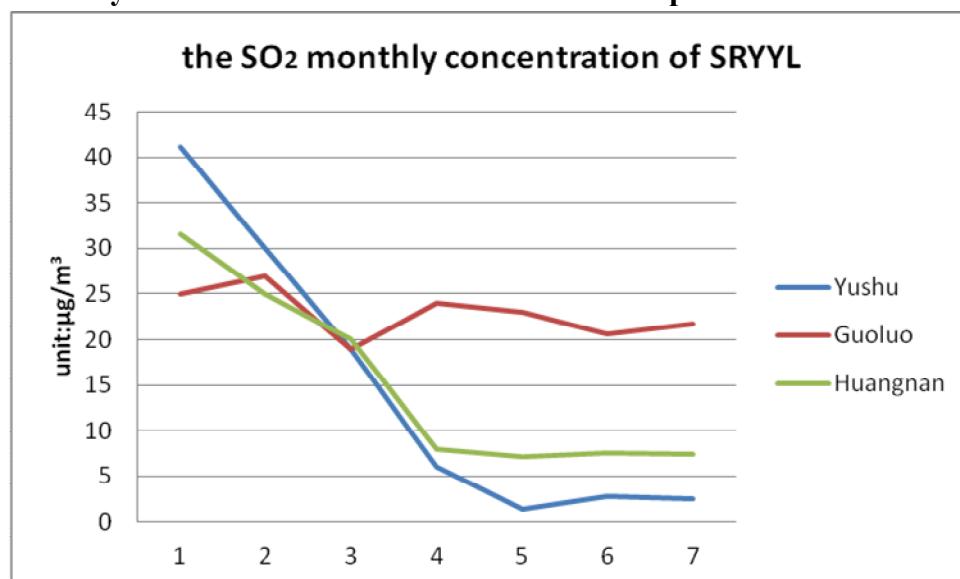


Fig.1 The SO₂ monthly concentration of SRYYL

The SO₂ monthly concentration of SRYYL is higher in January and February then decreased rapidly showing a significant impact of coal consumption in winter. The concentration o

f SO₂ reached the lowest point during May and June. Then continued a low level at Yushu and Huangnan. However, the SO₂ concentration increased at April didn't change much during the rest months at Guoluo station. The steady pattern of SO₂ in Guoluo shows clearly unknown sources.

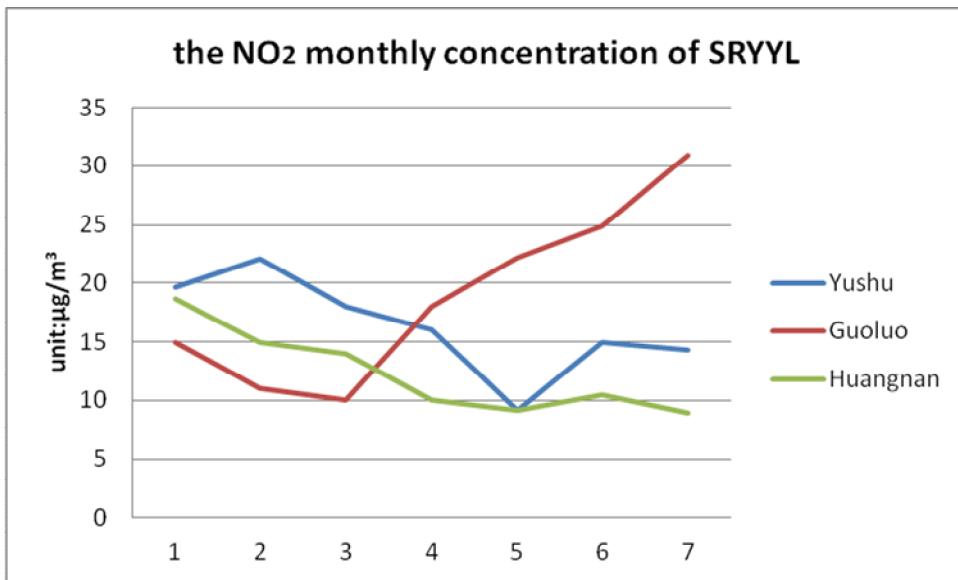


Fig.2 The NO₂ monthly concentration of SRYYL

The NO₂ monthly concentration of SRYYL is higher in January and February then decreased rapidly, but in Guoluo State, the concentration increased from March to July. Considering there are sources also for SO₂ during the summer in Guoluo, it should largely relate to human activities. The lowest point showed in May. The overall level of the concentration of NO₂ is under the national standard.

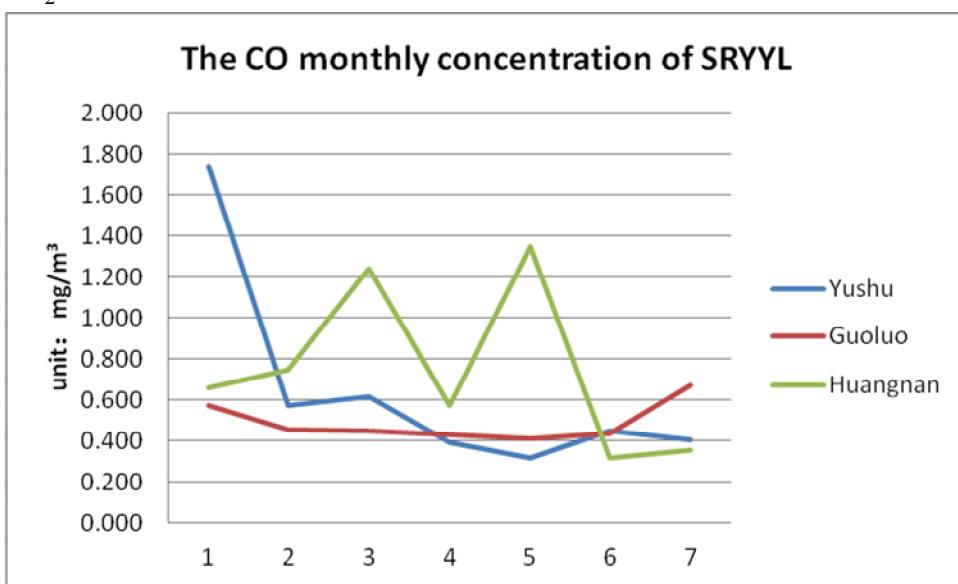
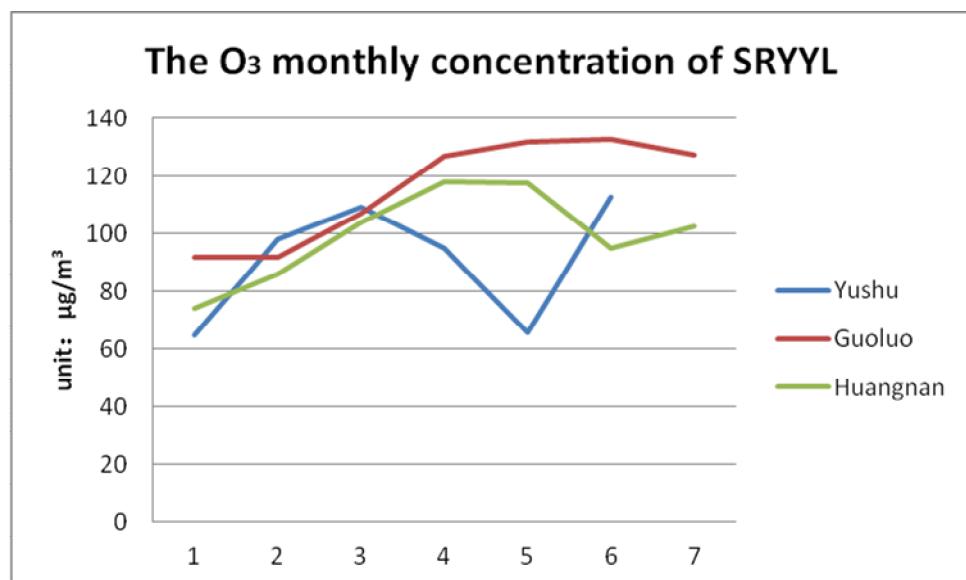
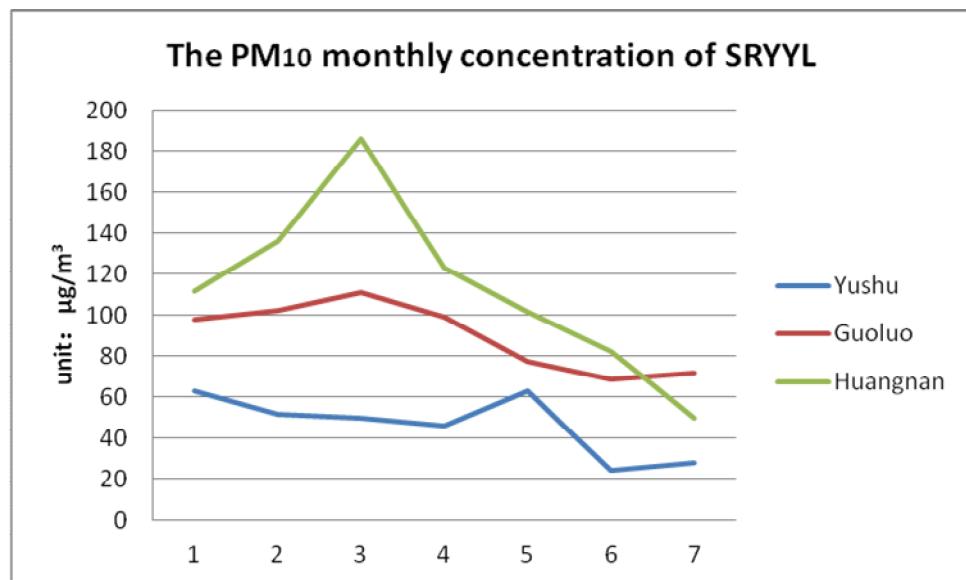


Fig.3 The CO monthly concentration of SRYYL

The CO monthly concentration of Yushu is different in January and February then decreased rapidly, but in Guoluo State, the concentration increased when April came and decreased slowly. The concentration of SO₂ reached the lowest point during May and June. Then it continued a low level.

Fig.4 The O₃ monthly concentration of SRYYL

The O₃ should be most concerned about, monthly concentration of the three state was all showed an ascending trend from January to July, the Guoluo State was the most obvious. The Yushus' went down starting from March and increasing rapidly from May. They all reach the highest point during June and July.

Fig.5 The PM₁₀ monthly concentration of SRYYL

The PM₁₀ maybe the most important pollutants in the SRYYL, in the Winter and Spring monthly concentration of the three state were higher than any other months due to strong spring dust storms. In the three states, Huangnan State's concentration is the highest. They all decrease from April and reach the lowest point during June and July.

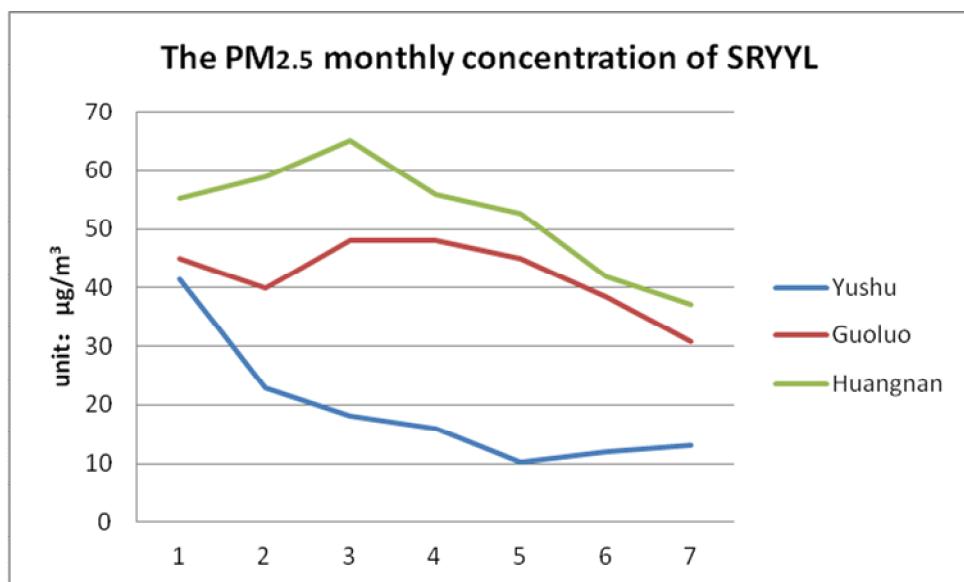


Fig.6 The PM_{2.5} monthly concentration of SRYYL

The PM_{2.5} concentration shows the same rule as the PM₁₀. In Winter and spring monthly concentration of the three state were higher than any other months. In the three states, Huangnan State's concentration is the highest. They all decrease from April and reach the lowest point during June and July and they all lower than the nation standard.

Summary

1. The variation pattern of SO₂

According to the analysis, we obtained that the concentration of SO₂ have no significant change during the period, and was influenced by meteorological factor. Specially, it was higher in first quarter. The range of concentration was 30µg/m³-41µg/m³. Therefore, it was lower in third quarter and the range of concentration was 21µg/m³-23µg/m³. The concentration of SO₂ showed decrease trend.

2. The variation pattern of NO₂

According to the analysis, the concentration of NO₂ changed as SO₂ but the concentration of NO₂ is lower.

3. The variation pattern of CO

According to analyze, we obtained that the concentration of CO won't changed much, and it was influenced by meteorological factors, especially, it was higher in first quarter. The concentration of CO showed decrease trend.

4. The law and variation of O₃

According to the analysis, we obtained that the concentration of O₃ showed increase trend and it was influenced by meteorological factors, especially, it was higher in third quarter.

5. The law and variation of PM₁₀ and PM_{2.5}

According to the analysis, it obtained that the concentration of PM₁₀ and PM_{2.5} have similar variation patterns, and it was influenced by meteorological factors, especially, it was higher in first quarter. The concentration of PM_{2.5} and PM₁₀ showed decrease trend.

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