Advanced Science and Technology Letters
Vol.31 (MulGraB 2013), pp.232-237
http://dx.doi.org/10.14257/astl.2013.31.51

Analysis on Climate Change of Nantong for Nearly 60 Years

Shao Li[1], Yu Wenzheng[2]* Chen Tianliang Jin Wang

College of Environmental Science and Engineering, Nanjing University of Information Science & Technology, Jiangsu Nanjing, 210044, China

[1]shaoli20081317@163.com, [2*]ywzheng519@126.com

Abstract: Nantong is chosen as the object of study in this paper. According to the meteorological observational data for the period from 1951 to 2010 in Nantong, the changes of climate variables on the time series for nearly 60 years are analyzed through estimation of linear tendency and sliding average. It is found that: in the past 60 years, the average temperature is rising at the rate of 0.297℃ / 10a, where the warming trend in spring is the most significant, and that in summer is the least. The trends of the min-mean and max-mean temperature are on the rise. The rapidly increasing changes of the extreme minimum and maximum temperature are observed. Over the past 60 years, the tendency of precipitation is generally on the rise with the small rate. The increasing trend of precipitation in summer is the most pronounced, followed by winter. Precipitation in spring and autumn is slightly decreasing. The contribution of the increase in precipitation mainly derives from the addition in summer and winter.

Key words: climate change; Nantong

1 Study area

Statistics show that the annual average temperature in Nantong is around 15℃. The annual average sunshine hours are 2000-2200 hours, and the annual mean precipitation is about 1000-1100 mm with a hot rainy season. The rainfall in summer is about 40-50% of the annual rainfall. Perennial rain day is about 120 days, and the period of mold rain ranges from June to July.

Foundation: Dynamic mechanism of desertification in response to climate change in Qinghai Lake (41375160), evaluation of solar energy resources and the related studies of efficiency and effectiveness of photovoltaic (1213013) and effect of urbanization on climate change——a case study of Yangtze River delta (2010JDXM027).

ISSN: 2287-1233 ASTL
Copyright © 2013 SERSC

2 Data and methods

2.1 Data

The meteorological data during 1961-2010 is mainly used from the weather stations in Nantong in Jiangsu province. This paper analyzed the weather variables such as average maximum temperature, average minimum temperature, extreme minimum temperature, extreme maximum temperature and precipitation.

2.2 Methods

The changes of climatic variables on the time series for nearly 60 years are analyzed through estimation of linear tendency and sliding average.

3 Analysis on climate change

3.1 Analysis on temperature change

3.1.1 Tendency of annual average temperature

The annual average temperature in Nantong was 15.4 ℃ during 1951 to 2010. In recent 60 years, the annual average temperature in Nantong trend in growth rate of 0.297 ℃ / 10a, the annual average temperature between 14.3 ℃ and 17.5 ℃ (Fig.3-1).

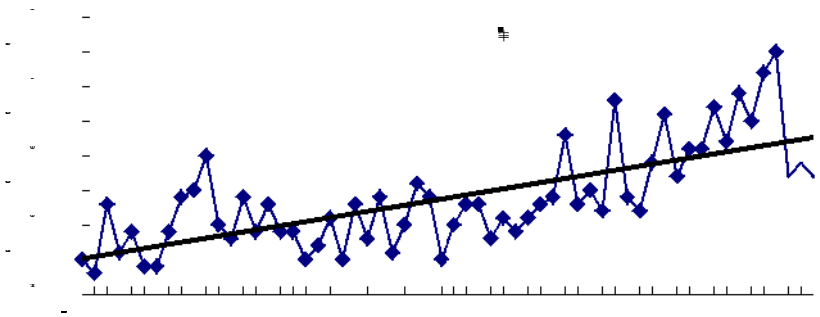

Fig.3-1 The annual average temperature in Nantong 1951~2010

Copyright © 2013 SERSC

3.1.2 Tendency of seasonal average temperature

As shown in Fig. 3-2, Fig. 3-3, Fig. 3-4 and Fig. 3-5, the temperature varies linearly rate of Spring, Summer, Autumn and Winter were 0.395'C / 10a, 0.219'C / 10a, 0.343'C / 10a, 0.322'C / 10a. The spring average temperature was 13.8'C, the minimum value was 12.2'C, appeared in 1952, 1956, 1957 and 1970, the maximum value was 16.5'C in 2007. In summer, the average temperature was 27.9'C, minimum value was 22.1'C in 1957, the maximum value was 27.9'C in 2006. In autumn, the average temperature was 17.4 'C, the minimum value was 13.2 'C in 1957, the maximum value was 19.5 'C, appeared in 2005 and 2006. The winter average temperature was 4.3'C, the lowest point was 1.8'C in 1967, the highest point was 7.1'C in 2007.

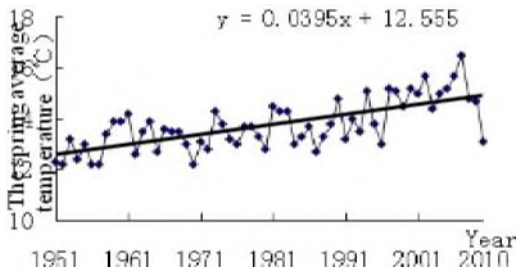

Fig.3-2 The spring average temperature in Nantong 1951~2010

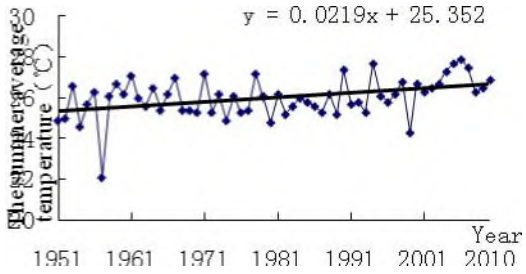

Fig.3-3 The summer average temperature in Nantong 1951~2010

Copyright © 2013 SERSC

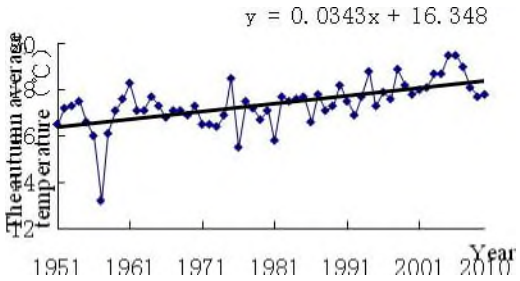

Fig.3-4 The autumn average temperature in Nantong 1951~2010

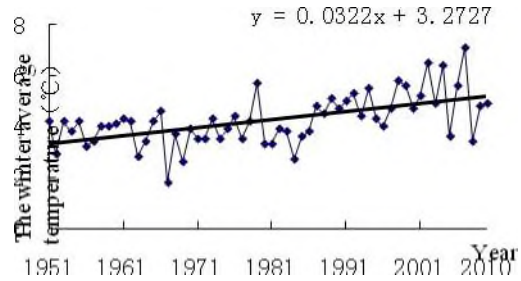

Fig.3-5 The winter average temperature in Nantong 1951~2010

3.2 Precipitation change

3.2.1 Annual scale

The average precipitation in Nantong is 1094.6mm, and the fluctuation is relatively large. In recent ten years, the rising tendency of precipitation is the most obvious after 1951 with the rate of 203.8mm / 10a.

3.2.2 Seasonal scale

According to Fig.3-6, a downward trend is in the precipitation in spring with the declining rate of 7.571mm / 10a. The mean precipitation in spring is 250mm, accounting for 22.8% of the annual mean precipitation.

Through Fig.3-7, it can be observed that the increasing tendency of the

Copyright © 2013 SERSC

precipitation in summer is significant with the rate of 12.981mm / 10a. In seasonal precipitations, summer is the most, 508mm, accounting for 46.4% of the annual mean precipitation.

Seeing Fig.3-8, the decreasing rate of precipitation in autumn is 6.694mm / 10a. The average precipitation is 209.4mm which accounts for 19.1% of the annual mean precipitation.

In Fig.3-9, it can be found that the increasing rate of precipitation in winter is 3.703mm / 10a. The average precipitation is 128.7mm, holding only 11.8% of the annual precipitation.

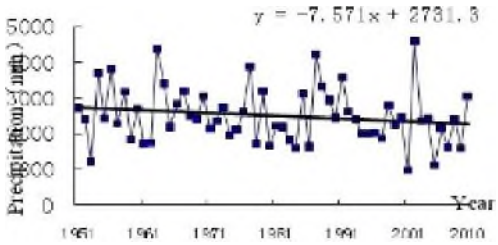

Fig.3-6 The spring average precipitation in Nantong 1951~2010

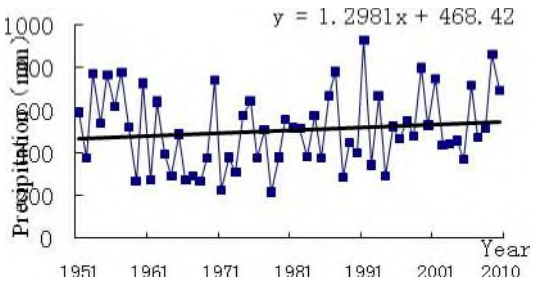

Fig.3-7 The summer average precipitation in Nantong 1951~2010

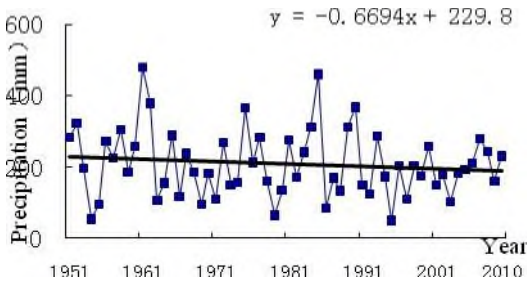

Fig.3-8 The autumn average precipitation in Nantong 1951~2010

Copyright © 2013 SERSC

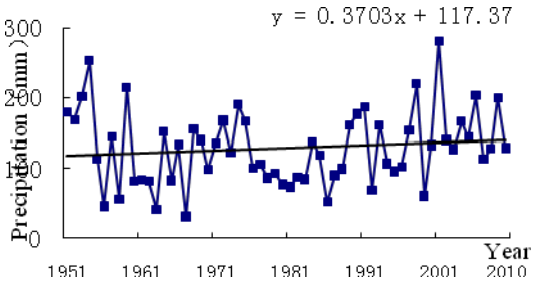

Fig.3-9 The winter average precipitation in Nantong 1951~2010

4 Conclusions

(1) In the past 60 years, the trend of the average temperature in Nantong is on the rise with the warming rate of 0.297℃/ 10a. The turning point appears in 2008 where the temperature decreased obviously. The mean temperature in recent three years is lower than that in the previous seven years of about 1℃. But the average temperature in recent ten years is 16.4℃, which is higher than that in the 1990s,15.8℃.

(2) In the past 60 years, the trends of the average temperature in four seasons are on the rise, where the increasing trend in spring is the most significant and that in summer is the smallest. In recent ten years, the trends of warming have slowed. Except the temperature in summer increasing slightly, the temperatures in other three seasons tend to decrease.

(3) The trends of the min-mean temperature and the max-mean temperature are on the rise, and the increasing rate of the min-mean temperature (0.282℃/ 10a) is slightly higher than the max-mean temperature (0.232℃/ 10a).

(4) There are rapidly rising trend in extreme minimum temperature and extreme maximum temperature. The increasing rate of extreme minimum temperature (0.497 ℃ / 10a) is significantly higher than extreme maximum temperature (0.34℃/ 10a), and both of the warming rates are faster than that of the average temperature.

(5) In the past 60 years, the tendency of precipitation is generally on the rise, but the increasing rate, only 8.25mm / 10a, is small. The 60s and 70s are the periods of relatively drought in history.

(6) The increasing trend of precipitation in summer is the most pronounced, followed by winter. Precipitation in spring and autumn is slightly decreasing. The contribution of the increase in precipitation mainly derives from the addition in summer and winter.

Copyright © 2013 SERSC