Characteristics of Chinese regional climate change and the advances of aerosols' climate forcing simulation in China

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Over the past 50 years, the annual mean surface temperature in China has a clear warming tendency. The warming occurs mainly in the winter and spring seasons. Northern China and the Tibetan plateau are regions of warming, while southwest China has cooling, especially in spring and summer, and a cooling tendency is found in the summer in the middle and lower reaches of the Yangzi River.

The annual precipitation of China shows a slight increase. In the middle and lower reaches of Yangzi River and Western China, the increase is obvious. However, in Northern China, the eastern part of Western China, and the southern part of Northeast China, the annual precipitation has a decreasing tendency. Overall cloudiness has a decreasing tendency, which is most obvious in Northern China. The annual sunshine duration, pan-evaporation, and wind speed show obvious decreasing tendencies since the 1970s.

In addition to natural climate variability, many scientists attribute the Chinese regional climate variations to the forcing effects of GHGs and aerosols. Owing to the complexity of aerosol effects, their role in climate change has been attracting more and more scientific attention as one possible factor in climate change other than greenhouse gases.

However, because of the lack of direct long-term measurements of aerosol properties, indirect methods have been used to retrieve aerosol optical information. This approach has been used to obtain a reasonably accurate input of the aerosol spatio-temporal distribution, with this aerosol distribution then used to conduct simulations of the aerosol climate forcing.

This report will describe some advances in research about aerosol optical characteristics, illustrate simulated aerosol climate forcing, and discuss the prospects and objectives for aerosol climate effect research in China during the next 5-10 years.

Key words: regional climate change, aerosol climate forcing, China

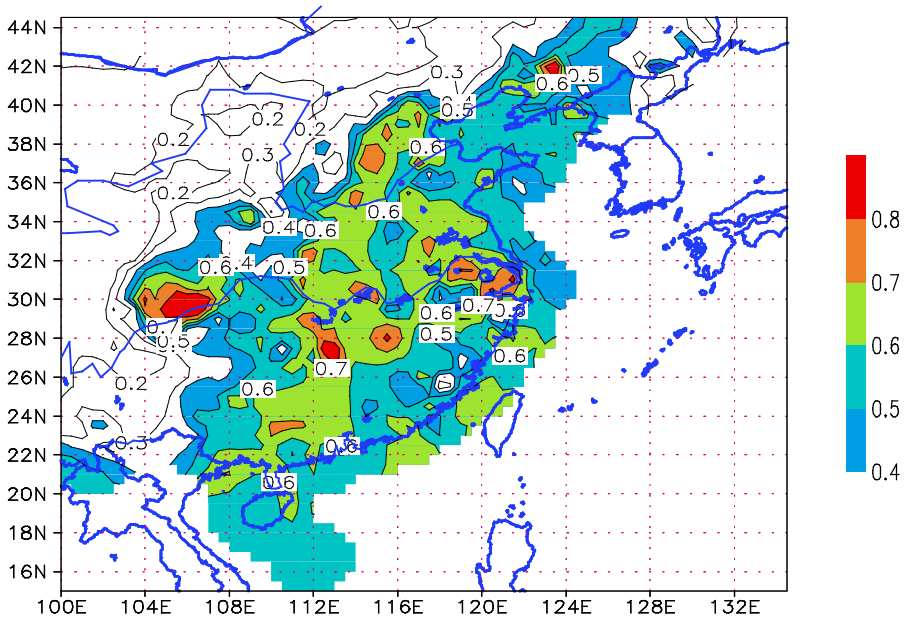

Fig. 1 The distribution of averaged AOD (aerosol optical depth) at 550nm in 1951-2000 retrieved by using visibility and water vapor pressure of 504 stations.

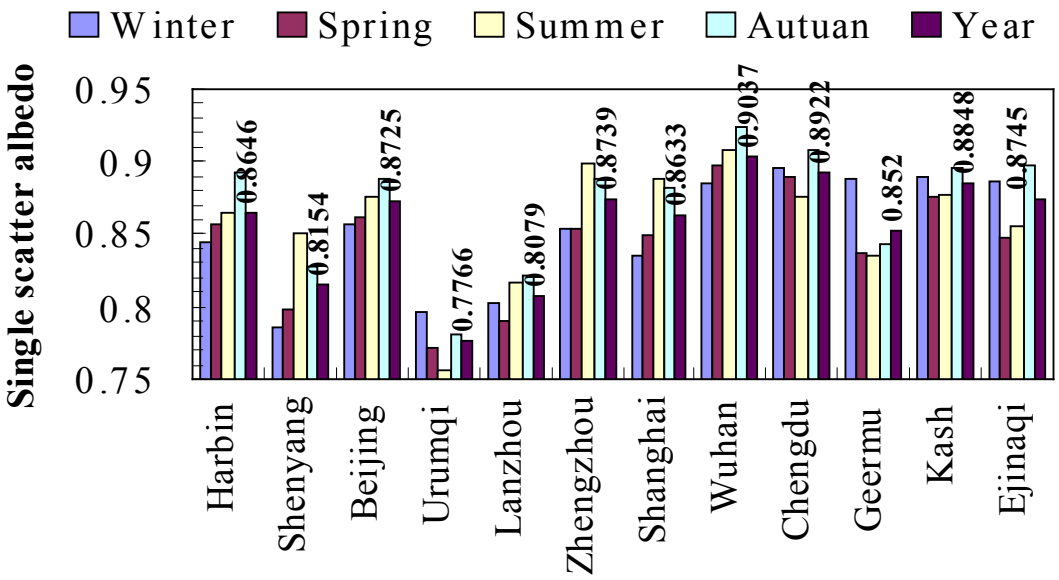

Fig.2. Aerosol SSA (single scattering albedo) at 12 cities as retrieved using the broadband radiation method (BRM). After Qiu J., Yang L., and Zhang X. (Tellus, 2004).