

Review of Chinese atmospheric science research over the past 70 years: Climate and climate change

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Over the past 70 years since the foundation of the People's Republic of China, Chinese scientists have made great contributions to various fields

in the research of atmospheric sciences, which attracted worldwide attention. In the field of climate and climate change, we have witnessed multiple remarkable achievements by Chinese scientists.

The review covers and summarizes the contributions of the Chinese scientists from the six aspects. First, important progress in general climate studies is introduced. Chinese scientists made statistical analyses of climate changes in temperature and precipitation (drought and flood) based on large time-scale data. They systematically studied the formation mechanisms of climate disasters and extreme climate events, which laid the physical foundation for climate disaster prediction in China.

The Tibetan Plateau has an important influence on the evolution of the global atmospheric circulation and plays an important role in [climate change](#) and climatic anomalies in China dynamically and thermodynamically. Chinese scientists have made pioneering and original scientific achievements in this field. Monsoon is an important circulation system in the global climate system.

The interannual and interdecadal variations of the East Asian monsoon have a major impact on climate disasters. The research in this field is dominated by Chinese scientists. China is the first country to study the impact of teleconnection oscillation and westerlies on the climate, and has made remarkable achievements.

The developments of climate dynamics and climate system models constitute the theoretical basis and numerical tools for modern climatology research. The development and application of the climate system model is an important direction of modern climatology. Chinese scientists have established a theoretical framework for climate dynamics. Since the late 1970s, China has worked to develop climate models and apply them to simulation studies of climate processes.

One of the most important points of progress in atmospheric sciences in the 20th century is that scientists and governments all around the world have realized the role of human-induced [global warming](#) and its influence on the global environment. Additionally, they have realized that climate change is a result of the interactions among multi-spheres in the Earth's system. The research on climate and environmental evolution in China conducted by Chinese scientists has promoted the continuous progress of domestic and international research on climate change and contributed to the progress of global change research. In the field of climate change, Chinese scientists have reaped numerous fruits as a world leader in this area. Thus, the right to speak internationally is becoming more and more powerful.

Recent decades have witnessed the increasingly profound impact of climate change on people's lives. Looking ahead, there still remain many unresolved problems that will lead the way in the future research on the climate and the climate change.

1. Based on existing results, a scientific and reasonably complete physical image needs to be constituted by questions of how the dynamic and thermodynamic effects of the land-atmosphere coupled process on the Qinghai-Tibet Plateau affect Asian monsoons and multi-scale disaster weather systems, etc.
2. The impact of the interaction of different "spheres" on the anomalies of the East Asian monsoon climate and the feedback effects of East Asian monsoon on global climate change deserves in-depth study.
3. There is still a large gap between the current climate model in China and the international leading model. It is necessary to develop high-resolution land-atmosphere coupled climate system models, making the Chinese comprehensive level of climate model development and simulation rank among the top in the world.

4. How much global warming caused by greenhouse gases generated by human activities will be produced is still a problem that has not been clarified. What are the different responses of global warming to climate variability in different regions of China? The warming of different regions of China, the attribution analysis of climate change in different regions, and the differences between these factors and the global climate change factors are all urgent scientific questions to answer.
5. In the context of global warming, how to study the causes and changes of extreme weather and climate events from the perspective of multi-factor synergy is a difficult and important point in international [climate](#) research.

More information: Jianping Huang et al, Review of Chinese atmospheric science research over the past 70 years: Climate and climate change, *Science China Earth Sciences* (2019). [DOI: 10.1007/s11430-019-9483-5](#)

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