



## **Linkages of periodic climatic and social-economic changes in China during the past 2000 years**

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Impacts of climate change on rise and fall of human civilization in the history could provide lessons for understanding how impacts of climatic change and human response interacted. However, such a study is highly restricted by lacking in high-resolution series concerning long-term social-economic processes. China is a country that has great potential for providing long-term socio-economic series in high-resolution because it has abundant related historical records as long as thousands of years in the Chinese historical literatures.

In this paper, A methodology named Semantic Differential for quantifying historical literal descriptions to grade numbers is developed. Using the methodology, 10-year resolution graded series of social-economic system change of China, including harvest of agriculture, economy, social rise and fall, are reconstructed during the past 2000 years.

To compare the periodic changes of climate, harvest, economy, social rise and fall in China during the past 2000 years, it is found that : (1) There are similar periods on multiple time scales among all the series. (2) On the centurial scale, the better economic and social phases generally occurred in the better harvest phases when generally had a warm climate. (3) In the warm phases, both economic and social status were recovered faster and flourished longer than that in the cold phases. (4) The direct impact of climatic change on food security could be enlarged or diminished when it transmitted from harvest I to other social-economic subsystems because of feedbacks of the system.