

Climate and extreme events in eastern China during 1620-1720

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The Maunder Minimum, 1620-1720, is now commonly known as a period of rare sunspot appearance and reduced solar activity, which has great effect on global and regional climate. Based on the analysis of the winter half-year (October to April) temperature anomaly series (Ge *et al.*, 2003), the 48-station's yearly drought/flood grade series (Zhang, 1996) in eastern China (east of 105° E, 25-40°N), and other written records; climate and extreme events in eastern China during 1620-1720 are studied. The highlights of this study are summarized as followed:

(1) The period of 1620-1720 is one of the coldest period in the last 2000 years, with the mean winter half-year temperature being 0.5° C lower than that of 1950s-1970s. The 1650s-1670s is one of the coldest 30-year during the last 2000 years. The maximum amplitude of southward displacement of climatic zone during 1620-1720 is about 3° latitude than that of 1950s-1970s. 12 extreme cold winters were documented in 1620-1720, and their winter temperature is even lower than that of the coldest winter since 1951.

(2) There existed great precipitation variability for the period of 1620-1720. In which, there are four rainless periods, and each of them appears consecutively as groups of several continuous extreme drought years. However, there also recorded two rainy periods grouped with several severe floods years. One of the most extreme drought for the last 1500 years was documented in 1634-1643, which might have triggered a large-scale peasant rebellions and social turbulence in China, and played important role to the collapse of Ming Dynasty.

(3) This climate characteristic of a sustained cold and drought, great climate variability such as the occurrence of severe winter and extreme drought during the period of 1620-1720 in eastern China are also well expressed in the tree-ring records in western China.

Keywords: climate; extreme events; eastern China; Maunder Minimum

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