

Sand Dust Weather in the Later 19th Century of Beijing

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Historical documents, especially the private diary with high temporal-spatial resolution and more confidence, have become one of the important proxies in the research of past climate change. An ancient Chinese diary named "Weng Tonghe Diary" written by Weng Tonghe in the late Qing Dynasty and edited by Chen Yijie was dug out. First of all, every sand dust record was extracted from this diary. Then the omitted days in every month was analyzed. It is found that if the omitted record days in one month were not more than four days, this month could be considered as a full recording month. In other words, there are no omitted record days in this month. In the end, based on the records of full recording months, the characteristics of sand dust weather in Beijing during 1860~1898A. D. were analyzed. Following are the main conclusion. (1)During 1860~1898, the annually sand dust days of Beijing are 10.4 days in average. If considering the difference between the records of proxy data and the modern observation, the annually sand dust days should be little more than 10.4 days. So it is firmly more than the average of 7.8 days in the 1990s. (2) On the sight of annual variability of sand dust days, there are three periods: the high frequency period $(1860 \sim 1871)$ with annually 15.1 days in average, the low frequency period (1876~1883) with annually 7.3 days in average, and the mid frequency period $(1884 \sim 1898)$ with annually 9.7 days in average. (3) As to the seasonal distribution, 70% of the sand dust weather occurred in spring, in which the weight of April and May is over 50%; and 20% occurred in winter, which is the second high frequent season. Comparing with that in 1961~2000A. D., sand dust weathers during 1860~1898A. D. was more highly concentrated in spring. (4) Nearly half (48.2%) of the sand dust days arose in the duration between the last ten days of March and the first ten days of May. Moreover, the sand dust days increased abruptly between the mid and last ten days of March, and decreased abruptly between the first and mid ten days of May. (5) It is also identified out 23 sand dust weather processes that were lasting longer than one day, of which the longest one lasted 4 days, during 1860~1898 A. D. . The above findings reveal that the sand dust in the recent decades in Beijing may not be more serious than that in the past; at least, it is true in the 1990s.