Supporting Information for

**Distinct Weekly Cycles of Thunderstorms and a Potential Connection with Aerosol Type in China**

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Figure S1 shows the weekly cycles in thunderstorm activities at Mt. Hua and at Xi’an during two periods, i.e., 1983–1994 and 1995–2005. The weekly phase in each period is similar to that of the entire period although the statistical significance is not very high due to the short period of time covered. The weekly phase is almost identical when the time period is divided into two, indicating that the effects of pollution aerosols on thunderstorms are the same in both periods. Therefore, the analysis of the entire period in this study does not involve the post hoc domain issue. China’s economy has rapidly grown since the early 1980s, which may explain the accelerated increase in aerosol loading since then [Ansmann, et al., 2005; Qiu and Yang, 2000]. The weekly cycles in thunderstorm activities thus also more likely emerged since then. As such, we chose the study period of 1983–2005 in this study (the meteorological station at Xi’an relocated after 2005).

Reference:

Ansmann, A., R. Engelmann, D. Althausen, U. Wandinger, M. Hu, Y. Zhang, and Q. He (2005), High aerosol load over the Pearl River Delta, China, observed with Raman lidar and Sun photometer, Geophys. Res. Lett., 32, L13815, doi:10.1029/2005GL023094.

Qiu J H, Yang L Q (2000), Variation characteristics of atmospheric aerosol optical depths and visibility in North China during 1980–1994. Atmos Environ, 34: 603–609.

Figure S1. Thunderstorm day anomalies for the two periods during 1983-2005 (a) at Mt. Hua and (b) at Xi’an as a function of the day of the week. Only data recorded from 1200-2000 LT of each day are considered. Vertical bars represent the standard deviation (±σ).





Figure S2. (a) The anomalies of dust day at Xi’an as a function of the day of the week during the period 1983-2005. Dust data are based on weather reports. The code in the original file denoting a dust occurrence is 31. (b) Aerosol index anomalies over the region (108.5–109.5°E, 34–35°N) as a function of the day of the week during the period 1983-2005. The aerosol index is retrieved from Total Ozone Mapping Spectrometer measurements. Vertical bars represent the standard deviation (±σ). The significance level for panel a is *p* = 0.12. The significance level for panel b was not calculated because there was too much missing data.



Figure S3. Thunderstorm day anomalies (a) at Xi’an and (b) for megacity stations over southeast China as a function of the day of the week. Vertical bars in all panels represent the standard deviation (±σ). Significance levels, *p*, are given.



Figure S4. Lightning strike rate anomaly as a function of the day of the week for four 10°x10° regions from west to east in the 30°N-40°N latitudinal band: a) 80°E-90°E, b) 90°E-100°E, c) 100°E-110°E, and d) 110°E-120°E. Data are from the TRMM LIS product and cover the period 1998-2009. Vertical bars in all panels represent the standard deviation (±σ). Significance levels, *p*, are 0.11, 0.02, 0.09, and 0.03 for panels a, b, c, and d, respectively.