

***Interactive comment on* “The interdecadal worsening of weather conditions affecting aerosol pollution in the Beijing area in relation to climate warming” by Xiaoye Zhang et al.**

Anonymous Referee #1

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Comments to the Author (General comments) In this paper, the relationship between worsening of weather conditions and aerosol pollution, especially for the cause factor and feedback loop are investigated. I think it is a very interesting paper. There are some problems should clearly explain before this paper is accepted. 1. Page 2, in the introduction, the aerosol has direct indirect and semi-direct climate effect, especially for dust aerosols, which has been reviewed by Huang et al., (2014). The dust storm also has a significant effect on Beijing’s air quality. The emission, transport and deposition of dust aerosols from Gobi Desert and Taklimakan Desert have been reported by previous papers (Chen et al., 2017; Huang et al., 2008). The references below are recommended. ĩAñHuang, J., T. Wang, W. Wang, Z. Li, and H. Yan (2014), Climate effects

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of dust aerosols over East Asian arid and semiarid regions, *J. Geophys. Res. Atmos.*, 119, 11,398–11,416, doi:10.1002/2014JD021796. ĩAñChen S., J. Huang, J. Li, R. Jia, N. Jiang, L. Kang, X. Ma, and T. Xie, 2017: Comparison of dust emissions, transport, and deposition between the Taklimakan Desert and Gobi Desert from 2007 to 2011. *Science China Earth Sciences*, doi: 10.1007/s11430-016-9051-0. Shao Y, Wyrwoll K H, Chappell A, Huang J, Lin Z, McTainsh G H, Mikami M, Tanaka T Y, Wang X, Yoon S. 2011. Dust cycle: An emerging core theme in Earth system science. *Aeolian Res*, 2: 181–204 2. Page 3, line 6-11, Could you explain what the high and low PLAM stand for. And if the high PLAM means the worse weather conditions and severe aerosol pollution. Since you said “The PLAM was derived based on the relationship between PM mass concentrations and key meteorological parameters ...”, I think the PLAM stands for the correlation between PM mass concentration and meteorological parameters and can't stand for the intensity of unfavorable weather conditions. There are some confusions, please explain clearly. 3. Page 3, in equation (2), the detail calculation of the PLAM should be written. Where the $\alpha(m)$ and $\beta(c')$ come from and how to derive the two parameters? 4. In equation (2), the “ $\beta'(c)$ ” should be changed to “ $\beta(c')$ ”. 5. In equation (1), the “,” should be added before “(1)”. 6. In line 16, “Where” should be the top lattice because this sentence is not ended. 7. Page 4, line 1-2, why the PLAM can represent the unfavorable weather conditions, even aerosol pollution? 8. In Figure 1, why you plot the first and fourth columns and what do they used for? 9. Page 4, Line 6-8, how can I derive these information from the figure 1? 10. I think the study areas should be illustrated in this paper and the location observation sites. 11. I think the areas of the northerly wind speed you calculated should be marked out. 12. Page 4, Line 27, the same to question 6. 13. Page 5, line 35, “Wu (2017)” should be corrected in to “Wu et al., (2017)”. 14. In Fig. 2a,d,e, if the linear trends pass the significant level ?

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