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# ***Interactive comment on* “Possible influence of atmospheric circulations on winter hazy pollution in Beijing-Tianjin-Hebei region, northern China” by Z. Zhang et al.**

## **Anonymous Referee #2**

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This paper uses daily visibility and number of hazy days data from meteorological stations, and reanalysis data to study the relations between atmospheric circulations and winter haze, and builds a statistical model based on the relations. The methods are innovative, but several places need improvements. Specific comments are shown below.

1. In the abstract, the authors just simply claim that “all of the six indices have significant and stable correlations with the winter visibility...”; it’s better to provide more detailed and conclusive descriptions of these relations in the abstract so that readers can find what you found quickly. Besides, it’s better to include a summary of the possible mechanism (sect. 3.4) in the abstract.

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2. In sect. 2.1, the authors defined hazy days as “visibility  $\leq$  5km and RH < 90%”, which is different from CMA’s definition (visibility < 10km, [1]). Why do the authors use a different definition in this study?
3. In Table 1 and Sect. 3.2, the authors show that visibility and EU, WP, and SBH are highly correlated, but the reasons were not given and this information is not used in the later built model. How to link the correlations between visibility and EU, WP, and SBH to the statistical model?
4. The numbers in Fig. 3, 4 and 6 are hard to read. In addition, Fig. 3(e) was plotted, but there is no explanation in the figure title and this plot is not explained in the paper.
5. Fig. 3 show the correlation between SLP, UV850, etc and visibility over most areas of the world. Where do these visibility data come from? Not sure if reanalysis data provide visibility information. In 3b, how is the correlation coefficient represented? What means positively correlated and what means negatively?
6. Page 22501, line 20, the authors claim that “the significantly negative correlation suggest. . .”. However, the latitudes of BTH region range from 36N to 42N (Fig. 7), which lie in the positive correlation region, not the negative correlation, so the conclusion based on these is problematic.
7. Table 2 gives the expressions for the six indices, but the authors didn’t provide any basis for the expression. For example, U850 is defined as the difference between U850 within region A (55~75N, 40~110E) and region B (40~50N, 45~75E). These regions are not the BTH region, why are these selected to express the indexes? Other indexes have the same problem.
8. The authors attributed the bad performance of the statistic estimation model after 2008 to air pollution control. However, there is no evidence showing that the emission changes after 2008 are much higher than before 2008. The substantial emission increases after 2000 might be higher than the air pollution control changes that happened

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after 2008, but it seems that the model is not affected around 2000 in Fig. 5.

9. Page 22506, line 9: it's better to provide some explanation of how relative humidity degrades visibility.

[1] Chinese Meteorological Administration, Observation and forecasting levels of haze, 2010

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