

Interactive comment on “Characteristics of pollutants and their correlation to meteorological conditions at a suburban site in the North China Plain” by W. Y. Xu et al.

Anonymous Referee #2

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Overview of article:

This manuscript presents new observational data from a site in Wuqing for the Haze in China project. The measurements provide a useful description of pollutant characteristics for a suburban site allowing for the evaluation “regional” air quality. Broadly, it was found that higher wind speeds typically decreased high primary pollutant concentrations by way of greater mixing. Ozone demonstrated the opposite relationship likely due to increased transport of ozone formed in other regions and an increase in biogenic VOCs concentrations from S-SW source regions. Overall, this manuscript is thorough and contains detailed analysis and description of the NCP regional back-

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ground air quality characteristics. In spite of the detail, there are still a few content and technical suggestions that can improve the quality and readability of this manuscript. These recommendations are made below:

Recommendations:

Minor Comments and Concerns:

The frequency increment method assumes that the North wind is characteristic of background pollutant conditions (this assumption is supplemented by Figures 7 and 8) and therefore the percent increase in regionally polluted events can be calculated by the difference between the North direction and all other directions. This method is only convincing under higher wind speed categories since transport from the relatively pristine Northern air mass is unlikely to reach the Wuqing station. This can be seen in Table 3 for the lower wind speed bins (wind speeds < 2 m/s). For the low wind speeds the primary pollutants demonstrate vastly different frequency increments during the same season across wind directions, while ozone shows little variability during those same conditions. This indicates that local sources of primary pollutants are the likely driver of changes in frequency increment. It may be more convincing simply to leave off the low bin wind speeds from Table 3 or just mention that this method may not be as indicative of regional transport for lower wind speeds.

There was an assumption made in Section 3.5.1 paragraph 5 that states that NO_x from regional sources is most likely weak. Have you considered PAN as a possible non-local source of NO_x to Wuqing from Tianjin or Beijing or have other articles described this?

There is a lot mention of the PBL height and mixing, however, no data are provided other than wind speed to quantify or present evidence for the PBL height and mixing argument (such as on page 7137 lines 4-13). It seems reasonable but the suggestion should be taken as such, simply a suggestion and not a central explanation. If possible, present something regarding the PBL height either in a figure or table or just reframe the discussion/conclusion to use less direct language when talking about mixing and

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PBL height.

On page 7135 lines 4-5, it is stated that "Atmospheric temperature determines how fast molecules can move in the air..." This is not correct. Temperature IS the average kinetic energy of the molecules in air, it does not determine the speed of the molecules in air.

The Conclusion section needs to be put in context of prior literature and studies. Seemed to end without commenting on other work and how this particular study fits into HaChi or other literature.

Technical Recommendations:

Pg. 7114 line 13: "...in the NCP, relatively higher concentrations" should be changed to "relatively high concentrations"

Pg. 7115 lines 2-3: "O₃ is one of major components...and hazardous to vegetation" should be changed to "O₃ is a major component ... and can be hazardous to vegetation"

Pg. 7115 first paragraph seems disjointed. The paragraph begins by saying that "Additionally, CO and NO_x are precursors of ozone. CO is then well discussed, however, immediately after the CO discussion SO₂ is mentioned and the transition to SO₂ chemistry and its importance comes out of nowhere. Need better connected thoughts here.

Pg. 7116 lines 16-18: Reword the sentence "As for chemical reactions..."

I was having some issues understanding which direction the winds were coming from. When a wind is coming from the South it should be called a southerly wind; if headed South it should be referred to as a southward wind. Section 3.1 was particularly difficult to read because of this (see pg. 7122 lines 22, 25-26). After reading on it became more apparent that the authors were always referring to the origin of the wind and not the direction it was headed. Make it clearer so that it is more readable.

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Pg. 7128 lines 9-10: The sentence "The traffic..." reads as two independent thoughts. Reword.

Pg. 7130 lines 13-17: These sentences need to be re-worded. Too many independent thoughts in one sentence.

Pg. 7130 line 29: Include a citation for SO₂ domestic heating in winter if possible.

Pgs. 7130-31 lines 29 and lines 1-2: Re-write this sentence. Again too many independent thoughts in one sentence.

Pg. 7131 lines 22-23: Re-write the sentence "In the SE sector..." There are too many thoughts in one sentence.

Pg. 7132 entire last paragraph: Re-write this paragraph since most of the sentences are run on sentences often containing several seemingly unrelated thoughts.

Pg. 7135 line 18: Reword "... , under which no O₃..."

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 7113, 2011.

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