Author Response to Anonymous Reviewer #1

We thank Reviewer #1 for the support to publish this paper and for the comments to improve it. Each comment by the reviewer is reproduced below, in bold type. Our replies to these comments are given below, and changes to the manuscript are marked in blue.

Specific comments

1. **P12460, L11. "…for 113 organic compounds are listed in Table S3". Please check the number of organic compounds.**

   Response: Accepted.

   We are sorry for this mistake. The number of organic compounds listed in Table S3 should be 100. In revised manuscript, this sentence is changed to "…for 100 organic compounds are listed in Table S3".

2. **P12463, L13-15. "…the highest-/lowest-value ratios of 2, 2-DMB and acetylene were 2.13 and 2.32, respectively." This statement is hard to understand. Please explain how you defined the so called "highest-/lowest-value ratios".**

   Response: Accepted.

   We are sorry for the unclear description. Figure 6 shows the hourly average diurnal profiles for 2, 2-DMB and acetylene before, during, and after the control. The highest hourly mixing ratio of 2, 2-DMB in Fig.6 divided by the lowest hourly mixing ratio of 2, 2-DMB is defined as "highest-/lowest-value ratios of 2, 2-DMB.

   In revised manuscript, "Before the control period, the highest-/lowest-value ratios of 2, 2-DMB and acetylene were 2.13 and 2.32, respectively." is changed to "Before the control period, the highest-/lowest-value ratios (the highest average hourly mixing ratio of a given VOC species divided by the lowest average hourly mixing ratio of this species) of 2, 2-DMB and acetylene were 2.13 and 2.32, respectively."

3. **P12463, L17-18. It is hard to understand how you concluded that combustion may have been an important nighttime source of VOCs during the second and the third periods, please clarify.**

   Response: Accepted.

   We are sorry for the unclear description. 2, 2-DMB is considered a typical tracer for vehicular emissions (Chang et al., 2004), and acetylene is a tracer for vehicular and other combustion processes (Baker et al., 2008). Before the control period, the highest-/lowest-value ratios of acetylene and 2, 2-DMB were very similar with the values of 2.32 and 2.13, respectively. During control, the highest-/lowest-value ratio of acetylene (3.05) was higher than the value of 2, 2-DMB (2.13). After control, the highest-/lowest-value ratio of acetylene (4.08) was significantly higher than the value of 2, 2-DMB (2.08). The highest-/lowest-value ratios of acetylene increased over time during the

three periods, but the values of 2, 2-DMB were relatively stable .So the influence from the planetary boundary layer and vehicular emissions on the higher nighttime mixing ratios of acetylene can be eliminated. Coal combustion was found to be an important source for ambient VOCs during winter in Beijing [Wang et al., 2013]. We speculate that combustion may have been an important nighttime source of VOCs during the second and the third periods.

In revised manuscript, the last paragraph of section 3.2 is changed to "During the period after control, nighttime NMHC mixing ratios were much higher than those before control, suggesting that nighttime emission sources may differ. We also found some evidence for the higher nighttime VOC mixing ratios in the period after control. Figure 6 shows the hourly average diurnal profiles for 2, 2-dimethylbutane (2, 2-DMB) and acetylene before, during, and after the control. 2, 2-DMB is considered a typical tracer for vehicular emissions (Chang et al., 2004), and acetylene is a tracer for vehicular and other combustion processes (Baker et al., 2008). Before the control period, the highest-/lowest-value ratios (the highest average hourly mixing ratio of a given VOC species divided by the lowest average hourly mixing ratio of this species) of acetylene and 2, 2-DMB were very similar with the values of 2.32 and 2.13, respectively. During control, the highest-/lowest-value ratio of acetylene (3.05) became higher than the value of 2, 2-DMB (2.13). After control, the highest-/lowest-value ratio of acetylene (4.08) was significantly higher than the value of 2, 2-DMB (2.08). The highest-/lowest-value ratios of acetylene increased over time during the three periods, but the values of 2, 2-DMB were relatively stable .So the influence from the planetary boundary layer and vehicular emissions on the higher nighttime mixing ratios of acetylene can be eliminated. Coal combustion was found to be an important source for ambient VOCs during winter in Beijing [Wang et al., 2013]. We speculate that combustion may have been an important nighttime source of VOCs during the second and the third periods."

Reference

Wang, M., Shao, M., Lu, S.-H., Yang, Y.-D., and Chen, W.-T.: Evidence of coal combustion contribution to ambient VOCs during winter in Beijing, Chin. Chem. Lett., 24, 829-832, 10.1016/j.cclet.2013.05.029, 2013.

4. **P12463, L20. Title of chapter 3.3.1 can be simplified as "Identification of VOC sources".**

Response: Accepted.

Thank you for your valuable suggestion. In revised manuscript, title of chapter 3.3.1 is changed to "Identification of VOC sources".

5. **P12468, L1, Title of chapter 3.4 can be simplified as "Source of SOA formation'.**

Response: Accepted.

Thank you for your valuable suggestion. In revised manuscript, title of chapter 3.4 is changed to "Source of SOA formation".

6. **P12468, L7-8. "…the SOAP-weighted mass contributions of VOC sources were very similar." This statement is vague. Please explain similar to what.**

   Response: Accepted.

   We are sorry for this unclear expression. Before the control period, the SOAP-weighted mass contribution of vehicular-related sources was much larger than other sources. In contrary, during the control period the SOAP-weighted mass contribution of each VOC source was very similar.

   In revised manuscript, "Before the control period, the SOAP-weighted mass contribution of vehicular-related sources was 1613 μg cm-3, accounting for 43% of the total. During the control period, the SOAP-weighted mass contributions of VOC sources were very similar." is changed to "Before the control period, the SOAP-weighted mass contribution of vehicular-related sources was much higher than other VOC sources, accounting for 43% of the total. In contract, the SOAP-weighted mass contributions of all these VOC sources were very similar during the control period."

Technical comments:

1. **P12456, L13. Deleted "Obtaining".**

   Response: Accepted.

   This has been corrected accordingly.

2. **P12463, L24. Replace "following" with "after".**

   Response: Accepted.

   This has been corrected accordingly.

3. **P12468, L15. Replace "the next largest" with "the second largest".**

   Response: Accepted.

   This has been corrected accordingly.