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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Measurements of ozone and its precursors in Beijing during summertime: impact of urban plumes on ozone pollution in downwind rural areas" *by* J. Xu et al.

Anonymous Referee #2

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This paper presents the measurements of ozone and its precursors at four stations in Beijing area, which are in line along the regional transport route of air pollutants. The air quality impacts of ozone transported from urban to the downwind rural areas have been investigated in several megacities, e.g., Mexico City. Nevertheless, field measurement data from a network in Beijing is still rather limited. Given the unique features of ozone precursors in Beijing, this paper is still helpful to improving our understandings of the transport and chemistry of ozone in a megacity.

Specific Comment: 1. It was indicated, and actually hypothesized, that the concentration and composition of ozone precursors were different in urban and downwind rural

areas. However, the results (as shown in Figure 4) show that the compositions of NMHCs were rather similar at the BL and SDZ sites in spite of the substantially lower HC levels observed at SDZ. While some differences were actually indicated in the text and Table 3, it seems very confusing on the characteristics of O3 precursors at the two sites. 2. The mixing ratio of isoprene at BL was significantly higher than at SDZ, 13.36 vs. 2.79 ppbv. The authors suggested that the anthropogenic sources of isoprene were negligible in Beijing. In this context, the lower isoprene level observed at the rural site, SDZ, needs to be explained. 3. CO was used as an indicator of polluted air mass in this study. In addition to that, CO (and CH4) is also an important precursor of O3, in particular in a highly polluted area like Beijing. I suggest adding CO and CH4 into the calculation of OFP (Table 3) and make some discussion upon this point. 4. The ratios of HCs with different lifetimes were used to infer the photochemical ages of air masses. Such an analysis should be made along the transport of an air parcel or for a stagnant air mass. The current analysis shows different HC ratios at BL and SDZ, respectively, but seems ignoring the differences in the emission profiles at the two locations. Will this result in any bias in the analysis of O3 formation/transport? Given that the samples were collected along the transport route, it could be useful to analyze the data in the context of upwind/downwind relationship.

Technical Suggestion: 1. The unit of radiation in Figure 2 could be in error. 2. The resolution in Figure 3 is not enough. It's rather hard to see the differences among the data from respective stations.

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