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Interactive comment on "Impacts of Biogenic Emissions on Summertime Ozone Formation in the Guanzhong Basin, China" *by* Nan Li et al.

Anonymous Referee #2

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The manuscript presents a modeling effort in assessing the contributions of anthropogenic emissions on ozone (and its precursor) and PM2.5 concentrations in Xi'an, China. The work is well designed, and model results are well presented and analyzed. I would recommend accepting the manuscript with minor revision addressing following concerns.

My major concern with the work comes from the model uncertainty analysis, particularly in the simulation of VOCs and in emission inputs. In my opinion, six off-line VOC measurement points in space and time are not sufficient to validate the model accuracy for the following ozone source apportionment analysis. In addition, an agreement in Aug. 6 & 7 would not necessary indicate an agreement in the rest of month August. The current state of Section 3.2 is insufficient. More material is needed to

show and quantify the model uncertainty in VOC estimation for the area under study. The uncertainty in emission input is needed as it is one of the main sources of model uncertainties.

Another minor comment is with the application of brute-force comparison method in assessing the contributions of different emission sources to ozone concentration. The brute-force method has inherent disadvantages when applied to secondary species such as ozone and PM due to the non-linearity in responses. A critical question I would expect the authors to discuss in the manuscript is about the difference between actual and pure contribution from anthropogenic and biogenic.

Specific questions:

1) In Fig. 7, is the black line based on theoretical calculation or model simulation? It seems to me that the smooth black line is based on the theoretical calculation for clear sky condition. If it was true, then I doubt if the decrease (red line) includes both the cloud and aerosol effects.

2) In Section 3.2, is the simulated isoprene/monoterpene mean concentration the mean over the one-month simulation periods or Aug. 6-7th or the mean of six data points corresponding to the time and location of the six measurements?

3) Why modeled wind speed is discontinuous in Fig. 3c?

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