

## Reply to Referee #1:

We thank the reviewer for the careful reading of the manuscript and helpful comments. We have revised the manuscript following their suggestions as is described below.

Specific comments:

(1) The authors should clearly indicate the meteorological conditions for the different ensemble model calculations. There should be a table to list the meaning of the ensemble calculation. For example, what are E-11 and E-14 to present? The authors also can add some statistics in the table (e.g., the O<sub>3</sub> differences with each ensemble run compared to ensemble mean). In this case, the reader can have insights that which meteorological variable has most important effects on ozone?

The ensemble initialization has been introduced in Section 2, second and third paragraph. “EN-11” and “EN-14” represent a low [O<sub>3</sub>] case and a high [O<sub>3</sub>] case, respectively.

(2) Similar to the comment in the abstract and conclusion, the authors should give some result to indicate which meteorological variable has biggest impact on the calculated ozone concentrations (winds, temperature, pressure???).

In the abstract and conclusion, we have indicated the meteorological variables with the largest impact on the calculated ozone concentrations as: “*The impact of wind speed and PBL height on [O<sub>3</sub>] are more straightforward and important.*”

(3) There are some abbreviations need to be clarified or defined, such as 3DVAR, BES, GFS etc in page 3235.

The abbreviations (such as 3DVAR, BES, GFS) in the paper have been clarified as suggested.

(4) In Figure 3 and page 3237, the authors indicate that there are anti-cyclones in Mar/09, Mar/15, and Mar/29. However, I read the map, and find they are cyclones instead of anti-cyclones. Please check these carefully. By the way, the map is too small to read. Maybe need to re-plot these maps.

Fig. 3 has been updated and is easy to read.

(5) In page 3239, the authors state that the large difference between the calculated and measured wind directions is mainly due to the uncertainties of the model. This reviewer think that the measured surface wind directions often be disturbed by city buildings, especially in large cities, which cannot represent the synoptic scale wind direction. The authors should make comments on this issue.

In page 3239, we have included the reviewer's suggestion in the end of the paragraph as “*In addition, the measured surface wind directions are often disturbed by city buildings,*”

*especially in large cities, which can not generally represent the prevailing synoptic scale wind direction.”*

(6) In Figure 5, the figure is not clear. I can hardly read the bold orange lines.

Fig. 5 has been updated to the bigger size.

(7) In Figure 6, I cannot read the measurement values, which are represented by colored squares.

Fig. 6 has been updated to the better resolution.

(8) In Figure 10, the figure is not clear. I can hardly read the orange lines.

Fig. 10 has been updated: the width of orange lines has been increased.

(9) In page 3233, Tie et al. (2009) studied the ozone formation in Mexico City and the surrounding areas, which should be cited in the paper.

In page 3234, we have included: “*Tie et al. (2009) studied the ozone formation in Mexico City and the surrounding areas during the MIRAGE-Mex field campaign using a regional chemical/transport model (WRF-Chem).*”