Response to referee comments on "Modeling study of the 2010 regional haze event in the North China Plain"

We thank the reviewers for valuable comments. This document is organized as follows: the referees' comments are in blue and our responses are in black.

Suggestions for revision:

I have read both the comments from reviewers and the responses by authors. Generally, the authors have given a very good reply to all the questions except for one that is on BC feedback on the meteorology. I don't think the authors have satisfactorily addressed the concern "BC is responsible for 50% of the aerosol feedback on meteorology". As the reviewer has clearly pointed out the uncertainties in achieving the conclusion on BC feedback, I suggest that the authors weaken the quantitative conclusion and use qualitative description on this feedback.

Response:

To weaken the quantitative conclusion, we added one sentence in section 4.4.1: "These calculations suggest that the contributions of BC absorption to the aerosol feedbacks are significant, but there remain large uncertainties in the absolute magnitude."

In the conclusion, we deleted some quantitative conclusions:

"It can account for about as high as 65.7% of the PM2.5 increases, and 59.9% of the PBLH decreases in Shijiazhuang."

"Due to the underestimation of sulfate and OC, and overestimation of BC in the current model, the contribution of BC absorption in aerosol feedbacks may have been overestimated. We decreased the BC emission by 50%, and found that the contribution decreased from about 60% to 50%."

We added one qualitative conclusion: "The model sensitivity studies showed that BC absorption has significant impacts on meteorology and air quality. However the uncertainties remain large and further studies are needed to better quantify the role of absorption in the feedbacks."

In the abstract, we also deleted quantitative descriptions ("BC account for about 65.7% of the PM2.5 increase and 59.9% of the PBL decrease in Shijiazhuang") and added qualitative conclusion: It was also shown that Black Carbon (BC) absorption has significant impacts on meteorology and air quality.

Hope it is better after the revision.