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## Response to Referee #2

**RE:** Comprehensive evaluation of typical planetary boundary layer (PBL) parameterization schemes in China. Part II: Influence of uncertainty factors

**Author(s):** Wenxing Jia et al.

This manuscript represents an informative contribution to modelling science within the scope of the GMD, which provides a good reference for atmospheric modeling research community. The scientific quality of the manuscript is generally good with the valid scientific approach and applied methods in sensitivity modeling experiments of WRF. Some comments and suggestions are as follows:

Thank you for your positive comments and valuable suggestions to improve the quality of our manuscript. Based on these comments and suggestions, we have made careful modifications to our previous draft, and the detailed point-by-point responses are listed below.

### **Specific comments:**

(1) The most evaluations of PBL simulation are only for the near-surface meteorology, not for the entire PBL meteorology. Please clarify this limitations for this study.

**Re1:** We consider it a limitation to evaluate only the near-surface meteorological parameters and not the entire PBL. Due to the limitation of observational data and super-computing resources, many studies are conducted only for individual cases in individual regions, and the results lack generalizability. This study (i.e., Part II) and the Part I provide a more comprehensive evaluation and uncertainty analysis of the PBL schemes.

(2) The modeling validations of vertical resolution below 2000 m are compared with the meteorological sounding data. How is the vertical resolution below 2000 m for the meteorological sounding data? if the vertical resolution of sounding data is too coarse

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for the both sensitivity experiments from 21 to 35 levels below 2000 m, please modify the relative conclusions on the (larger?) effect of vertical resolution.

**Re2:** For the model where the whole level is 48 levels, it is 21 levels below 2 km, while 62 levels correspond to 35 levels below 2 km. In the results of our analysis, it is found that the increase in the number of levels of the model from 48 to 62 levels does not improve the simulation significantly, while there is a smaller improvement in wind speed in individual regions. However, it is better not to need this improvement relative to the increased in memory.

(3) Please clarify the vague and misleading conclusion that the update of the model version does not necessarily optimize the model results. The updated model version can improve the meteorological simulations, and the updated near-surface scheme and PBL scheme could necessarily optimize the modeling results of near-surface and PBL meteorology?

**Re3:** We are very sorry about the statement that there might be a problem here. We have corrected this.

(4) Please correct thoroughly the English language and usage, making the scientific results and conclusions in a clear and concise way.

**Re4:** Revised as suggested. We have reworked the entire manuscript.