

## ***Interactive comment on “Development of WRF/CUACE v1.0 model and its preliminary application in simulating air quality in China” by Lei Zhang et al.***

### **Anonymous Referee #1**

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In this manuscript the authors updated the CUACE model with heterogenous reactions and updated dry deposition scheme of particles, and coupled it to the WRF model. This study also evaluated the WRF/CUACE v1.0 model by simulating PM<sub>2.5</sub>, O<sub>3</sub>, and NO<sub>2</sub> concentrations in different seasons and different years. This article is clearly written and the methods are generally sound. I recommend the manuscript to be published unless the following comments are addressed:

1. Line 234-235: The authors mentioned “The feedback of chemical species on meteorology in the current WRF/CUACE version is not realized”. So in Figure 1, I suggest using dashed line to indicate the influence of chemical variables on WRF module. 2.

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Line 290-291: The simulations are relatively poor in the SCB, where the complex terrain poses great challenges to meteorological field simulations. Show the simulation results of the meteorological fields of the four regions in the supplementary, and compare the simulation results with in-situ observations. 3. In Section 5.3, the authors evaluated the model performance with and without heterogeneous chemical reactions during a haze event at the Langfang site. How about model improvements at the other sites in the YRD, PRD and SCB region? 4. Line 90-91: This study also updated the dry deposition scheme of particles in CUACE. Please also show the model improvements with and without the updated dry deposition scheme in the supplementary.

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