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Interactive comment on "Effects of black carbon and boundary layer interaction on surface ozone in Nanjing, China" *by* Jinhui Gao et al.

Anonymous Referee #2

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Review of "Effects of black carbon and boundary layer interaction on surface ozone in Nanjing, China" by Gao et al.

The main focus of the paper is to discuss the effect of BC on solar radiation, PBL, and surface ozone. Some interesting results are found by the authors. For example, they find that the absorbing effect of BC heats the air above the BL and suppresses PBL development, which eventually leads to changes in the contributions of ozone through chemical and physical processes (photochemistry, vertical mixing, and advection). The heavy aerosol pollution is a very important issue in China, and this paper fits well in the scope of ACP. However, there are some comments regarding the paper, and the authors should carefully address these comments before the publication.

(1) Fig. 2 is too crowded. In order to better evaluate the model simulation in details,

the Authors should enlarge the figure. I suggest it can be separated to 2 figures. One figure only contains meteorological parameters (Fig. 2a) and another is for chemical species (Fig. 2b). (2) Fig. 3 has a similar problem. The Fig. 3C is impossible to read. It should be an individual panel. (3) Why there is a consistent heating by BC around 1.2 km, especially at 10am. If it is due to residual layer of BC, the authors should explain it in more details. (4) In the introduction, the Authors should reference the work by Tie et al. (2005). Although it used a global model, it is an early work to discuss the effect of aerosols (including BC) on photochemistry and ozone. Also in Tie et al. (2017), they found that the moister plays important roles on PBL development, especially in the aged aerosols, including BC. The Authors should state this point in the Introduction. (5) In previous works (Tie et al., 2009), in large cities in eastern China, NOx concentrations are very high. As a result, increase in NOx concentrations lead to decrease in ozone concentrations in the center of cities. However, in rural areas, the concentrations of NOx decrease rapidly, and increase in NOx concentrations lead to increase in ozone concentrations of ozone. In the analysis of paper, the Authors should discuss this point in more details.

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