First of all, we appreciate the reviewer's comment. In response to it, we have made relevant revisions to the manuscript. Listed below are our answer and the changes made to the manuscript according to the comment. The comment of the reviewer (in black) is listed and followed by our response (in blue).

Comments to the author:
General comments

The paper focuses on the lower and middle troposphere with shallow convection and modeling of radiative aerosol cloud interactions over South Korea. This includes sensitivity studies for separating effects like altitude of the aerosol layer and aerosol amount, microphysics and radiation. Compared to the first version in ACPD it contains more information and is more concise.

Please use the meteorological conventions concerning altitude. The upper atmosphere usually refers to the stratosphere or mesosphere (i.e. at least above about 15km altitude) and not 4km which is the middle (or free) troposphere.

"Upper atmosphere" is replaced with "free atmosphere". Free atmosphere, instead of free troposphere, is inserted into the manuscript, since free atmosphere is more popular term than free troposphere and officially defined in the AMS glossary of meteorology.

At some places also atmosphere above or below the cloud layer might be used.

We inserted phrases "atmosphere around or below cloud bases" and "atmosphere around or above cloud tops" at proper locations of text. Here, "atmosphere around or below cloud bases" is equivalent to "atmosphere below the cloud layer", while "atmosphere around or above cloud tops" is equivalent to "atmosphere above the cloud layer",

I also wonder that "planetary boundary layer" is not used for the lowermost atmosphere.

"Low atmosphere" is replaced with "the planetary boundary layer"

The paper might be a useful contribution to ACP after further improvements.

Specific comments

Introduction: It should be mentioned that the focus is on cumulus clouds induced by shallow convection

To mention that this study is about warm cumulus clouds induced by shallow convection, the last paragraph in introduction is revised as follows:

(LL111-121 on p4-5)

Despite above-mentioned field campaigns, effects of aerosols above or around tops of warm cumulus clouds, which are induced by shallow convection, have not been examined as much as those of aerosols around or below bottoms of those clouds (Haywood and Shine, 1997; Johnson et al., 2004; McFarquhar and Wang, 2006). Motivated by this, this study delves into effects of not only aerosols around or below bottoms of warm cumulus clouds but also those above or around tops of those clouds. Through this, this study aims to contribute to the more comprehensive understanding of aerosol-radiation-cloud interactions. This more comprehensive understanding in turn contributes to more general parameterizations of those interactions for climate and weather-forecast models. To fulfill the aim, this study adopts the large-eddy simulation (LES) framework and an idealized setup for the aerosol layer.

Section 2.1: Please provide some information on horizontal and vertical resolution already here and not only partially in the next section.

The information on resolutions is moved from Section 2.2.1 to Section 2.1 as follows:

(LL127-130 on p5)

The Advanced Research Weather Research and Forecasting (ARW) model is used for LES simulations in this study. The ARW adopts a 50-m resolution for the horizontal domain. In the vertical domain, the resolution coarsens with height. The resolution in the vertical domain is 20 m just above the surface and 100 m at the model top.

Section 2.2.1: You may begin with: "As case study we simulate an observed system...”

Done.

Fourth paragraph of section 2.2.1 (before line 222) or Section 3: It would be nice to present a typical model result similar to the observations in Figure 2 (map of cloud reflectivity) for the standard control case. To present domain averages only is not sufficient in connection with weather forecast.

The simulated field of cloud reflectivity is added in Figure 6 and the related text is added as follows:

(LL269-273 on p10)

Figure 6 depicts the simulated field of the cloud reflectivity at 14:00 LST on April 13th, 2016 in the control run. Similar to the observed counterpart in Figure 2, simulated cloud cells are elongated in the southwest-northeast direction. Also, there is a good consistency in the overall cell size and population and the overall pattern of the spatial distribution of cloud cells between the observed and simulated fields.

Note that this added text is not in the fourth paragraph of Section 2.2.1 but in the first paragraph of Section 3.1 where the evaluation of the simulation is presented in the old and new manuscripts, since we believe that the added text is about the evaluation of the simulation.

Section 3.1, second paragraph: It would enhance the value of the paper if more information on the comparison between observations and model is provided in a figure or a table, maybe in a supplement if it is comprehensive.

More variables are compared between observations and the model, following this comment. Comparisons of these more variables and the previous variables in the old manuscript between observations and the model are shown in Table 3 in the new manuscript. Associated text is added as follows:

(LL273-277 on p10)

Table 3 shows comparisons of cloud and environmental variables between observation and the control run. Observation is performed by ground stations and satellites. Note that ground stations which measure $PM_{2.5}$ as marked in Figure 1b also measure cloud and environmental variables. Table 3 shows that differences in those variables between observation and the control run are ~10%.

Technical corrections

At plenty of lines including abstract and conclusions: please replace "upper atmosphere" by "atmosphere above cloud layer" or "free troposphere" or "middle troposphere" (see general comments)

“Upper atmosphere” is replaced with “free atmosphere”

Line 60: "a variation"

Done.

Line 459: you may shorten to "..effects and without"

Following this suggestion, the corresponding title is revised as follows:

(LL445 on p15)

Comparisons between simulations with and without aerosol radiative effects