Responses to Comments

1) Please move the presentation and description of Eqs. 3 and 4 into the methodology section.

Response: We have moved the equations into the methodology section, and to distinguish the CCFs described in these equations with the CCFs in section 4.1 and 4.2, we have added corner marks to these variables in the context as:

"3.3 Convective cloud fraction at different terrain heights in polluted or clean environment

In order to isolate the potential effect of topography on the aerosol-convective-cloud relationship, we investigate in this study the convective cloud fraction (CCF) changes along with TH at different levels of aerosol loading. The CCF under clean (or polluted) conditions (CCFC(P)) within each elevation bin h is calculated using the formula shown below:

$$CCF_{C(P)}(h,t) = average\left(\frac{N_{C(P)}|_h(i,j,t)}{N_{total}|_h(i,j)}\right) \times 100\% \qquad (3)$$

where $N_{C(P)}|_h(i,j,t)$ represents the number of convective clouds occurring under clean (C) or polluted (P) conditions in the $(i,j)^{th}$ pixel box in the ROI during hour t, and $N_{total}|_h$ (i,j) represents the total number of convective clouds observed in each pixel box during the 08:00-17:00 daytime period. For each CCF bin, i and j denote the pixels within the region having elevation h. Sample sizes are shown in Figure S3.

By normalizing the occurrence frequencies by the total number of polluted and clean cases within each hour, respectively, we explore how topography changes the polluted and clean convective clouds spatially. The normalized $CCF_{C(P)}$ ($NCCF_{C(P)}$) is computed as:

$$NCCF_{C(P)}(h,t) = average\left(\frac{N_{C(P)}|_h(i,j,t)}{\sum_m \sum_n N_{C(P)}(m,n,t)}\right) \times 100\% \qquad (4)$$

The $NCCF_{C(P)}$ is also calculated with i and j at each elevation bin h. Unlike $CCF_{C(P)}$ (Equation 3), the denominator for $NCCF_{C(P)}$ (Equation 4) is not summed over all studied times-of-day but over the entire ROI (the size of which is m×n pixels) within each hour. NCCF focuses more specifically on how CCF at a given location and terrain elevation compares with all locations at the same elevation and the same time, reducing the influence of diurnal variation and emphasizing elevation-related differences. As such, the difference in $NCCF_{C(P)}$ between clean and polluted cases reflects the difference caused by topography when the overall environment is under clean or polluted conditions."

And in section 4.3 we have also rewrote the discussions as follows:

"The CCFs at different TH in both polluted (CCF_P) and clean (CCF_C) conditions are shown in Figure 9 (calculated by Equation 3). We find that the CCF difference between polluted and clean conditions generally agrees with Figure 7 in that CCF_P is higher in the morning, lower in the afternoon, and the differences are statistically greatest in early morning and late afternoon. In addition, the differences between CCF_P and CCF_C vary considerably along with increasing TH, which may indicate that the effects of topography and air quality on CCF co-vary, and the impact of topography might be much stronger compared with increased aerosol loading.

There is also another aspect of these phenomena. Because the elevation-related response reverses over the day (e.g., Figure 9), we applied $NCCF_{C(P)}$ to reduce the impact of diurnal

***variations. We can see from Figure 10 that below the elevation of 500 m, most of the convective clouds are suppressed under polluted conditions, whereas over regions with terrain height greater than 1000 m, the amount of convective cloud under polluted conditions is significantly larger before 14:00 LT. This phenomenon may partly explain the results shown in Figure 7, where complex topography plays an important role in the aerosol effect on convective clouds. Under polluted conditions, convective clouds over lower terrain are much easier to suppress, whereas over elevated terrain, convective clouds are more likely to be invigorated.*”**

2) Please double-check the caption of Figure 6: Do the red lines and numbers really refer to the mean values of the bottom and top quarter or rather to the threshold values to separate them from the 25% to 75% range?

Response: We have checked the caption. The red lines and numbers in Figure 6 are the mean values of the bottom and top quarter, and their values are just close to the 75% and 25% of the distribution in Figure 6.