The manuscript by Lu et al. investigated the lower tropospheric ozone over India and its linkage to the south Asian Monsoon by using satellite observations and GEOS-Chem model. Spatial and temporal characteristics of lower tropospheric ozone over India were analyzed in terms of seasonal cycle and inter-annual variability (for 2006-2010) and also long term-trends (for 1990-2010). The contribution/roles of different processes, including precursor emissions (anthropogenic NOx, biomass burning etc), meteorology (horizontal and vertical transport), chemical production, and dry deposition were discussed. The linkage of lower tropospheric ozone concentrations over India to the south Asian Monsoon were also quantified.

This comprehensive analysis focus on the ozone over Indian region where the precursor emissions are still rising in recent years. This study is thorough and clear, which would help to understand the local and global environment effects of India ozone. Overall, this manuscript is well organized, states the problem, outlines the model experiments, and describes the model results. This study fits the scope of ACP. I recommend publication.

Below are several comments that I think the authors may address to improve the manuscript.

General comments:
1. Line 162-163. The authors reduced the 1990-1996 ACCMIP emissions by 30% to correct the gap between GFED3 and ACCMIP, and also to get a full set of data for 1990-2010. It's quite understandable and straightforward. While the readers might get the impression that GFED3 is more accurate than ACCMIP. I'm just curious is there any reference that evaluate the two biomass burning emission inventories for this region? Any discussions of the sensitivity of the biomass burning emissions would be helpful.

2. Line 177. The contributions of different processes are analyzed, including chemical production and loss, horizontal and vertical transport and dry deposition. I'm wondering if the cloud-chemistry/wet scavenging are considered as the two processes might involve the O3 chemistry. Or are they already considered but just ignored as the contribution are too small? Some discussion would be helpful.

3. Line 181. For the horizontal transport (E-W, N-S) in the text and also figure 2, it would be better to give the directions for positive/negative values.

4. Section 3.1. The anthropogenic NOx emissions and biomass burning emissions are shown in this section while no discussions of NMVOC emissions are provided. While anthropogenic and biogenic NMVOC are also important ozone precursors. Especially for biogenic NMVOC, it might have strong seasonal cycle which might change the NOx/VOC regime in different seasons. Some discussions would he necessary here.

5. Line 213. When retrieving the OMI observed tropospheric ozone, some discussions of the sensitivity of the priori profile and average kernel matrices would be helpful. Are there any system biases or different biases in different seasons? Any uncertainties?

6. Line 242. It's quite important to state that biogenic isoprene and soil Nox emissions are higher in the pre-summer monsoon than wintertime which help the reader to understand the results. As suggested in Q4, it will be great to give a table that lists the seasonal/annual emissions from different sources (biogenic VOC, anthropogenic VOC, soil NOx, biomass burning CO etc.)

7. Line 285. "Strong vertical convection". Just curious, is there any index to show the strength the convection?

8. Line 340-342. In addition of NOx emission reduction, how about the changes of reaction rates and biogenic VOC emission caused by T reduction during pre-summer monsoon? And their roles in the O3 production?

9. Line 375. Can you show the selected region in one of your figures?

10. Line 384. How the statistics are conducted? How many samples are compared? Are the correlations for grid-to-grid? Or just the regional averages?

11. Figure 7. The caption is not clear. Do you mean " Differences in May-August mean between the lowest and highest SASMI conditions "?

12. Figure 3. Dry deposition is not shown here. As there is no obvious season changes? A little bit explanation would be helpful.

13. Figure 4. Can you give the number pairs of data?