The paper uses the OMI measurements of NO_2 over Los Angeles metropolitan area and WRF-chem model simulations to examine the different variables that affect the spatial variations in the weekday-weekend NO_2 pattern. Modeling demonstrates that spatial variation of NO_2 reductions on weekends is sensitive to HO_x productions, VOC emissions and spatiotemporal distribution of NO_x emissions. This paper should be accepted as it provides important contribution to the field, both for the region and building a framework for using space based measurements to understand and constraints urban photochemistry. This would be especially valuable when higher temporal measurements are available from geostationary satellites in the future.

General comments:

It would be more appropriate to call it weekday-weekend pattern of NO_2 rather than day-of-week pattern as only the difference in weekday and weekend NO_2 spatial variations is analyzed.

The total NO_2 decrease in Los Angeles for all the cases considered is within 39-44% (based on Table 1). Considering that the weekend NO_x emission reduction in the model is 37.5%, the reduction in NO_2 due to chemical feedback seems to be in the order of only 5%. Could you comment on the extent of the contribution of chemical feedback on the observed decrease in NO_2 columns in different basins? Is chemical feedback only important for getting the spatial distribution correct?

Could you please include how the model simulations compare with the observations on absolute scale for weekday and weekend in the three basins? Table 1 would be a good place for it. It is quite surprising that the modeled NO_2 values agree with the observations within 2% of the observations as models often tend to overestimate NO_2 over urban areas (e.g. Kim et al, 2009). Is the agreement biased by the low values over the background regions? Please include how the observations and model (base case) compare over the three basins.

It is quite intriguing that the authors concluded that the two weeks of model simulations is representative of the long run average considering that the weather in Los Angeles area tend to stagnate during late summer and have high ozone episode events. Please comment on how this two week period was chosen.

It should be mentioned that higher temporal resolution satellite data in the future from geostationary satellite instruments like TEMPO would greatly improve and enhance the application of the framework presented here. Higher temporal resolution satellite data would likely help discern which of these parameters are most important for the spatial variation on NO_2 decrease on weekends.

Specific Comments:

19176 line 10: 0.05^o

19176 line 17: change to decreases in percentage.

19176 line 27: Is $3.9x10^{16}$ the maximum value over the 3 years period?

19176 line 28: Fig 1b is not present. Please update.

19178 line 13: What is the basis for 37.5% emission reduction on the weekend? Is it based on the average NO_2 column decrease in OMI? If so, the NO_2 column decrease in OMI is due to both emission reduction as well as chemical feedback, how do you account for that? Else please include a reference or add rationale for the reduction.

19179 line 1: Could you also add the value in mixing ratio (for example assuming a typical BL height of 1 km).

19179 line 29: Could you please add a reference for solar glint reflectance impacts on the NO_2 retrieval.

19180 line 3: Please also include this information in section 2 on OMI observations.

19180 line 12: "As a result, the agreement of simulated and observed NO_2 trends is more meaningful than the agreement between observations and simulations for the single period (e.g. weekday NO_2 column….." How is this statement affected when the biases do come into play via chemical feedback? How relevant are the findings, based on the percent difference on weekday and weekend, for true conditions if the model results are biased either too high or too low?

Table 1: What is the spatial distribution of Los Angeles plume? Is it within the Los Angeles basin as defined in the paper or the entire metropolitan area?

Figure 2: It would be helpful to readers to have the rectangles for the three basins on Fig 2a, b and c.

Figure 3: What is the lowest value in the NO_2 vertical column color scale? What value does color white correspond to? It would also be helpful to have the figure little larger and rectangles for the three basins.