Review of "Direct Measurements of Ozone Response to Emissions Perturbations in California" by Shenglun Wu et al.

This manuscript investigates the ozone (O_3) formation sensitivity to precursor VOC and NOx concentrations and seasonal variations by deploying three smog chambers equipped with lamps that produce constant UV radiation. Satellite retrievals of HCHO/NO_2 ratios were used to complement the results of the chamber measurements and support the seasonal changes of BVOCs abundance and O_3 formation sensitivity. One of the main motivations of this study is to identify the dominant factors contributing to the recent increased O_3 concentrations in some of the air basins in California, after decades of decreasing trends due to the success of implementing emissions control actions. This is an interesting study; however, the manuscript will require more detailed description of the methodology and analysis of the results. Considering the scientific significance and policy relevance of the topic, more work is also needed to substantiate the conclusions regarding the response of O_3 to precursor emission control strategies. The following are some specific comments.

1. The authors stated that "A new technique was used to directly measure O_3 response to changes in precursor NOx and VOC concentrations.....…"; it will be helpful for the readers to have more detailed description of the measurements and the improvements compared to other recent smog chambers studies.

2. The authors used artificial light to provide constant UV radiation in the chamber experiments, which is different from the real atmospheric conditions. Additionally, the settings of other parameters for the smog chambers, such as temperature, relative humidity, etc., are important in modifying the O_3 formation but they were not provided in the measurement section. More importantly, it is not reasonable to explore the seasonal changes of the O_3 sensitivity using chambers with constant UV radiation. Except for anthropogenic emissions changes, variations of solar radiation play a major role in the seasonal pattern of O_3 formation sensitivity. O_3 formation regime becomes more NO_X-sensitive in warm seasons, which is mainly caused by intensified solar radiation. Increasing solar radiation enhances BVOCs emissions that are light- and temperature-dependent, facilitates photochemical reactions, and promotes development of the planetary boundary layer to decrease near-surface NO_2 concentrations.

3. O_3 formation sensitivity is investigated only by adding 8 ppb NO_X in chamber #1 and 8 ppb surrogate VOCs in chamber #3. Lacking a series of linear experiments with different concentrations of precursor gases, the current conclusions are drawn from the effects of 8 ppb precursor perturbations on O_3 levels of the air masses sampled at one site, which is not sufficient to assess the O_3 formation sensitivity *in situ*, let alone the regional O_3 sensitivity.

4. O_3 production sensitivity is determined by the ratio of NO_X to VOCs. Adding constant 8 ppb NO_X or surrogate VOCs to experimental air masses sampled in different seasons with various precursor concentrations could lead to varying perturbations for the ratio, possibly contributing to the measured seasonal variations in O_3 production sensitivity.

5. While smog chamber experiments have been used to simulate the photochemical reactions occurring in the atmosphere, the experiments can not accurately represent the complex real atmospheric conditions. This should be taken into consideration in discussing ozone sensitivity to the precursor gases and in drawing conclusions about emissions control policies.