The authors thank the editor and anonymous referees for reviewing our manuscript, and particularly providing valuable comments and suggestions. Our responses in form of point-by-point are given.

The manuscript entitled "Measurement report: characterization and sources of the ambient secondary organic carbon in a Chinese megacity over five years from 2016 to 2020" conducted a long-term field campaign at a regional site in the YRD region from 2016 to 2020 and aimed to investigate the characteristics of carbonous aerosol pollution and their seasonal and diurnal variations, as well as the relationship between the meteorological factors and carbonaceous aerosol concentrations. This study enhanced the understanding of the variation and sources of SOC in the PM2.5 fraction, and was in favor of evaluation of the effectiveness of the current air pollution control policies. The manuscript is overall well organized, and can be read easily. I broadly agree with the discussions and findings of this manuscript. I therefore recommend a minor revision of this manuscript before final publication in ACP.

Response: We thank the referee for the positive comment.

In the conclusion, it is difficult for me to find research findings with strong regularity or regional characteristics of the Yangtze River Delta. Therefore, it is suggested to condense the conclusion.

Response: We have now condensed the conclusion, it now reads, "…Our results elucidate the trends in SOC and POC over recent years in Shanghai, which are important for evaluating the effectiveness of the air pollution control measures and holding important implications for policymaking. Given that SOC was associated with high temperature and regional transport, global warming is likely increasing the importance of SOC. Since SOC is regional, combined efforts in reducing regional sources of SOC precursors are needed to further reduce the air pollution events in Shanghai."

In 3.2.3, The discussion on the formation of photochemistry should have become one of the highlights of the paper, but unfortunately, the reviewer found that the author basically stayed at the level of the discussion on the correlation between ox and SOC, and lacked in-depth analysis of radiation intensity and liquid phase processes, suggesting further in-depth discussion.

Response: We used the concentration of oxidant of O_x (O_3+NO_2) as a proxy for the atmospheric oxidizing capacity associated with photochemical reactions. The positive relationship between SOC and Ox is suggesting a photochemical formation pathway of SOC (see Fig. 5). The radiation intensity is usually stronger in summer than in winter. In this study, we also observed a concurrent increase in SOC with Ox during winter pollution periods (PM>100 μg m^{-3}; Fig. 4), suggesting the importance of photochemical reactions even in winter. Due to the lack of in-situ measurement of radiation intensity, further discussion of the impact of radiation is not included.

The liquid phase of SOC formation is often reported during winter Haze in north China with a positive relationship between SOC and RH (Lin et al., 2020; An et al., 2019; Sun et al., 2015; Chen et al., 2019). In this study, we found RH is negatively correlated with SOC. Therefore, we concluded liquid phase chemistry was likely less important compared to photochemical formation. Because of this, we tended not to expand our discussion on liquid phase chemistry.