

**General comments:**

Thank you for submitting your response to reviewers' comments and revising the paper accordingly. I have reviewed your response and believe you have adequately addressed the comments. However, there are still some edits that need to be made before the manuscript is accepted for publication. Please see the detailed list below.

**Response:** Thank you handling our manuscript and went through very carefully our manuscript, we appreciate this.

Best wishes!

**Specific comments:**

**Comment:** I actually think L46 of abstract is correct if "reaching" is used

**Response:** We agree, revised.

**Comment:** L53: change to "on a daily basis, suggesting important roles of photochemistry in SOA formations"

**Response:** Revised.

Comment: L60-61 change to "This was further confirmed by continuous increase of NO<sub>2</sub>+/NO<sub>3</sub><sup>-</sup> fragment ratio after sunset which is indicative of formation of particulate organic nitrates".

**Response:** Revised.

**Comment:** L62: "...our understanding of"

**Response:** Revised.

**Comment:** L72: "... number of studies show.."

**Response:** Revised.

**Comment:** L84: "... are an active research area of interest in atmospheric chemistry in the recent ten years since significant contributions of SOA to atmospheric aerosol mass have been recognized (Zhang et al., 2007; Jimenez et al., 2009). However, SOA formation is quite complex due to varying precursors, oxidants and formation pathways under different emission characteristics and meteorological conditions."

**Response:** Revised.

**Comment:** L92 Change to "Both field measurements and laboratory studies are needed in investigating detailed SOA formation mechanisms in different regions. Field measurements provide insights into key oxidants and formation pathways under ambient conditions, thus information from field measurements are important for both designing laboratory experiments and targeting emission control strategies."

**Response:** Revised.

**Comment:** L106: "Using these techniques..."

**Response:** Revised.

**Comment:** L107 Change to “. Su et al (2020) found that…”

**Response:** Many studies found this phenomena, and Su et al (2020) concluded this. To make this clearer, this sentence was revised as: “, and many studies found that…”

**Comment:** L127: delete “and the PRD region importance of long-term measurements”

**Response:** Revised.

**Comment:** L143-144: Change to “however long-term aerosol spectrometer measurements that help characterizing OA sources and SOA formation mechanisms in this region remain lacking”

**Response:** Revised.

**Comment:** L182-183: Change 'peaked' to "peaking"

### **Response:** Revised.

**Comment:** L188: "... was not well separated from cooking-related ..."

### **Response:** Revised.

**Comment:** L194: "...urban areas, POA was mainly composed of HOA (which is mostly associated with traffic emissions) and COA, while SOA could be resolved..."

### **Response:** Revised.

**Comment:** L198 “… ranging from 0.1 to 0.5. Furthermore, we constrained the HOA and COA profiles with HOA and COA profiles reported in Liu et al. (2022) as priorities considering …”

## Response: Revised

**Comment:** I203: delete "... more details about the method please refer to Liu et al. (2022)"

### Response: Revised

**Comment:** 1204: "...datasets. For example ..."

### Response: Revised

**Comment:** L261: "... and therefore do not support directly aqueous phase SOA formation"

### Response: Revised

**Comment:** 1277 "... and possibly..."

### Response: Revised

**Comment:** Figure 6- please add (a), (b), etc to each panel and refer to these in the caption

**Response:** Revised accordingly.

**Comment:** 1377-378: Consider changing "mattered more" to "... was more significant than."

**Response:** Revised.

**Comment:** L382: “… from those observed..”

**Response:** Revised.

**Comment:** Unclear what you mean here, but if the point is to say the conclusions about SOA are consistent with other studies, change to “However, our conclusions about SOA playing significant roles in haze formations in Guangzhou urban area during all seasons are consistent among existing literature (e.g., Zhou et al., 2020).”

**Response:** Many thanks! Your understanding is what we want to deliver, and corrected as you suggested.