The paper explores the molecular composition and source contributions of PM2.5 samples collected at high temporal resolution during winter haze events. The results highlight the predominance of organic matter and identify biomass burning as the most significant source of organic matter/organic carbon. The data provide valuable insights for the analysis and modeling of particle growth and composition during haze episodes. However, given the paper's title, "Significant Role of Biomass Burning in Heavy Haze Formation in a Megacity," I anticipated a more detailed discussion of the mechanisms and evidence supporting biomass burning's role in particle growth during these events. This critical aspect is not adequately addressed in the manuscript's current structure and analysis. While the work is promising and merits publication, it requires major revisions to address the major comments outlined.

Major comments:

1. Line 223: The OC/EC average ratios fell in a range of 8.7-13.3, close to those measured in regions influenced by biomass burning (BB). What were the OC/EC ratios reported in previous studies, and how do they compare to those from other sources?

2. Line 230: WSOC is often composed of BB-derived and aged OC. What are the possible mechanisms to form those SOC/SOA? There are several publications talking about the BB-aqSOA formation, and it is required to expand the explanation here.

3. Line 231: WISOC normally represents primary OC. Are there any studies supporting this statement?

4. Line 245: According to the molecular level measurements, are there any molecules detected associated with BB gases, like the phenolic compounds?

5.Line 252: Fig. 3 is confusing and hardly support your statement in the main text. It was described that the WSOC is likely predominantly contributed from BB, but here the authors indicated that over 60% WSOC is contributed by anthropogenic sources, like cooking, heating, and industrial activities. The authors need to explain this.

6. The authors devoted an excessive amount of text to discussing SOA tracers from other sources (sections 3.3.3 – 3.3.6), which does not directly support the article's main conclusion. It can be more concise.

7. The tables and figures should be cited more clearly in the manuscript to make readers understand the data and analysis. For example, line 513: due to low temperatures and high RH (Table 1 and Fig. 5-6). It is difficult for the readers to connect all figures with the text.

8. The introduction is over length but fails to get to the main point. For example, the 1st paragraph is not related to the topic at all. And more BB associated measurements, experimental, and modeling studies are not mentioned in the introduction.

9. The paper is hard to read and the language needs big improvement. Try avoid using obscure, vague, and unscientific words in the manuscript. e.g.: tough, notwithstanding, aforementioned. Don't over use tentative language such as "may be".