Response to Anonymous Referee #1

The authors conducted a high-resolution measurement of ambient particulate matter in the Pearl River Delta region of Southern China with source apportionment and health risk implications analysis. Overall, the manuscript is well organized and the results are clearly presented with comprehensive interpretation. The analysis of high time-resolution hazardous elements is limited in published papers. The results will be helpful to understand the source and potential risk of aerosol. The results will also provide important information for policy makers thus such study should be encouraged. I recommend it for publication after addressing the following comments.

Response: We appreciate your useful comments, which improve the quality of the manuscript. We answered them one by one as below.

Reviewer's comments are in plain face.

Author's responses are in blue color.

Changes in the manuscript are in red color.

Major comments:

It would be helpful if the authors can provide more details on the calculation of uncertainties of elements, and the reasons for choosing the number of factors in this study.

Response: Thank you for your comments. New paragraphs were added in the section 2.3 (page 5, lines 20-22): "Note that Gupix provides a specific statistical error and limit of detection (LOD) for each element in each PM sample and these have been used to provide the uncertainty matrix used in the PMF analysis."

and section 3.2 (page 10, lines 11-15) to address these problems:

"Multiple PMF model runs were performed choosing fewer and more factors to examine the effect on modelling diagnostics and interpretability of the source profiles coupled with the advantage of high-resolution data to examine the diurnal concentration variations. The final six-factor solution adopted included an FPEAK rotation (-3, %dQ(Robust) = 2.91) that provided a good separation of the minor

marine aerosol source as evidenced by the FPEAK Bootstrapping results".

Minor comments:

1. P7 Line 8-9: Cr(VI) and Cr(III) has different health effect but only total Cr is available in current study. Then how was the hazard index for Cr calculated? Similar question for As.

Response: Yes, the reference levels and cancer risk slops for Cr vary with its valences (eg., Cr(VI) and Cr(III)) and exposure pathways (eg., oral intake, inhalation, etc.). However, neither reference concentration (Rfc) nor cancer risk slop for inhalation of Cr(III) are available in Integrated Risk Information System (IRIS), so we assumed that the total Cr in our study was Cr(VI), the Rfc and cancer risk slope of which are provided in IRIS (USEPA, 2017).

On the other hand, both the Rfc and cancer risk slop provided in IRIS are specific to inorganic As and its compounds, hence our health risk assessment results for As is specific to the inorganic As compounds, which is the dominating species existing in the airborne particles.

We have added new sentences in the section 2.6, lines 11-16.

2. P8 Line 17: is it organic carbon (OC) or organic compounds? OM should be used for PM reconstruction.

Response: corrected in the text.

3. P4 Line 14: O3 should be O_3.

Response: corrected.

4. P9 Line 20: a period is missing.

Response: corrected.

5. P12 Line 1-2: will the stable nocturnal boundary layer/mixing height affect all sources?

Response: Thank you for your comments. Different sources may have their own dynamic variations. Nocturnal boundary layer/mixing height will affect all sources indeed, especially for the industrial coal combustion and motor vehicles sources. We have modified this paragraph.

6. P13 Line 24-26: since lead was found to be the most risky elements, the authors may need to provide more information regarding the major source of Pb?

Response: We added in page 15 (lines 2-3): "From the source apportionment results, lead was mainly emitted from industrial coal combustion (91.5%), and slightly from biomass burning (8.5%)."

7. P14 Line 1: "the PMF sources…", "the" should be deleted.

Response: corrected.