Response to Anonymous Referee #3

The authors thank anonymous referee #3 for their useful comments. The manuscript is better after considering referee #3's suggestions.

Our response is structured as follows: original comments from reviewer #1 are bolded, the author's responses are in italics, and the revised portions of the manuscript follow in quotation marks and red letters.

General Comments

The authors present an important topic and explore a variety of aerosol classification schemes using an extensive data set with different aerosol types. This analysis allows authors to discuss about the differences between classification schemes and one of the main conclusions is that all classification schemes fail at some point, and some aerosol types are missing. This is, there is no combination of extensive and/or intensive optical properties that allow the perfect classification of aerosol types and it looks like knowing the measurement sites is needed, or helps discriminate the aerosol type. This should be included in the conclusions. Also the conclusions should explicitly indicate the specific ideas for future work needed (last paragraph on conclusion section).

The paper is within the scope of ACP and presents an interesting analysis that show the goodness and weakness of the different aerosol classification schemes presented and propose other approaches for the classification of aerosol. I recommend the publication of this paper.

Thank you for the comment; it is a good suggestion to bolster the conclusion by stating specifically that there is no 'silver bullet' classification scheme that can deduce aerosol type from only a combination of intensive and extensive aerosol optical properties. The authors also added specific ideas for future work needed into the conclusion. Please see changes to manuscript below.

Pag. 20, lines 9-17: "This study has further assessed existing aerosol typing schemes, provided additional methods that can be implemented to reduce ambiguity in typing schemes, elucidate aerosol conditions that accompany aerosol type, and allow for identification of multiple aerosol types at one site. A major conclusion from the analysis, however, is that there is no combination of extensive and/or intensive optical properties that allow for a perfect classification of aerosol types. Prior knowledge of the measurement site can help inform aerosol classification schemes, but obscurity remains in these techniques. Furthermore, this paper highlighted the need for further analyses and suggests specific ideas for future work needed to progress and refine aerosol typing schemes that infer aerosol type from optical properties. Namely, repeating this analysis with concurrent aerosol chemical and optical measurements to verify aerosol classification thresholds will be essential to expand and improve aerosol classification schemes."