

General Comments:

Overall, the revised version well addressed most of the concerns the reviewers have raised. However, there is still one concept confusion to untangle. The issue is about aerosol mixing state. After the reviewer raised some concerns about the authors' statement about mixing state of individual particles, the authors made some clarification about the difference of "mixing states of aerosol population" and "mixing state of individual particle". Please refer to S+P textbook "Atmospheric Chemistry and Physics" Chapter 24.6 (for the 2006 version or 2nd edition) about the official definition of mixing state. It is insisted here that the concept of "individual particle mixing state" should be avoided as much as possible. The reason is that if you describe the chemical composition of one individual particle through one measurement technique, it is already 100% clear about how the particle is "mixed" by its components. The concept of mixing state is created for the convenience of modelling. In real-world, an aerosol population will be in a state between an internal mixture and external mixture, two of the theoretical extremes. In a model, if you designate these two states as 0 and 1, a real-world aerosol mixture will be a value between 0 and 1. That is the beauty of this concept.

The expression of "mixing state of individual particles" can be understood easily. However, it tends to cause confusion with the concept of "mixing state of aerosol population". Therefore, it is suggested that the atmospheric chemistry community should refrain from using the concept of mixing state of individual particles. It's almost certain that one should not describe an individual particle as an externally mixed particle or an internally mixed particle. Because you may be able to define an internally mixed particle as a particle composed of two or more chemical components, but you cannot define an externally mixed particle. If a particle is composed of two or more species, one can express it as homogeneously mixed or not.

To sum up, it is suggested, but per the decision of editor, to replace the expression of "mixing state of individual particles" with other pertinent expressions.

Specific Comments:

When there are multiple papers in the in-text citations, it is suggested to separate them by a space after the semicolon. It is consistent that all the citations are not separated by space in this manuscript. It's the best to be consistent with other ACP publications also.

Can the authors clarify that Figure 9 is created for this manuscript specifically?

Technical corrections:

Line 122: The company name “Tianld Co. China” doesn’t make sense since “tianld.com” is just a just a website domain name. It is suggested to change it to “Beijing XXBR Technology Co., Ltd” if this is what it meant for.

Line 195: Change “in our previous study” to “in a separate study”.