**Atmospheric
Chemistry
and Physics
Discussions**

Interactive comment on "Development of an aerosol chemical transport model RAQM2 and predictions of Northeast Asian aerosol mass, size, chemistry, and mixing type" *by* M. Kajino et al.

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Dear anonymous referee 1

We very much appreciate your constructive comments, useful information and your time. Thanks to your review, our manuscript was substantially improved. Point-by-point responses to your comments (in blue) are attached in this later.

We attached the revised manuscript with modifications highlighted in red as the supplement (only text and tables, no figures).

The usage of English of the current version was not checked yet but will be checked by

native English speakers at least once before publication.

Sincerely yours, Mizuo Kajino

Comments and replies:

This paper presents a new version of the RAQM model. The previous model has been used to study a variety of regional air quality problems in East Asia. This new version has a much improved aerosol module, with a very nice capability to track different mixtures of aerosols. This implementation tracks 4 mixtures – aitken; accumulation; soot aggregates; and coarse. The model predictions for a full year simulation (2008) is tested/evaluated using various observations from EANET and other sources. The paper nicely describes the model and presents the evaluation of composition, mass and size (PM1;PM2.5;PM10). These results shows that the model has skill similar to other contemporary models and this is the sort of information one needs to present and publish when introducing a new model (version).

Thank you for the evaluation.

I think the paper would be stronger if more discussion is focused on the calculated mixing state information. They present interesting results in ïňĄgures 4 and 6 regarding how the various species and mixed within the categories and how they vary by season. There is no data to comapre the mixtures to, but this aspects represents a unique aspect of the model. They have some discussions along these lines, but more is possible. For example can some analysis be done to show how the mixtures change as they move away from the source regions and pass into the marine environment? It would be interesting to discuss in more detail the mixtures containing soot. How do these mixtures vary by region/season? This sort of discussion would add new science element to the paper.

Thank you for your useful suggestion. We made a new Figs. 7-10 to show spatial distributions of the mixing state and discussed them in Sect. 3.6. Sect. 3.6 were

divided into four subsections: 3.6.1 Relationship between chemical size distribution and mixing types, 3.6.2 Mixing type of sulfate (Fig.7 is discussed), 3.6.3 Mixing type of nitrate (Fig.8 is discussed), and 3.6.4 Mixing type of soot aggregate (Figs.9 and 10 are discussed).Those are briefly summarized in Sect. 4, too (Conclusion).

Please also note the supplement to this comment:
http://www.atmos-chem-phys-discuss.net/12/C7231/2012/acpd-12-C7231-2012-supplement.pdf