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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Hemispheric transport and influence of meteorology on global aerosol climatology" *by* T. L. Zhao et al.

T. L. Zhao et al.

sunling.gong@ec.gc.ca

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We thank the reviewer for the instructive comments which have improved the quality of the paper. The manuscript (acp-2011-980) has been revised following the comments. To help the readers of this reply, we have quoted the questions of the reviewer in brackets.

[1. Although source-receptor (S-R) relationships have been mentioned numerous times, including in the abstract, I cannot see clearly this point. To me, the paper is about aerosol transport as indicated by the title. Please clarify or revise the context. For example, Fig 1 only shows aerosol transports from the four boundaries of the identified regions, what about local sources emission) and sinks (e.g., deposition).]

Response: We agree with the presented suggestions. In the revised version, the source-receptor (S-R) relationships have been revised or changed with emphasis on the meteorological factors controlling the intercontinental aerosol transport and its inter-annual variations in the abstract and the context.

[2. The results seem to indicate that aerosol particles behave almost like "passive" tracers of large scale circulation. In this regard, partitioning between mean and eddy transports would make more sense. For example, eddy transports likely have a lot to do with the higher meridional variability.]

Response: We agree and have added a sentence on this impact in Section 3.1.

[3. The authors mention that the model include aerosol-cloud interactions; but it is not clear whether the relationship to precipitation is due to wet deposition only or also include effects of aerosols on precipitation. This needs to be clarified.]

Response: Yes, in section 2, we have clarified that the aerosol-cloud interactions only deal with wet deposition such as in-cloud and below-cloud removals but not the effects of aerosols on precipitation.

[4. Both standard deviation and coefficient of variation are used to represent variability. I do not understand why sometimes one not the other is used? Please explain. I also do not see the need of the acronym LTR.]

Response: Yes, both standard deviation (STD) and coefficient of variation (CV) could be used to represent variability. The CV, defined as a ratio of STD to its mean, describes a relative measurement of variability, while the STD expresses an absolute measurement of variability. In this study, the CV-values are used to analyse the HTAP-regionally averaged variability of aerosol transport (Table 2) and the temporal changes of HTAP-regionally averaged aerosol loadings and concentrations (Fig. 8) for the relative magnitudes of inter-annual variability over the HTAP-regions. The STD- values are used to distribute the spatial patterns of inter-annual aerosol variability with the

absolute magnitudes of aerosol transport fluxes, dry and wet depositions (Figs. 9 and 10) during the hemispheric transport over the NH. We have added the more explanations on the CV and STD in section 3.1 and 4.2. We have deleted or changed the unnecessary LRT to intercontinental (hemispheric) transport in the revised manuscript.

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