

Interactive comment on “Review and uncertainty assessment of size-resolved scavenging coefficient formulations for snow scavenging of atmospheric aerosols” by L. Zhang et al.

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We greatly appreciate all of the comments, which have improved the paper. Our responses are detailed below.

RC- Review Comments; AC – Authors Comments

RC: (Paraphrase: There is a need for new experimental data on snow scavenging, both for quantifying magnitudes of different processes and for validating theoretical approaches; this important need should be noted in the Conclusions section.) Please add few sentences from your own perspective: what kind of specific experiments (type,

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property, range) would you need? Where are the most crucial gaps in the observations / experiments?

AC: From the present study we can see that there are numerous areas that need to be investigated through new field and laboratory experiments in order to reduce the uncertainties in quantifying the scavenging coefficient. To avoid an overly exhaustive list and to emphasize experiments that are feasible and cost-effective, we have added the following recommendation to the manuscript: “All theoretical studies show that below-cloud scavenging of aerosol particles by snow particles depends on aerosol size and snowfall intensity. Currently there are very few publications that consider the influence of different aerosol size distributions and snowfall intensities on below-cloud scavenging coefficients. Also, the size distribution and shapes of snow particles can be specific to specific synoptic systems; observational experiments carried out in different climate regimes would be well appreciated by modellers.”

RC: I think the authors should show also the parameterization by Kyrö et al. in Figs. 7,8,10 - experimental data is so limited both urban and rural data should be utilized for comparisons (please see also Referee #3, Comment 13).

AC: Results from the empirical scavenging coefficient parameterization by Kyrö et al. (2009) have been added to Figures 7, 8, and 10 in the revised paper. Discussions of this parameterization have also been added.

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