

Interactive comment on “Development of a new semi-empirical parameterization for below-cloud scavenging of size-resolved aerosol particles by both rain and snow” by X. Wang et al.

Anonymous Referee #2

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This manuscript (MS) presents new mathematical formulations for size resolved aerosol scavenging coefficients by rain and snow that can be used in chemical transport models. The new parameterizations are based on most known theoretical formulations of the physical variable involved and are compared with similar parameterizations derived from measurements. The manuscript is well written and I recommend publication after consideration of a few remarks.

Specific comment:

On pg. 5907, line 20 is written: “The ambient temperature was assumed to be 15 C for rain cases and –10 C for snow cases and the ambient pressure was assumed to be

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1013.5 hPa. How these assumptions impact on the new parameterizations? I suggest to the authors to add these results in the MS.

On pg 5919, line 5 is stated that “The new parameterization . . . is more realistic than the majority of theoretical $\Lambda(d)$ formulas”. In order to support that I suggest to the authors to add a comparison with other parameterizations for both rain and snow in the Sect. 3.1 and 3.2.

Minor comments:

pg. 5902: Since “empirical” refers to something relying on or derived from observation or experiment, I suggest to the authors to change the title in “Theoretical development of new parameterizations for below-cloud scavenging...”

pg. 5904, line 10: The statement “the only exception is one controlled outdoor field experiment that obtained Λ_{rain} to a similar order of magnitude to the theoretical values.” has to be supported by the reference.

pg. 5906, line5: “component parameters” are not appropriate terms. I suggest to use other terms all over the MS.

pg. 5907, line 5: “a number of size bins or sections”: the term “sections” is not usually used in aerosol microphysics, I suggest to be omitted.

Fig. 1a and b: The caption should include what means red, black and yellow curves.

Interactive comment on Geosci. Model Dev. Discuss., 6, 5901, 2013.

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