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Atmospheric Chemistry and Physics Discussions

# *Interactive comment on* "On the discrepancies between theoretical and measured below-cloud particle scavenging coefficients for rain – a numerical study" *by* X. Wang et al.

**Anonymous Referee #1**

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This manuscript (MS) tries to explain the differences between the theoretical estimated and field measured scavenging coefficients for aerosol particles with diameters lower than 3 um with a suite of twelve simulations performed with a one-dimensional cloud model which correspond to three precipitation intensities (0.1, 1 and 5 mm h-1) and four vertical diffusion coefficients (one zero and the other three are shown in Fig. 1). As expected, the increase of vertical diffusion further results in an increase of scavenging coefficient calculated as the difference in number concentration at the beginning and end of a precipitation event and this increase leads to an improvement of the agreement with field measurements. The MS concludes with an obvious statement that the theoretical estimates of scavenging coefficients on microphysical basis can be used



as they are in atmospheric models which contains continuity equations and, thus, the diffusion process is already considered as in the real atmosphere where the field measurements were performed. While conceptually this MS does not say something new, it can be interesting as a numerical exercise if the results will be presented in a more explicit way, showing the difference in the production (P) and loss (L) terms induced by the changes in vertical diffusion coefficient. It will be also useful to see how change the in-cloud scavenging and its contribution to below-cloud scavenging, the evaporation below cloud, the in-cloud supersaturation and cloud water. I suggest to the authors to add in the title that the numerical study was performed with the one dimensional cloud model since numerical studies can be performed in many ways in general.

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