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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Microphysical processing of aerosol particles in orographic clouds" *by* S. Pousse-Nottelmann et al.

Anonymous Referee #3

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This paper presents parameterization of aerosol cloud processing and subsequent cloud formation in a idealized case by simulating orographic clouds over two bell-shaped mountains using the numerical weather prediction model COSMO with the M7 aerosol module and an extended version of the Seifert and Beheng microphysics scheme. It is found that the aerosol-cloud processes changes aerosol composition and distribution and that cloud related aerosol cycles differs in warm phase clouds and mixed phase clouds. The processed aerosol then impacts cloud formation in downwind areas.

The paper is well written and follows a organized and logical way. The used tool and setup to investigate the effects aerosol cloud processes is well chosen and is appropriate for the problem. The topic fits into Atmospheric Chemistry and Physics and the

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findings will be useful for further investigating aerosol cloud interactions. I recommend the publication in ACP after following concerns are addressed.

*Major issue:

There should be a major and more pronounced discussion about difference of AP and SCAV-ALL since Aitken mode is completely missed in AP in comparison to SCAV-ALL, although these to simulations expected to differ only in enhanced accumulation and coarse mode due to the regenerated aerosols.

*Minor issues:

At the time the paper of Seifert and Beheng 2006 hail was not implemented in the scheme, but newer versions does take it into account. But this has no impact on your results since you did not take hail into account.

Your Fig. 1 implies that collision scavenging is also done for graupel but text says that collision scavenging is omitted for graupel.

Interactive comment on Atmos. Chem. Phys. Discuss., 15, 2405, 2015.