Atmos. Chem. Phys. Discuss., 10, C6843–C6844, 2013
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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Stratocumulus cloud thickening beneath layers of absorbing smoke aerosol" *by* E. M. Wilcox

Anonymous Referee #2

Received and published: 9 December 2013

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Summary

This is a well written, concise and compelling paper which applies novel data from new satellite instruments to test model results and theoretical concepts of the semi-direct effect of aerosols published by other authors. It makes the important point that the semi-direct effect of aerosols can be negative when absorbing aerosol exists above boundary layer clouds; this is in contrast to the usual description of a positive semi-direct effect when absorbing aerosols and clouds exist in the same layer of the atmosphere. The results are made quantitative throughout, which is in contrast to some

other studies using similar data. It is therefore entirely appropriate for publication in ACP.

Minor comments and suggestions for the consideration of the author:

Page 18641, lines 8-14: there is something about this sentence that makes it hard to understand, perhaps it could be split differently to aid the reader.

Page 18643, line 10: the author quotes the single scattering albedo of the aerosol at 0.55 micron. What, if any, wavelength dependence of aerosol properties have been used in the calculations?

Page 18643, line 12 onwards. The study uses AOD of 0, 0.4 and 1.0 as illustrations. It would be useful if the author could give an example of the range of AODs anticipated in the region of study.

Page 18644, line5: It is not clear from the text how to compare the forcing efficiency of Magi et al (2008) with the flux convergence calculated here. I think the discussion of the differences is valid, but not very transparent to the reader.

Page 18645, line 11-14: Do we expect there to be no difference at 600hPa, and in particular do we expect the cooler temperature SST cases to be warmer under a clean sky? A little more discussion would be useful here.

Page 18647, line 9: a missing "in"

Page 18648, line 15: "by" should be "to"

Page, 18649, line 17: a missing "to"

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 18635, 2010.