

Interactive comment on “A simple relationship between cloud drop number concentration and precursor aerosol concentration for the regions of earth’s large marine stratocumulus decks” by D. A. Hegg et al.

Anonymous Referee #1

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Reviewer Comments on "A simple relationship between cloud drop number concentration and precursor aerosol concentration for the regions of earth's large marine stratocumulus decks"

General Comments: This paper clearly and concisely presents a direct correlation between accumulation mode number concentration and cloud droplet number concentration for marine stratocumulus decks, as the title so clearly states. The results of this study have important implications for predicting aerosol-climate feedbacks and for using satellite data to estimate cloud microphysical properties. It is quite impressive

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and surprising that such a simple relationship exists. I expect this work to be highly cited in the coming years. I have only minor and technical comments, in addition to suggestions to broaden the impact of this work.

Minor Comments: Pg. 28665, Line 24: It would be fantastic to see the comparison between CDNC and MODIS AMNC. Clearly the in situ relationship between CDNC and AMNC is strong. Previous work has shown the ability of MODIS to determine AMNC as the authors claim, but it would be great to have some measure of this quantitatively reported in this study. For example, one could imagine a plot with MODIS AMNC for the 3 regions vs CDNC. If such a comparison exists in the literature, the authors could point readers to that.

Pg. 28666, last paragraph: Is there a reason (other than simplicity) to leave out other studies such as DYCOMS? The benefit of 3 studies is that each region receives equal weight, but it seems appropriate to include all large studies in marine stratocumulus, if measurements exist. I am thinking particularly of Twohy et al., 2005 (full citation below).

Pg. 28667, Line 29: It might be worth pointing out how well the CDNC seems to "fill" the gap in the overall trend of AMNC in the in-cloud region. Visually, this is quite impressive, and it would further drive home the authors point that AMNC is the main predictor of CDNC.

Table 1: Does this include profiles near the coast, where concentrations were highest? (VOCALS)

Technical Comments: Pg 28664, Line 8: Report the slope as well.

Pg 28664, Line 23: Add quotes around "CCN closure studies"

Pg. 28665, Line 16: Omit spaces between dash and text. Otherwise it reads as a pause, not a hyphenated word.

Pg. 28669, Line4: Report the slope as well.

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Figure 3: Make the fit equation larger so as to be clearly seen on a screen at typical size display.

Cited: Twohy, C.H. and Petters, M.D. and Snider, J.R. and Stevens, B. and Tahnk, W. and Wetzel, M. and Russell, L. and Burnet, F., 2005, Evaluation of the aerosol indirect effect in marine stratocumulus clouds: Droplet number, size, liquid water path, and radiative impact, *J. Geophys. Res.*, 110.

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