

Interactive comment on “Influence of the Arctic Oscillation on the vertical distribution of clouds as observed by the A-Train constellation of satellites” by A. Devasthale et al.

Anonymous Referee #1

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This is a nice, concise paper that investigates the how the vertical distribution of clouds in the cold season in the polar/extra-tropical region depends on the phase of the Arctic Oscillation. The cloud data come from three satellite borne instruments and the paper is a nice example of how such data can be used. I find that the paper is interesting and generally well written. However, I have a couple of major issues that the authors should consider before I can suggest that the paper is accepted.

Major comments:

a) The influence of the AO is studied by stratifying cloud data into different phases of the AO index. However, the period under consideration is brief and, unfortunately,

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the statistical significance of the results is not considered at all in the paper. Without indications of the significance we can not be sure that the patterns found are not just chance occurrences.

When calculating the statistical significance the authors should take into account possible serial correlations in the data. Such serial correlations are present at least in the AO index and might also be present in the cloud data.

b) I also miss some indication of how much of the cloud cover the AO "explains". To indicate this the authors could show a plot of the climatological mean cloud cover.

c) Finally, I find that the authors overestimate the similarities between the patterns found with the different data sets. To me it is not clear that Fig. 3 and Fig. 4 show the same patterns.

Minor comments:

p10307, l6: "strongest pattern" -> "most important mode".

p1307, l24: I don't think it is true that there is a general trend in the AO index. It might have looked so at the time of Thompson et al. 2000, but it seems to have been a premature conclusion. The AO index shows a lot of low-frequency variability. See e.g. Cohen and Barlow, J.Clim., 18, 4498-4513, 2005.

p10313, l14: "is observed" should be deleted.

p10313 and 10314: It is not clear to me what the difference is between Fig. 4 and 5. From the text (p10313, l19 and p10314, l6) it seems that both figures show ice clouds.

Figures: In some of the figures the altitude is measured in hPa and in other figures in km. Perhaps a consistent choice could be made.

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