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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Characteristic nature of vertical motions observed in Arctic mixed-phase stratocumulus" *by* J. Sedlar and M. D. Shupe

Anonymous Referee #3

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This is a very well written manuscript based on a unique set of observations from the central Arctic Ocean. The data are analysed thoroughly and several interesting findings have been reached. Figures are well planned and of good quality. The conclusions are on a solid basis. I suggest accepting the manuscript subject to the following minor revisions.

1. Decoupling of the cloud layer and the sub-cloud layer receives a lot of attention in the manuscript. A classical mechanism for the decoupling is that the cloud layer is heated by solar radiation absorbed by the cloud droplets (e.g. Stull, 1988, An Introduction to Boundary Layer Meteorology). Does the present study support the dominance of this mechanism? Are also other mechanisms found important? It seems that in the present study the radiative shealding of upper clouds is important to suppress the

clod-top radiative cooling, but it remained unclear for me what was the main reason for the common occurrence of decoupling. Perhaps the lateral advection of heat and moisture (end of Section 3)?

2. In the abstract and in a few other places in the authors refer to striking differences from lower-latitude stratocumulus. I would appreciate reading (in Section 7) a clear summary on the reasons for these differences.

Interactive comment on Atmos. Chem. Phys. Discuss., 13, 31079, 2013.