1. Scientific Significance

Fair, although I do think the paper can be improved substantially by just reorganizing the focus of the material

2. Scientific Quality

Good. The authors did a thorough job analyzing their data.

3. Presentation Quality

Fair. The English presentation is very strained, and could benefit from a thorough review of a technical editor. Furthermore, the decision to break up each case into a description, analysis, and then separate discussion makes the paper very blocky and difficult to read. If a central thesis is presented, followed by support for the thesis, the article would read much easier, and hence get read a lot more

Comments:

After reading through the article several times, I was still left with the question what the purpose of article was. The paper details results from four isolated cases observed by the group, but the best conclusion the very strong group of authors could come up with was that they have show that lidars can detect information of the whole range from subvisible to optically thick clouds. This conclusion came as a surprise considering the multitude of citations in the paper to other work that suggests the same.

The collection of cases clearly represents the spectrum of interesting observations they observed during the experiment. However, the cases are quite distinct, and the authors make no attempt to weave a coherent thesis other than that the lidar can see a whole range of clouds

Section 3.1. It is not clear to me what the significance of this result is that cloud cover change over such a short period. Nor do I see how figure one supports the assertion that it does. This section may easily be deleted.

Section 3.2 I was intrigued by the first case, and am still not sure exactly what we are looking at there. I have no idea what is meant by pre-condensed liquid droplets. I asked an aerosol scientist and cloud physicist if they knew what a pre-condensation particle was, but also to them it was unknown terminology. The discussion suggests that these are pure liquid drops, with an effective radius of 280 nm. At atmospheric saturation ratios such drops would have to be unstable drop embryos, which I find highly unlikely. Why would such big pure liquid embryos form in a coherent layer? Can you really exclude any hygroscopic aerosol, and hence arctic haze? Why not a swollen aerosol particle slightly different composition than observed before? I do not have a good feel for how sensitive the inversion code is, but it seems to me that if you want to come to the conclusion presented that more prove needs to be provided. The HYSPLIT analysis discussion in this

context is pure speculation. If the result can be substantiated, it may be interesting enough to constitute a separate article, but as is I'm skeptical.

Page 15138 line 26: weak inversion
Page 15141 line 13. It is not clear to me what is meant in this sentence.
Page 15144 first paragraph: There is something peculiar about these clouds (or measurements) that allow the lidar to penetrate through optical thicknesses of 15. In the conclusions you argue for small inhomogeneities in the cloud. Can this be quantified? A cursory look at the arctic HRSL site suggest that this is not a common occurrence.
Page 15148 line 18. "… trough propagating…."
Page 15149 lines 5 through 20. Pure speculation. Remove.
Page 15149 line 26. What is the purpose of this sentence? Maybe you meant to say "Lidar observations were presented that cover…."
Page 15150 line 23: The issue is not that you can see a specific cloud boundary. More important is whether
Page 15151 line 20: "This is possible …..". However, I cannot agree with this statement, particularly with the wording of the authors that suggest it is practical. A better phrasing might have been "… under special circumstanced cloud boundaries have been seen up to optical depths of 15."
Page 15151 line 26: Why is this statement in the discussion and not in the analysis section?

Other than the dubious pre-condensation cloud I'm not sure this article presents any new discoveries, and the conclusions are mundane. If the authors significantly reduce the scope of the article by focusing on what they consider the more noteworthy conclusions, presented in a concise manner with a clear focus on the objective of the paper, I may be convinced that the paper is worthy of publication. The amount of data analyses done in preparation for this paper is not insignificant: however, I do not think the authors did a credible job presenting their results.