This study focuses on the impact of snow density on the radar propagation correction applied to sea ice freeboard, and subsequent estimates of sea ice thickness and growth rate. On the whole I thought the paper was thorough and well-written, and will be of interest to the sea ice remote sensing community. However, I have a few comments that need to be addressed before publication.

Main comments

1.) The authors' statements about improving the accuracy of sea ice thickness estimates are simplistic and misleading. In the abstract they state that "Correcting these biases would improve the accuracy of sea ice thickness products" and this is echoed throughout the text. This conclusion doesn't account for opposing biases that also exist. For example, *Nandan et al.* [2017] found that saline snow on first-year ice decreases the radar penetration depth and increases the main scattering horizon by ~7 cm. The impact of the salinity bias on sea ice thickness estimates is opposite to the one presented in this study, and of a greater magnitude. Therefore, to improve the accuracy of sea ice thickness estimates we require an in-depth analysis of all possible biases. The authors should include a balanced discussion of other biases (some of which will have the opposite effect of the one discussed here), and address the fact that correcting only one of these biases could actually be detrimental to the accuracy of sea ice thickness estimates. In any case, it's not possible to say that any correction definitely "would" improve sea ice thickness estimates without independent evaluation of the corrected thickness dataset.
2.) It should be clearer that the study is only concerned with the impact of evolving snow density on the radar propagation correction, and not the conversion of sea ice freeboard to thickness (for which all groups apply an evolving snow density). This is suitably explicit in the title of section 3 and a couple of places in the text, but not throughout. Please check.

Minor comments

Introduction: Unnecessarily dense with information. The first two paragraphs could be condensed and combined.

P1L6: Rearrange for absolute clarity that 15 cm applies to sea ice thickness, not growth rate

P2L35: Reference needed

Figure 1 (a) and (b): Larger text for numbers and y-axis labels

P8L154: "…**effectively** setting the rate to zero **for the radar range correction** introduces…"

P8L155-157: Again, make it clear that these calculations do account for seasonal variation in snow density, even though they will still be sensitive to uncertainties in the density assumptions.

References

Nandan, V., T. Geldsetzer, J. Yackel, M. Mahmud, R. Scharien, S. Howell, J. King, R. Ricker, and B. Else (2017), Effect of Snow Salinity on CryoSat-2 Arctic First-Year Sea Ice Freeboard Measurements, *Geophysical Research Letters*, *44*(20), 10,419-410,426, doi:10.1002/2017gl074506.