Comment on egusphere-2022-1079

Anonymous Referee #1

Referee comment on "Late summer transition from a free-tropospheric to boundary layer source of Aitken mode aerosol in the high Arctic" by Ruth Price et al., EGUsphere, https://doi.org/10.5194/egusphere-2022-1079-RC1, 2022

The determinations of the aerosol budget at high latitudes is important because of the feedbacks associated with aerosols and clouds and the impact these will have on the radiation balance in a very sensitive area. This paper looks at the transition from summer to winter in high Arctic and the impact changes in sea ice cover have on the source of aerosol. There are few observations of aerosols in the Arctic and so the observations used in this paper are limited geographically and temporally. The paper then uses a series of model runs with a variety of parameterisations of aerosols. This is all good, except that it makes for a very complex paper with 9 model runs referenced in the main body of the paper. This makes it difficult to follow the details.

The errors in the figures make the text difficult to follow. The figures have multiple lines, sometimes overlapping so some can’t be seen. I see that some effort was made to improve this by making lines transparent in figure 7 - but this was not successful. Figure 3 has lines missing completely. It would have been better if fewer models had been reported on in the main body of the paper and the other models runs relegated to the appendix or supplementary material. This would make the paper much easier to read.

A couple of rather more minor point, in figure 2 the x-axis says days of year when the figures are clearly day-month. Also, it would be interesting to know why the model was run for 2018 when the two of observational campaigns were in 2008 and 2016. Is this because there was not computer time to run more years?

This is a paper that has important results that are worth publishing but it would benefit from some simplification.