

The authors explore potential impacts of shipping activity on the properties and radiative effects of Arctic clouds. They use Large Eddy Simulations to investigate the effects of different fuel types and of emission management by scrubbing, as well as the effect of varying cloud conditions. This study is well set up and described, and I recommend it for publication after some minor comments are addressed.

General comments:

1. Non-cloud effects: Some broader overview (in the introduction) on the other potential impacts of arctic shipping on radiative forcing would be helpful. An order-of-magnitude estimate for the effect of, e.g., soot-on-snow albedo reduction, as well as direct radiative effects of aerosol in the arctic, or other effects, would be particularly valuable to situate the study in context and increase its value for non-cloud-scientists.
2. Semi-direct aerosol effect: Connected to the above point, in your simulations, radiation is not coupled to aerosol (l. 176). Can semi-direct effects of aerosol on clouds be excluded? What is the reason for not including this in the modelling?
3. Ice phase effects: You mention in the introduction, l. 95, that Christensen '14 and Possner '17 observe shifts to the ice phase from ship aerosols. In the methods, ll.168-171, you describe the choice of constant, diagnostic ice crystal number concentrations, motivated by the findings of ship aerosol as ineffective INPs. Is this not contradictory? In this setup, could it be misleading to write in the abstract (l. 15): "Simulated enhancements [...] predominantly affected the liquid phase properties of the cloud..." without referencing the diagnostic N_i used (same in l. 372)?

Specific comments:

1. L. 240: Do you have a hypothesis for the mechanism for higher LWP with prescribed aerosol?
2. L. 322: "Similar relationships [...] were also noted by Christiansen et al. (2020).
3. L. 327: "Which is expected given the relatively large LWP" Is this because the albedo-LWP relationship saturates?
4. Fig.2: What is behind the periodic increases or bumps in IWP, which seem to come about earlier in the polluted cases than in "Mix"? Are they freezing events? The rain numbers seem to dip in the next figure, and in B2 the graupel has maxima... Do you think the warm phase changes could in turn make the polluted cases freeze out earlier?
5. Fig. 3: It takes my laptop a long time to render this figure, maybe you can rasterize it (also for the other heatmap figures)?

6. All figures: Green and red in the same panel (e.g. Fig.2) is not the most colourblind friendly choice. Consider changing.