

Summary:

The manuscript tries to understand the link between snow algae growth and its relationship with albedo and ablation rates. The authors use field observations to monitor changes in snow algae over the melt season and apply these results to a model to simulate algae blooms. This research is relevant to further understanding of how algae abundance on snowpacks evolution over a season and what effects they have on surface albedo and melt rates. While I believe this work is relevant to the community, I think the manuscript could be written in a more compelling way, with greater connections and applicability to the Greenland ice sheet. And, while the model serves its purpose for this study, I think its functionality should not be overstated. And, the linkage with snow algae to surface albedo and melt rates is not made in the manuscript. I think greater emphasis and connection with albedo and melting should be added. And, what these observation and modeling efforts mean for implementation into regional climate models.

Major Comments:

1. How representative is the model for use in other regions, beyond a glacier ice cap? Can the numerical model be feasibly used elsewhere on the ice sheet?
2. What are the larger impacts of this study? I think the authors should discuss this further and link the field and modeling study to broader application and regions of the Greenland ice sheet.
3. There appears to be large uncertainty associated with the algae cell observations (Fig. 7b). How can the authors argue that a good fit is achieved between the field and modeled algal cell concentration? There needs to be further discussion on the utility of the logistic model as well as its deficiencies. How can we improve the model? What data and additional variables are needed? And, what is the greater link to surface albedo and melting?

Specific Comments:

1. Pg. 6 line 2: Change to ' 3.1×10^3 cells m^{-2} '. And, again on line 4.
2. Pg. 6 line 17-18: What evidence do you have to validate that the red algal cells originate from windblown spores? Is there a way to verify this further and possible local sources (eg. nearby tundra)?
3. Pg. 7 line 5-6: reword sentence structure.
4. Pg. 7 Equations 1 and 2: These equations may be better placed in the Methods section.

5. Pg. 8 line 2-3: are these numbers correct? The text states the initial concentration was substantially smaller than the final concentration. Check the concentration numbers.
6. Pg. 8 line 4-5: Why aren't the authors using two separate carrying capacities for Site-A and Site-B, if they have different maximum concentrations of algal cells?
7. Pg. 8 line 21-22: The text of 100 times more at Site-A than Site-B is redundant to the previous few lines of text.
8. Pg. 24 Fig. 7b and c: Error bounds are needed for the logistic model (solid) line. Similarly, for Fig. 8b and c.