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Interactive comment on "Brief Communication: Capturing scales of spatial heterogeneity of Antarctic sea ice algae communities" *by* A. L. Forrest et al.

Anonymous Referee #2

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Overall the information presented represents valuable information regarding the feasibility of using optics to infer algal biomass in sea ice and the horizontal variability of such in land fast ice of Antarctica. That said, there are several areas in the ms that deserve improvements. Among the areas that need improving is work to provide better citations that will help place the current work in better context of the scientific progress over the past 20+ years. Additionally better citations will help the authors to provide better and more accurate information regarding sea ice and sea ice biota. Specific examples are given below.

Page 1: First sentence of abstract (line 12) is hyperbole and not needed-

line 23- There are much better references than just one reference from McMinn et al

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1999 for the assertions- including review papers by working groups.

line 28- is an assertion that is simply not true- the idea that ice algae predominantly grow at the bottom of the sea ice is a fallacy propagated by thinking that McMurdo sound sea ice is representative of 20M sq kilometers of sea ice- when in fact ice algae grow throughout all sorts of areas of the sea ice in the pack ice regimes. Moreover, fall blooms are also common- refer to the work by Garrison and others as well the Japanese authors on the topic.

Page 2: line 5- again only one reference is not sufficient - e.g. citing Palmisano's work would be appropriate

Page 3- line 24- Sullivan et al's prior work in the 80's also quantified the percentage of the biomass in different layers of the bottom ice.

Page 4 line 13- 14- the sentence is very hard to translate. How did they scale the estimates? what does this mean? was there a correction factor applied and if so, how?

Page 5- line 6- referencing something that may or may not be published somewhere else does not seem like it should be allowed.

line 10 - same issue- it seems relevant to present the data herin.

Page 6 line 7 - the sentence is very awkward- and meaning is obscured. suggest re-writing to clarify.

Page 7- line 2- the term pioneering seems a bit much as this does not seem like pioneering work. There has been much work on this topic and approach already. More appropriately the incremental work demonstrates ability to use place optical instrumentation on underwater vehicles to try to estimate biomass over larger spatial scales.

line 10- assertion that new understanding is possible- would be more convincing if the authors presented on this manuscript what new understanding they have provided by doing the exercise. The ms does not convince me that they have contributed more

understanding yet. perhaps if they did a rigorous spatial analysis of their transects to inform us of the spatial scales of patchiness or autocorrelation THEN i could see that they might be providing better and new information for better understanding sea ice and sea ice algae.

Figure 1- the orientation of Antarctica in the inset looks transposed. The text on the transect figure inset make this figure problematic- it is not readable

Figure 4- it would be nice to add a panel that shows the depth of the radiometers on the vehicle as it made the transect.

Fig 4c- does the repeat of the lines imply there is a lack of repeatability ? is there an issue being hid hear concerning the stability of the incoming surface radiation during the measurements?

again- this seems like a nice data set to work with- but there are issues to be addressed in the analyses and the presentation that would make the publication much better.

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