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Interactive comment on "The impact of melt ponds on summertime microwave brightness temperatures and sea ice concentrations" *by* S. Kern et al.

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The ability to remotely sense and discriminate between sea-ice, open water and melt ponds is an important topic for model evaluation, process studies and initialization of operation forecast systems. This paper provides a very in-depth development and application of a scheme to estimate aspects of the area fraction of the surface types listed above.

Unfortunately, the paper is very difficult to read. It is so densely packed with abbreviations and acronyms and excess technical detail that it will be unintelligible to most readers. Even if one has a background in this field, the presentation style is a real impediment to effective communication. I would very strongly urge a complete re-write

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Discussion paper

of the manuscript with an eye to simplification, clarification and more organized flow of material. The same issues arise with the figures which are, like the text, almost impenetrable. I am convinced that the length of the text and the number of figures could be reduced by half, which would also allow individual figure panels to be increased to a readable size. This requires careful consideration of what the key messages/conclusions are, and what is the essential material that must be presented in order to substantiate these. There is no point publishing a paper that no one can or will want to read.

I read and re-read the Conclusions section multiple times and I must say I am still not clear on what the real take-home message is. Certainly there is a lot of detail about uncertainties and their source and the differences between different algorithms. But the last paragraph basically just says melt pond fraction is confounded with open water fraction in summer (something that has been well known since the early days of sea-ice remote sensing), that users should be aware of this, and that there nothing at the moment that can be done about it. Given all the preceding detail, it is surprising that nothing is said regarding which algorithms are more or less reliable and how a user might make choices when faced with a particular problem or application, or indeed how an 'essential climate variable' might be constructed. The second-last paragraph of the paper seems to provide some commentary on different algorithms, but having read it several times, I still cannot glean any concrete guidance.

So, my conclusion is that this paper requires quite a bit of work, and I would recommend major revisions.

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