

Interactive comment on “The color of melt ponds on Arctic sea ice” by Peng Lu et al.

Anonymous Referee #2

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The paper of “the color of melt ponds on Arctic sea ice ” give a new insight on the optical properties of Arctic melt pond, which is very important for the knowledge of melt pond thermodynamic processes and remote sensing. There are very few papers have been published on this topic because of the complexity of influencing factors. Thus, it is worthy of publication. However, in the current state, I think this study just can give the knowledge on the color of idealized and simple melt pond because it just give the model of two-layer pond (ice covered by water) and just in the state of overcast sky: (1) Most melt ponds in Arctic would be covered by a thin ice although in the midsummer because the cold air at night, and the snow accumulated on the thin ice and itself would influence the optical characteristics of melt pond, as shown in the Fig.1 (Not all of them are open melt pond) ; (2) overcast sky is prevailing but not always during summer in Arctic and the incident spectrum would obvious influence the pond color. Thus, if the authors can add some works on (1) three- or four- layers model and (2)

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the influences of incident spectrum, this study would be effectively improved both for the preciseness and applicability. Here are some other detail comments: (1) Color can be equivalent to albedo. Color only covers the visible light. (2) Scattering in meltwater and ocean water is neglected. Why? (3) 3.3 Influence of optical properties of ice. – how about the porosity of the ice under the melt water. Many cases, the density of ice under melt pond is only about 1/3 of that of level ice because the large porosity and the salinity is as large as the upper ocean. (4) 4.2 Possibility of retrieving pond depth and ice thickness.—I would like remove this section because: (1) the visible color of pond is very difficult to obtained by satellite remote sensing due to the cloud and small scale of the pond, (2) we cannot judge which pond is covered by ice and/or snow by satellite/aerial images, (3) the color of pond also depends on many factors, especially for the porosity of ice under the ice, it also can be found that the relationship is very unreliable as shown in fig.11.

Please also note the supplement to this comment:

<https://www.the-cryosphere-discuss.net/tc-2017-117/tc-2017-117-RC2-supplement.pdf>

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2017-117>, 2017.

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