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The Cryosphere Discussions

Interactive comment on "Transition in the fractal geometry of Arctic melt ponds" *by* C. Hohenegger et al.

Anonymous Referee #1

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I have found this paper well written and interesting; its scope of is clear and defined. The paper is based on observation of images of ponds shapes and sizes and finds a relationship between pond's area and perimeter based on fractal theory. Furthermore the varying fractal properties of the ponds studied in the paper are related to the pond's age.

The database used is very valuable and it is used in a novel manner: the approach to the pond's study is different from any other I have encountered until now and the results are quite striking. The intrinsic nature of the developing ponds is well captured by the fractal law applied. In particular the ponds characterized by an area of a length scale of 10 m2 correspond to young ponds, a length scale of 1000 m2 correspond to well developed ponds (very ramified and coalesced ponds). The transition between the

two is continuous but on a logarithmic scale the slope discerning the two is quite steep and has a flex around values of 100 m2.

The methodology is quite clear and the reference to previous work on ponds is exhaustive. I believe that although the paper's findings are interesting, I cannot see a straightforward way to apply them in a forecast of pond's area in climate model: in order to use the pond's characteristics one has to know where they are and how big they are.

I would encourage the authors to exploit further the relationship between the characteristics of melt ponds and sea ice topography in a future work: if a correspondence can be found between the pond area and their age one could link the presence of certain types of melt ponds with sea ice topography. This could help to implement some method to include in GCMs in which the ice topography can be adjusted depending on the pond's characteristics interactively. I would still imagine the melt pond area to be calculated within the model and not prescribed.

In fact, based on the observation that ponds of a certain age and size appear over certain ice types, e.g. parameters that would influence the ice strength.

My recommendation is that the paper results are suitable for publication without the need of any revisions.

Interactive comment on The Cryosphere Discuss., 6, 2161, 2012.