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Interactive comment on "Toward a method for downscaling sea ice pressure" *by* Jean-Francois Lemieux et al.

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Response to reviewer 1

We would like to thank reviewer 1 for his/her comments.

Note that based on comments from the reviewers, we have simplified and made the numerical experiments more uniform. First, the thickness of the level ice is 2 m for all the experiments. Second, the viscous coefficients (see eq. 5 and 6 in the revised manuscript) are always capped using the approach of Hibler 1979. Finally, the numerical approach was slightly modified: we seek the steady-state solution of $\rho h \partial u/\partial t = \nabla \cdot \sigma$. instead of solving directly $\nabla \cdot \sigma = 0$.

Although both approaches give the same answer, the new one is more consistent with the stability analysis described in the appendix. Because of these changes, all the numerical experiments were redone.

Below, the comments from the reviewers (1) are in normal character. Our responses (2) are in bold while changes to the manuscript (3) mentioned here are also in bold and in quotes.

REVIEWER 1

(1) I think this paper is well-written, presents important new results on the downscaling of pack ice pressure in models for application to ships in ice, and should be accepted with only the following minor revision.

On Figures 4 and 5, panel (c): can the authors please specify what type of distribution was fitted to the data, provide the distribution parameters, and the 95% confidence intervals of the distribution parameters?

(2) Figures 4 and 5 are figures 3 and 4 in the revised manuscript. These figures show the probability density functions (PDF) calculated from the simulated 2D fields of pressure. There is no fit to the model outputs. The curves simply show the value of the PDF for all the bins (the bin size is 0.25 kNm^{-1}). We have added the following text when introducing figure 3:

(3) "From these simulated 2D pressure fields, probability density functions (PDF) are calculated using bins of 0.25 kNm^{-1}. They are shown in Fig. 3c which demonstrates that the simulated fields are very similar at 10 and 20 m resolutions."

Jean-François Lemieux

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Discussion paper