

## ***Interactive comment on “Laboratory Study of the Properties of Frazil Ice Particles and Flocs in Water of Different Salinities” by Christopher C. Schneck et al.***

### **Anonymous Referee #1**

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The authors present laboratory experiments to measure frazil ice particles properties. Experiments are conducted in a water tank with bottom mounted propellers to create turbulence. The change in frazil ice properties as a function of salinity concentration is investigated, and different behavior between freshwater and saline water is highlighted. High-resolution camera and cross polarized lenses system is used to capture images and a suitable image processing algorithm is developed.

The growth rate of frazil crystals and flocs, their size distribution over time and the super cooling curves are measured and discussed. The presented findings suggest that overall process of nucleation and growth of frazil ice particles is similar for freshwater

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and saline water: in both cases a lognormal particle size distribution is observed, even if in saline water the mean value of particle size is slightly smaller. On the contrary, flocculation process significantly slowdown in saline water. Furthermore, flocs porosity is estimated by comparison with a thermodynamic model.

Given the lack in measurements of the size and shape of frazil ice particles and flocs (particularly in saline water), the results of this paper can be very useful for modeler community. Moreover the authors deeply discuss the results with clear and precise comparison with literature data and models. Therefore I recommend this paper for publication.

I only have few comments for the authors.

- Turbulence intensity is held constant in all experiments with a turbulent kinetic energy dissipation rate of about  $336 \text{ cm}^2/\text{s}^3$ . Can the authors contextualize this value with those measured in ocean mixed layer or in rivers?
- In Introduction the rationale of this study is well presented and the state of art of the laboratory experiments is well detailed, but the novelty of the present study is quite hidden. I therefore suggest to improve this section (in particular to extend from line 6 to line 12 of page 4) by highlighting how the present study differs from previous ones.
- (very small comment) Page 1 line 23 I suggest to remove the “(i.e. cooled below  $0^\circ\text{C}$ )”, since it is false for saline water.

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Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2019-99, 2019.

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