Global Water Futures 2021 Operations Team Meeting – Project Reporting Template

Instructions: All GWF projects are asked to provide a summary update on their activities and accomplishments in preparation for the upcoming Operations Team meeting. **Please submit these by email to chris.debeer@usask.ca by no later than December 2.** These will be used to help guide discussions and breakout synthesis activities and will be made generally accessible on our website in advance of the meeting.

Project Name:	**Evaluation of ice models in Large Lake using Three-dimensional Coupled Hydrodynamic-Ice Models**

Our major accomplishments to date are:

- Masters student Sarah Walsh successfully defended her thesis "Simulating Wintertime Lake Dynamics with the MITgcm Ice Model"
- Postdoctoral Fellow Siva Prasad coupled ROMS with the Los Alamos Sea Ice Model. Comparisons have been made between observations and model predictions for several winters., each with their respective ice models, have been run
- PhD student Andrew Grace has published on paper on the behaviour of surface and bottom gravity currents at temperatures near the density maximum for fresh water. We are currently revising a second paper on how heat introduced into cold near surface waters (i.e., below the temperature of maximum density) via weak shortwave solar radiation appropriate for under ice conditions is transported vertically via instabilities. Here background sheared currents are included (e.g, those associated with an under-ice river plume).
- Simulations of winter dynamics have also been done using the MITgcm and its ice model.

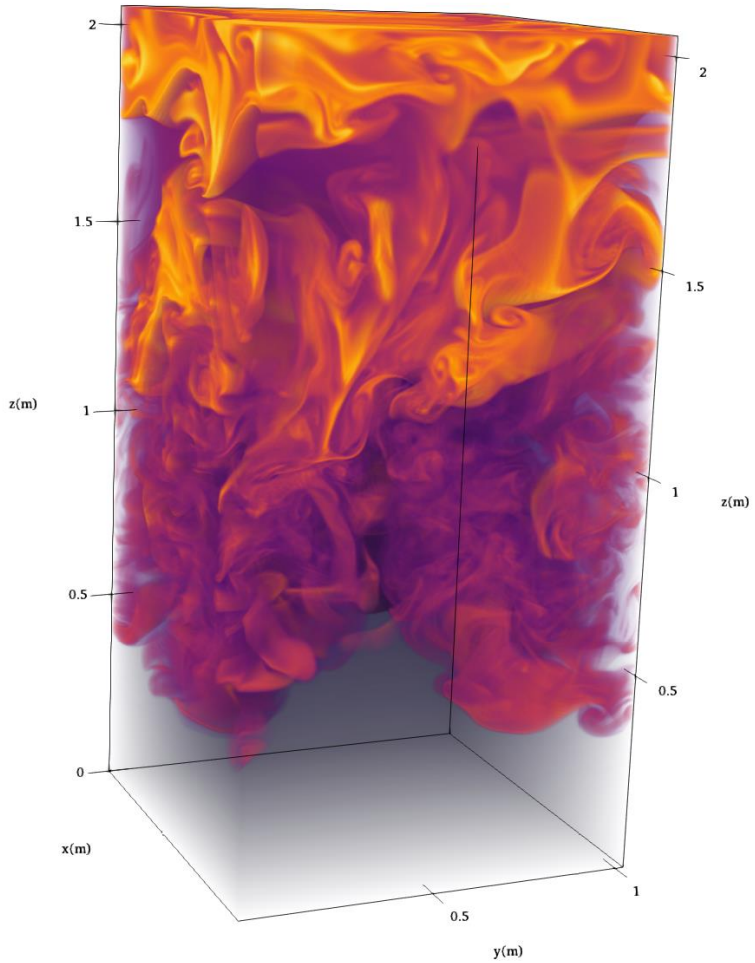
Our current activities are:

- Siva Prasad is no longer involved in the project. Ice modelling work will continue this winter with the help of an undergraduate research student.
- Revisions of Andrew Grace's second paper should be completed shortly. This work is being extended to consider non-uniform heating.

The main accomplishments expected by the end of the project are:

- The major accomplishment of this project will be an improved understanding of the dynamics of gravity currents and instabilities in a background sheared current associated with solar heating of water near the temperature of maximum density where the nonlinear equation of state results has significant consequences for the dynamics. This as implications for vertical mixing under ice and in open water cold-water conditions (e.g., leads during the winter or at ice-off and ice-on).

Here is a key visual from the project (figure, photo, table, graph, etc.)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