

## **Response to Anonymous Referee #2 (Round 2)**

Thank you for your thorough review and suggestions that have helped us substantially improve our manuscript. We have implemented all of the changes you have recommended. Namely, we have changed Eq. 7 as you have outlined in your comments to be a function of salinity and the water pressure (not effective pressure).

We have also made the changes you have suggested to the energy equation (Eq. 8). We now assume that the brine temperature is equal to the melting point (not the ice temperature) along the channel and in time. This has had major implications for the results of the model.

Essentially, by changing the assumption that the brine temperature is equal to the melting point, when the channel walls melt the brine is diluted which increases the melting point. Energy is used to warm the brine to the new melting point which results in less energy available for melting the channel walls. Consequently, salinity has the opposite effect of our original statement and fresh water has a higher peak discharge than saline fluid. The original conclusion about fluid density substantially increasing fluid flux is still true, however this is only the case for freshwater. When considering saline fluid, the resulting increase in energy due density is small compared to the influence of changes in the brine temperature.

This has led to substantial changes to the results and discussion sections of the manuscript.

We have addressed all of the line by line comments exactly as you have recommended.