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Effect of turbulence and convection on melting of the ice shelves in stratified environment BISHAKDATTA GAYEN, MAINAK MONDAL, The Australian National University, ROSS GRIFFITHS, Australian National University — We have performed high-resolution simulations to investigate the convective boundary layer when a wall of ice dissolves into stratified seawater under polar ocean conditions. Under the stratified ambient condition, melt water spreads out into the interior in a series of nearly horizontal layers due to double diffusive convection. The layer thickness depends on the ambient density gradient and the difference in density between the freezing point (interface temperature) and the ambient water temperature. For a small O(1) m hight box the layers are laminar and results for layer depth are in agreement with the experimental results. However, for significantly higher ice walls the layer scaling differs as a result of turbulent mixing. Stratification has a significant effect on melt rate which further helps in the shaping of ice-wall. The temperature and density structures found under Pine Island Glacier show several layers having a vertical scale that can also be explained by this study.

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