

Abstract: The recent acceleration in Arctic sea ice decline is larger than predicted in most modeling studies. This suggests a heat source for the ice melt that is absent or underrepresented in the models. A relatively warm layer of Atlantic origin water provides a large heat reservoir; however, this layer is separated from the surface by a cold halocline layer. For this heat to play a significant role in ice melt requires a vertical advective heat flux extending from the top of the Atlantic layer (~250 m depth) to the surface mixed layer. Across shear lines in the ice cover, there is a discontinuity in the ice-ocean momentum transfer. Associated with this are strong Ekman pumping velocities below the shear lines. Here, we consider whether this can lead to significant advective fluxes allowing heat from the warm Atlantic layer to influence ice melt. This is addressed using a high-resolution coupled ocean-ice general circulation model (the MITgcm).