



Contrasting Arctic and Antarctic sea ice temperatures

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Sea ice temperature affects the sea ice growth rate, heat content, permeability and habitability for ice algae. Large-scale simulations with NEMO-LIM suggest large ice temperature contrasts between the Arctic and the Antarctic sea ice. First, Antarctic sea ice proves generally warmer than in the Arctic, in particular during winter, where differences reach up to $\sim 10^{\circ}\text{C}$. Second, the seasonality of temperature is different among the two hemispheres: Antarctic ice temperatures are $2\text{-}3^{\circ}\text{C}$ higher in spring than they are in fall, whereas the opposite is true in the Arctic. These two key differences are supported by the available ice core and mass balance buoys temperature observations, and can be attributed to differences in air temperature and snow depth. As a result, the ice is found to be habitable and permeable over much larger areas and much earlier in late spring in the Antarctic as compared with the Arctic, which consequences on biogeochemical exchanges in the sea ice zone remain to be evaluated.