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Opposing subpolar changes in ocean heat content due to the Subantarctic Front shifting in the upper Southern Ocean

The global ocean has been warming significantly due to rapid climate change, leading to conspicuous changes in the subpolar Southern Ocean. The Subantarctic Front (SAF) plays an important role in modulating changes in regional ocean heat content (OHC) through meridional heat advectons. However, the influence of the SAF shift has been overlooked in the past based on its overall weak trend. In this study, we used observed objective analysis and reanalysis datasets to explore the changes in subpolar ocean heat content and analyze attributions to the remarkable regional discrepancy. We found a notable difference in the direction of OHC trends between the Atlantic–Indian sector and the Pacific sector, which could be attributed to the inverse meridional heat advection caused by the SAF shift. Atlantic–Indian sector warming was significantly modulated by increasing meridional heat advection induced by the poleward SAF. In the Pacific sector, the equatorward SAF resulted in substantial cold

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