

The relative roles of transient and standing eddy heat transports in the Southern Ocean of a high resolution global model

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As the only major ocean basin that allows for circumpolar flow, with no continental boundaries against which zonal pressure gradients may be established, the Southern Ocean has been singled out as a region in which transient mesoscale eddies are especially important. When effects of bathymetry on the flow are considered, however, transient eddies alone need not generate the entire poleward heat transport that compensates the equatorward heat transport forced by the prevailing westerly winds. Instead, topographically fixed meanders, or standing eddies, can deliver much of this poleward component of the heat transport.

Together, the transient and standing eddies must deliver a sufficient magnitude of poleward heat transport to more than fully compensate the wind forced transport. Building upon our process modeling that shows that standing eddies can dominate the poleward heat transport, we analyze the balance between transient and standing eddy heat transports across the Southern Ocean in a realistic, high resolution global ocean model.