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Control of Southern Ocean sea surface temperature variability by air-sea fluxes in an eddy resolving model

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Recent works suggest that the response of poleward eddy heat flux across the Antarctic Circumpolar Current to increased winds associated with the positive trend of the Southern Annular mode could be a significant contributor to the observed warming of the Southern Ocean. Here, simulations of a realistic eddy resolving regional ocean-sea-ice model forced by atmospheric reanalyses are used to investigate the mechanisms driving the interannual variability of sea surface temperature in the Southern Ocean. Our model results show that the interannual variability of eddy activity does not contribute significantly to the interannual variability of SST south of the polar front. In the model, the interannual variability of SST south of the polar front is mostly governed by anomalous air-sea fluxes. Furthermore, significant air-sea fluxes anomalies are found to be associated to positive phases of the Southern Annular mode. These findings advocate that reducing the uncertainty in air-sea fluxes estimates is essential for understanding the observed trends in the Southern Ocean.