Poleward shift of the southern boundary of the Antarctic Circumpolar Current off East Antarctica

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The subpolar cyclonic circulation in the Southern Ocean connects offshore warm water and inshore cold water and is vital for the Antarctic climate. Comparison of 5 cross-slope hydrographic sections between 1996 and 2018/19 in the Australian-Antarctic Basin revealed a systematic poleward shift (30-80 km) of the southern boundary of Antarctic Circumpolar Current (ACC) which is defined by the 1.5 ˚C isotherm of Circumpolar Deep Water (CDW). Historical data suggest that this change is decadal rather than interannual. Due to the poleward shift, temperature anomaly by up to +1 ˚C occurred in the upper CDW layer in the proximity of the southern boundary of the ACC. Deepening of the isopycnal of bottom water coincides with the poleward shift of the southern boundary, implying the influence of the poleward frontal shift offshore. The poleward shift of the southern boundary is not zonally homogeneous. The topographic feature which controls the cyclonic circulation is the most likely explanation for the locality.

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