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Localised acceleration of the Antarctic Circumpolar Current

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The Antarctic Circumpolar Current (ACC) is maintained by wind forcing at the surface. The accelerating influence of this forcing is balanced, circumpolarly, by the decelerating influence of form stress at the bottom. How the strength and structure of the mean flow interacts with the surface forcing locally, is poorly understood, especially regarding the role of mesoscale eddies. Here, a coupled ocean-sea ice model (NEMO), forced by atmospheric reanalysis, is exploited. Simulations at coarse to eddying resolution elucidate the interplay between wind forcing and the ACC. Dynamical budgets, integrated along streamlines, reveal a response of the ACC not only to the strength of the Southern Ocean wind stress but its spatial pattern. Specific regions are identified where the forcing strongly influences the mean flow. These regions are contrast against those where the forcing is locally manifest in the eddy and bottom pressure fields. Implications for future changes to the ACC and its consequent meridional exchanges are discussed.