

Zonally symmetric shifts of the Southern Hemisphere Westerly Winds

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Abstract

Peatlands preserve climate and environmental change over thousands of years, and arguably nowhere is this more important than the Southern Ocean region. This region has particular significance for understanding the evolution of the southern westerly winds, and their influence on ocean carbon flux, Antarctic sea ice, and regional temperature and precipitation patterns. Here we investigate shifts in the latitudinal position and strength of the Southern Hemisphere Westerly Winds using high resolution geochemical data from peat sequences in sub-Antarctic islands across the Southern Ocean. We measure bromine concentration, derived from sea-spray aerosols, as a wind-strength proxy over the Holocene, and find Southern Ocean-wide increases in bromine over the last 2000 years, indicating a zonally symmetric strengthening of the southern westerly winds during this time. This work has important implications for understanding the links between stronger and poleward-shifted westerlies and the outgassing of natural CO₂ from the Southern Ocean.