

Can New Zealand Peatlands Reveal Shifts in Southern Hemisphere Westerly Winds?

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The position of the Southern Hemisphere Westerly Winds has an impact on the global carbon cycle by controlling upwelling in the Southern Ocean. Understanding past latitudinal variability in the core of the Westerlies can help us to understand drivers of atmospheric $p\text{CO}_2$ through time and help us to predict patterns that impact the present and future. We developed a method to examine past positional changes in the Westerlies using peat cores from the Auckland Islands, a group of subantarctic islands located to the south of the main islands of New Zealand. We looked at both the hydrogen isotope ratios (δD) of n-alkanes and the relative abundances of biomarkers found in leaf waxes to explore positional changes in the Westerlies throughout the Holocene. We found that, over the interval of the last 500 years, the Westerlies reached a northern maximum at ~1650, and they have continuing to move southwards through the present. Using microfossils and biomarker abundances, we found notable vegetation changes in the middle Holocene, which would indicate wetter climate and northward shifts in Westerly position at that time.