

Drying of East Antarctic terrestrial ecosystems provokes rapid community change

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Antarctica has experienced major changes in temperature, wind speed and stratospheric ozone levels over the last 50 years¹⁻². Whilst West Antarctica and the peninsula showed rapid warming and associated ecosystem change¹⁻⁷, East Antarctica appeared to be little impacted by climate warming, thus biological changes were predicted to be relatively slow^{1-2,8-11}. Detecting the biological effects of Antarctic climate change has also been hindered by the paucity of long-term data sets, particularly for organisms that have been exposed to these changes throughout their lives¹⁰⁻¹². We monitored vegetation communities in the Windmill Islands, East Antarctica from 2000 to 2014 and found significant changes in moss species composition¹²⁻¹³. In addition, we have shown that radiocarbon signals preserved along shoots of the dominant Antarctic moss flora can be used to determine accurate growth rates over a period of several decades, allowing us to explore the influence of environmental variables on growth^{12,14}. Carbon stable isotopic measurements suggest that the observed effects of climate variation on growth are mediated through changes in water availability and most likely linked to the more positive phase of the Southern Annular Mode and changing westerly wind patterns¹⁴⁻²⁰. For cold remote locations like Antarctica, where climate records are limited and of relatively short duration, this illustrates that mosses can act as microclimate proxies and have the potential to increase our knowledge of coastal Antarctic climate change²¹⁻²².

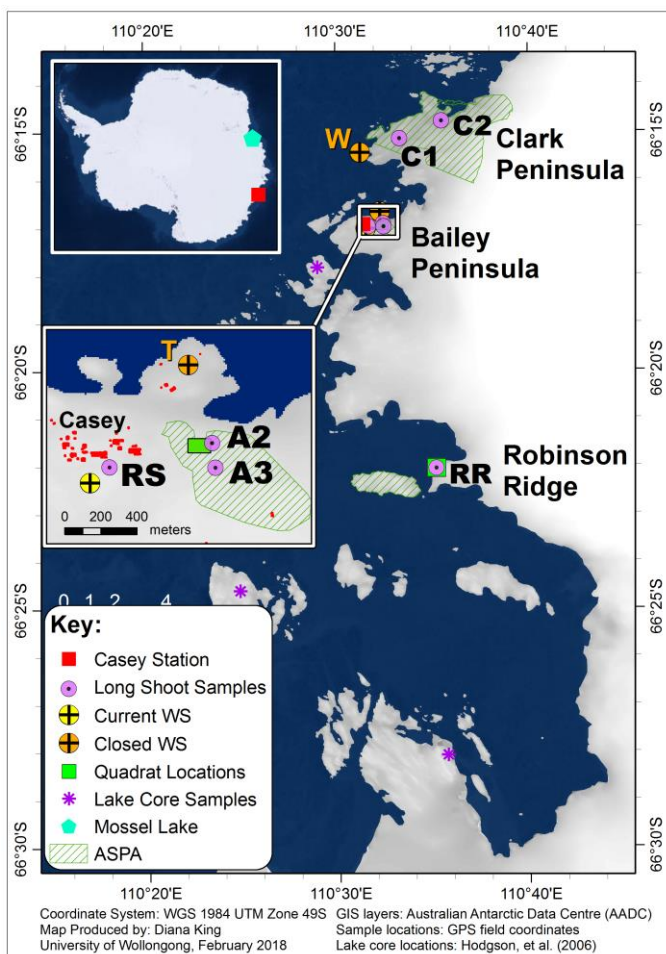


Figure 1. **Map of the Windmill Islands, East Antarctica** showing location of sampling sites. Inset shows the location of Casey Station on the Antarctic continent. Cores of long moss shoots were collected from locations labelled: C1 (Clark 1), C2 (Clark 2), RS (Red Shed), A2 & A3 (Antarctic Specially Protected Area 135) and RR (Robinson Ridge). Long-term monitoring quadrat locations are shown at ASPA 135 (A2) and Robinson Ridge (RR). Current (Casey 1989–present) and closed (W = Wilkes 1961–69, and T = Casey Tunnel 1970–89) weather stations are marked on the map as WS. Lake core locations taken from Hodgson et al. (2006).

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