

Dating West Antarctic ice sheet collapse using genomic data

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West Antarctica has been identified as one of the fastest warming places on the planet. Large parts of the West Antarctic Ice Sheet (WAIS) are predicted to melt as a result of climate change. Reducing uncertainties over the rate of that melt has been identified as a key research priority in the 5th IPCC Assessment Report. It is well understood from geological reconstructions that there are times in the past when average temperatures were only ~2-3°C warmer than today, but global sea levels may have been up to 20 m higher. Determining which of these times may have been accompanied by a widespread collapse of the WAIS is needed to provide critical insights into the potential rate and magnitude of sea-level rise over the coming decades and centuries. It is unknown whether there was a collapse of the WAIS during the Last Interglacial, 125,000 years ago – the last time Earth was +1°C warmer than the pre-industrial period. A recent ice sheet model implies Antarctica may have contributed up to 5m of the 6-9m of global sea-level rise known from geological evidence. Confirming this is particularly important for constraining future sea level projections. The complete collapse of the WAIS would lead to the existence of trans-west Antarctic seaways linking the present day Ross, Weddell and Amundsen Seas. Such seaways would allow marine animal migration across newly opened straits, and a genetic signature of that historical connectivity will persist in the genomes of benthic animals present in Antarctica today. I will describe how we are using this information to distinguish between hypotheses to determine when the WAIS last collapsed.