



Continuous and discrete measurements of atmospheric methane from an ice core from Roosevelt Island, East Ross Sea, Antarctica

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A new ice core from Roosevelt Island was drilled for the Roosevelt Island Climate Evolution (RICE) project to establish the history of deglaciation of the Ross Sea through the Holocene. Evidence of glacial retreat in the Ross Sea Embayment shows that deglaciation happened in several stages of rapid collapse and persisted well after the melting of the Northern Hemisphere ice sheets was complete. The ice rise on Roosevelt Island records the timing of the last leap when the West Antarctic Ice Sheet (WAIS) receded past Roosevelt Island.

In order to discern the timing of deglaciation, a precise age-depth relationship is required for the RICE ice core. We present a timescale for Roosevelt Island using mixing ratios of methane in air preserved within the ice core measured continuously with a Picarro laser spectrometer as well as in high-resolution with gas chromatography (GC). Discrete data from GC analysis over the top 400m of core replicate both the magnitude and variations from other high-resolution ice core records from WAIS Divide, Law Dome, GISP2 and NEEM S1. Both the continuous and discrete methane records of the RICE core were matched to these established records and provide an accurate and consistent depth-age relationship for the past 3.6kyr. Future work on the 400-750m depth section is expected to extend the RICE chronology to at least the Last Glacial Maximum.