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Inter-hemispheric phasing through Termination II: integration of marine, ice and speleothem records

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Assembling precisely dated records from both hemispheres is fundamental to unlocking the factors that drive Earth's climate from a glacial to an interglacial state. Whilst marine sediments and ice cores contain many of the clues about the phasing of climatic changes through glacial terminations, reliance on these records alone cannot provide all of the answers, particularly regarding timing and phase differences. Improved knowledge of timing and phasing is vital for testing hypotheses of external forcing of, and internal feedbacks through, terminations.

In this study, we apply a recently derived radiometric chronology for Iberian margin marine sediments through Termination II to a Southern Ocean core (MD02-2488) incorporating previously determined phase relationships between the Southern Ocean and the North Atlantic Ocean. Given the apparent coupling of Southern Ocean SSTs to Antarctic ice core palaeotemperatures, this enables us to indirectly apply a radiometric chronology to the ice record through Termination II. To independently verify this new Southern Ocean/Antarctic chronology, we then compare our results with a New Zealand speleothem (flowstone) record spanning the same period from a site (Nettlebed Cave) where delta-13C has been previously revealed as a key indicator of temperature change through terminations. Finally, we consider the likely forcing mechanisms and phasing relationships arising from these comparisons.