

Glacial Terminations or Glacial Interruptions?

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The long-held view that the ‘preferred state’ of the climate system is a warmer, less glaciated world in which Ice Ages were ‘terminated’ when excess carbon was re-released from the ocean to the atmosphere is questioned. I argue instead that the preferred state of the climate system for the past 30 million years was one of expanding ice cover and colder climatic conditions induced by net removal of carbon relative to carbon sources. In other words, carbon sources and sinks are not in balance, and this applies to glacial/interglacial timescales. In this context short-term intervals of warmer conditions (interglacials) are better termed ‘interruptions’ rather than ‘terminations’. In support of this view, recent discoveries have revealed geologic reservoirs of carbon that accumulate in near surface environments. These reservoirs of carbon can be disturbed and released to the ocean/atmosphere, and in doing so disrupt the carbon system and atmospheric CO₂. Evidence is presented that points to regularly paced intervals of excess carbon release to the ocean/atmosphere system from geologic sources when hydrostatic pressures fell as ice sheets expanded. This alternative hypothesis makes specific predictions about carbonate chemistry changes in the ocean and associated changes in geochemical tracers that are in direct conflict with the prevailing hypothesis. Each of these predictions is explored and discussed in the context of what is currently known and what future research could reveal about the long-standing mystery of what controlled atmospheric CO₂ on glacial/interglacial time scales.