

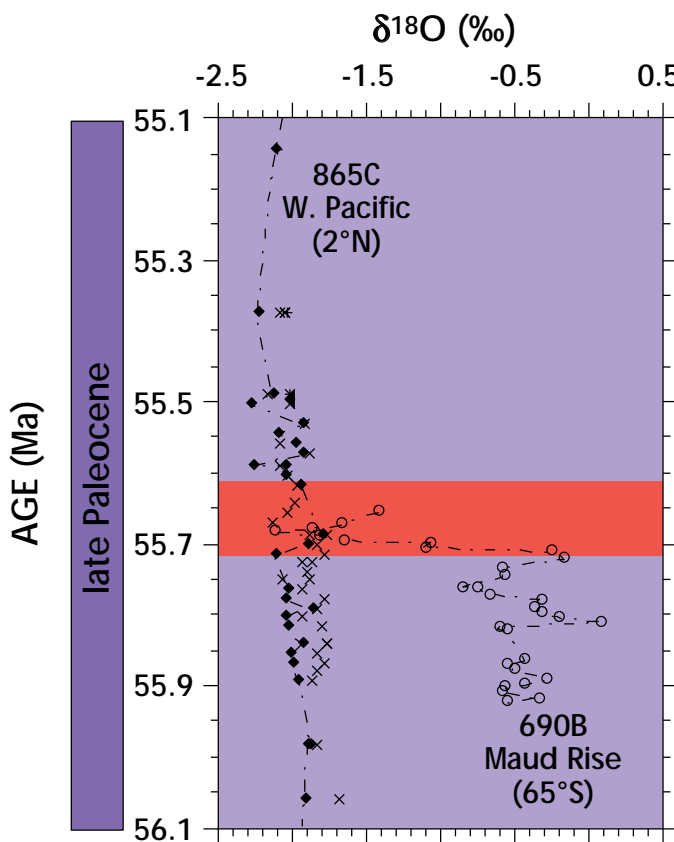
A global warming event 55 million years ago

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With the looming possibility of global warming, scientists have been probing the geologic record for past events that might help us to understand the effects of rapid climatic changes. Over the last few years, geologists studying deep sea sediments have found evidence for dramatic global warming in the late Paleocene epoch about 55 million years ago. This warming was coincident with the massive extinction of microscopic organisms living on the seafloor. Ratios of oxygen isotopes (^{18}O and ^{16}O) contained in the shells of these organisms indicate that polar ocean temperatures, and the usually frigid deep waters of the ocean, warmed by an astounding 8°C over a span of roughly 10,000 years. As water is warmed, its capacity to hold

oxygen decreases. Therefore, it appears that rapid heating of ocean deep waters left them depleted in oxygen, causing many inhabitants of the deep oceans to literally asphyxiate [Kennett and Stott, 1991]. Until recently, one of the main problems facing scientists was that there was no record of this event in the tropics.

Two new records from tropical oceans have yielded vital new information on the late Paleocene warming event. Strikingly layered sediments, recently brought up from the Caribbean's depths, provide evidence that bottom-feeding organisms which normally stir up the sediment either temporarily inhabited other areas or became extinct as a direct result of bottom water oxygen depletion. This is the most convincing evidence for oxygen depletion in the deep sea. At another site in the equatorial Pacific, oxygen isotopic data indicate that tropical surface waters did not warm at all during the event. This surprising result suggests that latitudinal thermal gradients diminished to levels lower than any known time in the geological past [Bralower et al., 1995]. In addition, subtle ecological changes resulting from the late Paleocene event appear to have triggered a dramatic burst of evolution in floating marine organisms with new species arising at rates unknown in the geologic record [Kelly et al., 1996].



References:

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Planktonic stable isotopic record of the latest Paleocene interval in Hole 865C (after Bralower et al., [1995]) compared to record from Site 690 on Maud Rise [Kennett and Stott, 1991]. Site 690 analyses are of species of *Acarinina*; Site 865 analyses are of species of *Acarinina* (diamonds) and *Morozovella* (crosses). Position of the LPTM is shaded in red. The data indicate the lack of tropical warming in the LPTM compared to extreme warming at high latitudes.