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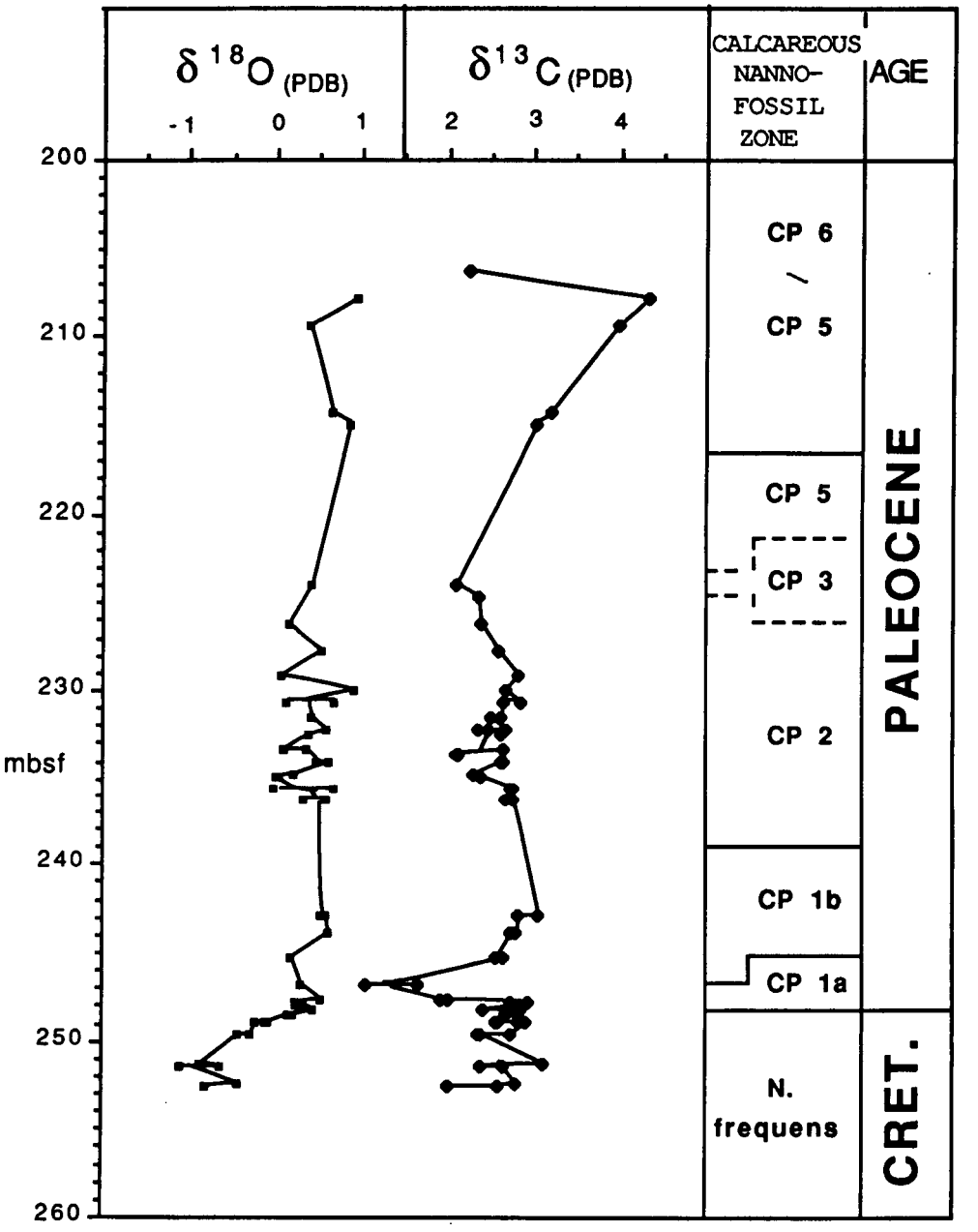
CRETACEOUS/TERTIARY BOUNDARY IN THE ANTARCTIC: CLIMATIC COOLING PRECEDES BIOTIC CRISIS; Lowell D. Stott, and James P. Kennett, Marine Science Inst., Univ. California, Santa Barbara, CA 93106.

Stable isotopic investigations have been conducted on calcareous microfossils across two deep sea Cretaceous/Tertiary boundary sequences on Maud Rise, Weddell Sea, Antarctica at 65°S. The boundary is taken at the level of massive extinctions in calcareous planktonic microfossils, and coincides with a sharp lithologic change from pure calcareous ooze to calcareous ooze with a large volcanic clay component. Biostratigraphic evidence indicates that Site 690 is continuous, although bioturbated across the boundary, while a brief disconformity exists at the boundary in Site 689.

The uppermost Maestrichtian, is marked by a long-term decrease in $\delta^{18}O$ which spans most of the lower and middle A. *mayaroensis* Zone and represents a warming trend which culminated in surface water temperatures of about 16°C. At approximately 3 meters below the K/T boundary this warming trend terminates abruptly and benthic and planktonic isotopic records exhibit a rapid increase in $\delta^{18}O$ that continues up to the K/T boundary. This isotopic event entails a 1.5°/oo increase in the planktonic record and a 1.0°/oo increase in benthic values which we interpret to represent a 4-5°C cooling in Antarctic surface waters. The trend towards cooler surface water temperatures stops abruptly at the K/T boundary and $\delta^{18}O$ values remain relatively stable through the Paleocene. Comparison of the Antarctic sequence with the previously documented deep sea records in the South Atlantic (Sites 356,527,524) reveal shifts of similar magnitude in the latest Maestrichtian but the lower latitude surface waters apparently recovered to warmer conditions following the K/T boundary where as the Southern Ocean surface waters did not. This indicates that the Southern Ocean underwent the most significant, and apparently permanent, climatic change. Nonetheless detailed analysis of fossil assemblages, together with carbonate accumulation rate and carbon isotopic data , from South Atlantic localities indicate that the oceans on the whole and its biota were undergoing considerable change prior to the major biotic crisis at the K/T boundary.

The latest Cretaceous oxygen isotopic shift recorded at Maud Rise and other deep sea sites is similar in magnitude to large positive $\delta^{18}O$ shifts in the middle Eocene, at the Eocene/Oligocene boundary and in the middle Miocene that marked large scale climatic transitions which ultimately lead to cryospheric development of the Antarctic. The climatic shift at the end of the Cretaceous represents one of the most significant climatic transitions recorded in the the latest Phanerozoic and had a profound effect on global climate as well as oceanic circulation.


δ 18O (PDB)
-1
0
1
δ 13C (PDB)
2
3
4
CALCAREOUS NANNO-FOSSIL ZONE
AGE
200
210
220
230
240
250
260
mbsf
CP 6
CP 5
CP 5
CP 3
CP 2
CP 1b
CP 1a
N. frequens
PALEOCENE
CRET.