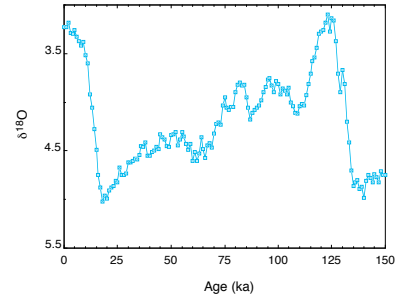


1) I have asserted more than once that the location of the Quissett campus was at the edge of a glacier at some time in the past. What is the direct evidence that this is true?

2) The maximum extent of the most recent glaciation occurred between 25 and 18 thousand years ago. How do we know this?

3) Label on this graph: the Holocene, the Last Glacial Maximum (LGM), the Last Interglacial, and Marine Isotope Stages (MIS) 1-5. According to this graph, what was the warmest time during the last 150,000 years?



4) What was Milankovitch's hypothesis?

5) Briefly describe the 3 fundamental parameters of the Earth's orbit and give their periods.

6) Variations in the Earth's orbit do not change the total incoming solar radiation received over the course of a year. How can these variations change the Earth's climate?

7) How will Earth's orbit be different 10,000 years in the future and how will it affect the difference between summer and winter temperatures?

a) Here on Cape Cod.

b) In Canberra, Australia.

8) If the Earth's axis of rotation were perpendicular to its orbital plane how would the seasons be different? How would Milankovitch induced climate changes be different?

9) Draw a graph of $\delta^{13}\text{C}$, dissolved oxygen, phosphorus, and total carbon versus depth in the ocean. Explain the processes that produce these typical profiles.

10) What is the 'greenhouse effect' and how does it work? If Milankovitch forcing explains long-term climate change, why do we study CO_2 changes in the past?

11) The glacial to interglacial change in CO_2 was about 80 ppm and CO_2 have not exceeded 280 ppm over the last 800,000 years. What is the evidence for this?

12) During glacial periods the oceans were colder. All gases, including CO_2 , are more soluble in colder water, so CO_2 would be drawn out of the atmosphere during glacial times. Why isn't this an adequate explanation for synchronous changes in atmospheric CO_2 and temperature?

13) Describe the leading hypothesis for glacial-interglacial changes in atmospheric CO_2 .