Exam Introduction to Palaeoecology (part 2)

30-01-2006

Write down your name and student number on each answer sheet!

Question 1.

Which modes (name at least 3) of preservation do you encounter in the plant fossil record and which type of information do they carry?

Question 2.

Plant fossils are one of the foremost used and best biological proxies for the reconstruction of the terrestrial environment. Describe briefly the basic principles of the approaches, such as the taxonomical and the non-taxonomical and discuss their advantages and disadvantages.

Question 3.

Palaeobotanical evidence shows that the first land plants evolve during the Silurian and Devonian.

a) What are the morphological features of these primitive plants and which anatomical features do they invent in order to move from the aquatic to the terrestrial environment?

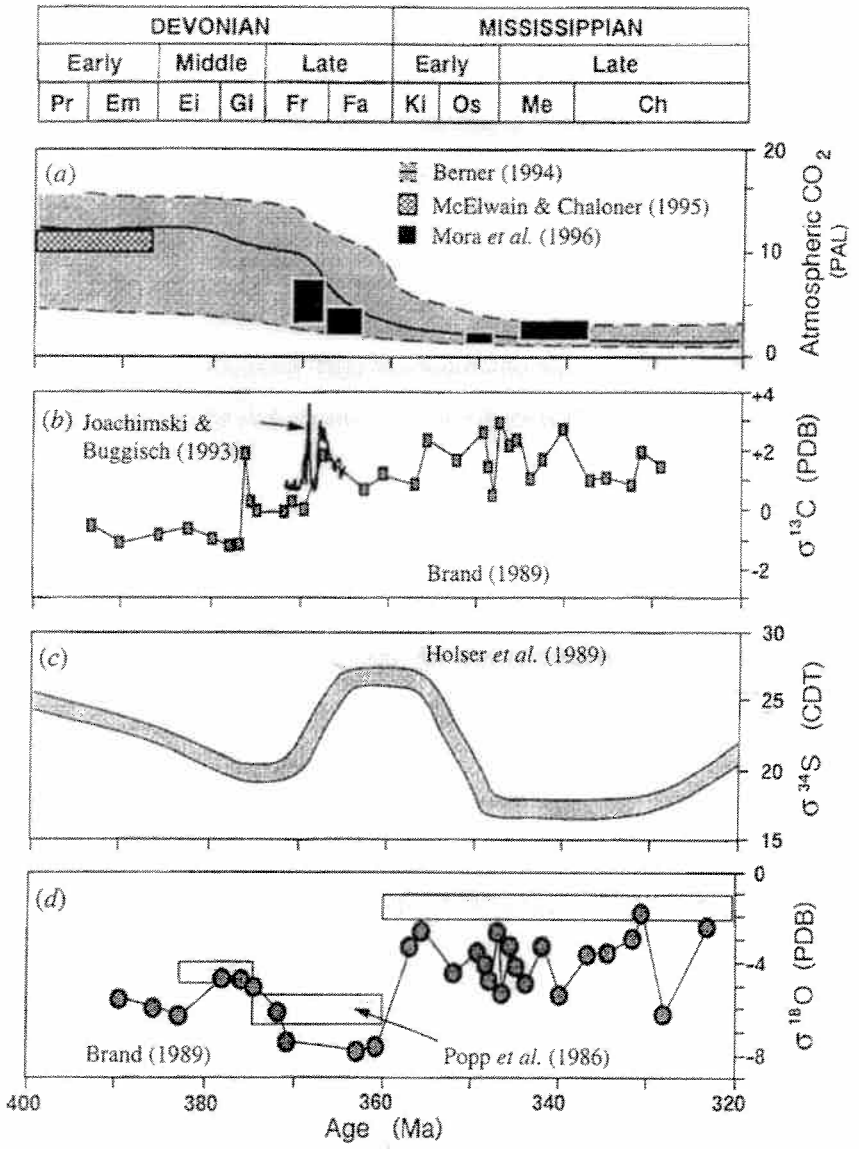
b) How does the advent of land plants influence the global C cycle and which evidence exist in the geochemical record? Explain your story together with a graph of the geochemical proxy through this time interval.

Question 4.

The evolution of the terrestrial vegetation has not only a great impact on the C cycle but also on the other biogeochemical cycles and the climate system of the Earth, which may have resulted in the mass extinction among marine biota at the end of the Devonian. Summarize the changes in the biogeochemical cycles and the series of events with the help of the figure below.

1) What is the effect on the N cycles?
2) What is the effect on the P cycle?
3) What is the effect on the hydrological cycle?
4) What is the effect on the radiation budget on land?
5) What is the effect on the sedimentary cycles?

Note that the $\delta^{18}O$ and $\delta^{13}C$ both have been measured on $CaCO_3$ whereas $\delta^{34}S$ has been measured on gypsum ($CaSO_4$).



Question 5.

Explain the global Carbon cycle at a hierarchy of different time scales. Start with the short C cycle at seasonal to decadal time scale, than at a time scale of thousands of years finally at a timescale of million of years.

a) Which are the relevant reservoirs, which are the major fluxes for each of these cycles?

b) How do they contribute to fluctuations in the atmospheric CO_2 level?