

Hertentamen Marine Sciences 3

16 April 2015



WHILE DOING ROUTINE RECON OVER THE PACIFIC OCEAN, LIEUTENANTS CROMWELL AND OLSEN MAKE A STARTLING DISCOVERY.

- NB1:** Schrijf uw naam en studentnummer op *ieder* in te leveren blad
NB2: Maak uw antwoorden compleet maar vooral ook zo kort/to the point mogelijk; *gezwets levert geen punten op*
NB3: Schrijf netjes: slecht leesbaar voor de docent is fout
NB4: Vergeet de digitale enquête niet in te vullen!

Succes!

Namens alle docenten, Appy

Naam:

Studentnummer:

Francesca Sangiorgi

1. Let's talk about diatoms.

a. Why do they undergo sexual reproduction?

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b. Where in the ocean/sea would you go sampling if you want to find abundant diatoms? Why?

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c. Why are diatom valves not very abundant in sediments of most oceanic regions?

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2 "Prediction is difficult especially about the future". However, which group of eukaryotic phytoplankton would be ranking #1 in your list "fittest to survive in the ocean of the future"? Explain your answer.

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Naam:

Studentnummer:

Dedmer van de Waal

1. Explain what happens with pH during a bloom of a non-calcifying phytoplankton species with nitrate as nitrogen source.

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2. Give three examples of how climate change may cause an increase in the carbon:nutrient ratio of phytoplankton.

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3. Species A has a $K_{1/2}$ for nitrate of $0.5 \mu\text{mol L}^{-1}$, while for species B this is $0.2 \mu\text{mol L}^{-1}$. Explain what $K_{1/2}$ means, and which species is probably the better competitor for nitrate.

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Naam:

Studentnummer:

Corina Brussaard

1. Describe the two major life cycles of viruses in the ocean and explain how they relate to the trophic status of pelagic ecosystems.

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2. Grazing may increase species diversity but may also decrease it – provide examples for both situations and explain why.

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Naam:

Studentnummer:

3. Global climate change-induced warming of the surface ocean results in physicochemical (physics and chemistry) changes and has biological consequences.

a. Describe how these changes will affect the length of the food chain in the temperate Northeast Atlantic Ocean, and explain why.

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b. Will this stimulate the biological pump? Explain.

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Naam:

Studentnummer:

Sabine Gollner

1.

a. What is the largest benthic ecosystem in the deep-sea?

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b. What are the main abiotic characteristics there (name at least 4)?

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2. Name two autotroph ecosystem types in the deep-sea. Who are the primary producers and what is their source of energy? Briefly characterize their sources.

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3. The deep-sea is rich in mineral resources. Name three main mineral resources and their associated ecosystems, which are prospected for future mining.

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Naam:

Studentnummer:

Mark Vermeij

1a What is a “phaseshift”?

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1b. Shortly describe the changes in abundance and composition of fish and benthic communities across a human induced gradient of reef decline (hint: Think about the Sandin et al. 2008 paper about the Line Islands)

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2a. What is the difference between “settlement” and “recruitment”?

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2b. Name a positive and a negative settlement cue for coral larvae.

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Naam:

Studentnummer:

3a. Which four functional algal groups can be found on nearly every reef around the world?

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3b. Give three characteristics of a turf algal community.

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Naam:

Studentnummer:

Gert-Jan Reichart en Lennart de Nooijer

1. Which two types (related to their lifestyle) foraminifera exist?

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2. Where would you expect to find them? And what controls the accumulation of the two types in sediments

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3. How could you use the abundances of the two types as a paleo-proxy? And what can you reconstruct with it

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Appy Sluijs

- Figure 1 (from Zachos et al. 2008) shows a compilation of deep ocean benthic foraminifer $\delta^{18}\text{O}$ generated on ocean drilling program sites from various ocean basins.

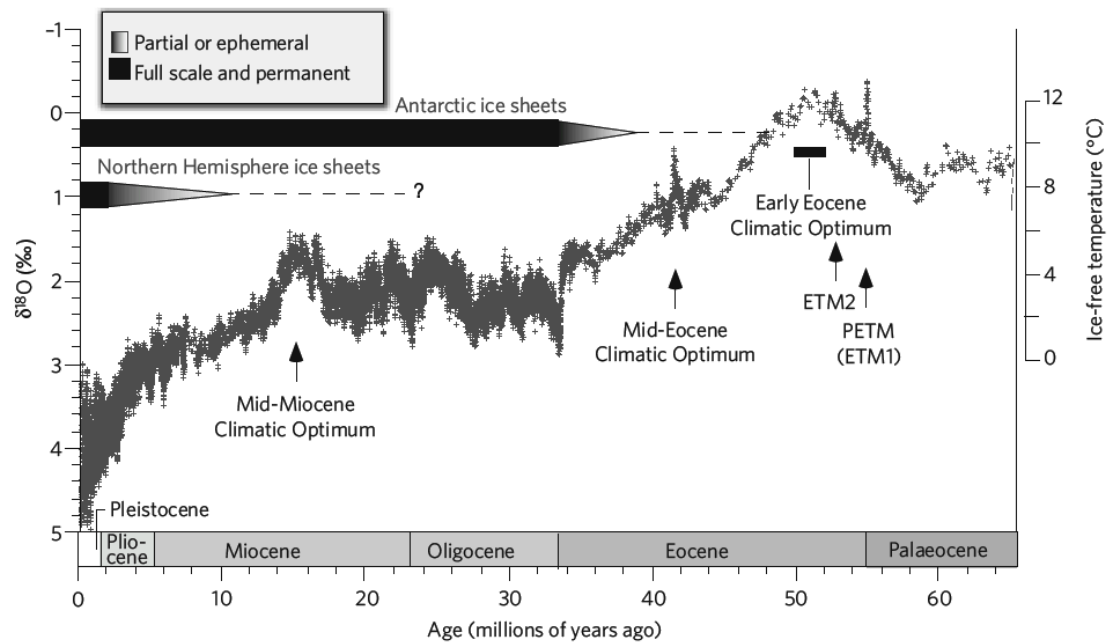


Figure. 1. Deep sea benthic foraminifer stable carbon and oxygen isotope compilation across the Cenozoic (from Zachos et al., 2008).

- One massive change in the data occurs a little less than 34 million years ago, close to the Eocene-Oligocene boundary. Describe the signal and explain it.

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Naam:

Studentnummer:

b. How do you interpret the change at about 16-17 million years ago?

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c. The very large increase in benthic foraminifer $\delta^{18}\text{O}$ during the Oligocene-Miocene Transition at ~23 million years ago is typically interpreted as a massive expansion of the Antarctic Ice sheet. This likely also resulted in more (seasonal) sea ice cover along the Antarctic margins. Name 2 biological/ecosystem changes you expect to record in the sediments along Antarctica (BIOLOGY, so do not include changes in the chemical composition of fossils).

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Naam:

Studentnummer:

Francesca Sangiorgi

1. What can cause hypoxic/anoxic conditions in coastal zones?

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2. Imagine you were given money to perform 3 types of analyses in a sediment core that contains a sapropel layer, but you cannot see the sediment core. What analyses would you select or what proxy would you apply to locate the sapropel? Name the 3 proxies below at A, B and C, explain which biological/physical/chemical factor these proxies are indicators of and indicate what signal you expect these proxies to give within the sapropel layer.

A: Analyses of

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Because this indicates

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I expect it to see within the sapropel layer

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(don't forget the next page)

Naam:

Studentnummer:

B: Analyses of

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Because this indicates

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I expect it to see within the sapropel layer

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C: Analyses of

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Because this indicates

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I expect it to see within the sapropel layer

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