NTNU
Det skapende universitet

Institutt for biologi

Exam in BI3061 Biological Oceanography

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Duration of exam: 4 hours

Credits: 7.5

Allowed aids: none

Language: 2 pages English

6 questions (on page 2)

No enclosures

Date of censorship: 20 December 2015

Comments: Only English questions (to avoid confusions regarding terms): Answer may be in english or norwegian

Controlled by:

Date Sign

QUESTIONS

Question 1:

A. How is salinity defined today? How is it measured?
B. Describe consequences in the ocean caused by the low compressibility of water
C. Living organisms have been detected at the greatest known depth of the ocean. How can this be possible? Please explain.
D. What is the difference between a thermocline, halocline and pyknocline? And, what do "clines" have in common?

Question 2:

A. What is a station curve, an isopleth graph, and a T (temperature)-S (salinity) diagram? What so they show?
B. Oxygen minima can be found at medium depth during the growth season in many seas, bays and fjords. In deeper water, even hydrogen sulphide can be found as a result of insufficient deep-water exchange. Mention places where this happens.

Question 3:

A. Tidal systems can be amphidromous. Describe the behaviour of such a system
B. Describe the difference between deep-water waves and shallow-water waves.

Question 4:

A. The prokaryotic phytoplankton comprises two major classes. Can you name these and give examples of important genera? For these two major classes, there are important pigment tracers that can help in the identification of the groups. Can you name 2-4 class specific pigments markers for prokaryotic phytoplankton?
B. Why is Chlorophyll *a* used as an indicator for phytoplankton biomass using remote sensing from satellites?
C. Why do phytoplankton blooms have a patchy (uneven) distribution in time and space (discuss abiotic and biotic factors)?
D. What is the "pros" (strengths) and "cons" (weaknesses) using satellite detection of phytoplankton blooms?

Question 5:

A. The fate of inorganic (mineral) nutrients for phytoplankton (autotrophs) growth: The inorganic nutrients may disappear unused out of the system or may be taken up by the primary producers. Discuss this briefly (negative or positive outcomes) with respect to 1) biomass accumulation, 2) changes in species composition, 3) sedimentation and 4) transformation in the food web.
B. What is the best measure on nutrient loading for phytoplankton growth rates: 1) Mineral nutrients such as nitrate (N) and phosphate (P)) or 2) Concentration of P and N in the water or the concentration of P and N in the cells? Discuss this briefly.

Question 6:

A. How does zooplankton (heterotrophs, such as ciliates and copepods) react to increased food supply with respect to feeding rate and biomass?
B. Can you briefly discuss the high nutrient – low Chlorophyll a situation related to iron availability in the Southern Ocean with respect to biomass and biodiversity in planktonalgae.