Contents

Papers

Mathematical modelling of the chlorophyll *a* concentration in a stratified medium

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Mathematical model
Stratified sea
Phytoplankton

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Abstract

The numerical studies and the computer simulations of time-space variability of phytoplankton concentration field in the near surface layer of a stratified sea were the aim of the research work conducted; the task was focused on finding the main mechanisms governing this variability. In the two-dimensional model applied the following hydrophysical processes were taken into consideration: in particular the fine-scale dynamic processes such as interlayers, Kelvin-Helmholtz hydrodynamic instability, as were biological, and chemical processes such as primary production, phytoplankton mortality, phytoplankton grazing by zooplankton, concentration of nutrients and their uptake and regeneration.

Chlorophylls *c* in bottom sediments as markers of diatom biomass in the southern Baltic Sea

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Chlorophyll *c*
HPLC
Baltic Sea
Spitsbergen fjords
Diatoms
Marine environment

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Abstract

Sediments from different regions of the Baltic Sea, collected in the years 1992–1994, were analysed for chlorophyll *c* content by reversed-phase HPLC. For comparison, a series of samples from Spitsbergen fjords were also analysed. Diatom distribution was determined in selected samples. The total chlorophylls *c* in sediments is a very sensitive indicator of the occurrence of chlorophyll *c*-containing algae in the overlying water column. The shape and relative proportions of the chlorophyll *c* peaks in the HPLC chromatogram reflect the presence of fresh and senescent algal cells, as well as the oxygen conditions in the environment. Both benthic and planktonic diatoms are the main source of chlorophylls *c* for the Baltic sediments. Furthermore, the ratio of chlorophylls *c* and *b* to chlorophyll *a* depends on the proportions of diatoms, green algae and blue-green algae in the total Baltic phytoplankton biomass.

Variability in nutrient distribution in the Pomeranian Bay in September 1993

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Baltic Sea
Nutrients
Odra impact
Spatial variability

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Abstract

Physical and biological factors as well as water/nutrient discharges from the river Odra (via the Szczecin Lagoon and the rivers connecting the Lagoon with the Pomeranian Bay) were found to affect nutrient distribution in the Pomeranian Bay in September 1993. Other factors influencing this distribution included the eutrophic waters of the Greifswalder Bodden, and physical phenomena such as upwelling and the pulsating nature of the river Swina's outflow. The dynamics of the water are thought to be a significant factor in the transport/transformation of riverine water. A separate `mini-ecosystem´, characterised by distinct chemical, physical and biological parameters, was recorded.

Communications

Dense bottom waters in Storfjord and Storfjordrenna

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Water masses
Circulation

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Abstract

On the basis of published information and our previous data, special attention was paid to the presence of dense bottom waters around the south-eastern tip of Spitsbergen during the 1995 `Oceania´ cruise. Such waters, with a temperature of 1.6–2.0°C below zero, a salinity around 35 PSU and a density of 28.00–28.16, were recorded in Storfjordrenna and Storfjord. In Storfjordrenna this type of water appeared in separate bodies with a relatively large vertical extension, which was most probably caused by an eddy-type of circulation.

Chlorophylls *c* in bottom sediments as markers of diatom biomass in the southern Baltic Sea

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Chlorophyll *c*
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Abstract

Sediments from different regions of the Baltic Sea, collected in the years 1992–1994, were analysed for chlorophyll *c* content by reversed-phase HPLC. For comparison, a series of samples from Spitsbergen fjords were also analysed. Diatom distribution was determined in selected samples. The total chlorophylls *c* in sediments is a very sensitive indicator of the occurrence of chlorophyll *c*-containing algae in the overlying water column. The shape and relative proportions of the chlorophyll *c* peaks in the HPLC chromatogram reflect the presence of fresh and senescent algal cells, as well as the oxygen conditions in the environment. Both benthic and planktonic diatoms are the main source of chlorophylls *c* for the Baltic sediments. Furthermore, the ratio of chlorophylls *c* and b to chlorophyll *a* depends on the proportions of diatoms, green algae and blue-green algae in the total Baltic phytoplankton biomass.

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Arctic ecosystems
Glacial bays
Macrofauna communities
Biodiversity

A comparison of the macrofaunal community structure and diversity in two arctic glacial bays – a `cold´ one off Franz Josef Land and a `warm´ one off Spitsbergen

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Abstract

The species composing the bottom fauna of Skoddebukta, a tidal glacier bay off West Spitsbergen (77°N), and Tikhaia Bay off Franz Josef Land (Hooker Island 80°N) were studied. Skoddebukta contained transformed Atlantic waters at a temperature of > +4°C in summer, while the Arctic waters of Tikhaia Bay were at their summer maximum temperature of < –0.5°C. The glaciers were of different types: `warm´ at Skoddebukta and `cold´ at Tikhaia Bay. Over 210 benthic taxa were identified at both sites, 30% of species being common to both. The zoogeographical status of the fauna was similar in both bays. Cluster analysis of the samples revealed the existence of 7 associations. The associations mostly influenced by glacier or river outflow were significantly dominated by deposit feeders and displayed low diversity. The Tikhaia Bay community was more diverse than that in Skoddebukta, which is due to its better trophic conditions and lower level of inorganic sedimentation-induced disturbance.

Dissertations

Aerosol emission due to the shore-line dissipation of wind-induced wave-energy

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Ph. D. thesis in oceanology, supervised by Professor Czeslaw Garbalewski.

Polonium, uranium and plutonium in the ecosystem of the southern Baltic

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Thesis for a 2nd doctor's degree in chemistry and radiochemistry.