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Papers

Analysis of temporal and spatial variability of 'yellow substance' absorption in the southern

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Inherent optical properties
Absorption
Yellow substance
Southern Baltic

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Abstract

The value of the yellow substance absorption coefficient in the visible-light spectrum is a very important characteristic used in the optical classification of seawaters. The absorption of yellow substance also needs to be included in algorithms for the remote detection of optically-active seawater constituents. This paper presents the results of an analysis of yellow substance absorption coefficient data, a_y , collected during 11 cruises in the southern Baltic. The statistical distribution of the value of a_y ($\lambda = 400$ nm) and the value of the yellow substance absorption spectrum slope coefficient are analysed. The range of spatial and temporal variability of these parameters is discussed, and the auto-correlation matrix of the absorption coefficient measured at different wavelengths is analysed. Particular attention is given to selected wavelengths, essential in evaluating the influence of changes of a_y on the spectral reflectance.

**Selected properties of
different molecular
size fractions of humic
substances isolated
from surface Baltic
water in the Gdańsk
Deep area**

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Humic substances
Baltic water
Heavy metals
Complexation

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Abstract

Humic substances were isolated from surface Baltic water in the Gdansk Deep area and fractionated by ultrafiltration on membrane filters of pore sizes 1000, 5000 and 10 000 Daltons. 97% of the material obtained was smaller than 10 000 D. The fractions were characterised by UV-VIS and IR spectroscopy, and analysed for elemental composition and functional group concentration. The nitrogen and phenolic hydroxyl group concentrations confirmed the autochthonous origin of the fractions. The aromaticity of the molecules was found to increase with molecular size, and the greatest saturation of aromatic rings with carboxyl groups was found in the fraction smaller than 1000 D. Complexation capacity was not directly connected with molecular size. All the fractions possessed a larger capacity for lead than cadmium, the complexation of the latter being detected only in the < 1000 D fraction.

**Determination of
the structure of an
oil-seawater emulsion
from measurements
of light attenuation**

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Light attenuation
Oil-water emulsions
Structure of
polydisperse systems

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Abstract

The effect of the statistical distribution parameters of nonabsorbing particles on the transparency of polydisperse systems is described. A method of inverting the transmission spectra into the size distribution of scattering particles is presented. It was tested on an emulsion of Baltic crude oil in artificial Baltic seawater and was found to provide useful information on the structure of emulsions containing particles $< 1 \mu\text{m}$ in size.

**Migration patterns
of acoustic scatterers
in the southern
Baltic Sea**

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Marine acoustics
Scattering layers
Diurnal migration
Baltic Sea

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Abstract

Echosounding records made at a fixed point of the Gdansk Deep at different seasons (spring, summer, autumn, winter) were used to determine the seasonal and diurnal migration patterns of plankton layers in connection with thermohaline conditions. Apart from some seasonal differences, a major, common pattern of vertical migrations at sunrise and sunset was observed. The width and scattering strength of the layer formed at night in the water column depends on the temperature gradient in the thermocline. The differences in the total energy backscattered by biological aggregations at different frequencies allow inferences to be drawn about the dominant size of scatterers.

Interannual variability in the hydrophysical fields of the Norwegian-Barents Seas confluence zone

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Arctic Seas
Hydrography
Variability

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Abstract

Every summer since 1987 (except 1990), the Institute of Oceanology has conducted oceanographic research in the area between Norway and Spitsbergen, and between 12 and 17° E from the board of r/v 'Oceania'.

The data collected show quite substantial, interannual variations in physical properties and transport. In the north-east corner of the area investigated (close to Storfjord) surface-water temperatures differed by > 6°C (2.6°C in summer 1993 and 8.8°C in summer 1992) and salinity by > 1.5 PSU.

The depth of the thermocline and temperature gradients fluctuated, as did the depth of the maximum salinity layer. Water transport across the 15°E meridian in the upper 1000 m layer calculated by geostrophic methods varied from 2.6 to 8.9 Sv eastwards and from 1.1 Sv to 5.1 Sv westwards.

The largest variations were observed in the surface waters and in the north-eastern and south-eastern parts of the confluence zone, *i.e.* in the areas most strongly influenced by Barents Sea waters. In the areas occupied by Norwegian-Atlantic waters and in deeper layers, conditions were much more stable.

A new application of oxyreactive thermal analysis in marine algological studies

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Algae
Methodology
Oxyreactive thermal analysis
Taxonomical differentiation

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Abstract

This is a preliminary study of the application of oxyreactive thermal analysis in algological investigations. Several species of Chlorophyta, Phaeophyta, Rhodophyta and *Zostera marina* taken from different stations off the southern Baltic coast have been studied. It is pointed out that oxyreactive thermal analysis can be used for taxonomical investigations in order to establish the systematic membership of certain species of algae based on fragments of thallus. This method can also be applied in order to establish environmental specificity by differentiating the chemical composition of certain species. It is also suitable for assessing biochemical differentiation among the various parts of the thallus.

**The biochemical
composition of *Saduria*
(*Mesidotea*) *entomon*
(Isopoda) from the
Gulf of Gdańsk
(southern Baltic)**

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Crustacea
Biochemical composition
Saduria entomon

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Abstract

The biochemical composition of specimens of *S. entomon* from the Gulf of Gdansk (southern Baltic) has been investigated. The average values found, expressed as a percentage of dry weight, are as follows: 28.8% proteins, 6.7% lipids, 8.0% carbohydrates and 28.0% ash. Seasonal variation in the biochemical composition of *S. entomon* was observed during the study period. The differences in protein, lipid, carbohydrate and ash content between males and females were not statistically significant ($p > 0.05$). The relatively small average contents of individual components compared to those in other crustaceans from the Gulf of Gdansk may have resulted from the broad food preferences of *S. entomon*, ensuring its access to nutrients throughout the year.

The influence of hydrogen sulphide on macrofaunal biodiversity in the Gulf of Gdańsk

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Hydrogen sulphide
Sediment
Zoobenthos

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Abstract

Investigations into the occurrence and concentrations of hydrogen sulphide in sediments of the Gulf of Gdansk were carried out in September 1994. It was found that the concentration of H_2S increased with basin and sediment depths. The highest concentration (1244 mol dm^{-3}) was recorded in the 4–8 cm sediment layer at the deepest of the stations investigated (station 14; 82 m depth). The studies demonstrated that numerous species belonging to the macrozoobenthos are exposed to H_2S concentrations from several to several hundred mol dm^{-3} . These are both deep-water species – *Macoma balthica*, *Harmothoe sarsi*, *Saduria entomon*, *Pontoporeia femorata* – and shallow-water species – *Corophium volutator*, *Mya arenaria*. High concentrations of hydrogen sulphide, *i.e.* $> 1000 \text{ mol dm}^{-3}$, caused the number of different macrozoobenthos species to decrease, even though abundance and biomass levels remain high. The studies indicated that the presence of hydrogen sulphide is best tolerated by two species – *Macoma balthica* and *Harmothoe sarsi*.

Communications

The diurnal migration pattern of plankton in the Gulf of Gdańsk during storm-induced onshore – offshore bottomwater transport

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Marine acoustics
Hydrology
Gulf of Gdańsk

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Abstract

This paper describes a front carrying warm and salt water, changing the depth of the thermocline and halocline in the Gulf of Gdansk, measured by *in situ* (CTD) and remote sensing (acoustic sounding) methods.

Dissertations

Characteristics of backscattered ultrasonic signals from the floor of the southern Baltic

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