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Papers

Influence of clouds on the broadband spectral irradiance at the Baltic surface

OCEANOLOGIA, No. 38 (3)
pp. 297–315, 1996.
PL ISSN 0078-3234

Baltic atmosphere
Broadband spectral irradiance
Clouds

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Manuscript received May 14, 1996, in final form June 21, 1996.

Abstract

On the basis of downward irradiance data in the ultraviolet, visible and infrared spectral intervals as well as of meteorological observations collected during several cruises to the Baltic, the influence of clouds and solar zenith angle on the broadband spectral composition of solar radiation reaching the Baltic surface is analysed. The relation between the atmospheric transmittance of total irradiance and solar zenith angle, and the ratios of broadband spectral irradiance to the total for both visible and infrared radiation have been estimated by polynomials.

Sea surface slope distribution and foam coverage as functions of the mean height of wind waves

OCEANOLOGIA, No. 38 (3)
pp. 317–332, 1996.
PL ISSN 0078-3234

Wind waves
Slope distribution
Foam coverage
Mean wave height
Modified
Cox-Munk expression
Modified Gordon-Jacobs
expression

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Manuscript received April 9, 1996, in final form May 29, 1996.

Abstract

The article discusses problems of the statistical description of a wind-ruffled sea surface for optical modelling purposes. A new parameter, namely the mean height of the waves \bar{H} , is used in both the slope distribution of the ruffled sea surface and the foam coverage of the surface. Unlike the parameter used up to the present, *i.e.* the wind speed over the sea surface v , the mean height of the waves \bar{H} is connected with a large number of hydrometeorological and geometrical factors modifying the state of wave motion of the sea (*e.g.* the wind fetch D , the sea depth h , the shape of the coastal region *etc.*). A theoretical basis for applying this new parameter and modifying dependences for the slope distribution and the foam coverage of the ruffled sea surface is given. In addition this paper contains an initial verification of the ideas presented with the small number of data available in the literature.

The position of the seasonal thermocline in southern Baltic waters polluted with crude oil

OCEANOLOGIA, No. 38 (3)
pp. 333–349, 1996.
PL ISSN 0078-3234

Seasonal thermocline
Eutrophic seawater
Crude oil pollution

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Manuscript received March 5, 1996, in final form June 7, 1996.

Abstract

The paper deals with the formation of the thermocline and the mixed layer in a sea polluted with crude oil when the natural optical parameters of eutrophic seawater are seasonally variable. Differentiation of the degree of eutrophication of the seawater is expressed in terms of the concentrations of chlorophyll and yellow substances. The occurrence of crude oil pollution is taken into account by modifying the time-variable absorption coefficient of the seawater – crude oil system. The variability in the absorption spectra of natural seawater in the spring – summer season is estimated on the basis of investigations of seasonal changes in the chlorophyll concentration in the southern Baltic.

Numerical simulations were carried out for Baltic and Gulffax crude oil using the one-dimensional integral DKTz–2 model. The computations were performed for monthly average values of parameters determining the state of the southern Baltic environment collected over several years. Experimentally found crude-oil optical parameters (light refraction and absorption coefficients) were applied, as were the variability with time of these parameters and that of the crude oil layer thickness.

The results of the numerical simulations show that the increase in the volumetric concentration of crude oil in the upper sea layer causes the thermocline to be formed closer to the water surface. Simultaneously, the thickness of the mixed layer decreases but its temperature rises. If a crude oil layer appears on the water surface, the trend of the changes is the same.

**Comparative
estimations of the
energy content of
Enteromorpha spp. using
different methods***

OCEANOLOGIA, No. 38 (3)
pp. 351–360, 1996.
PL ISSN 0078-3234

Enteromorpha spp.
Comparative determination
Energy content
Jurata

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Manuscript received March 4, 1996, in final form May 28, 1996.

Abstract

The energy content of *Enteromorpha* spp. from Jurata (situated in the western part of the Gulf of Gdansk) was determined. The values were measured directly by combustion in a microbomb calorimeter and indirectly by calculation based on the biochemical composition, and on carbon and nitrogen contents.

On the basis of the results obtained, very little difference – on average $2.98 \pm 5.69\%$ ($0.54 \pm 0.67 \text{ J mg}^{-1}$ of DW) – was found between the energy values calculated from the carbon content and those calculated from carbon and nitrogen contents. Moreover, the values calculated from both these sources were higher those that calculated from the biochemical composition by about $14.95 \pm 12.24\%$ ($2.09 \pm 1.72 \text{ J mg}^{-1}$ of DW) and $17.28 \pm 14.41\%$ ($2.63 \pm 2.07 \text{ J mg}^{-1}$ of DW) for the two methods respectively. At the same time, large differences were found between the values calculated using microbomb calorimetry and other methods (biochemical composition, carbon content, and carbon and nitrogen contents): they were $20.40 \pm 15.09\%$, $33.76 \pm 5.86\%$ and $35.74 \pm 6.71\%$ for the three methods respectively.

* This research was supported by grant No. 0344/P2/93/05 from the State Committee for Scientific Research, Republic of Poland.

The sandy littoral zoobenthos of the Polish Baltic coast

OCEANOLOGIA, No. 38 (3)
pp. 361–378, 1996.
PL ISSN 0078-3234

Baltic littoral
Benthos

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Manuscript received January 26, 1996, in final form May 20, 1996.

Abstract

Macrobenthos and meiobenthos were quantitatively sampled in the sandy littoral along the Polish Baltic Sea coast in August 1994. Macrofaunal abundance (0–987 indiv. m⁻²), biomass (0–3.19 g m⁻² wet wt.) and the number of species (3) were very low. Eight meiofaunal animal groups were found. Meiofaunal abundance (38–760 indiv. 10⁻¹ cm⁻²) was dominated by Nematoda and Turbellaria, the biomass (0.86–34.9 mg 10⁻¹ cm⁻² wet wt.) by Oligochaeta. In terms of biomass, the macrobenthos:meiobenthos ratio ranged from 0.02 to 5.17. Macrofaunal abundance and biomass were more variable than those of the meiofauna.

**Hydrogen sulphide
and other factors
influencing the
macrobenthic
community structure
in the Gulf of Gdansk**

OCEANOLOGIA, No. 38 (3)
pp. 379–394, 1996.
PL ISSN 0078-3234

Gulf of Gdansk
Macrofaunal communities
Hydrogen sulphide
Biodiversity

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Manuscript received May 8, 1996, in final form July 24, 1996.

Abstract

Three stations in the Gulf of Gdansk were sampled monthly for one year with regard to macrozoobenthos composition, oxygen content and temperature of near-bottom waters, granulometry, organic matter content and H₂S concentration in sediments. The differences in H₂S concentrations at the stations were most conspicuous. The presence and concentrations of H₂S appeared to be the decisive factor for the grouping of samples in the Bray-Curtis Similarity Index-based ordination. Even seasonality was of secondary importance. The number of species and the Shannon Indices decreased, and the dominance of the predominant species – *Macoma balthica* – increased in accordance with the H₂S gradient between the stations. The community was dominated by detritus-feeders.

* This research was supported by grant No. 0344/P2/93/05 from the State Committee for Scientific Research, Republic of Poland.

Communications

Preliminary results of dissolved organic carbon concentration measurements in the Vistula river mouth using high-temperature catalytic oxidation

OCEANOLOGIA, No. 38 (3)
pp. 395–403, 1996.
PL ISSN 0078-3234

Salinity
Dissolved organic carbon
High-temperature
catalytic oxidation
Gulf of Gdansk

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Abstract

Some 100 measurements of dissolved organic carbon (DOC) concentrations were made in the water in the Vistula river mouth area using high-temperature catalytic oxidation. The results ranged from 4.8 to 22.4 mg dm⁻³. No relationship was detected between DOC and salinity within the 0.9–7.6 PSU salinity range.

* This research was supported by Gdansk University internal grant No. BW/1380–5–0014–5.

**The seasonal
succession of hyaline
Helicostomella subulata
and agglutinated
Tintinnopsis lobiancoi
– dominants of the
Baltic Tintinnina
(Ciliophora)**

OCEANOLOGIA, No. 38 (3)
pp. 405–418, 1996.
PL ISSN 0078-3234

Baltic Sea
Helicostomella subulata
Tintinnids
Tintinnopsis lobiancoi

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Abstract

Tintinnid species composition and abundance were determined in surface water samples taken from four sites in the Gulf of Gdansk, and along four cruise tracks from the Gulf of Gdansk to Helsinki.

The seasonal succession of two dominants – the hyaline *Helicostomella subulata* and the agglutinated *Tintinnopsis lobiancoi* – was evident. The former coincided with the beginning of summer and was replaced early in the season by the latter. Other Tintinnina species were found only occasionally and did not significantly affect the total tintinnid abundance.

Reviews

Underwater irradiance as a factor affecting primary production

OCEANOLOGIA, No. 38 (3)
pp. 419–422, 1996.
PL ISSN 0078-3234

by Jerzy Dera, Dissertations and monographs IO PAS, 7, 1995; 110 pp. (68 + 42 in Appendix), 14 figures (13 + 1), 44 tables (4 + 36).