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CLISED

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Chloropigment proxies in recent sediments - comparison of the Gulf of Gdańsk (Poland) and Drammen/Oslofjord (Norway)

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Chloropigments (chlorophylls a,b,c and their derivatives) in recent sediments are valuable markers of the state of the aquatic environment. Their concentration in





sediments depends on such factors as primary production, phytoplankton taxonomy, sedimentation rate, climate changes, hydrological and postdepositional conditions. This work concerns comparison of chloropigments in sediments of two different locations – the Gulf of Gdańsk (Poland, southern Baltic) and Drammen/Oslofjord (Norway). The Gulf of Gdańsk is an eutrophic basin of high anthropopression, mainly caused by the inflow of the largest Polish and the second largest Baltic catchment river - Vistula (Wisła). The Drammen/Oslofjord is characterized by much higher salinity and lower sedimentation rate of organic matter than the Gulf of Gdańsk. At both locations six stations of varied characteristics were selected. The recent (0-20 cm) sediments were collected, divided into layers and frozen immediately after collection. Chloropigments were determined using high-performance liquid chromatography (HPLC) with diodearray (DAD) and fluorescence (FL) detectors. Besides, the parameters characterizing the sediment: grain-size, organic carbon and radionuclide Pb-210 content were determined; the last one to estimate accumulation rate and mixed depth of sediments. Results of pigment analysis were related to parameters characterizing the sediment, physico-chemical characteristics of adjacent water and the location of sampling sites. This study was realized in the framework of CLISED (Climate Change Impact on Ecosystem Health - Marine Sediment Indicators, 2014-2017, No Pol-Nor/196128/88/2014) project of Polish-Norwegian Research Programme operated by the National Centre for Research and Development.













Station	Coordinates	Water	Parame	ters of near-botto	Sediment	Sediment
		[m]	oxygen [mg/l]	salinity	temp. [°C]	[cm/year]

Gulf of Gdańsk	
P1	54°50.042' N

11	19°19.683' E	112	5.4	12.0	0.5	0.10±0.01	v
Ml	54°44.912' N 19°17.662' E	95	3.9	11.7	6.4	0.16±0.01	0
P116	54°39.091' N 19°17.575' E	92	0.5	10.8	6.4	0.14±0.01	0
P110	54°29.986' N 19°06.902' E	72	5.4	8.6	5.0	0.17±0.02	3
BMPK10	54°33.545' N 18°40.950' E	31	11.1	7.5	4.9	no accumulation or max 0.07±0.01	12
P104	54°34.944' N 18°47.370' E	55	12.1	7.6	4.5	no accumulation	12

2.4

Oslo/Drammensfjord 59°41.276' N 8.0 0.11±0.01 113 0.3 31.2 10°22.745' E 59°38.862' N 31.0 8.2 0.27±0.02 122 0.5 10°24.804' E 59°45.066' N 0.20±0.02 154-158 9.2 32.3 8.3 10°34.429' E 59°47.386' N 32.6 0.10±0.03 152 1.7 9.2 10°43.154' E 59°50.643' N 0.2 33.2 8.5 0.18±0.01 10°43.557' E 59°51.470' N 33.6 1.7 8.3 0.05±0.01 10°41.710' I

Gulf of Gdańsk

sediment corer

Pigment concentrations

Oslo/Drammensfjord

−−−−− O₂ - Oxygen [mg/l]

% Chloropigments-a

12 D v μ Ω Ω Ω 10 J 15 10 5 12 T 10, 10, 1,

>0.063 mm ■ 0.063 mm - 0.004 mm ■ <0.004 mm

Cluster analysis

r/v Oceania

Conclusions

 Pigment concentration in sediments depends on three groups of tactors, i.e. primary production and sedimentation rate, stability of pigments and post-depositional conditions.

0%	0-1 1-5 5-10 10-15 110-15 15-20	0-1 1-5 5-10 10-15 15-20	0-1 1-5 5-10 10-15 115-20	0-1 1-5 5-10 10-15 15-20	0-1 1-5 5-10	0-1 1-5 5-10	0-1 1-5 5-10 10-15	0-1 1-5 5-10 10-15 15-20	0-1 1-5 5-10 10-15 115-20	0-1 1-5 5-10 10-15 15-20	0-1 1-5 5-10 10-15 15-20	0-1 1-5 5-10 10-15 15-20
	P1	M1	P116	P110	ВМРК10	P104	Α	В	С	D	Е	F
	■ phio	des-a 📕 p	yrophides-a	∎ chl-a-a	llom	■ chl-a	■ chl-a'	■ phytin-a	phytin-a'	pyroph	iytin-a 🔳	SCEs
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• Not only concentration of particular chloropigments-a but also percentage in their sum (Σ Chlns-a) are universal markers of environmental conditions in a basin.

• Chlorophyll-b/ Σ Chlns-a ratio is a marker of freshwater and chlorophylls-c/ Σ Chlns-a ratio of marine organic matter input.

 β -carotene is a better marker of primary production changes in an area than not only chlorophyll-a but also Σ Chlns-a.

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