# Marine sediment indicators in the Gulf of Gdańsk and Oslofjord – a comparison of climate change impacts on the ecosystem

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**Introduction:** The CLISED project (Climate Change Impact on Ecosystem Health - Marine Sediment Indicators, 2014-2017) aims to address natural and anthropogenic sediment indicators of ecotoxicity in relation to different geological sediment proxies with a focus on the impact of climate change. In order to accomplish this goal, recent and historical sediment (1000 years) from different coastal locations are studied. The study areas include the Gulf of Gdańsk, Poland (southern Baltic), the Oslofjord/ Drammensfjord in Norway as well as the Arctic region (Norway). Analysis of multi-parameter data sets will indicate sediment variability connected to different climatic conditions for the studied areas, as well as threats of release of natural and anthropogenic toxicants as a result of climate change.

**Methods:** The first Work Package (WP1) focuses on assessing the current status of recent sediments in the Gulf of Gdańsk and Oslofjord/Drammensfjord in terms of primary production, eutrophication effects and pollution. This information will be used to determine which parameters are most suitable as proxies for climate change and will be subsequently used to select sampling sites for deep (older) sediment cores which are to be taken in 2015.

**Fig. 1:** Sediment sampling from IOPAN's ship S/Y Oceania in Oslofjord June 2014.

A total of 10 cores were taken at each of the 12 sampling stations (Fig. 1). For the most part the cores were sliced in 5 cm intervals down to 20 cm depth with a separate sample of unconsolidated sediment from the top 1 cm of each core. One core per station was sliced in finer increments for Pb-210 dating analysis. Samples were prepared and stored for subsequent analyses.

**Results:** Thus far, sampling and analysis of recent sediments (short cores) in the Gulf of Gdańsk and Oslofjord/Drammensfjord have been completed. Analysis has included the quantification of phytoplankton pigments, Pb-210 sediment dating, organic carbon, black carbon, trace elements and their isotopes, polycyclic aromatic hydrocarbons (PAHs), nonylphenols and organotin compounds.

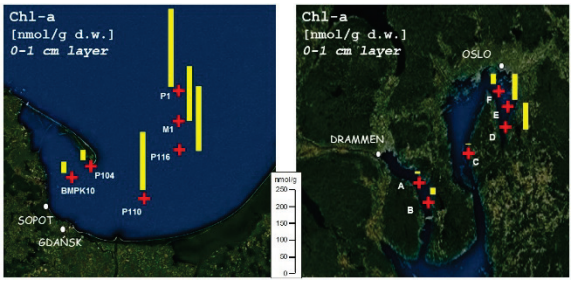


**Fig. 2:** Phytoplankton pigments in the top 1 cm of sediment cores from the Gulf of Gdańsk (left) and Oslofjord/Drammensfjord (right).

Figure 2 illustrates the differences in concentration of phytoplankton pigments in the top 1 cm for each of the cores. Preliminary assessments indicate that these concentrations are positively correlated to the TOC content. Furthermore, cores with lower rates of deposition (< 0.07 cm/year) also show lower content of TOC (< 2%). Additional analysis and assessment of trends is forthcoming and will be presented.

**Discussion:** This research will increase our knowledge base and be an important contribution to the implementation of EU Marine Strategy Framework Directive (2008/56/EC) and other management decisions related to the marine environment.

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