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Spectroscopic measurements of the surface waters for evaluating the fresh-water transport to marine environments in the Southern Baltic

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To asses concentration and spatial distribution of surface-active molecules (surfactants) the spectrophotometric and spectrofluorometric measurements of water samples taken from a surface film and a depth 0.5 m were carried out during three cruises of r/v Oceania in Springs' 2010-2011 and Autumn' 2012. Measurements were conducted along the transects from the river outlets to the open waters of the Southern Baltic Sea. Surfactants consist of polar molecules of marine dissolved organic matter and are chemically not entirely classified. However, fractions of dissolved organic matter having chromophores or fluorophores (CDOM or FDOM) are recognized through their specific absorption and fluorescence spectra.

The sea surface is a layer of transition between the atmosphere and the sea, where there is a variety of biological, physical and chemical processes which contribute to the accumulation and exchange of surfactants, the chemical species concentrated in the surface layer (surface active agents). The main source of marine surfactants are remains of phytoplankton and its degradation products, created by bacterial activity, and as a result of condensation of molecules of low molecular weight to form of surface-active macromolecules. The presence of surfactants in the surface layers can significantly affect the access of solar energy into the sea as well as the air-sea interaction processes.

The main objective of the research was to investigate the luminescent properties of surfactants, sampled in different regions of the Southern Baltic, and to find the differences between a surface film and a subsurface layer (of 50 cm). The next aim was to combine the differences in optical properties with the different dynamics for various river outlets.

The results of spectrophotometric studies show the differences in the intensity of spectral bands, particularly between coastal (estuaries) and the open sea zones. Also, analysis of the spectra shows differences between areas of the Vistula and Łeba and Parsęta (large and small river) estuary waters.