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Seasonal and regional variations in light absorption by phytoplankton, suspended particles and dissolved organic matter in the Black Sea

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From the regular long-term observations in the western deep-waters, in Crimea shelf waters the sets of data on bio-optical properties of suspended particles, phytoplankton and detritus were obtained. The results have shown high variability of phytoplankton and particle absorption. There are variations in the shape of the absorption spectra and values of chl-specific absorption coefficients. Relationships between the absorption coefficient of phytoplankton, particulate matter and pigment concentrations at different wavelengths have been determined and described by power functions.

In the deep-waters there were seasonal variations in chl$a$-specific phytoplankton absorptions due to different pigment packaging in cells because of the photophysiological response of phytoplankton to different environmental factors. In winter chl-specific absorption of surface phytoplankton was lower than in summer because upper mixed layer in summer twice or three times is thinner than in winter . As result the season-dependent relationships chl-specific absorption coefficients with Chl concentrations were obtained. This difference was more evident in blue part of spectrum.

Effect of species composition and cell size on phytoplankton absorption was fixed. High abundance of cyanobacteria in phytoplankton community resulted in special sign on the spectra shape and increasing of chl-specific absorption coefficients.

Bio-optical properties of shelf waters differ from those of deep-waters in higher Chl-specific phytoplankton absorption in blue part of spectra, in higher relative contribution of non-algal particles and dissolved organic matter to total absorption at blue max-

imum of spectra. Non-algal particles and dissolved organic matter absorption spectra were fitted to exponential curves and slope coefficients were determined.

Parameterization of light absorption by phytoplankton, non-algal particles and dissolved organic matter provides the input parameters for the further computations of radiative transport and primary production with spectral model.