



## **Application of semiautomatic measuring complex for ecological monitoring of marine aquatories (EMMA) in the study of coastal areas of the Black Sea**

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For monitoring of the ecological state of coastal waters it is often necessary to obtain data from board a moving ship or an airborne craft. We suggested using a three-channel passive optical device that enables to get the sea reflectance coefficient spectra from board a moving ship. The data of the measurements are processed then according to our original method, which is based on the intrinsic properties of the pure water absorption spectrum – water absorption step method (WASM). It gives us the possibility to suppress influence of the various weather and experiment conditions on the data quality and to obtain estimates of the absorption spectra of the sea waters under exploration. The retrieved spectra in its turn can be the source of information about water constituents concentration.

Based on foregoing we developed a semiautomatic measurement complex EMMA (Ecological Monitoring of Marine Aquatories) operating from board a ship. It includes three hyperspectral photometers, the data from which are processed by special algorithm on base of WASM. In natural waters we can get estimates of phytoplankton pigments, “yellow substance” and suspended matter concentrations. EMMA is also provided by the flowing system of temperature and salinity measuring.

The main results are the following:

- The data from the new semiautomatic complex EMMA obtained during the operational monitoring of coastal waters aboard a moving vessel are given for two different regions of the Black Sea: the region at a river mouth at Adler and the region of two seas waters mixing at Feodosia.
- Specially designed for the complex software based on the original algorithm for spectra calibration WASM, which can reduce the negative impact of adverse weather conditions (wind, cloudiness, sea roughness) on the results of evaluation of the composition of sea water (the concentration of particulate matter and DOM), is applied for the data processing.
- Complex EMMA is used for rapid determination of distribution of the main components of the coastal waters from board a moving vessel. The obtained water constituents concentrations are compared to the results of measurements in water samples.

The developed method of operative sea monitoring is necessary for a variety of purposes, including calibration of satellite measurements.