The Black Sea coastal zone in the high resolution satellite images

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Landsat data with spatial resolution of 30-100 m provide the ability of regular monitoring of ocean phenomena with scale of 100-1000 m. Sentinel-1 is equipped with C-band synthetic aperture radar. The images allow recognizing the features that affect either the sea surface roughness, or its color characteristics.

The possibilities of using the high spatial resolution satellite data are considered for observation and monitoring of Crimean coastal zone. The analyzed database includes all Landsat-8 (Level 1) multi-channel images from January 2013 to August 2015 and all Sentinel-1 radar images in May-August 2015. The goal of the study is to characterize the descriptiveness of these data for research and monitoring of the Crimean coastal areas.

The observed marine effects are reviewed and the physical mechanisms of their signatures in the satellite images are described. The effects associated with the roughness variability are usually manifested in all bands, while the subsurface phenomena are visible only in optical data. Confidently observed structures include internal wave trains, filamentous natural slicks, which reflect the eddy coastal dynamics, traces of moving ships and the oil films referred to anthropogenic pollution of marine environment. The temperature fronts in calm conditions occur due to surfactant accumulation in convergence zone. The features in roughness field can also be manifested in Sentinel-1 data. Subsurface processes observed in Landsat-8 images primarily include transport and distribution of suspended matter as a result of floods and sandy beach erosion. The surfactant always concentrates on the sea surface in contaminated areas, so that these events are also observed in Sentinel-1 images. A search of wastewater discharge manifestations is performed.

The investigation provides the basis for further development of approaches to obtain quantitative characteristics of the phenomena themselves.