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Natural and anthropogenic sources of hydrocarbons in bottom sediments in areas of possible petroleum contamination (Peter the Great Gulf, Sea of Japan)

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Assessment of features of composition and distribution of dispersed organic matter (DOM) and hydrocarbons (HC) components in marine bottom sediments is only possible taking into account the specificity of the whole complex of natural processes in the explored region.

During the two-year monitoring in Peter the Great Gulf (2012-2013) zones with background and anomalous concentrations of DOM components and petroleum HC in surface bottom sediments were detected.

Analytical procedure included the determination of elementary (TOC, Ccarb), group and molecular composition of DOM soluble part using preparative liquid chromatography method and GC/MS analysis (HC markers – n-alkanes, cyclanes, arenes,) with the Agilent GC/MS 6850/5973 System.

In the composition of aliphatic HC's fraction of bottom sediments in seaward part of the gulf (area remote from direct anthropogenic influences) predominate components genetically associated with terrestrial vegetation (C15–19/C27–31 ≤ 0.4). At the same time, their total concentrations increased more than an order of magnitude relative to 2012, thus, how the concentrations for 2012/2013 years have changed – for n-alkanes: 5/21 mkg/g; for hopanes: 2.5/33.0 mkg/g; for steranes: 1.4/18.3 mkg/g. The concentration of polycyclic aromatic hydrocarbons (PAH) (20 dominant compounds and their alkylated homologues) in most samples does not exceed 0.5 mkg/g. Anomalous concentrations (up to 38.0 mkg/g) were detected in areas with high anthropogenic impact and a low contribution of biogenic and diagenetic components in PAH.