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Aromatic hydrocarbons in components of geological environment of the Norwegian and Russian parts of coastal zone of the Barents Sea

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Information about hydrocarbons (HCs) distribution in components of geological environment (including aromatic (Ar) compounds) allows to estimate relative amounts of both natural and anthropogenic components and reveal sources of contamination. HCs are widely spread in lithosphere and create stable geochemical background. Variations in their composition attest to the specificity of initial organic matter, conditions of its accumulation and transformation.
The studied samples of soils and surface bottom sediments were collected during the research expedition in July, 2019 (supported by RFBR №18-54-20001 and NFR №280724). On the Norwegian coast of the Barents Sea the area of study included: salt marshes of Tana and Varanger fjords, littoral zone of rocky shores around Kiberg. In the Russian part of the Barents Sea samples were taken from the shallow water area of the Eastern coast of the Kola Bay. All samples were taken along the sublittoral – littoral – supralittoral transects appropriate for a detailed study of the organic matter (OM) spatial distribution. Study of the group composition of ArHCs in the extractable part of soil and sedimentary OM were performed using spectrofluorimetry.
The method is based on the ability of ArHCs to fluoresce under the influence of ultraviolet emitting in narrow spectral ranges determined by their molecular structure. This allows us to characterize the nature of ArHCs and determine possible sources of their input.
The spectrum characteristics of samples from intertidal zone of the Tana fjord salt marshes reflect the input of fresh unoxidized petroleum products such as diesel fuels and engine oils. The significant increase of ArHCs fluorescence intensity in surface sediments may testify to recent pollution accidents.
The spectrum traditionally associated with the estuarine-delta and lacustrine and swampy facies and characteristic for the post-sedimentation and early diagenetic stage of OM transformation was detected in samples from the salt marshes of Varanger fjord.
ArHCs of mixed origin (natural and anthropogenic) are identified in samples from the littoral zone of rocky shores of Kiberg. The spectral data of littoral sediments are typical for the polluted areas with high input of petroleum products. The specific maxima in the long wavelength region of

spectrum that is characteristic for the high molecular weight aromatic compounds from the land plants is also detected in these samples.

Spectral characteristics of ArHCs of bottom sediments and soils collected from the shallow water area of the Russian part of the Barents Sea point to the presence of both low molecular weight benzene HCs (high volatile components of flammable liquids) and high molecular weight compounds (oil fuel, gas oil). The detailed study of these anthropogenic HC components seems to be very important given the fact of their detection in all littoral samples.

The further detailed study of the molecular markers and biomarkers (n-alkanes, isoprenoids, cyclanes, terpanes, PAHs) will increase our knowledge about HC sources, efficiency of their microbial and chemical degradation, allow to estimate human impacts on the environment of the region and draw up the regional “geochemical passport”.