



Perylene as an indicator of facial conditions of sedimentation on the Kara Sea shelf

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The Holocene bottom sediments (up to 40 bottom stations) collected from the two transects located along and across the Voronin Trough during the Kara Sea regional geological mapping project (2017) were studied. The organic geochemical study of the dispersed organic matter (DOM) of the bottom sediments included detection of the content and molecular composition of aromatic hydrocarbons (ArHCs) using spectrofluorimetry.

The most intensive fluorescence maxima observed at 405 and 435 nm attest to the high content of pentacyclic compounds in all the stratigraphic horizons of sediments. As a rule these lipids form in the reducing stage of diagenesis of humic DOM or during the post-diagenetic transformation in the 3d type of kerogen [1]. Fluorescence spectra analysis shows that perylene dominates the composition of ArHCs that is unusual for the arctic shelf sediments. The previously detected elevated concentration of perylene [2] was associated with sediments enriched in the land plant OM and deposited under reducing conditions in estuarine-deltaic and lakeshore environment.

The detailed study of the molecular composition of HCs in one core using GC-MS (Agilent 5973/6850 GC-MS System) confirms the prevalence of perylene in composition of polycyclic ArHCs (PAHs) through the whole sediment section (up to 400 cm). In addition, the revealed predomination of the high molecular weight n-alkanes (15-19/27-31=0.22) attests to the humic genesis of the source OM and its transformation under reducing conditions (Pr/Ph=0.53).

This conclusion agrees with the results of the palynological analysis of the studied Holocene sediments. It shows that sediments are enriched in redeposited spore-pollen aggregates of the late Eocene age (climatic optimum), which contain a lot of subtropical and thermophilic elements. The invariability of spectral data of the sediment samples points to the single period of their formation, that is confirmed by the uniformity of lithologic composition (dark grey silt) and geochemical characteristics (TOC=1.2-1.3%, HCs =0.004-0.006 % in sed.) of sediments.

Received results demonstrate that the studied bottom sediments are formed from the eroded Paleogene deposits during transgression and regression periods in the western arctic shelf. The repetitive change in shallow-marine and continental sedimentation during regression periods was detected. The cryolithic zone development had a strong influence on the relief formation during the late Cenozoic subaerial and subaqueous periods. Ice cover facilitated the long time preservation of sediments and relief. Obviously, this has determined the stability of DOM composition of the Eocene sediments during their erosion and redeposition.

Thus, our observation evidences that perylene is a good source and DOM transformation marker that can be used both as a genetic and facial indicator in sedimentation conditions reconstruction.

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2. Cheng-Wei Fan, J. Shiueb, Cheng-Yi Wu, Cheng-Yu Wu. 2011. Perylene dominance in sediments from a subtropical high mountain lake. *Organic Geochemistry*. V. 42. P. 116-119.