FLUORESCENCE OF CHROMOPHORIC FRACTION OF DISSOLVED ORGANIC MATTER OF THE KARA SEA SURFACE WATERS IN EARLY SPRING 2016

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Fluorescence spectral distribution and intensity for the chromophoric fraction of dissolved organic matter (CDOM) of the Kara Sea surface waters were studied during March, 29 – April, 08, 2016. These waters are of particular interest since they allow to study CDOM distribution in the Kara Sea in early spring period when the ice melting occurs. Water samples were collected at 19 hydrological stations along the sailing line of the Noril'skii Nikel' vessel (1), Fig.1. Additionally, two ice samples were collected at the lower reaches of the Yenisei River. Salinity of the studied samples fell in the range of 0.12 (station 11, Yenisei River) to 35.43 psu (station 23, western coast of the Yamal Peninsula).

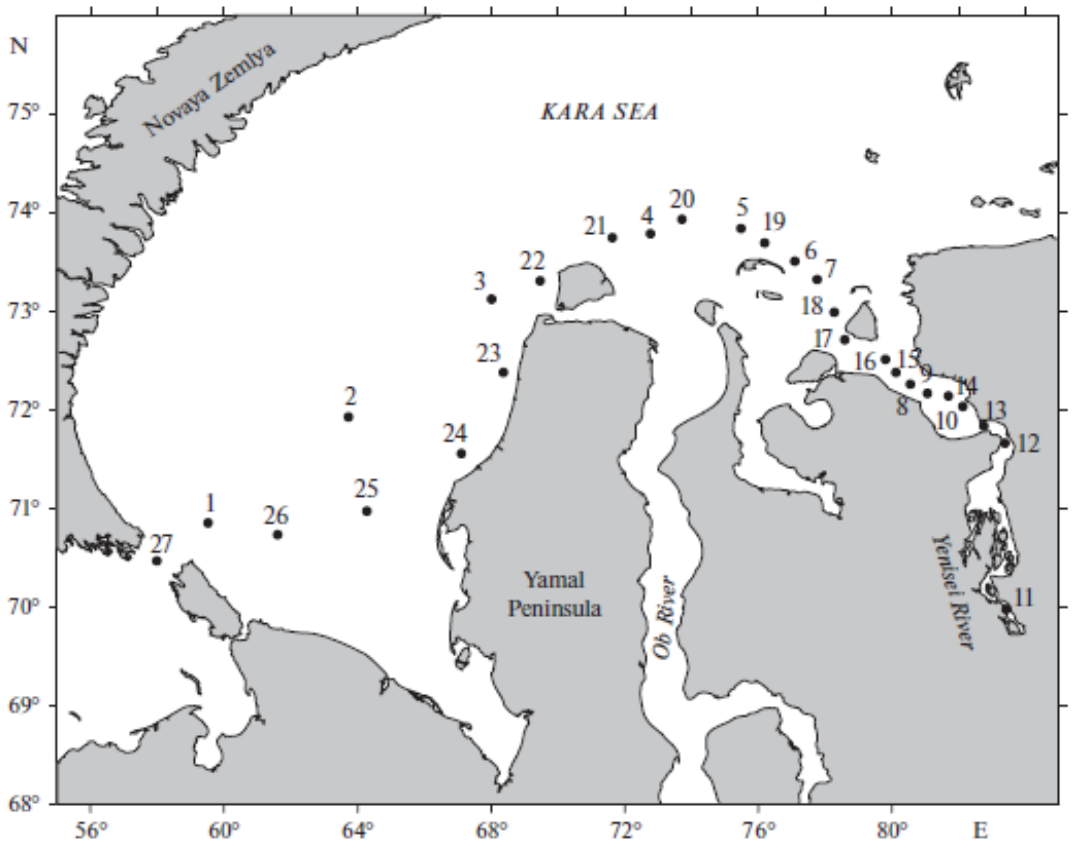

Figure 1: Scheme of stations in the Kara Sea in March–April 2016 (vessel Noril'skii Nikel').

Seawater samples were filtered using precombusted Whatman GF/F filters with a pore size of 0.7 μm. Emission scans were acquired at excitation wavelengths (λ_{ex}) from 230 to 550 nm at 5 nm intervals and emission wavelengths from λ_{ex} + 10 to 650 nm at 1 nm intervals.

It is established that CDOM at the stations 4-21 is represented mostly by terrigenous humic substances (HS) revealed in spectra as a single band in the visible spectral region with a maximum at

425-455 nm (2). At the transect Yenisei River – Kara Sea (stations 7-18) HS are most likely a dominant component of DOM, which is proved by the absence of fluorescence in the 290-320 nm range attributed to protein-like and marine humic-like CDOM, and also by gradual changes in fluorescence intensity along the salinity gradient agreed well with conservative distribution of dissolved organic carbon. A significant increase of HS content up to the values typical for the Yenisei River estuary was observed at the stations 4 and 19-21 (salinity >30 psu). Such an enrichment of brine with HS might be explained by the repartition of DOM between ice and brine during ice formation. The presence of autochthonous OM was detected at the stations 20 and 21.

To the west of the Yamal Peninsula, the influence of the river flow of the Obi and Yenisei rivers is insignificant. The presence of autochthonous OM was revealed at the stations 1 and 25, and its smaller amount (a fluorescence signal was one order of magnitude lower) at the stations 2, 23, and 27.

Based on the fluorescence intensity of HS and protein-like components of DOM for the melted ice samples, we conclude a significant depletion of HS as well as the presence of significant amount of labile autochthonous OM, which is most likely the result of high microbiological activity on the surface and/or in the volume of ice.

ACKNOWLEDGEMENT

This study was financially supported by the Russian Foundation for Basic Research, grant №16-35-60032 mol_a_dk.

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