Organic biomarkers in sediment from Admiralty Bay, Antarctica

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The use of biomarker data as proxies reflecting recent environmental conditions is a well established geochemical tool. Therefore, this study aimed to get more detailed information on the source and composition of organic matter from surface sediments from Admiralty Bay and adjacent area of Bransfield Strait,Antarctica. Total organic carbon, carbon isotopic composition, *n*-alkanes and fatty alcohols were analyzed in sediment collected in four different isobaths (100m, 500m, 700m, and 1100m). Samples from all isobaths were characterized by low amounts of organic carbon (0.14 – 0.52%) and no significant variation among locations. Values of $\delta^{13}C$, ranging from -25.9 to -24.7, were similar to those from terrestrial inputs in tropical and subtropical areas. However, the low values of $\delta^{13}C$ in high latitudes can be related to the higher concentrations of dissolved CO_2 at low surface temperatures and slow growth rates infer small periods of light. In comparison with $\delta^{13}C$ found in phytoplankton (-28 to - 33‰) the values in sediment were higher probably due to the high contribution from krill faeces that are approximately 3-4‰ enriched compared to phytoplankton. Furthermore, the influence of a lateral influx of benthic macroalgae from the nearby shelf areas can also contribute to an enrichment of about 3‰. Average concentrations of *n*-alkanes (*n*-C_{12} to *n*-C_{36}) were 0.86 ug g^{-1}, 0.79 ug g^{-1}, 0.67 ug g^{-1}, and 0.17 ug g^{-1} at 100, 500, 700 and 1100 m, respectively, and its distribution varied among isobaths. Sediments from 100 m showed more *n*-alkanes with higher molecular weight, dominance of *n*-C_{29}, probably due to the input of *n*-alkanes from terrestrial adjacent areas, especially from grasses, lichens and mosses. On the other hand, at 500, 700 and 1100 m, the lower molecular weight compounds were the predominant *n*-alkanes showing marine influence. Normal alcohols (C_{12} – C_{30}) concentrations were 25 ng g^{-1} at 100 m, 76 ng g^{-1} at 500 m, 104 ng g^{-1} at 700 m and 158 ng g^{-1} at 1100 m, with predominance of the chain with 16 carbons in all samples. C_{16} level increased from 100 m to 1100 m, it is considered a typical marine compound since it is the most abundant homologue in phytoplanktons, while C_{18} appears to be less specific. The ratio low molecular over high molecular alcohols was above 3 in all samples, and also indicates a dominance of autochthonous productivity. The organic matter in the sediment from the Admiralty Bay and adjacent area of Bransfield Strait seems to be a mixture of both terrestrial and marine sources. However, further studies are necessary to fully understand the sources and distribution of organic matter in the region.

Biogeochemical types of lake sapropels in Siberia

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We recognize three types of lake sapropels based on the paleolimnetic classification taking into account biological and chemical characteristics of sedimentation [1]. Molecular biomarkers were used as additional chemical criteria of origin of organics in sapropels [2]. Biological characteristics imply two types of sapropels: predominately macrophytic and planctonic and macrophytic. Combinations of biological and chemical characteristics imply three types of sapropels. Type 1, macrophytic with high Ca and low Fe, was found in West-Siberian lakes such as the whole Lake Beloye (Ca ~ 27%, Fe ~ 1.1%) [3] and near-shore zone of Lake Kirek (Ca ~ 18%, Fe ~ 3%) [4]. Type 2, planktonic and macrophytic with low Ca and high Fe, is characteristic for the central part of Lake Kirek [4]. Type 3, planktonic and macrophytic with low Ca and low Fe, was found in East-Siberian lakes, such as Lake Ochki (Ca ~ 0.43%, Fe ~ 0.67%) and Lake Dukhovoe (Ca ~ 0.86%, Fe ~ 2.7%) [5]. Formation of sapropels in certain lakes mostly depends on physic-chemical characteristics of their waters, i.e., mineralization, chemical class, pH, Eh and on dominated producers of the organic matter [5]. West-Siberian lakes mostly belong to the calcium hydrocarbonate class, have low or medium mineralization and alkalescent pH; macrophytes are the main producers of the organic matter. These conditions suggest formation of high-calcic sapropels. East-Siberian lakes show dominated planktonic sapropel production, whereas their hydrochemistry vary from little mineralized calcium hydrocarbonate alkalescent (Lake Dukhovoe) to ultra-fresh sulphate Ca-Na highly acidic (Lake Ochki) classes. These conditions suggest formation of low-calcic sapropels. This research was supported by the SB RAS Integration Project no. 125 and RFBR 11-05-00655.

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