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Biogeochemical study of water and bottom sediments from the Khai river – Nha Trang Bay estuarine system, South China Sea

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The present study was carried out in Nha Trang Bay (Southern Vietnam, the South China Sea). The samples of water, suspended matter and bottom sediments were collected in summer 2010-2012 in section from the estuary of the Khai River to the marine part of the bay. The samples were analyzed in the stationary lab of IO RAS, Moscow, by TOC-V-CPH, GC/MS and pirolysis methods.
We report here the novel data on sources, transformation and burial of OM coming from the Khai river waters. The investigation is focused on ontent and distribution of suspended matter (SM) in the estuary, dissolved organic carbon (DOC), particulated organic carbon (POC); molecular and group composition of hydrocarbons (n-alkanes, steranes, hopanes) and mercury content in water, SM and bottom sediments.
It was found that concentration of POC and SM decrease in the Nha Trang Bay waters from estuary to the open part of the bay. However, major changes in the concentration of SM and POC belong to the zone of salinity gradient.DOC behavior is more stable throughout the study area.
Organic-geochemical indicators estimation allowed recognition of genesis and transformation degree of organic matter in the study area. The estuary is characterized by mixed genesis of SM with a predominance of allochthonous organic matter whereas outlying parts of the Nha Trang bay are characterized by autochthonous OM. Composition of OM in sediments reflects regularities identified above, despite of the interannual and seasonal variability in the study area. The investigation reveals a predominance of terrestrial organic matter in the silt sediments of the estuary, transported by the Khai river.
Distribution of OM in sediments of marine part of the bay is mosaic, with a predominance of planktonogenic, bacterial or terrestrial input at their complex combination. Local anthropogenic pollution as well as an impact of industrial city effluents are found in river- and seaport areas. According to obtained data sedimentation rate in Nha Trang bay area is 36-118 g/m2/day in summer season.
Sedimentary TOC (%) in samples varies in the range 0.50 - 1.95 in 2010, 0.22 - 1.84 in 2011 and 0.27 - 1.94 in 2012. This variations associated with differences in grain size distribution of sediments and intensity of anthropogenic influence.
Mercury (Hg) concentration in the bottom sediments of aquatic systems varies from 2 to 108 ng/g of dry weight. Low concentration of the metal is typical for sediments, where OM is mainly represented by remains of aquatic organisms, while high concentration are common for river- and seaport areas with mainly terrestrial origin. Our study shows terrigenous organic matter is an important agent in the transfer of mercury from land to water ecosystems and Hg migrates in dissolved forms mainly.
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