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Seasonal and multi-annual variations of the North Dvina river input into the White Sea (Russia)

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The rivers are the main source of terrestrial material, including dissolved and particulate organic carbon (DOC and POC), into the seas and the oceans (Lisitzin, 1974).
The multidisciplinary program "The White Sea System" (principal investigator A.P. Lisitzin) started in 2000 and continues till present. The main aim of this program is to investigate the fluxes of material from the continent and from air into this sub-Arctic sea in different seasons and years. There were more than 30 expeditions in this period of time. Two volumes of the collective monograph "The White Sea system" (in Russian) were published (2010 and 2012) with the results of the program.
The aim of this presentation is to demonstrate the generalization of the data obtained in the expeditions on geochemistry of water and sediments and their fluxes into the sea.
The distribution of suspended sediment depending on salinity was in many cases quite typical with the exponential decrease of its concentrations. But in several cases these dependences were untypical – with the concentration maximum at intermediate salinities. The estimations have shown that the losses of suspended sediments in the mixing zone in a whole year were near 23% that was much lower in comparing with many other estuaries of the great rivers in the World.
The survey of the data on the distribution of DOC has shown its conservative or quasi-conservative behavior in the North Dvina estuary. Very untypical situation was observed in spring of 2003 when all the figurative points were divided in two independent groups – one with normal DOC concentrations (18-20 mg/l in river water) and another with very high concentrations – up to 70–75 mg/l (probably as a result of anthropogenic pollution) and conservative behavior in both groups.
The estimates of the losses of dissolved and particulate Fe, Mn and several trace metals were obtained.
So, such integral parameter of geochemical behavior of dissolved and particulate substances as their losses in the North Dvina mixing zone has shown that some characteristic features of the river and the White Sea basins (high humidity, very low river water turbidity, high DOC concentration, not very intensive biological activity and other) result to the lower influence of sedimentary and biogeochemical processes on the river material and its lower losses in comparing with other great rivers in the World.
And finally, the previous author's estimations of the river sediment and terrestrial DOC and POC input increase by the Arctic rivers due to expected global climate warming to the end of XXI century will be demonstrated (Gordeev, 2006 and Gordeev, Kravchishina, 2009).
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