



Interannual dynamic of zooplankton in Lake Imandra (Kola Peninsula) as influenced by heliophysical and anthropogenic factors

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Both heliophysical and anthropogenic (wastewater) effects on zooplankton biomass and abundance of Lake Imandra (the largest subarctic lake at Kola Peninsula, Russia) were investigated during the 1990 - 2003 period. We used different indexes of solar activity (sunspot numbers and UV-radiation values) as heliophysical factors. Information about UV-radiation values was derived from satellite data. As a parameter of anthropogenic pollution we used the information about wastewaters input in Lake Imandra by copper-nickel enterprise (Severonikel) and apatite-nepheline industry (OAO Apatit). Besides we used the direct measurements of concentrations of the most important pollutants (Al, Ni, Cu) and biogenic components (N and P) in Lake Imandra. It was shown that the correlation between heliophysical factors and zooplankton biomass and abundance was high and significant ($r=0.7-0.8$), and it was not significant between waste waters input volume and zooplankton productivity. According to the results obtained the main factor influencing zooplankton bioproductivity is solar UV-B radiation due to its damage effects. In addition for middle latitude Lake Krasnoye (Karelia, Russia; 1964 to 1984) and Lake Michigan (USA, 1984 to 1990) data we found nearly the same effect - anti-correlation between UV radiation level and zooplankton bioproductivity, but unfortunately the significance level was not sufficient. However, the effect at middle latitudes was some lower than at high-latitude Lake Imandra. Such discrepancy seemed to be associated with different day duration at high and middle latitudes. Our results seem to prove that solar forcing (mainly UV-B radiation) is significant factor governing zooplankton bioproductivity in subarctic lakes even in such polluted one like Lake Imandra.

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