



Heliogeophysical and man-made effects on zooplankton communities of subarctic Lake Imandara (Kola Peninsula, Russia), 1993-2003

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Heliogeophysical and anthropogenic (waste waters) effect on zooplankton biomass and abundance of the Imandra Lake (the largest lake at Kola Peninsula, Russia) were investigated during the 1990 - 2003 period. We used different indexes of solar activity (sunspot numbers, total solar irradiance (TSI) and UV-radiation values, cosmic ray intensity, number of solar flares). Information about TSI and UV-radiation values was derived from satellite data. As a parameter of anthropogenic pressure we used the information about wastewater inputs from the copper-nickel ("Severonikel" plant) and apatite-nepheline (AO "Apatit") enterprises. It was shown that the correlation (and/or anti-correlation) between heliogeophysical factors and zooplankton biomass and abundance was high and significant ($r=0.7-0.8$), and that it was not significant between waste waters input and zooplankton productivity ($r<0.5$). According to our results the main factor influencing zooplankton bioproductivity is solar UV-B radiation due to its damage effects. As for middle latitude Krasnoye Lake (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. Such discrepancy seemed to be associated with different day durations at high and middle latitudes. Our result seems to prove that solar forcing (mainly UV-B radiation) is between dominant factors governing zooplankton bioproductivity in Arctic lakes even in such polluted ones like Imandra Lake. The work was partially supported by Russian Foundation for Basic Research (grant N 05-06-97528).