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The impact of global warming on long-term variations of temperature conditions in lakes (Southern Urals, Russia)

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Abstract

Physical characteristics of lakes react to climatic trends and determine biological components of its ecosystem including biodiversity. Temperature conditions are the most important to water biota, affects on species richness, diversity, biomass level etc. Therefore, north temperate lakes are very useful as indicators of climate change and appropriate biodiversity changes. The main aim of our project is to establish, how climate change affects the lake biodiversity and its conservation. This first study was devoted to long-term changes in the lake temperature and mixing regime and is shown on an example of one typical Southern Urals lake with summer and winter stratification and total depth 25 m shown here. The duration of ice cover (DIC) is good indicator of annual heat content and on the other side, of climate affect on lake ecosystem. In last 35-40 years DIC significantly decreases at 0.3 day per year. DIC trend-cycle has an average duration 11 years that corresponds well-known 11-years cycle of solar activity. Trend-cycle component decreases and irregular component of cycle increases at the same time. From 1974 to 2012 DIC totally decreases to 9 days. Another good indicator of temperature changes is annual maximal temperature of bottom layer (TBL) as the annual rate of heat input to lake water. From 1986 to 2012 TBL increased up to 3° C at a rate of 0.1° C per year. TBL trend-cycle has a 5-years duration and is independent of DIC-cycle. Most likely, the warming of temperate lakes is due to natural causes of global warming.

Biography

Alexander Rogozin has completed his Ph.D. at the age of 29 years from Zoological Institute of Russian Academy of Sciences and postdoctoral studies from Ilmen State Reserve of Russian Acad Sci. Since 2010, he is the head of Biological Department of Ilmen State Reserve, a leading nature and biodiversity protection organization in Russian Academy of Sciences. He has published more than 15 papers in reputed journals and 4 monographs. His prime scientific interest is biodiversity and its conservation.