

Date: May 2

Time: 11:00 AM

Location: Ames 234

Speaker: Dr. Miki Hondzo
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Title: "The influence of physical processes on small-scale biological growth in lakes and rivers"

Abstract

Physical processes and parameters, including water temperature, dissolved oxygen, photosynthetically active radiation, and turbulence are unequally distributed characteristics in lakes and rivers. Microstructure field and laboratory measurements will demonstrate the existence of a turbulent benthic boundary layer along the sloping sides in stratified lakes, the vertical heterogeneity in temperature fluctuations, and the diffusive sublayer of dissolved oxygen at the sediment-water interface. From the water quality point of view, an important question is how these physical processes control the balance of organic production and decomposition (autotrophy and heterotrophy, or the photosynthesis to respiration ratio) in aquatic environments. The location and dimension of plankton habitat layers depend upon the physical processes/parameters and, therefore, generate the biological heterogeneity of a water column. The growth and metabolic rate of algae, periphyton, and bacteria are mediated by the moving fluid in the environment. Our measurements suggest a) the deficiency in traditional laboratory-oriented environmental tests; b) the integration between physical processes and small-scale biological growth at laboratory and field scales; and c) the importance of physical processes in determining the balance of autotrophy and heterotrophy in aquatic ecosystems. The photosynthesis to respiration ratio determines whether a lake or ocean is a source or sink for atmospheric CO₂.