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Chlorophyll quota and energy-intensive substance for prime production estimation of the aquatic ecosystem

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Motivation and Aim: The photosynthesis process is investigated with help of the mathematical modelling. Many researchers are working in this area [1, 2]. We are using of the chlorophyll quota that is mass part chlorophyll in phytoplankton biomass. We modelling of the process of formation of energy-intensive (ATP) substances. These substances are a basic for the growth of the phytoplankton biomass.
Methods and Algorithms: The two models are construed from the general idea based on Droop's model. These models have a target for the estimation of the biological production of aquatic ecosystems. The first model uses the chlorophyll quota to describe dynamic changes in phytoplankton due to photosynthesis. The second model uses the concentration of energy-intensive substance too.
Results: The chlorophyll quota has very variable values. These values depend on the phytoplankton state and environment. The chlorophyll quota depends from cell quota in our model. Both models have complex dynamics when the stabile equations don't exist. These dynamics are subjected to the attractor of the Droop's submodel. The solution dynamics can have complex properties on this attractor. The dynamics could have periodic or quasistochastic properties. This is a result for a stable environment. Our models have a different reaction to any feature of the environment. The big dark period is one of these features. The impact of environmental are shown. The year period for ordinary dynamics of photosynthetic activity radiation and temperature is studied.
Conclusion: The models are constructed from the general idea based on Droop's model. Prime production depends on photosynthesis intensity. Our models characterize photosynthesis intensity by chlorophyll content and by energy-intensive substance. This value depends on the phytoplankton state and environment. Our models can have complex dynamics. They could be used for detail description of prime production in aquatic ecosystem.
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