Seventh Workshop Dynamical Systems Applied
to Biology and Natural Sciences DSABNS 2016
Évora, Portugal, February 2-5, 2016

MATHEMATICAL MODELLING OF SPATIOTEMPORAL PLANKTON-OXYGEN DYNAMICS UNDER THE CLIMATE CHANGE

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ABSTRACT

Ocean dynamics is known to have a strong effect on the global climate change and on the composition of the atmosphere. In particular, it is estimated that about 70% of the atmospheric oxygen is produced in the oceans due to the photosynthetic activity of phytoplankton. However, the rate of oxygen production depends on water temperature and hence can be affected by the global warming. In this talk, we consider a generic model of the oxygen-plankton interactions. The model is analyzed both analytically and numerically where the rate of oxygen production slowly changes with time to account for the ocean warming. We show that a sustainable oxygen production is only possible in an intermediate range of the production rate. If, in the course of time, the oxygen production rate becomes too low or too high, the system's dynamics changes abruptly resulting in the oxygen depletion and plankton extinction

References

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 ISBN: 978-989-98750-2-9