1154-92-2248 **Seth T Cowall*** (`cowall_st@mercer.edu`), Mercer University, Department of Mathematics, 1501 Mercer University Drive, Macon, GA 31207, and **Matthew J Oliver** and **L Pamela Cook**. *A saddle point phytoplankton bloom mechanism in a reaction-diffusion NPZ model.* Preliminary report.

Phytoplankton are the base of the marine food web. They are also responsible for much of the oxygen we breathe, and they remove carbon dioxide from the atmosphere. The mechanisms that govern the timing of seasonal phytoplankton blooms is one of the most debated topics in oceanography. Here, we present a macroscale plankton ecology model consisting of coupled, nonlinear reaction-diffusion equations with spatially and temporally changing coefficients to offer insight into the causes of phytoplankton blooms. This model simulates biological interactions between nutrients, phytoplankton and zooplankton. It also incorporates seasonally varying solar radiation, diffusion and depth of the ocean's upper mixed layer because of their impact on phytoplankton growth. The model's predictions are dependent on the dynamical behavior of the model. The model is analyzed using seasonal oceanic data with the goals of understanding the model's dependence on its parameters and of understanding seasonal changes in plankton biomass. A study of varying parameter values and the resulting effects on the solutions, the stability of the steady-states, and the timing of phytoplankton blooms is carried out. The model's simulated blooms result from a temporary attraction to one of the model's steady-states. (Received September 17, 2019)