OCG350 Oceanographic Data Integration I Fall 2018

NPZ Model of Narragansett Bay

**Instructions**: you can work in groups of up to four people. This assignment is due on **Tuesday 20 November**. Follow the template for report writing that was distributed for Report 1.

**Objectives**:

To construct and solve an NPZ model with Python;
To introduce seasonality with time-varying parameters;
To qualitatively match the dynamics of the spring bloom in Narragansett Bay.

1. Start with the NPZ model we investigated in class (NPZ\_model\_ode\_solver.ipynb).

2. Read in Miller, Chpt. 4 about how other investigators have implemented seasonal NPZ models. Which external drivers are the most important to include? What model parameters do they affect?

3. The data we are trying to recreate are the Nutrient, Chlorophyll a, and Zooplankton data from Narragansett Bay, which are contained in the file, NPZ data.csv. Based on our discussions in class, you will need to decide which variables to track for N, P, and Z.

4. Compile the needed external driver variables. Daily Sea Surface Temperature is contained in the file SST.csv. Daylength, PAR, rainfall…

5. Adjust the model parameters to match the observed NPZ data as closely as possible. Your model should match the magnitude of the variables (units are micrograms carbon per liter) and their temporal pattern.

6. Your output should include timeseries graphs of observed and predicted NPZ. Since the observations were made at weekly intervals, it makes sense to plot them as points. The model predictions are calculated daily, so plot them as lines.

7. Your model report should include a description of the main features of the NPZ data. What are the main events and interactions that we are trying to describe? Also explain your rationale in adjusting the model parameters to reproduce these patterns. Finally, list some next steps to make the model even more realistic.