**Mini Project S5 SoSe2021: Modelling Host-virus-Zooplankton dynamics**

*Background:*

Phytoplankton are abundant primary producers and play an important role in the fixation of carbon and inorganic nutrients and thus biogeochemical cycles. Phytoplankton populations are controlled both by bottom up (nutrient, light, temperature) and top-down mechanisms (viral infection, zooplankton grazing) which can influence the “distribution” of biomass within an ecosystem.

Basic NPZD models can show the flow of biomass through the basic food web levels within an ecosystem. Within the mini project, we want to add a viral component to a NPZD model and thus build a NPZD-virus model. Such a model will be the basis for i) parametrization experiments of viral lysis and grazing experiments and ii) integration into water body models of the Baltic Sea.

*Modeling tasks and research questions for the mini project:*

1. Build a NPZD-virus model in R
   1. Drawing the model
   2. Writing equations for the different components
   3. List the parameters needed
   4. Building the model in R
2. Parametrization
   1. Literature search for parameters
   2. Decide on an ecosystem (e.g. Atlantic open ocean, Coastal North Sea) to find parameters in the literature
   3. Try to parameterize the model with constant parameters
   4. Try to parameterize the model with seasonal dynamics (if possible)
   5. Run the model to steady state
3. Research questions: (non-exhaustive and not needed to answer all of them)
   1. How do different viral infection rates influence the model outcome?
   2. How do different zooplankton grazing rates influence the model outcome?
   3. How do different nutrient/temperature/light levels affect the model outcome?

*Methods:*

* Literature research
* Modeling in R