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Towards end-to-end modeling of the marine food web

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Modeling of marine ecosystems is broadly divided into two branches: Biogeochemical processes and fish production. Biogeochemical models see the fish implicitly as mortality rates, while fish production models interact with the lower food web basically through prescribed food. The approaches describing the dynamics of the lower and upper food web are different. Growth of small plankton is usually governed by chemical equations, which quantify the flux among state variables to another one in terms of rates. For the upper part of the food web, the dynamics are characterized by life cycles of the species, e.g. copepods and fish. The individual mass of these species can develop over several orders of magnitude during the life span. New generations of model systems are needed to integrate the two branches.

The presentation outlines an now theoretical approach to serve the goal of bridging biogeochemical models and fish-production models. Using the Baltic Sea as an example system, a mass conserving formulation of the dynamics of the three main stocks (sprat, herring, and cod) will be discussed. After division of fish into size (mass) classes, the dynamics of predator-prey interactions is formulated. As a first step towards a linked model system, a simple box model is used to perform time slice runs over 20 to 40 years.