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Ecological ReGional Ocean Model ERGOM

strengths and weaknesses

ERGOM-user and -developer team

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ERGOM Ecological Regional Ocean Model

- About ERGOM
- Downloads
  - Formal description
  - Code Generation Tool
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  - Finished code
- Documentation
  - Getting started
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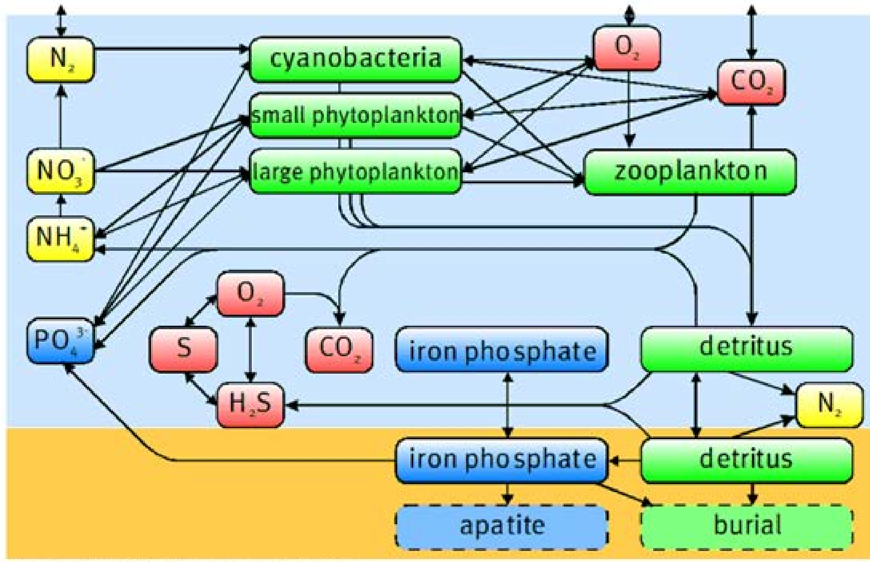
ERGOM

ERGOM is a biogeochemical model which was developed at Leibniz Institute for Baltic Sea Research, Warnemuende, Germany by Thomas Neumann and Wolfgang Fennel. It incorporates the nitrogen and phosphorus cycle.

Originally developed for the Baltic Sea, the model is specifically strong in representing processes related to hypoxia and anoxia. However, due to the generality of the processes described, the model can be also used for other seas and is e.g. also used for modelling the biology of the Benguela upwelling system.

ERGOM is free software and has users in several institutes and universities around the Baltic Sea.



Schematic view of ERGOM state variables and processes

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www.ergom.net

In the box:

- Pelagic and benthic/sedimentary sub-models
- Element cycles for:
  - N
  - P
  - C (and alkalinity)
  - O
  - S
- Processes:
  - Primary production (3 functional groups)
  - Secondary production
  - N-fixing, denitrification, nitrification
  - Mineralization, respiration, mortality
- Tagging of sinks and sources, age
- Additional modules (under development):
  - Population models for zooplankton, fish

Some technical issues:

- ERGOM is implemented in a meta-language and therefore independent of the host model (e.g. hydrodynamic model)
- Process oriented formulation
- Specific editor and code generator
- Available interfaces: MOM5.., Matlab, Pascal
- Under development: FABM, Scilab, DMI-Model

User:

Part of MOM and GETM distribution
BSH
DMI
Aarhus Uni
TU Tallinn
HZG
IOW

Why:

Maintain an up-to-date ERGOM across different host model becomes more easily
Input from other users is more convenient
Development, implementation of new processes is well-to-do

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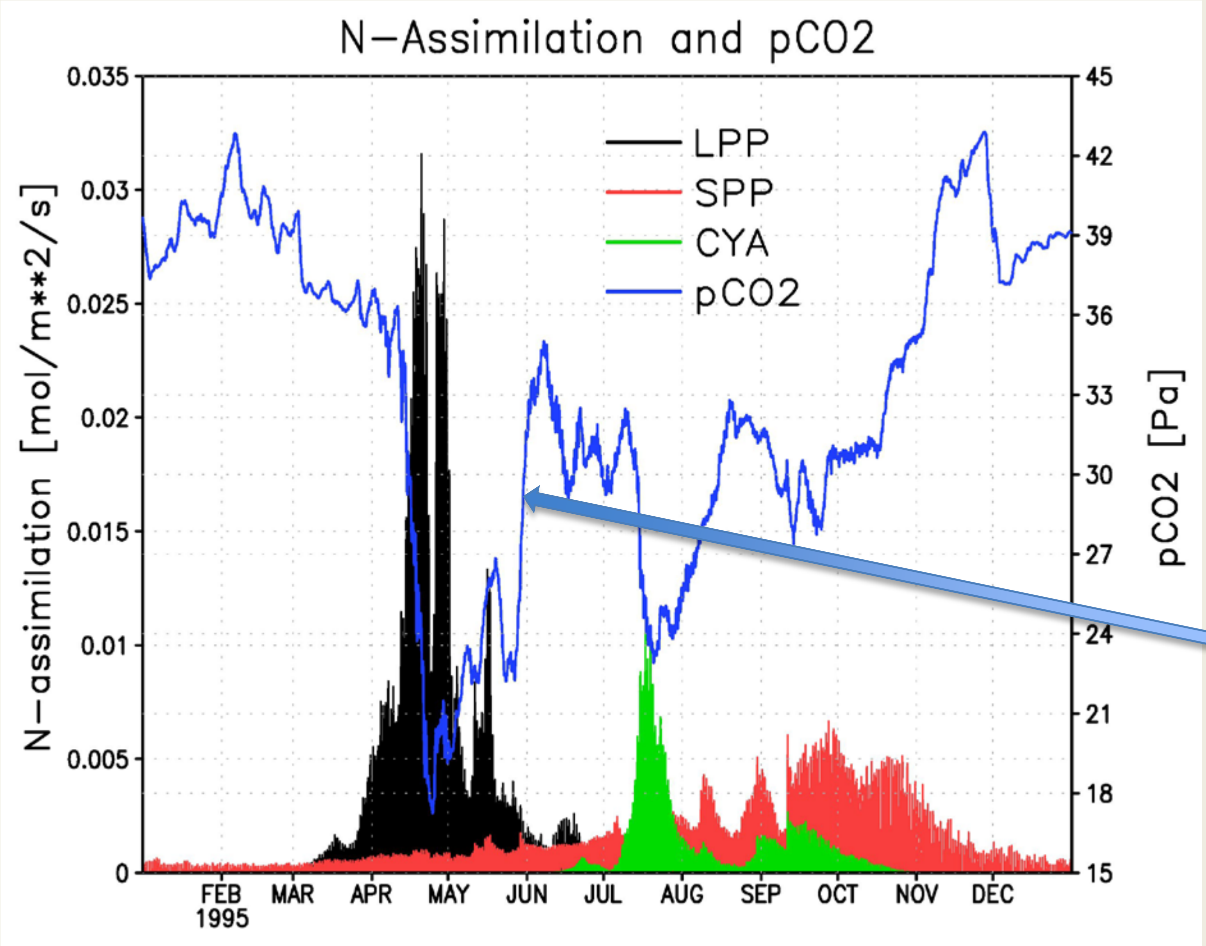
What happens after spring bloom?



Eastern Gotland Basin

pCO2 increase due to temperature cannot be confirmed by observations.
Do we miss something in the model?

“Cold fixation” can recover the model. But is that the truth?
Field experiments and process studies are urgently needed.

‘base’ model because the entire amount of excess phosphate that remained after the spring bloom was still present in mid-June and led to strong cyanobacterial production (Figure 4d). As a result, the two simulations

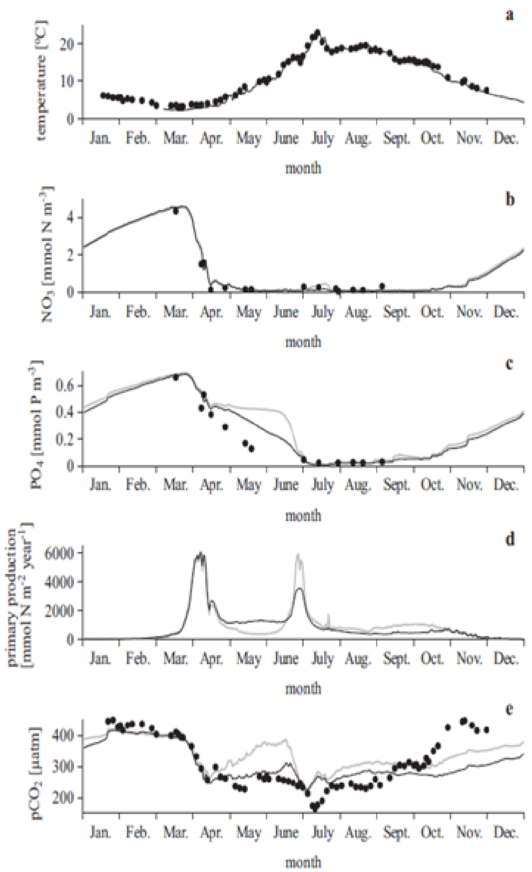


Figure 4. Observations of Schneider et al. (2009a) (black circles) and model results for two simulations (black lines: simulation with additional cyanobacteria group; grey lines: ‘base’ model); a) sea surface temperature, b) dissolved inorganic nitrogen near the sea surface, c) dissolved inorganic phosphate near the sea surface, d) daily averaged primary production, e) CO_2 partial pressure (pCO_2) near the sea surface

Sometimes (especially after spring) N-concentrations are exceptional high.

Is this the case in other spatial resolving models as well?

I suppose we miss transformation processes between locations for load estimates (somewhere in the river) and the artificial river mouths in the model.

What is the role of river estuaries and lagoons for nutrient retention? Is DOM important in this respect?
Can load data be improved, e.g. bioavailability?