

Annual General ECOSUPPORT assembly 2009

Validation of three biogeochemical models

Status of validation

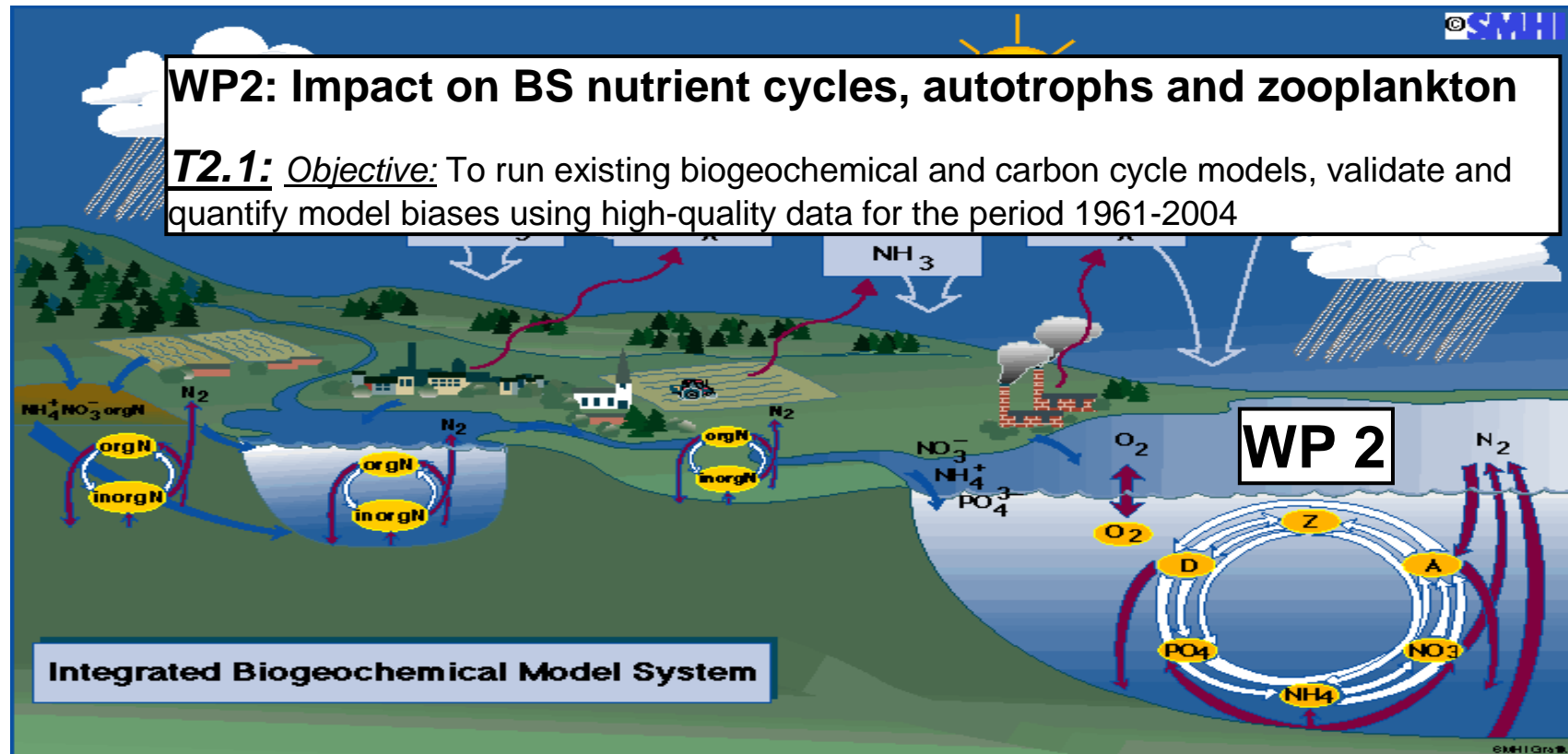
Presentation: Kari Eilola, SMHI



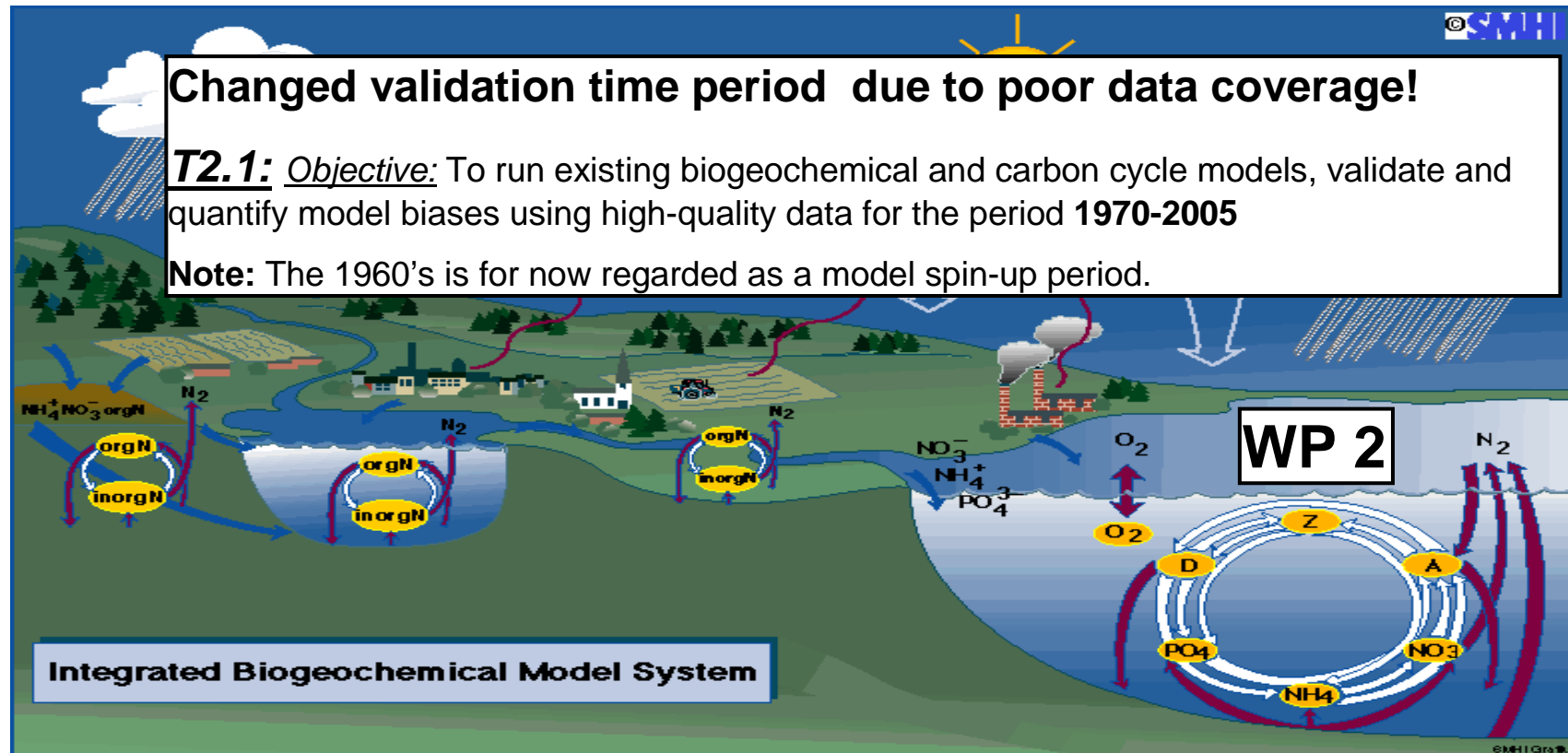
Contents

- **Model description (RCO-SCOBI)**
 - **Nutrient loads**
 - **Nutrient pools**
 - **Statistical averages**
 - **Horizontal variations**
 - **Hypoxia and cod RV**
-
- **Bengt biological data, short introduction**

Coupled ecological models

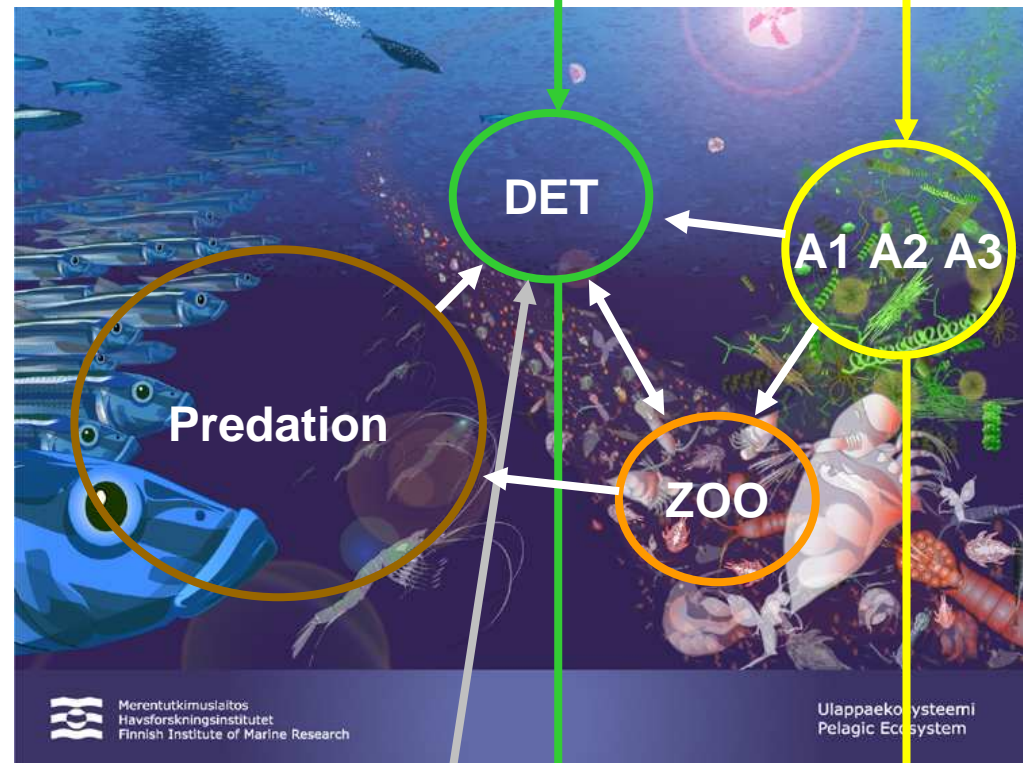
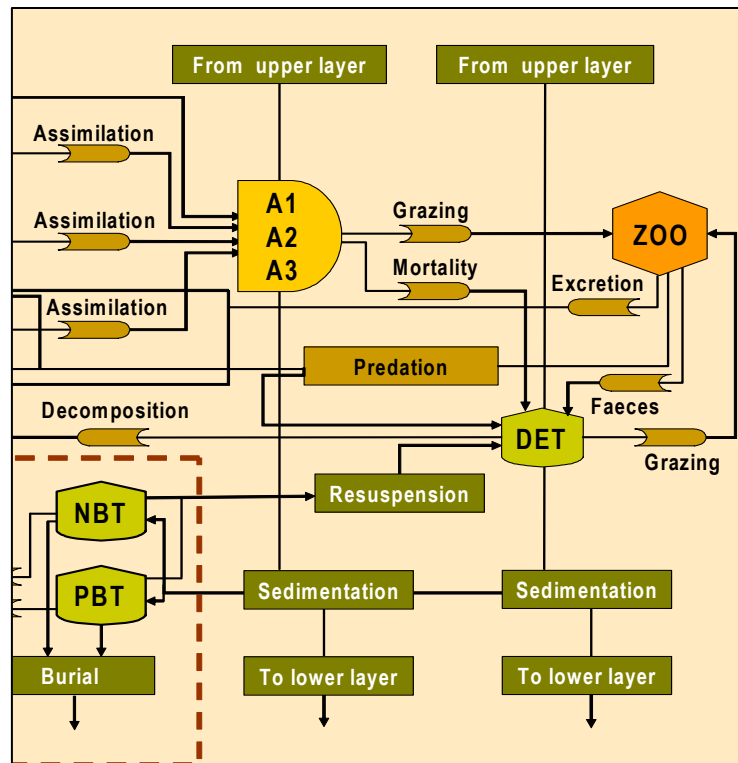


Coupled ecological models

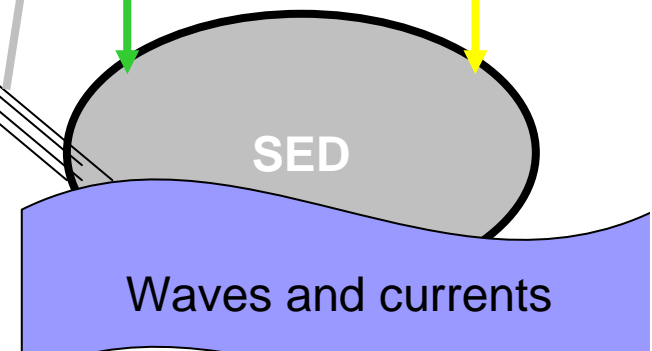


RCO – SCOBI

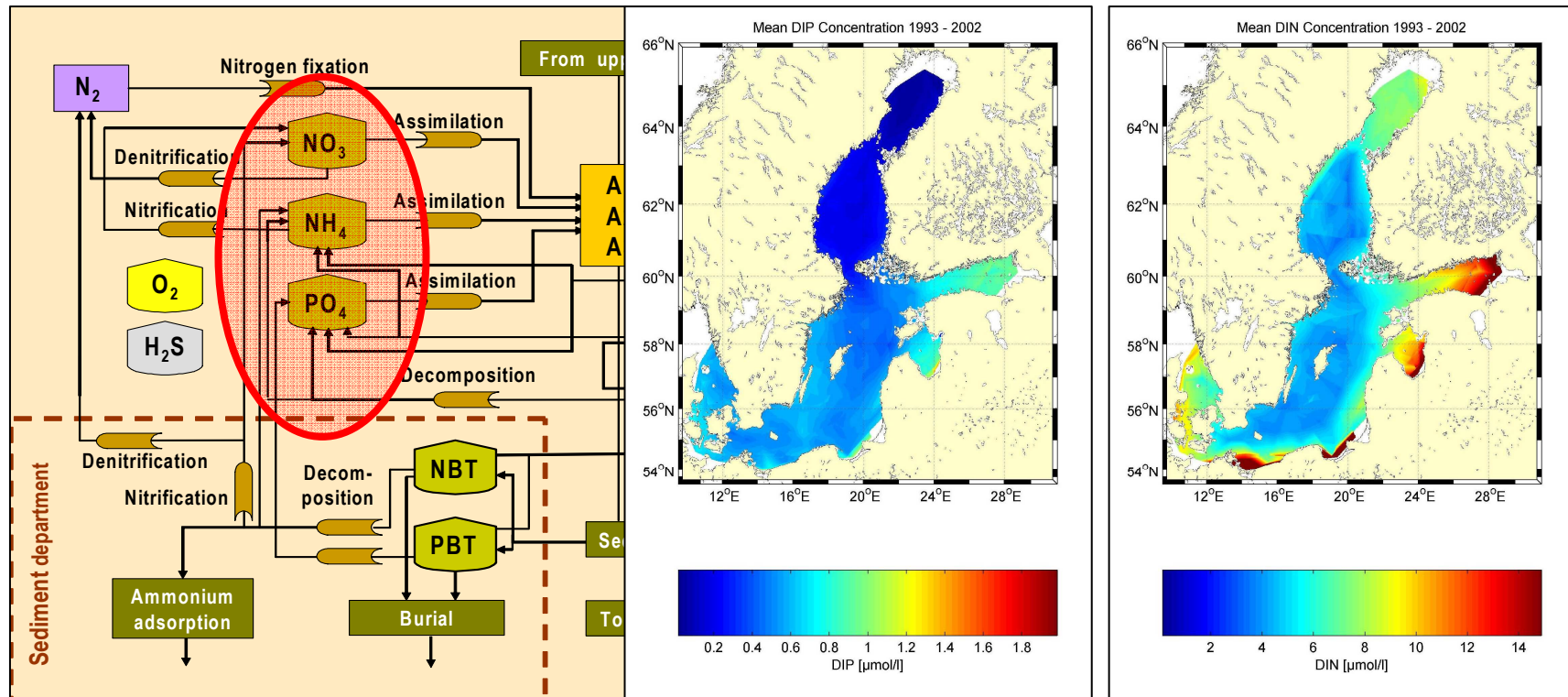
High resolution (2nm) 3-D model for biogeochemical climate- and process studies in the Baltic Sea.



Resuspension
of sediments



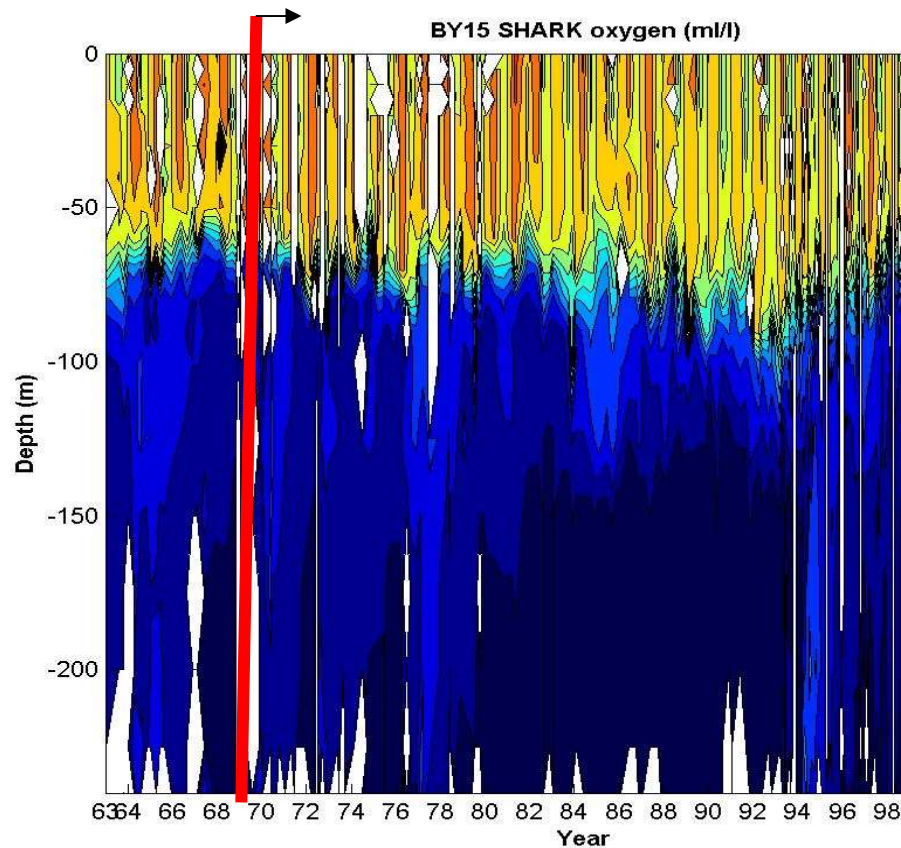
Inorganic nutrients and fluxes, DIN and DIP



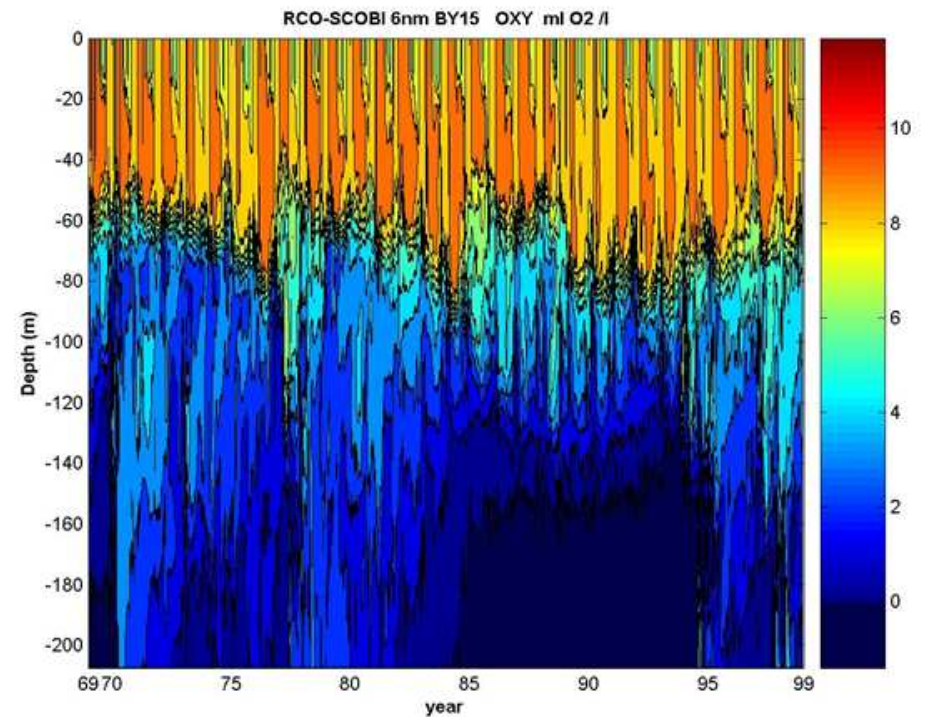
RCO - SCOBI

Eilola, K., H.E.M. Meier, and E. Almroth, J. of Mar. Sys, 75, 2009.

Modeled (6nm) and observed oxygen concentrations in the East Gotland deep



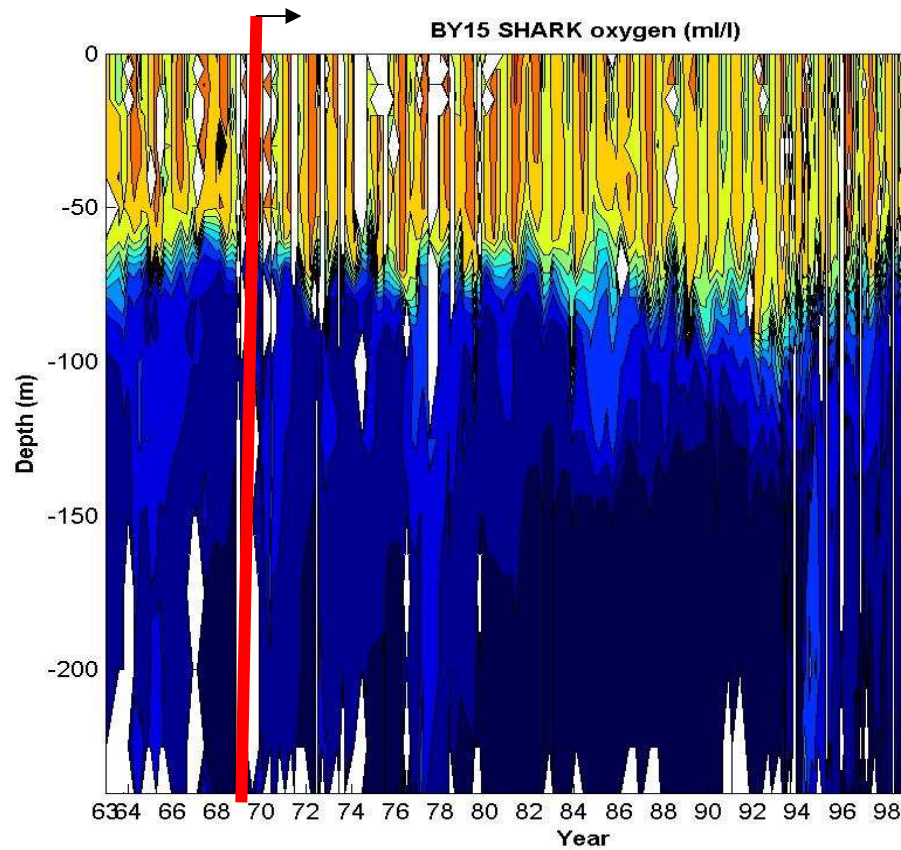
Left: SHARK data (1963-1998)



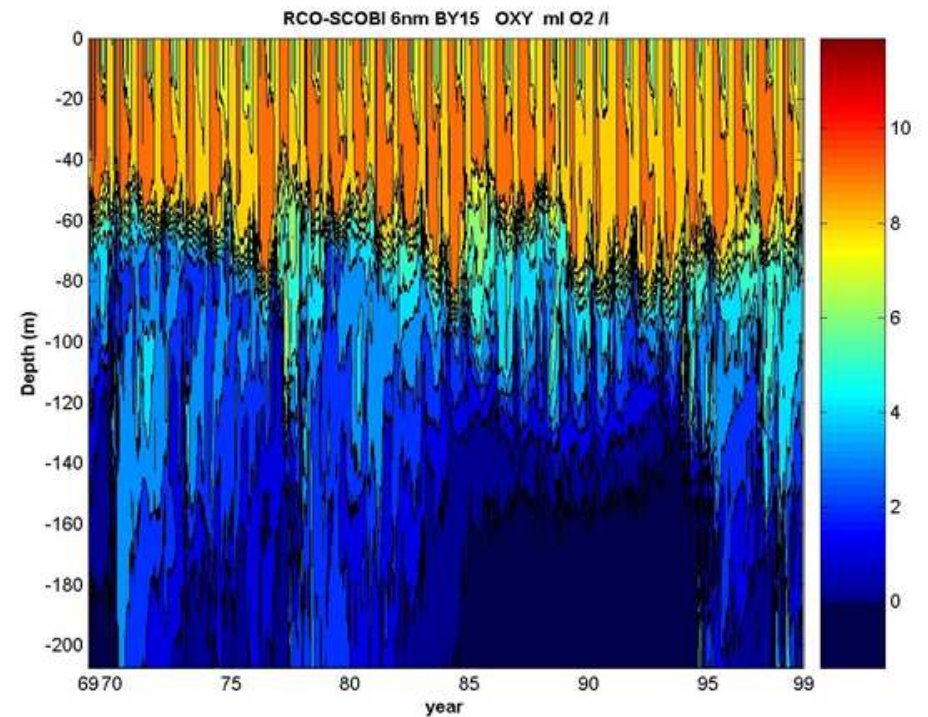
**Right: Example of model results (1969-1998)
The 6nm model is run from 1902 to 1998.**

RCO - SCOBI

Movie: Bottom water oxygen concentrations 1993-1995 @



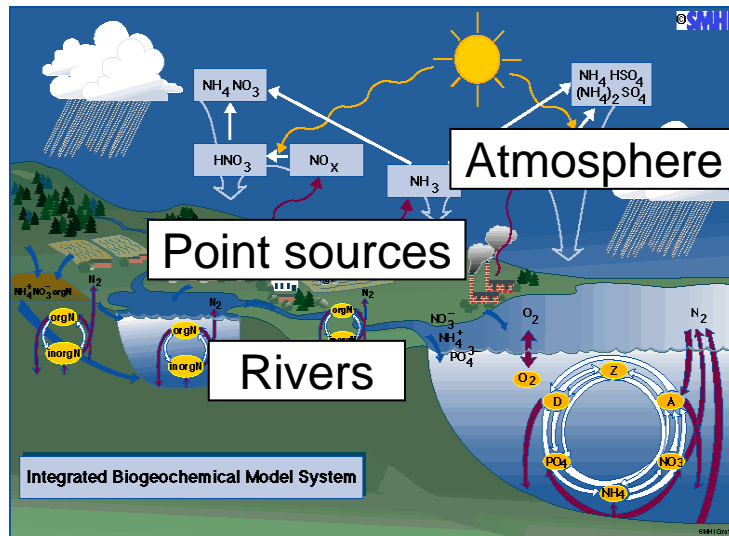
Left: SHARK data (1963-1998)



Right: Example of model results (1969-1998)
The 6nm model is run from 1902 to 1998.

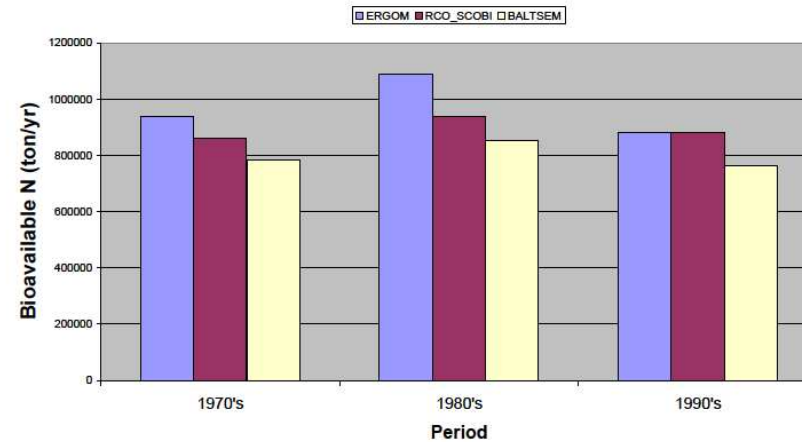
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Bioavailable nutrient loads in models

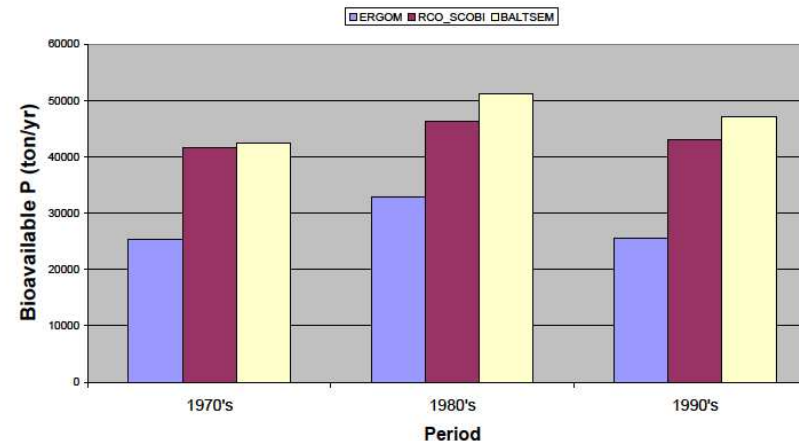


A common nutrient loading to the models is not ready yet!

Total nitrogen supply to Baltic Sea

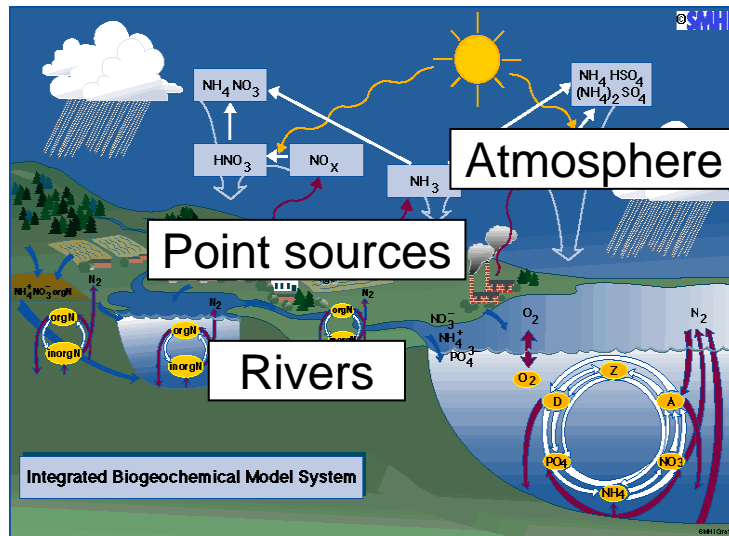


Total phosphorus supply to Baltic Sea

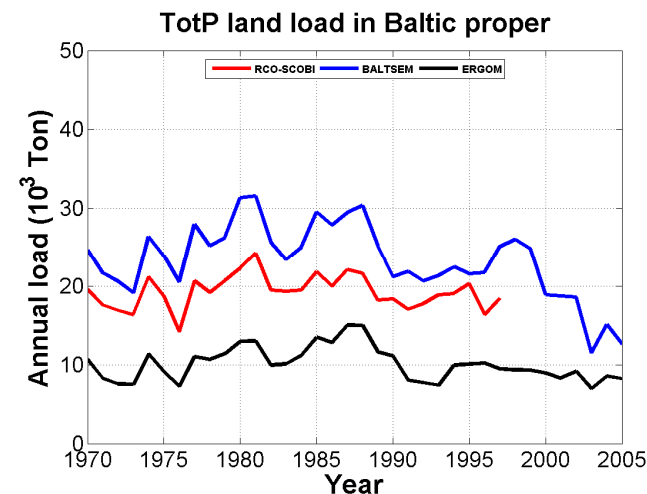
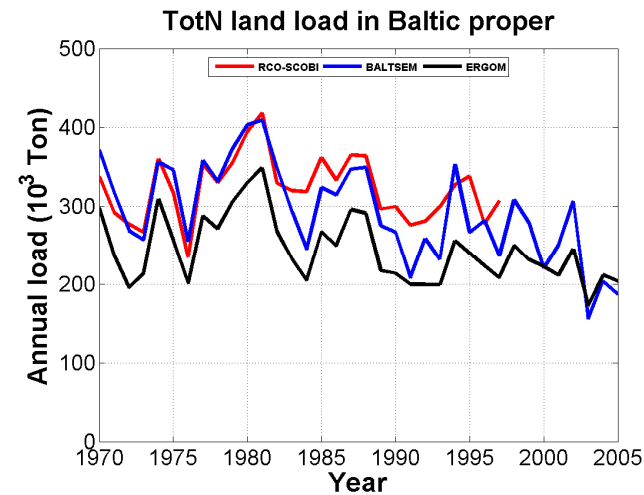


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Bioavailable nutrient loads in models

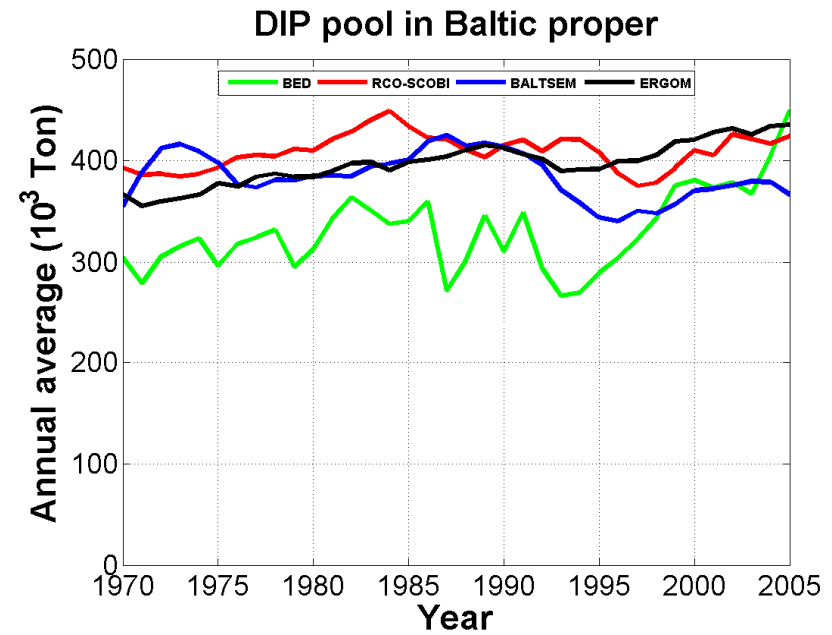


A common nutrient loading to the models is not ready yet!



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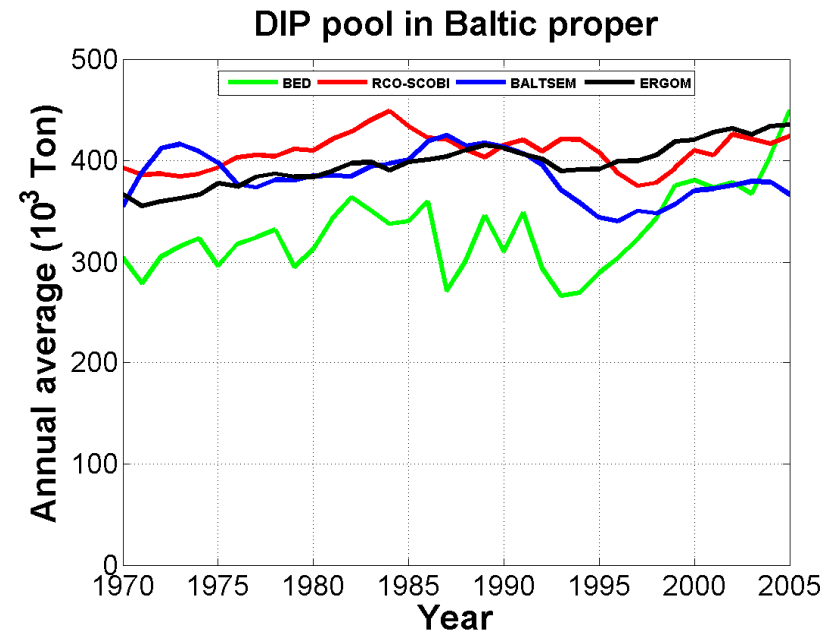
Nutrient pools



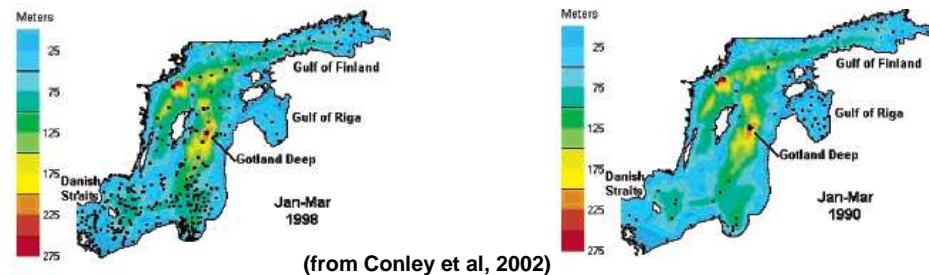
BED = Baltic Environmental Database

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Nutrient pools

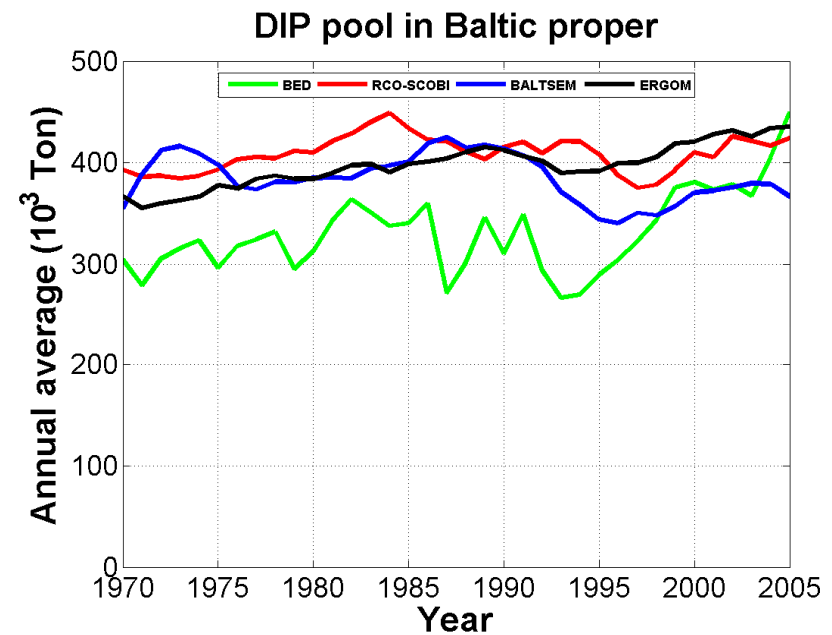
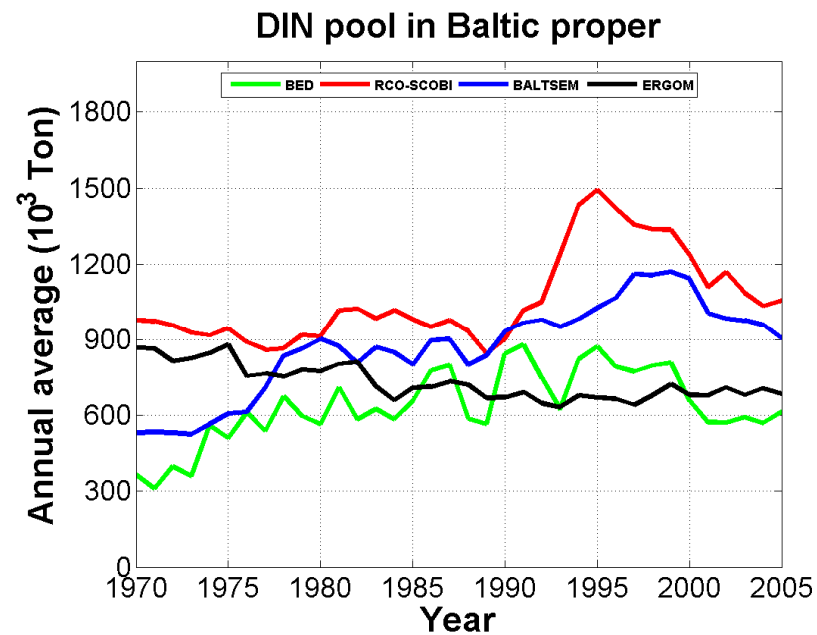


Examples of BED data coverage, Jan-Mar



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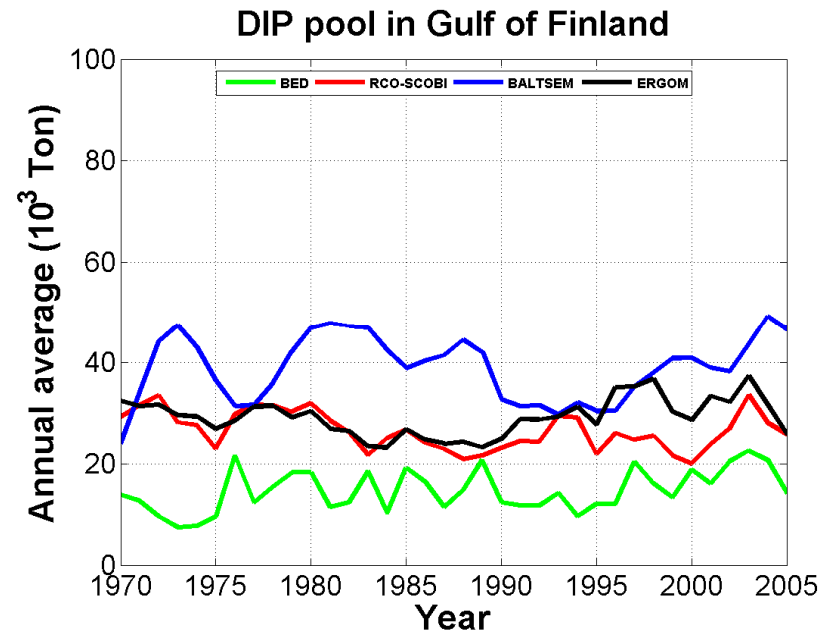
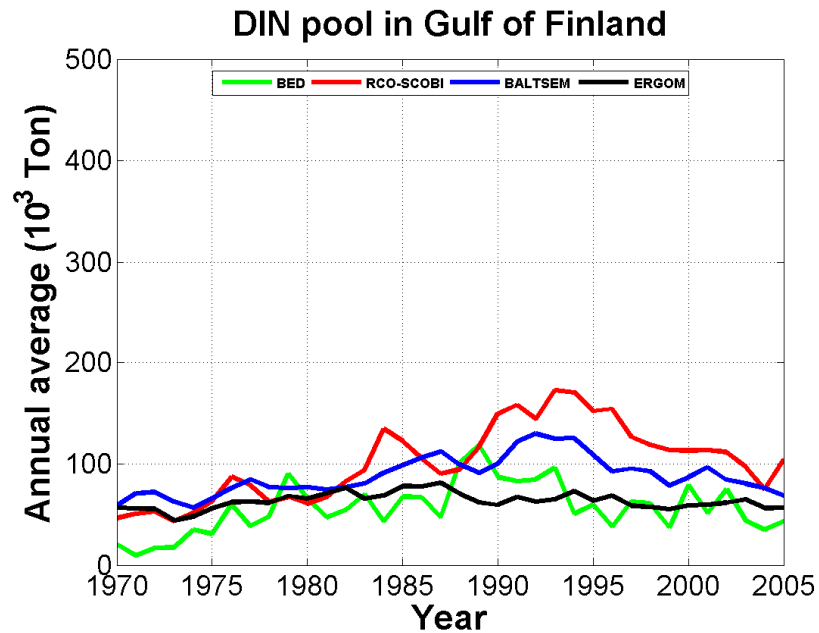
Nutrient pools



Different initialization of nutrient pools !

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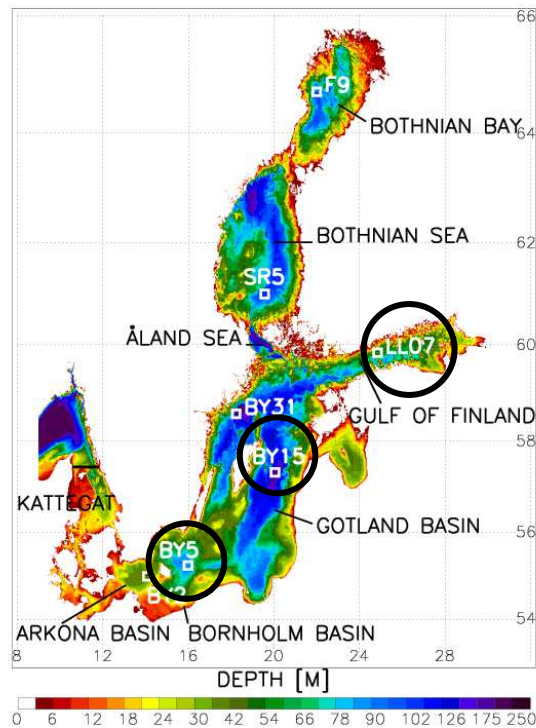
Nutrient pools



Different initialization of nutrient pools !

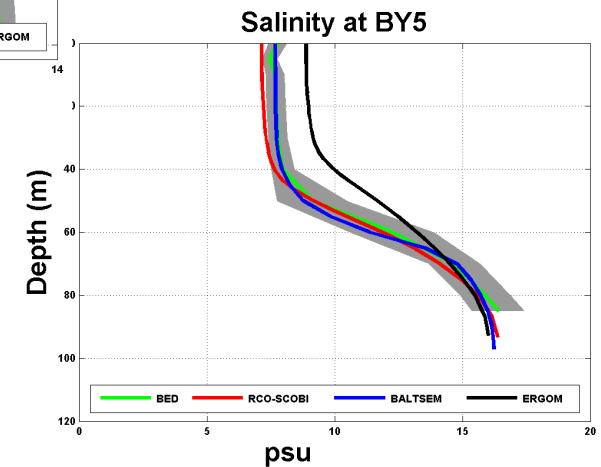
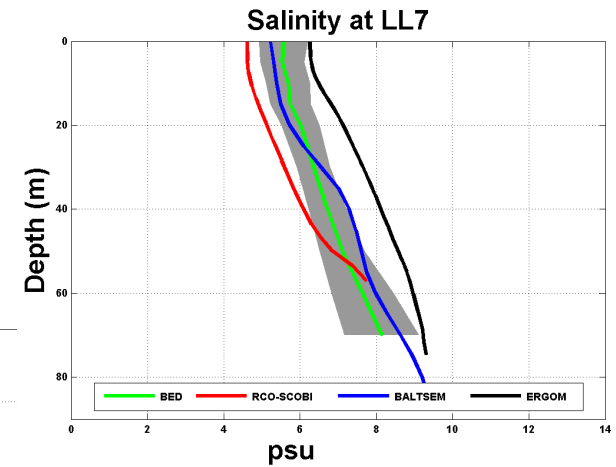
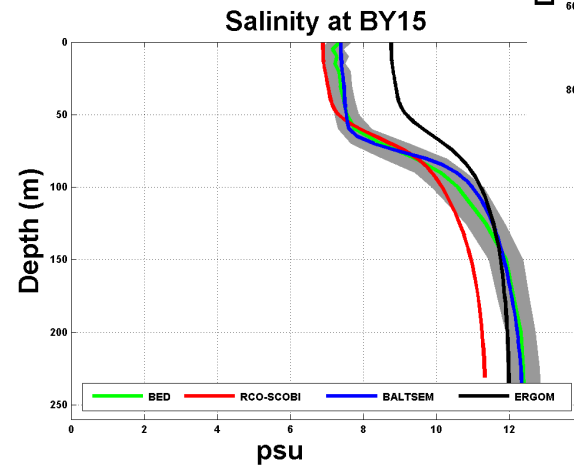
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Annual average 1970-2005



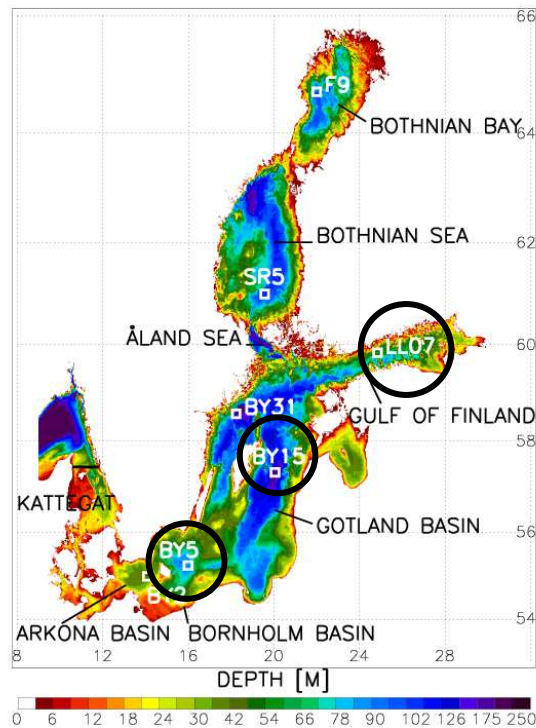
Station list

Salinity



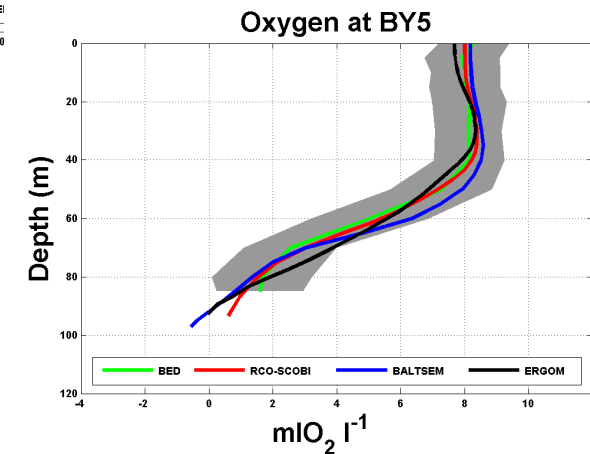
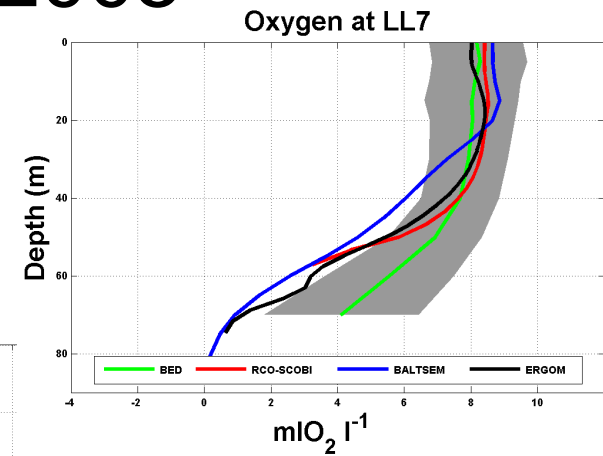
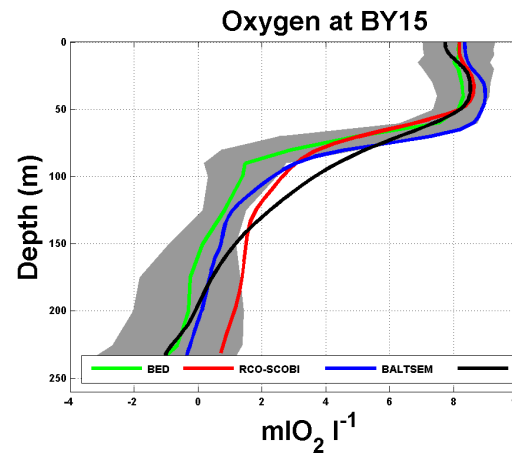
ECOSUPPORT

Annual average 1970-2005



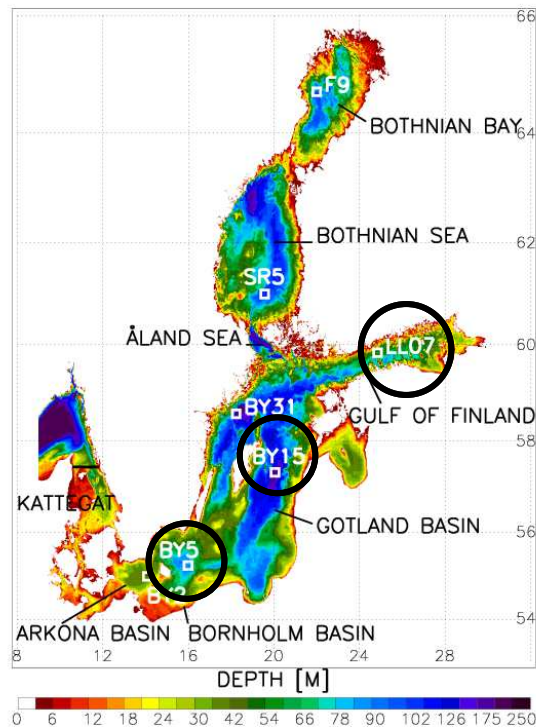
Station list

Oxygen



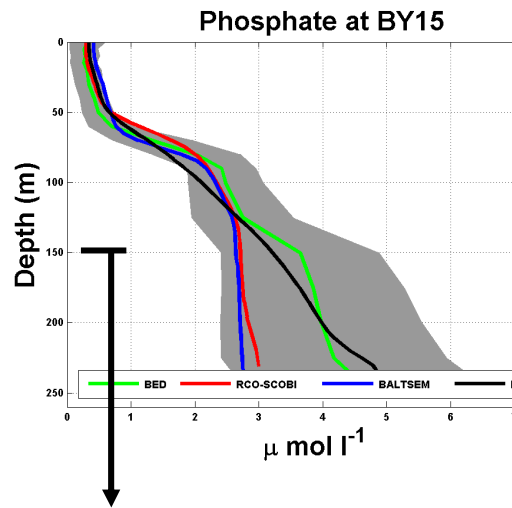
ECOSUPPORT

Annual average 1970-2005



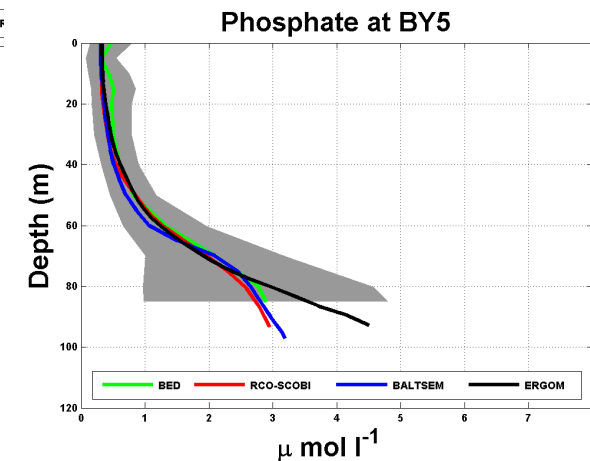
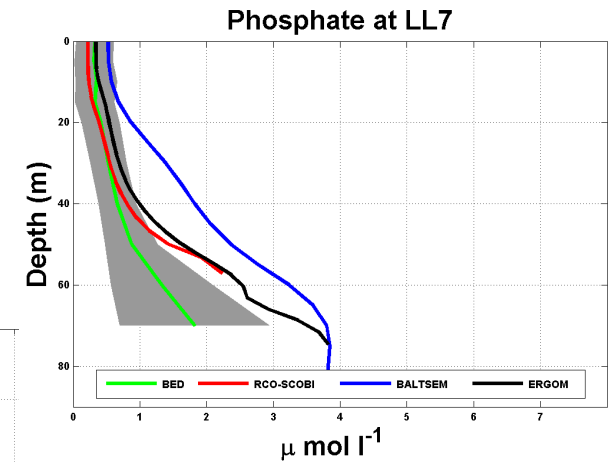
Station list

Phosphate



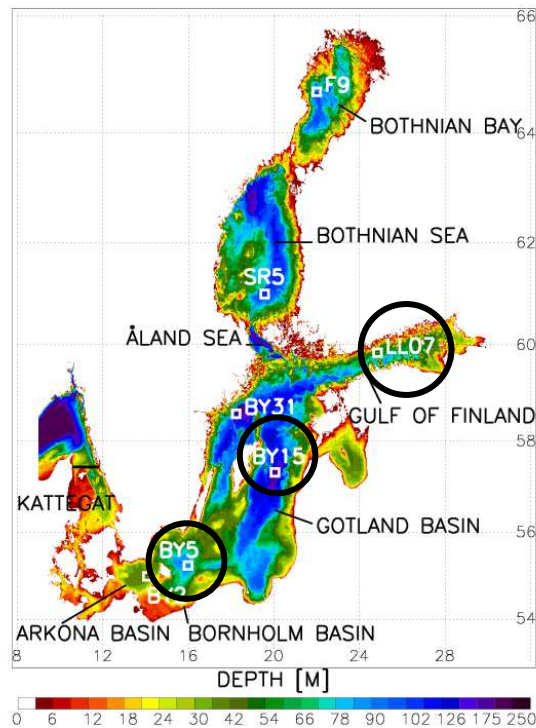
Note:

Volume below 150m is only about 2-3% of total Baltic proper volume



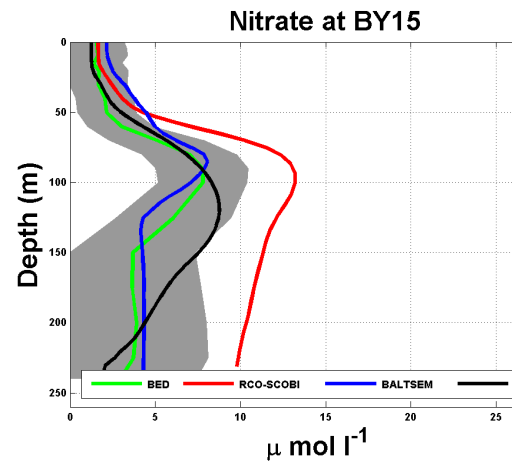
ECOSUPPORT

Annual average 1970-2005

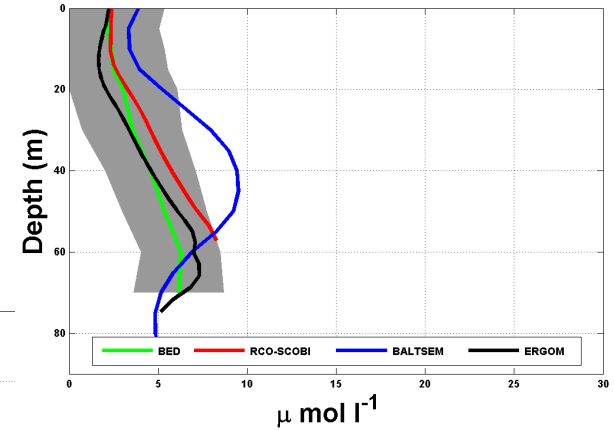


Station list

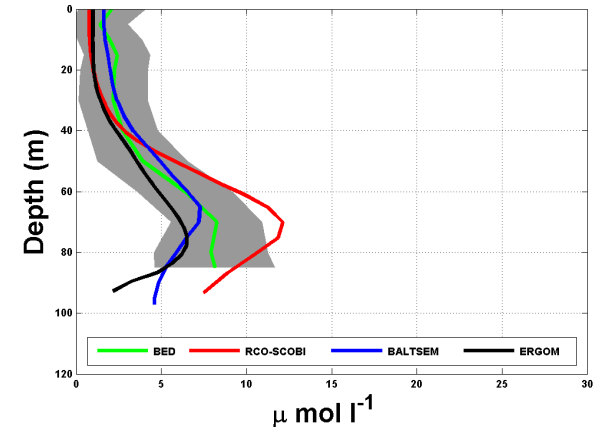
Nitrate



Nitrate at LL7



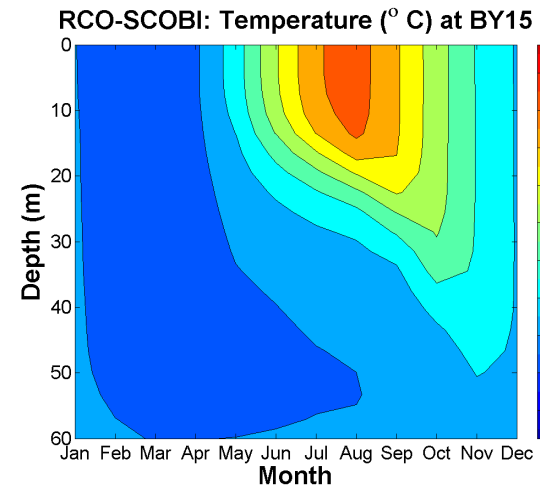
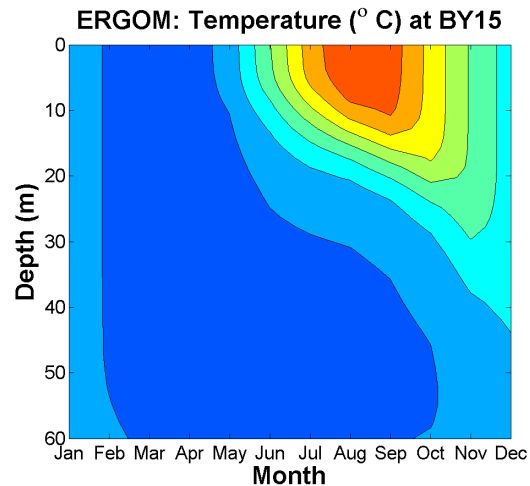
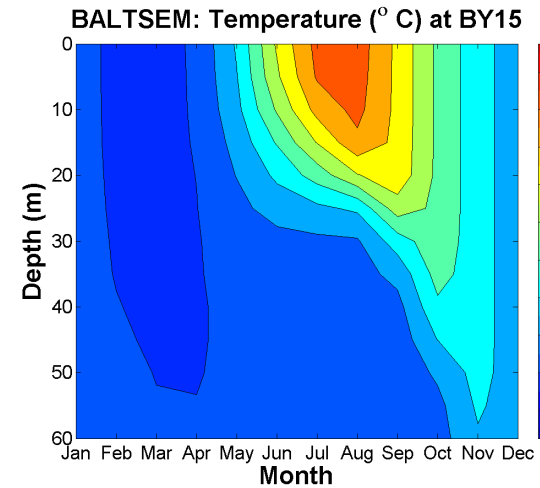
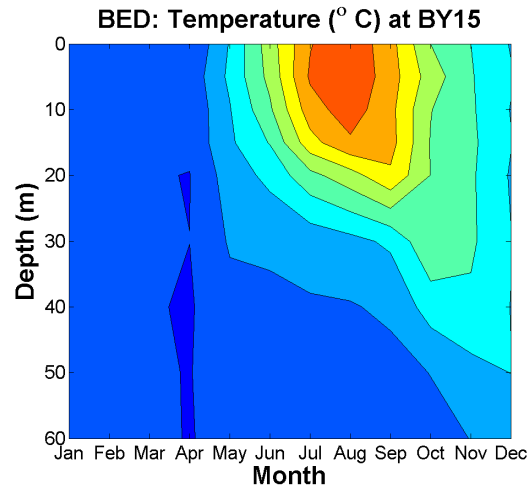
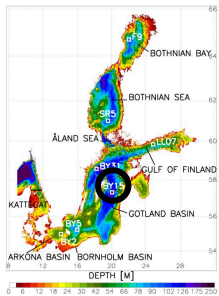
Nitrate at BY5



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Monthly mean 1970-2005

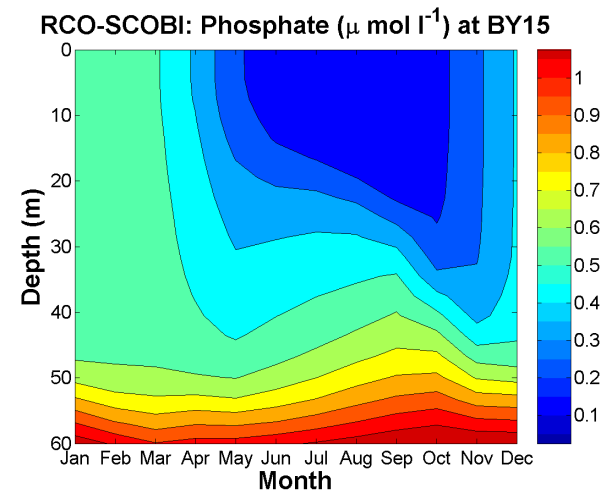
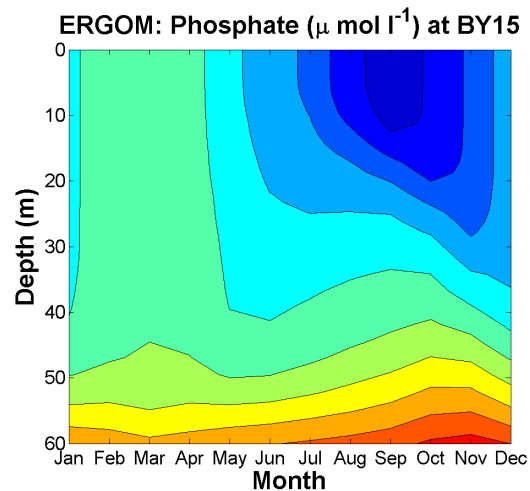
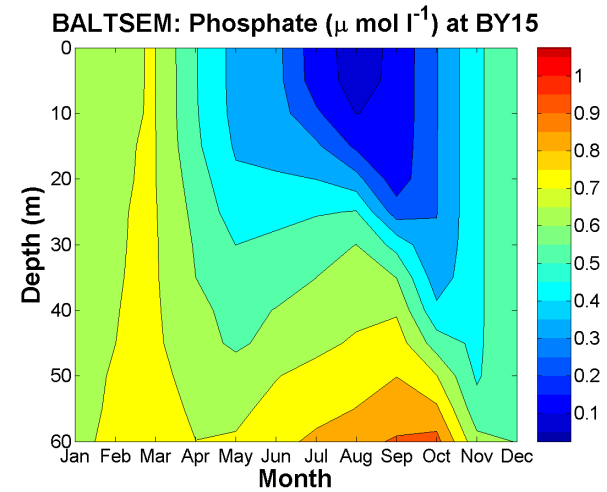
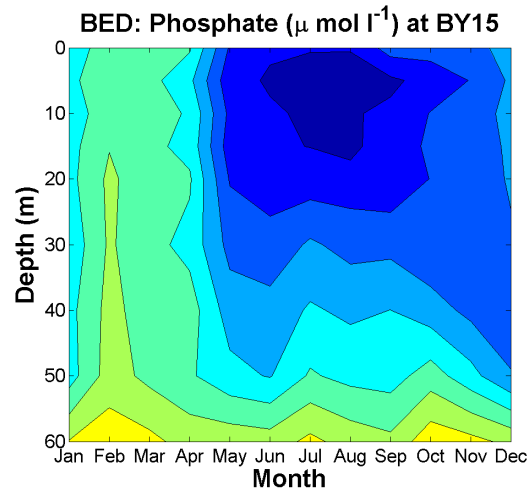
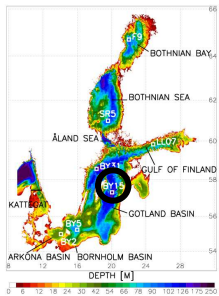
Temperature



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Monthly mean 1970-2005

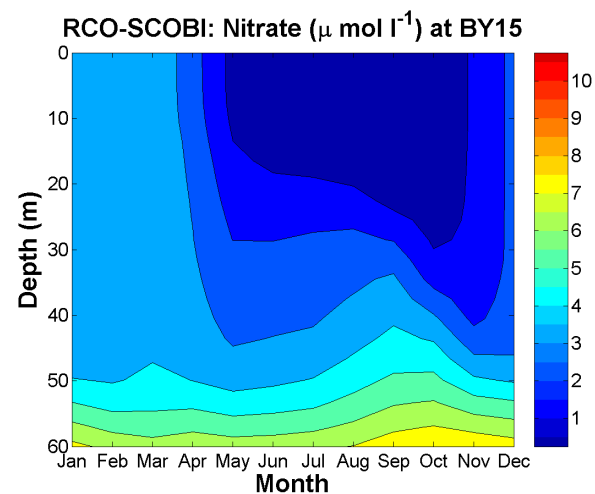
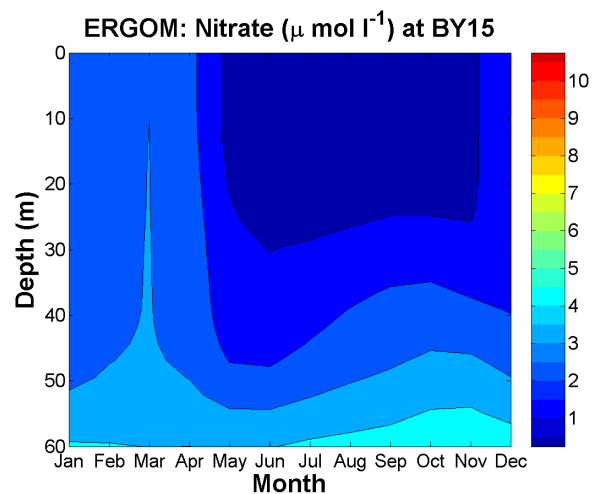
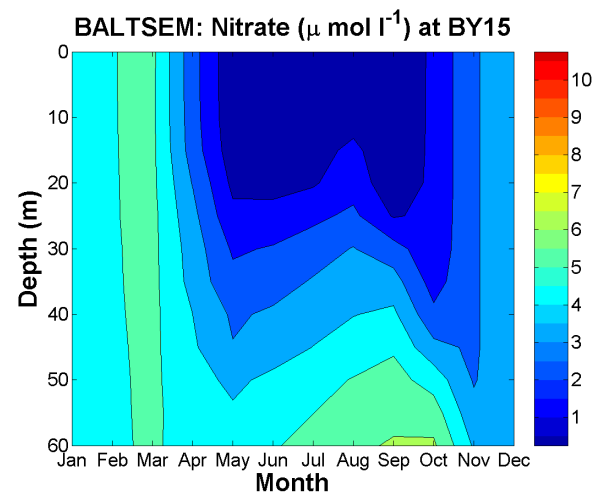
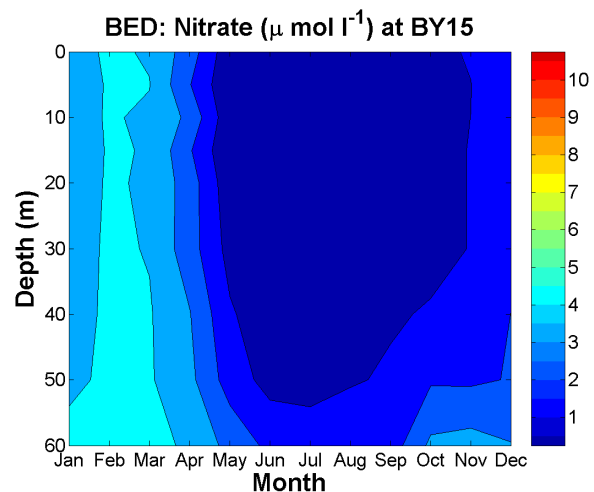
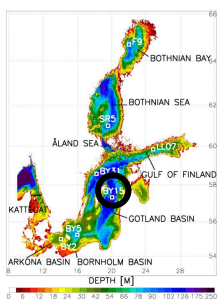
Phosphate



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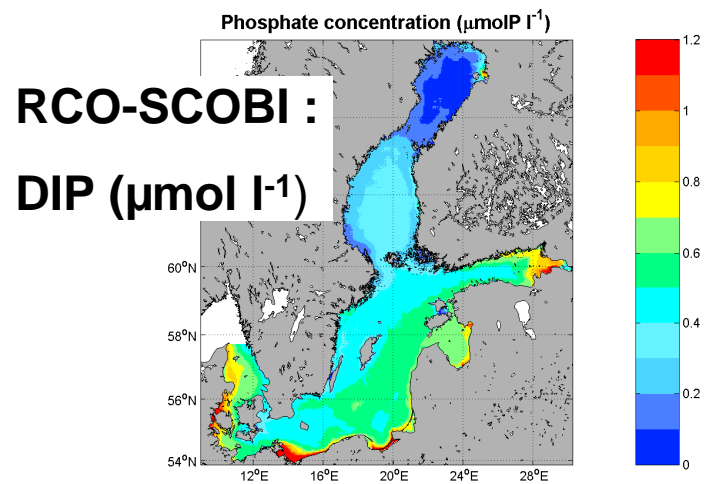
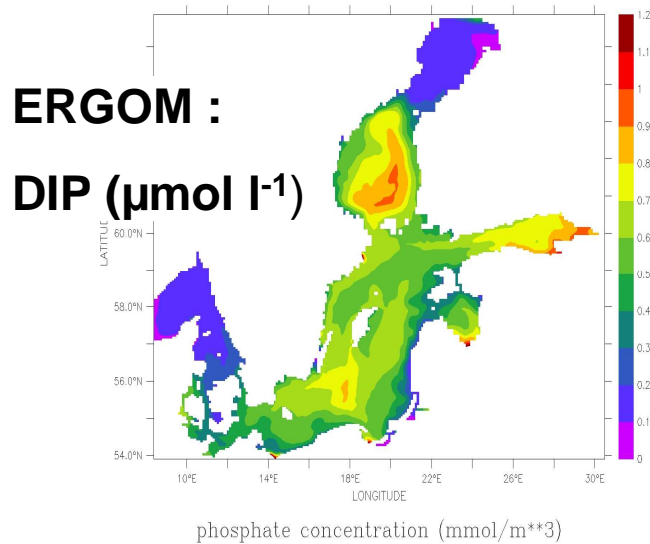
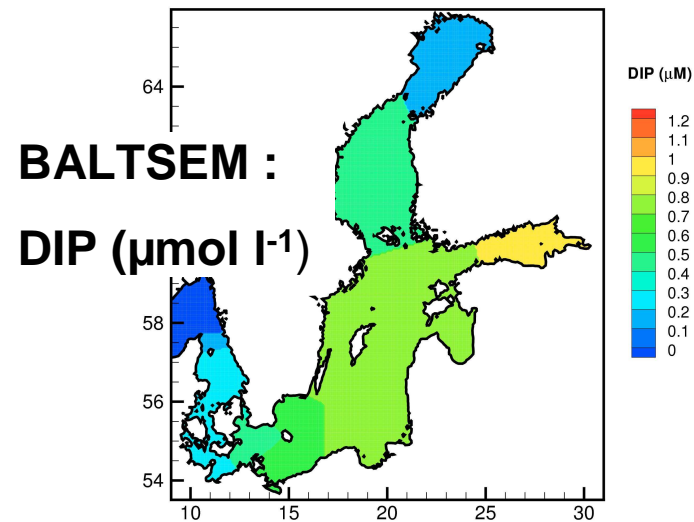
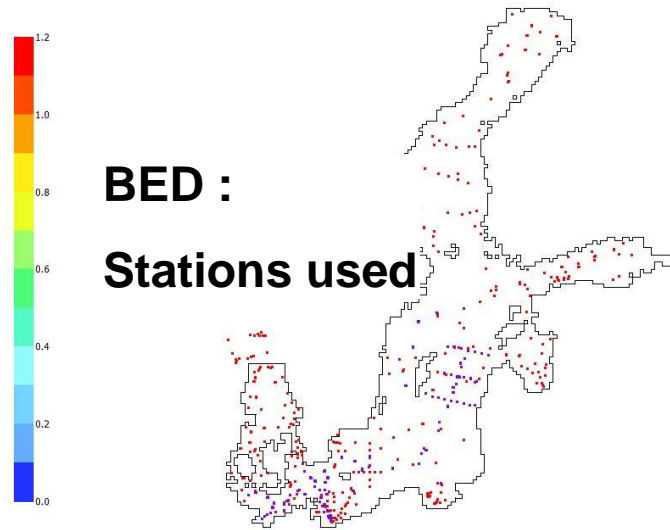
Monthly mean 1970-2005

Nitrate



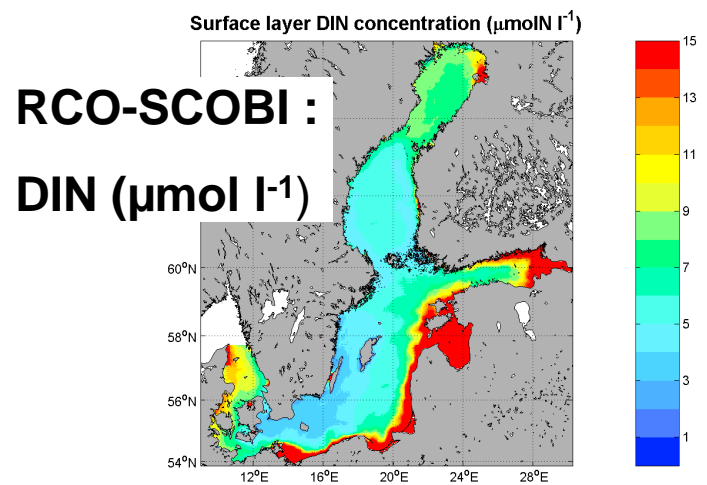
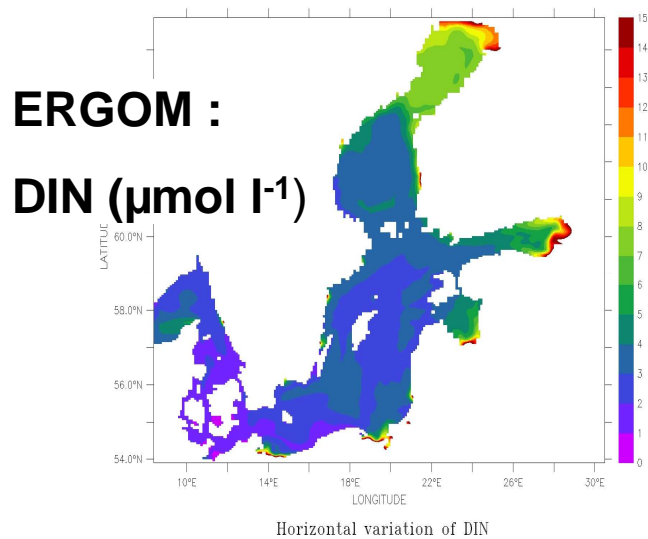
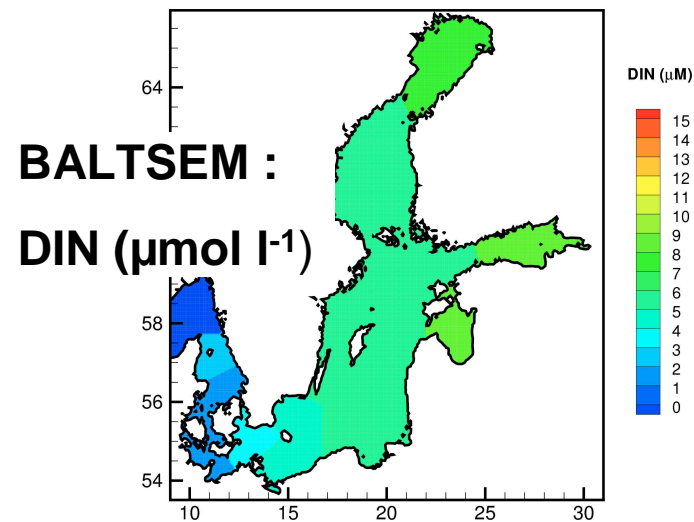
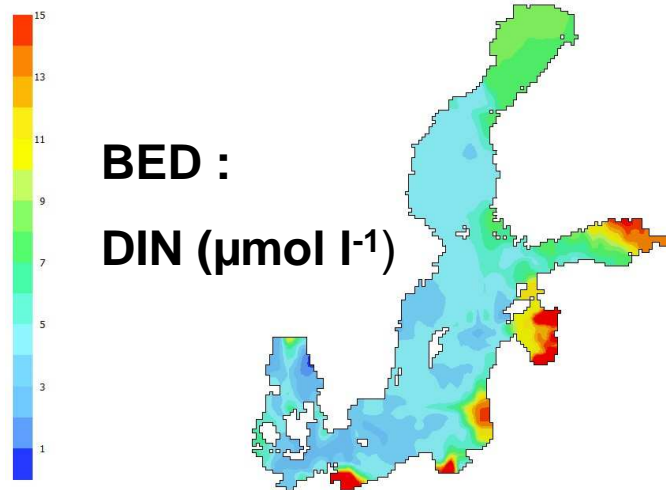
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March 0-10m mean 1995-2005



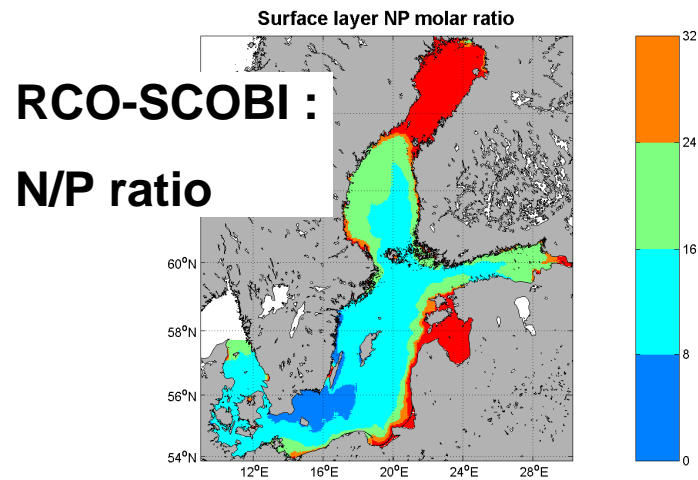
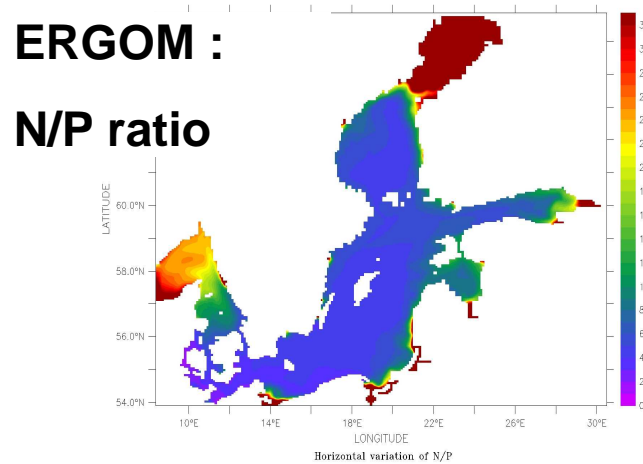
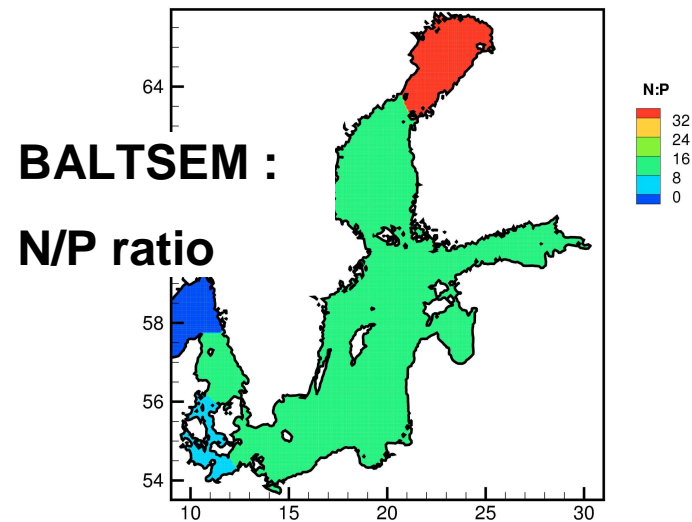
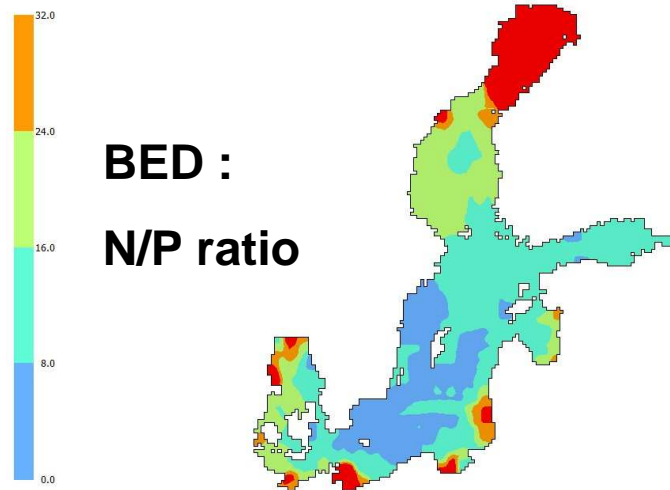
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March 0-10m mean 1995-2005



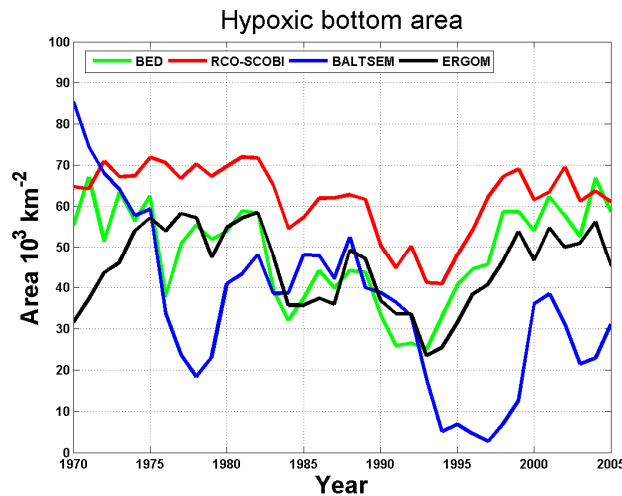
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March 0-10m mean 1995-2005

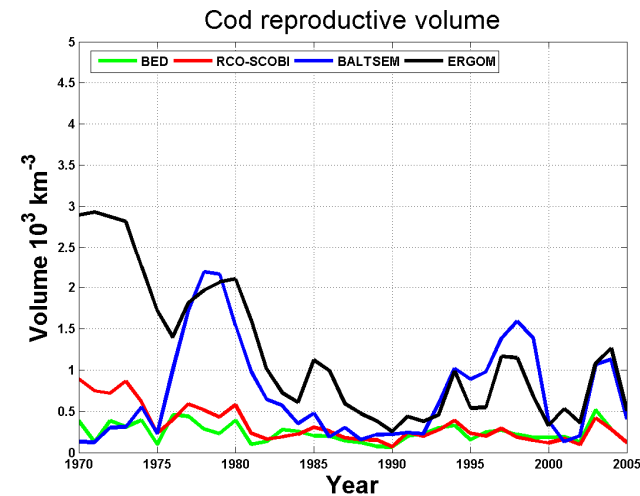


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Hypoxic area and cod reproduction volume Baltic proper



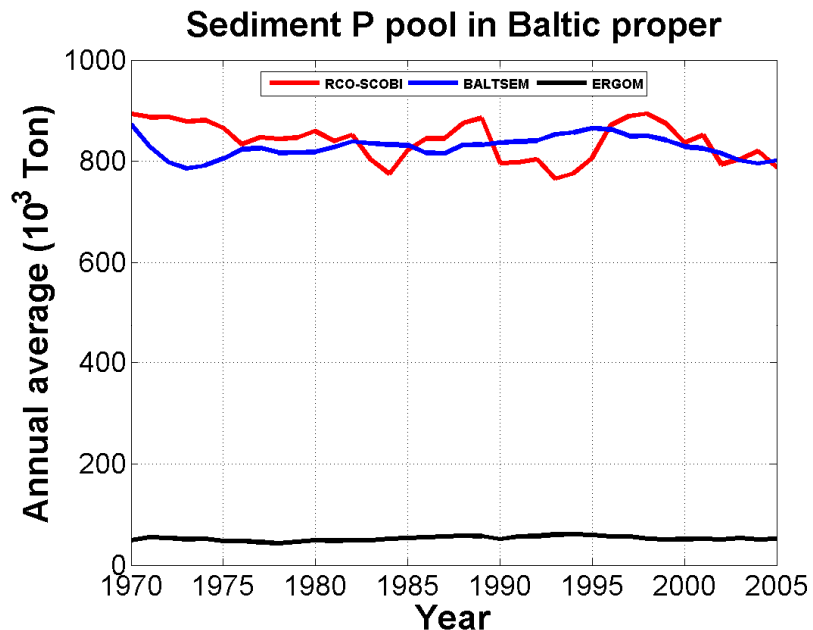
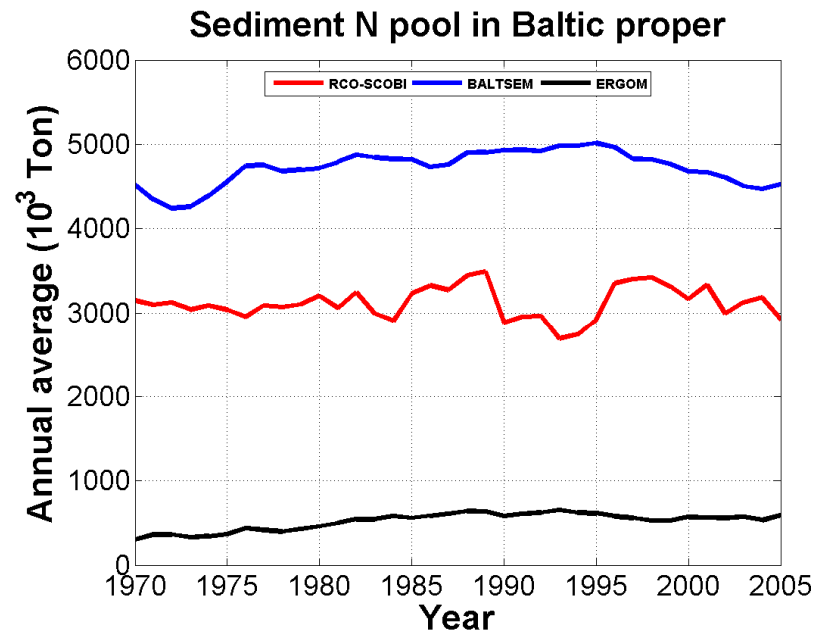
Annual average bottom
area covered with
 $O_2 < 2$ ml/l

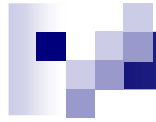


Annual average water volume with
 $O_2 > 2$ ml/l and salinity > 11 psu

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Continue discussions and work e.g. with differing loads and sediment nutrient pools and further investigations about nutrient fluxes and budgets





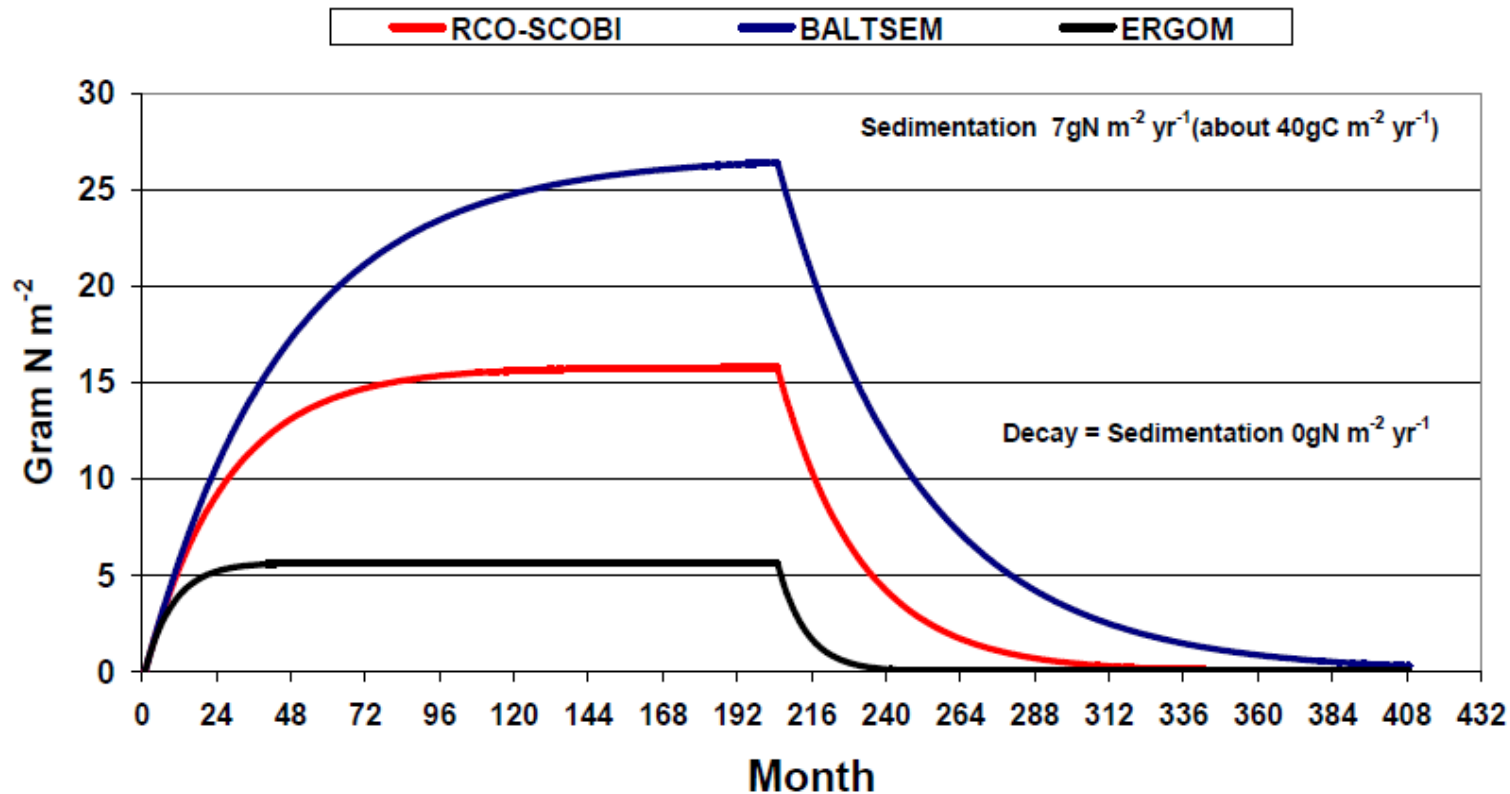
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Thank you !

Questions ?

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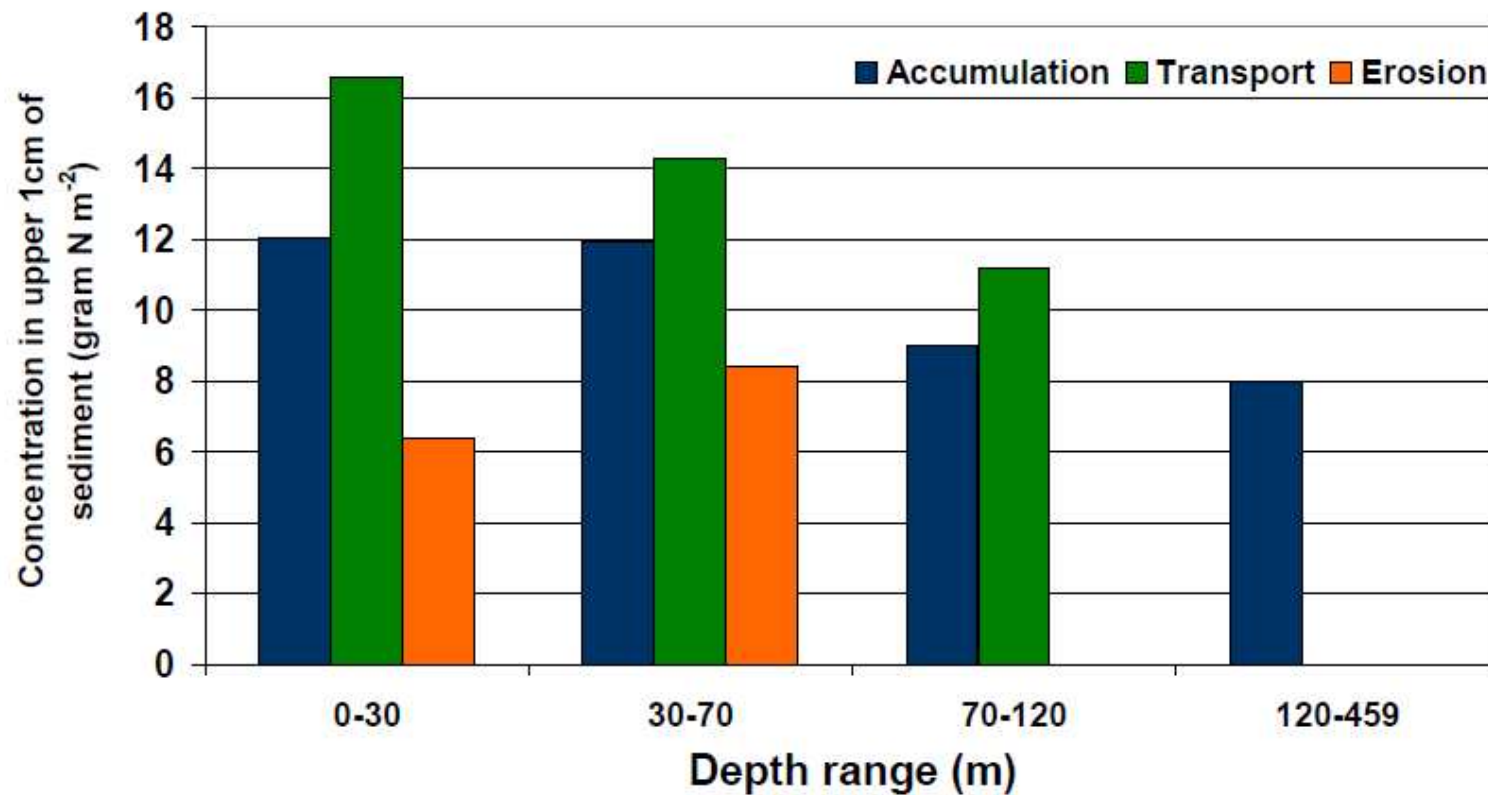
Sediment concentrations at $T=8^{\circ}\text{C}$



Theoretical consideration based on decomposition and burial rates in the models.

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Sediment N concentrations in Baltic proper



About 4-5 times more N in the upper 5cm of accumulation sediments

Figure based on data from Carman and Cederwall (2001)