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# BNI work for WP2

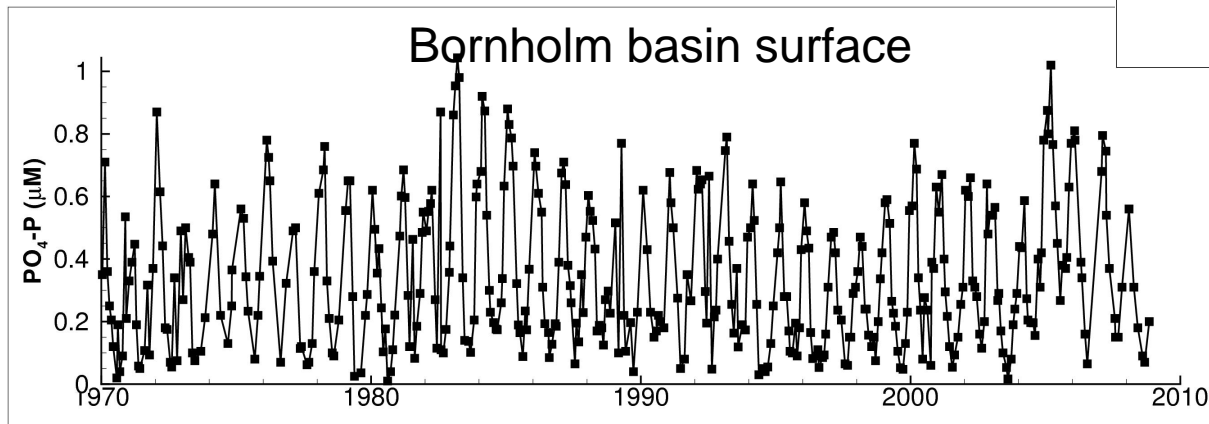
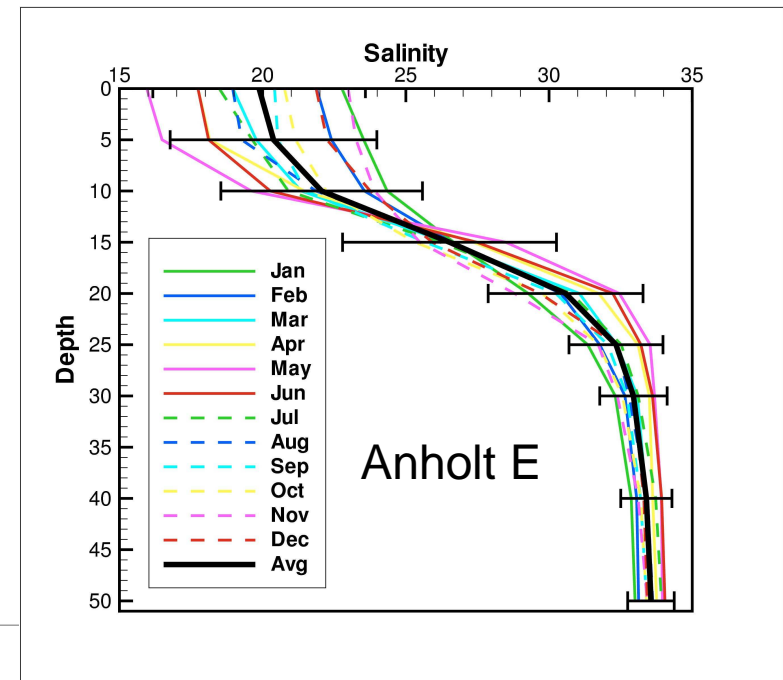
Bo Gustafsson, Oleg Savchuk and Bärbel  
Müller-Karulis

# Major tasks

- Ecosupport validation data set
- Load reconstructions
- Hindcast simulations 1970-2006
- Long-term hindcast 1850 – 2006
- Climate scenarios
- First runs with Foodweb model based on Baltsem hindcast

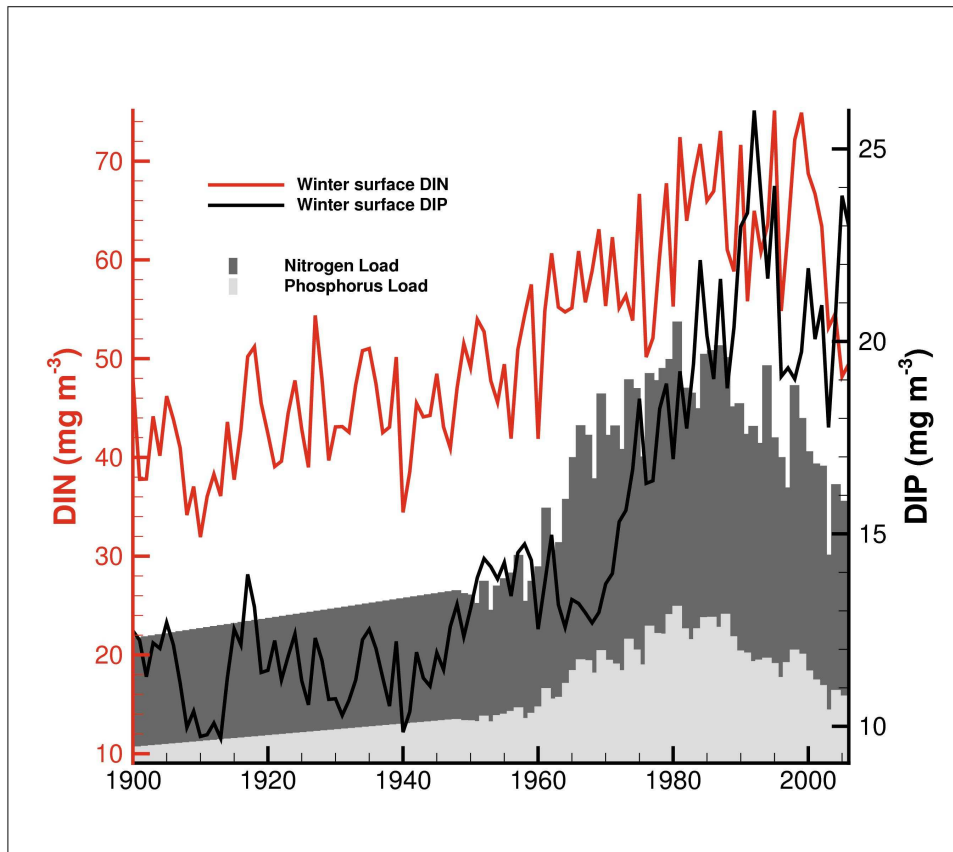
# Ecosupport validation data set

- First version released in April
  - monthly timeseries + statistics at standard depths for 16 selected stations 1970-2005
  - based on ~200000 S, T, 150 000 O<sub>2</sub>, 90 000 PO<sub>4</sub> and 70 000 N *quality controlled* measurements
- Second version will be released soon
  - Longer time-period (1900-2009)
  - Using new distributed data system connecting BED+SYKE+SMHI+IOW+NERI databases -> more data especially in recent years



Available from Ecosupport home page!  
Most raw data is available for free download or data manipulation via DAS ([nest.su.se](http://nest.su.se))! TRY IT!

# Long-term hindcast



- Shows non-linear and delayed response to load increase
- Qualitative correct development
- Accurate for validation period (1970-2006)

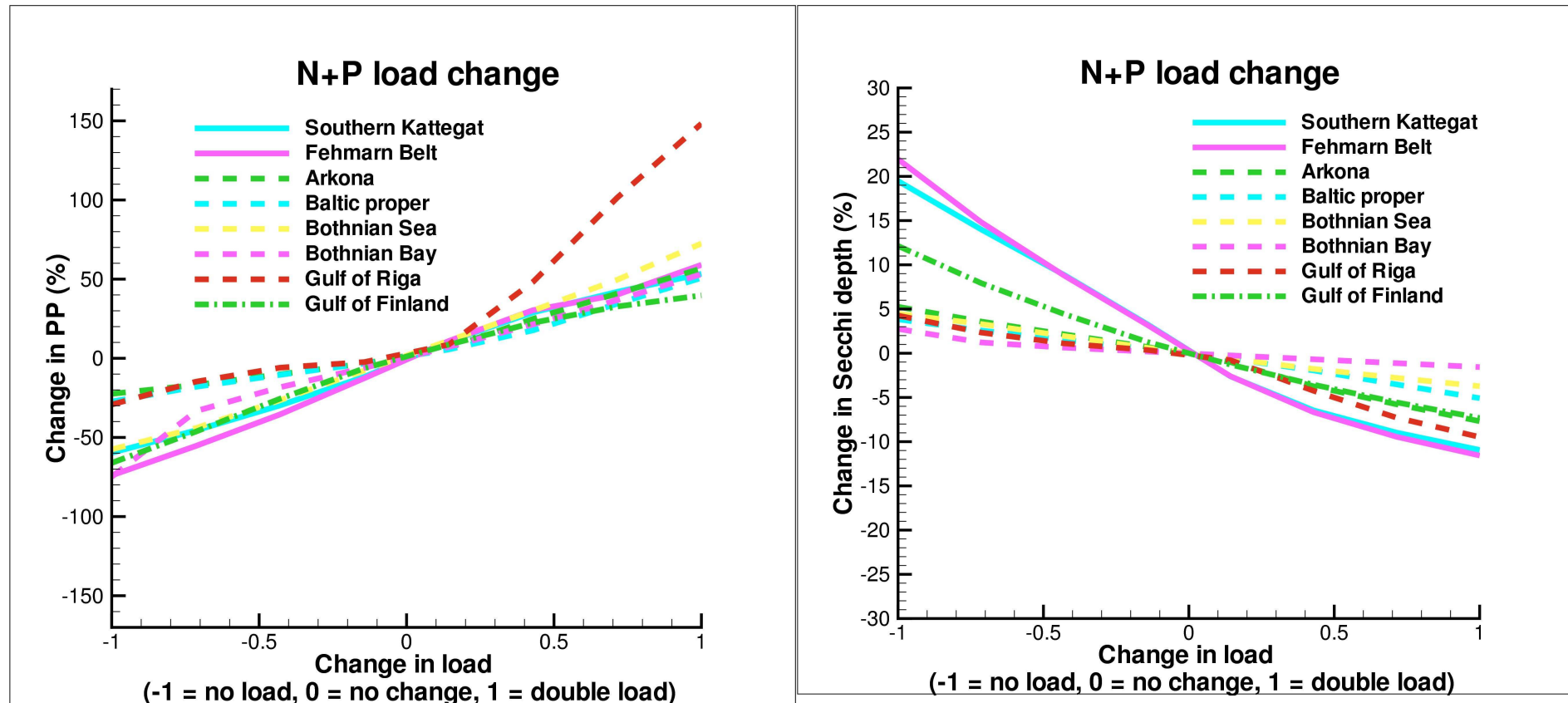
## Shortcomings:

- Still not “real” weather before 1961
- Probably too high DIP concentrations before 1970 or so – correction of loads?

# Experiments

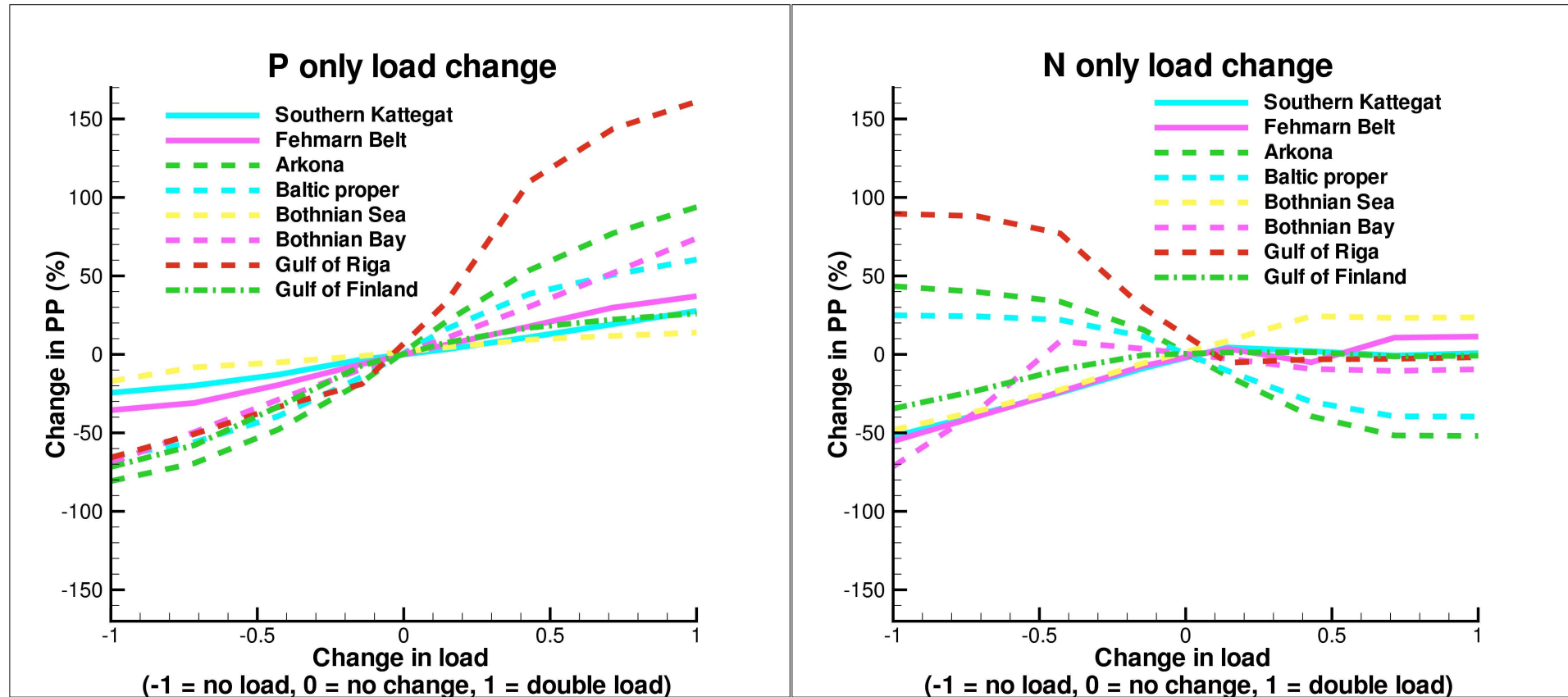
- All loads (riverine, point sources and atmospheric sources) are changed in proportion to the reference loads everywhere
- Changes are assessed using
  - annual primary production
  - annual average Secchi depth
- Runs are only 18 years so not in steady state!

# Experiments



# Experiments

## Changing only N and P loads



# Scenarios

## Climate scenarios 1961-2099

RCAO – ECHAM5 A1B

RCAO – HadCM3 A1B

Sealevel forcing and runoff from statistical downscaling (by SMHI)

“Real” nutrient loads 1961-2006, thereafter according to load scenarios (not coupled to runoff)

Initial condition from hindcast

## Load scenarios

Implemented 2007, constant thereafter

Reference – average loads 1997-2003

BSAP – reduction with 135 kT N and 15 kT P

Intensive agricultural development around the Baltic (Humborg et al, 2009) – increase with 341 kT N and 16 kT P

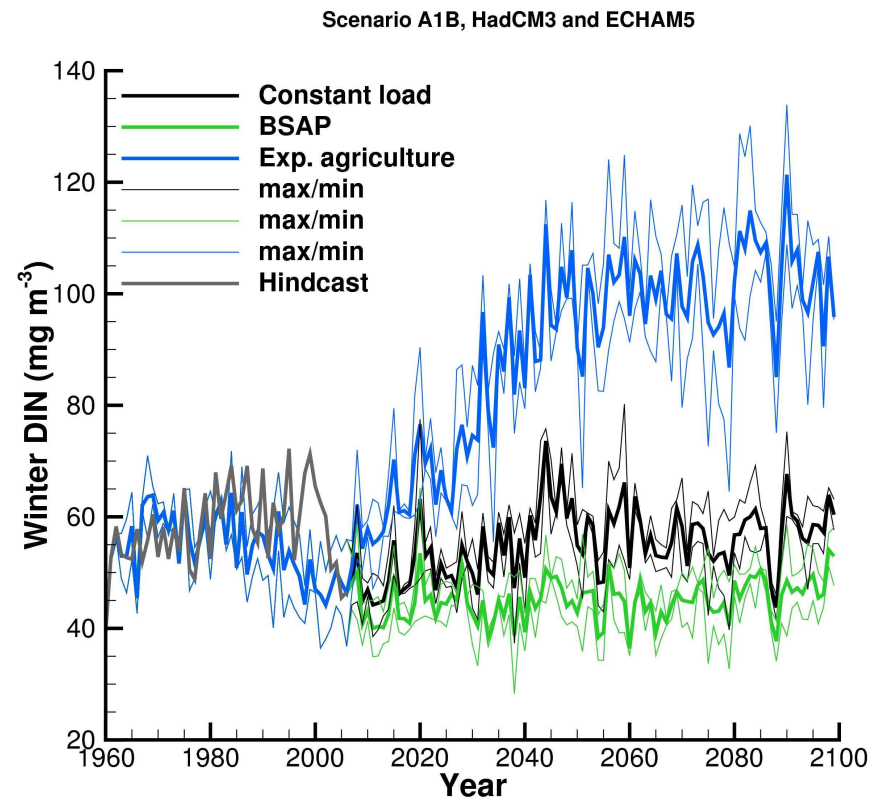
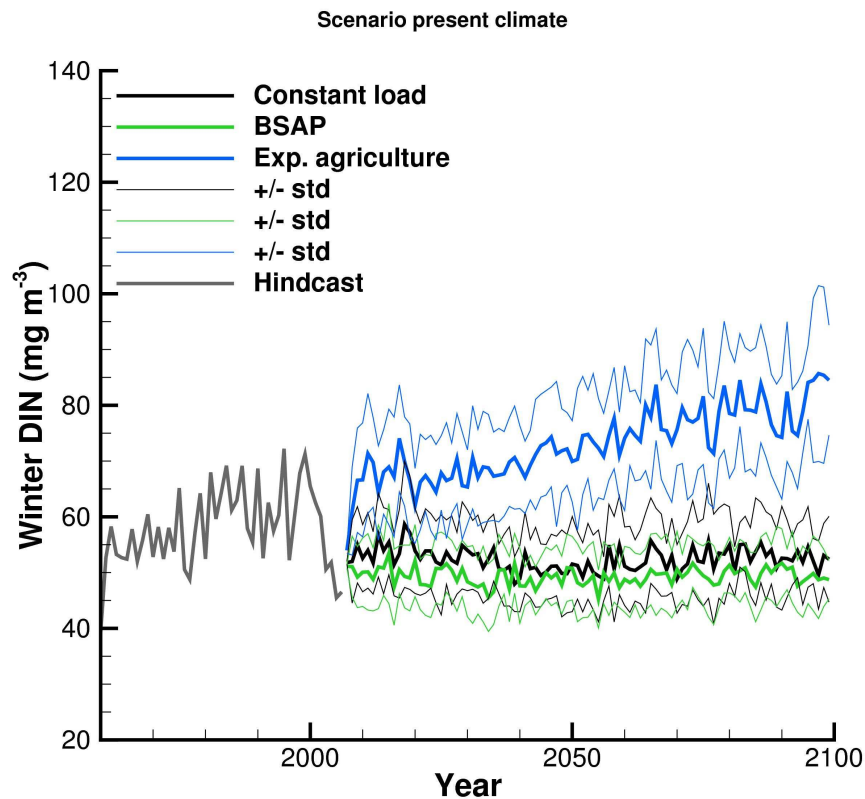
## Present climate met. forcing

Statistically generated, only small variations in river runoff

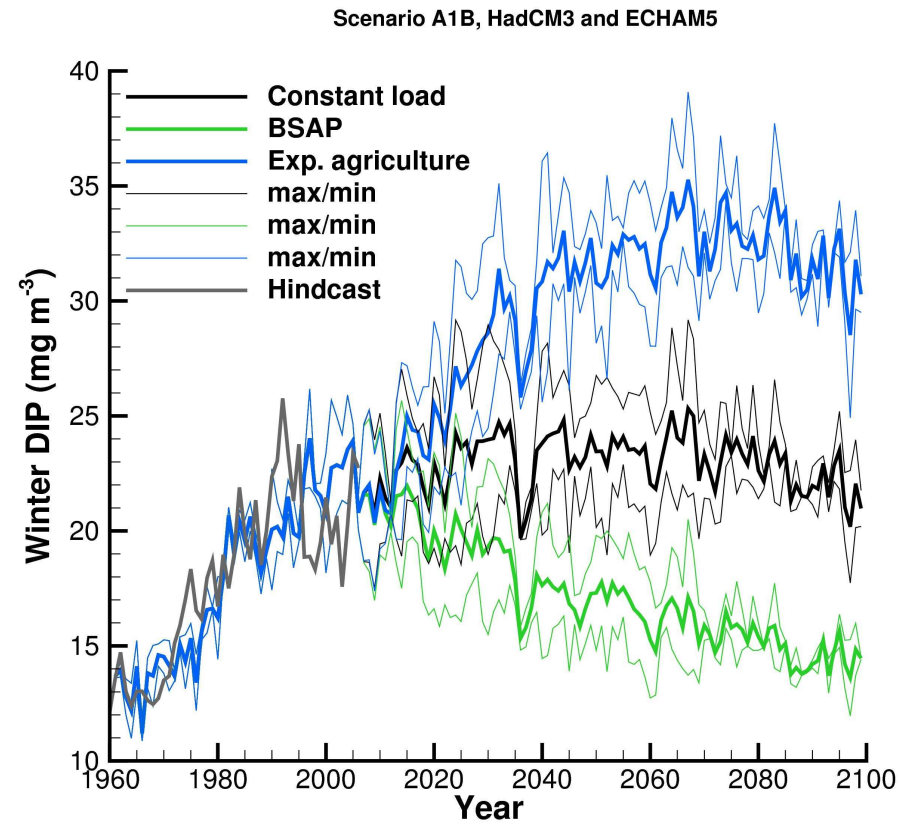
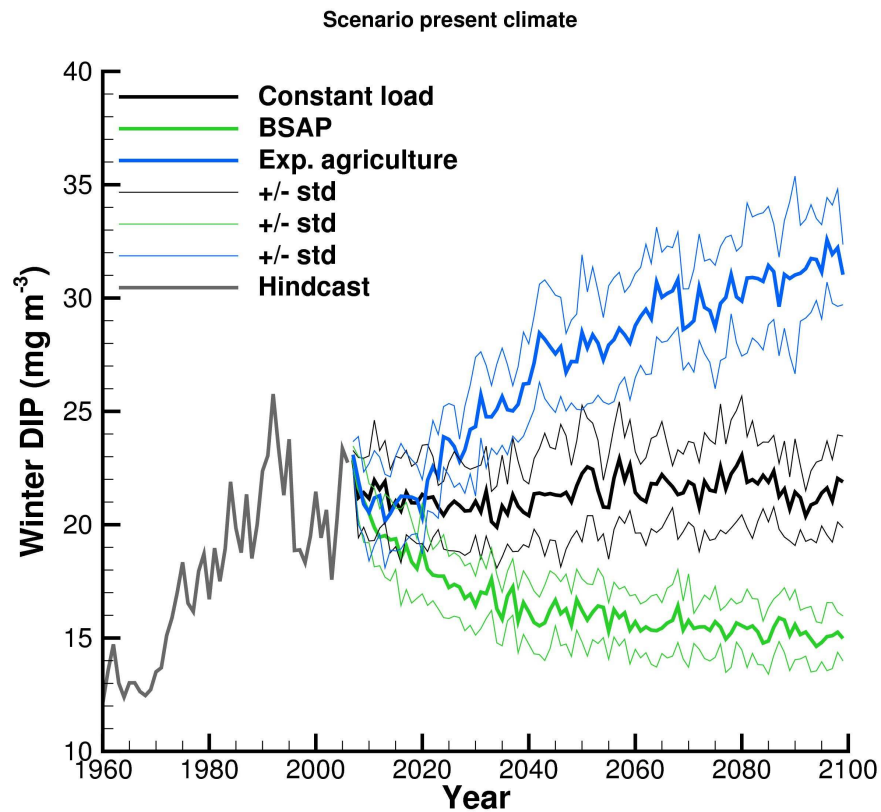
12 simulations 2007-- 2099



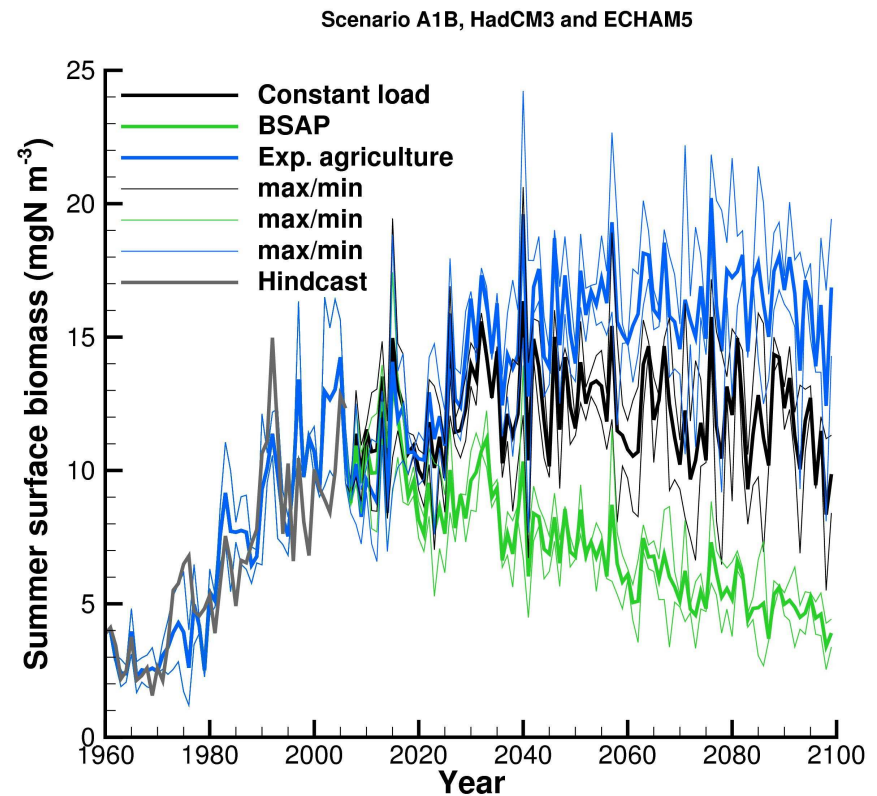
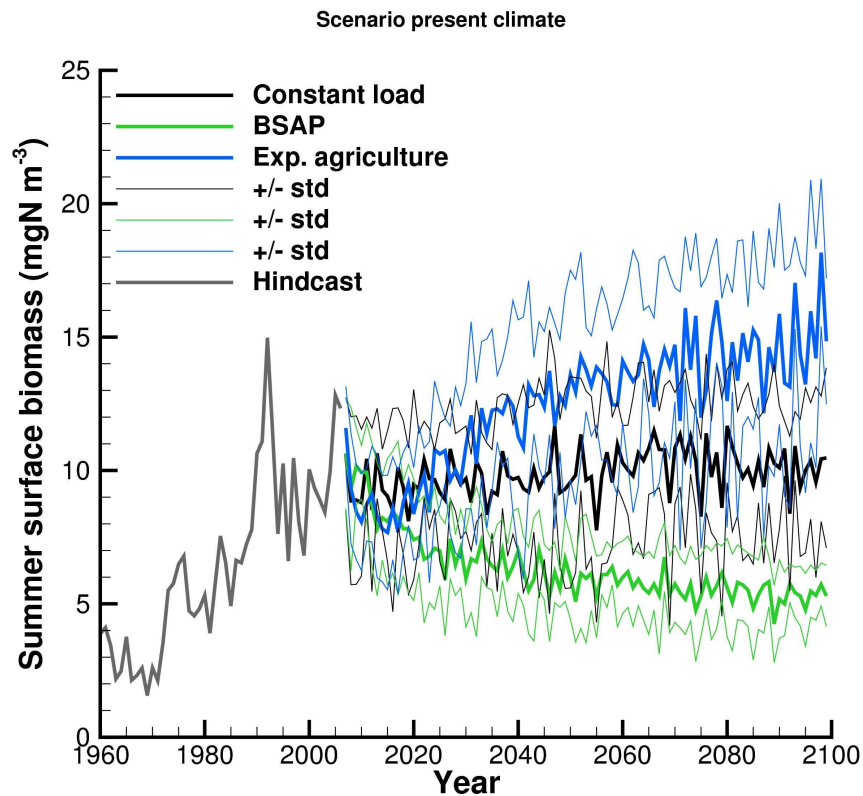
# Winter DIN - Baltic proper



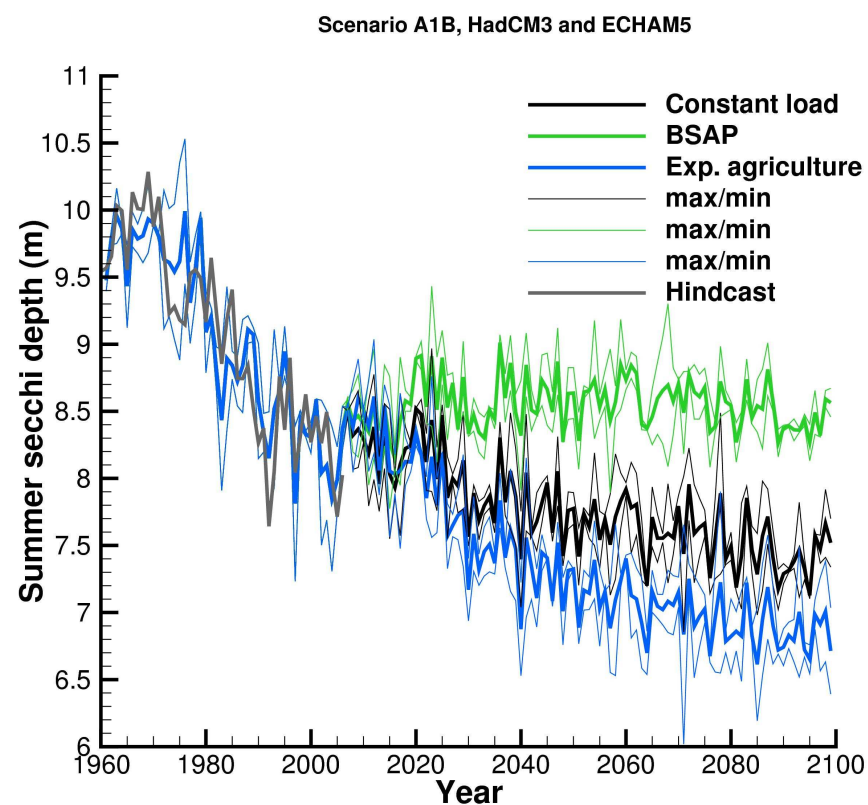
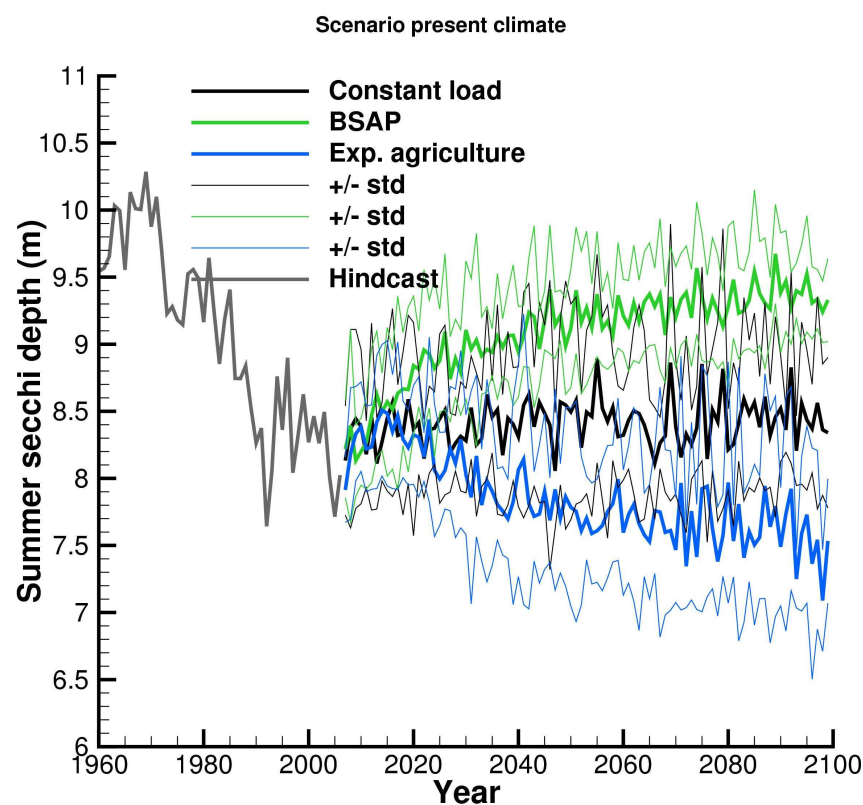
# Winter DIP – Baltic proper



# Summer phytoplankton biomass Baltic proper



# Summer Secchi depth Baltic proper



## Upcoming work

- Implement “real” forcing for the 1850-2000 simulation and assess performance
- “Validate” climate scenarios – fixing the last bits and pieces
- Attempt a recalculation of BSAP maximum allowable load calculation in changing climate
- Further develop interface between Baltsem and the food-web model