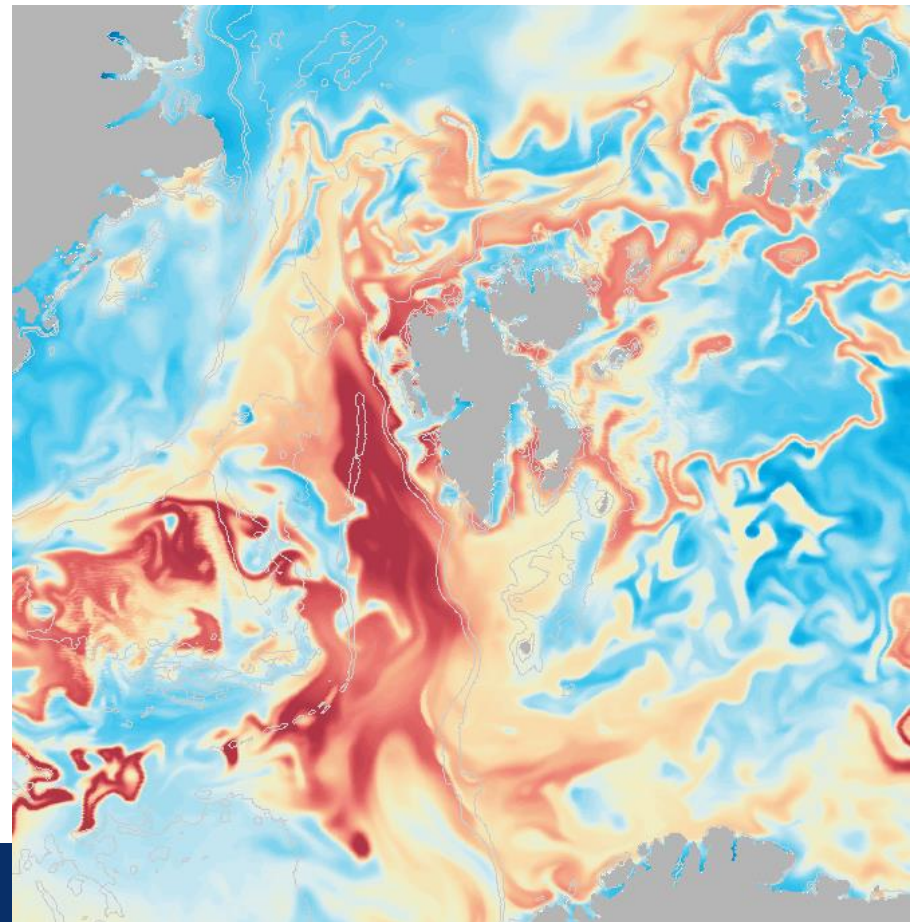


# SINMOD-

Consequence module-coupled physical and biological models

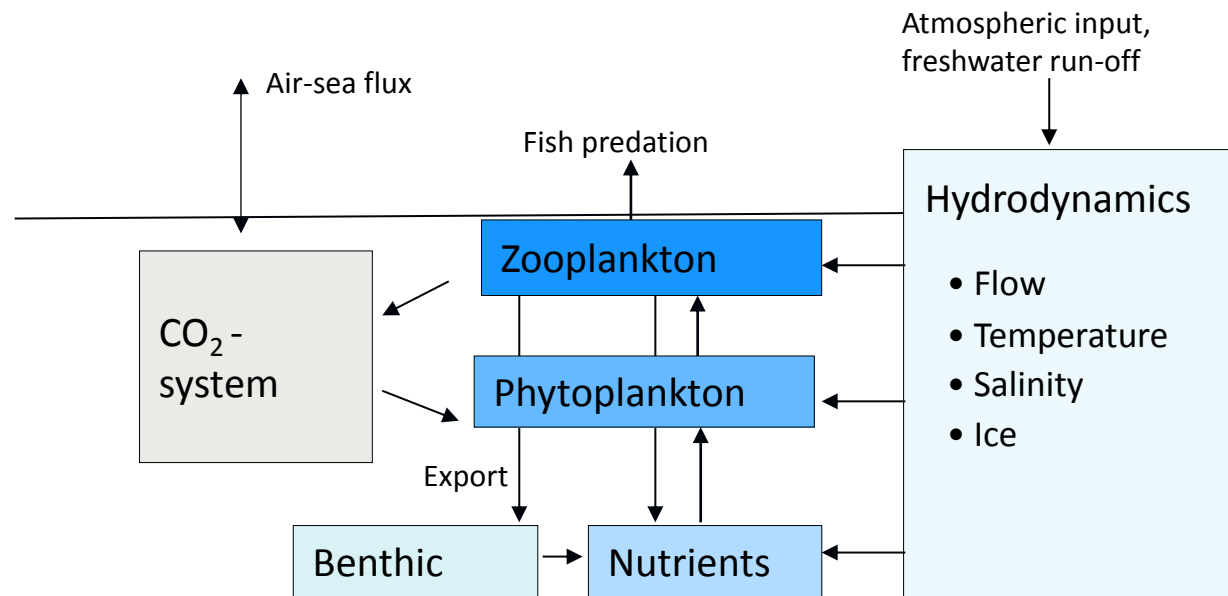
Ingrid H. Ellingsen

SINTEF Fisheries and Aquaculture,  
Trondheim

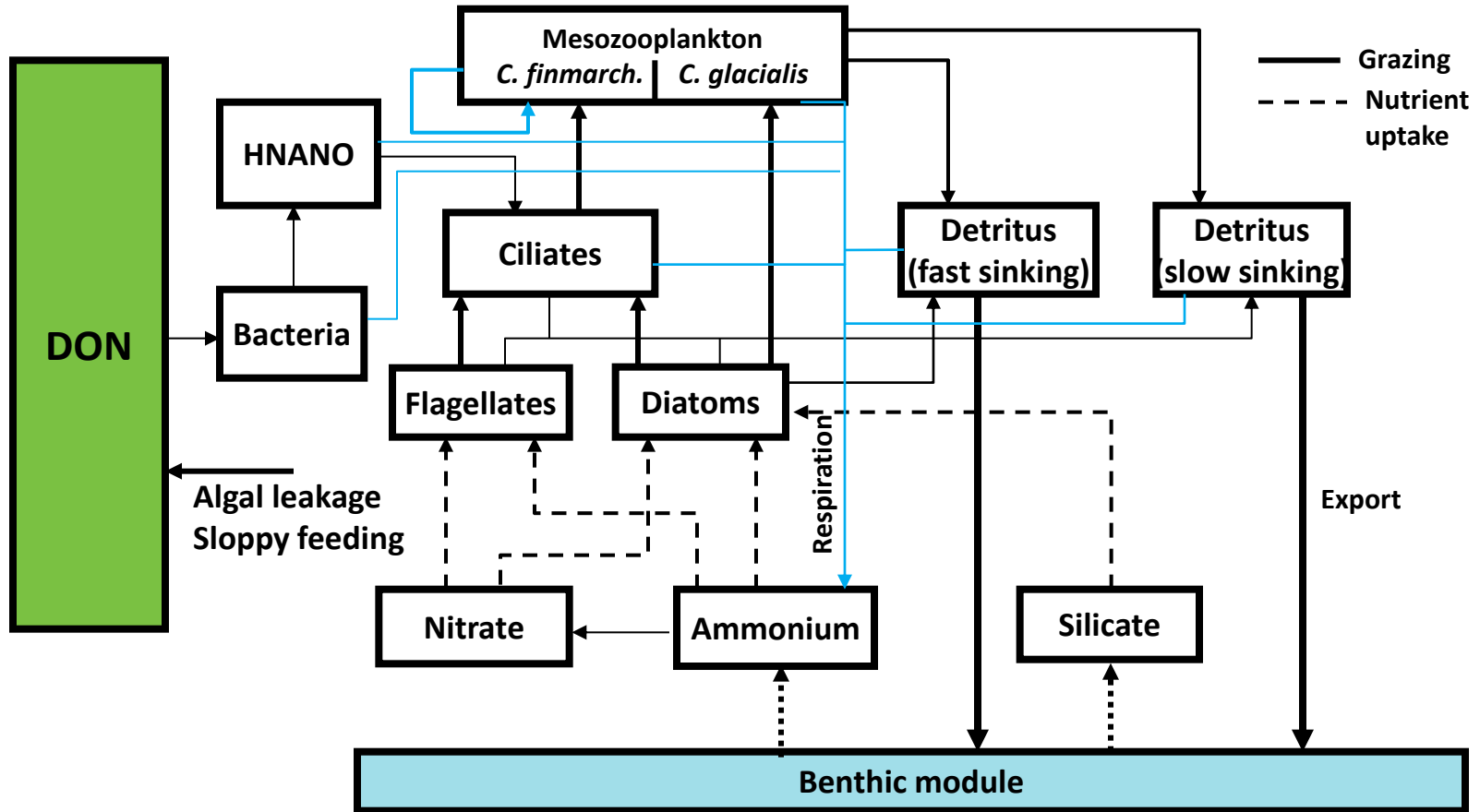


# SINMOD- basic model components

- Developed at SINTEF since 1987
- Coupled model system



# Structure of the ecological model

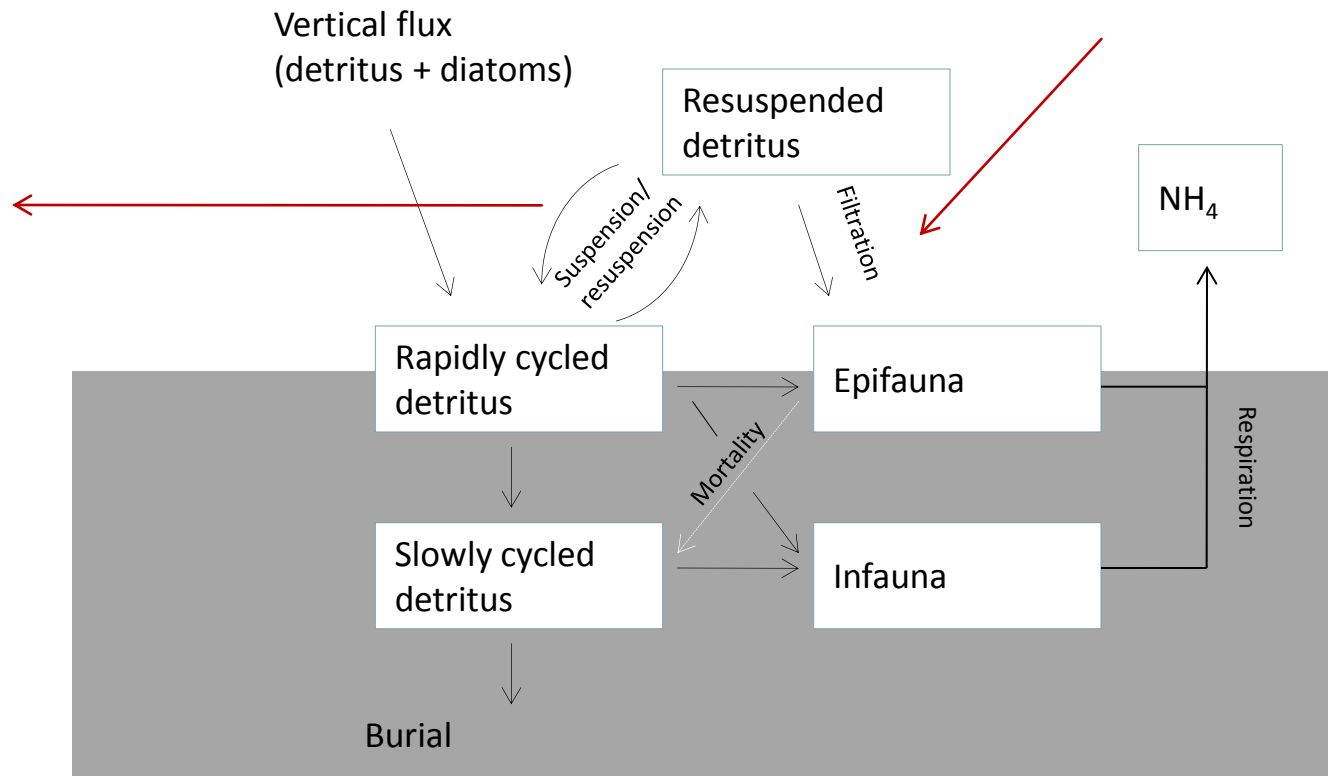


Fixed C/N – ratio = 7.6 (Marit Reigstad)

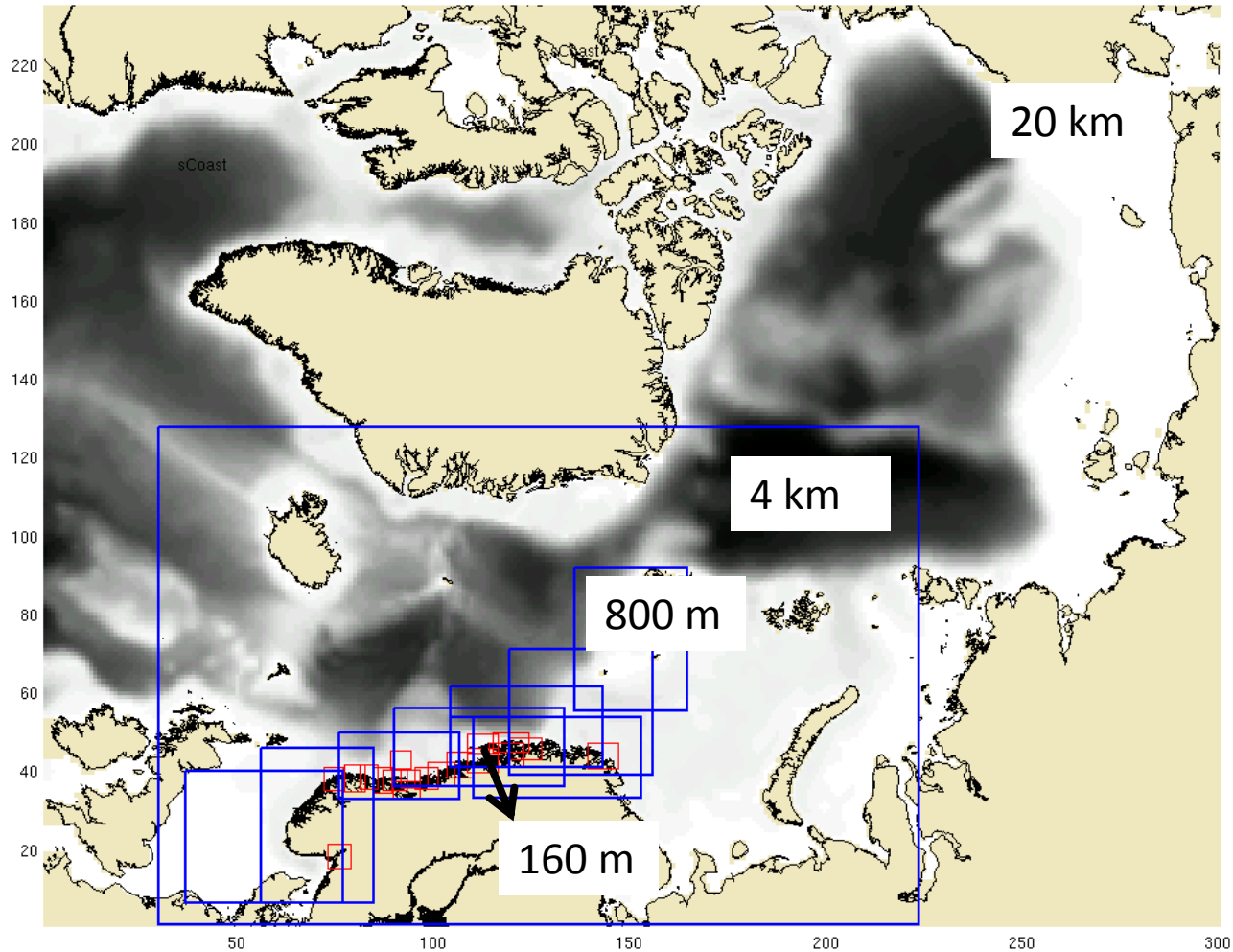
# Benthic module

Concentration depending on BBL

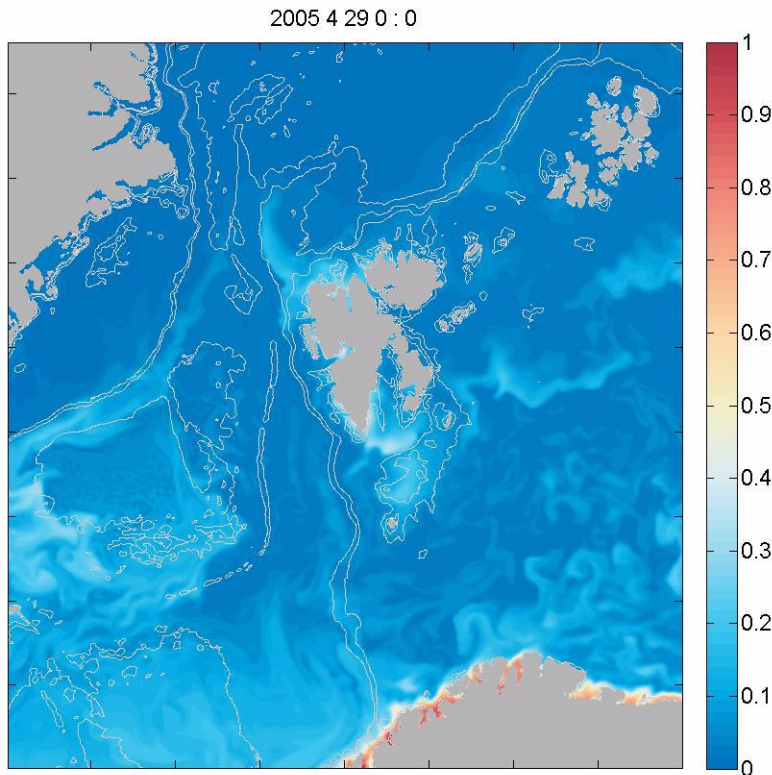
Calculation of suspension and resuspension of organic material depending on bottom velocity



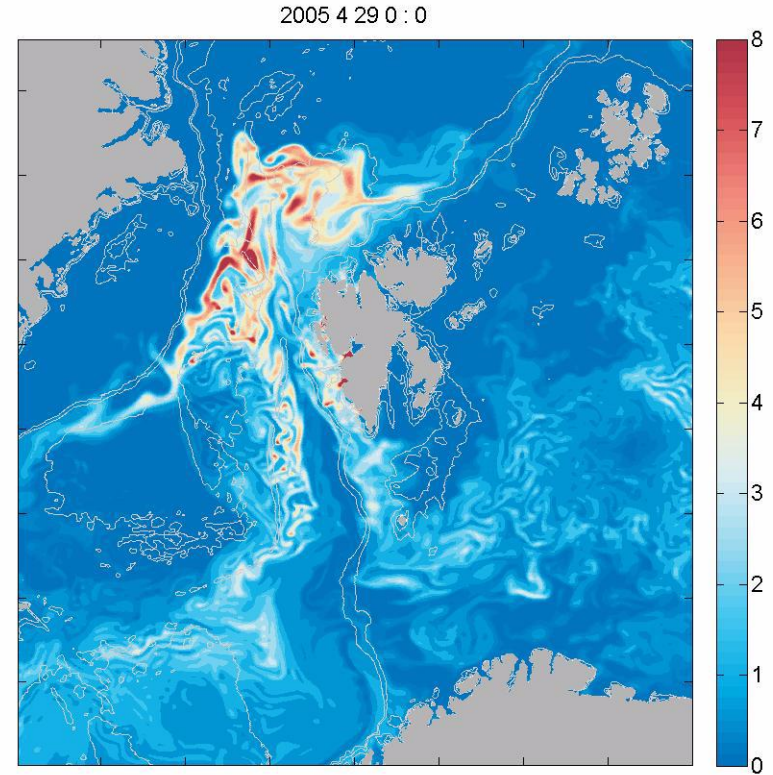
# Model configurations



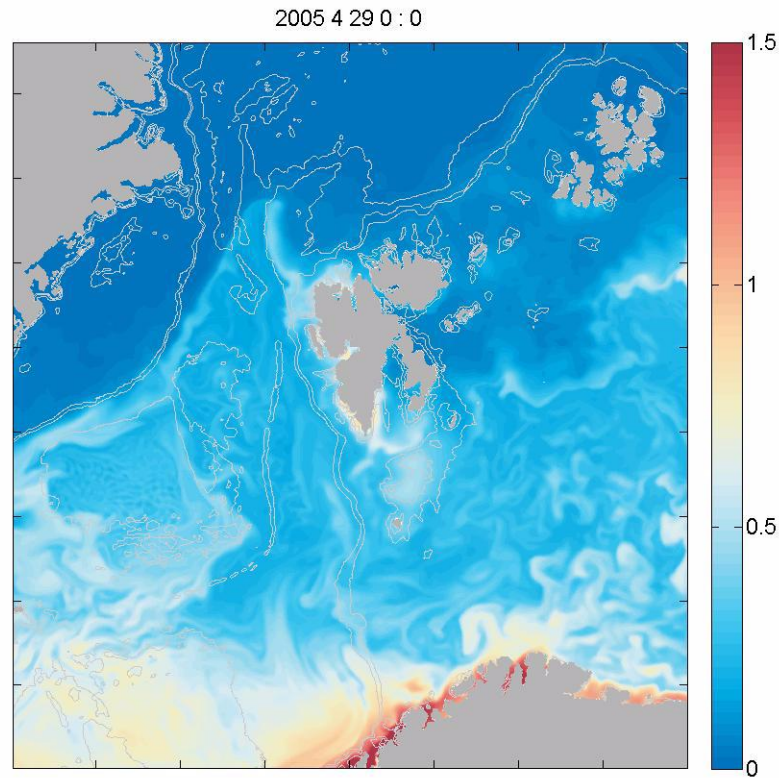
## Phytoplankton (mg Chl m<sup>-3</sup>) (surface)



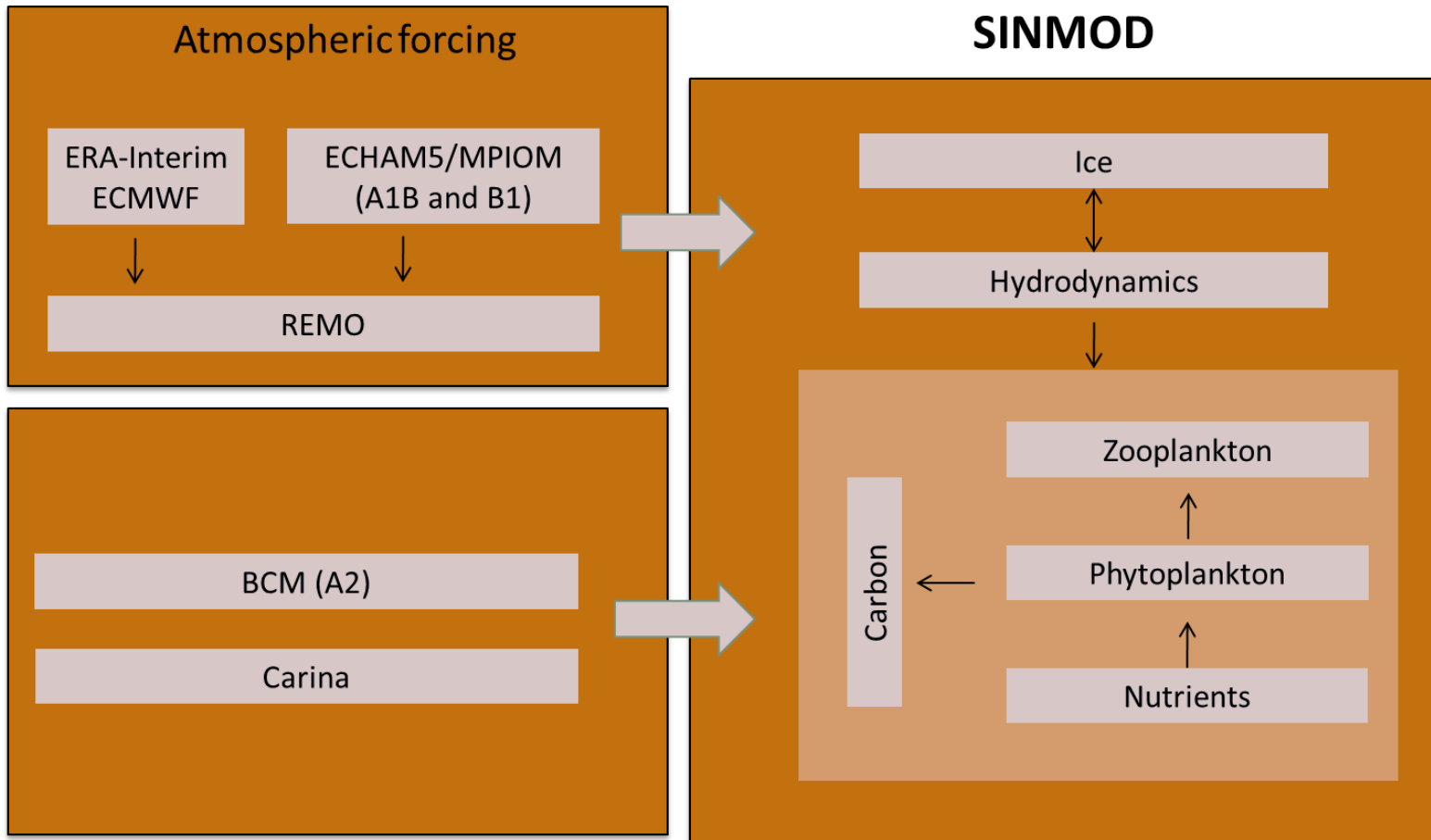
## Zooplankton biomass (g C m<sup>-2</sup>)



## Gross primary production (g C m<sup>-2</sup> d<sup>-1</sup>)

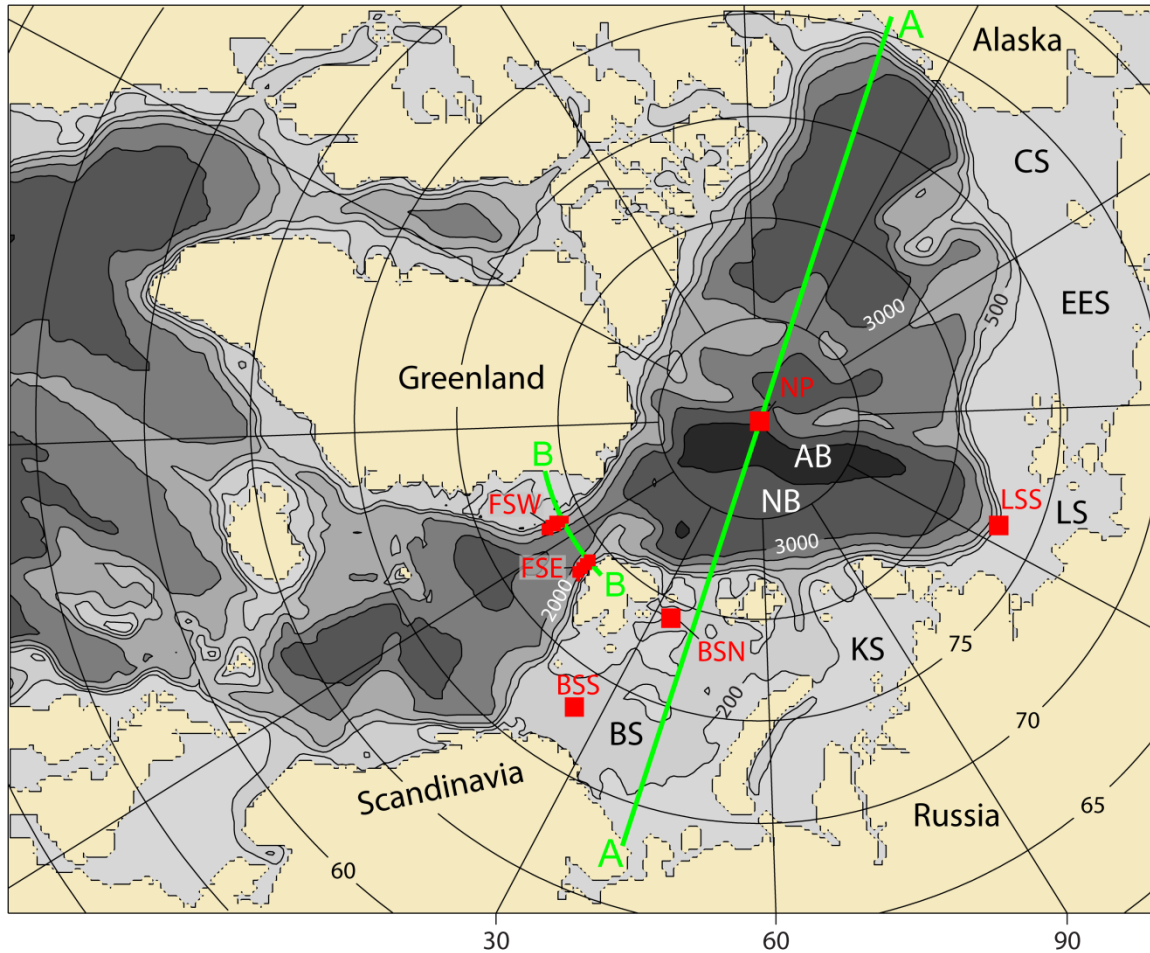


# Model system- climate change scenarios

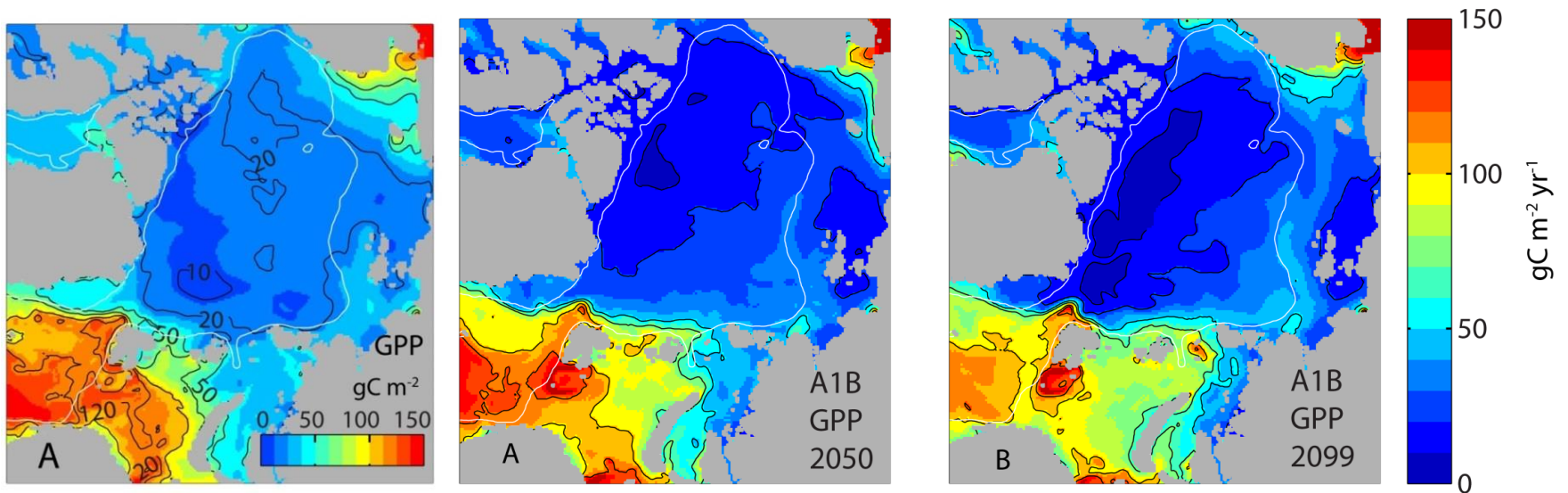




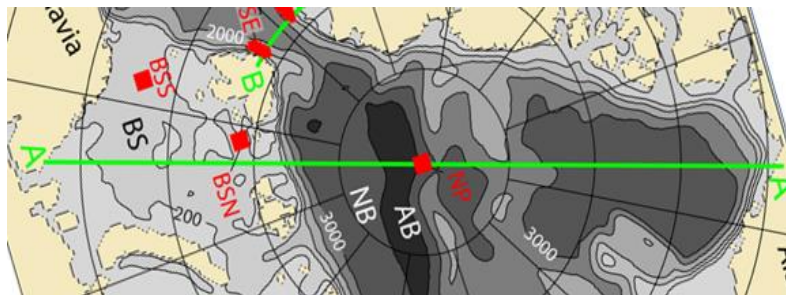
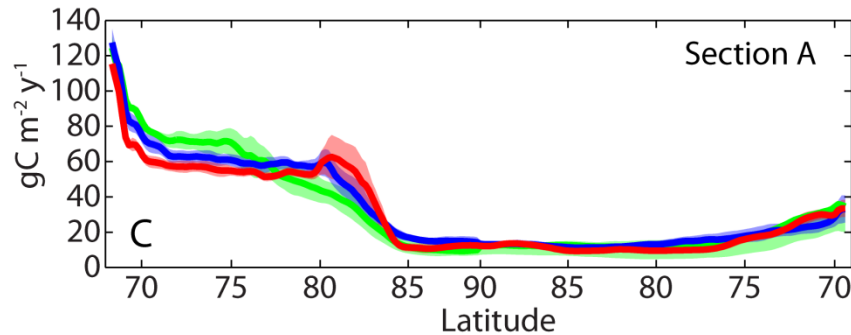
# Model domain (horizontal resolution of 20 km)



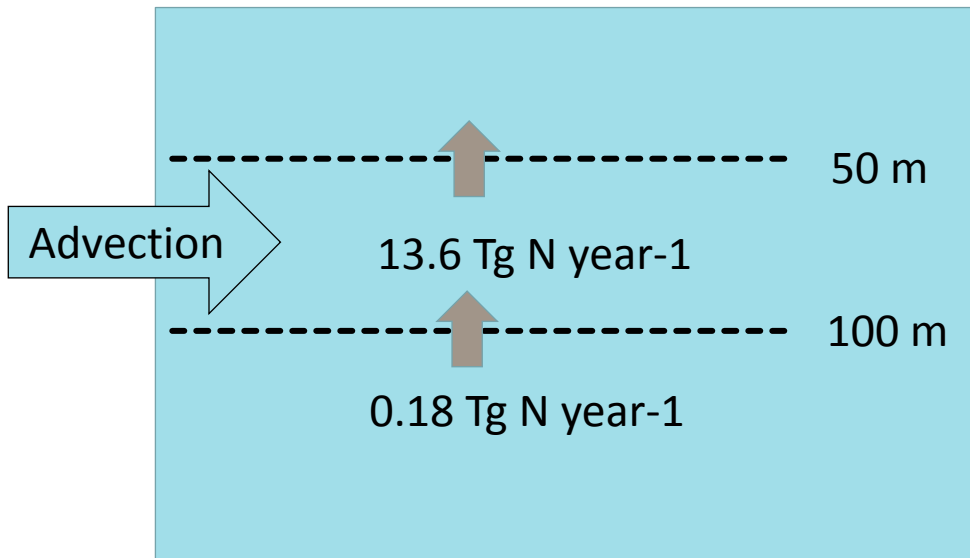
# Climate change effect on primary production



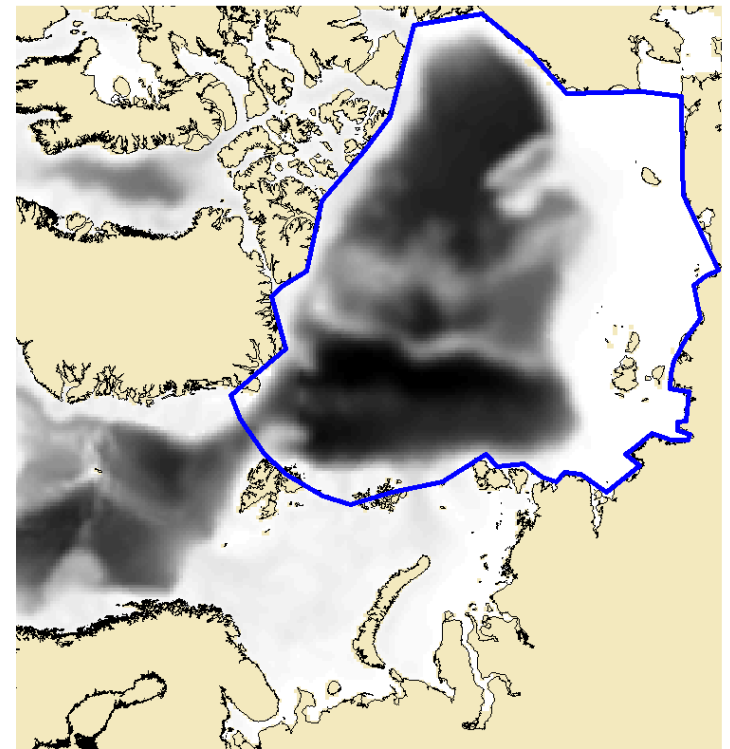
# Annual primary production in the Arctic Ocean



# Vertical fluxes (10 y mean, 1994-2003)



Estimated new production:  
 $13.6 * 7.6 = 100 \text{ Tg C year}^{-1}$



## Compared to other published data (Tg N year<sup>-1</sup>)

	Total	Fram Strait	BSO	Bering Strait	Davis Strait
SINMOD	-0.5	-11.	12.5	2.0	-4.
Torres-Valdes et al. (2013)	0.5	-4.5	14.8	4.0	-13.8
MacDonald et al. (2010)	18.8				

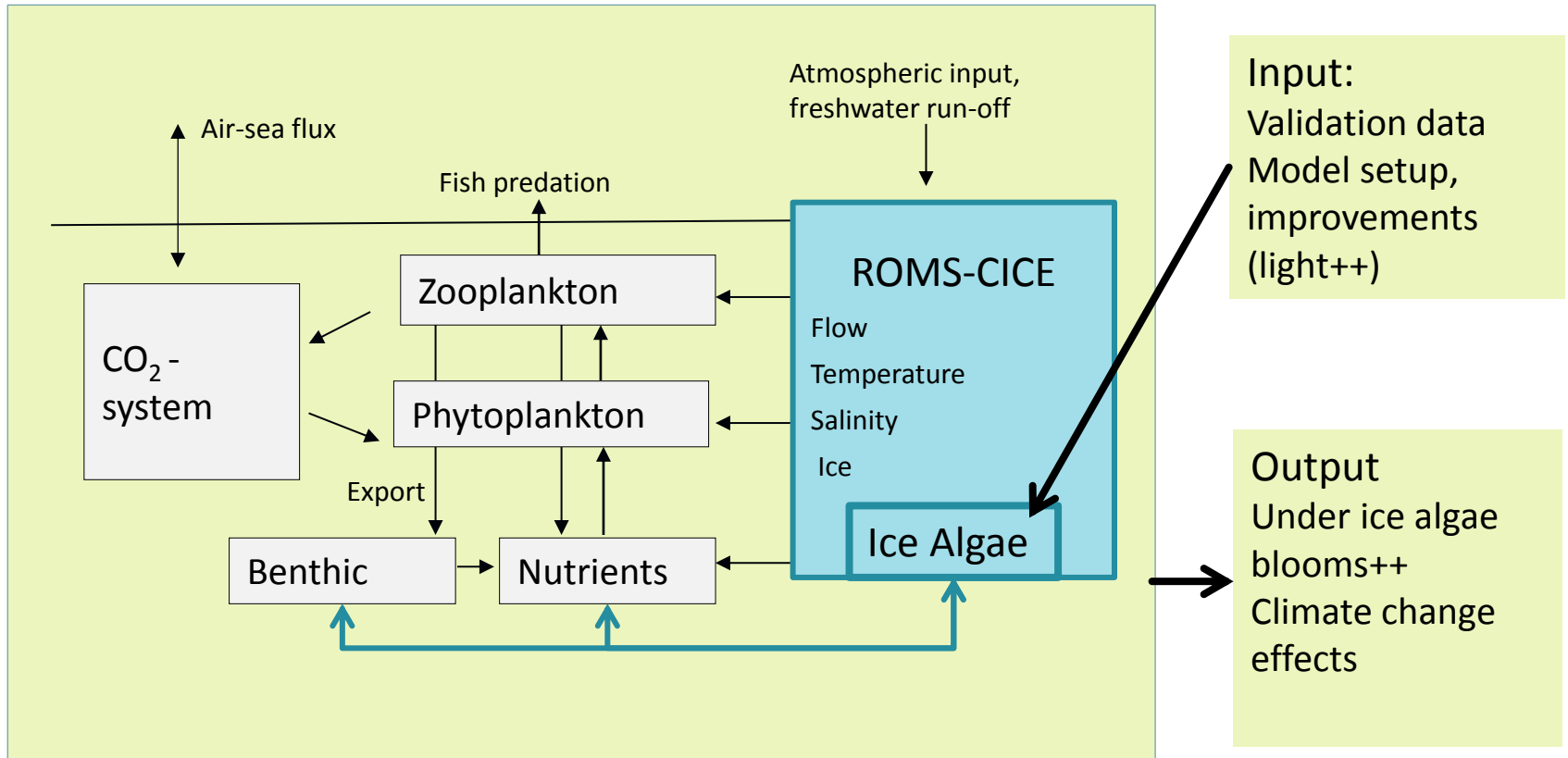
### Denitrification

6-29 Tg N year<sup>-1</sup>  
(Chen and Devold,  
2009)

### Rivers

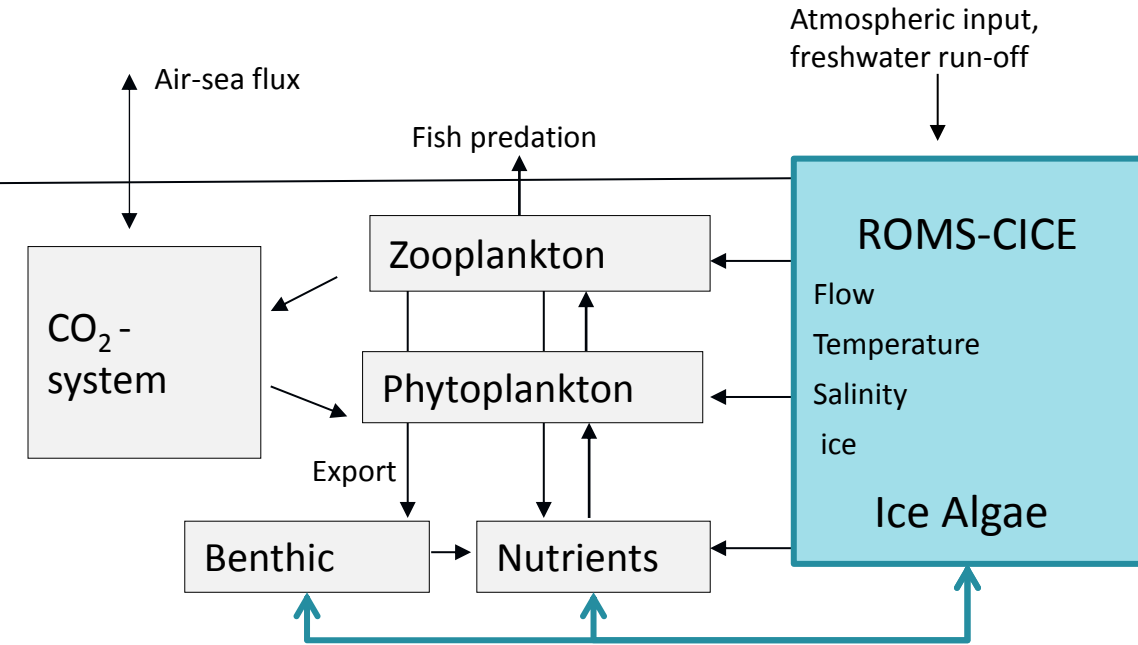
0.1 Tg N year<sup>-1</sup>  
(LeFouest et al 2013)

# Plans in Arctic ABC



ModOIE - Mesoscale modeling of Ice, Ocean and Ecology of the Arctic Ocean.

# Plans in Arctic ABC



No-ice experiments  
NorESM/MPI-ESM

