ALFRED-WEGENER-INSTITUT
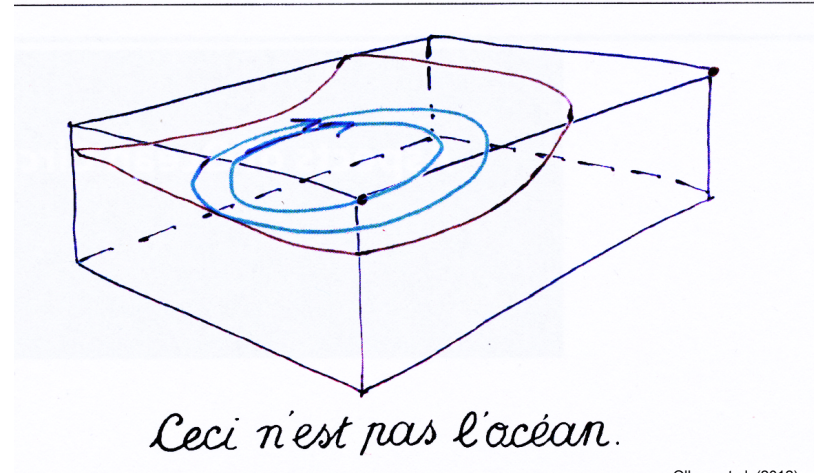HELMHOLTZ-ZENTRUM FÜR POLAR-
UND MEERESFORSCHUNG

Integration of an ecosystem module into the finite element sea-ice ocean model

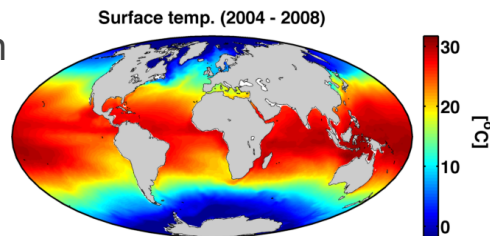V. Schourup-Kristensen, D. Sidorenko, D. A. Wolf-Gladrow and C. Völker

Ceci n'est pas l'océan.
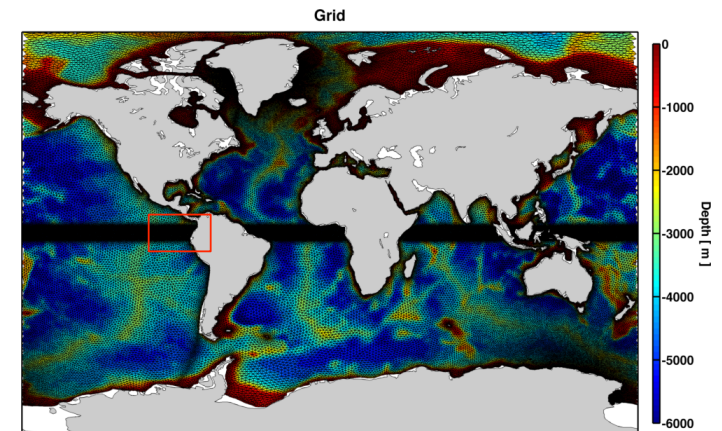
Olbers et al. (2012)
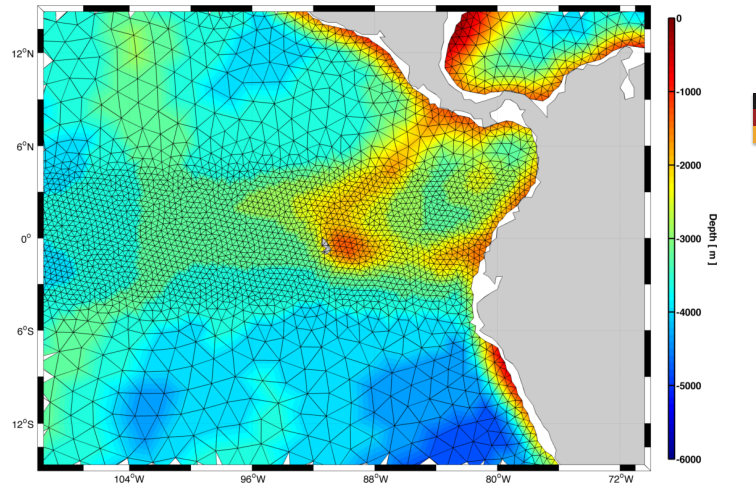
FESOM

The Finite element sea-ice ocean model

- Global model
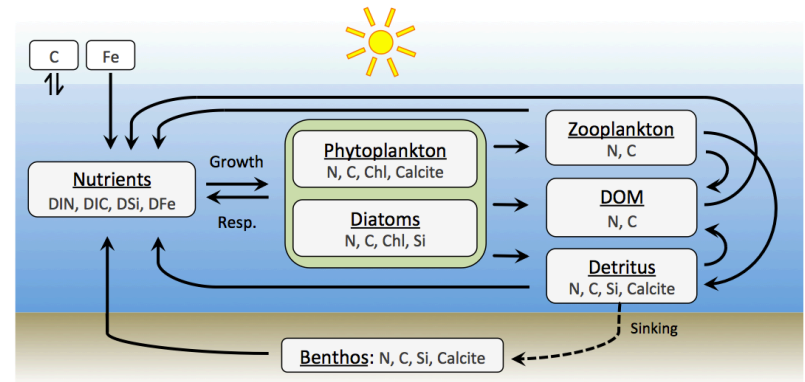- Has been assessed within the CORE framework
- Polar research

Surface temp. (2004 - 2008)

FESOM's unstructured mesh

Grid

FESOM's unstructured mesh

REcoM2: The Regulated Ecosystem Model

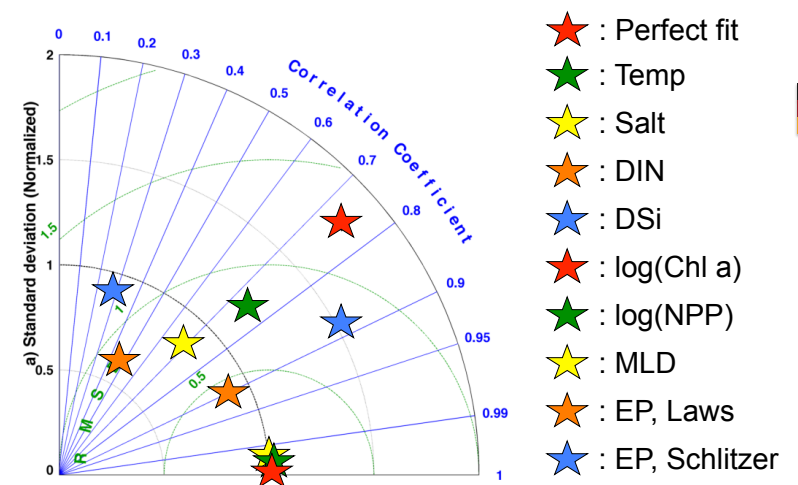## FESOM-REcoM2 run

- Hindcast experiment
- Run: 1971 - 2008
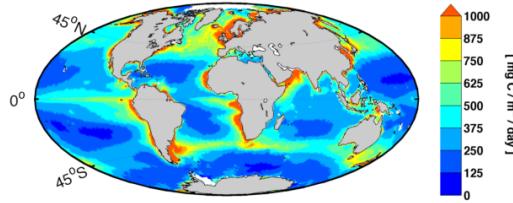- CORE-II forcing
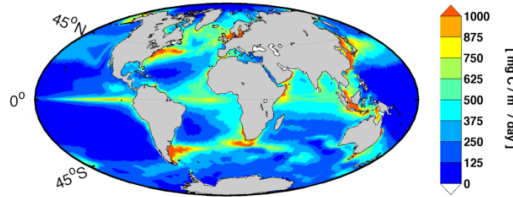- Present results from 2004 to 2008

Summary

★ : Perfect fit
★ : Temp
☆ : Salt
★ : DIN
★ : DSi
★ : log(Chl a)
★ : log(NPP)
★ : MLD
★ : EP, Laws
★ : EP, Schlitzer

Net primary production

a) Observational mean NPP (2003 to 2010)

[mg C / m² / day]

Global NPP:
47 Pg C yr⁻¹

b) Model mean NPP (2004 to 2008)

[mg C / m² / day]

Global NPP:
32.5 Pg C yr⁻¹

EP, zonal average

- FESOM-REcoM2
- Schlitzer
- Laws
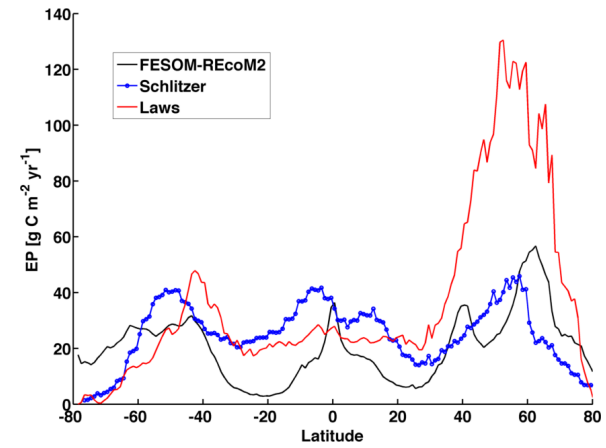
Global:
6.1 Pg C yr⁻¹

Southern Ocean NPP

NPP:
3.1 Pg C yr⁻¹

EP:
1.1 Pg C yr⁻¹

Mean NPP and MLD south of 50°S

- NPP model
- NPP sat
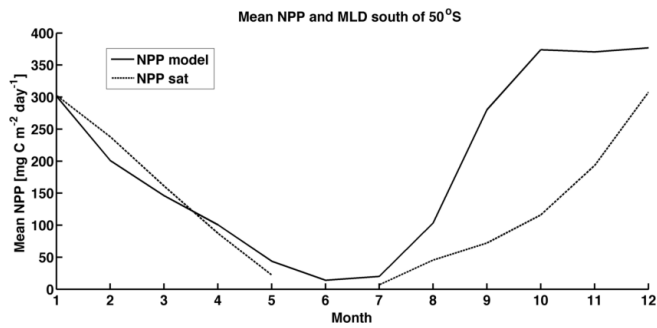
Timing of bloom

Timing of bloom maximum (2004 - 2008)

Feb
Jan
Dec
Nov
Oct
Sep

60°S

Drivers of production

a) NPP [mg /m^2/day] vs. MLD [m]

b) NPP [mg /m^2/day] vs. DFe [μ mol/m^3]
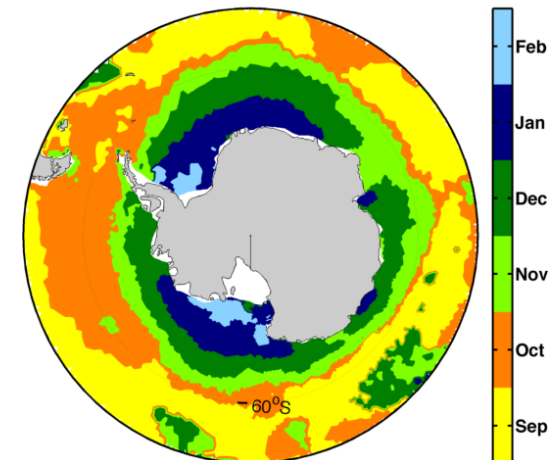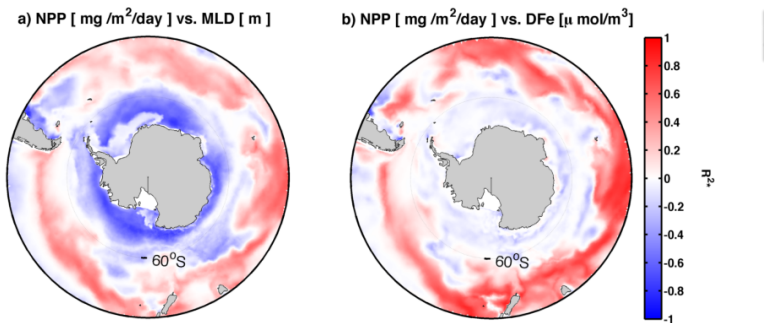
Conclusion

- Reproduces the large scale features of productivity and nutrients
- Performance of REcoM2 – FESOM similar to other non-eddy resolving models

Future work:

- Timing of the bloom in the Southern Ocean Ocean
- Effect of the different iron inputs

References

- Olbers, D., Willebrand, J. and Eden, C (2012). *Ocean Dynamics*. Berlin Heidelberg. Germany. Springer.

- Schourup-Kristensen, V., Sidorenko, D., Wolf-Gladrow, D. A. and Völker, C (2014). A skill assessment of the biogeochemical model REcoM2 coupled to the finite element sea-ice ocean model (FESOM 1.3). *Geoscientific model development discussions*. 7. 4. 4153-4249. doi: 10.5194/gmdd-7-4153-2014.