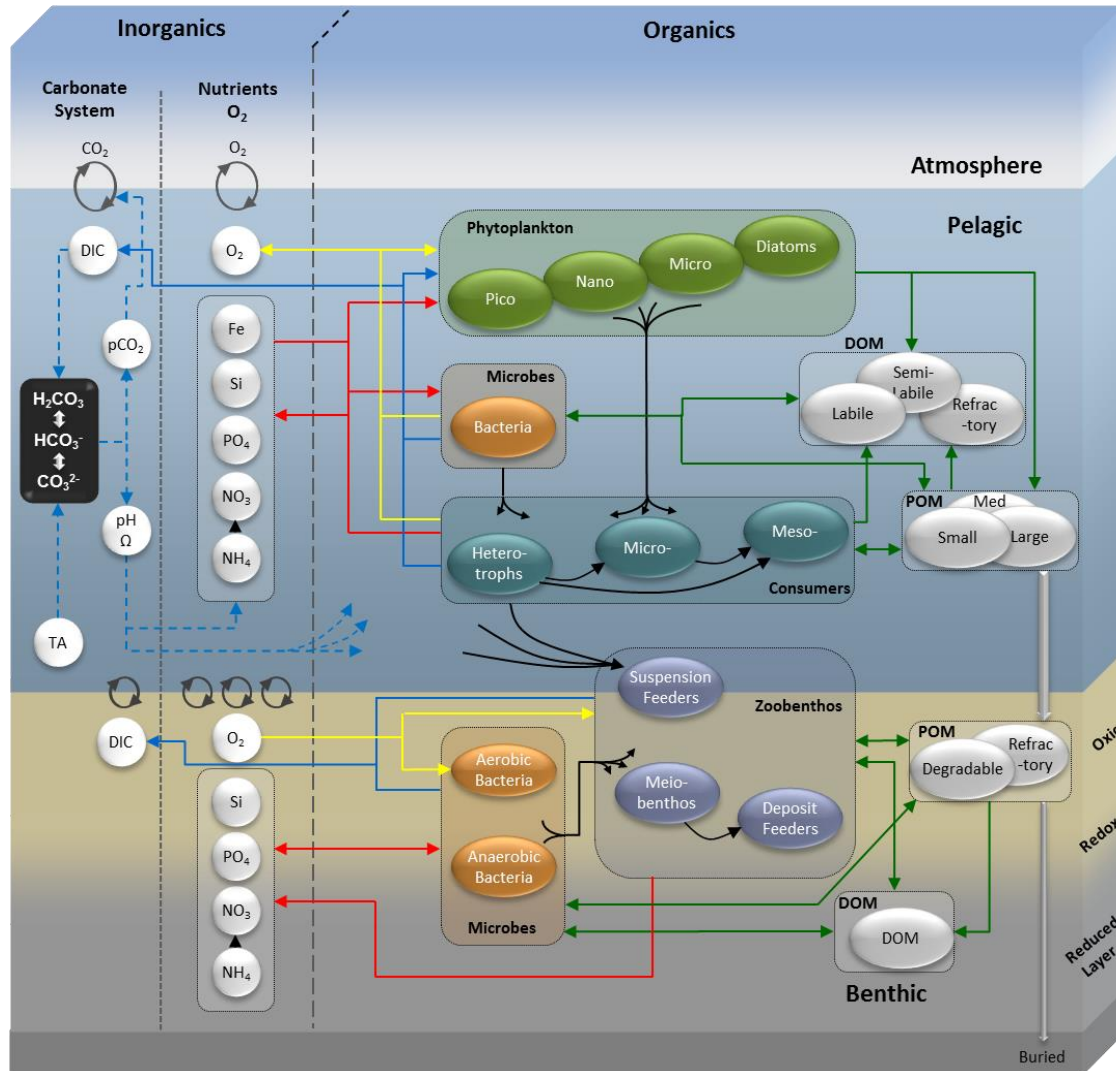# AMM7 hindcast: validation and major biogeochemical dynamics

Y. Artioli, M. Butenschön, S. Wakelin, J. Aldridge, L. Amoudry, J. Blackford, J. Bruggeman, J. Clark, J. Holt, G. Lessin,
M. Luneva, R. McEwan, L. Polimene, T. Silva, J. Tinker, S. Van Leeuwen, J. Van Der Molen, R. Wood, I. Allen
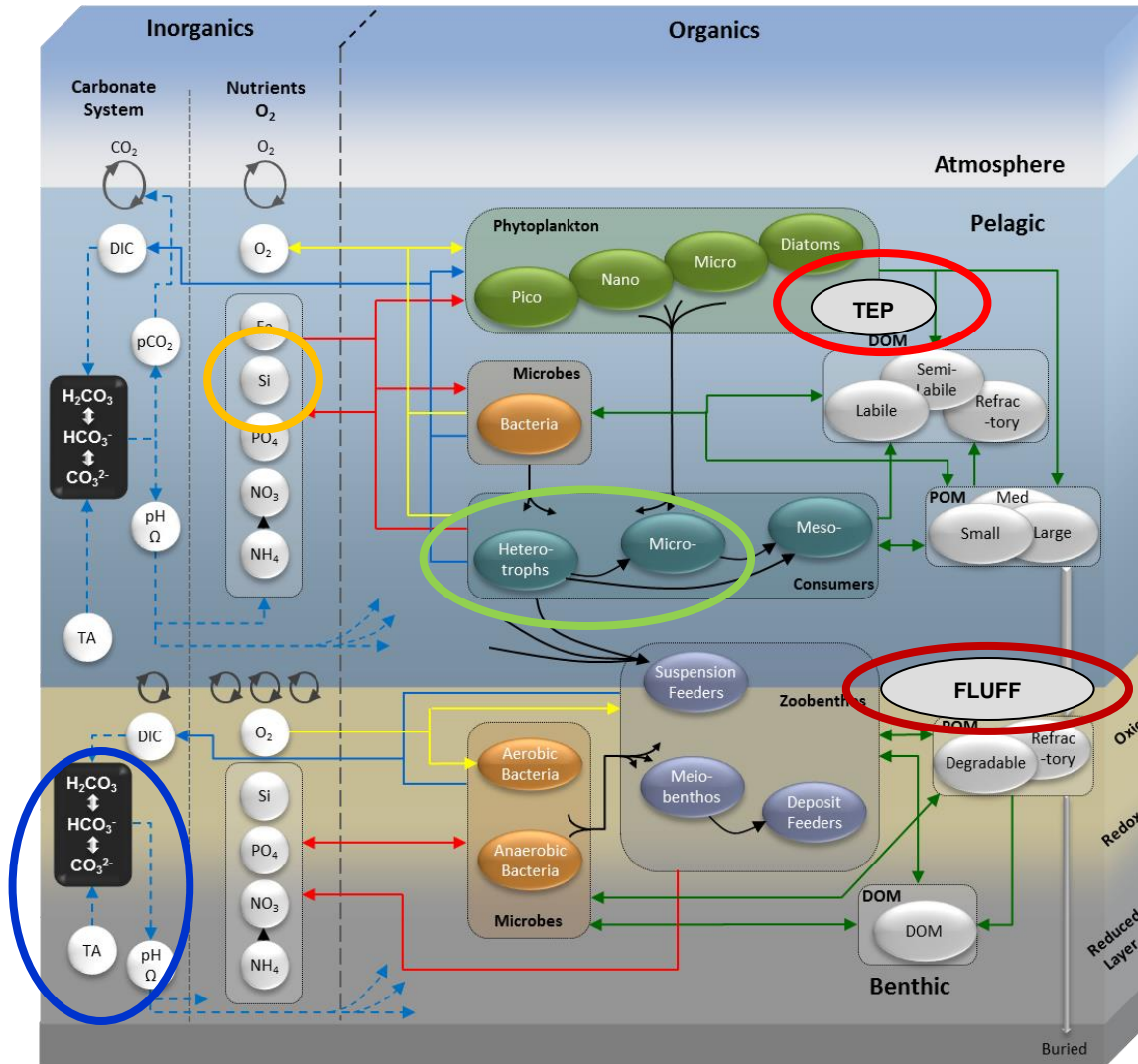
ERSEM: SSB-v0

ERSEM v16.06
Equivalent to ERSEM v15.06 but in FABM
Allows for flexible configuration
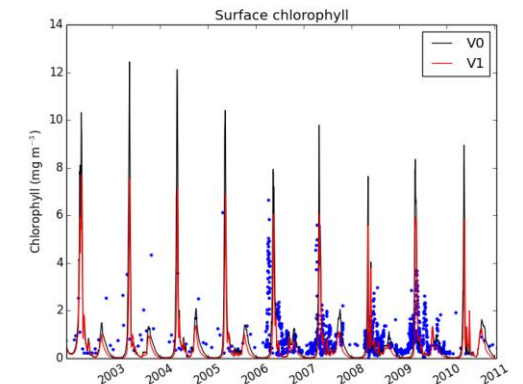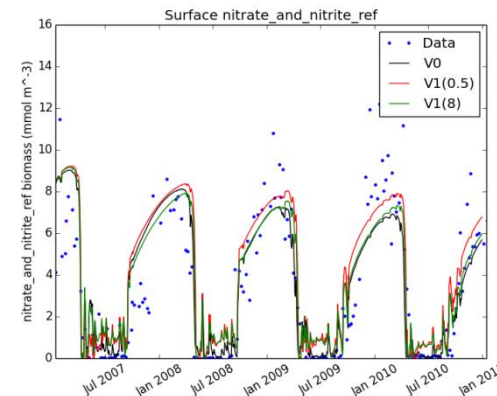Used in the 2 SSB modelling workshops

ERSEM: SSB-v1

Major updates:
- ➤ TEP
- ➤ Stoichimoetric Modulation Predation
- ➤ Pelagic Si reminerlisation
- ➤ Fluff layer
- ➤ Benthic carbonate

Run at L4 and Oyster ground

Model set-up: physics and configuration

- Based on NEMO 3.6, svn rev. 6232

- AMM at ~7km resolution (AMM7), 50 s-layers

- Code additions for open ocean boundaries of tracers

- Forced by reanalysis product

- Atmospheric deposition of nitrogen

- Attenuation using gelbstoff absorption from satellite

- Fully runtime configurable number of tracers, atmospheric and riverine inputs

- Run from 1980 to 2015, large list of variables at daily and monthly resolution (18TB)
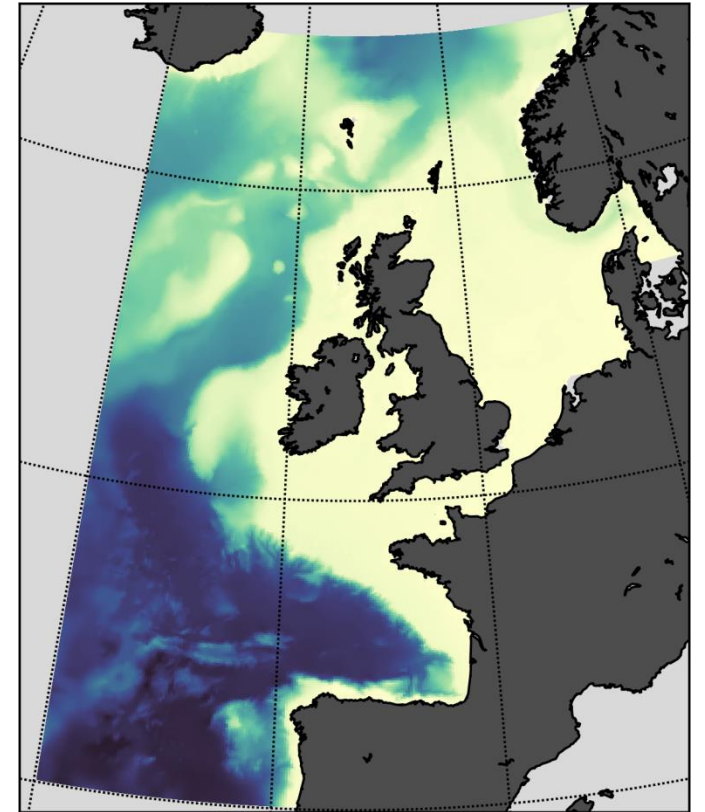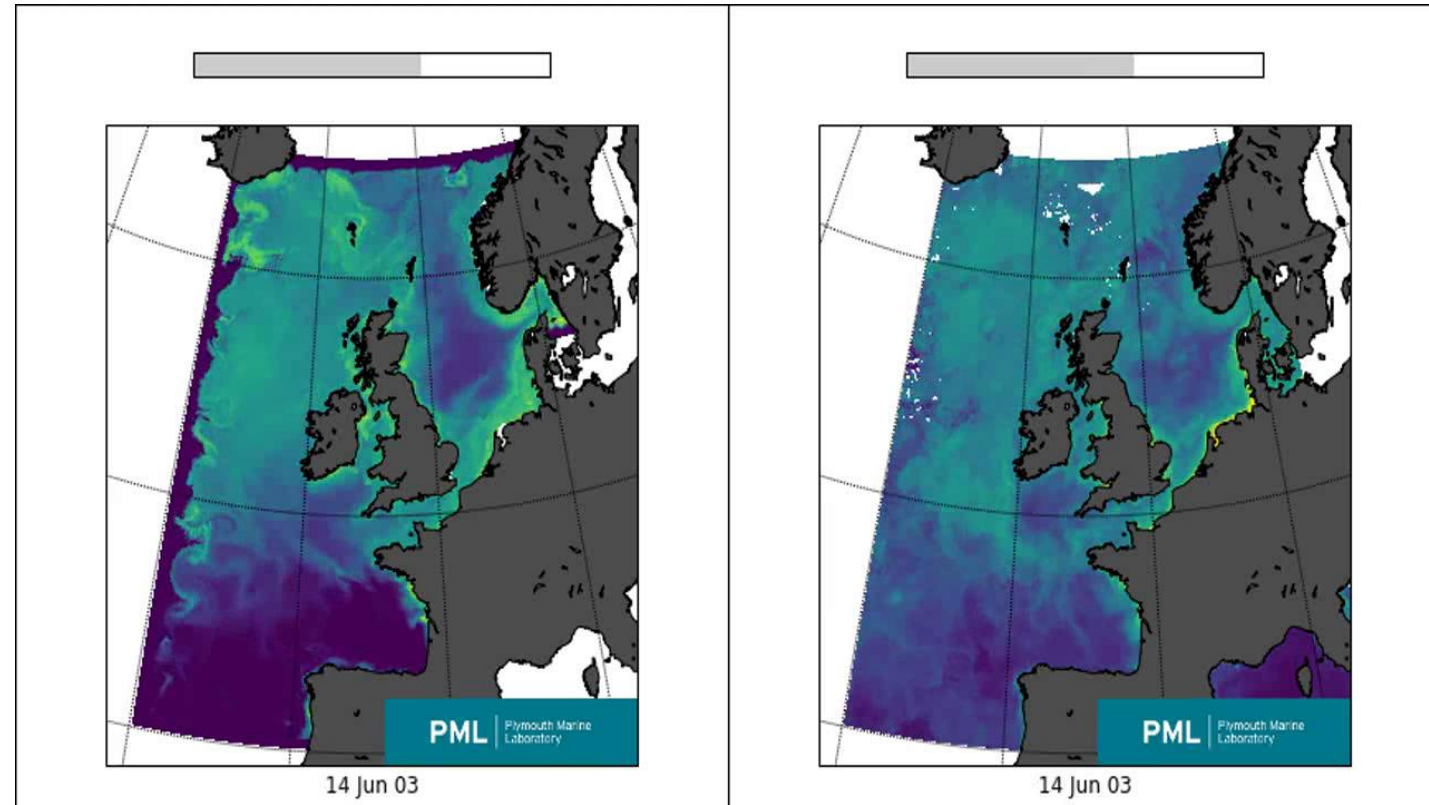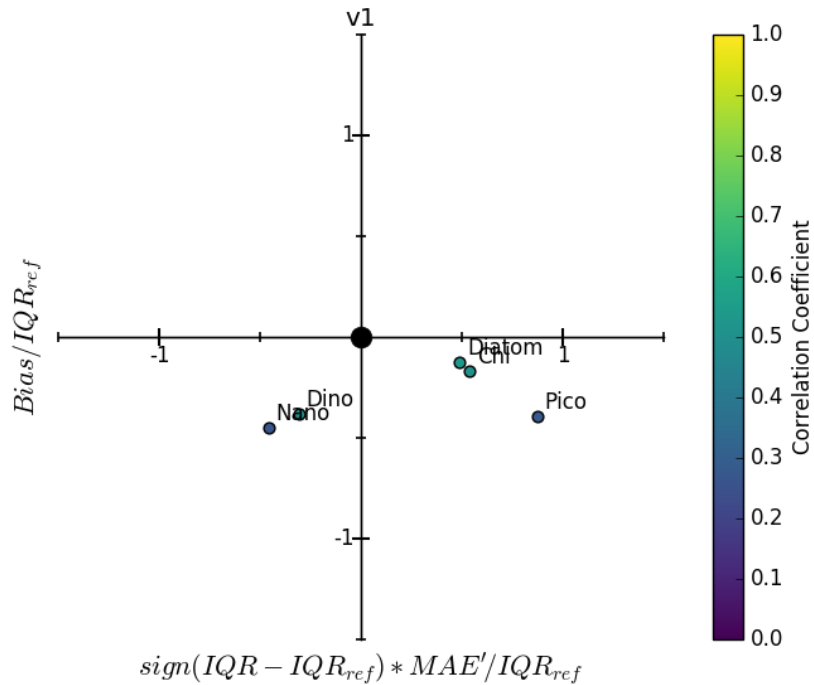
Validation/1: ICES dataset
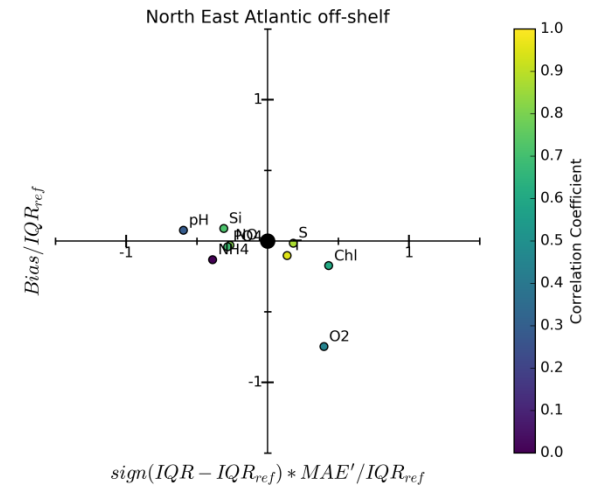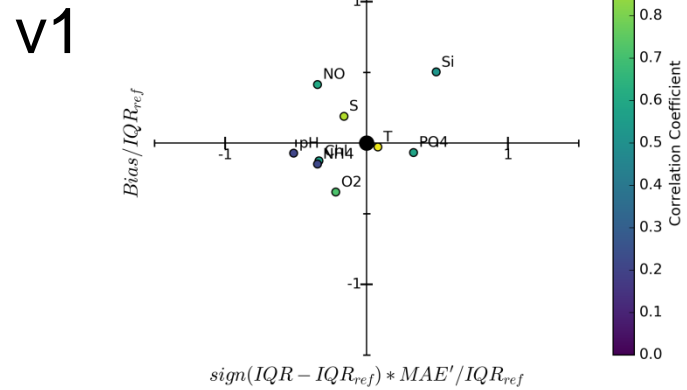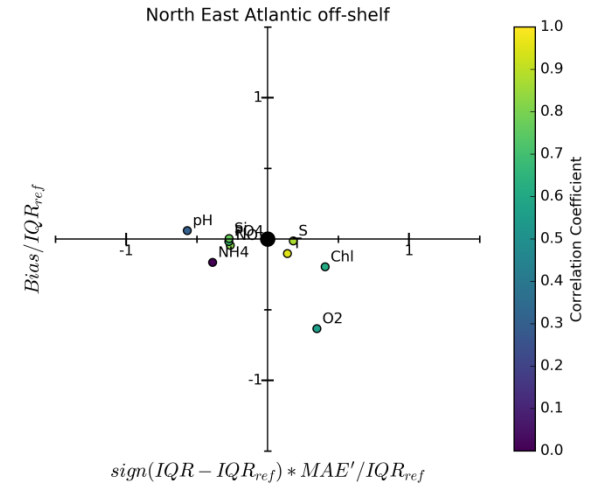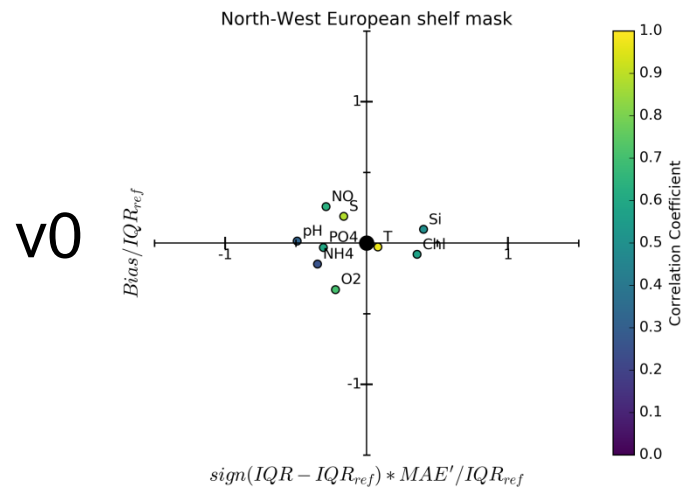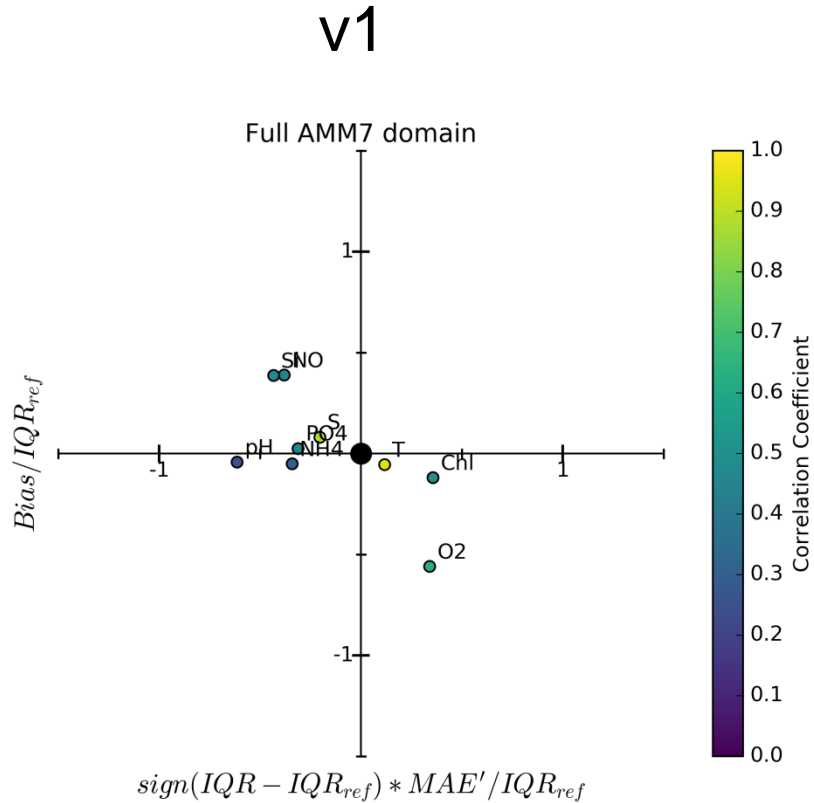
Validation/2: Satellite Chlorophyll
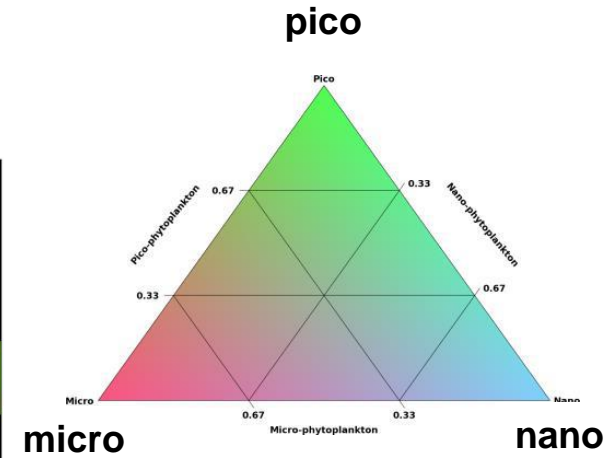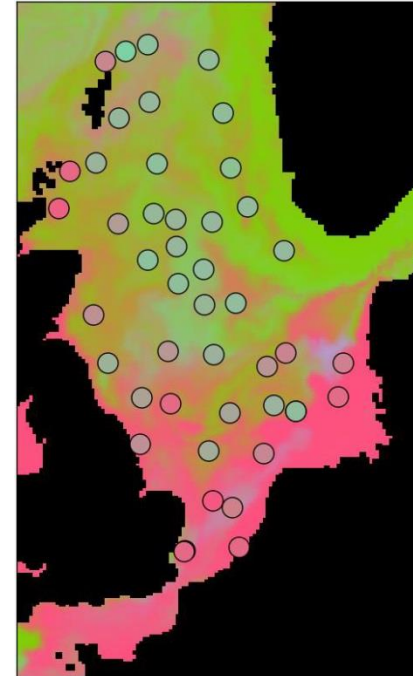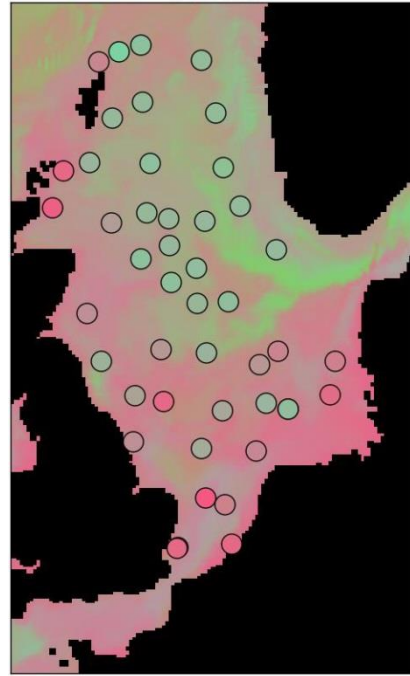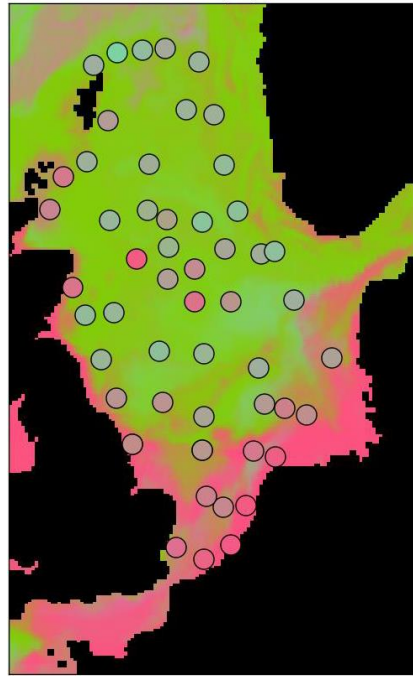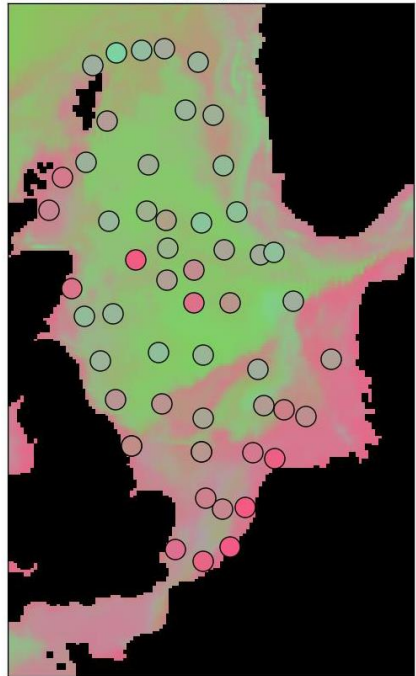
Chlorophyll

model

CCI

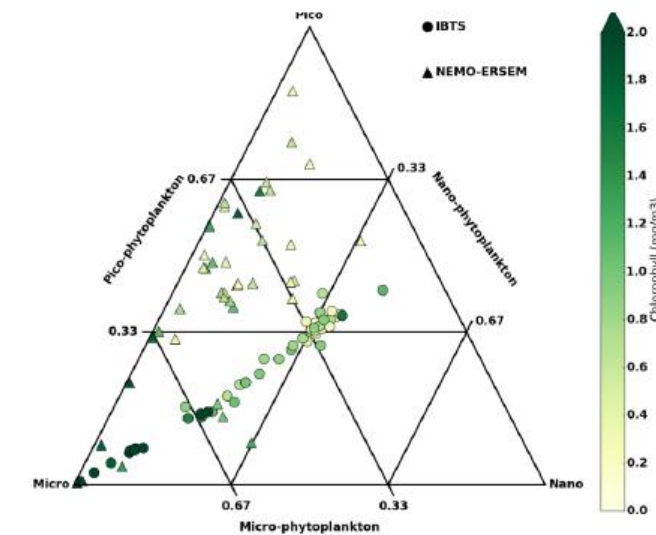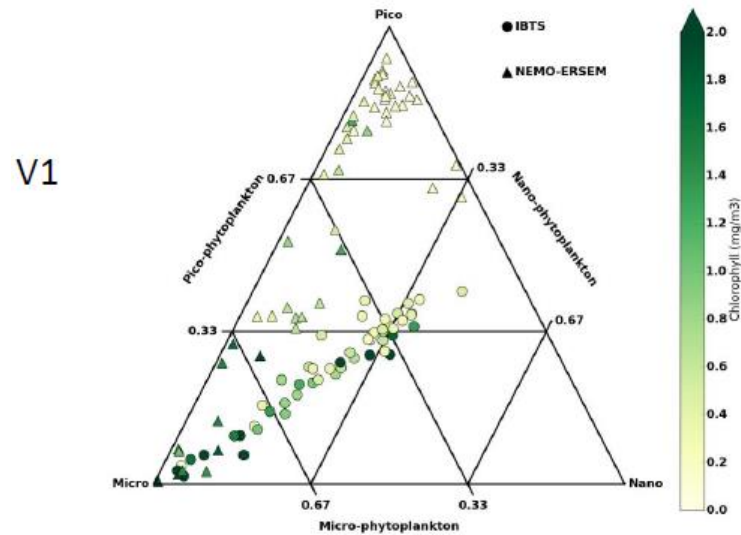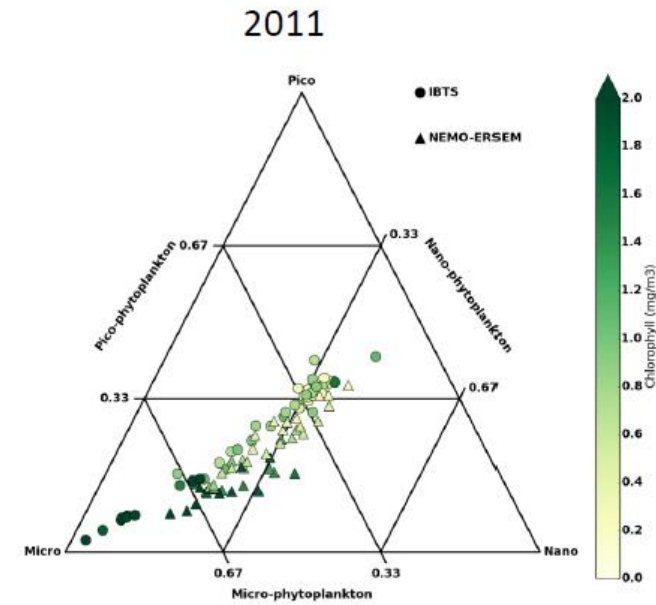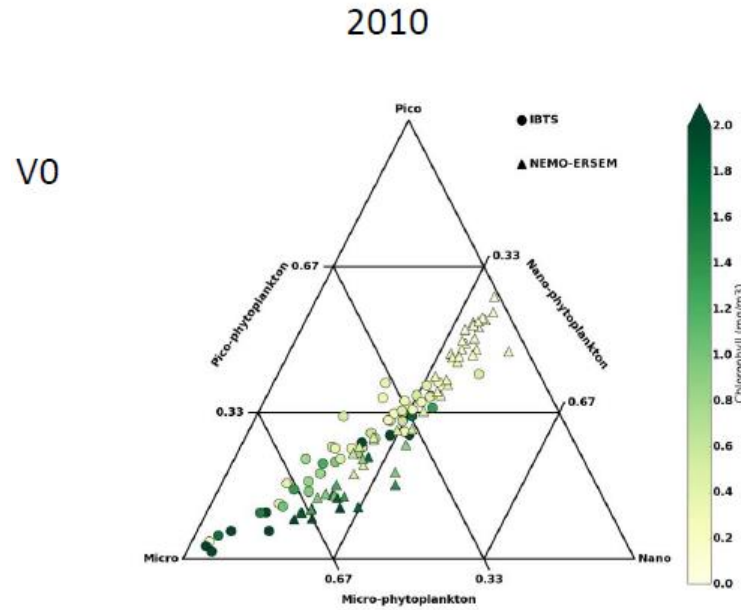# Validation/3: in situ community composition

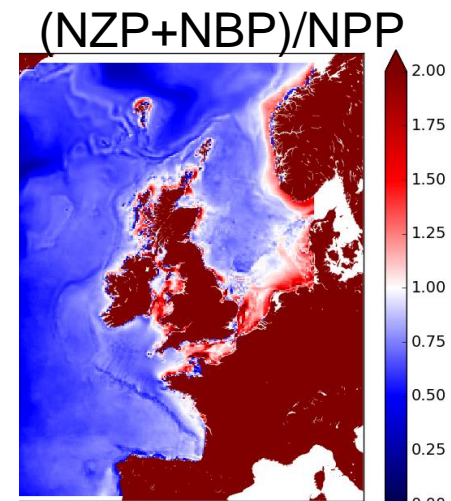V0 - 2010   V1 - 2010   V0 - 2011   V1 - 2011

● data from IBTS

Validation/3: in situ community composition

Biogeochemical dynamics: Carbon

NPP

Air-to-sea CO_2 flux

Shelf NPP
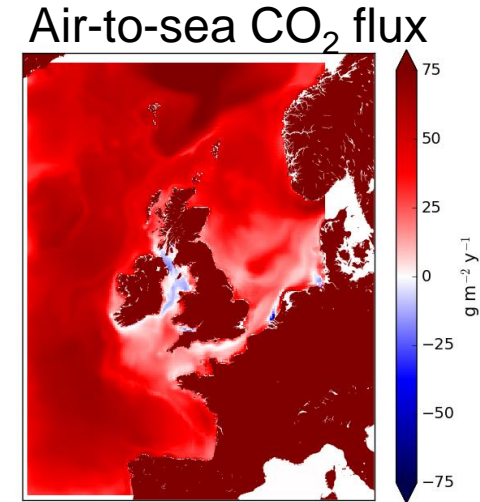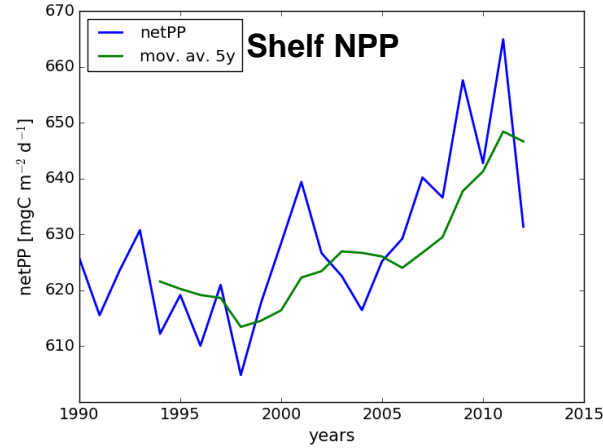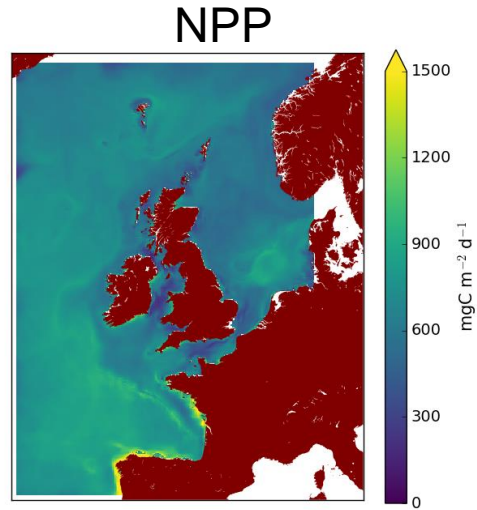
Shelf flux

$27 \div 36$ TgC y^{-1}
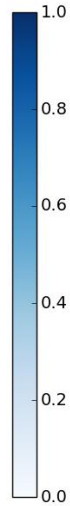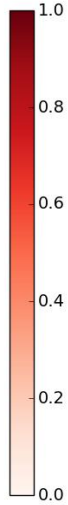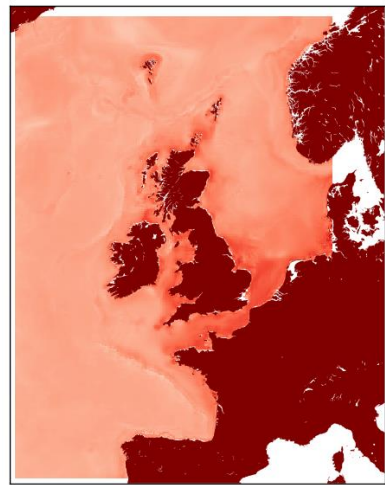
NCP

NZP

NBP

(NZP+NBP)/NPP
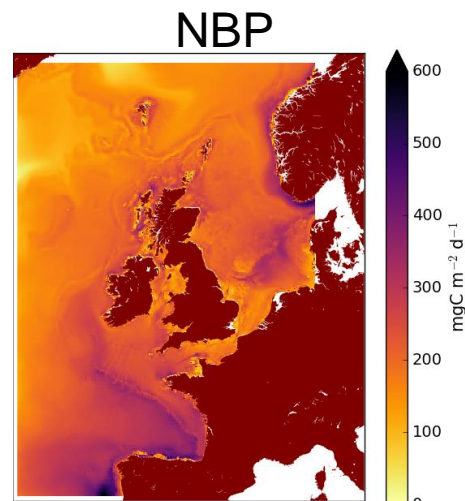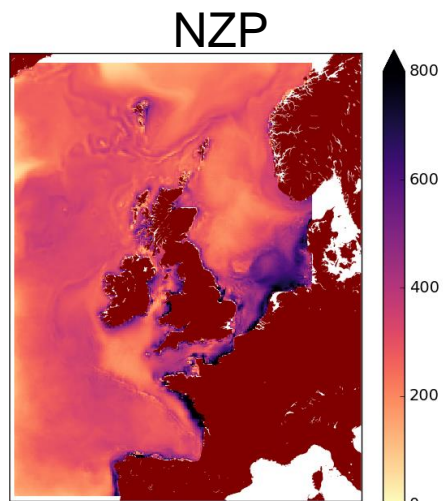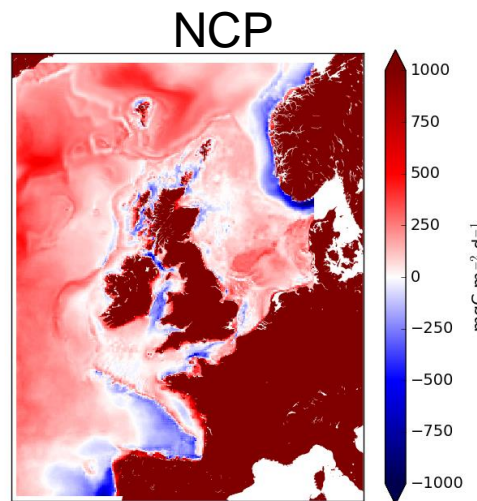
NPP=photosynth.- Phy. resp
NCP=photosynth.- Comm. resp
NZP=Zoo uptake - Zoopl. resp
NBP=bact. uptake. – bact. resp

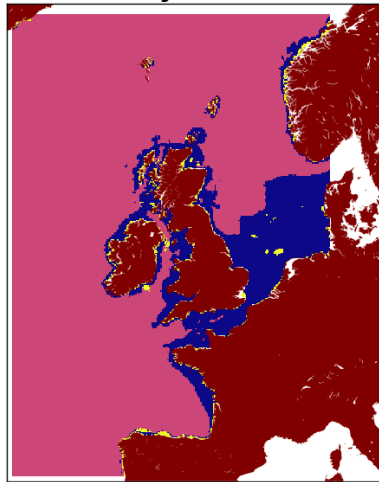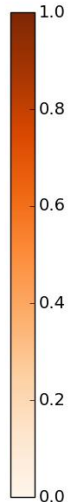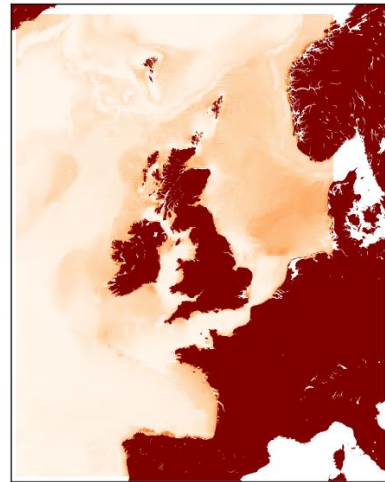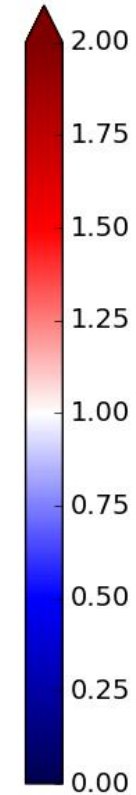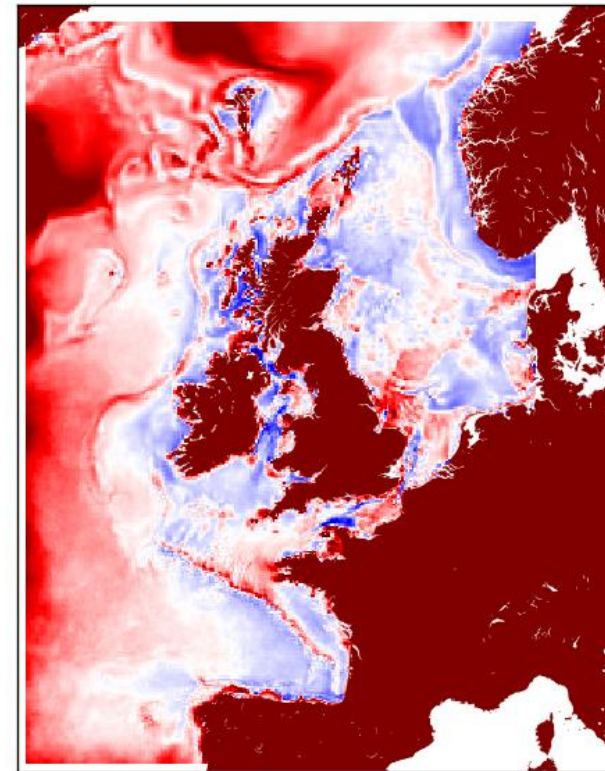# Biogeochemical dynamics: Inorganic nitrogen (remineralisation)
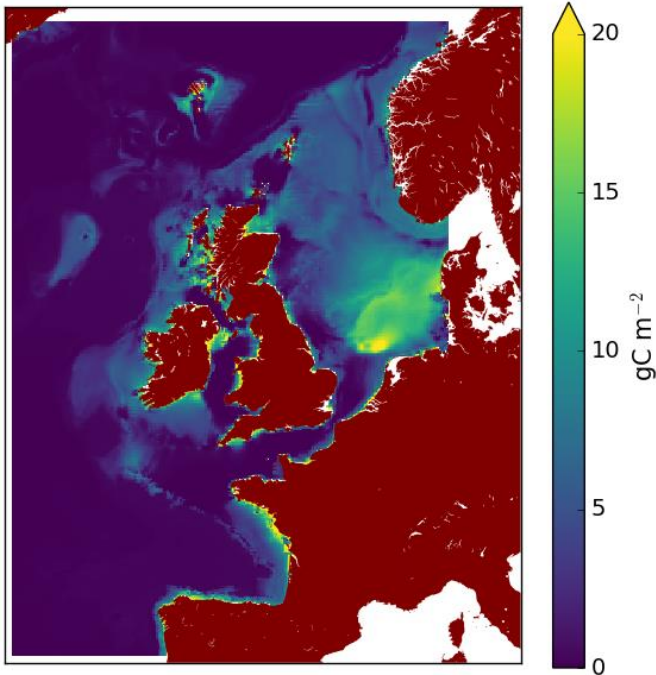
zoopl

bacteria

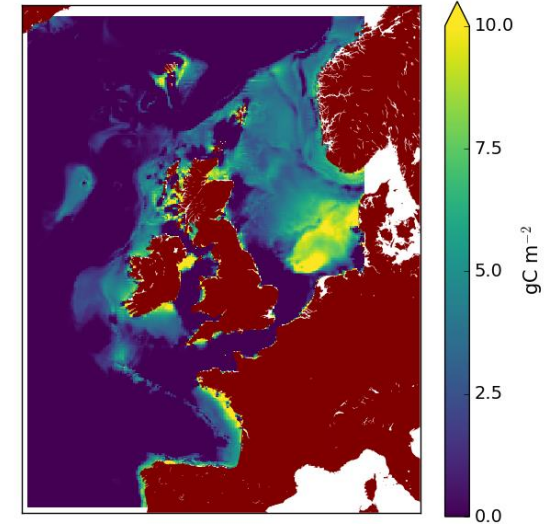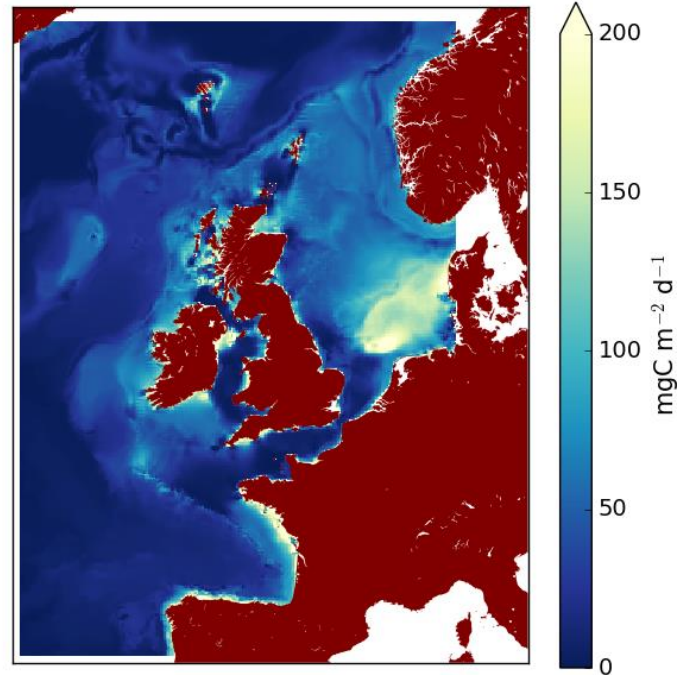benthos

Major source

PhyNuptake/Nremin

Extra sources needed

Local sources sufficient

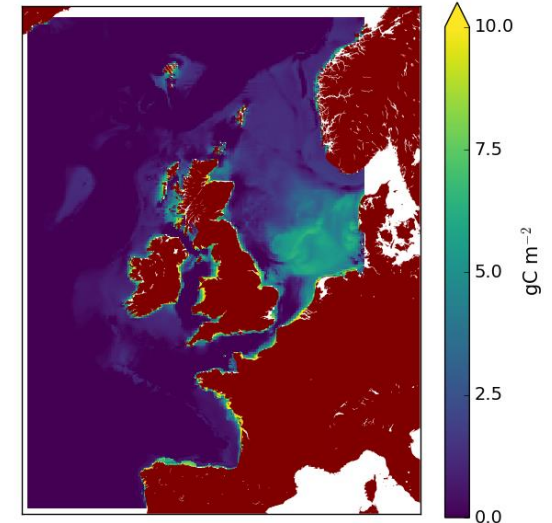# Biogeochemical dynamics: benthic-pelagic coupling

Total fauna

Export C

Deposit feeders

Suspension feeders
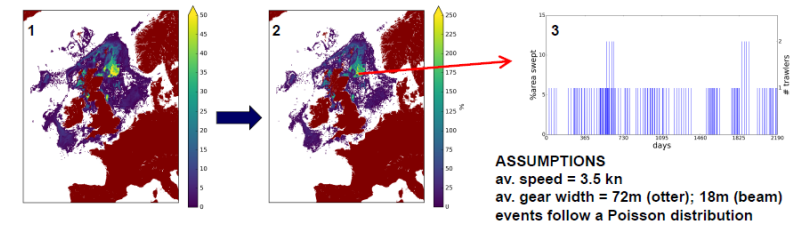
Scenarios

Based on v0

- Climate run (up to 2050, RCP 8.5)

- Trawling ➔ see poster

- Marine Protected Area

- (de-)Eutrophication

- Climate + trawling + MPA + Eutrophication

Conclusions

- ERSEM 16.06 (v0) slightly more reliable

- Model developments has proven to give important scientific insight, however they need more robust 3D parameterisation and data

- Shelf CO2 sink ~30TgC y^{-1}

- Shelf N mineralisation equals N uptake, high variability

- Physical drivers crucial to shape benthic community

- Tonnes of data to analyse (18TB) collaborations welcomed

06 Oct 01

06 Oct 01