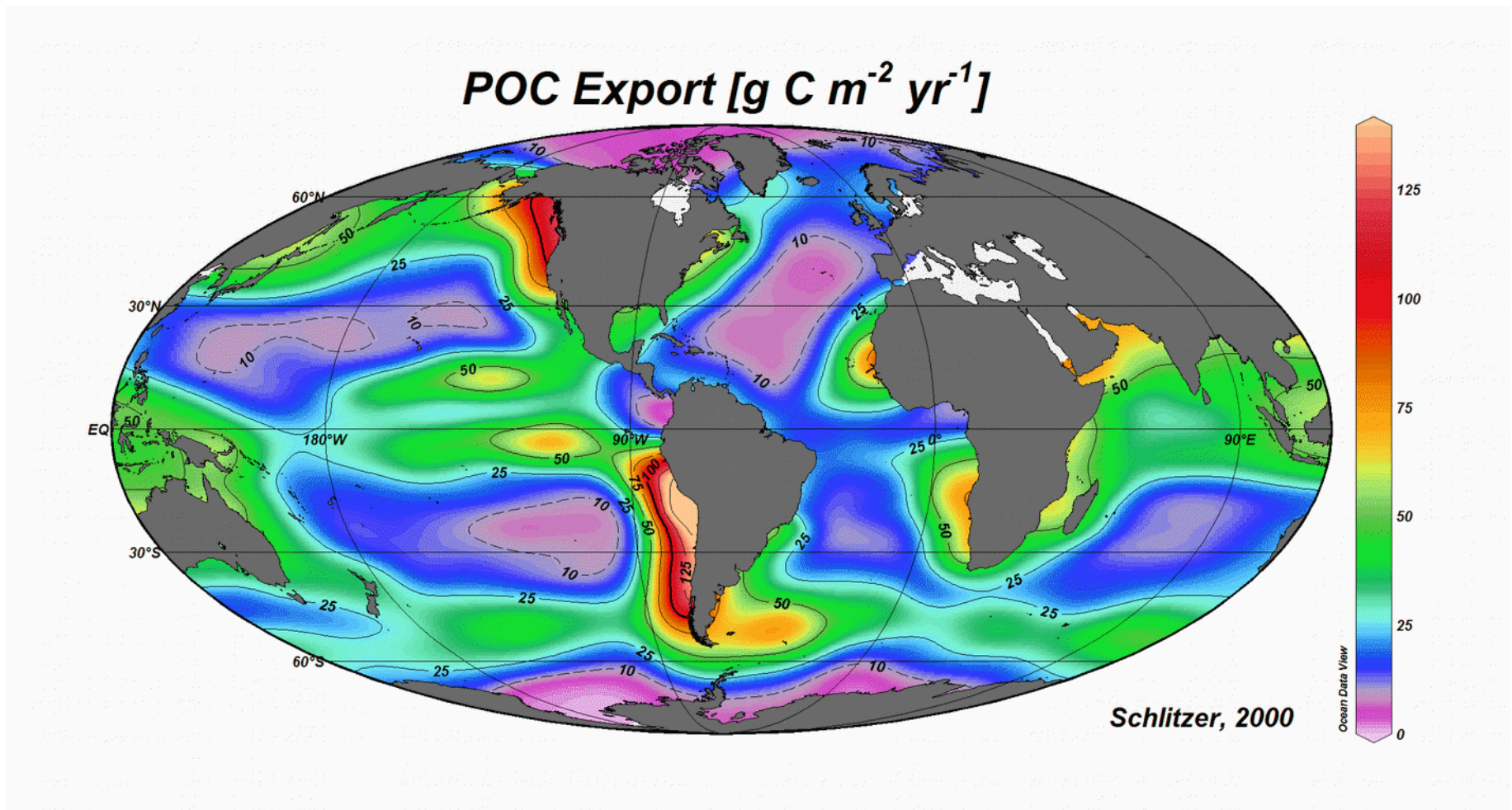




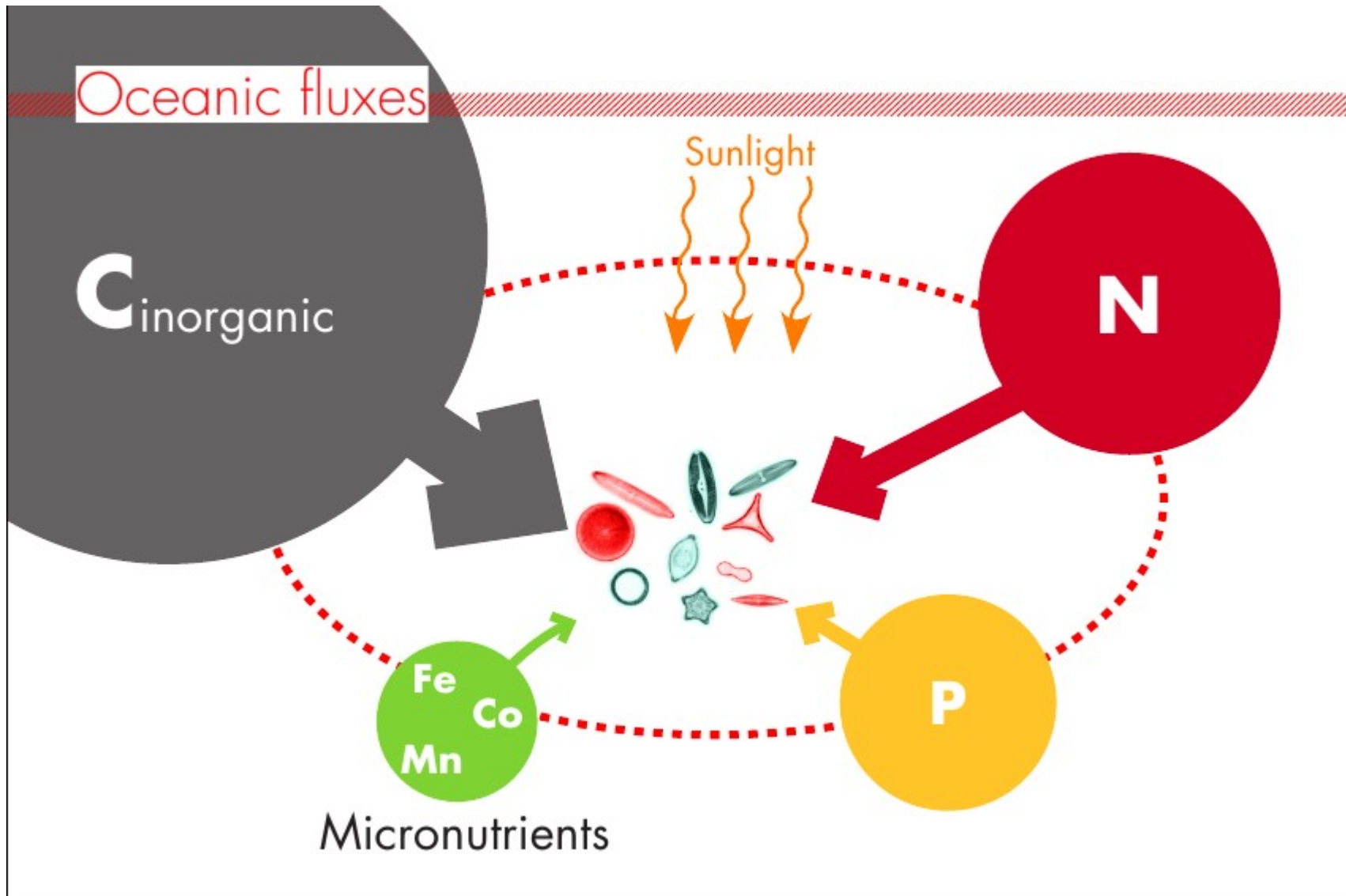
Nutrients supply to Southern Ocean Surface

Rémi Losno (IPGP, Paris)
Emilie Journet (LISA, Paris)

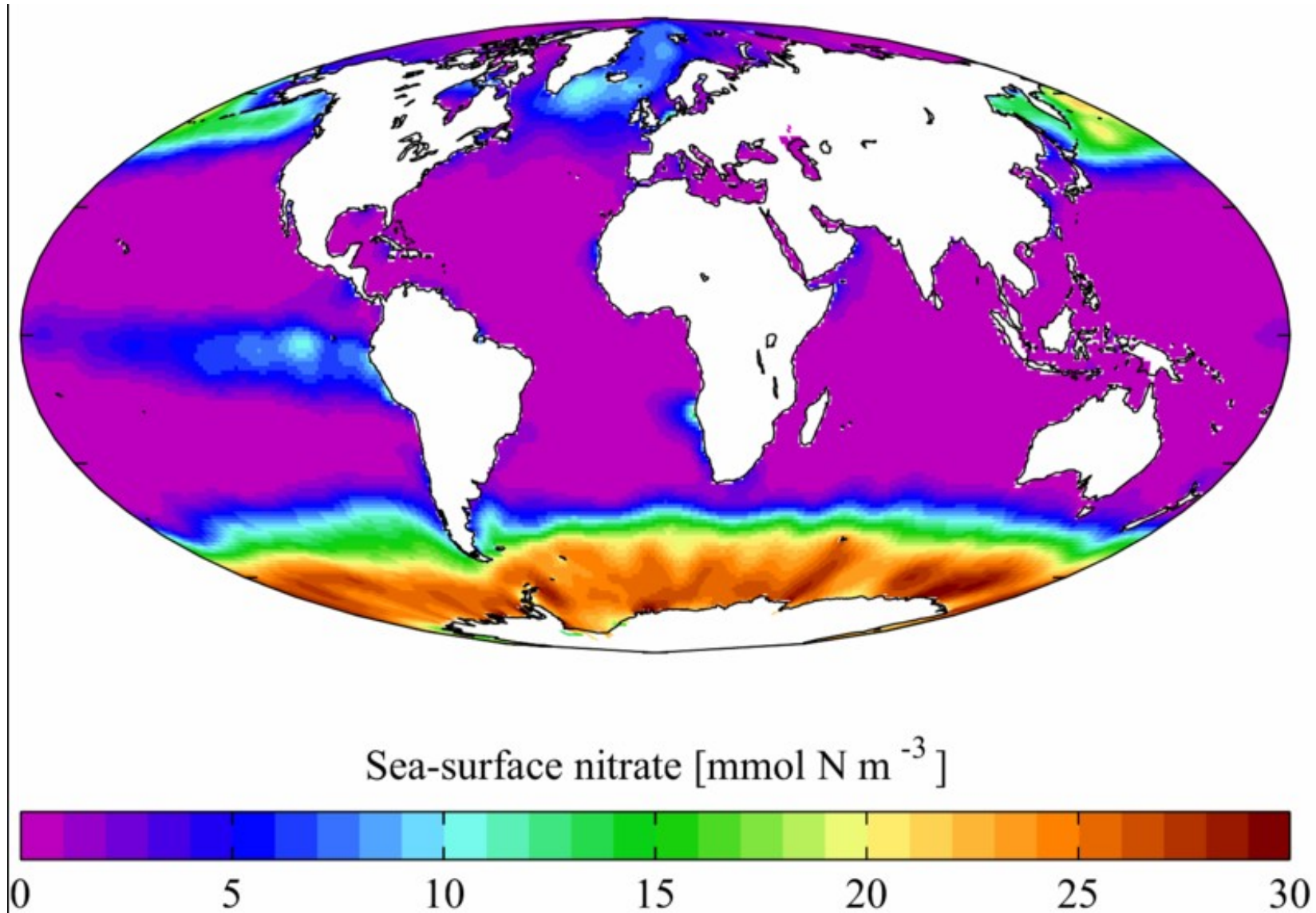
Biological pump export



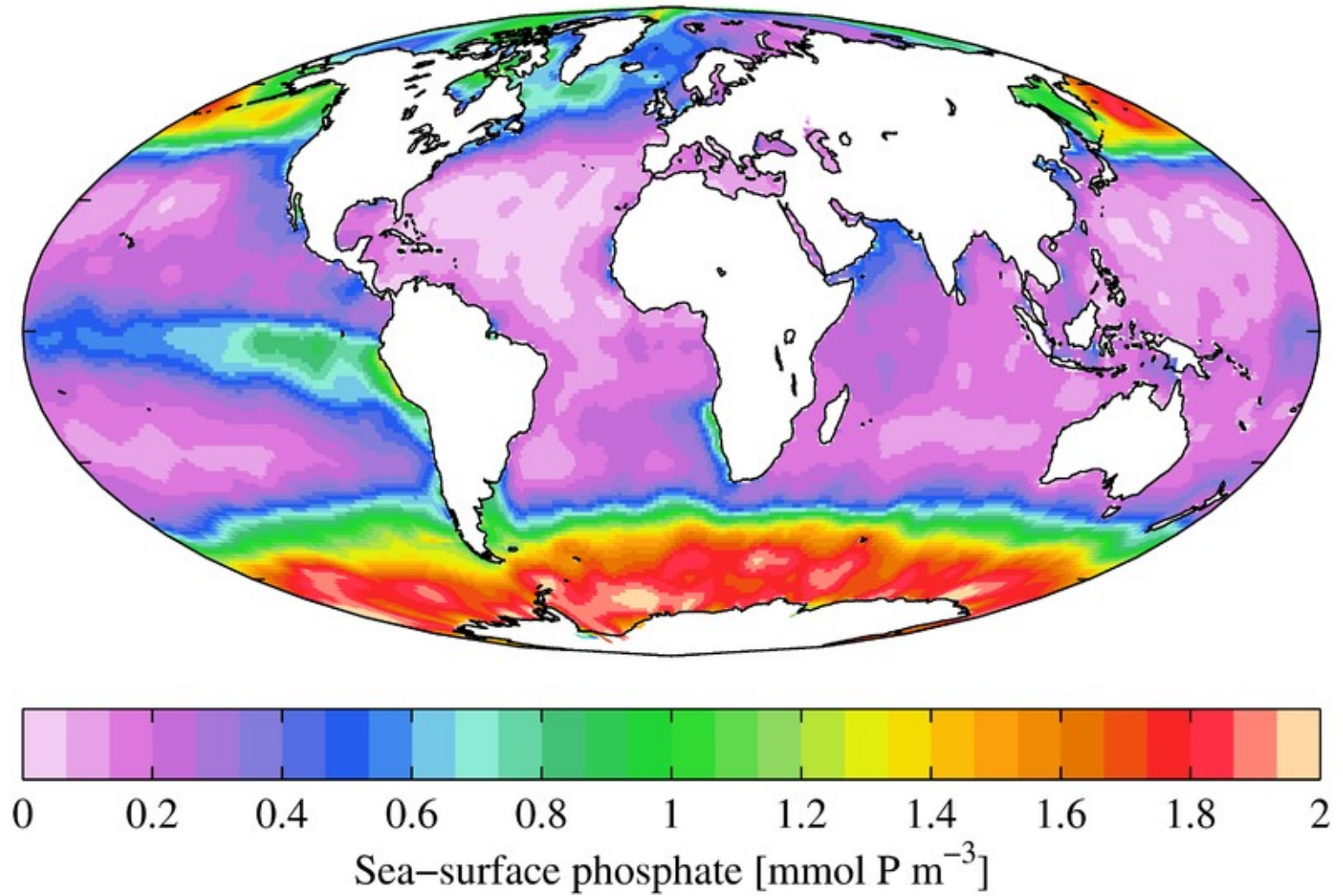
POC photosynthesis



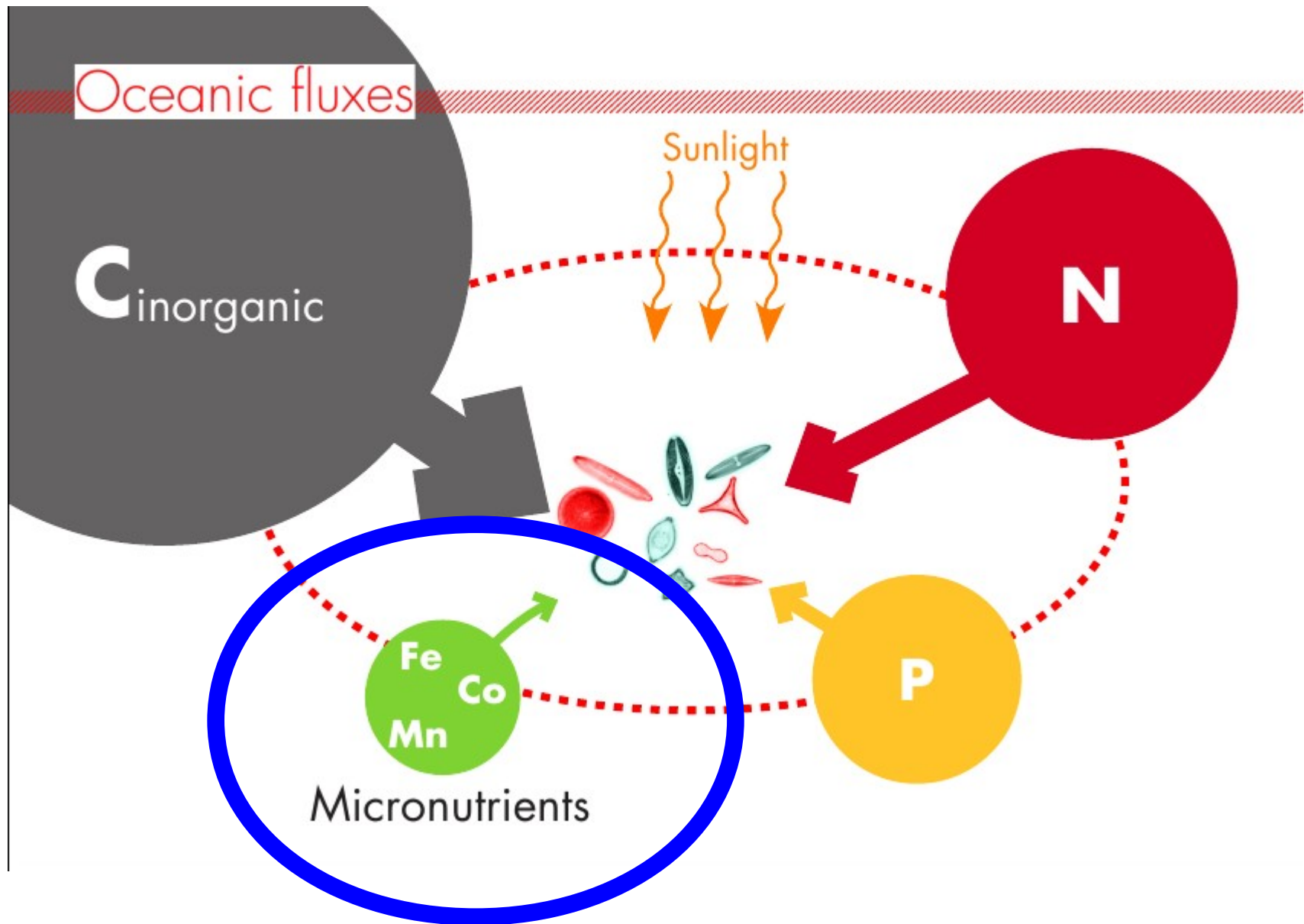
Macronutrients N



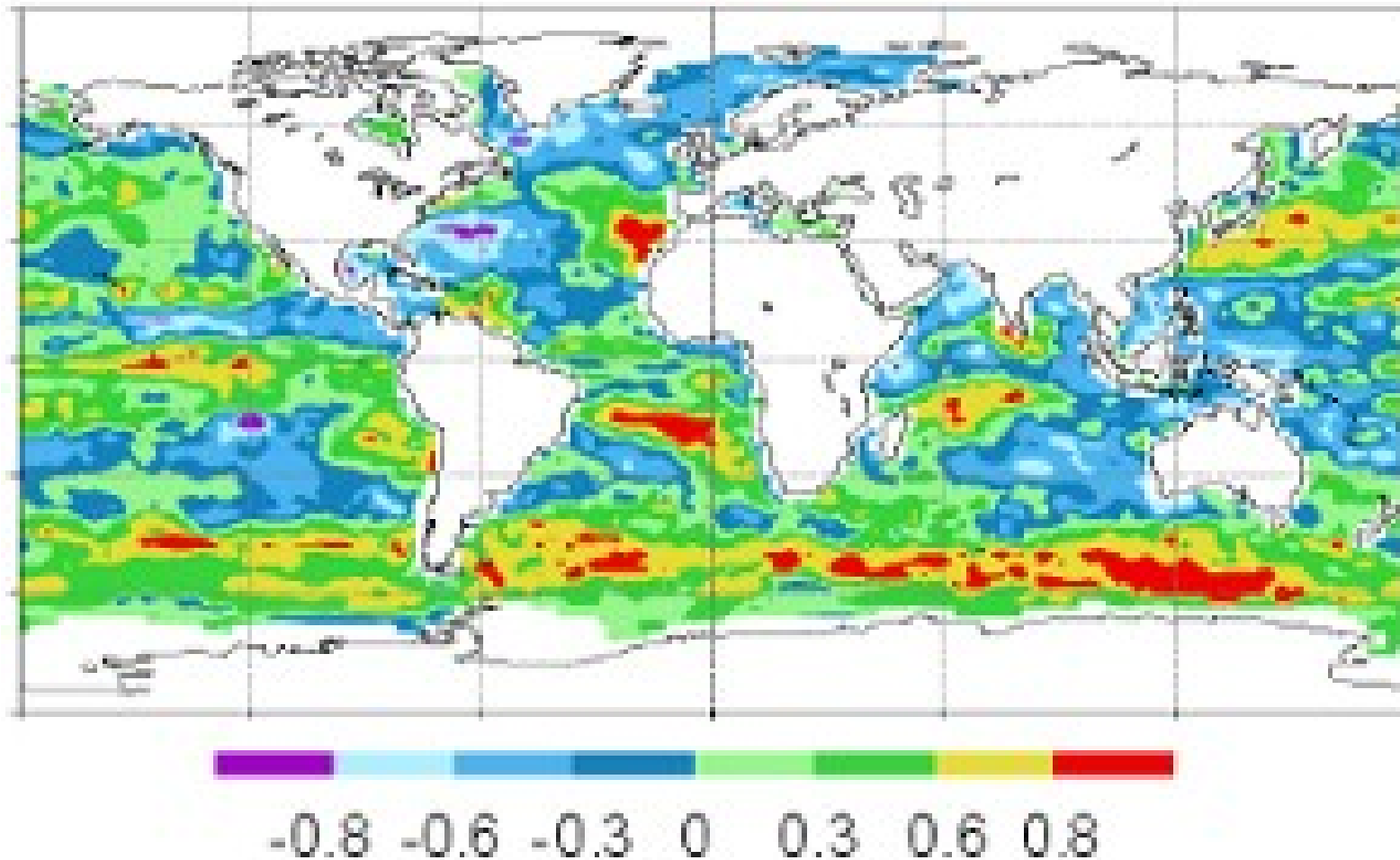
Macronutrients P



Limitation?

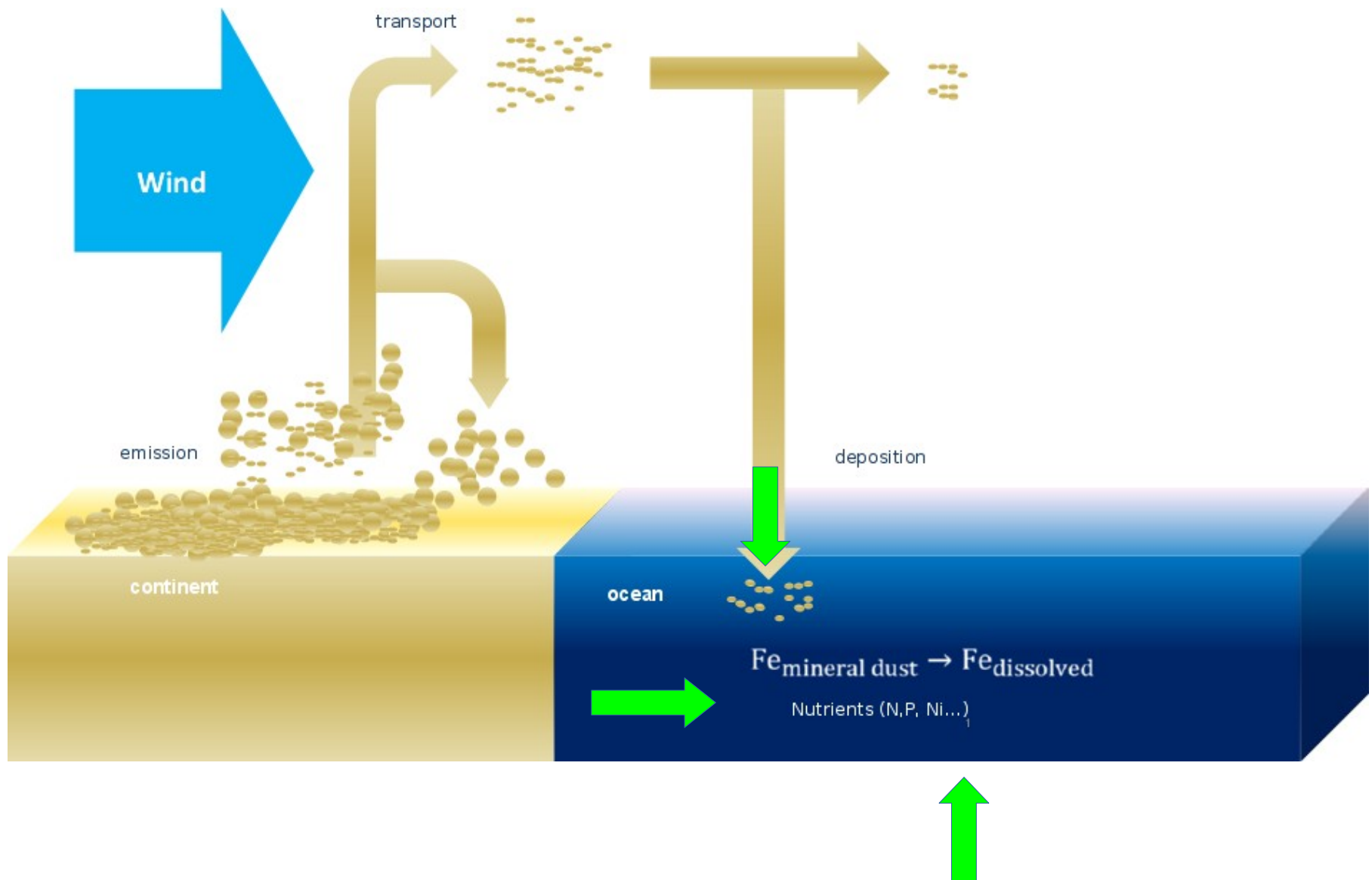


Correlation between Fe deposition and chlorophyll



from Falkowski et al. (2003)

Possible sources



What is already done so far

ness from dust sources. Very little observational data on aerosol concentrations and dust depositions exists for this ocean [Planquette *et al.*, 2007; Wagener *et al.*, 2008, Heimburger *et al.*, 2012a] for comparison with predictions given by global dust deposition models [Jickells *et al.*, 2005, Mahowald, 2007]. In an earlier paper focusing on dust deposition at

From Heimburger *et al.* 2013

Sourcing the iron in the naturally fertilised bloom around the Kerguelen Plateau: particulate trace metal dynamics

P. van der Merwe *et al.*, Biogeosciences 2015 (KEOPS 2 Special issue)

Iron fertilization experiments (12?)

Surface water iron supplies in the Southern Ocean sustained by deep winter mixing

An example of uncertainties and evolution of knowledge

scales. Upper limits' for dust deposition, sea ice melting and icebergs are on the order of $20 \mu\text{mol DFe m}^{-2} \text{ yr}^{-1}$, making them comparable to entrainment. However, it is notable that many of these additional

written in 2013

An example of uncertainties and evolution of knowledge

scales. Upper limits for dust deposition, sea ice melting and icebergs are on the order of $20 \mu\text{mol DFe m}^{-2}\text{yr}^{-1}$, making them comparable to entrainment. However, it is notable that many of these additional

About $200 \mu\text{mol/yr}$ in Southern Indian Ocean (Heimburger et al 2013)

Fractional iron solubility of atmospheric iron inputs to the Southern Ocean (V.H.L. Wintona et al. 2015),

$\sim 350 \mu\text{mol/yr}$ in South Atlantic

Chance et al. 2015, Atmospheric trace metal concentrations, solubility and deposition fluxes in remote marine air over the south-east Atlantic

Proposed questions

What is today the knowledge of nutrients supply:

- atmosphere
- deep sea
- rivers
- continental margin

What should we do to improve this knowledge to improve carbon cycle models over Southern Ocean in the changing climate context?

Deliverable

- Guidelines for future research work on Southern Ocean biogeochemistry.
- Possible large or long term field experiments, including time series.
- Model needs and developments.