

Microbial Identity – Process coupling:

a. Atlantic Meridional Transect



b. Spatial & Temporal Variability

Mikhail V. Zubkov

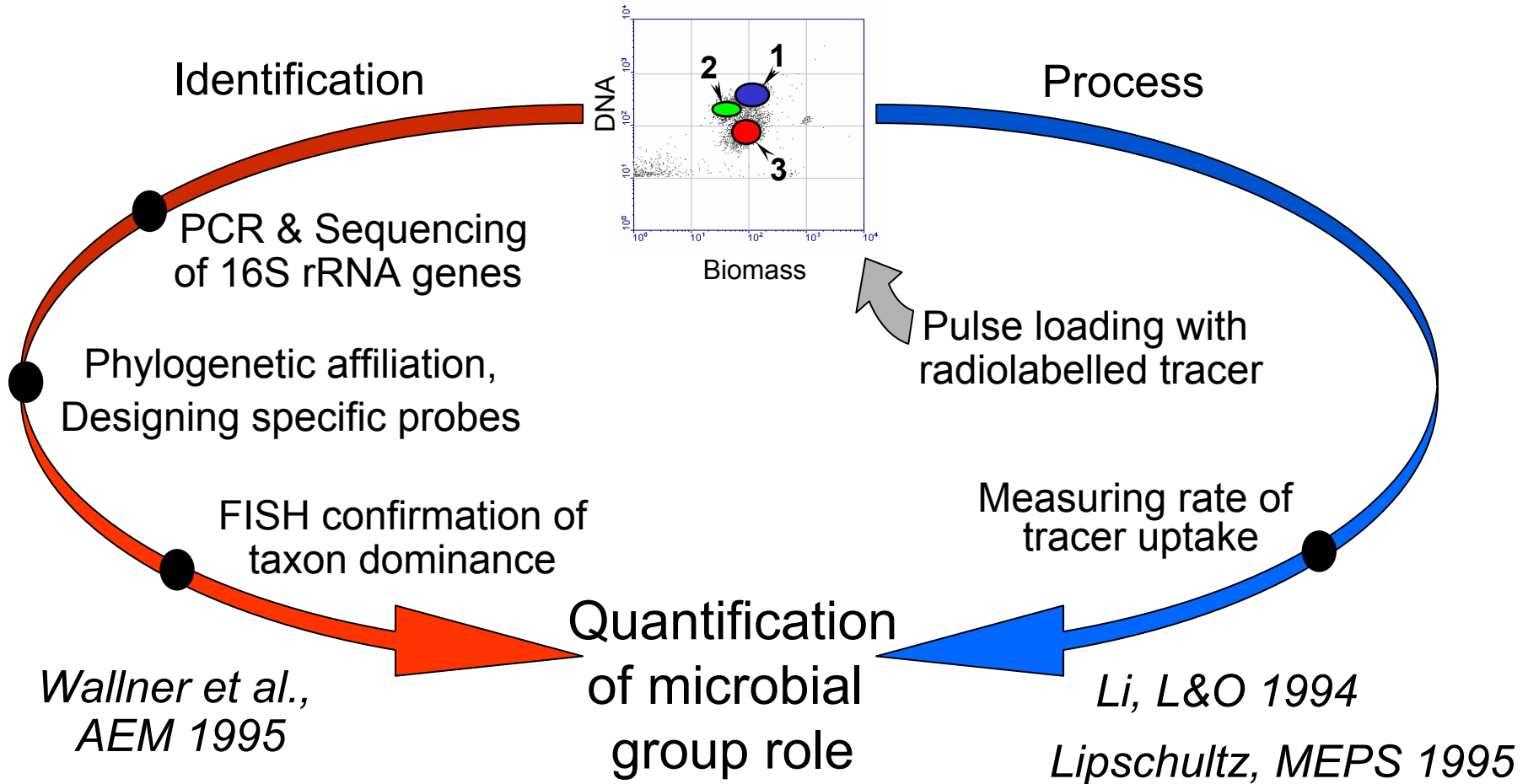


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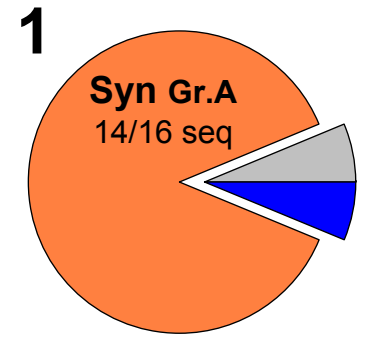
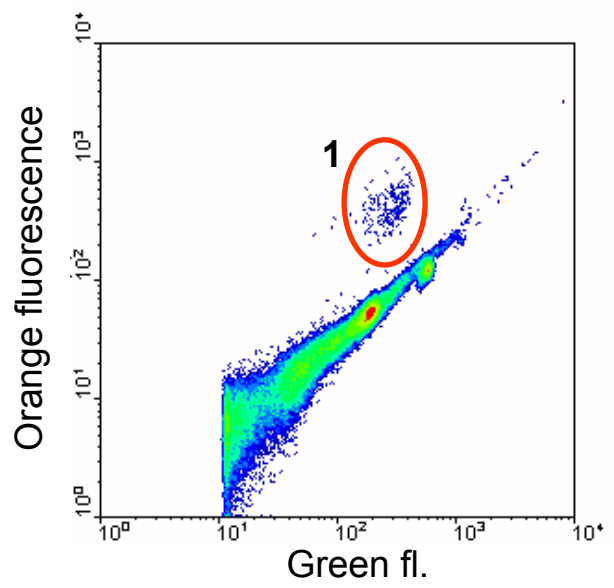
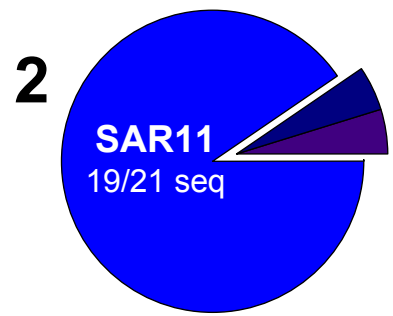
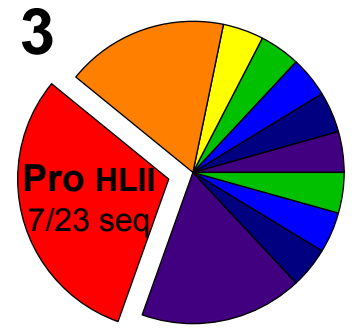
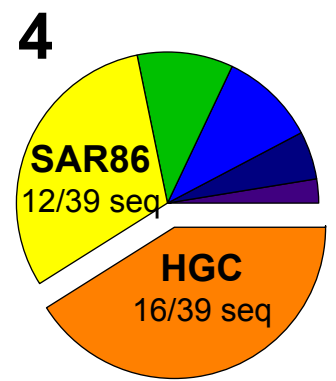
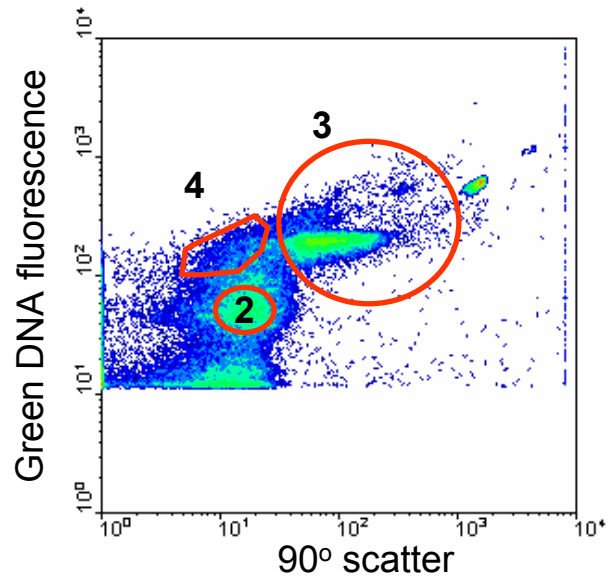
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Microbial identity – process coupling using flow sorting

(Zubkov et al. 2001, *AEM* 67:5210-5218)



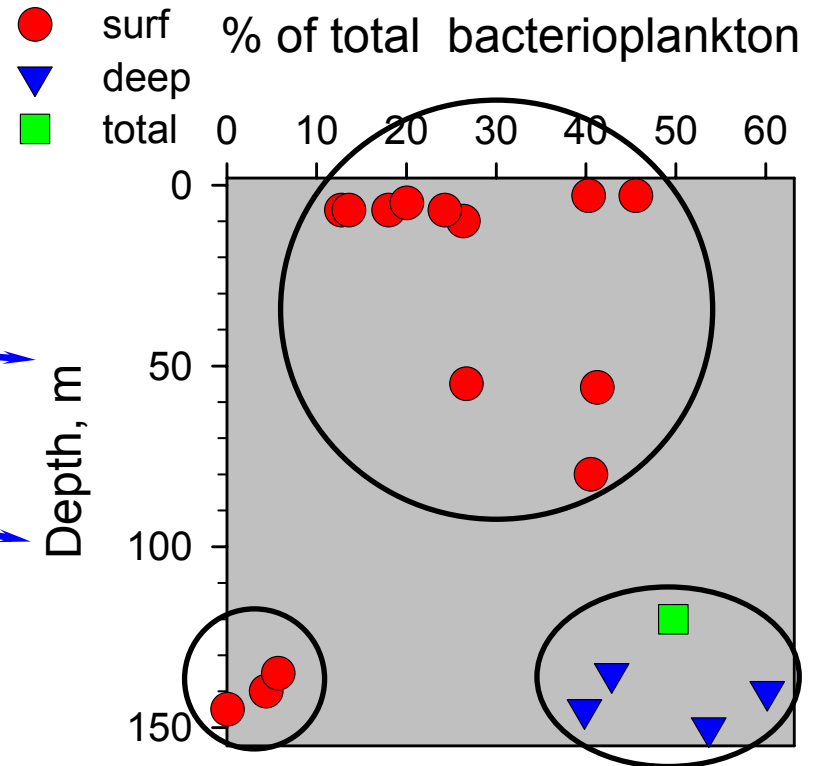
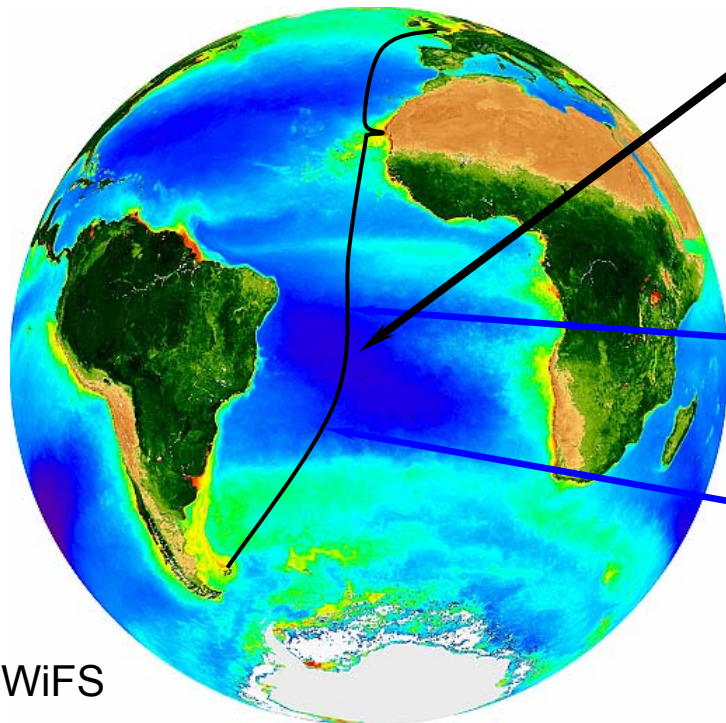
An example of molecular identification of picoplankton FC groups in oligotrophic waters (e.g. Fuchs et al. 2005, AME 39:145-157)



Hypothesis:

- *Prochlorococcus* living in surface waters could be more reliant on organic nutrients, e.g. amino acids, than *Prochlorococcus* inhabiting inorganic nutrient rich deeper waters

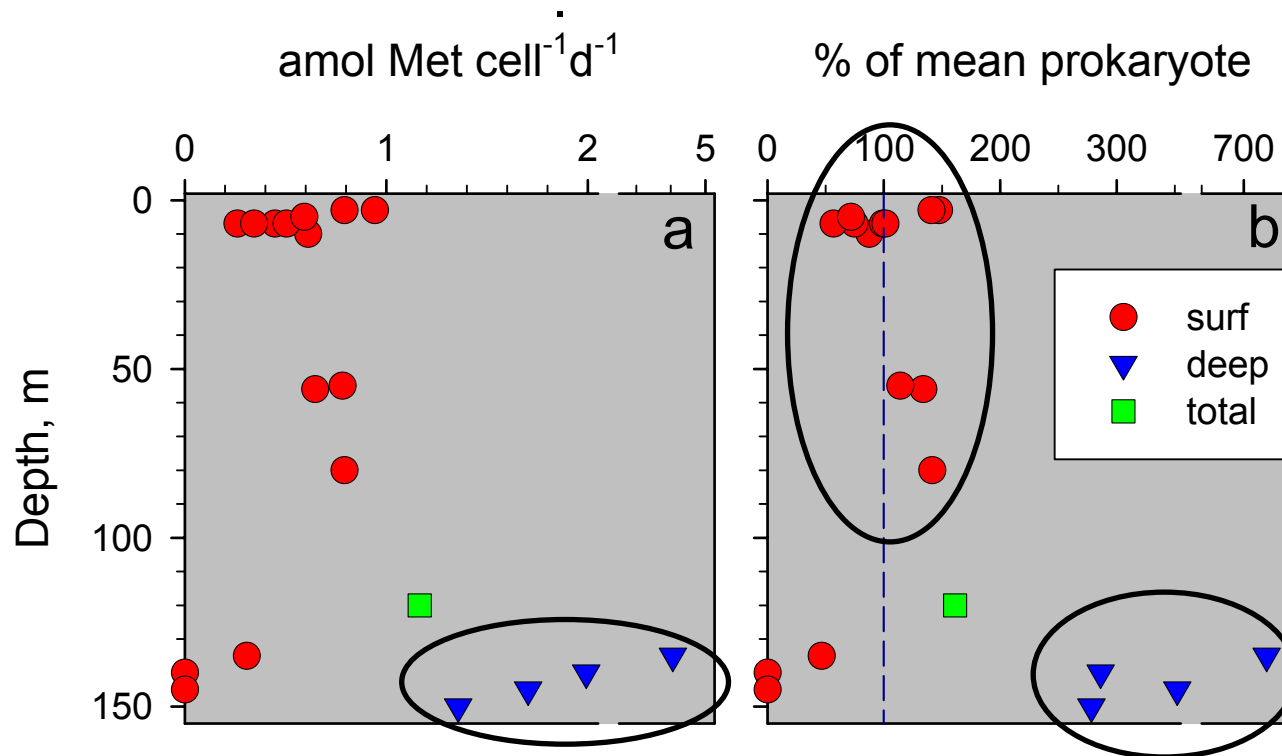
Comparison of methionine uptake by deep & surface adapted *Prochlorococcus* in the Southern Atlantic Gyre



The uptake rates of deep *Prochlorococcus* were **50%** of total bacterioplankton, double the uptake rates of surface *Prochlorococcus* (**25%**)

(Zubkov et al. 2004, *FEMS Microb Ecol* **50**:153-161)

Vertical distribution of methionine uptake rates of deep & surface adapted *Prochlorococcus* cells in oligotrophic waters of the Southern Atlantic Gyre

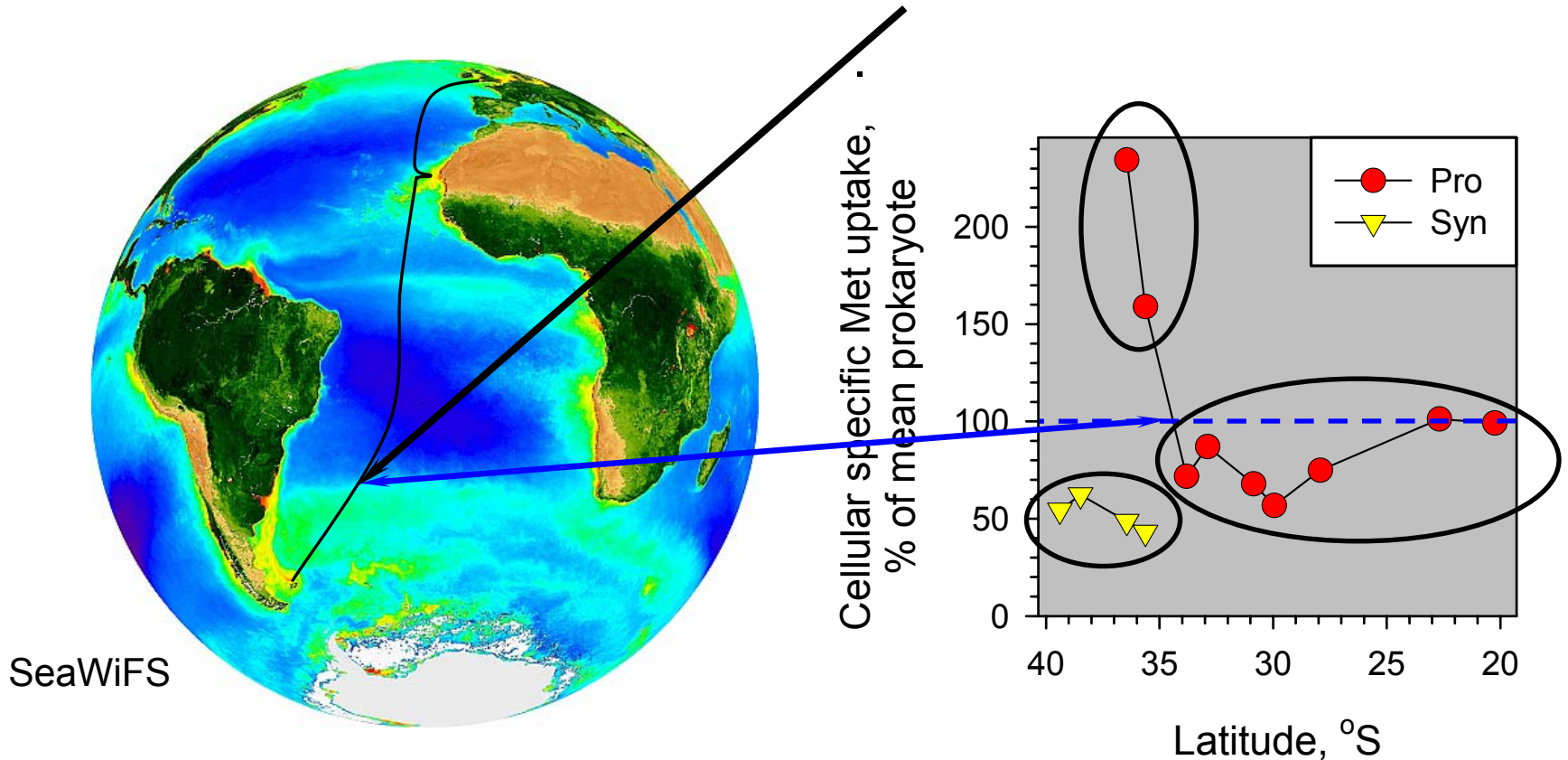


Daily methionine uptake contributed $\sim 0.5\%$ & 0.8% to surface & deep *Pro* cell biomass, respectively. Dissolved amino acids might satisfy $12\%-20\%$ & $45\%-70\%$ of nutrient requirements of surface & deep *Pro*, respectively

Hypothesis:

- *Prochlorococcus* living at the habitat boundaries could become metabolically inactive, i.e. decrease their uptake of amino acids

Methionine uptake rates by *Prochlorococcus* across the Subtropical Frontal Zone

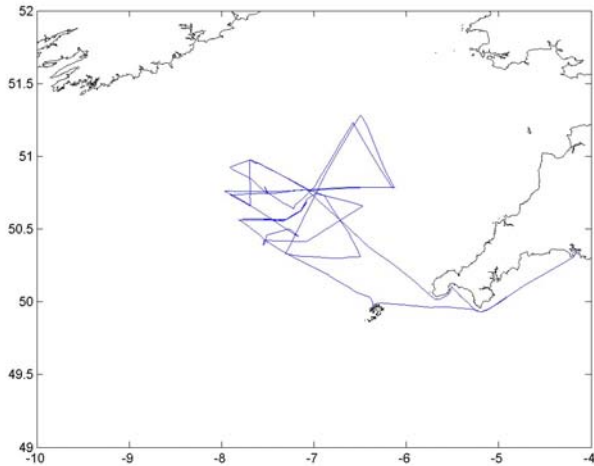


Against expectations *Prochlorococcus* methionine uptake rates in the Frontal Zone were **300%** higher than in the Southern Atlantic Gyre

(Zubkov & Tarran 2005, AME in press)

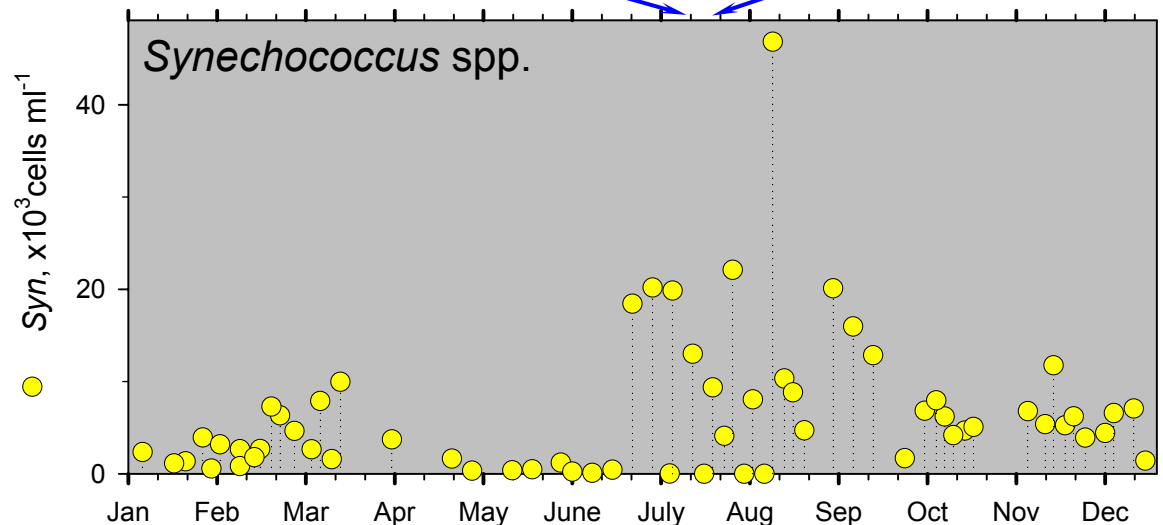
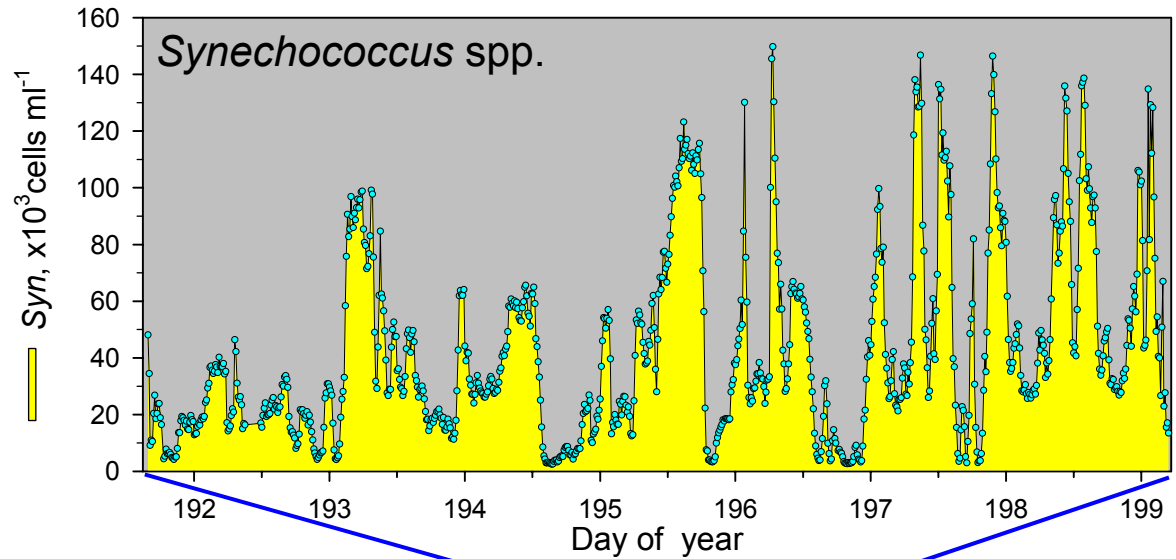
Extreme spatial variability in marine picoplankton and its consequences for interpreting Eulerian time-series

(Martin et al. 2005, Biol. Lett. in press)



Celtic Sea Survey
FC sampling - every
12 min ~ 1.4km

Seasonal study
off Plymouth
(English Channel)



Acknowledgements

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Glen Tarran, Carol Robinson



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Thank you very much for your attention