

PML

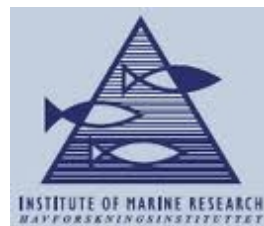
Plymouth Marine
Laboratory

Listen to the ocean

Seasonal particle dynamics in the euphotic and mesopelagic regions of the Nordic Seas

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Bjerknes Centre
for Climate Research



National Centre for
Earth Observation
NATURAL ENVIRONMENT RESEARCH COUNCIL

Outline

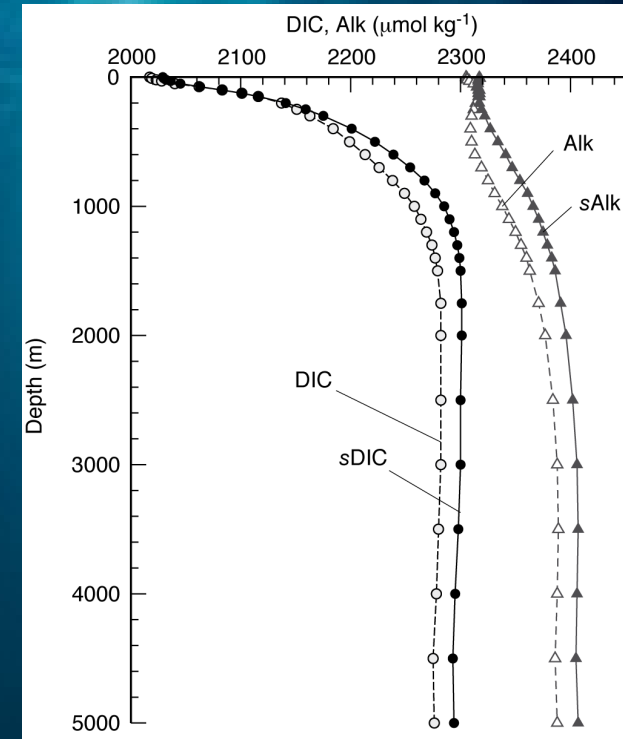
Biological carbon pump

Marine optics primer

Particle dynamics in the Norwegian Sea

Biological carbon pump

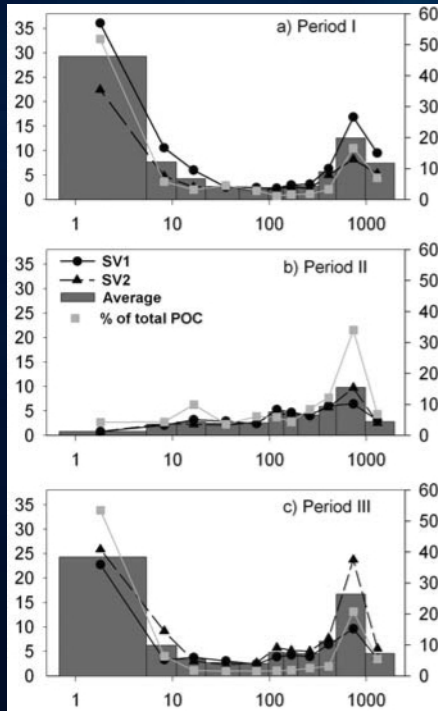
- Transfer of carbon from surface to deep ocean: control on atmospheric CO₂
- Sinking particles of organic origin
- Typically: relatively large organic aggregates with sinking rates >100 m d⁻¹



Sarmiento and Gruber, 2006

Slowly sinking particles

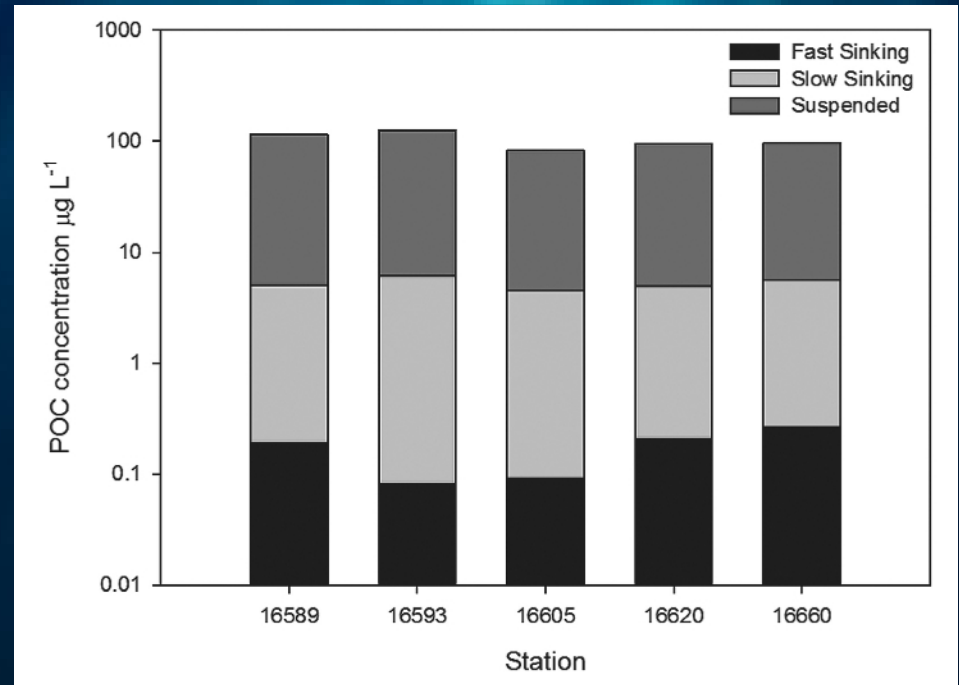
IMFD [g/m²/SV width]



% of total POC

Settling velocity
[m/d]

Alonso-Gonzalez et al., (2010)



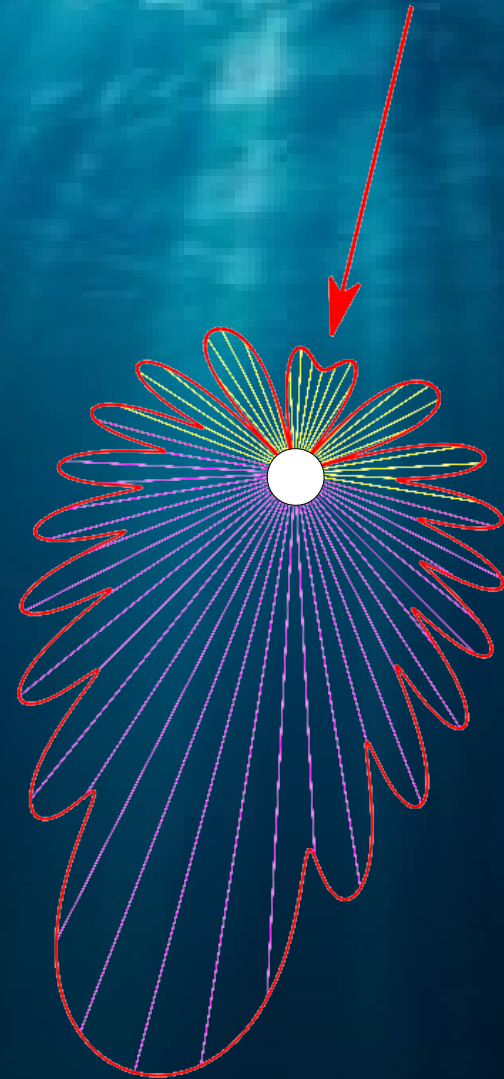
Riley et al., (2012)

Slowly sinking => small
=> optical scattering

Marine Optics Primer

Interaction of light with matter

- Absorption
- Scattering



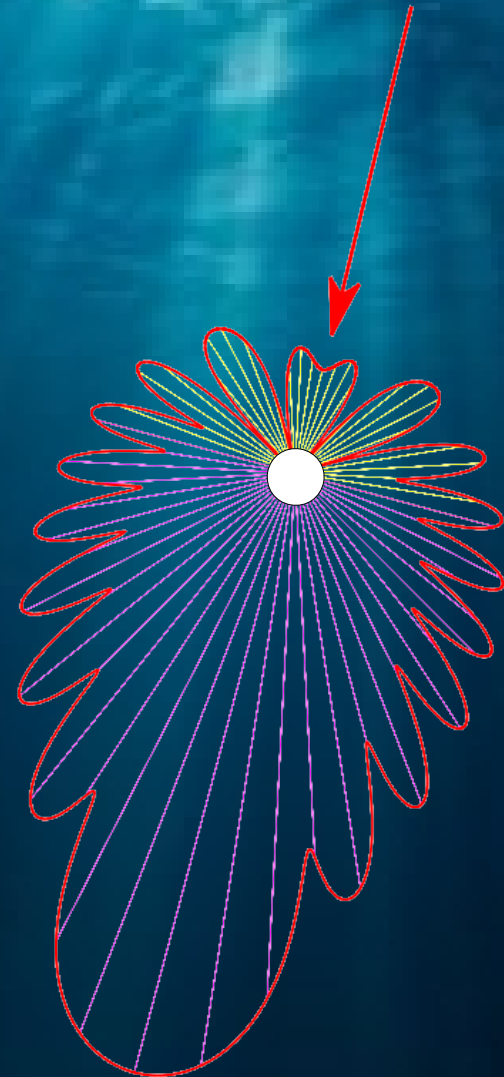
Marine Optics Primer

Interaction of light with matter

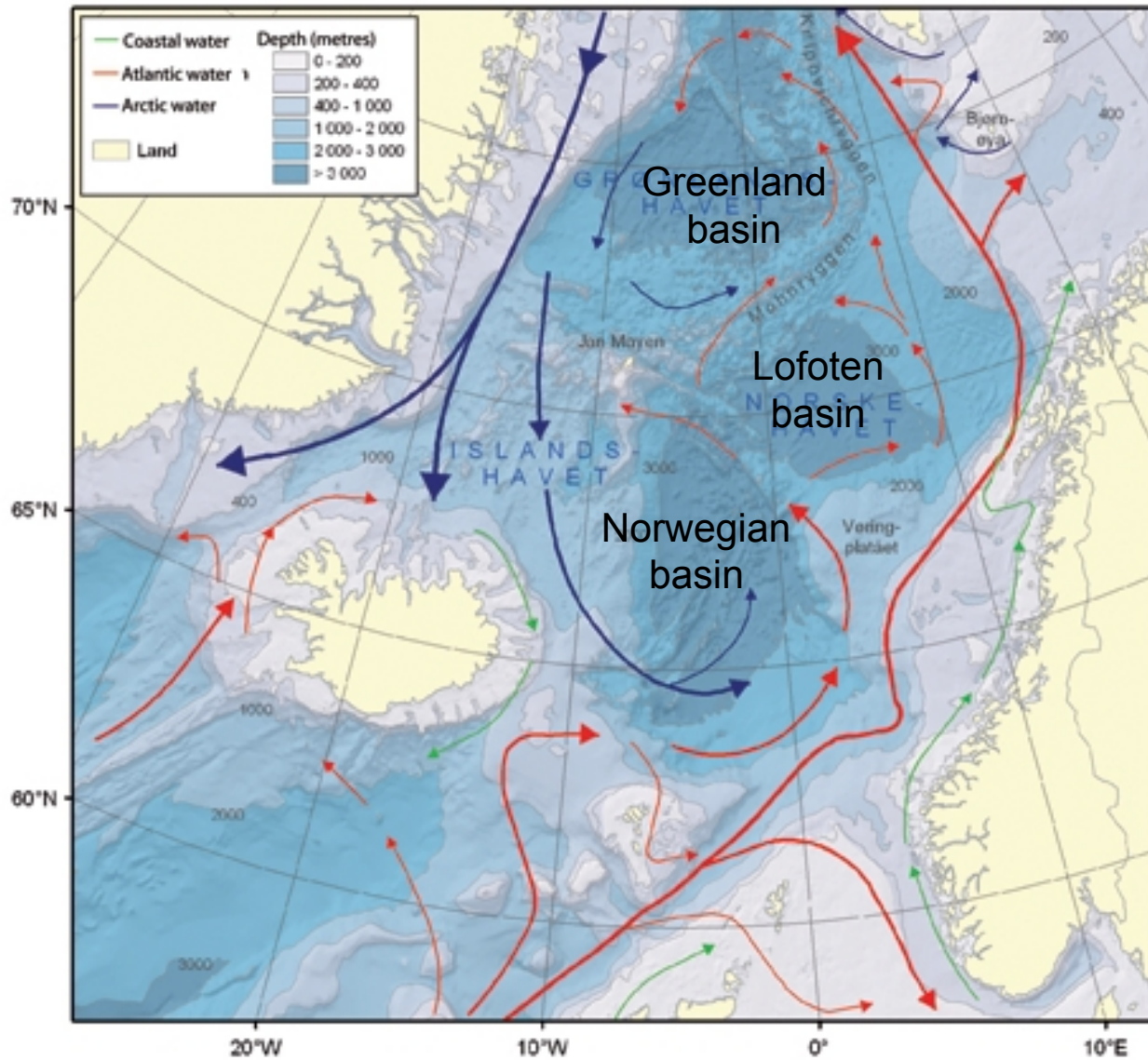
- Absorption
- Scattering

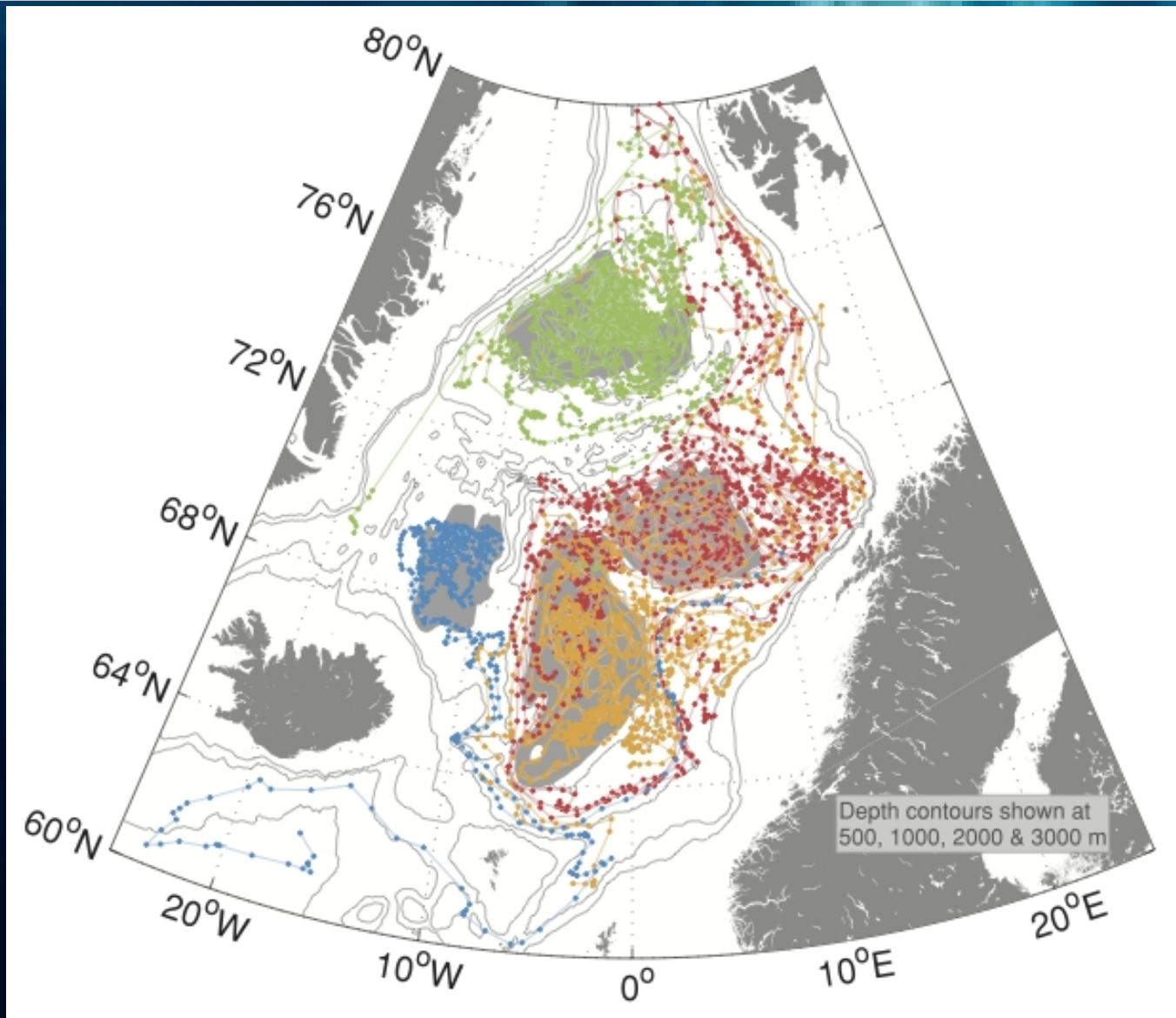
Oceanic scattering substances

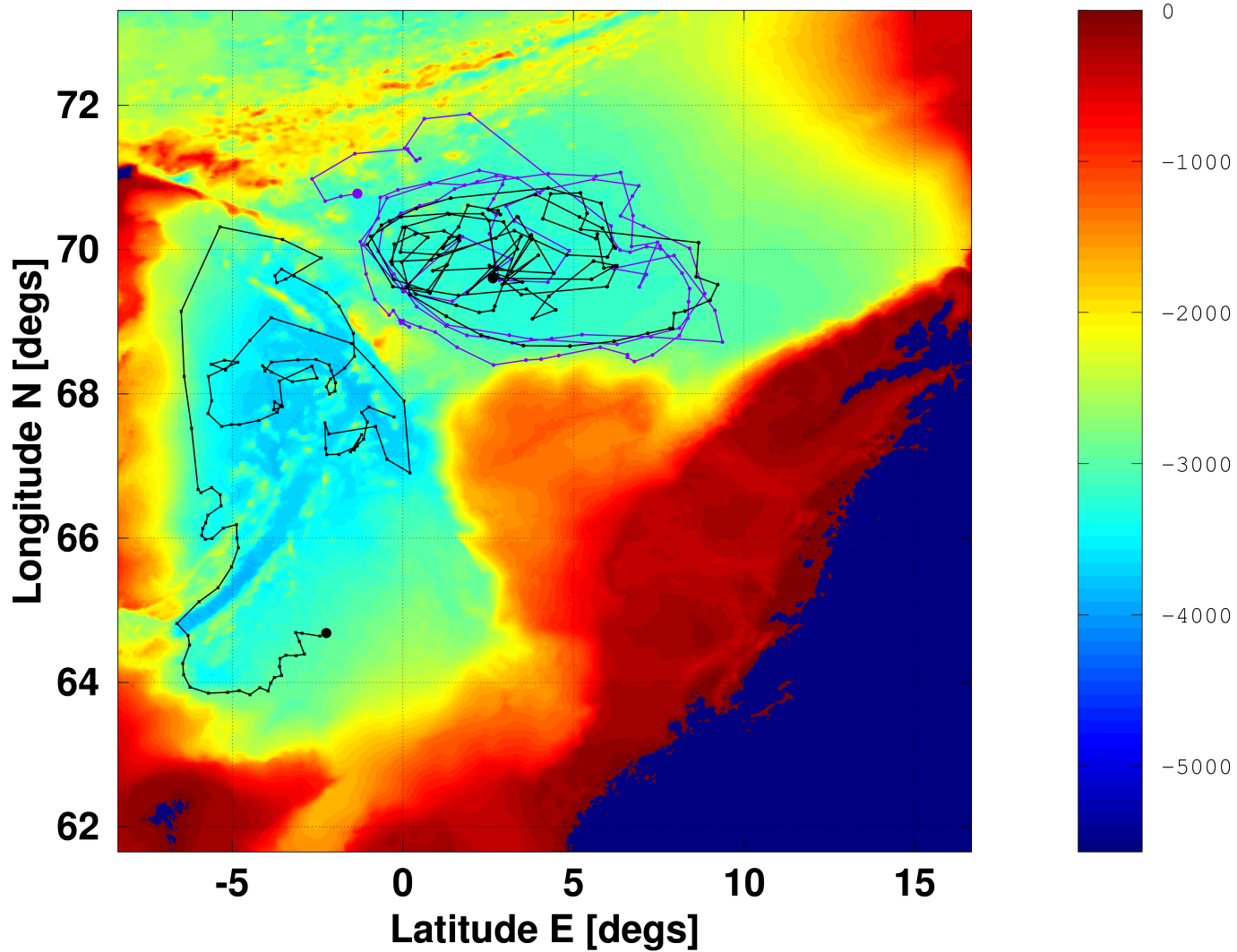
- Pure water
- Particles (0.5 – 20 μm)
 - phytoplankton + bacteria
 - organic detritus
 - minerals

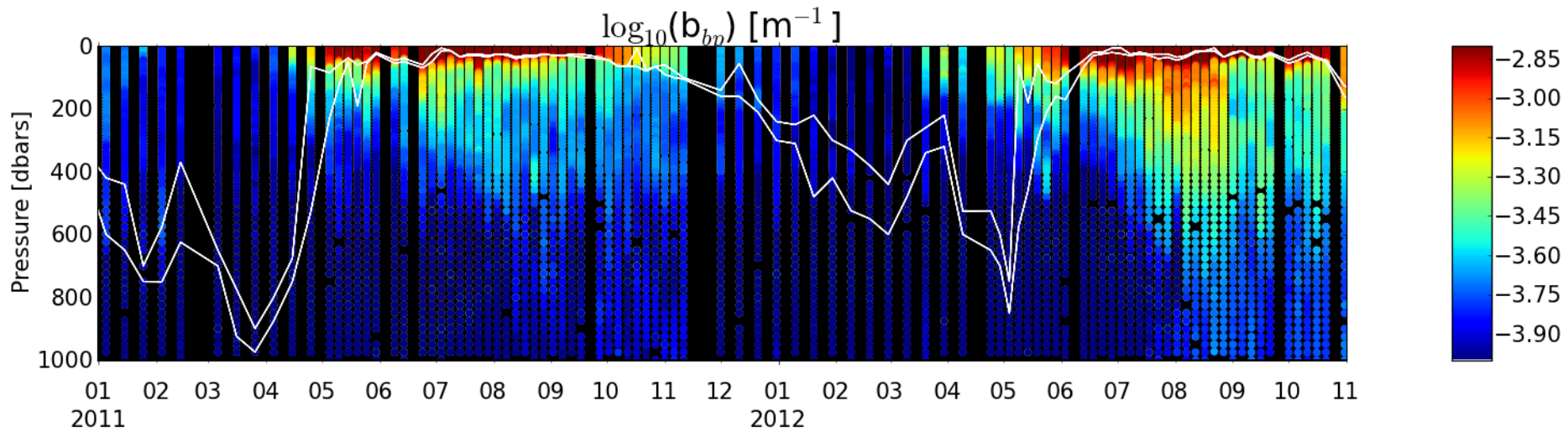
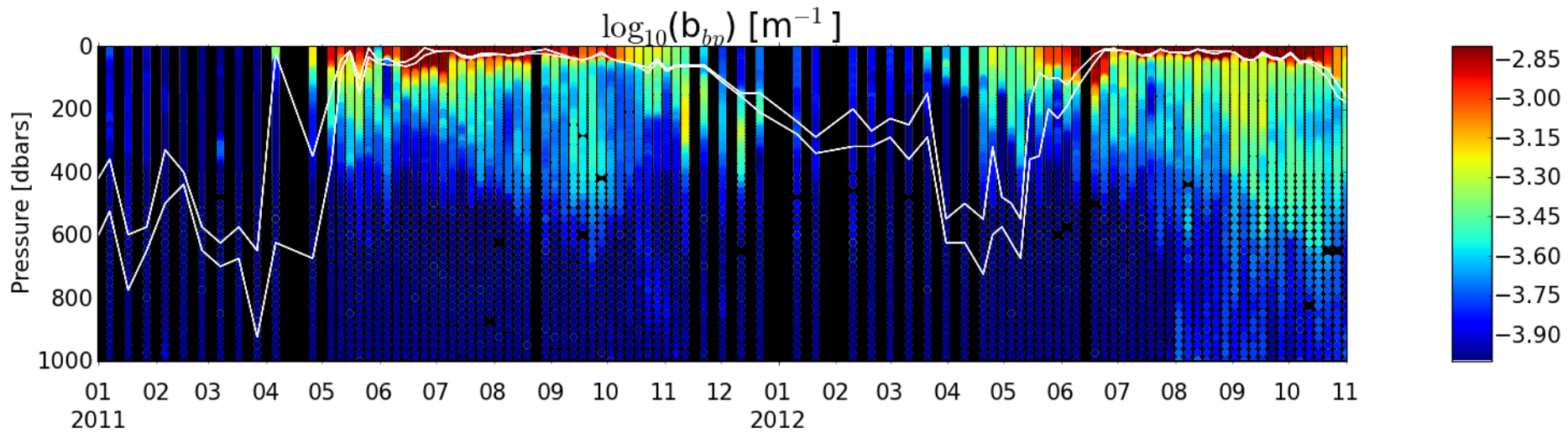


Particle dynamics in the Norwegian Sea

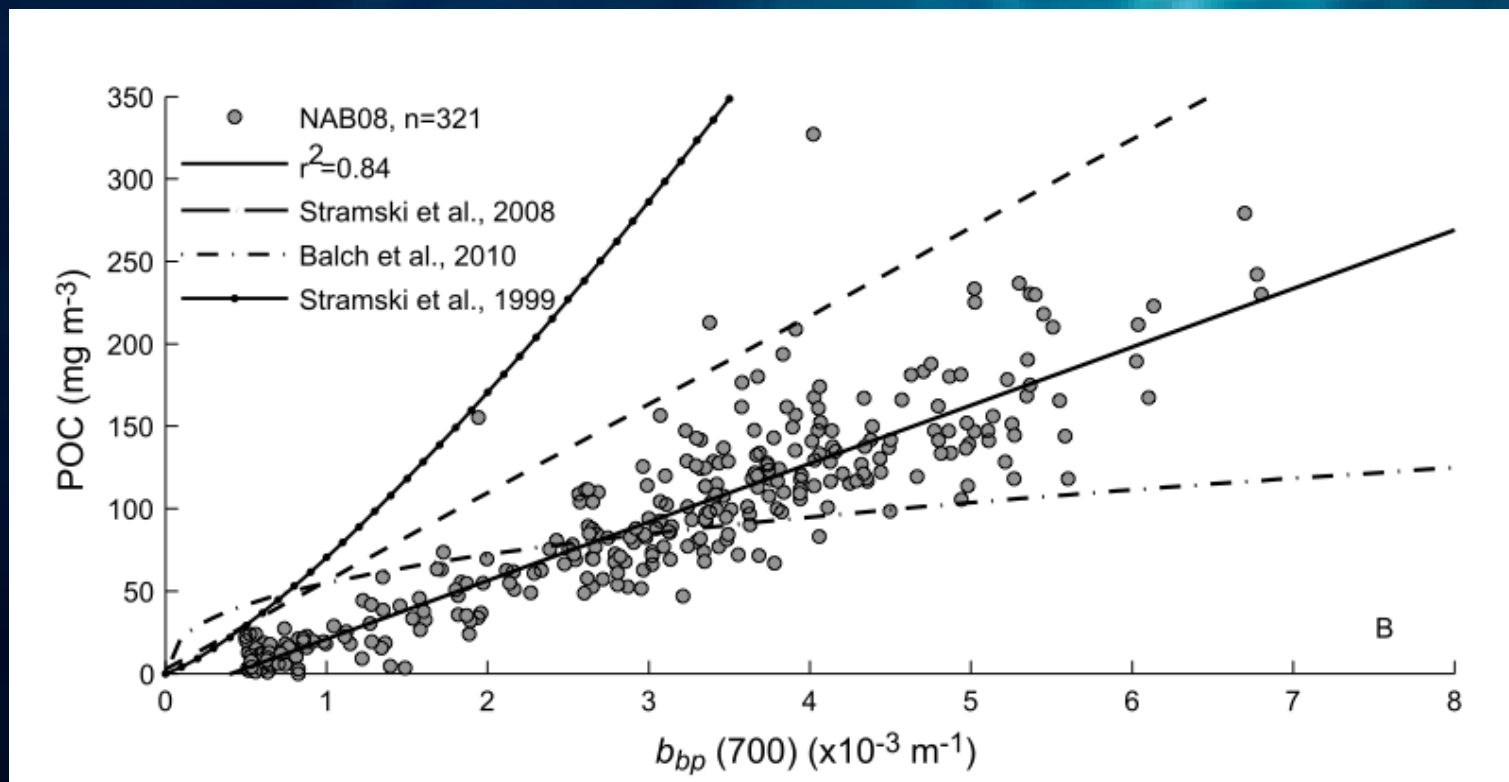




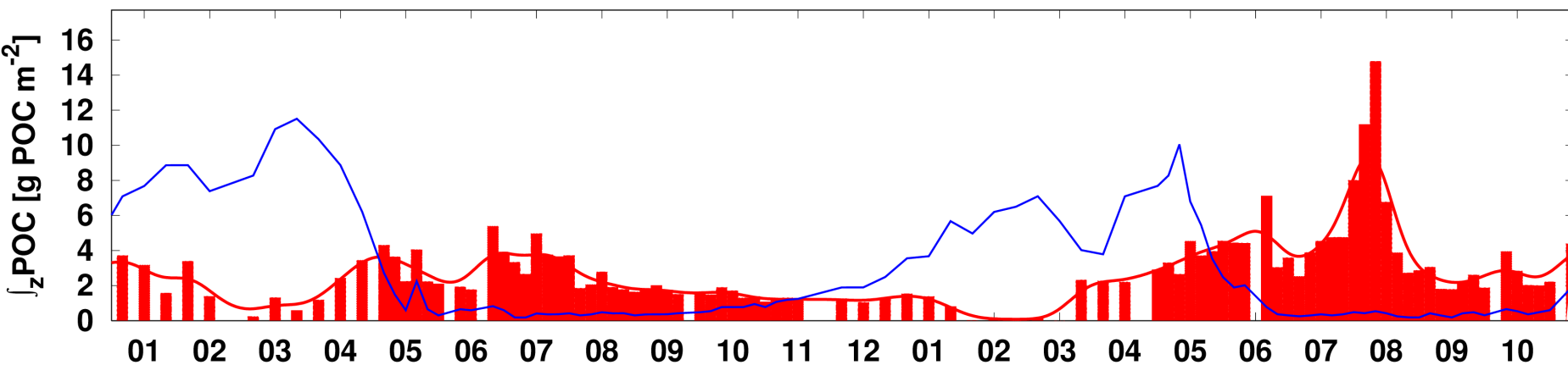
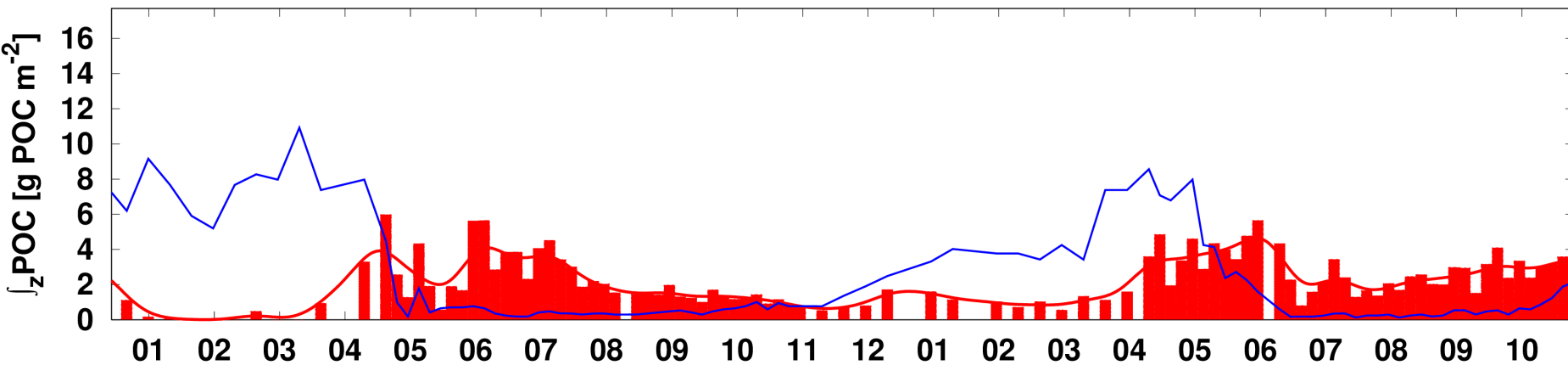




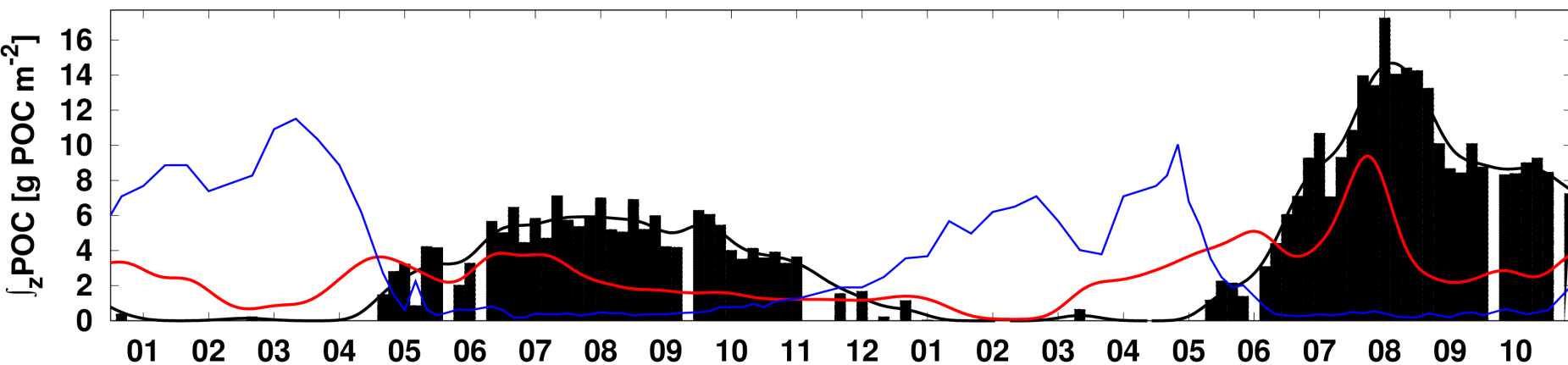
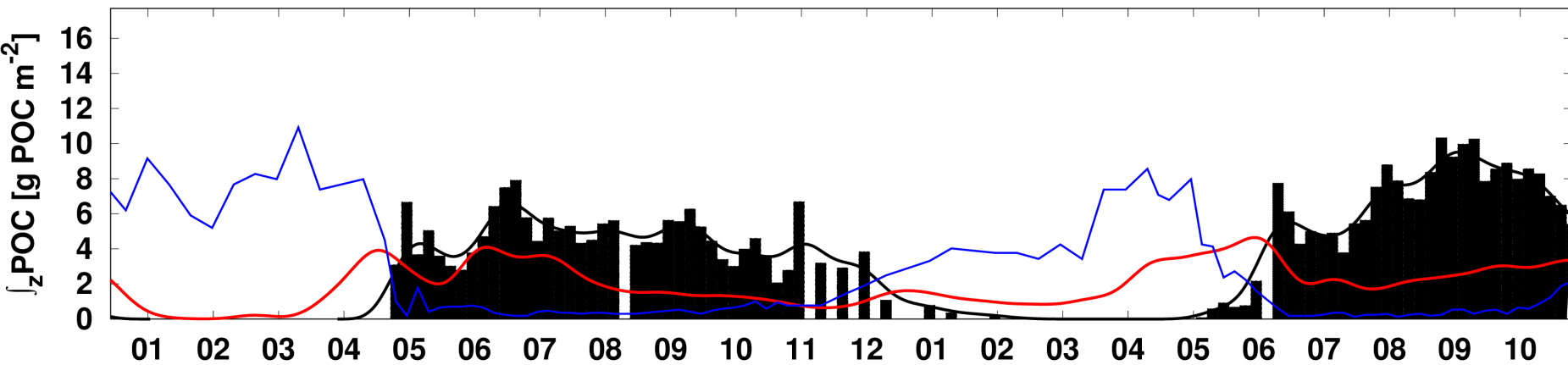
bbp-to-POC



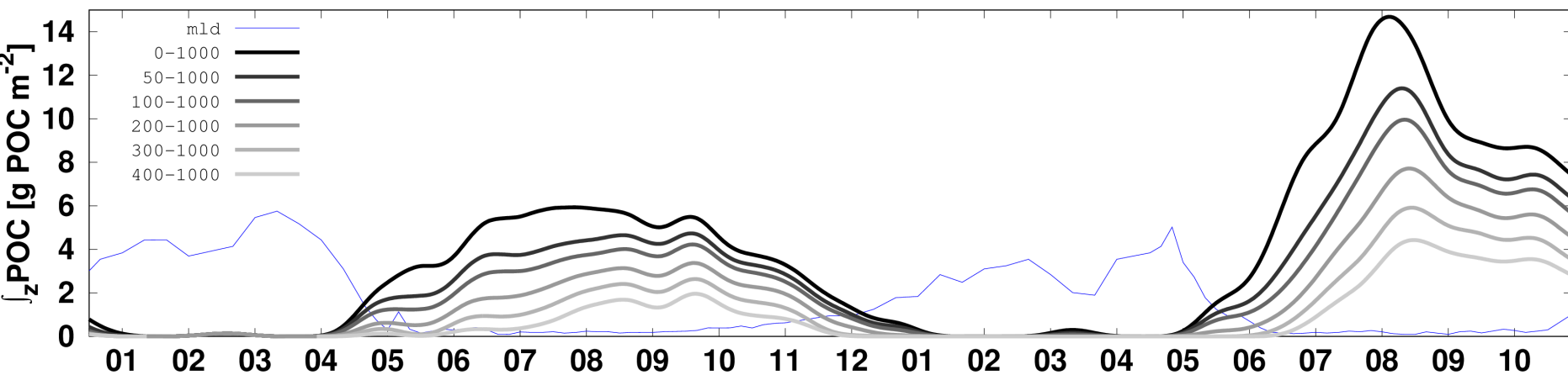
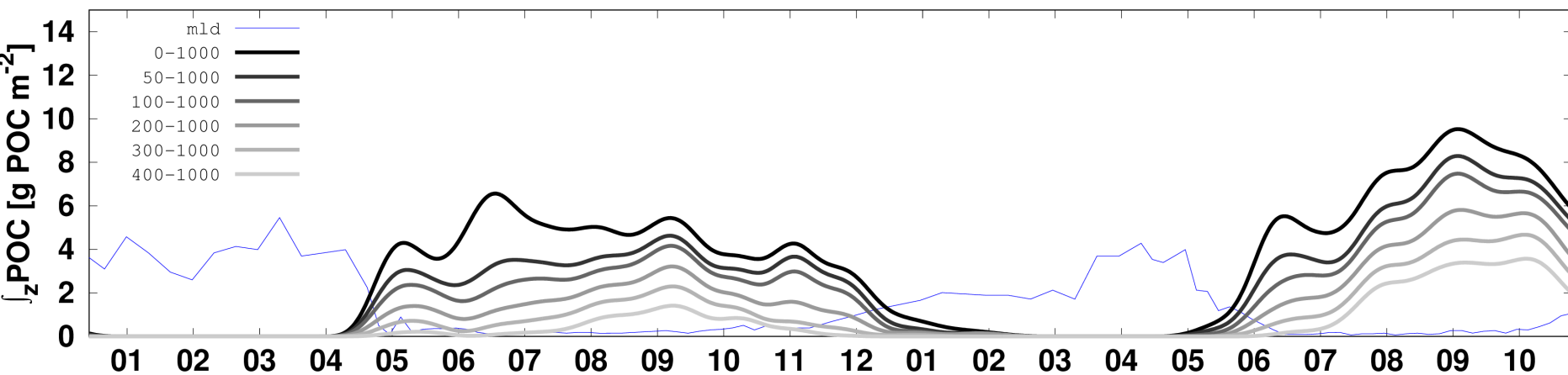
POC: productive layer



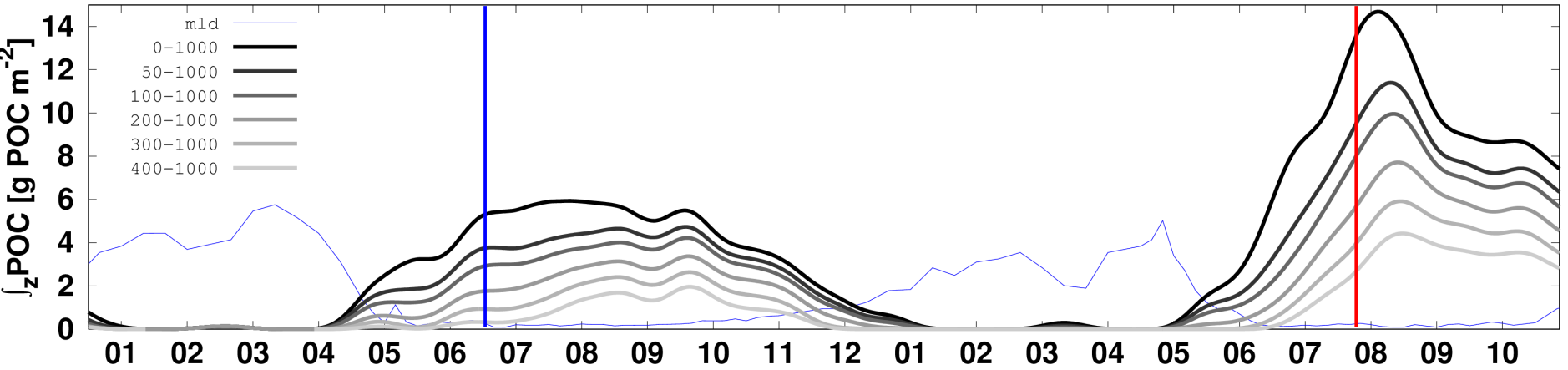
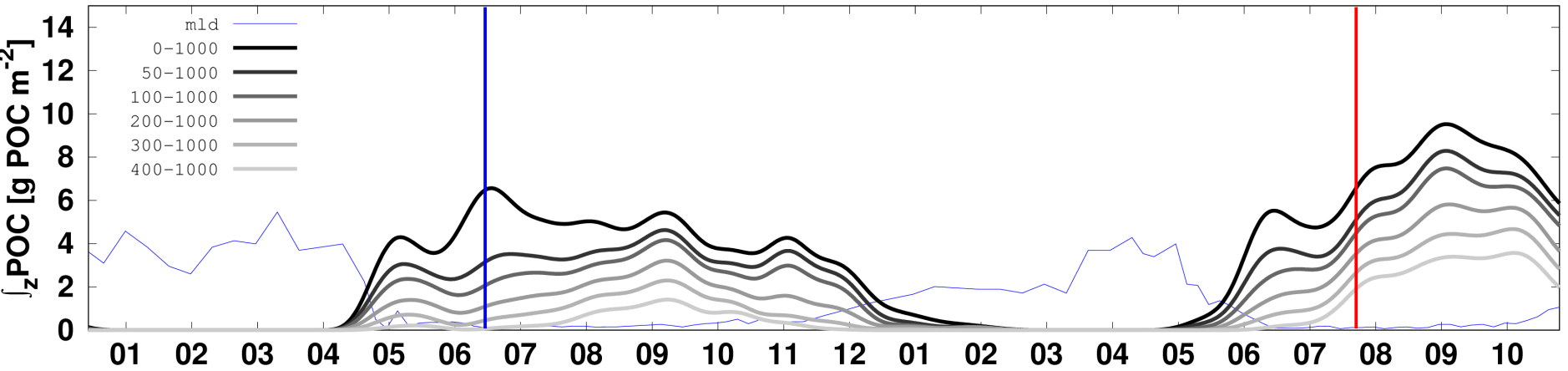
POC: mesopelagic layer



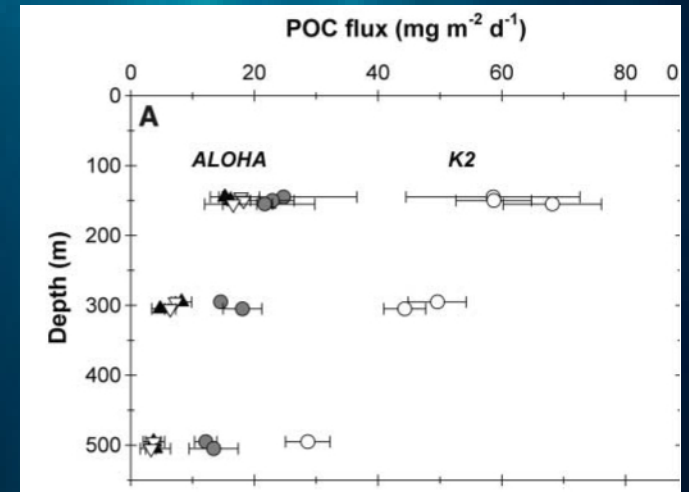
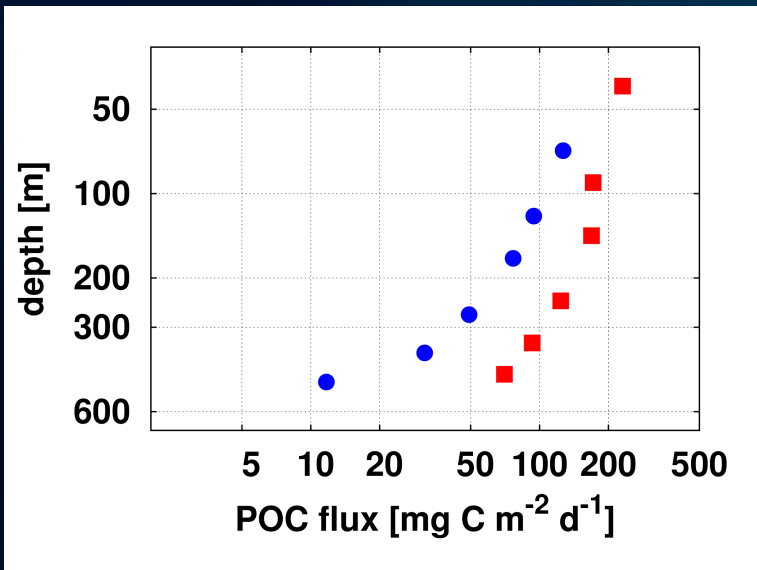
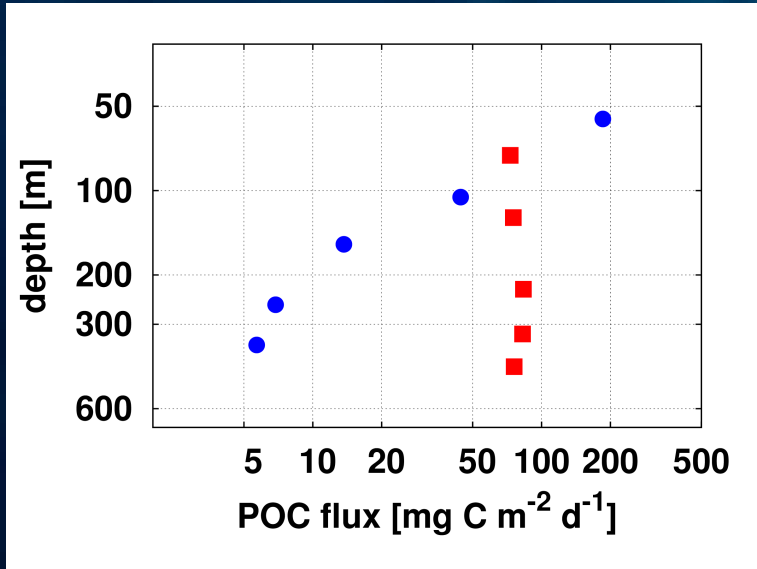
Stocks [mg POC m⁻²]



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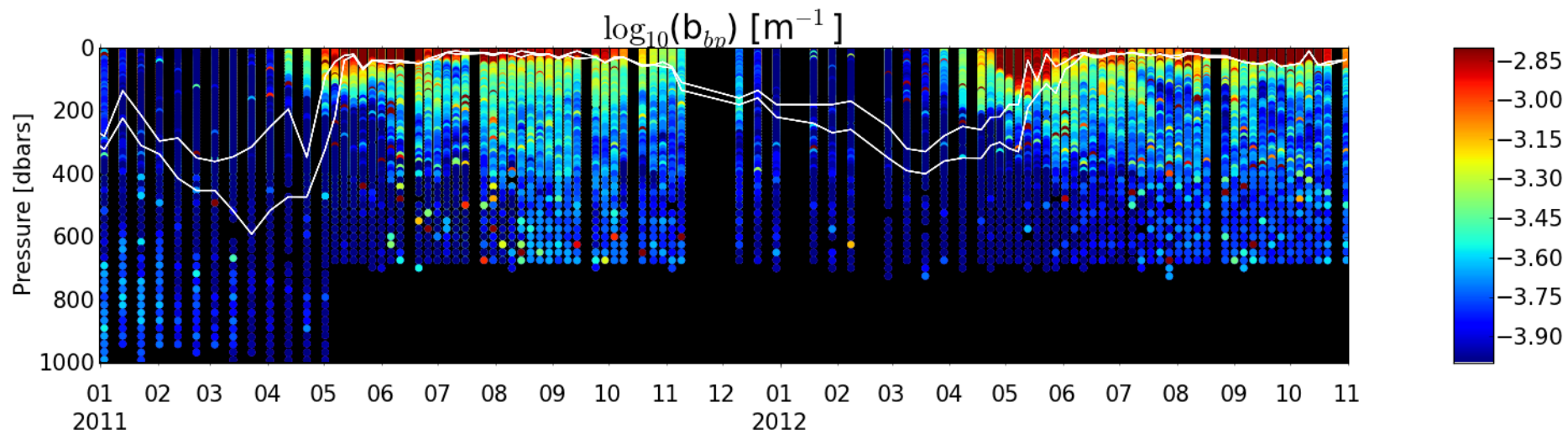
Transfer efficiency



Buesseler et al., 2007

Conclusions

- Bio-Argo is allowing us to have a first look at the seasonal mesopelagic particle stocks and their dynamics
- Large amount of POC in the mesopelagic region
- Relatively large fluxes of POC
- Very high seasonal and inter-annual variations



Thanks for your attention