



## Carbon from Space: maximising biogeochemical observations at SOTS

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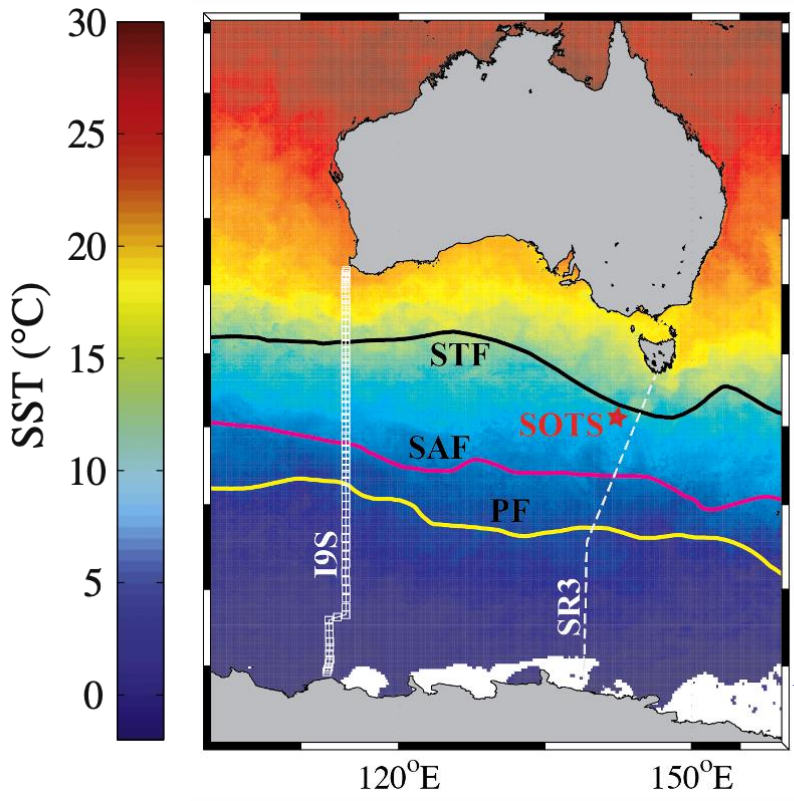
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# The Southern Ocean Time Series (SOTS)

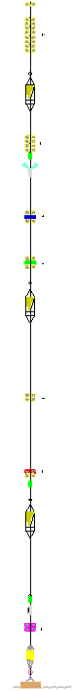
*Autonomous multi-trophic observations of Southern Ocean air-sea exchange, production, carbon uptake, and export in the Subantarctic Southern Ocean*



SOFS air-sea  
flux and  
BGC mooring



SAZ  
Sediment  
Trap mooring

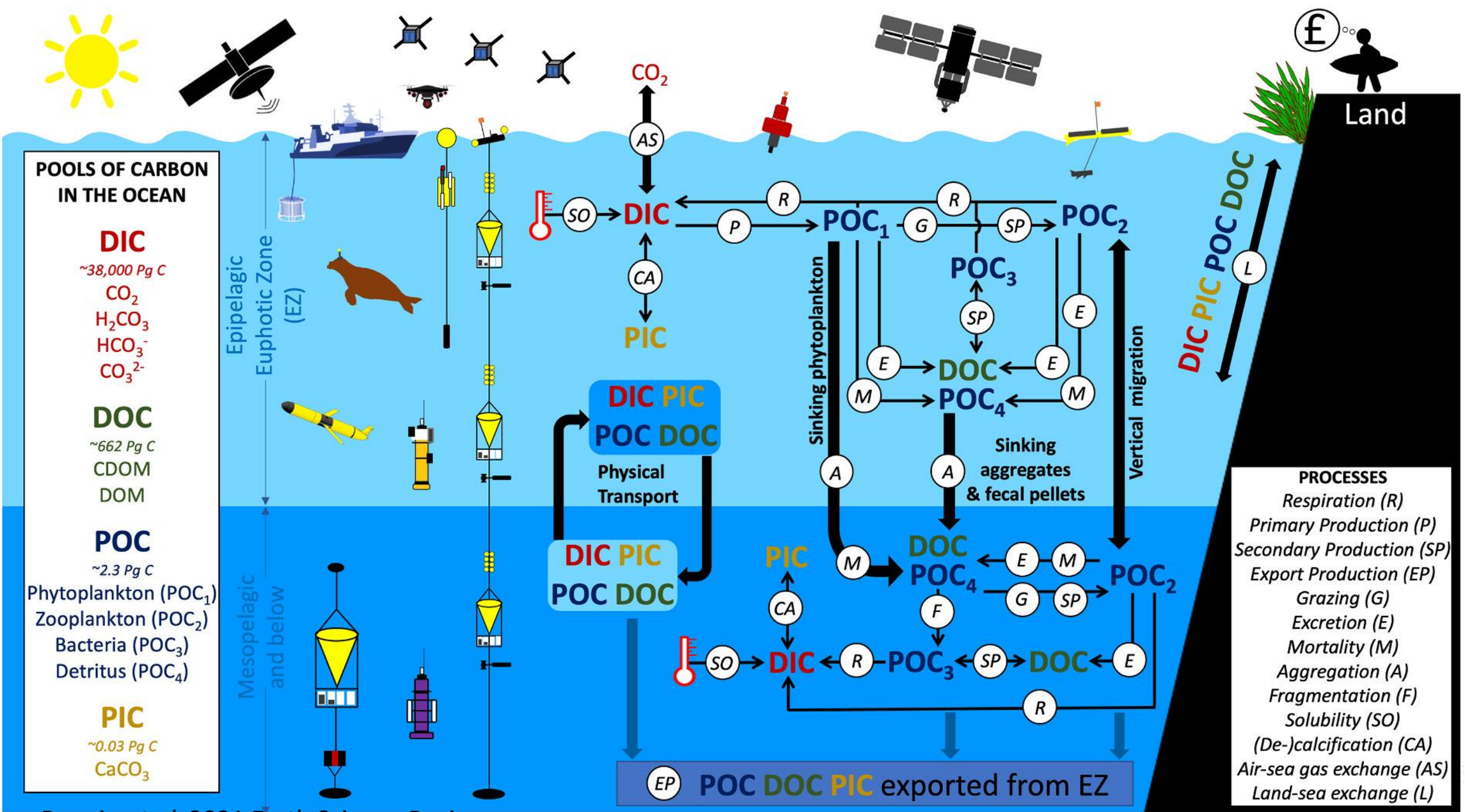


SOLACE  
Southern Ocean Large Area Carbon Extent



biogeochemical  
Argo







SAZ mooring

SOFS mooring

**POOLS OF CARBON IN THE OCEAN**

**DIC**  
~38,000 Pg C  
CO<sub>2</sub>  
H<sub>2</sub>CO<sub>3</sub>  
HCO<sub>3</sub><sup>-</sup>  
CO<sub>3</sub><sup>2-</sup>

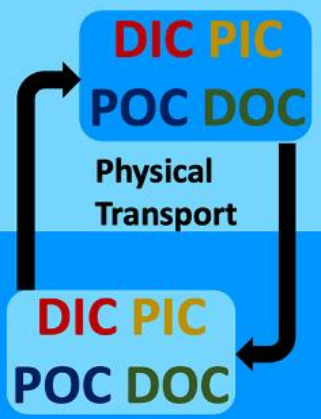
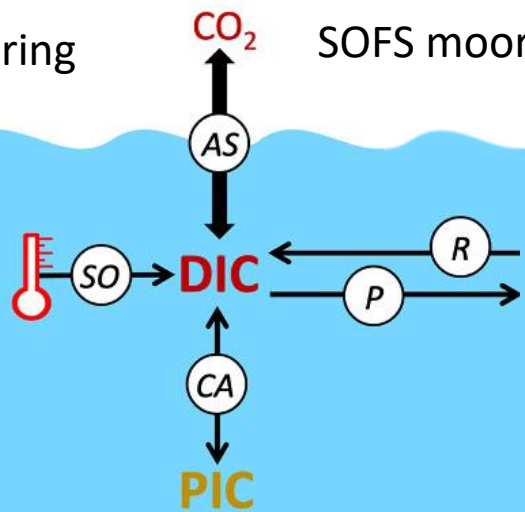
**DOC**  
~662 Pg C  
CDOM  
DOM

**POC**  
~2.3 Pg C  
Phytoplankton (POC<sub>1</sub>)  
Zooplankton (POC<sub>2</sub>)  
Bacteria (POC<sub>3</sub>)  
Detritus (POC<sub>4</sub>)

**PIC**  
~0.03 Pg C  
CaCO<sub>3</sub>

Epipelagic Euphotic Zone (EZ)

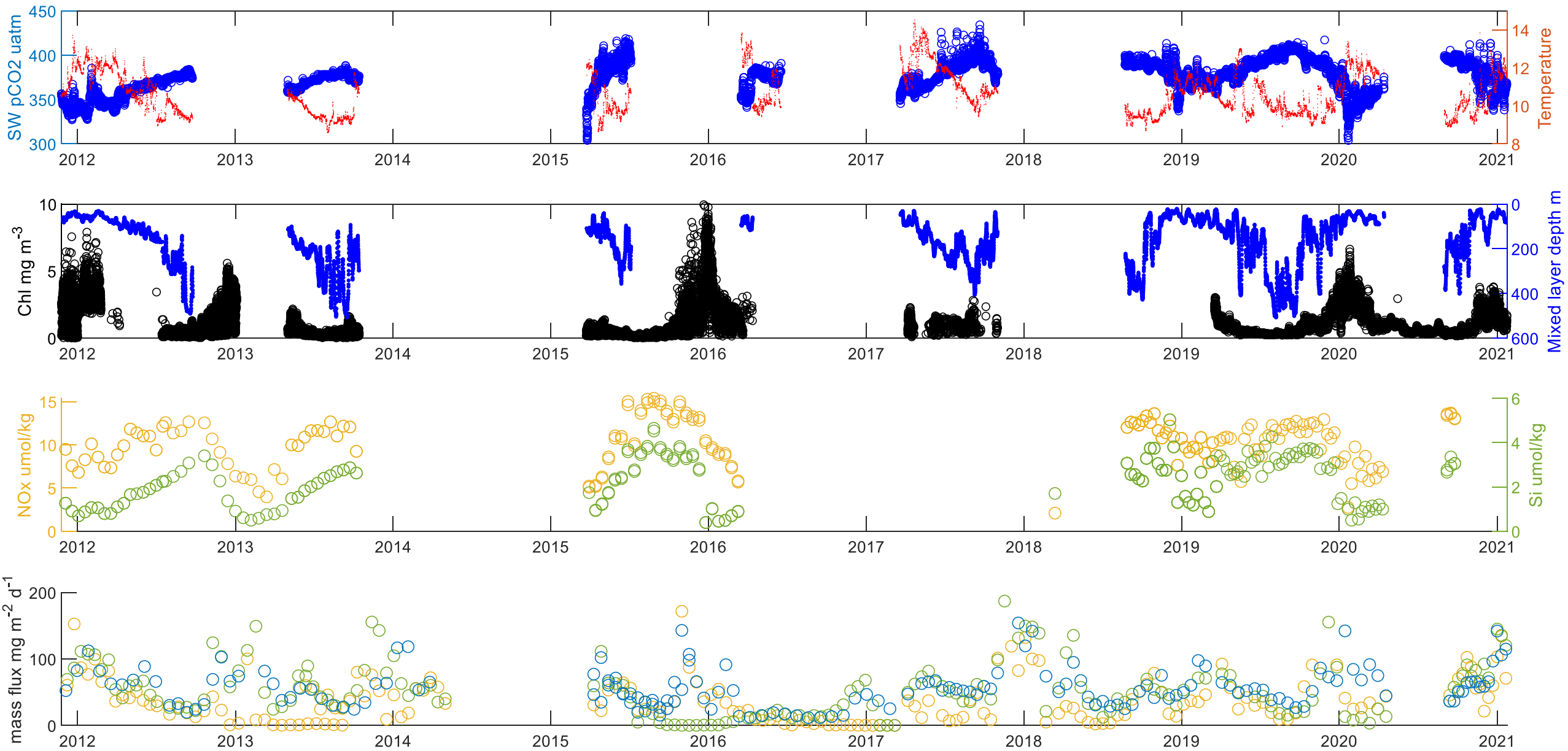
Mesopelagic and below

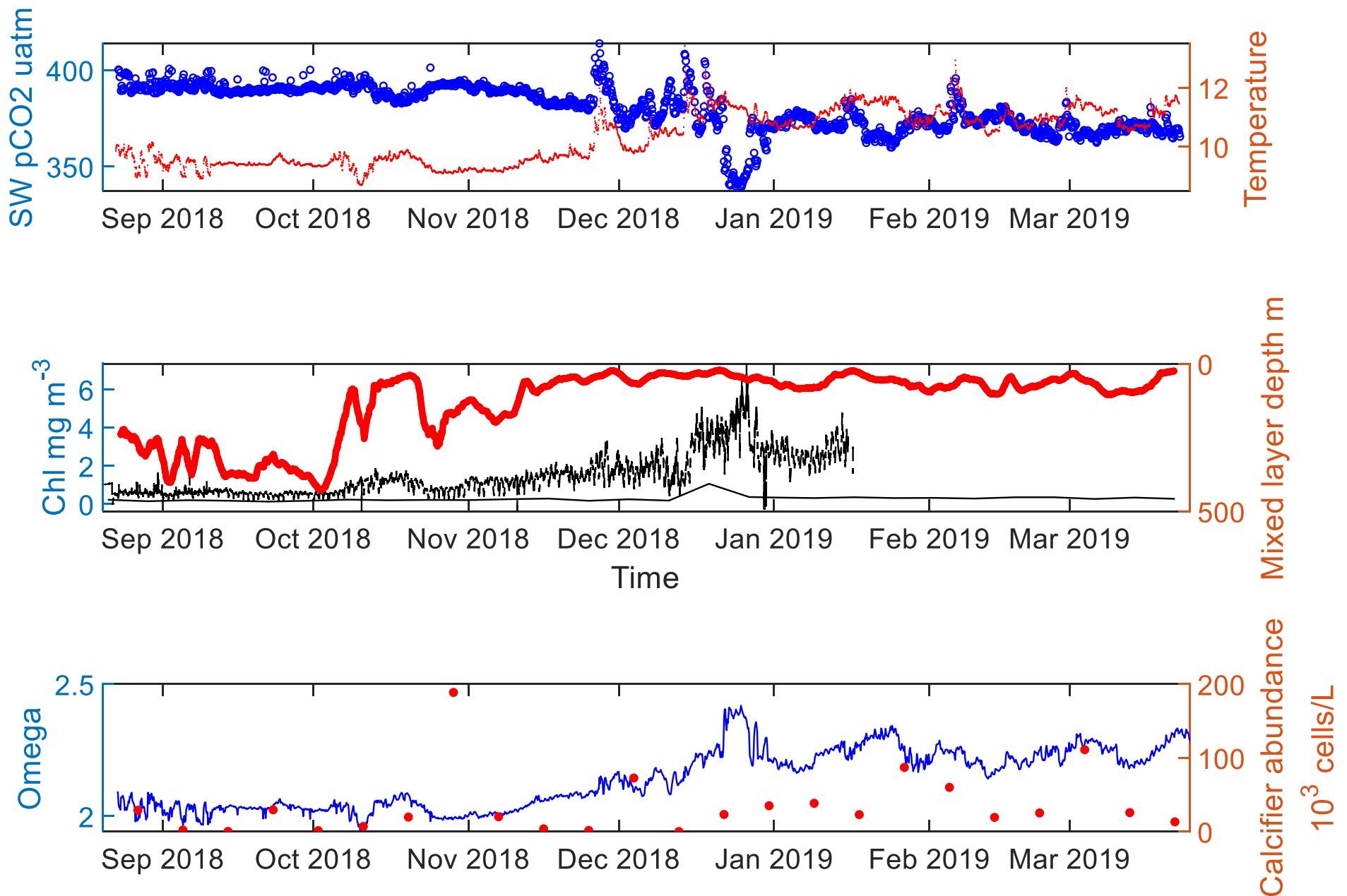
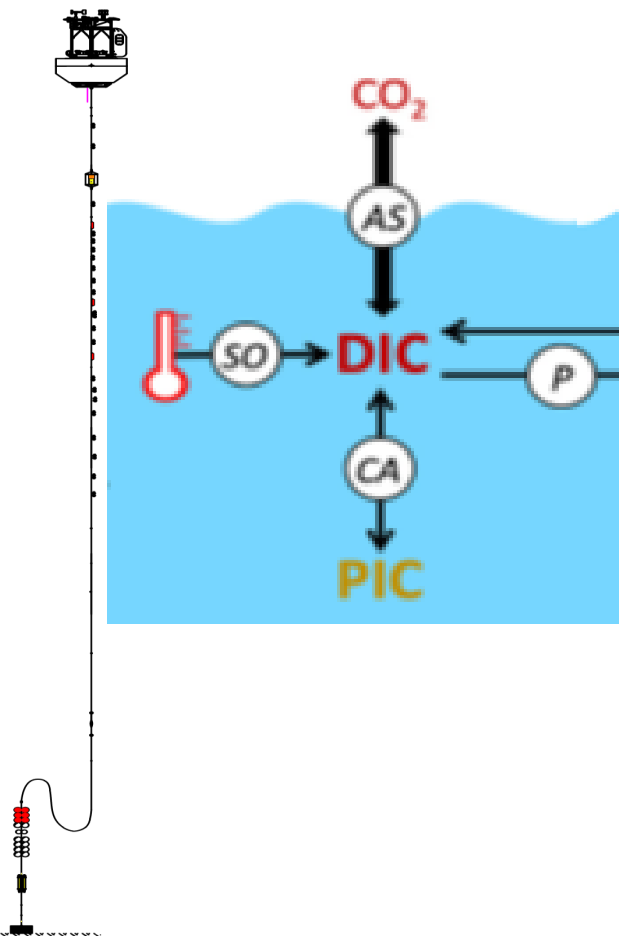


EP POC DOC PIC exported from EZ

**PROCESSES**

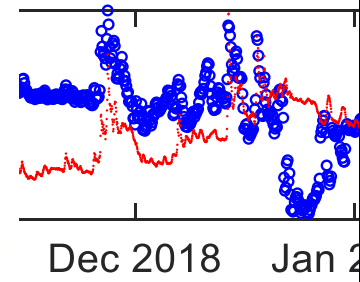
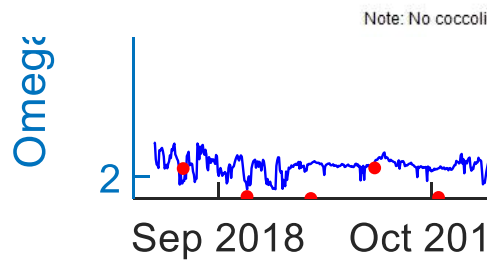
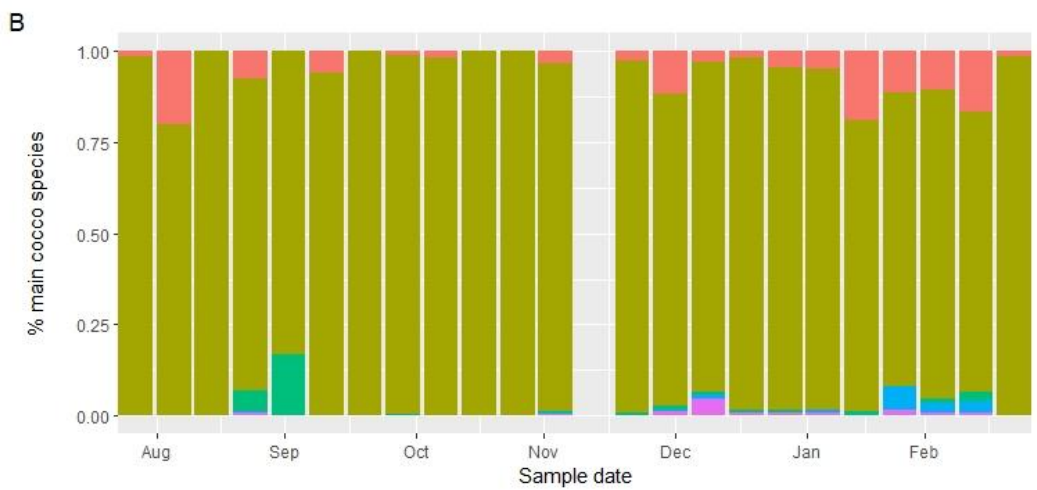
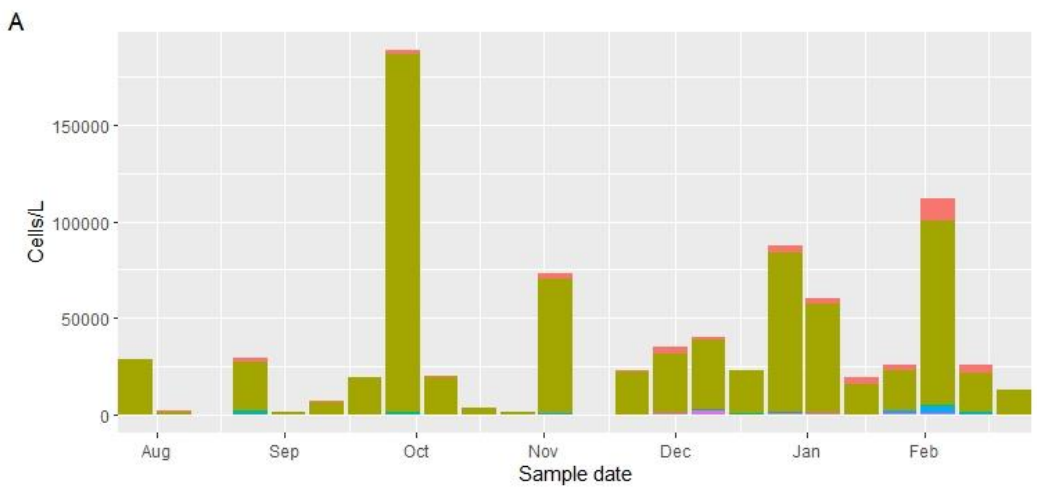
- Respiration (R)
- Primary Production (P)
- Secondary Production (SP)
- Export Production (EP)
- Grazing (G)
- Excretion (E)
- Mortality (M)
- Aggregation (A)
- Fragmentation (F)
- Solubility (SO)
- (De-)calcification (CA)
- Air-sea gas exchange (AS)
- Land-sea exchange (L)



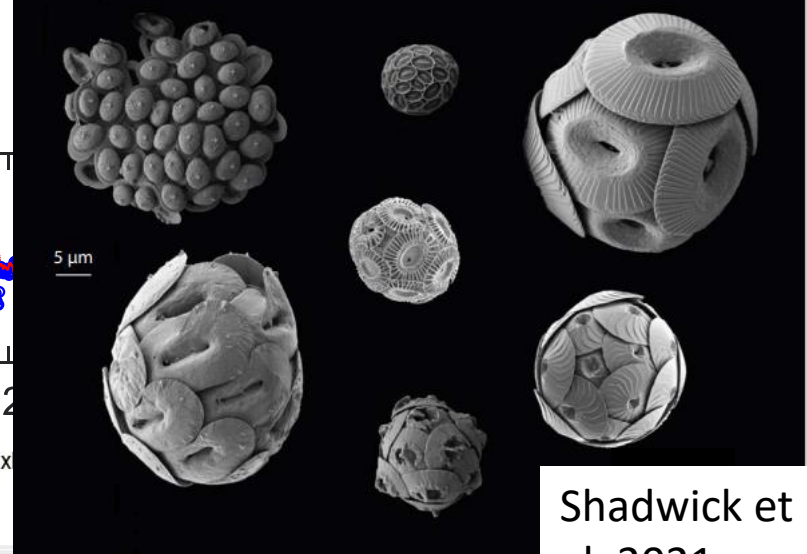


Absolute and relative concentrations of main species of coccolithophorids

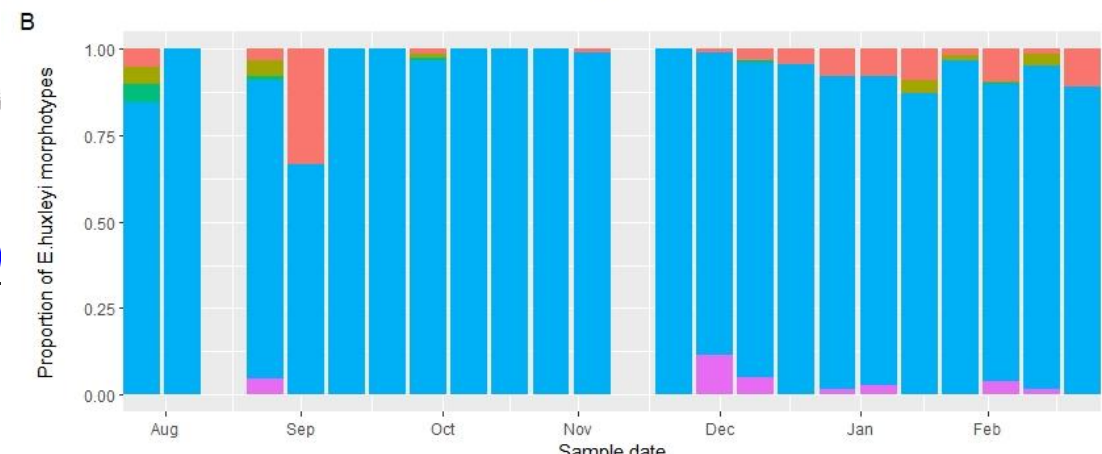
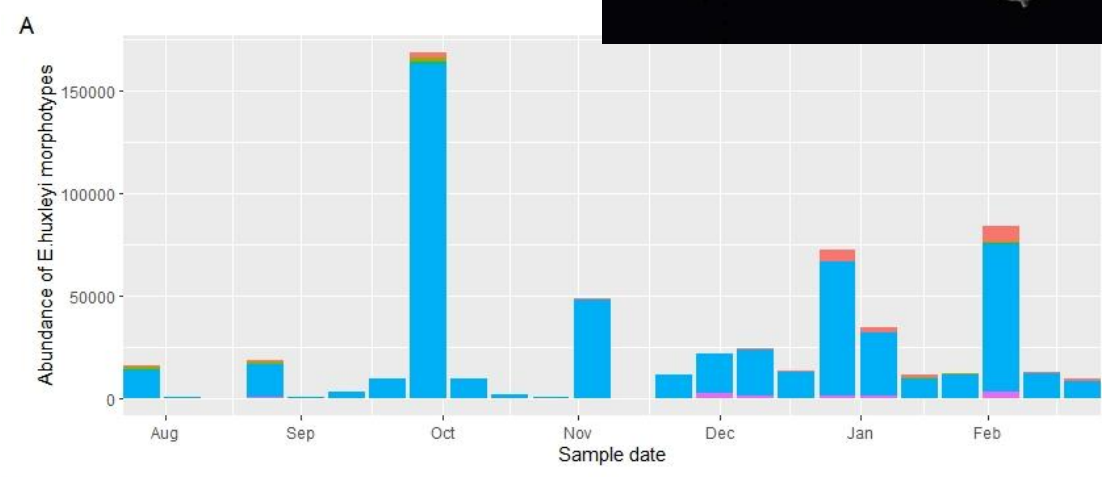
Sample dates 27-08-2018 to 22-3-2019



Absolute and relative concentrations of dominant *E. huxleyi* morphotypes  
Sample dates 27-08-2018 to 22-3-2019



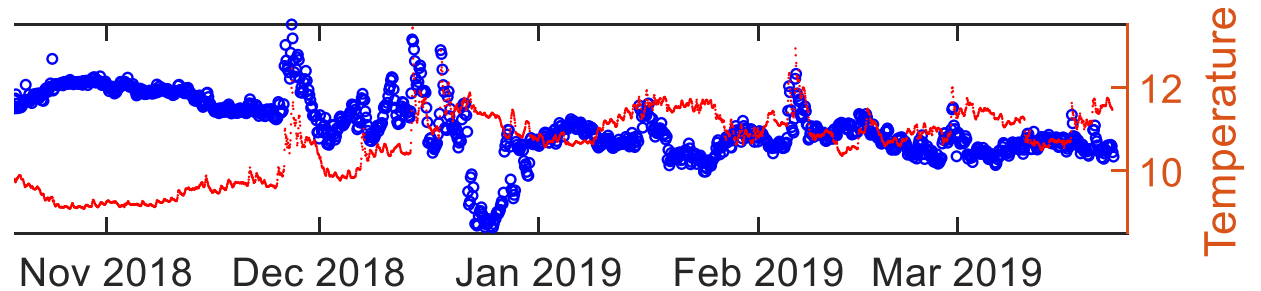
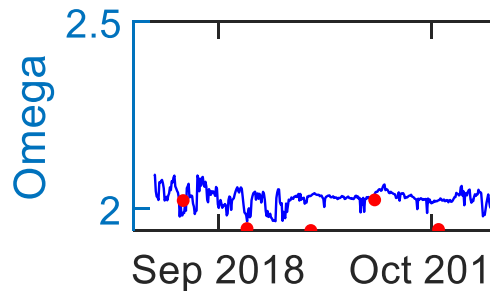
Shadwick et al, 2021



10<sup>3</sup> cells/L

# Full annual monitoring of Subantarctic *Emiliana huxleyi* populations reveals highly calcified morphotypes in high-CO<sub>2</sub> winter conditions

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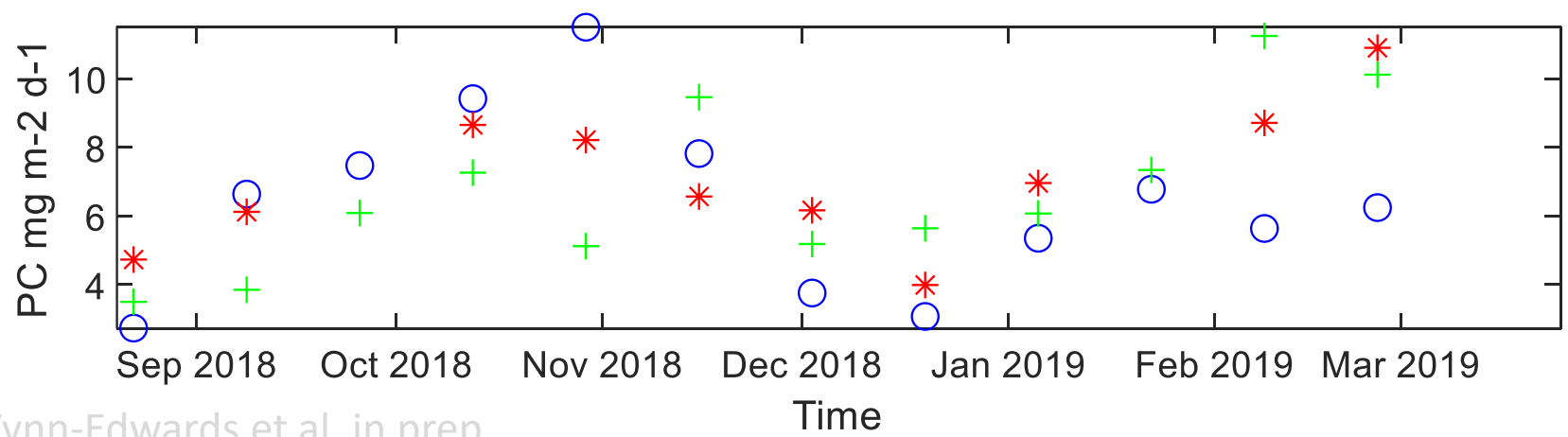
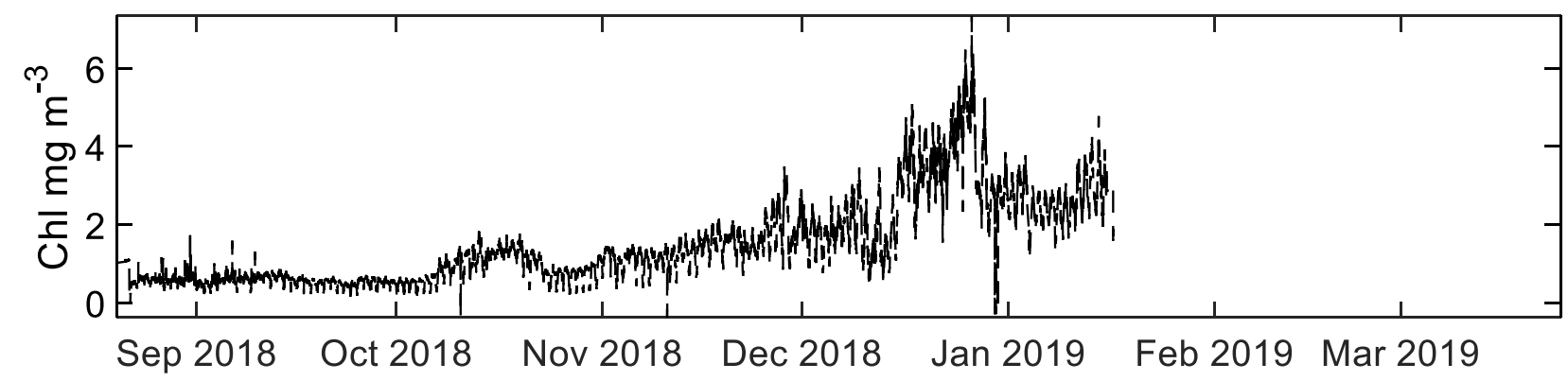
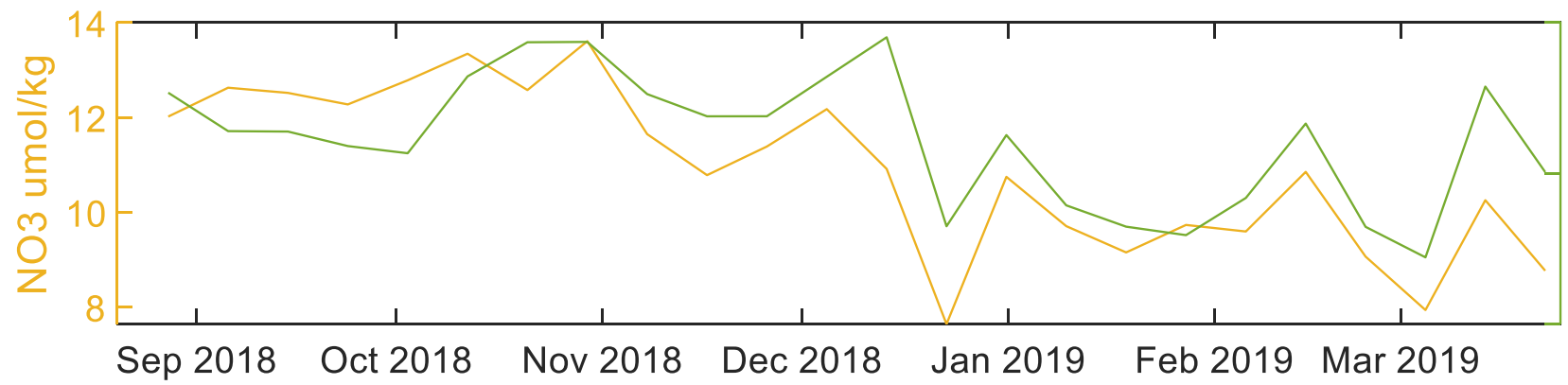
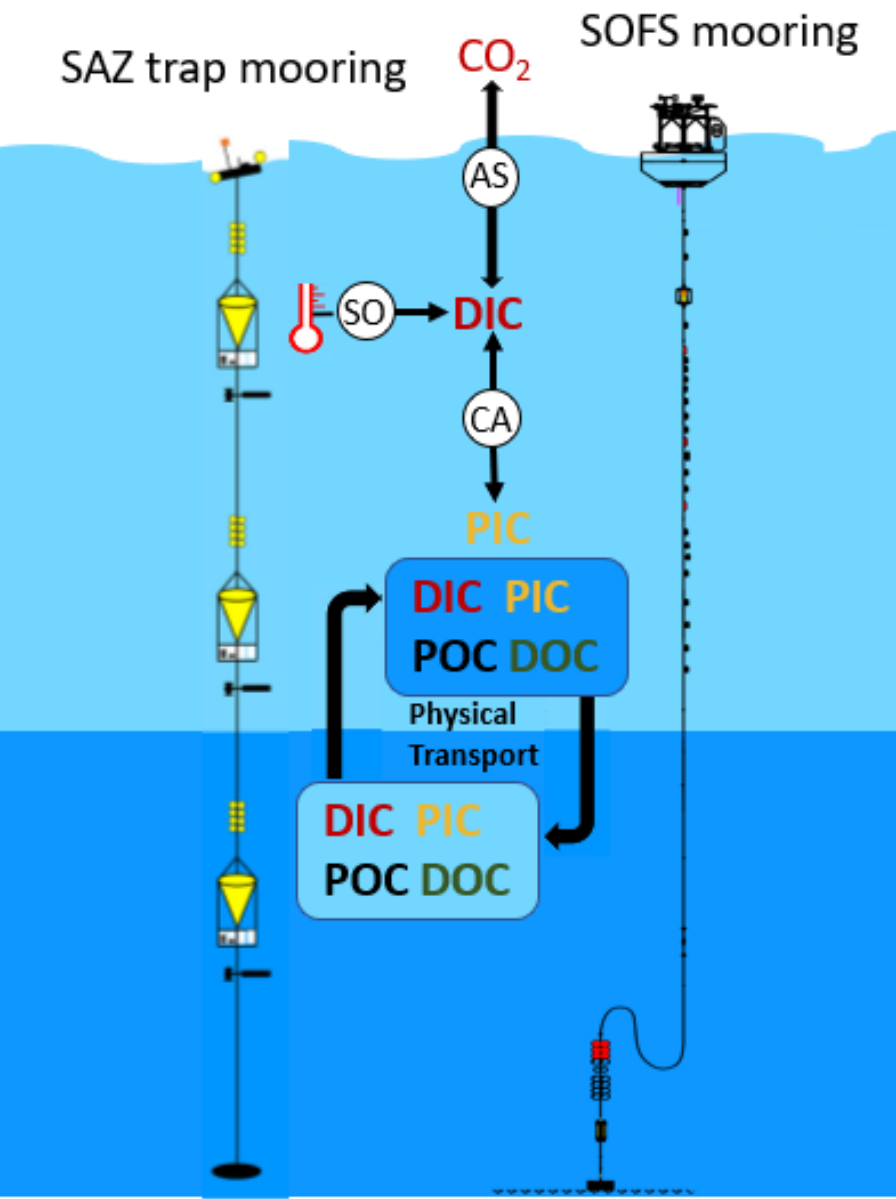
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## Coccolithophore biodiversity controls carbonate export in the Southern Ocean

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OBPS offers an array of services in publication, discovery, access and training of Best Practices, working with the technical communities that

# Ocean Carbon From Space 2022 Workshop

- SOFS is the only air-sea flux mooring in the Southern Ocean
- process studies are leveraging off the long-term timeseries data
- the data is freely available, and we have several QC reports published on OBPR
- we are open for collaborations

## Observational gaps:

- Limitation on the number of sensors we can add to each mooring
- Process study voyages (with all their additional measurement tools) predominantly happen in the summer season because of the harsh conditions at the site
- Filling knowledge gaps on the complex processes that influence C export / attenuation is not a matter of adding one or two more sensors

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