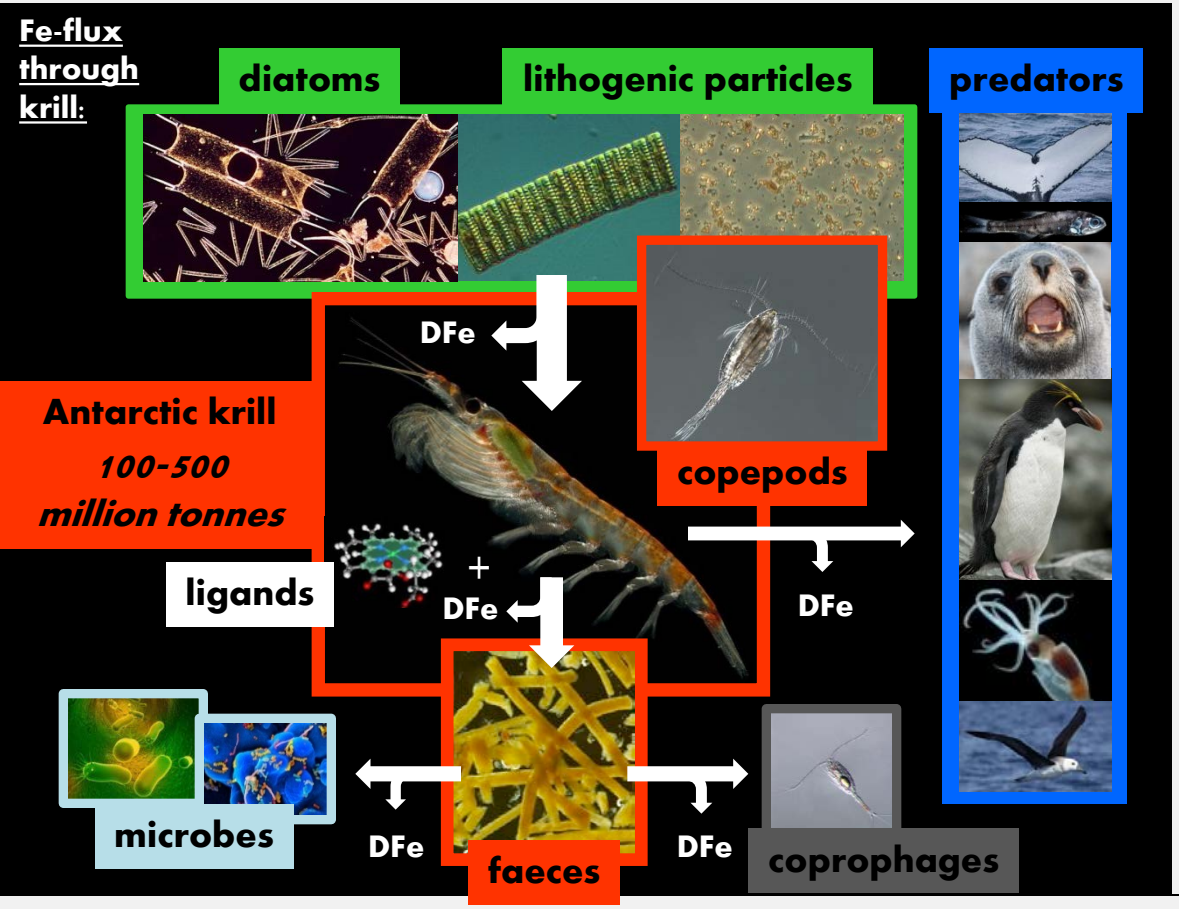
Zooplankton can iron-fertilise the ocean

Schmidt, Schlosser, Atkinson, Fielding, Venables, Waluda, Achterberg (2016), *Current Biology* 26

Katrin Schmidt

Fe-flux through krill:



Background
- lack of Fe limits PP
- most Fe in particulate form

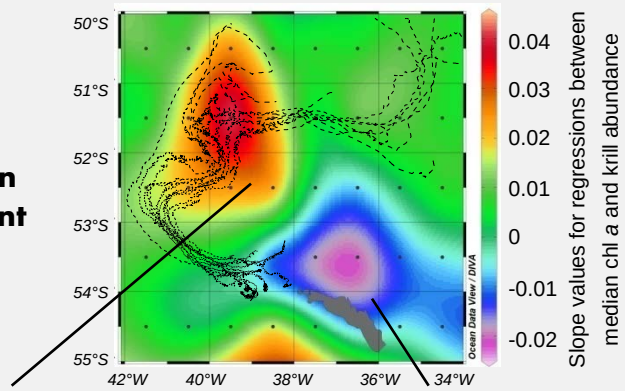
Zooplankton gut
mechanical impact, low pH (~5.4), low oxygen, enzymes

⇨ recycling of biogenic Fe
⇨ mobilisation of lithogenic Fe
⇨ release of Fe-binding ligands

DFe release
- via multiple pathways
- fecal pellets

South Georgia:

Interannual variability in bloom extent and krill abundance

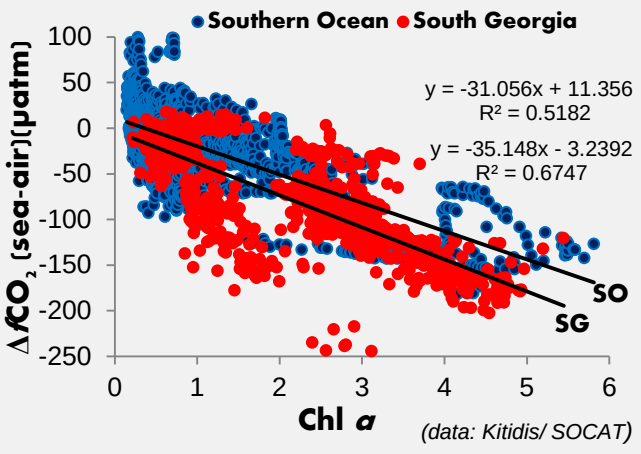


Fertilisation > Grazing losses Grazing losses > Fertilisation

Iron mobilisation and recycling by krill can boost the SG bloom.

bloom duration ⇧
spatial extent ⇧

nutrient-stress ⇩
photosynthetic efficiency ⇧



(data: Kitidis/ SOCAT)

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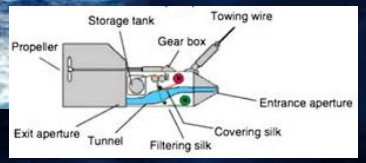
Identification of plankton communities at SAHFOS

Global Alliance of CPR Surveys (GACS)



Information

- size spectrum
- diatoms *vs* coccolithophores
- phyto- *vs* zooplankton
- indicator species
- 'recycling' vs 'export' communities
- carbon stock

for interpretation of pCO_2 data, satellite chl *a* etc.

Data

10 Year time-series
Falkland Is. - South Georgia

- 78 transects 2005-2016
- regional, seasonal & interannual changes in the plankton community
- carbon stock associated with different plankton communities

Technique

Continuous Plankton Recorder (CPR)

- underway phyto- & zooplankton sampling
- large spatial coverage at no extra ship time
- analysis of ~150 samples wk^{-1} (~3000 nmi)
- FlowCam® Macro for volume measurements
- platform for sensors, water sampler

Skills

Southern Ocean taxonomy

- statistical analysis and modelling

Shipboard experiments with krill (grazing, egestion, Fe release etc.)

- isolation of individual species, tissues, fecal pellets