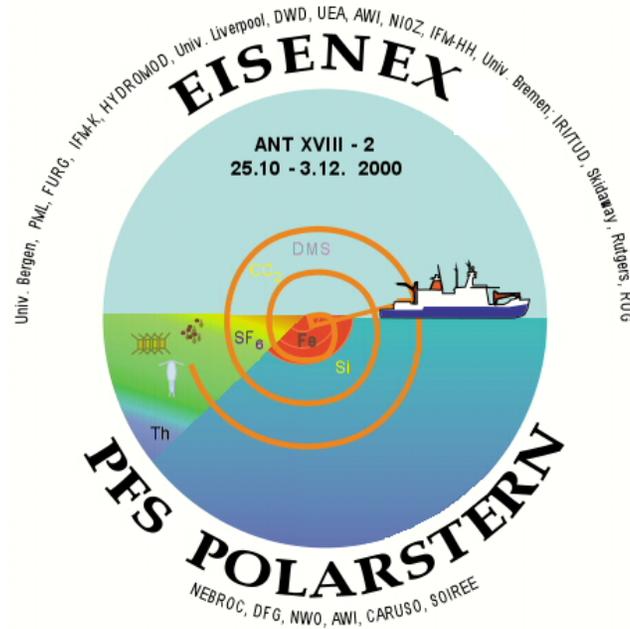


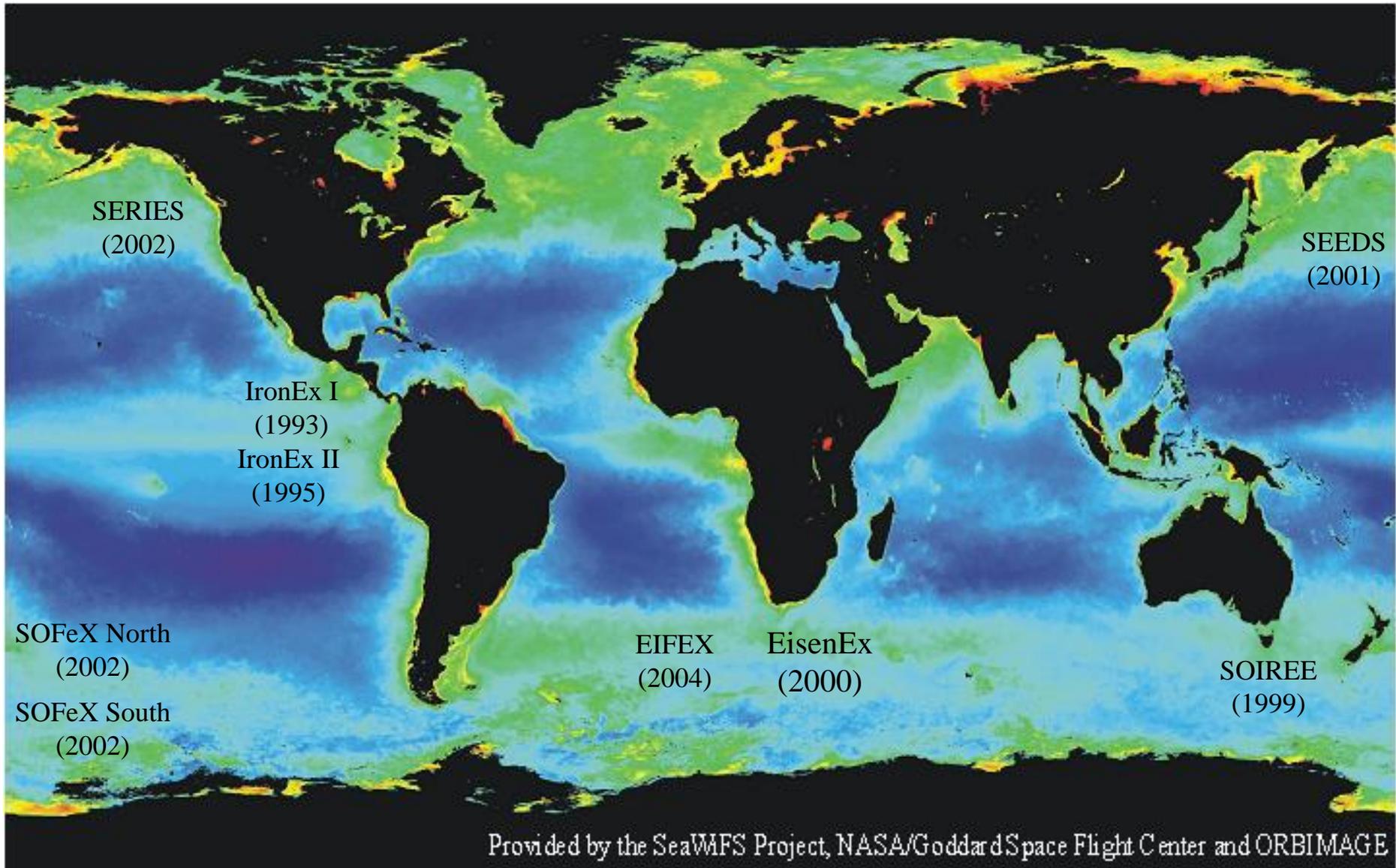
Species-specific growth performance and grazing mortality of the diatom assemblage during an *in situ* iron-induced bloom in the Southern Ocean



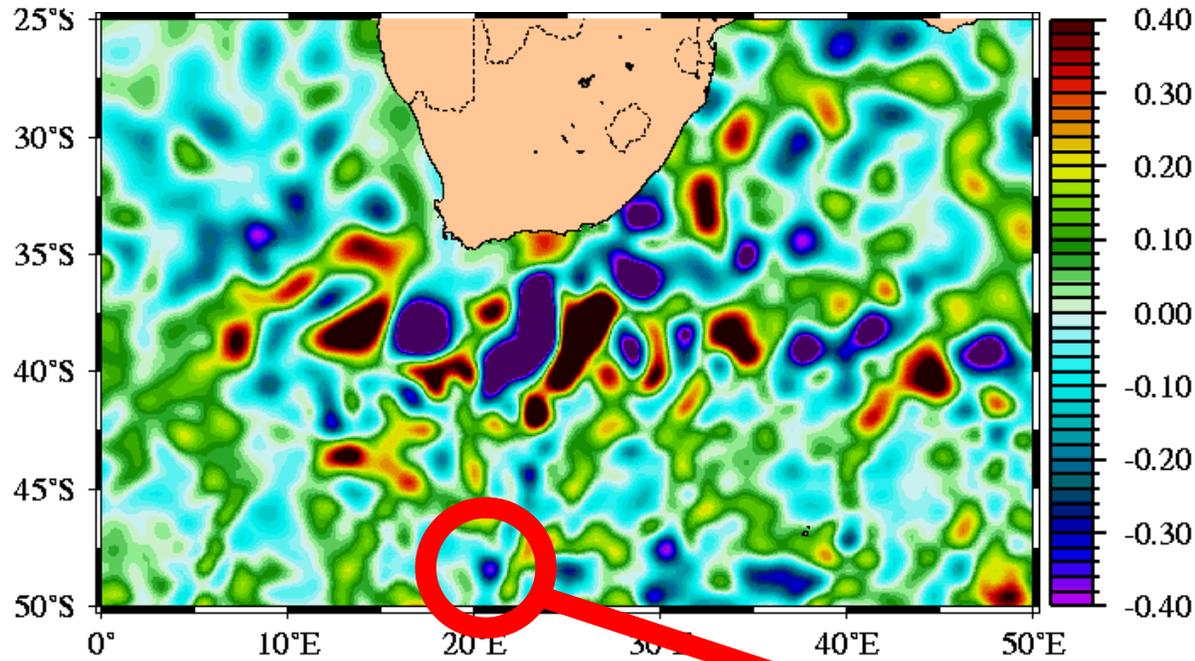
P. Assmy, J. Henjes, C. Klaas & V. Smetacek

Alfred Wegener Institute for Polar and Marine Research, Bremerhaven, Germany

In situ iron fertilization experiments in „HNLC“-areas

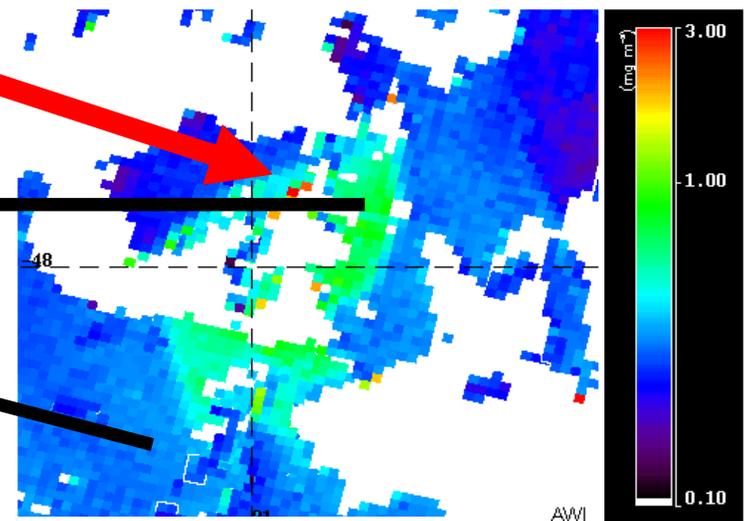


EisenEx target area

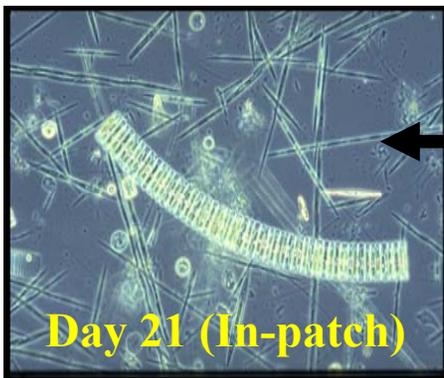


SeaWiFS satellite image

Chl *a* [mg m^{-3}]

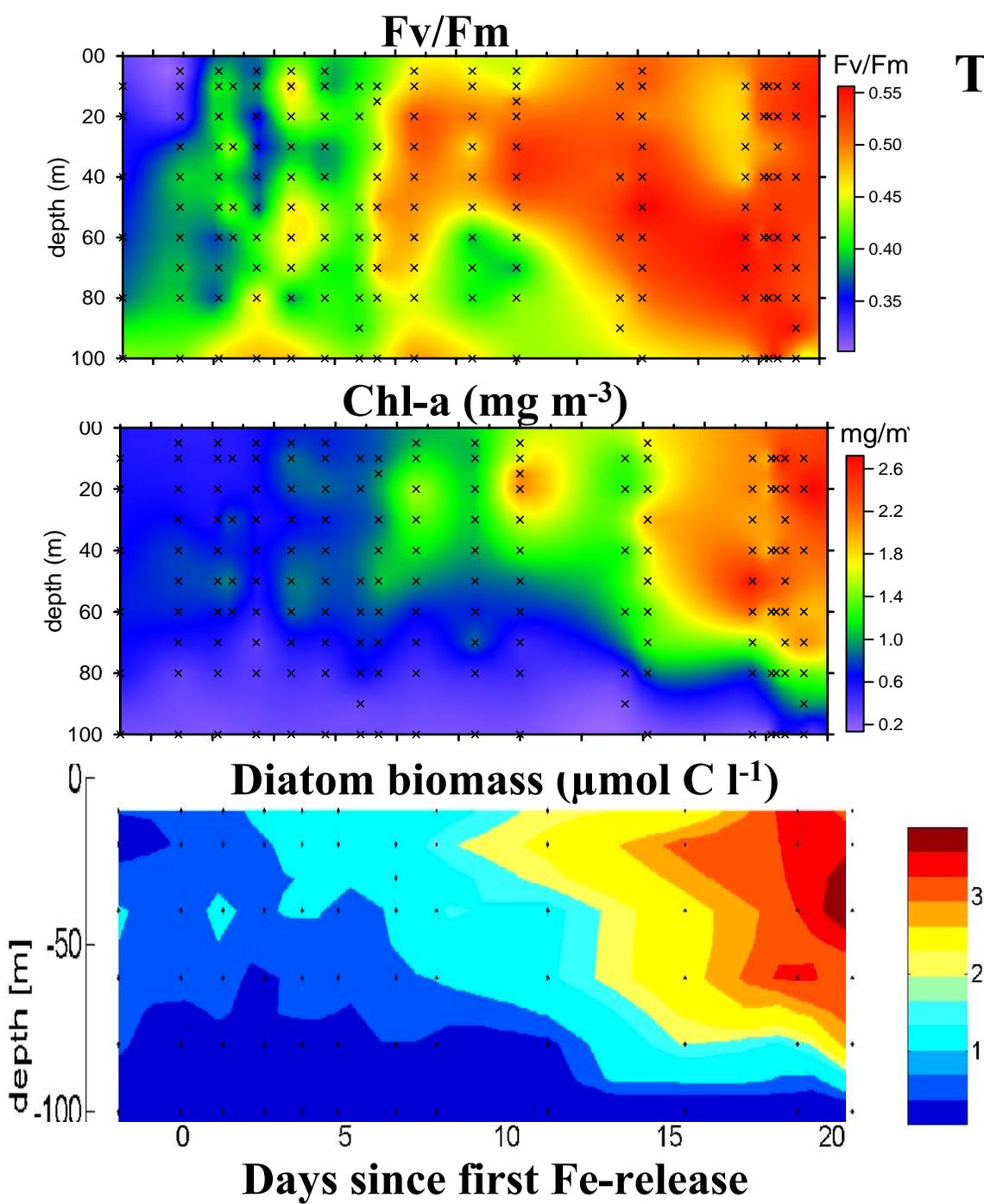


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Temporal evolution of the iron-stimulated phytoplankton bloom

Fv/Fm and Chl-a provided by M.Gorbunov



Growth performance of different diatom species during EisenEx

Pseudo-nitzschia lineola

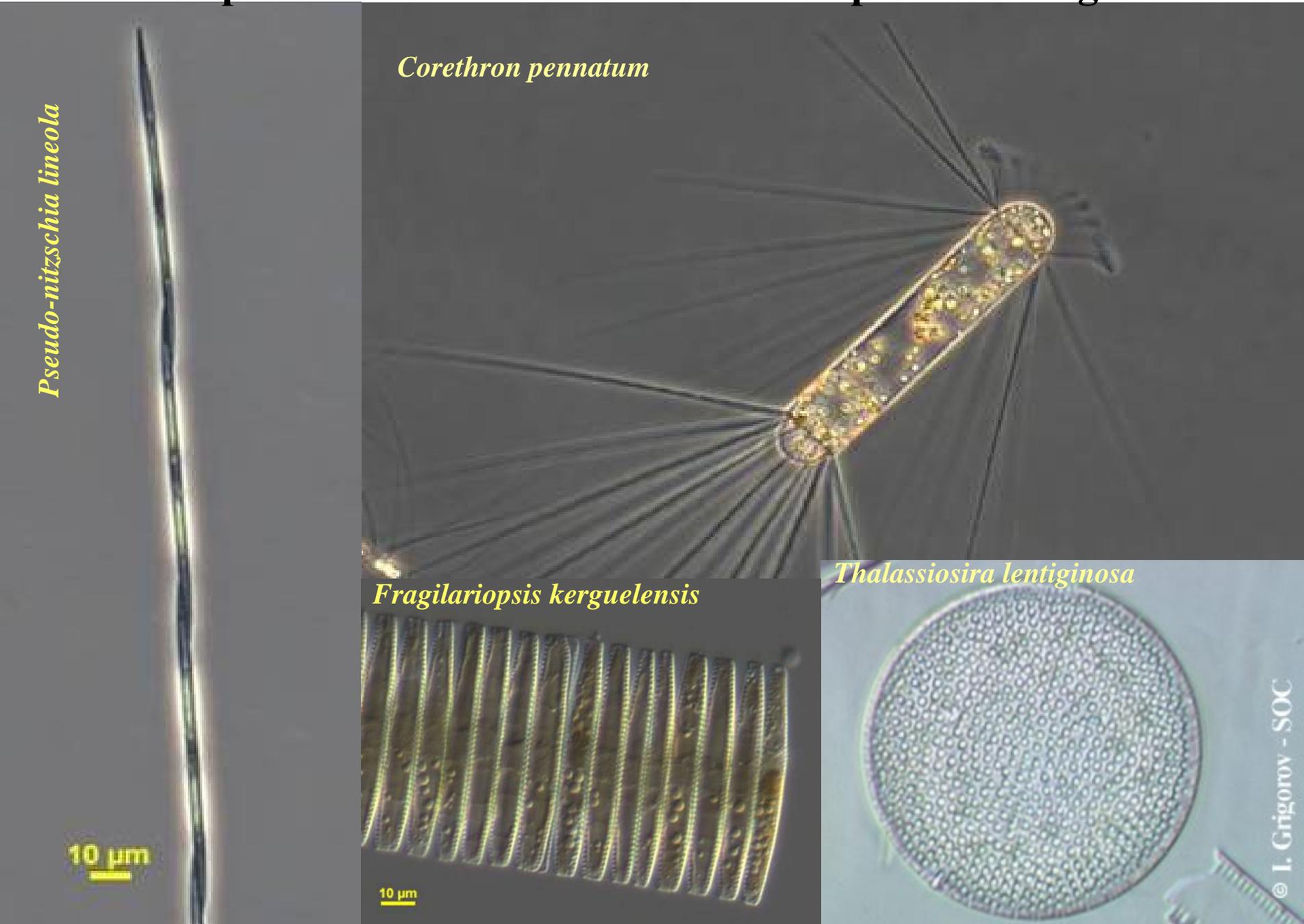
10 μ m

Corethron pennatum

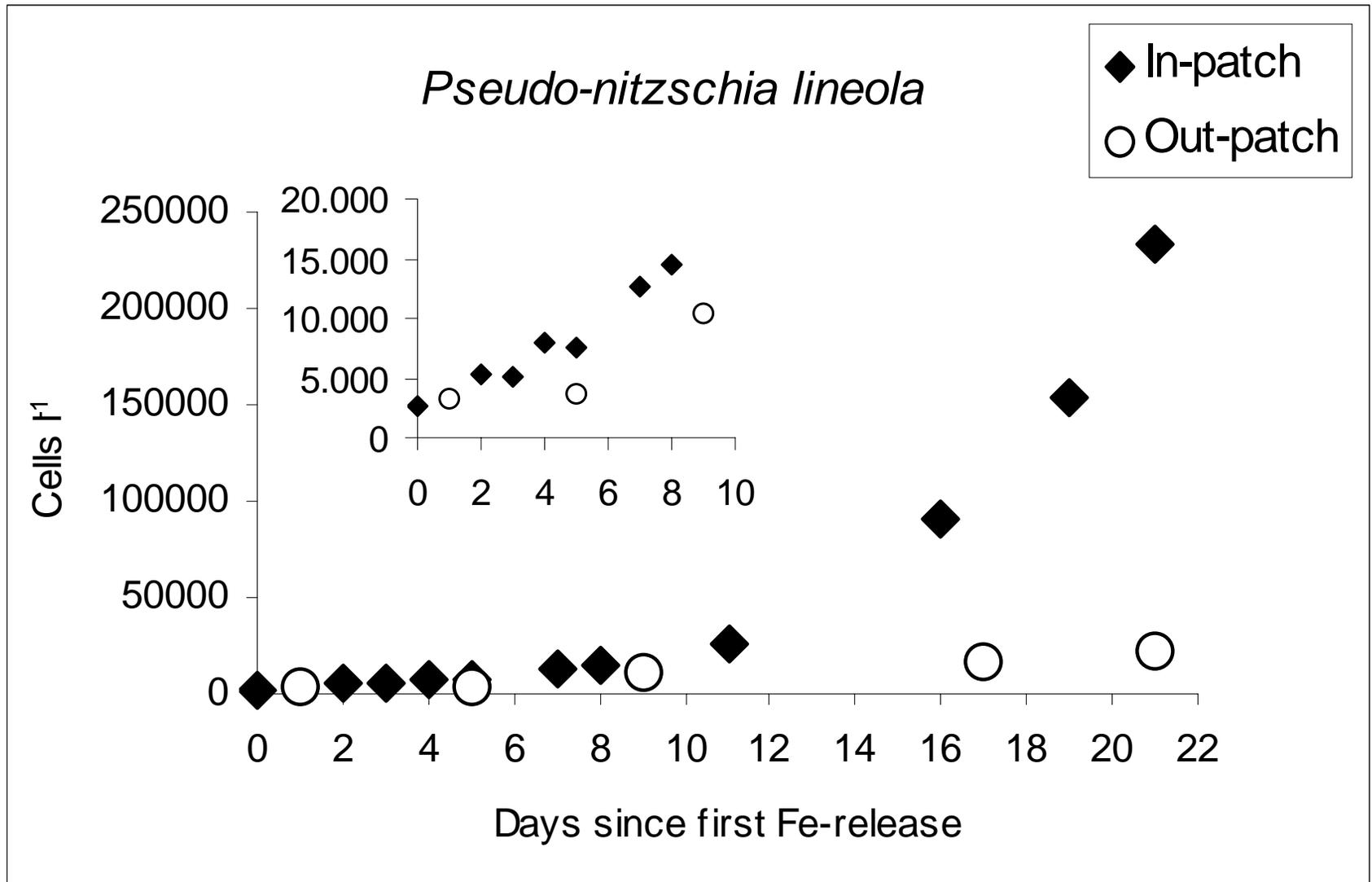
Fragilariopsis kerguelensis

10 μ m

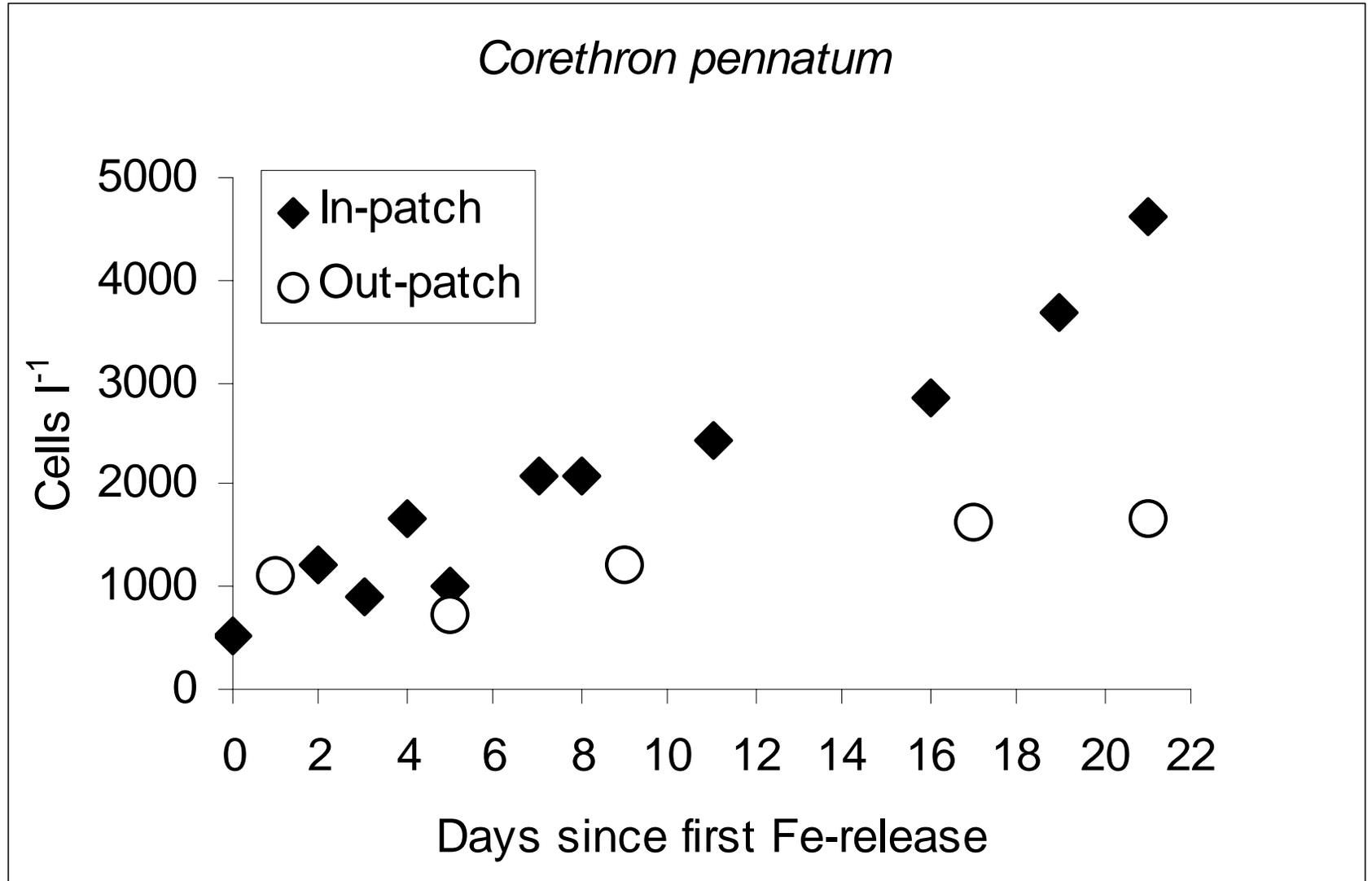
Thalassiosira lentiginosa



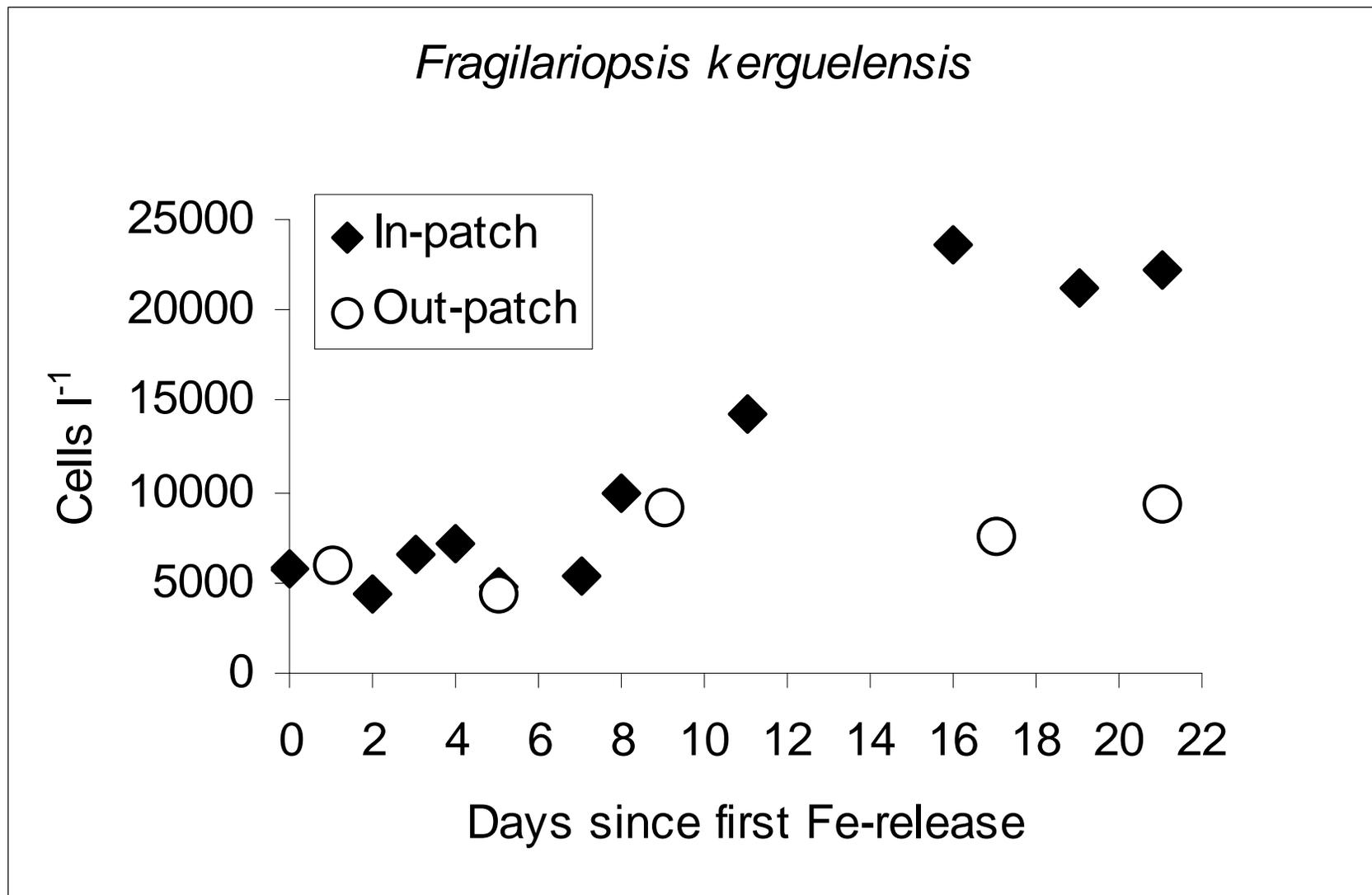
Exceptionally high growth rates throughout the experiment



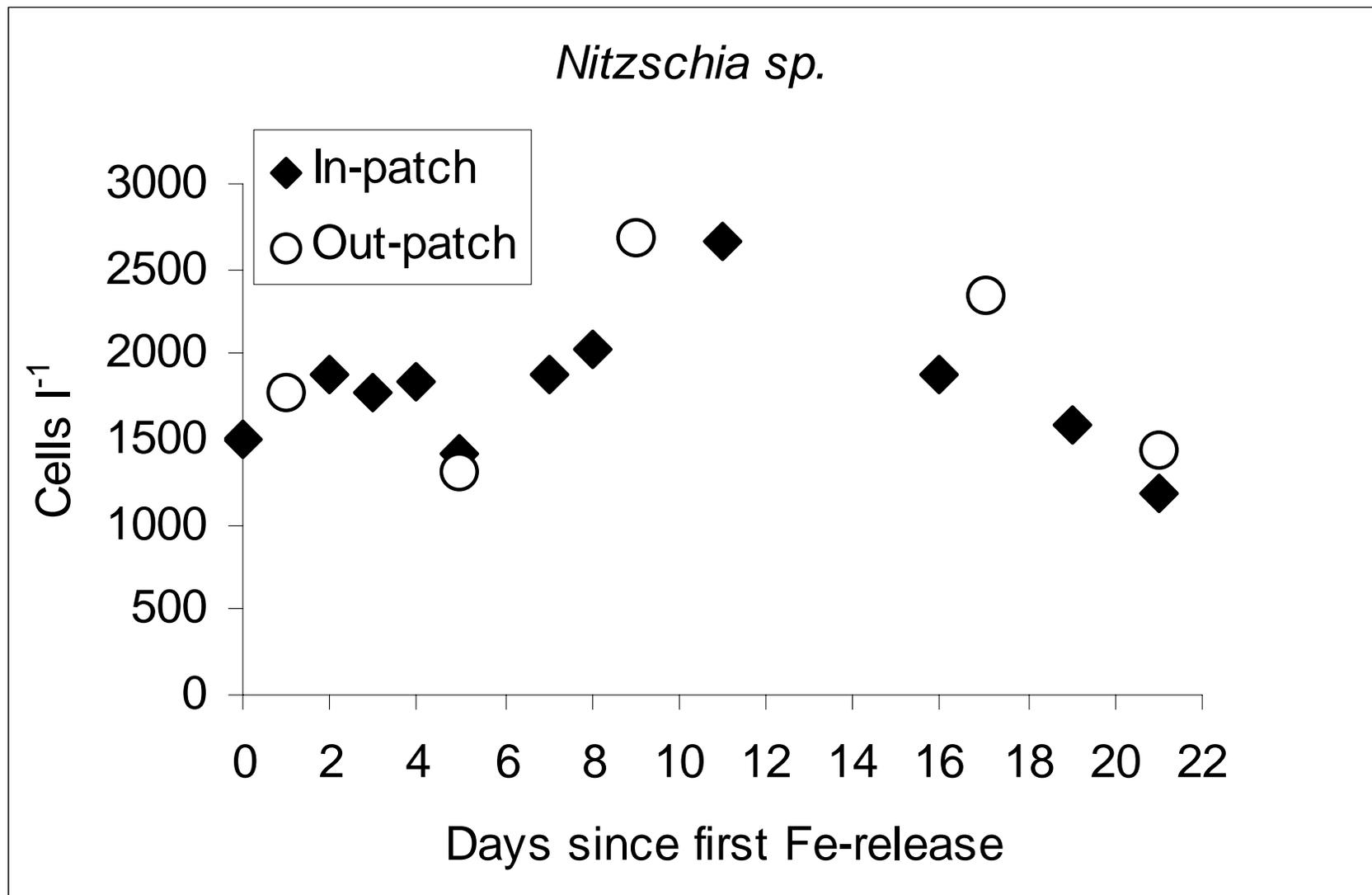
Continuous increase albeit linearly



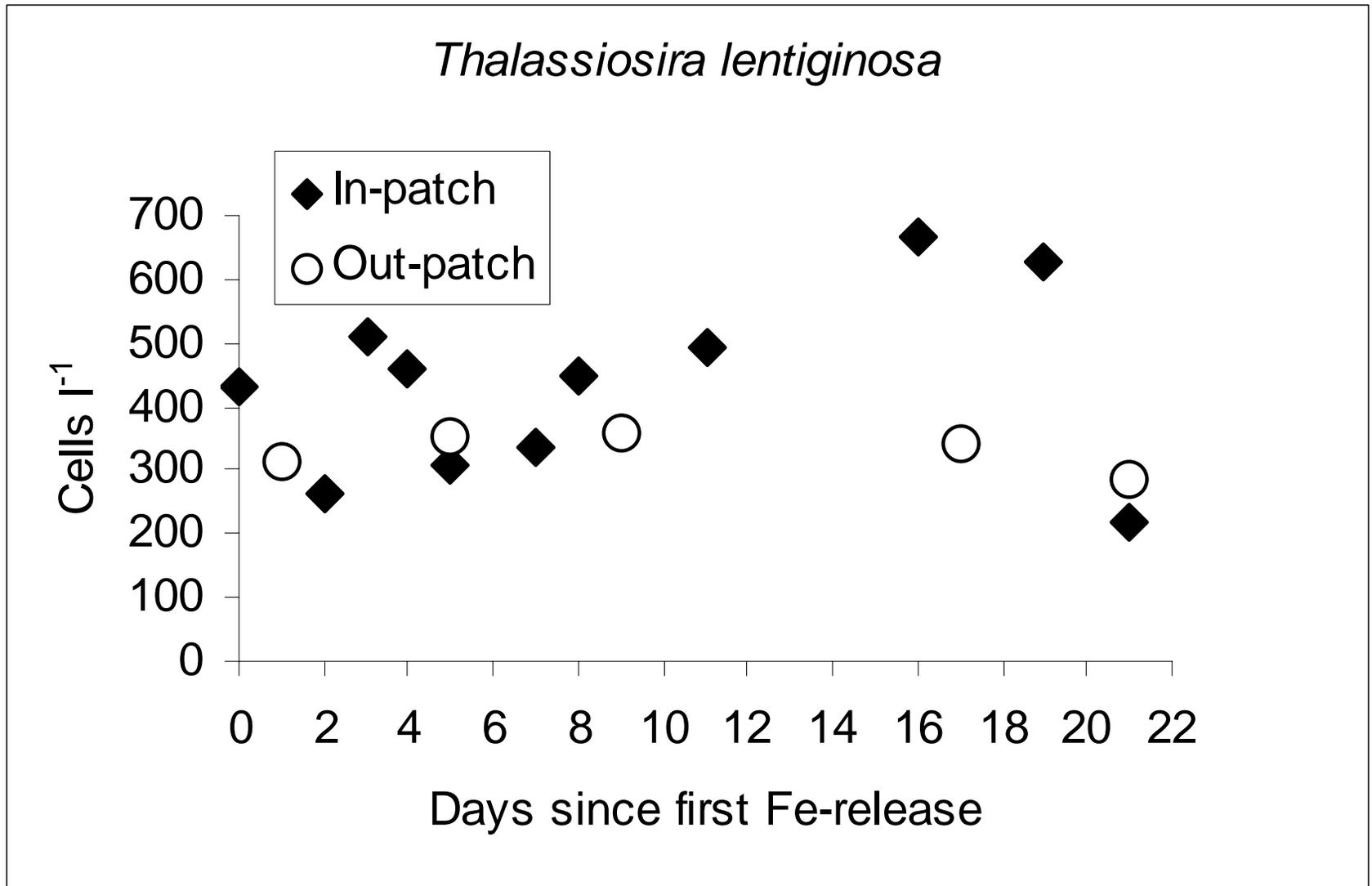
Linear increase but for only a short spurt phase



Initial linear increase and decline thereafter

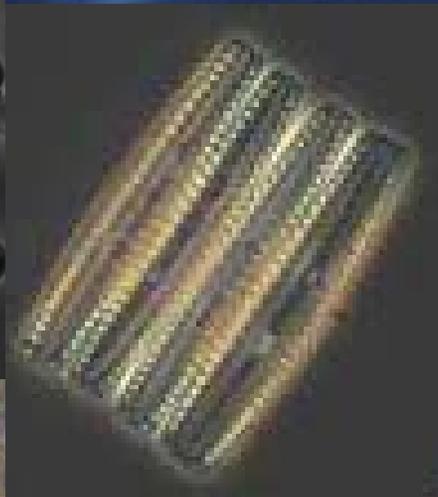
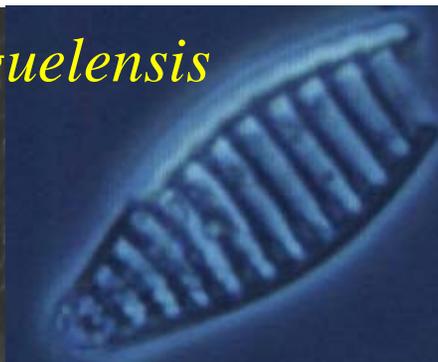
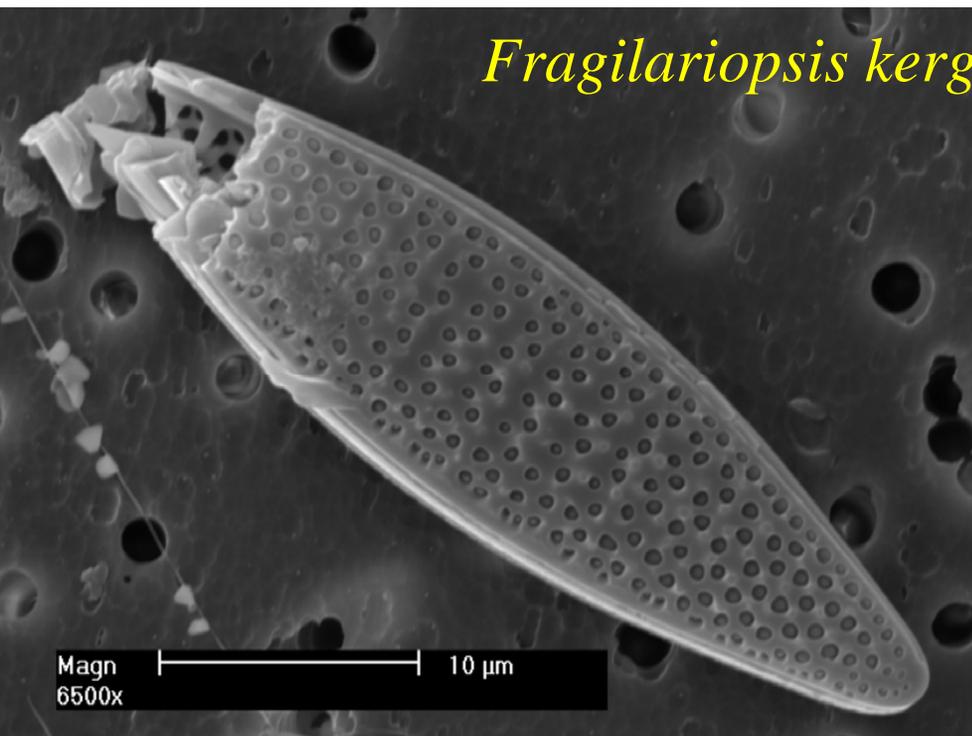


No consistent trend in response to Fe-addition

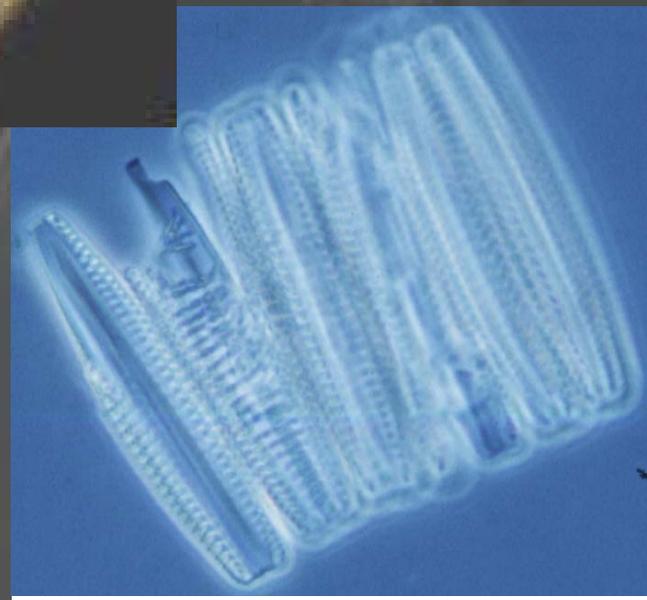
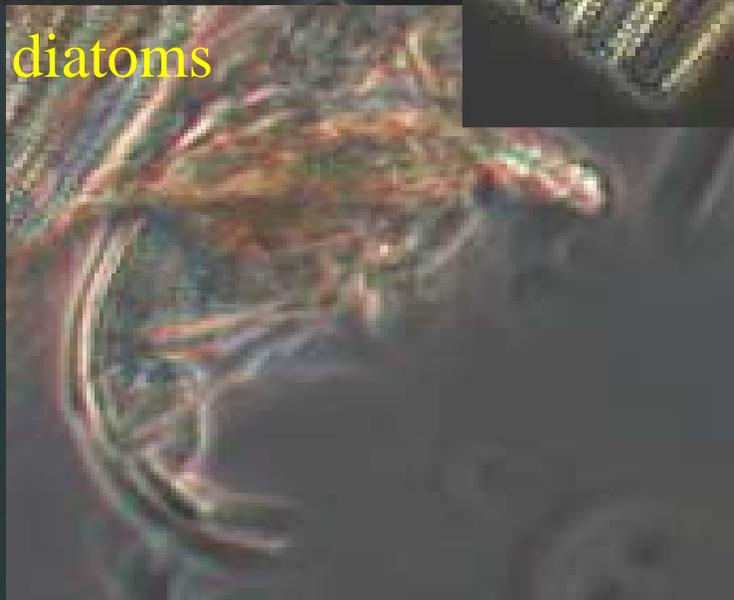
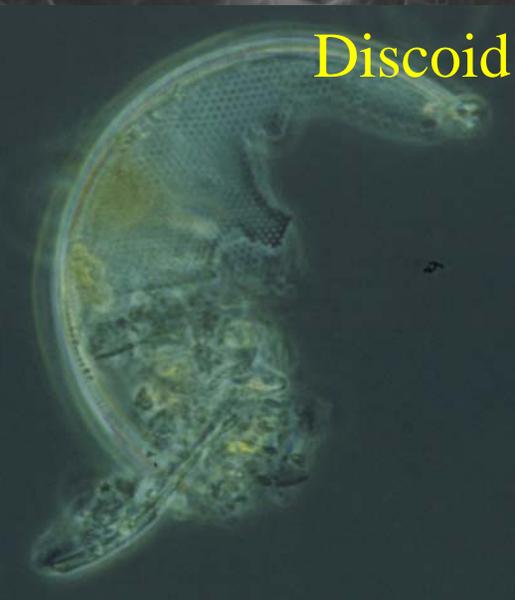


Intact empty and broken diatom frustules as mortality indicators

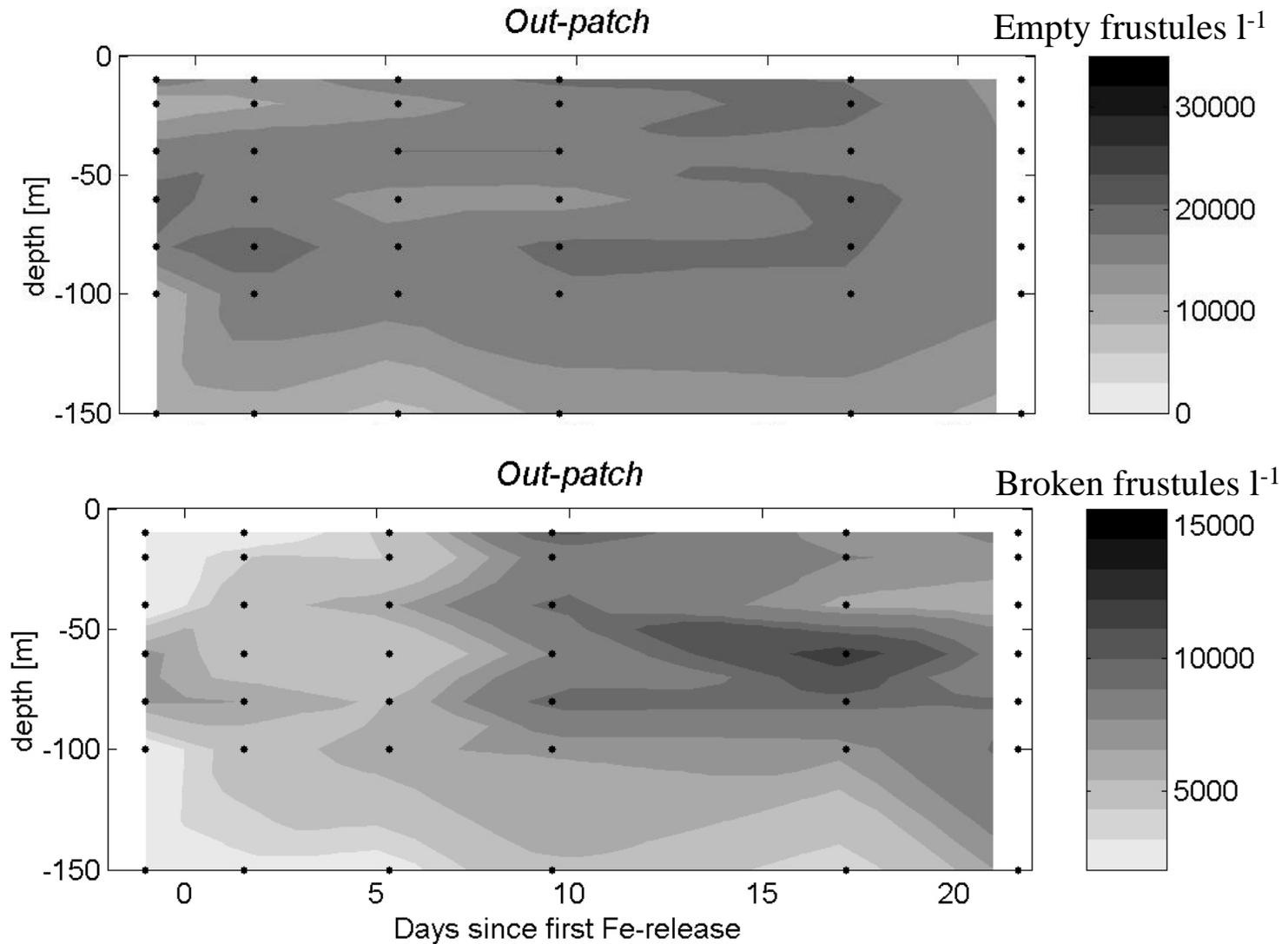
Fragilariopsis kerguelensis



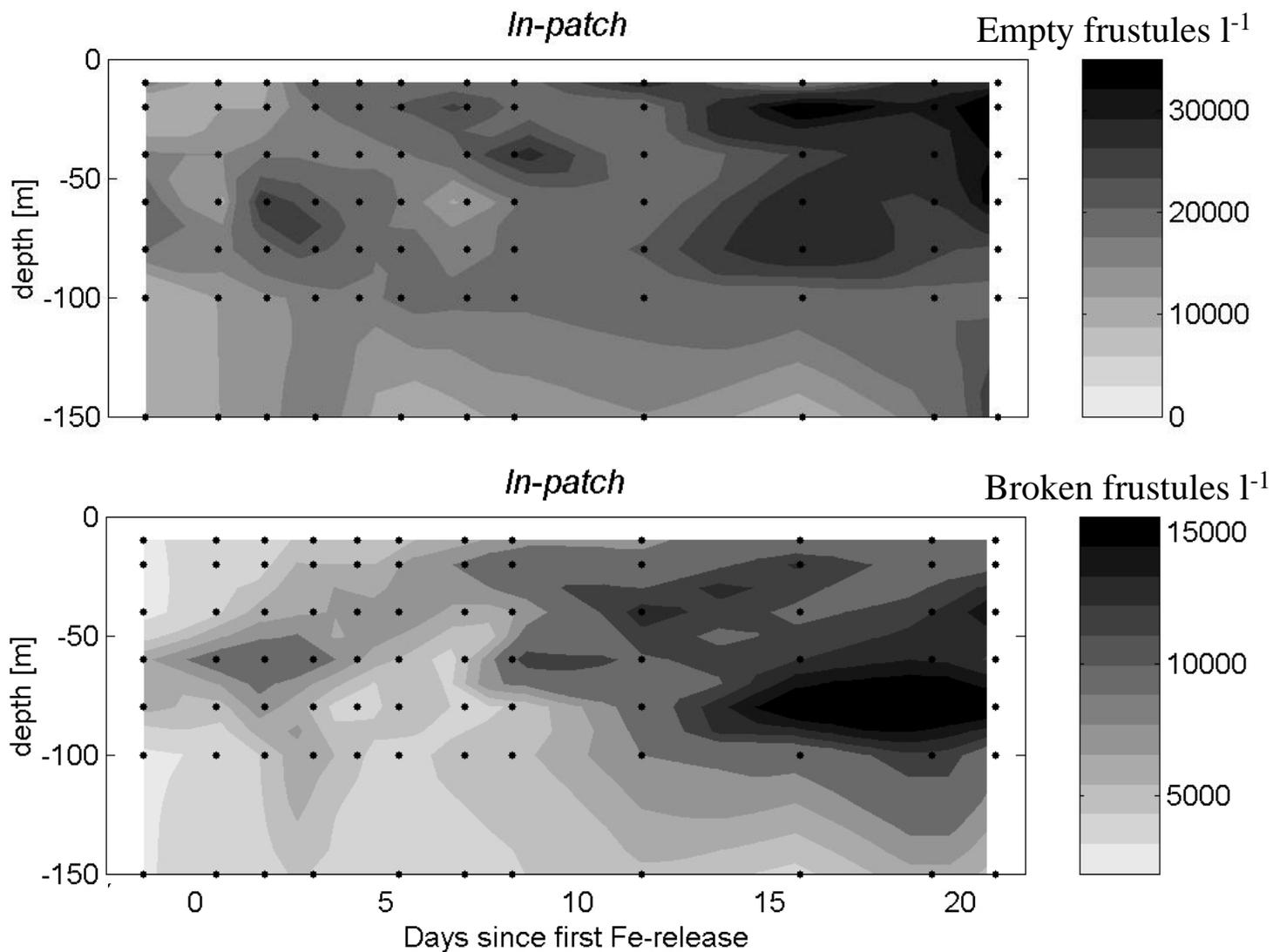
Discoid diatoms



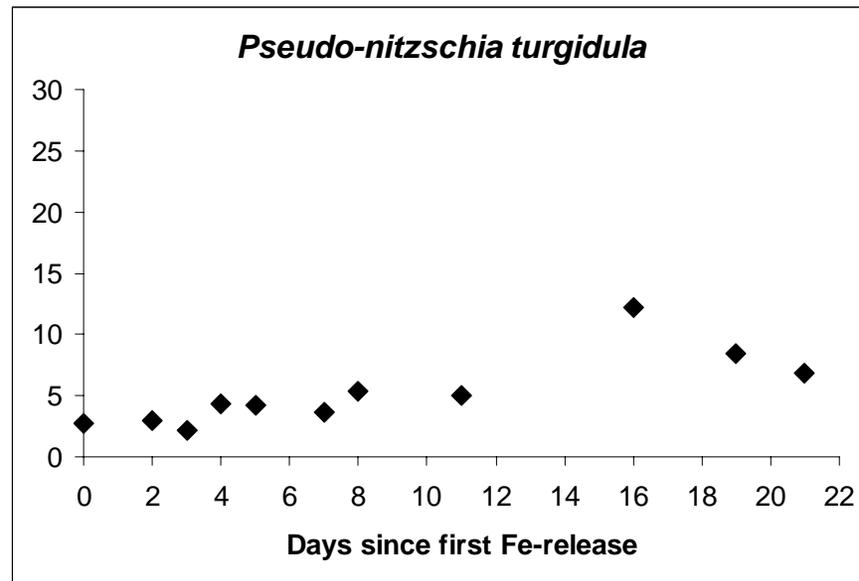
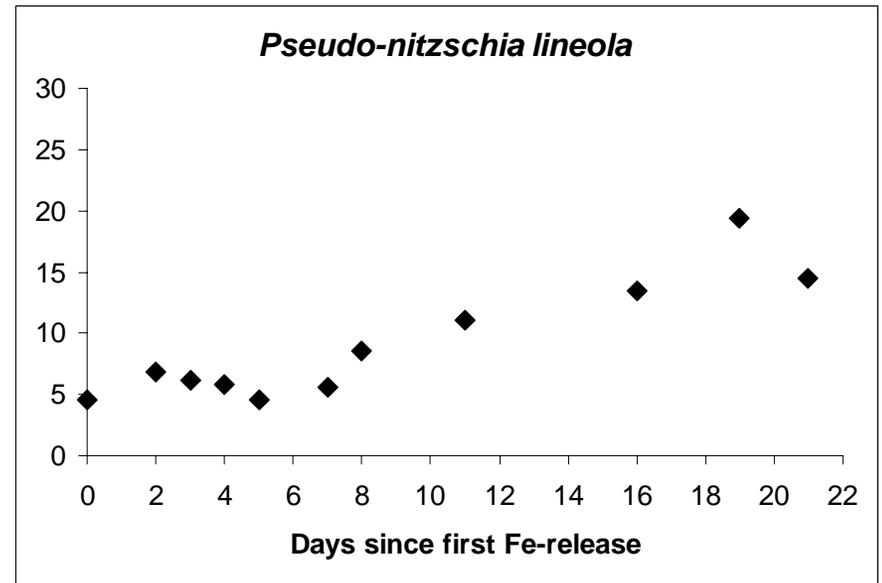
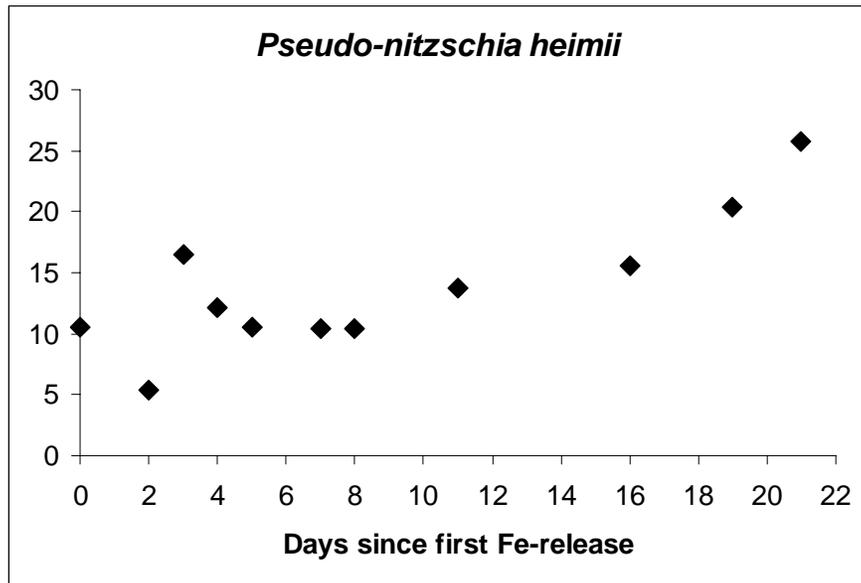
Vertical distribution of intact empty and broken diatom frustules outside the patch



Vertical distribution of intact empty and broken diatom frustules inside the patch

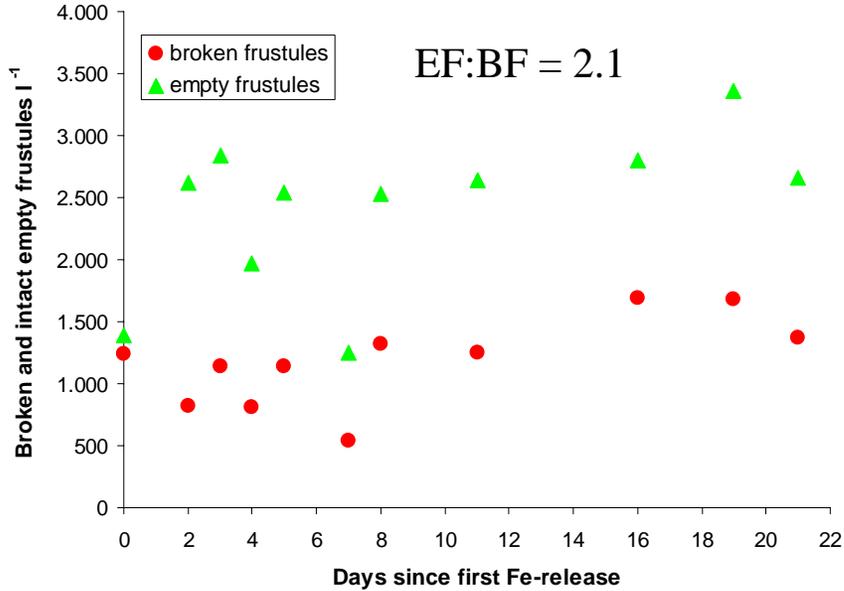


Species-specific ratios of live cells vs. empty and broken frustules in three *Pseudo-nitzschia* species

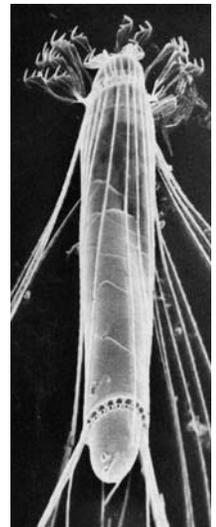
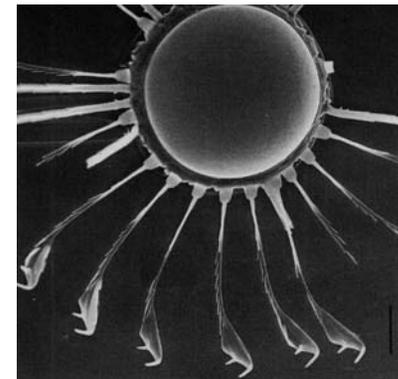
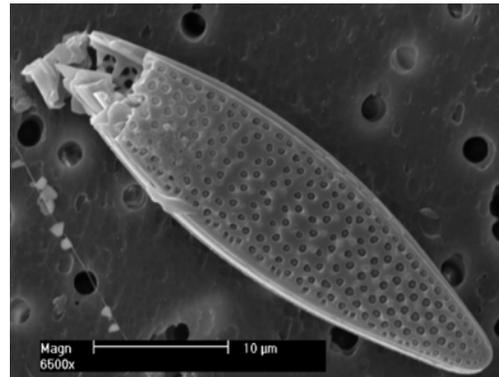
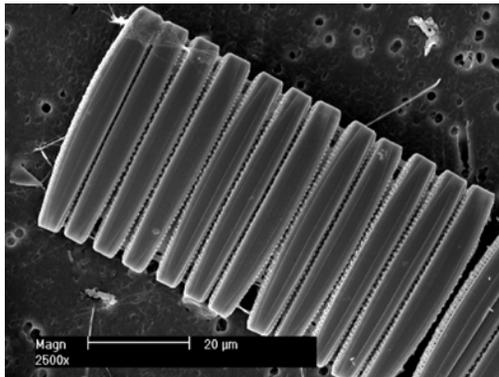
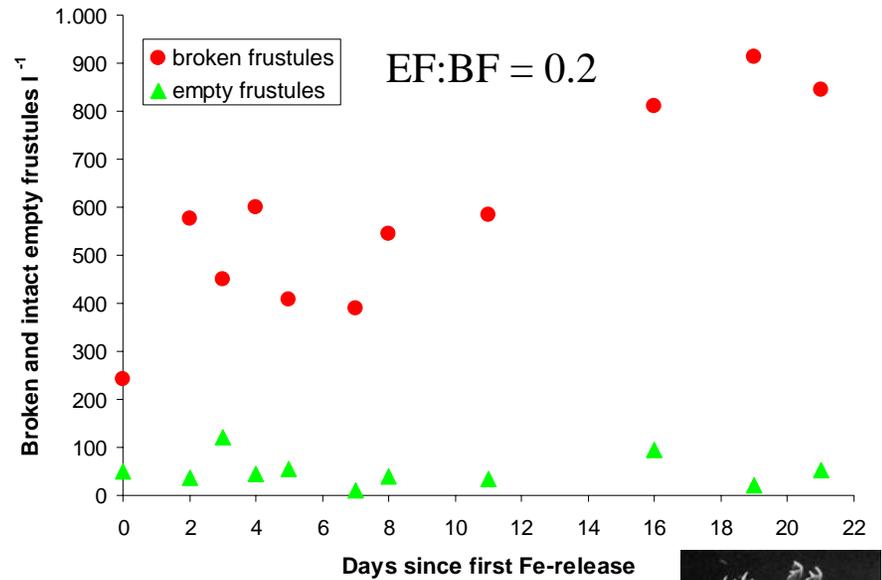


Species-specific grazing pressure

Fragilariopsis kerguelensis



Corethron pennatum



Crawford et al. 1998

Conclusions

Species-specific growth performance

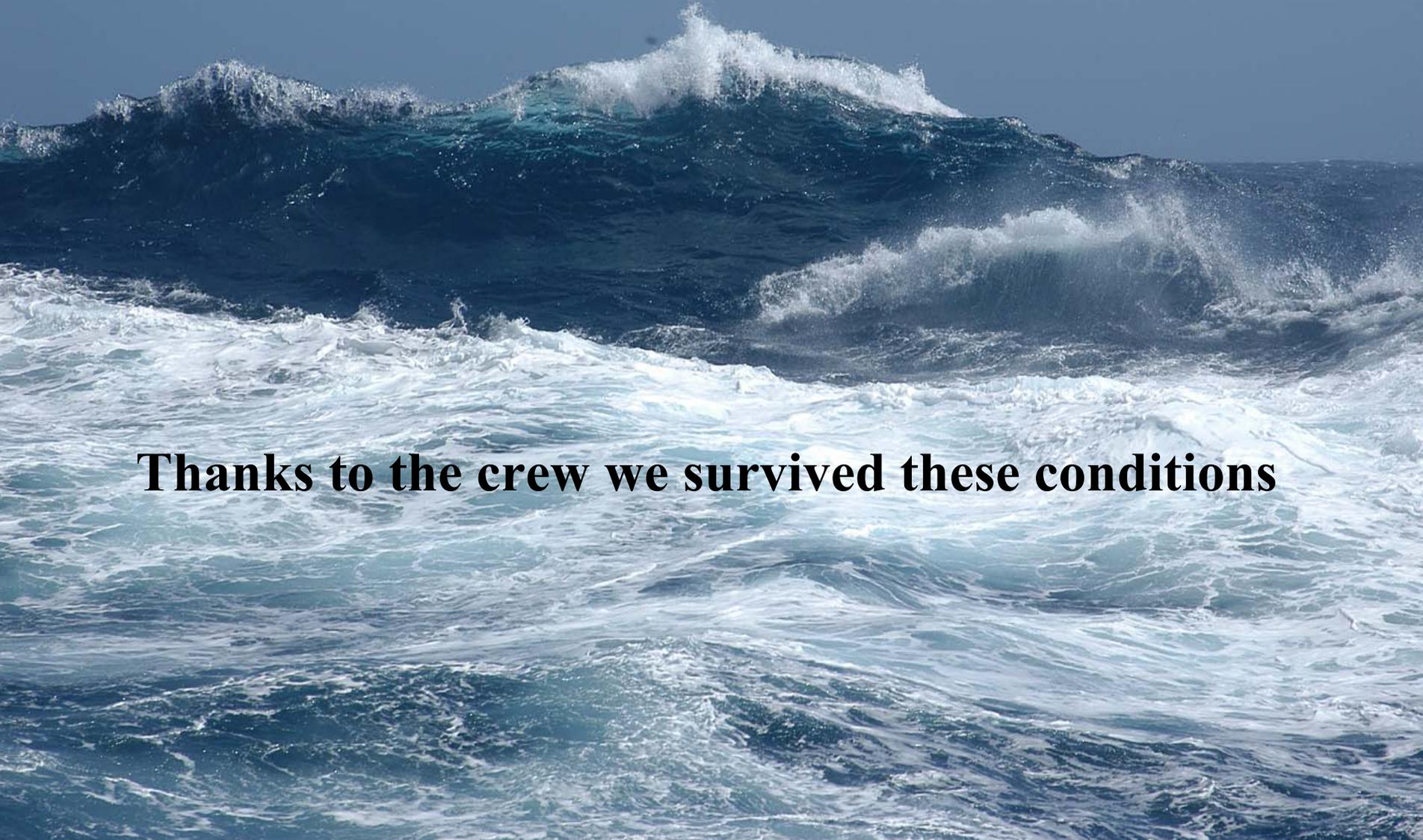
- *Pseudo-nitzschia lineola* maintained exceptionally high growth rates throughout the experiment and contributed 25% of total biomass.
 - Most other species were growing below or well below these rates.
- The population size of the majority species to survive and evolve is well below that achieved by bloom-forming species.

Species-specific grazing selection

- *Pseudo-nitzschia lineola* dominated despite heavy grazing pressure because of its exceptionally high growth rates
- Grazers discriminated between morphological similar species of the same genus (*Pseudo-nitzschia*)
- Large spiny *Corethron pennatum* were eaten mainly by copepods
- The heavily silicified *Fragilariopsis kerguelensis* withstands grazing by copepods and showed no clear trend

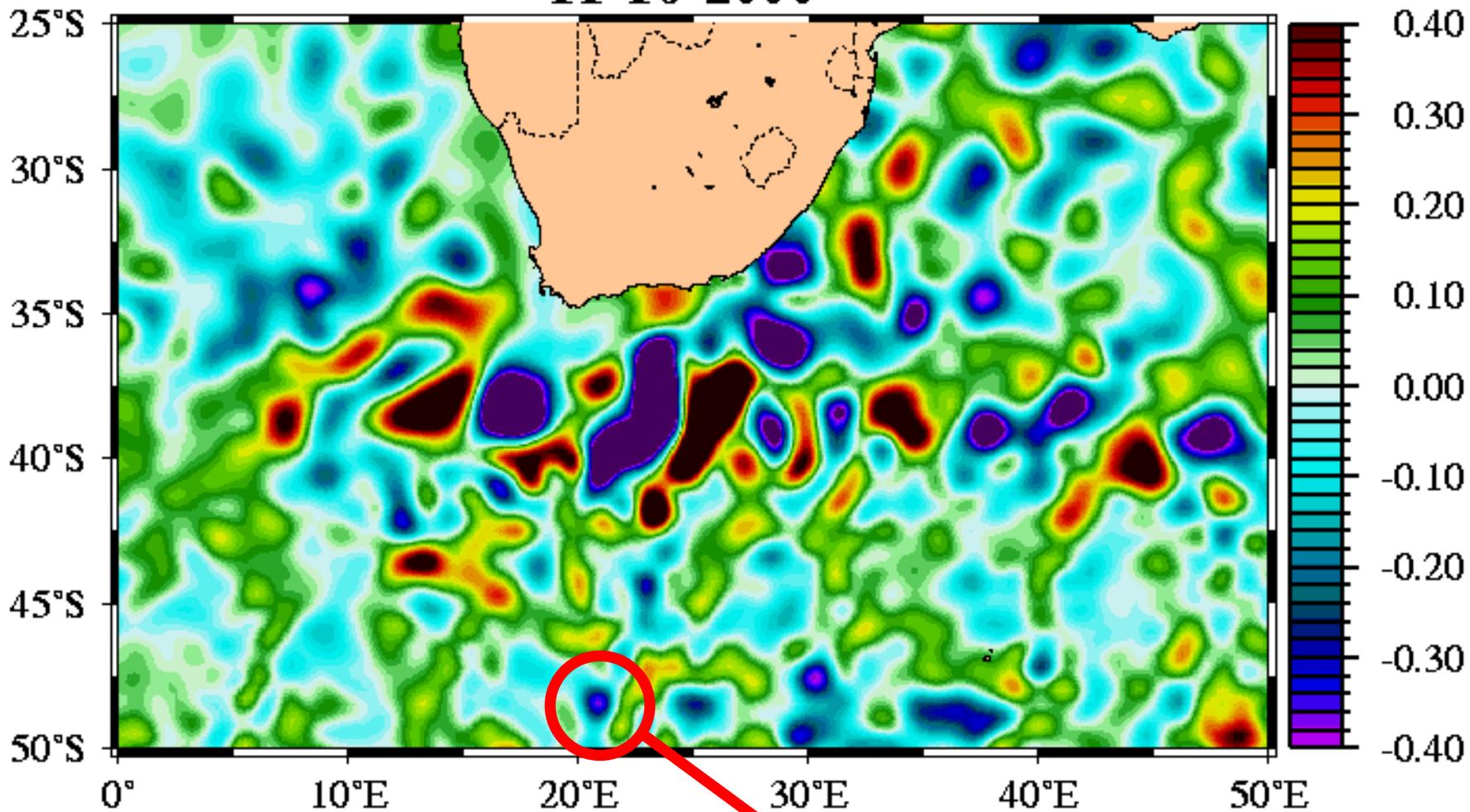
Thank you for your attention

Thanks to the crew we survived these conditions



Altimeter OI: Surface Height Deviation (m)

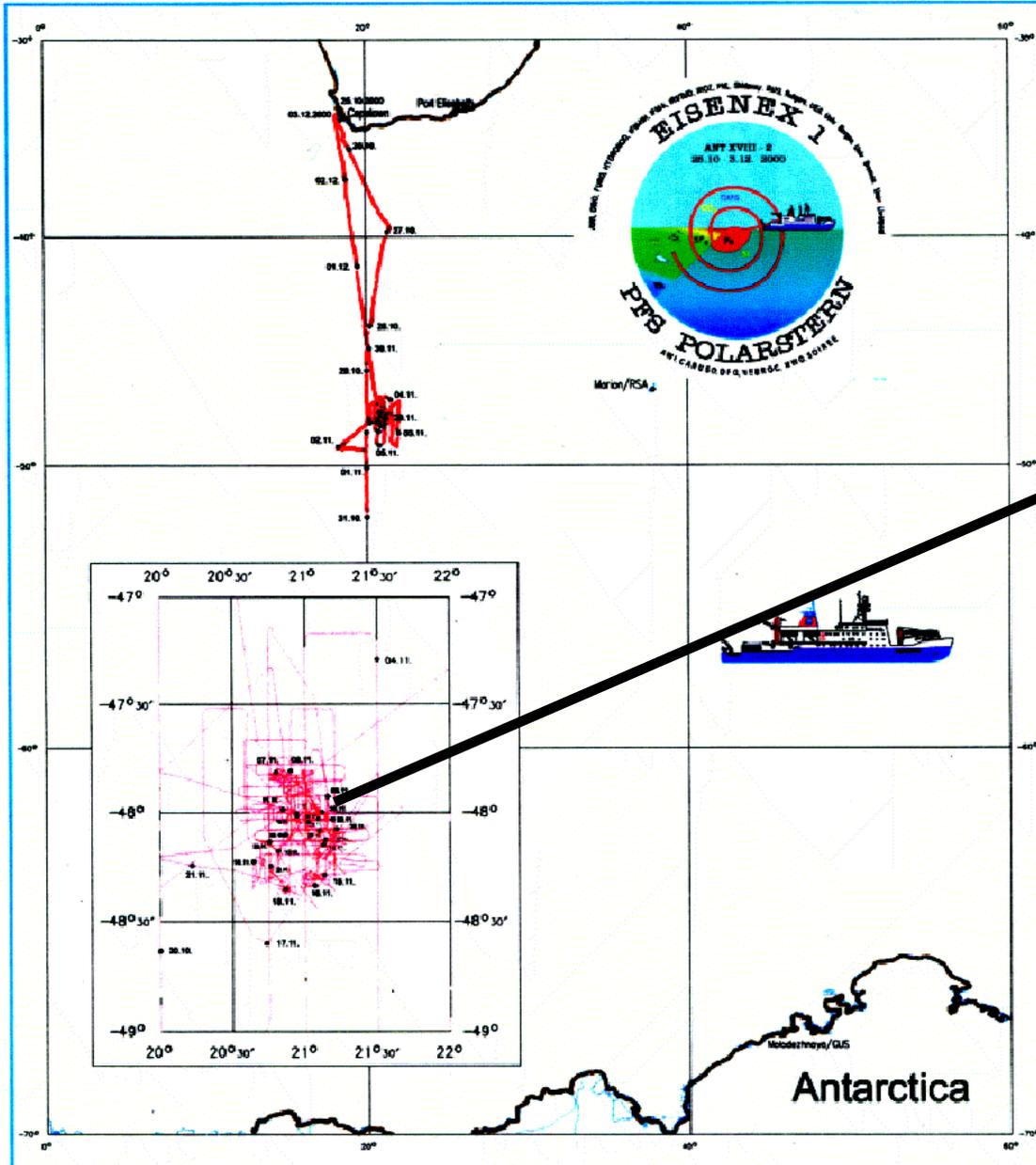
11-16-2000



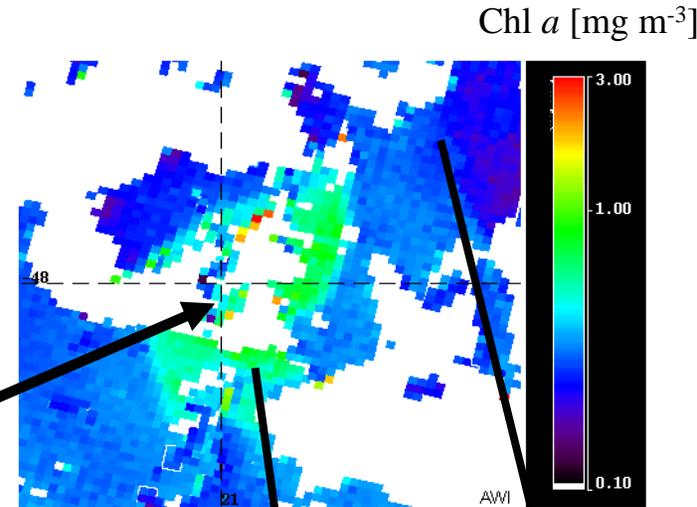
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EisenEx Eddy

Experimental site of EisenEx



SeaWiFS satellite image

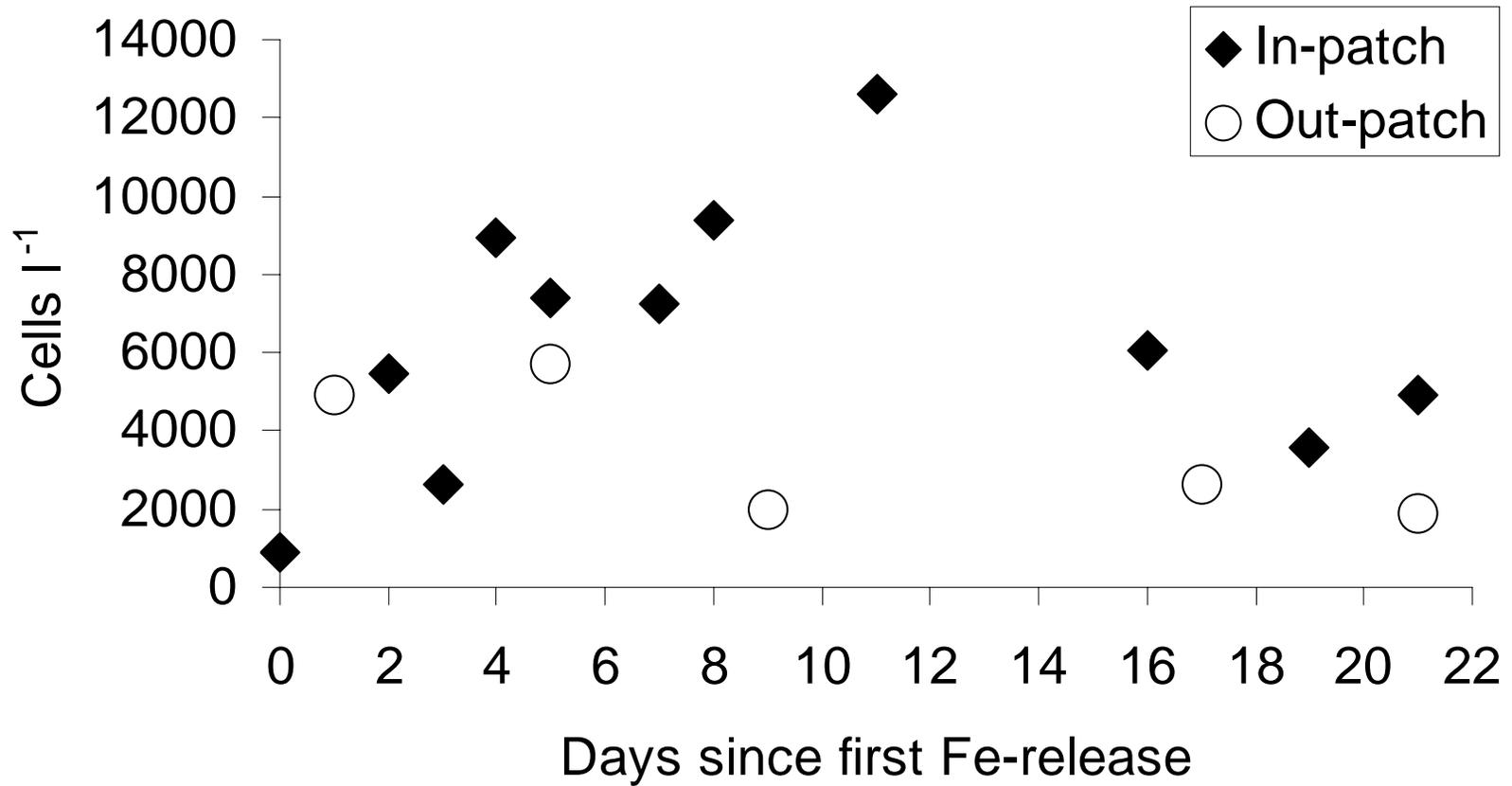


Marked differences in the growth behaviour of the species populations present during EisenEx were identified:

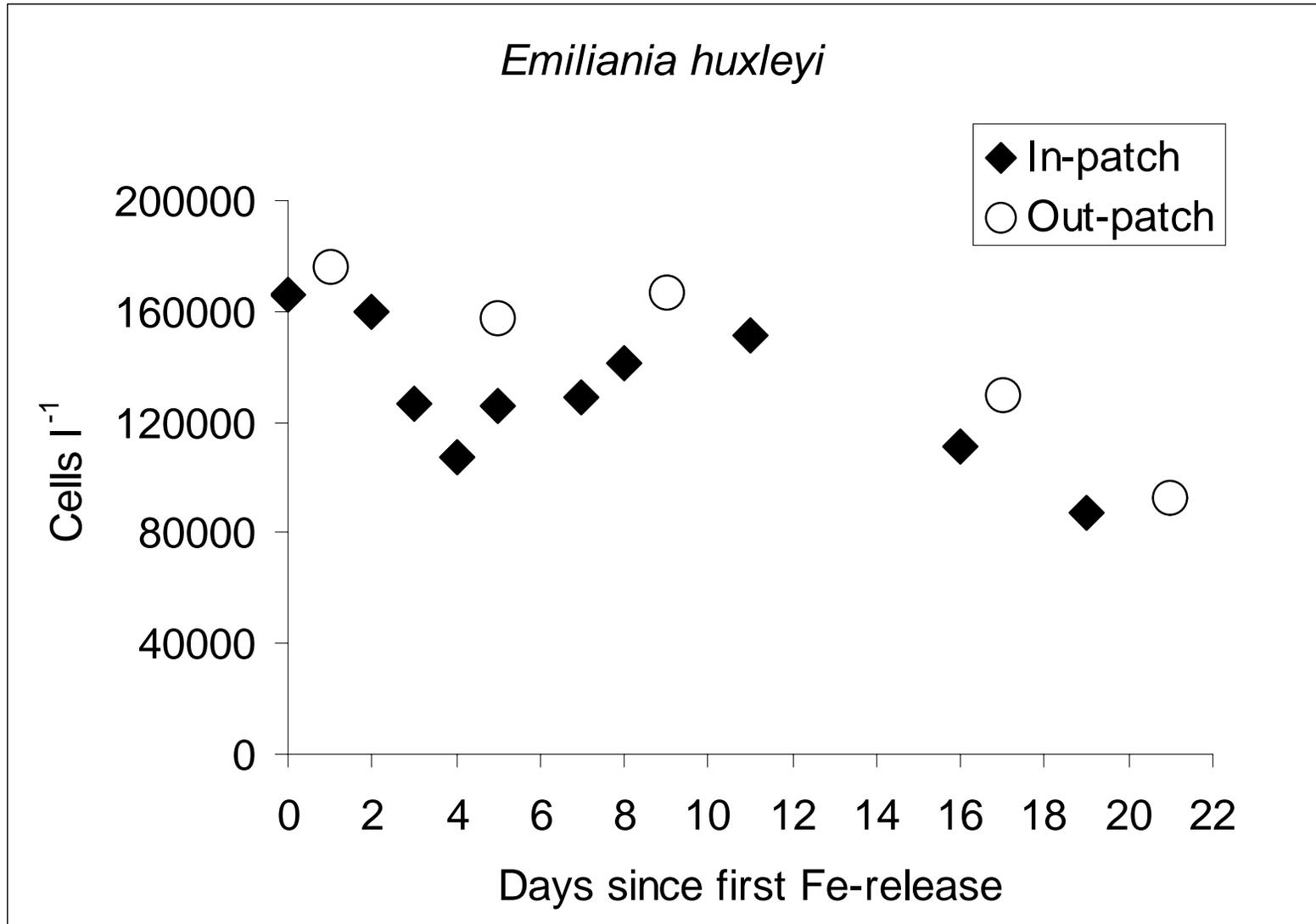
1. Exceptionally high growth rates throughout the experiment
2. Slow growth, albeit continuously
3. Rapid growth for short periods
4. Initial increase and decline thereafter
5. No response
6. Continuous decline

Category IV

Prorocentrum spp.

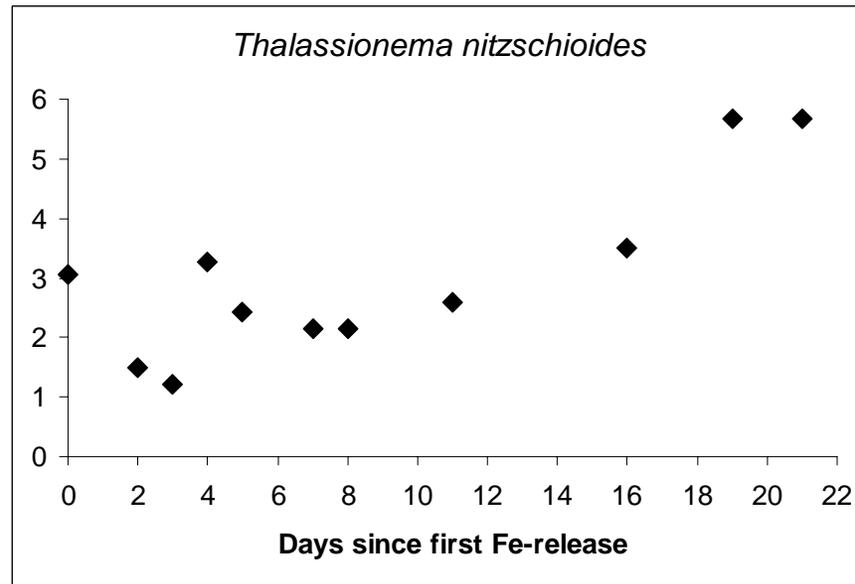
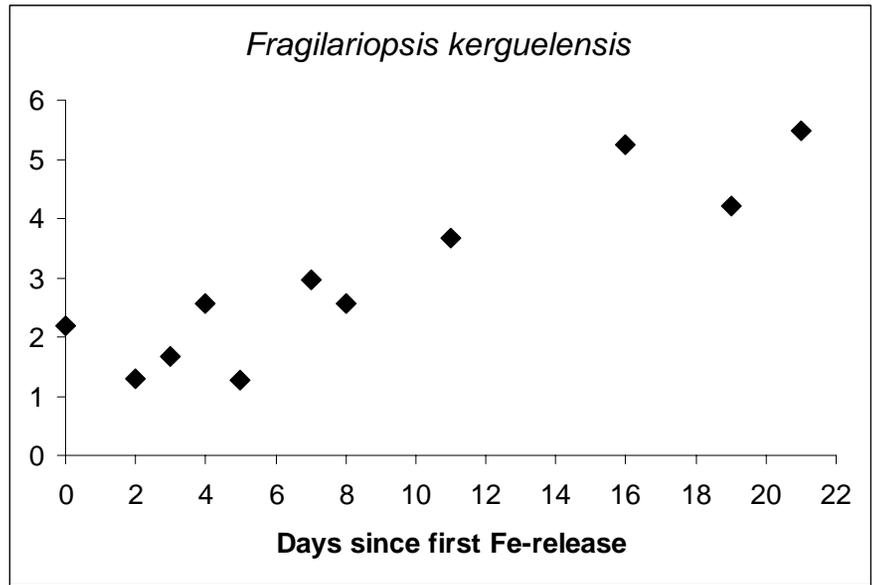
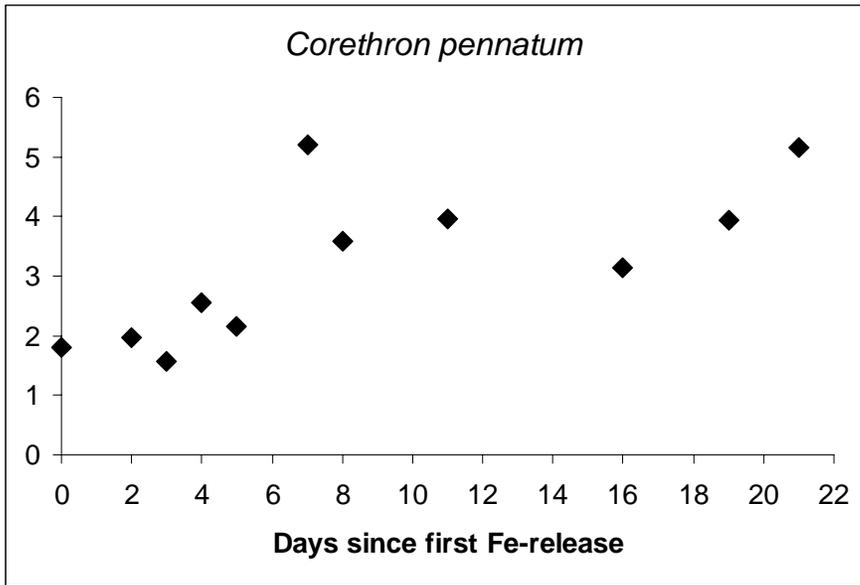


Category VI



The accumulation of intact empty and broken diatom frustules indicate how mortality acted on individual species populations:

Species-specific ratios of live cells vs. empty and broken frustules in three other significant diatom species



Emiliana huxleyi



10KV 15.7KX 1U 0006

Prorocentrum sp.

