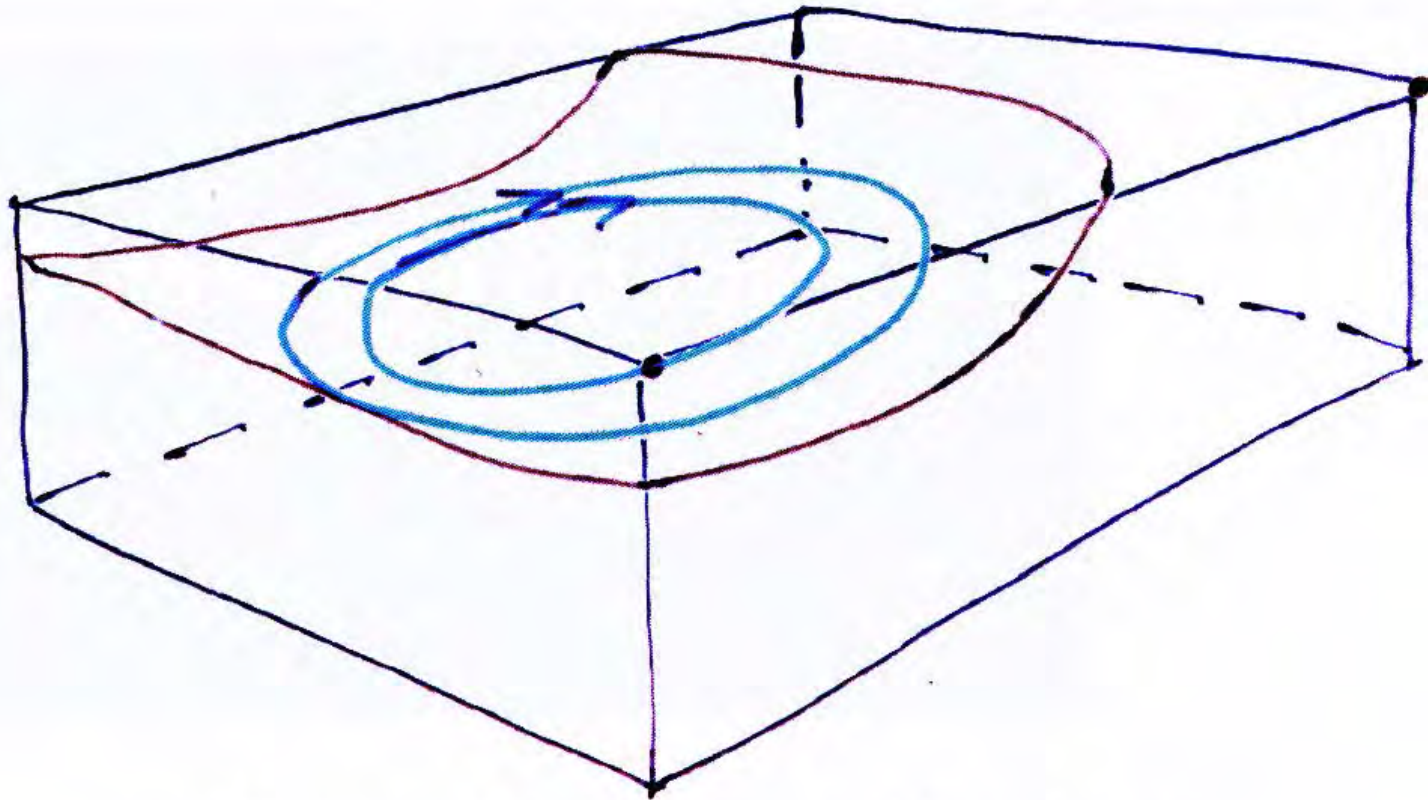


Iron supply to the Southern Ocean mixed layer from below; The ocean model effect

V. Schourup-Kristensen, J. Hauck, M. Losch, D. A. Wolf-Gladrow and C. Völker

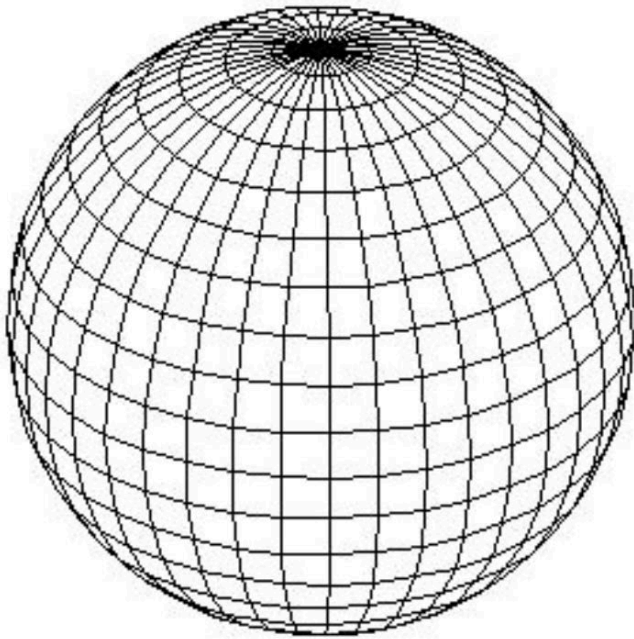


Ceci n'est pas l'océan.

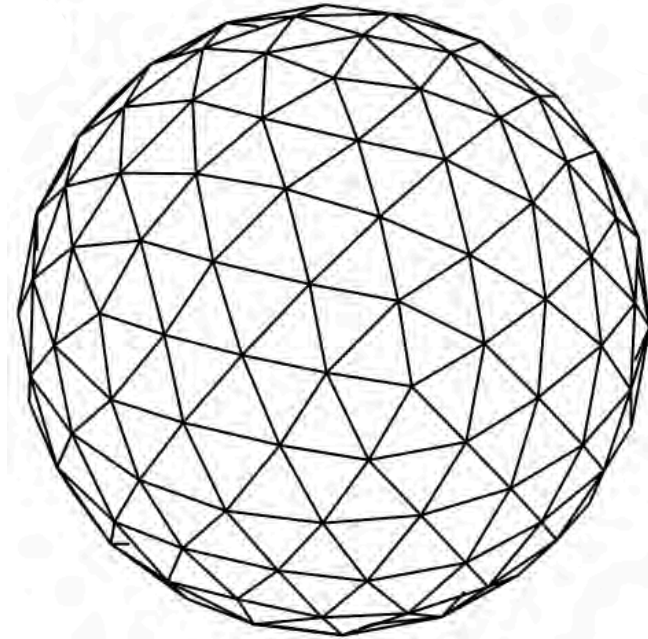
Olbers et al. (2012)

Two ocean models

MITgcm

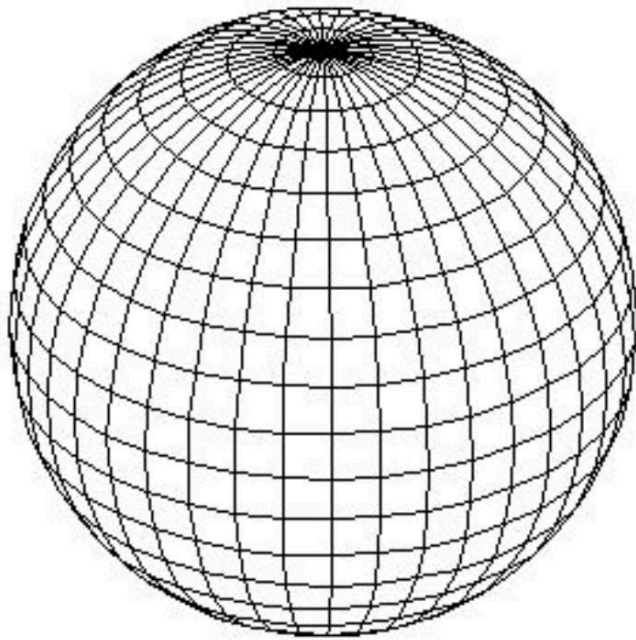


FESOM

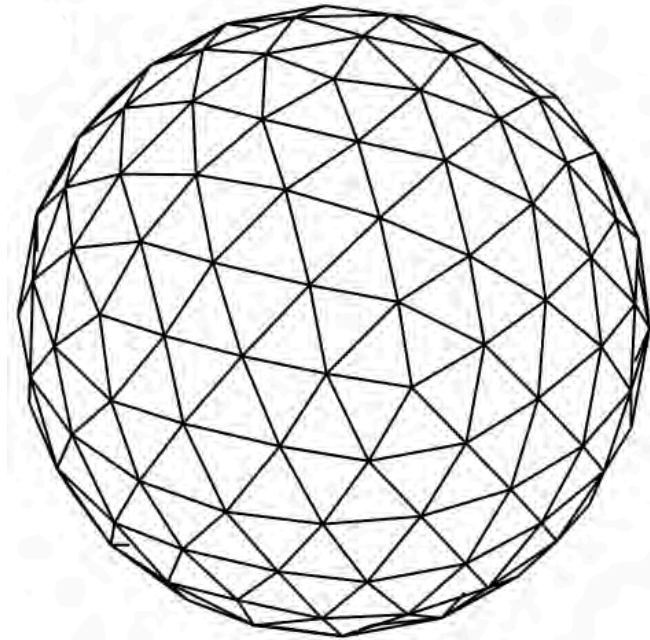


Two identical model runs

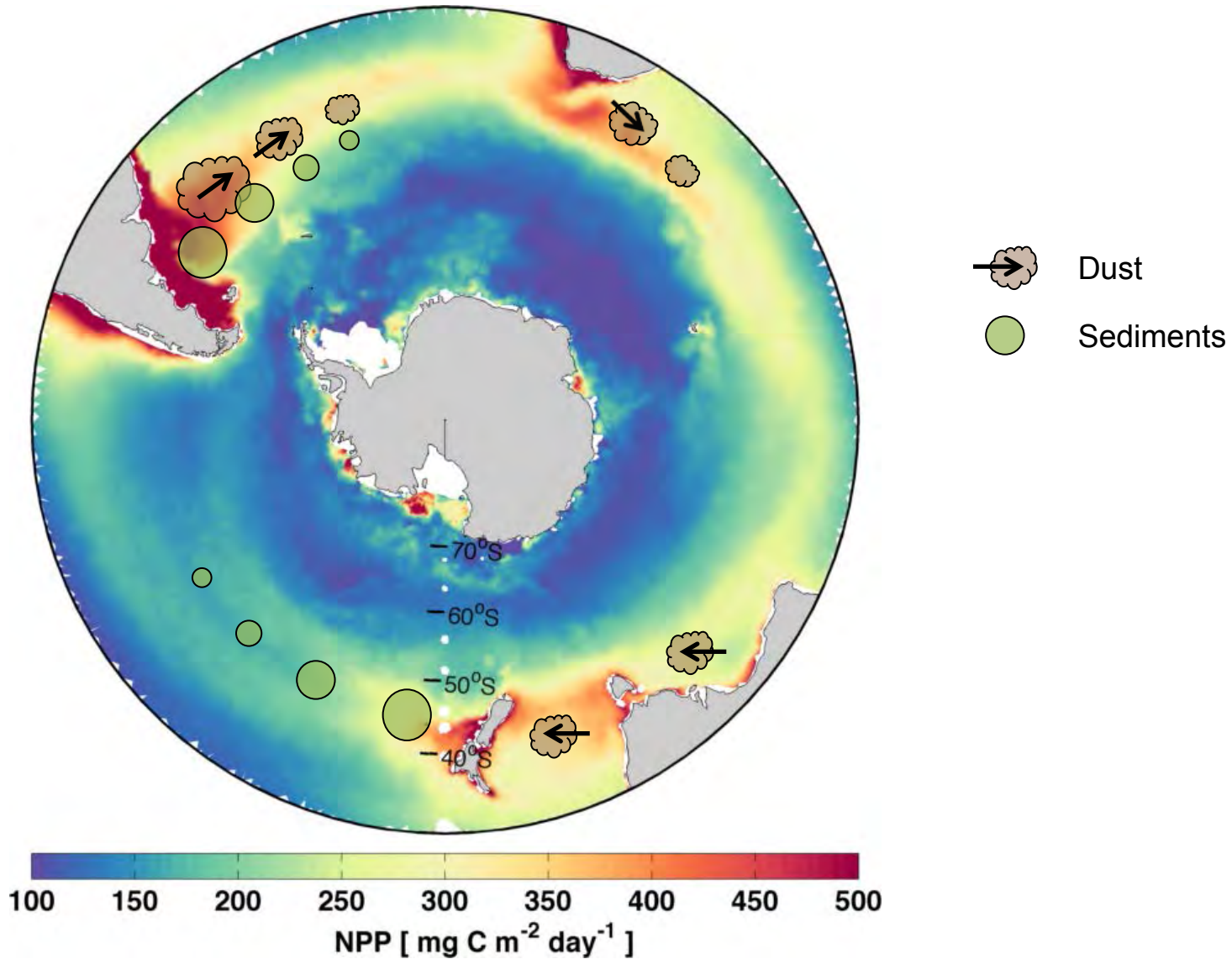
MITgcm - REcoM2



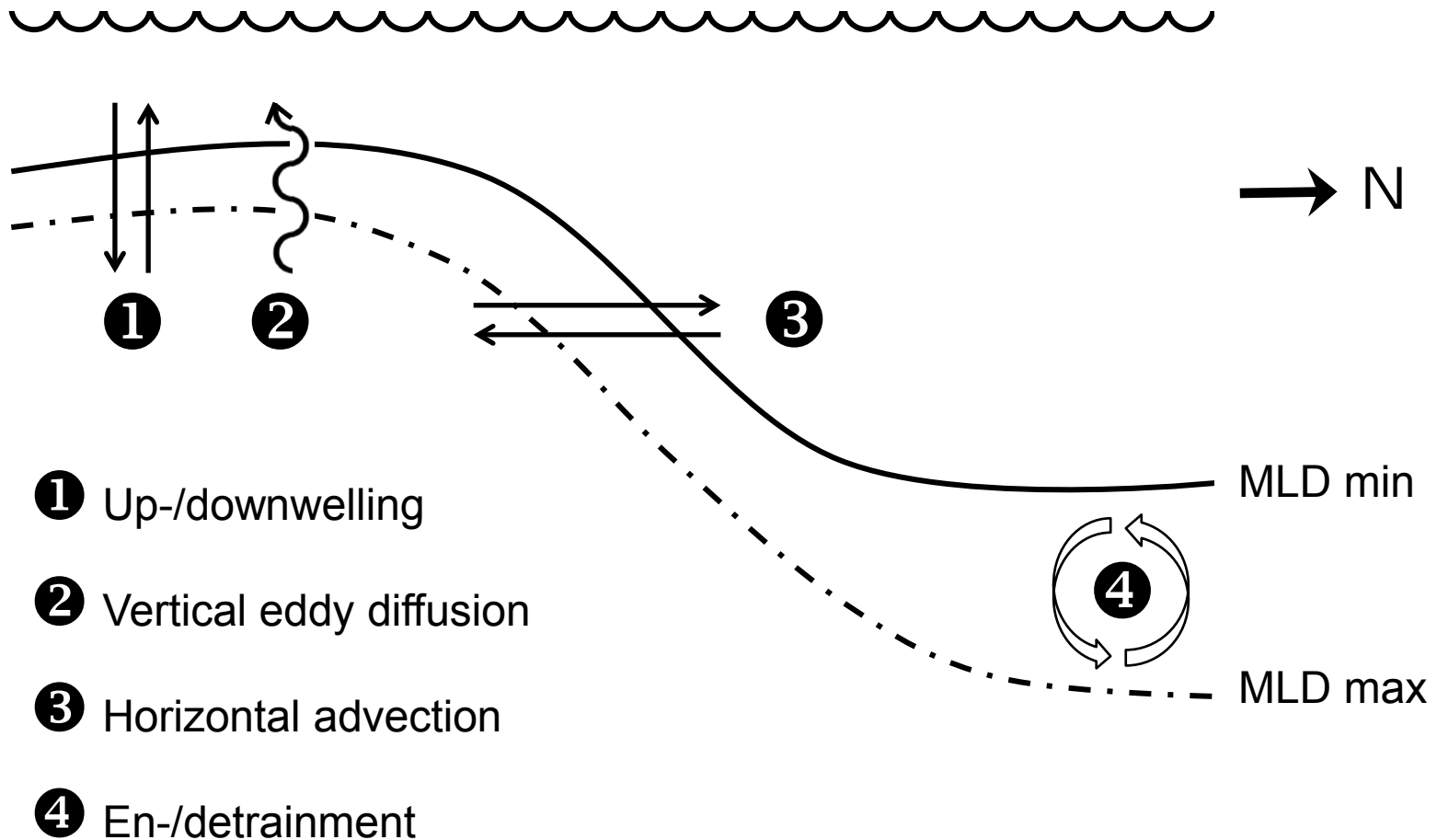
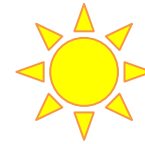
FESOM - REcoM2



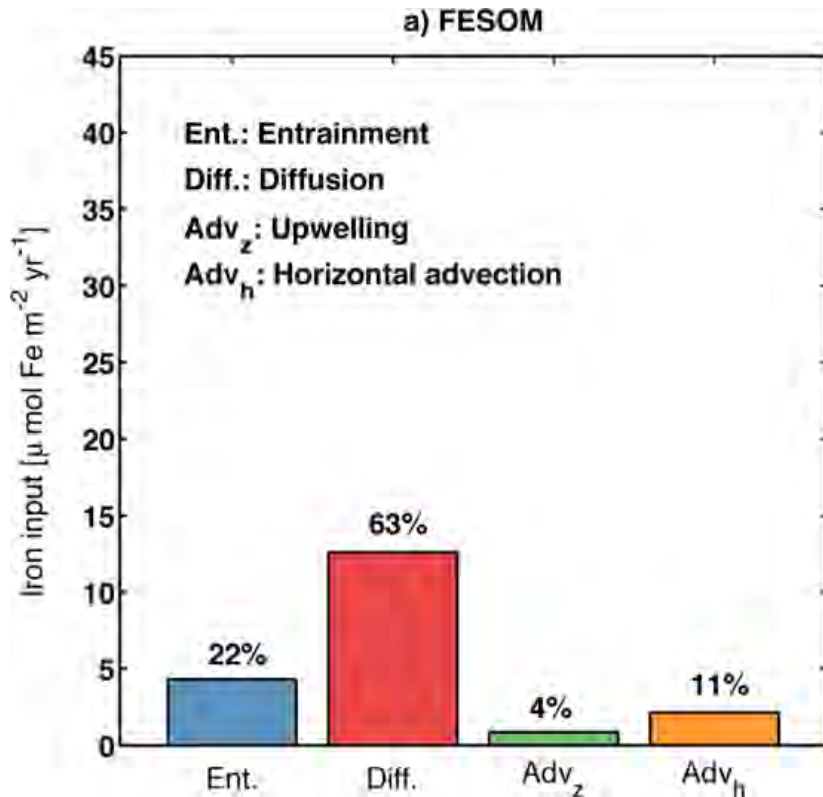
The Southern Ocean; and HNLC area



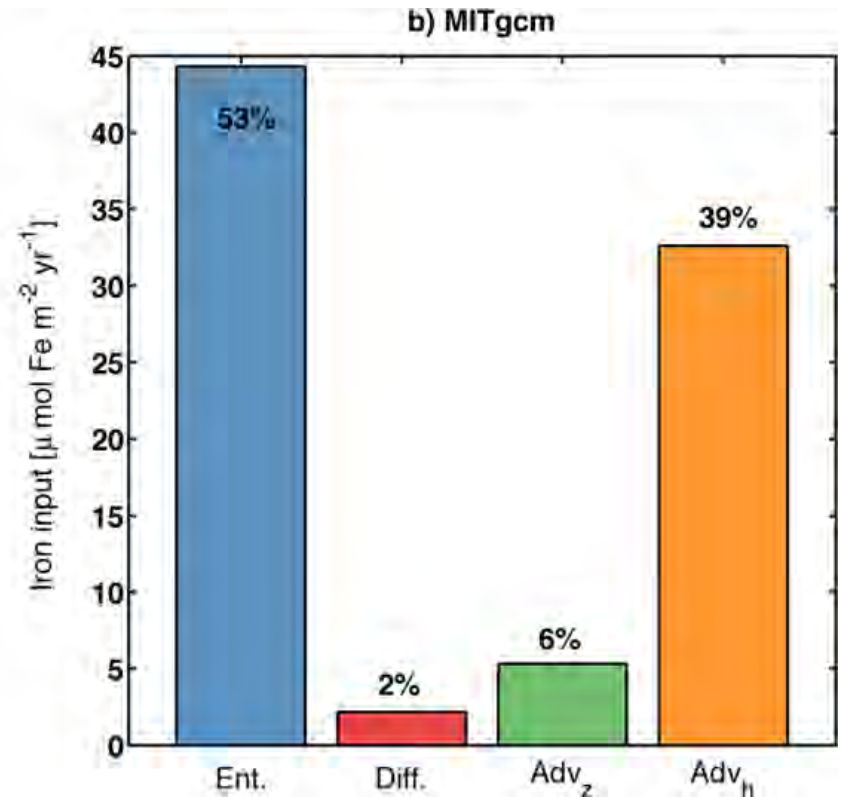
Physical iron supply



Total iron supply from below



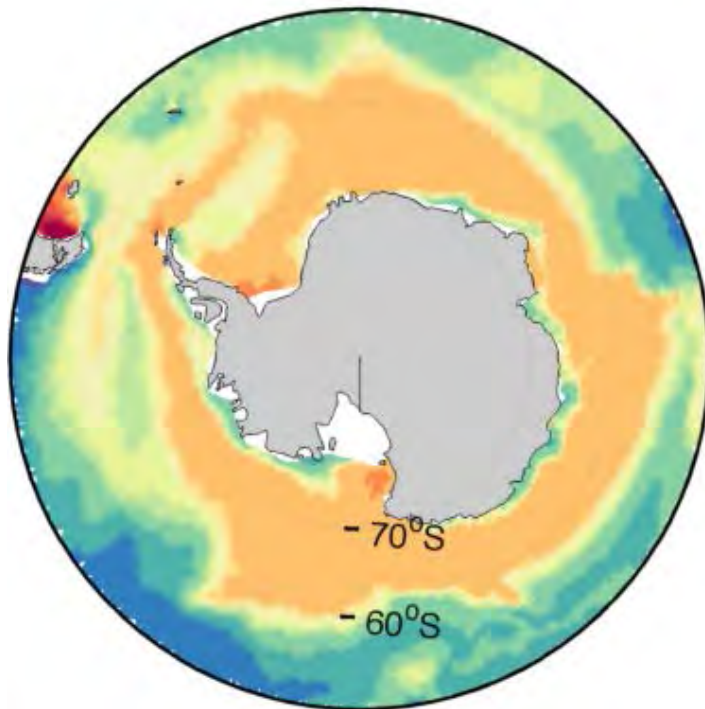
20 $\mu\text{mol Fe m}^{-2} \text{yr}^{-1}$



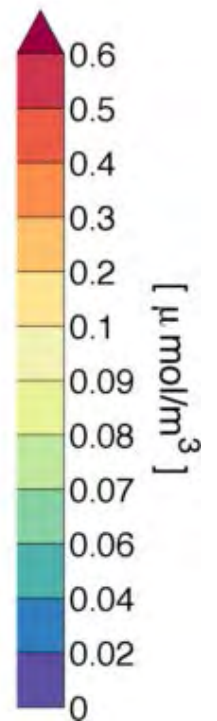
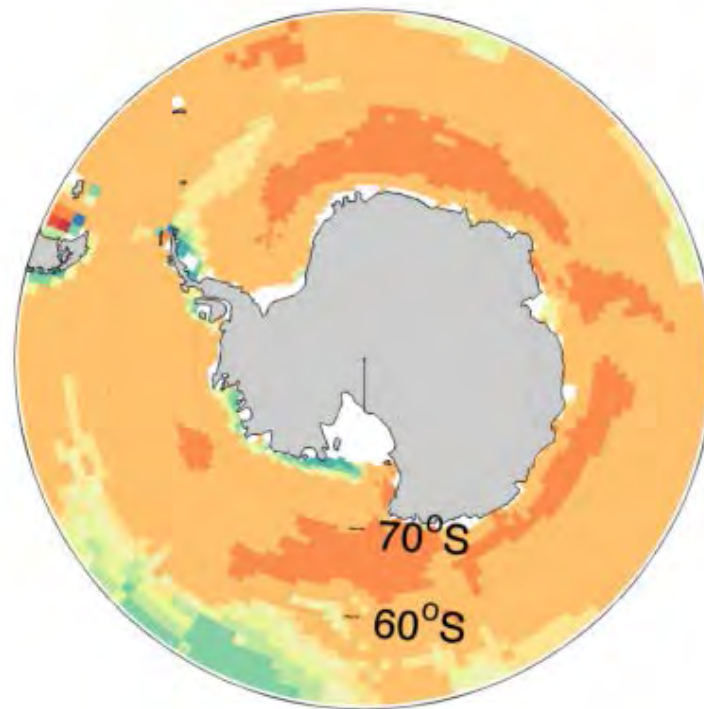
84 $\mu\text{mol Fe m}^{-2} \text{yr}^{-1}$

Surface iron concentrations

FESOM

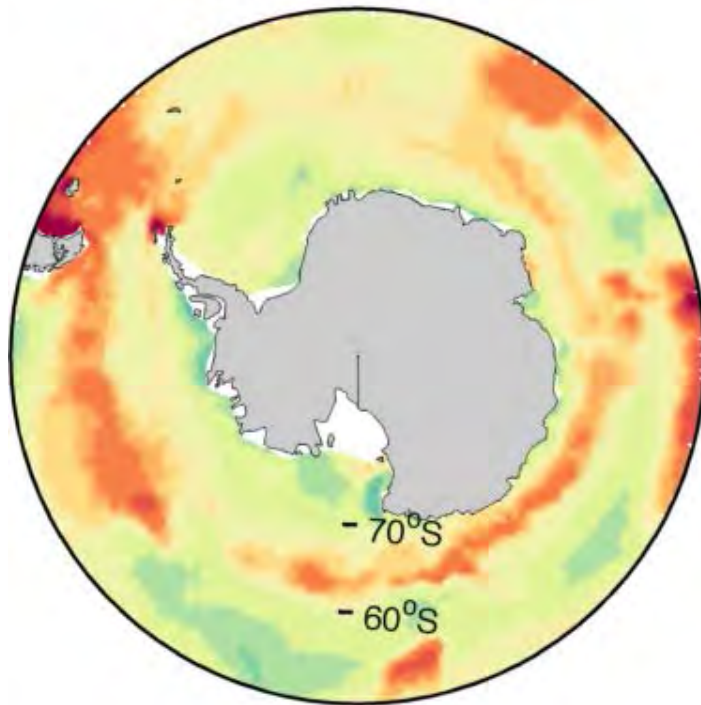


MITgcm



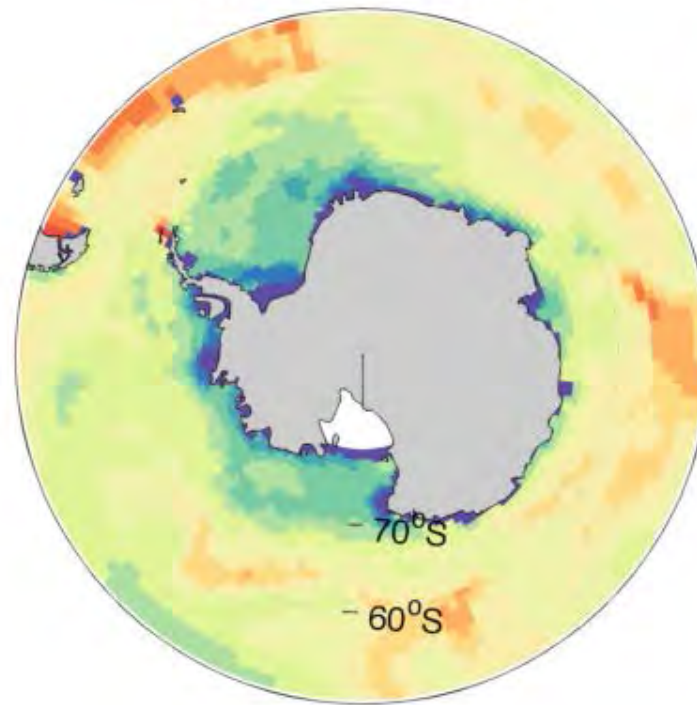
Net primary production

a) FESOM
Mean summer NPP

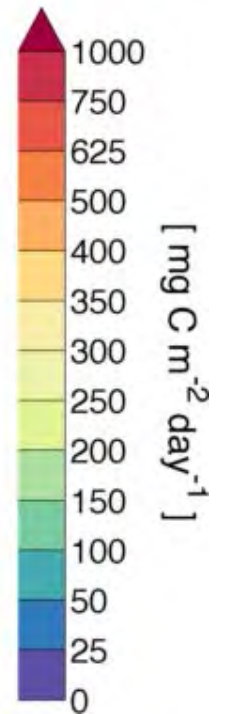


NPP : 3.1 Pg C yr⁻¹
EP : 1.1 Pg C yr⁻¹

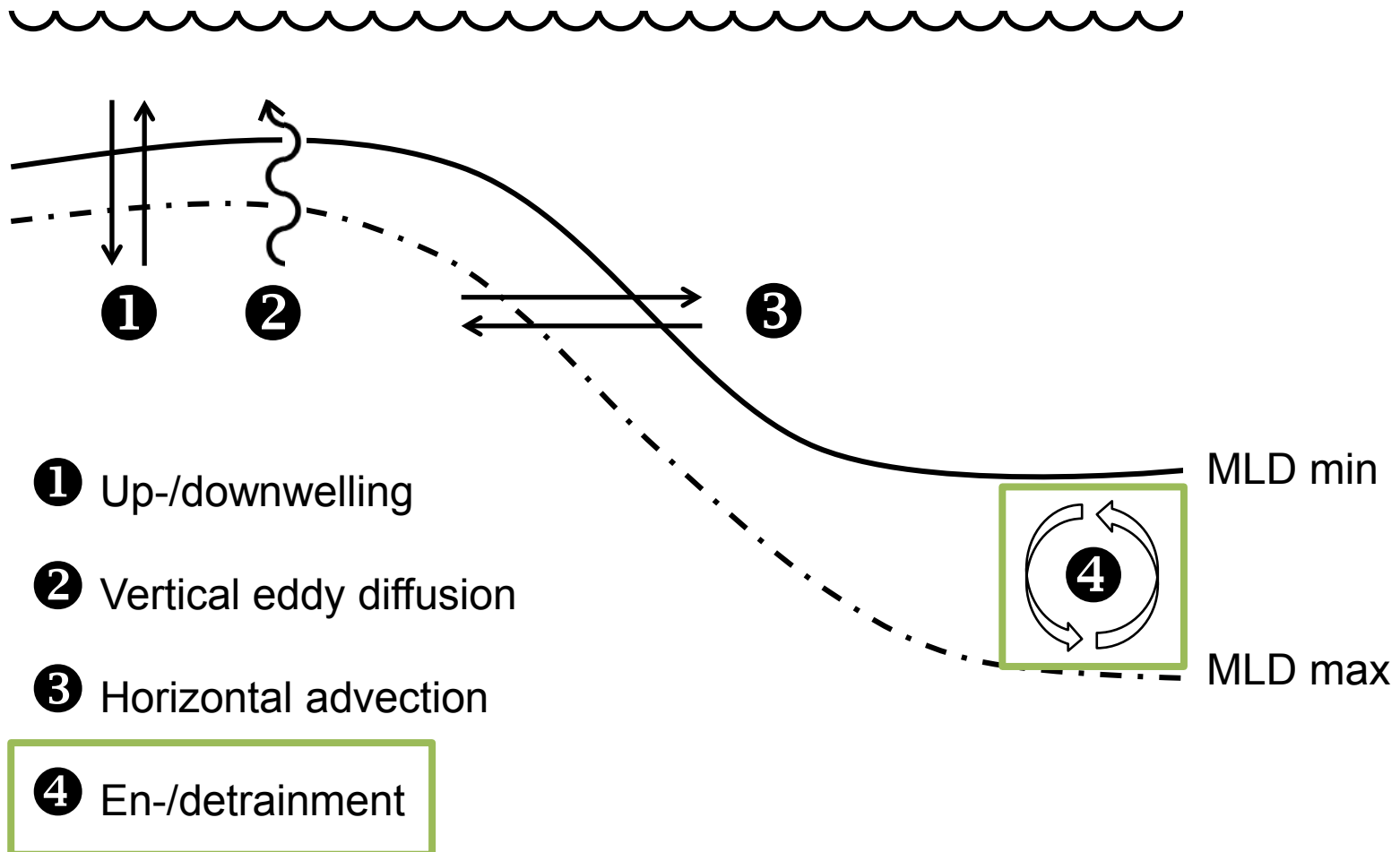
b) MITgcm
Mean summer NPP



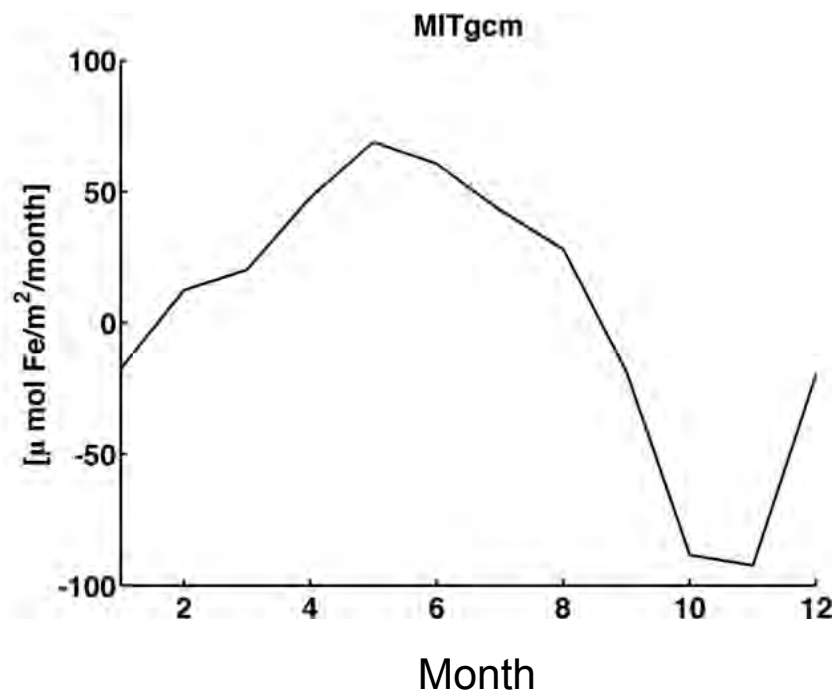
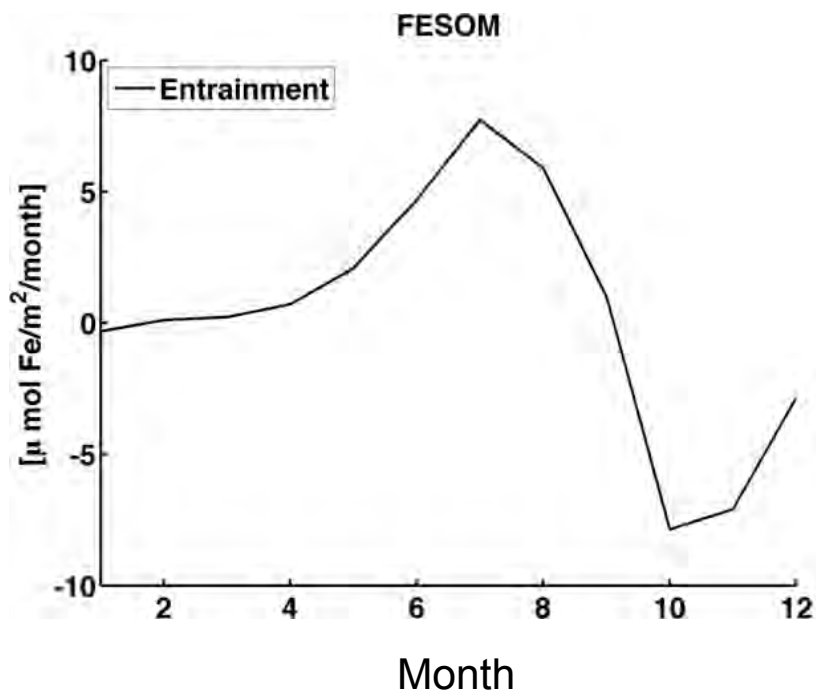
NPP : 2.1 Pg C yr⁻¹
EP : 1.2 Pg C yr⁻¹



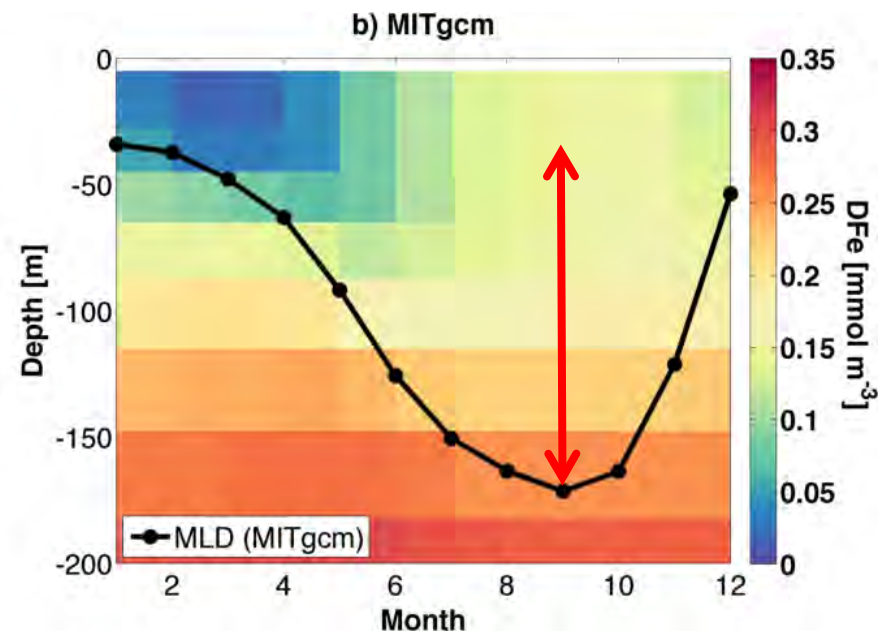
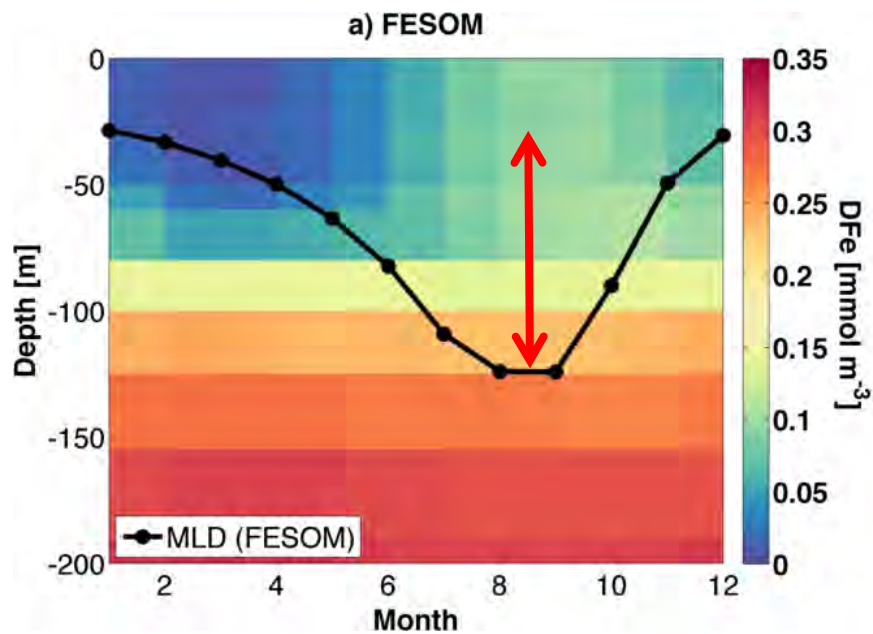
Physical iron supply



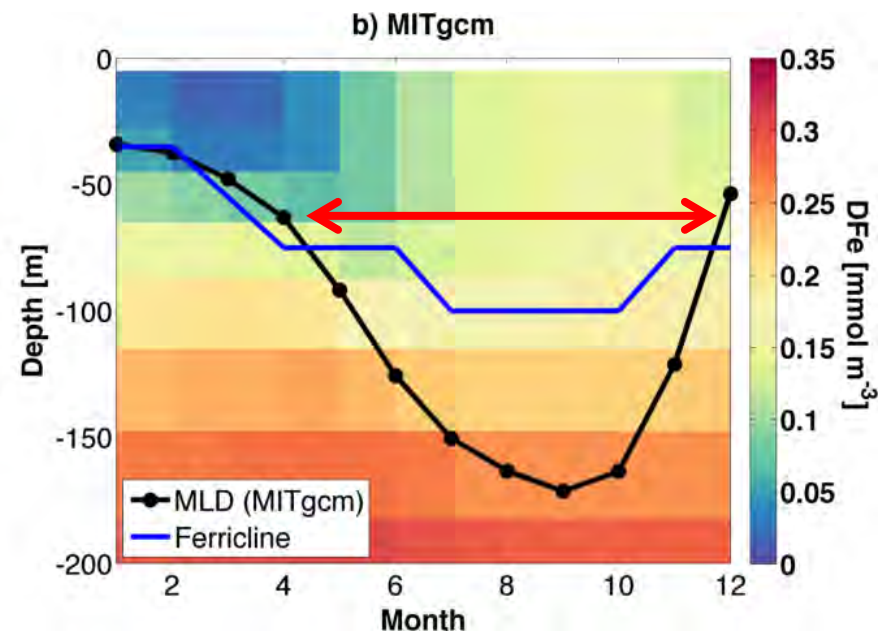
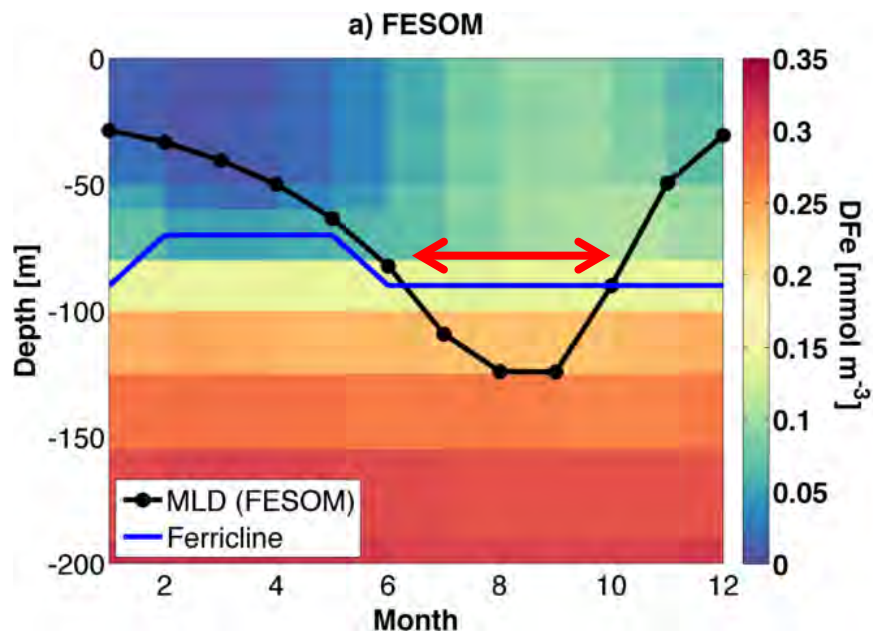
Seasonal iron supply; Entrainment



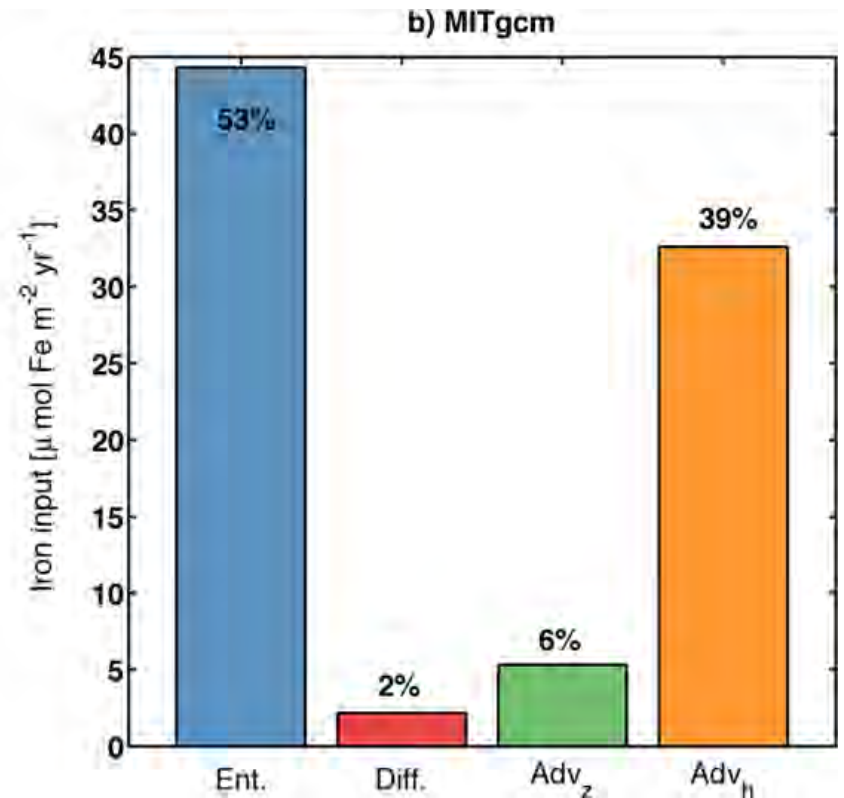
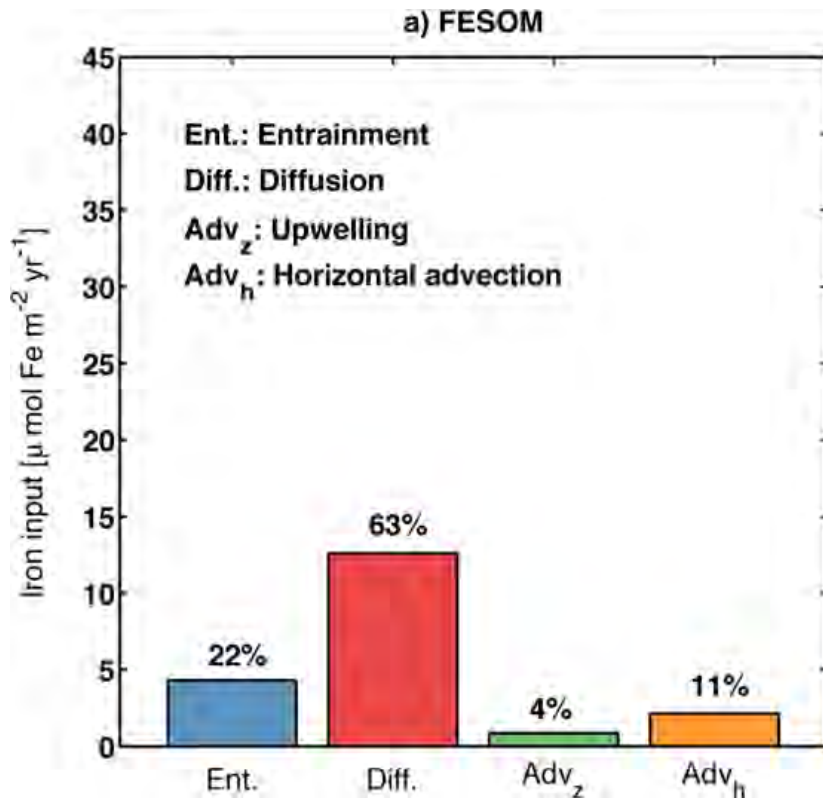
Seasonal MLD and ferricline



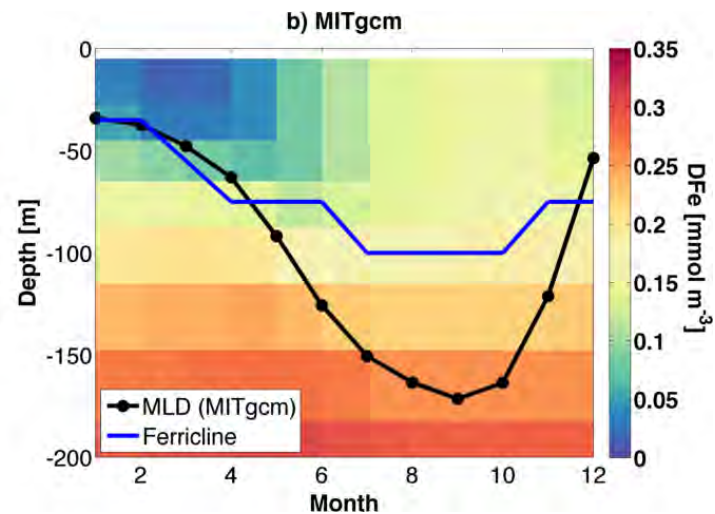
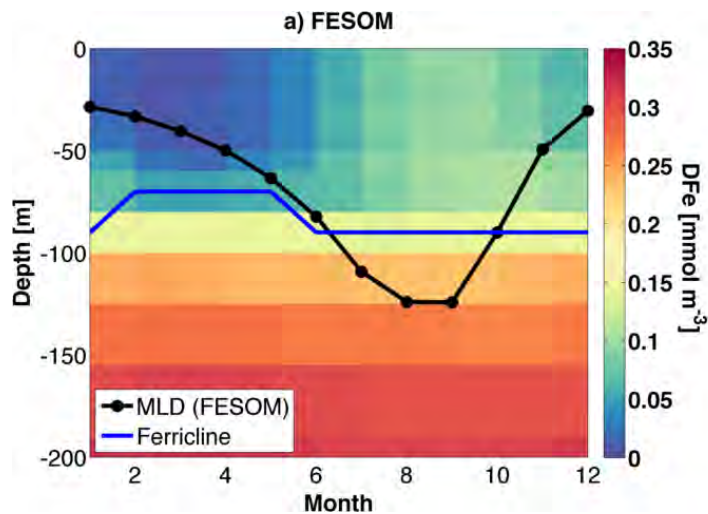
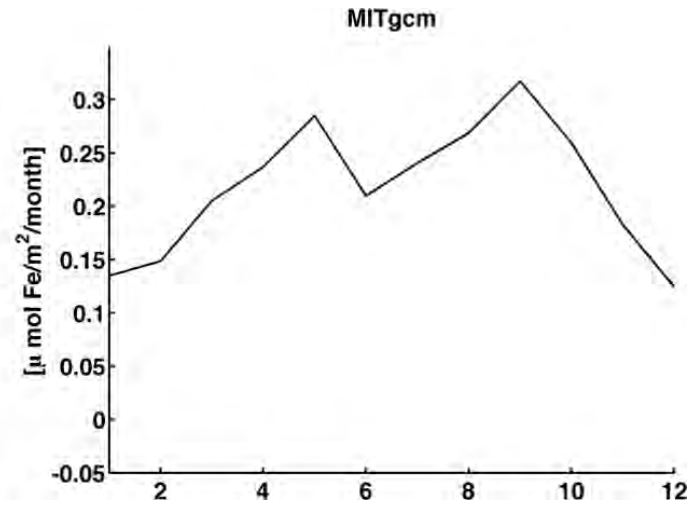
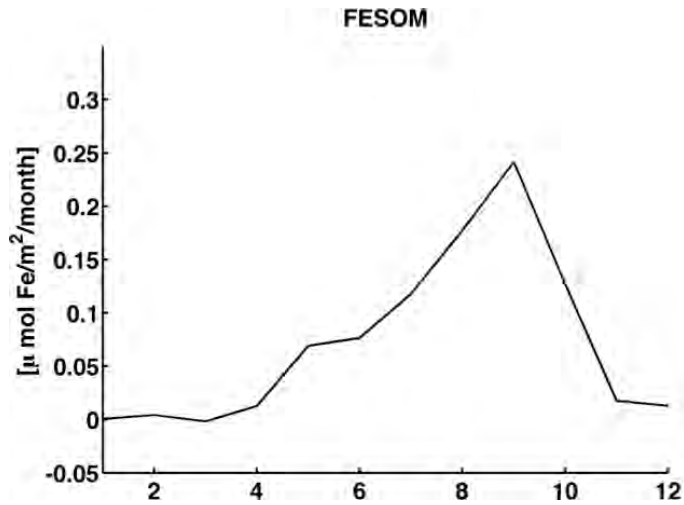
Seasonal MLD and ferricline



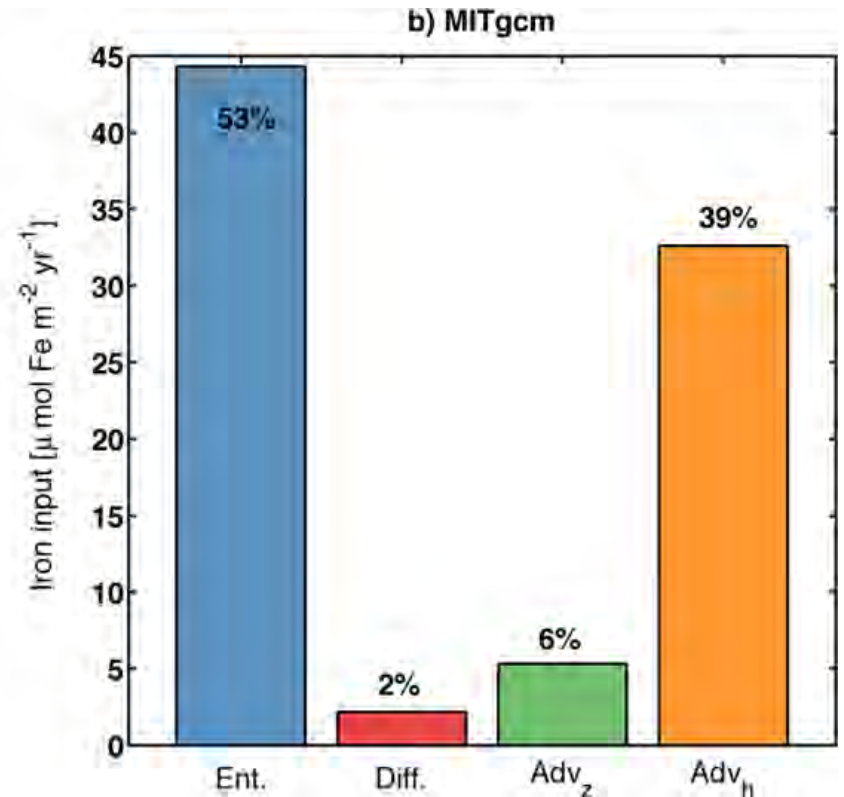
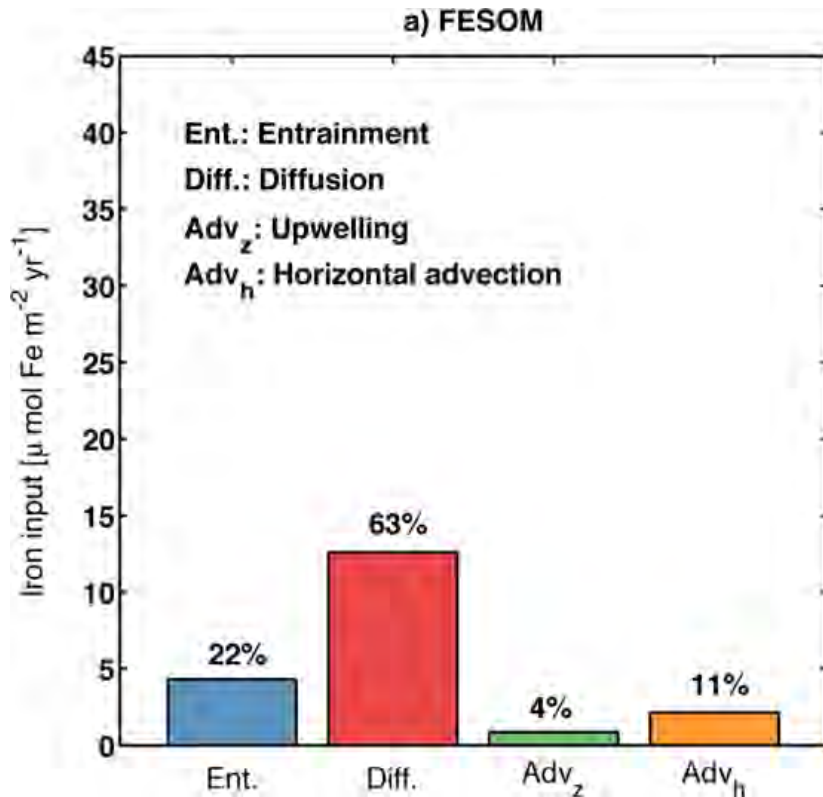
Total iron supply from below



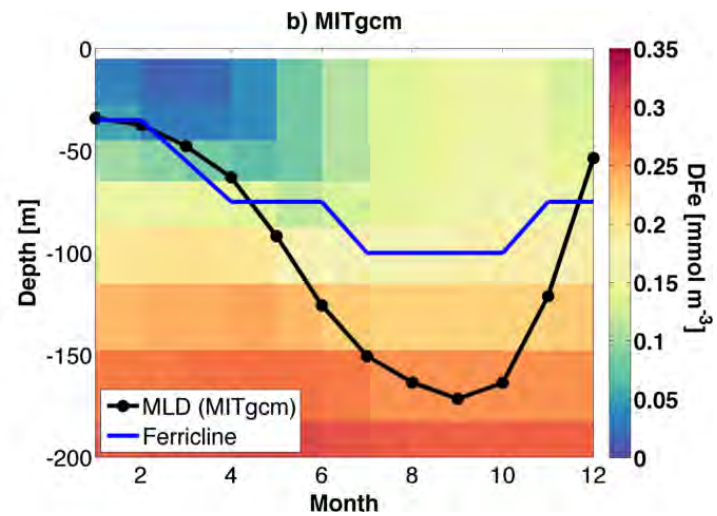
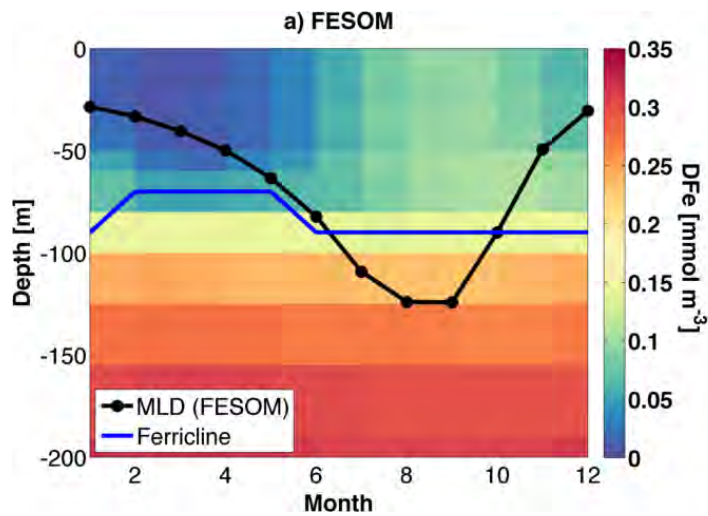
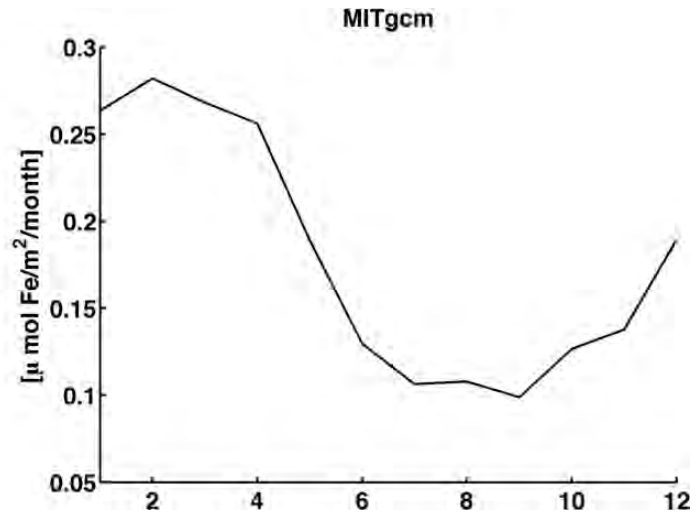
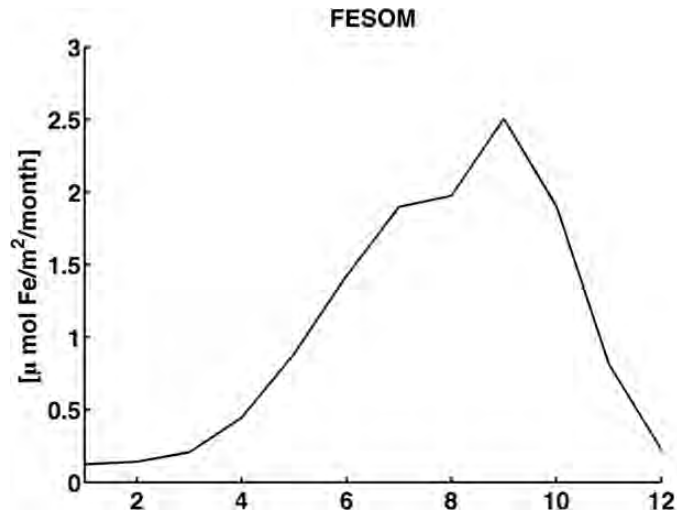
Upwelling of iron



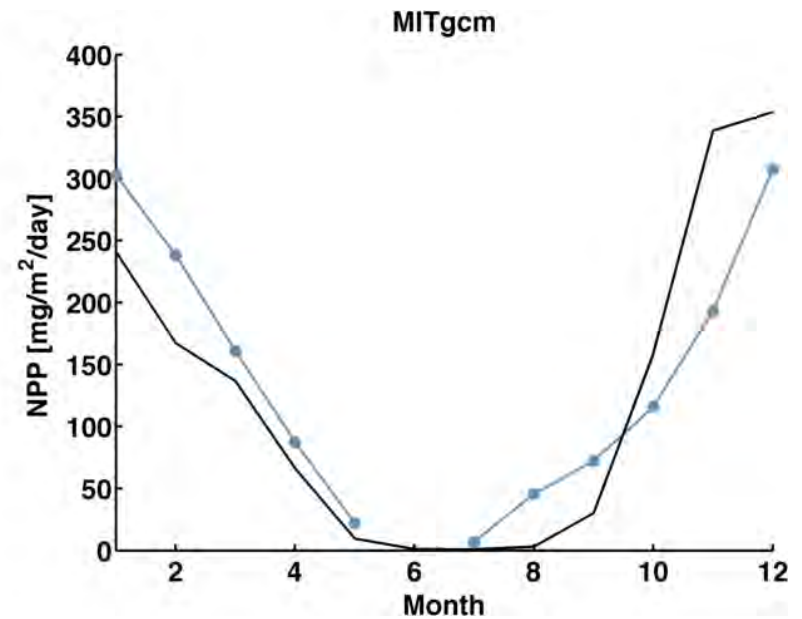
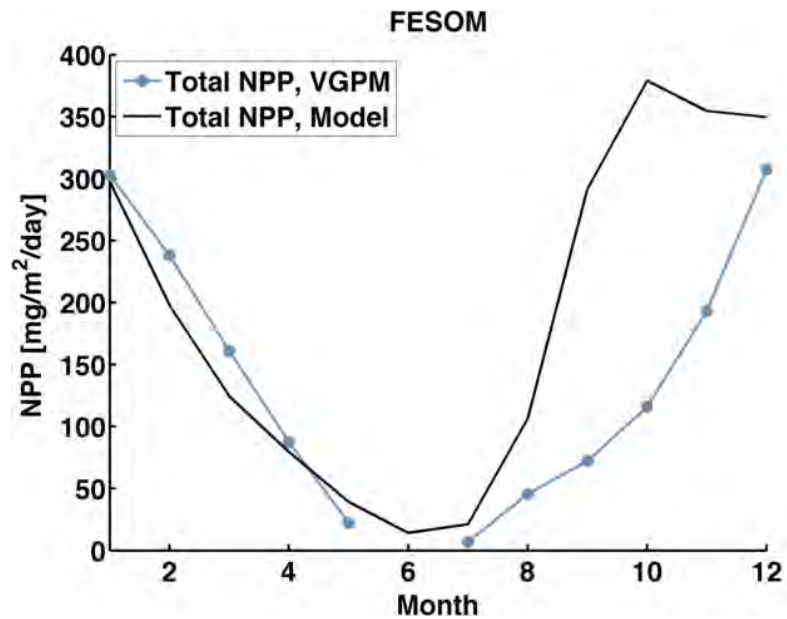
Total iron supply from below



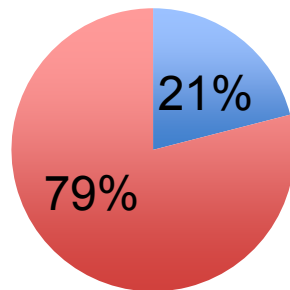
Turbulent diffusion



Seasonal NPP

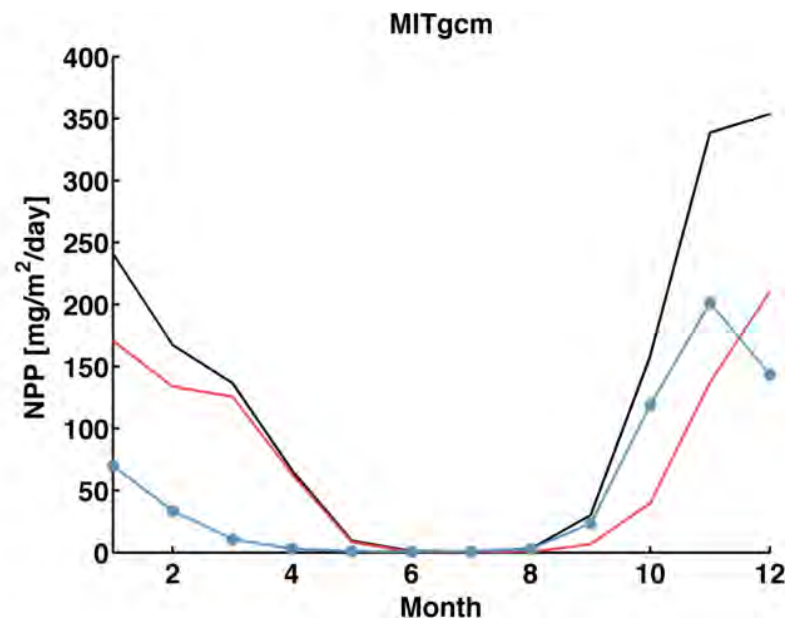
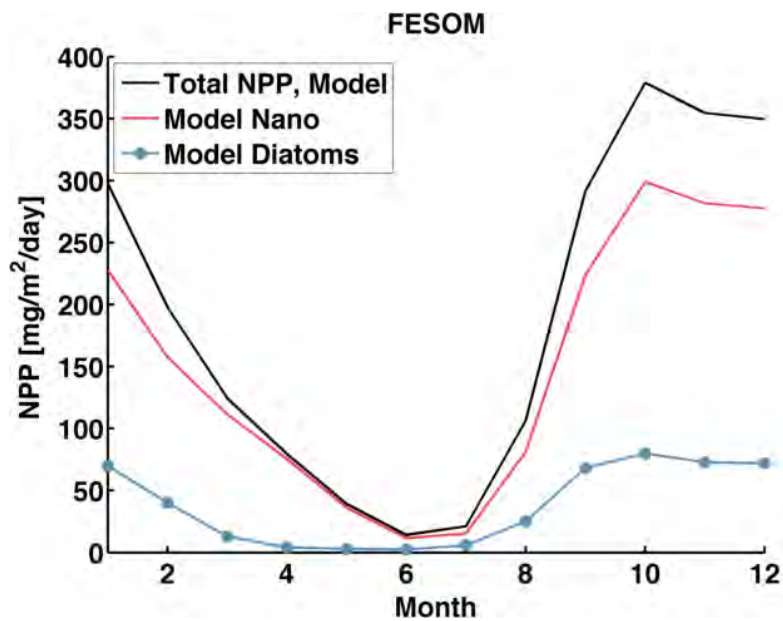
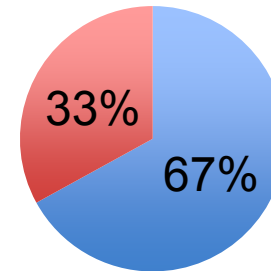


Seasonal NPP

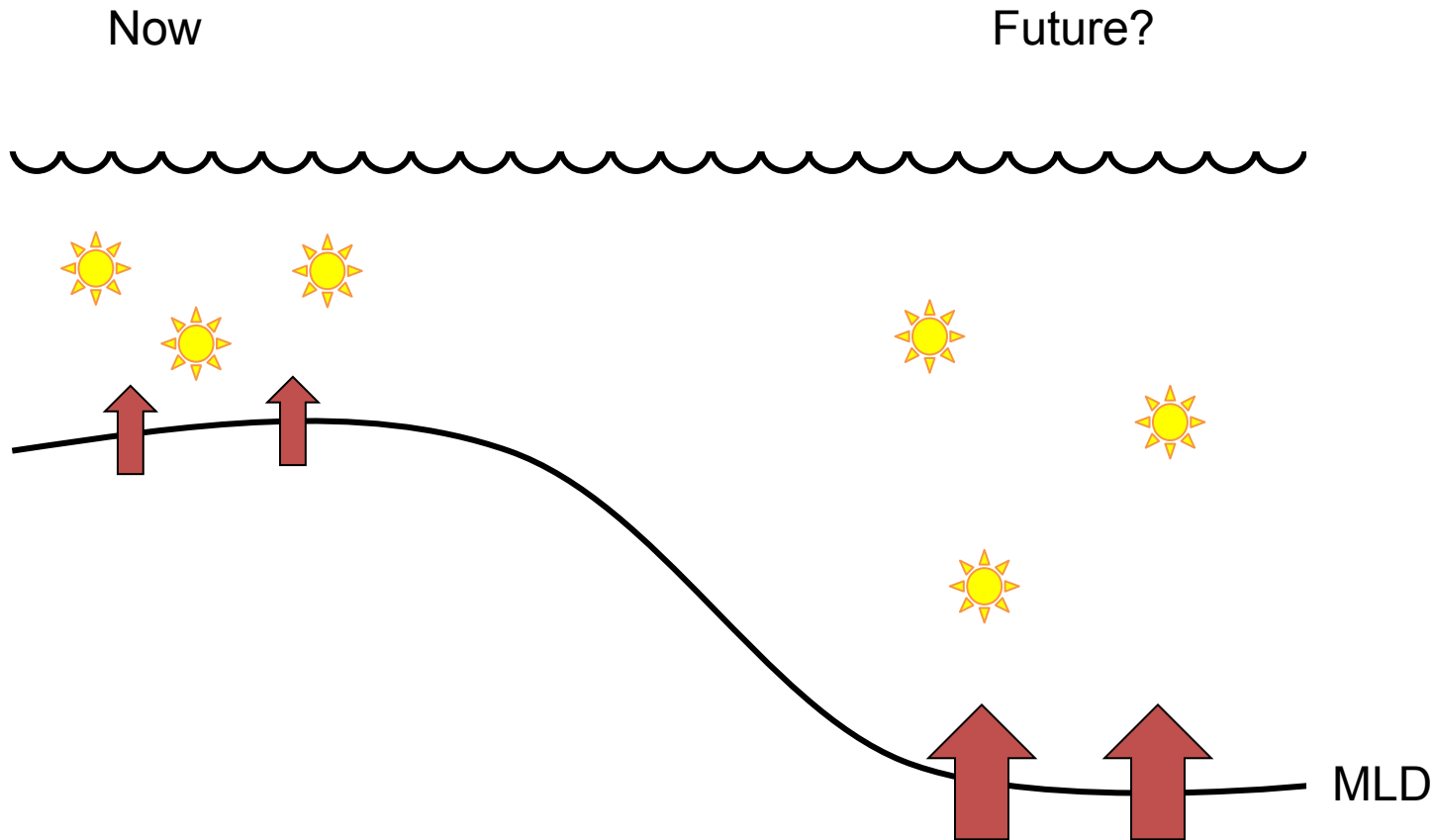


■ Diatoms

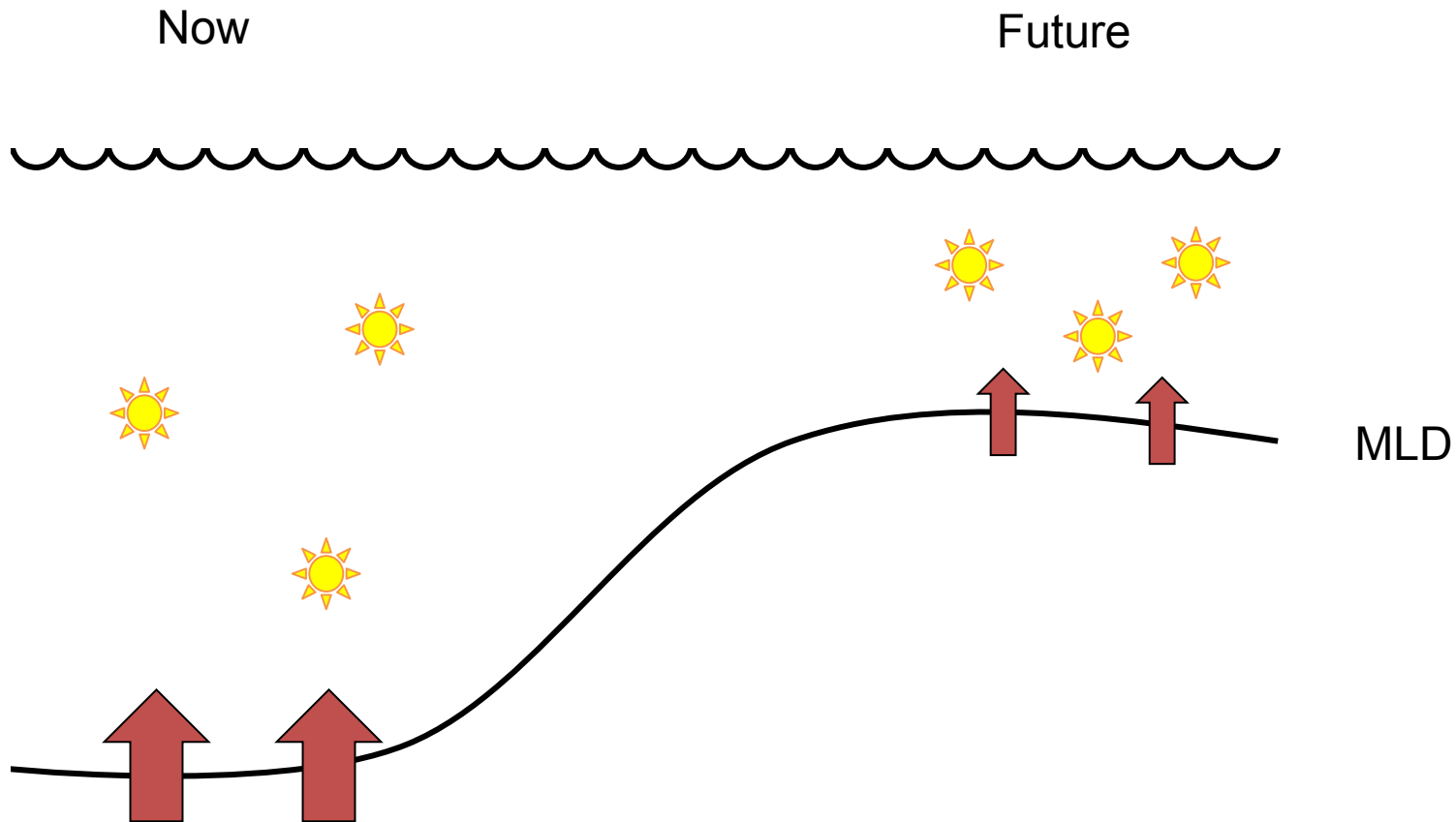
■ Nanophytoplankton



Physical iron supply



Physical iron supply



Conclusion

- The ocean model has a large impact on the biogeochemical results in the Southern Ocean
- It affects:
 - The vertical iron supply
 - The phytoplankton species composition
 - The timing of the spring bloom
- Future scenarios