

Nitrogen input - climatological

source: <https://pcmdi.llnl.gov/search/input4mips/>,

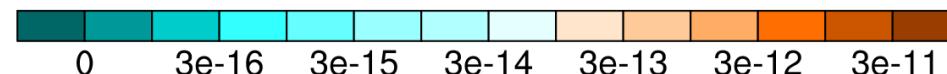
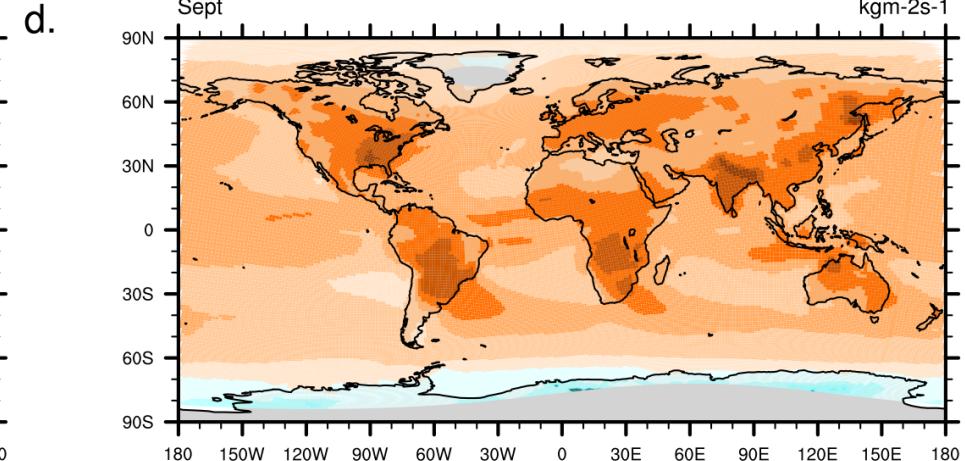
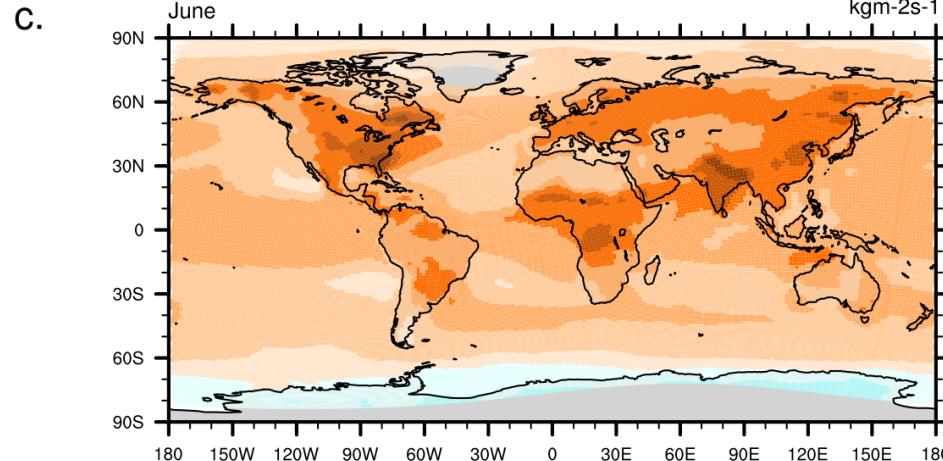
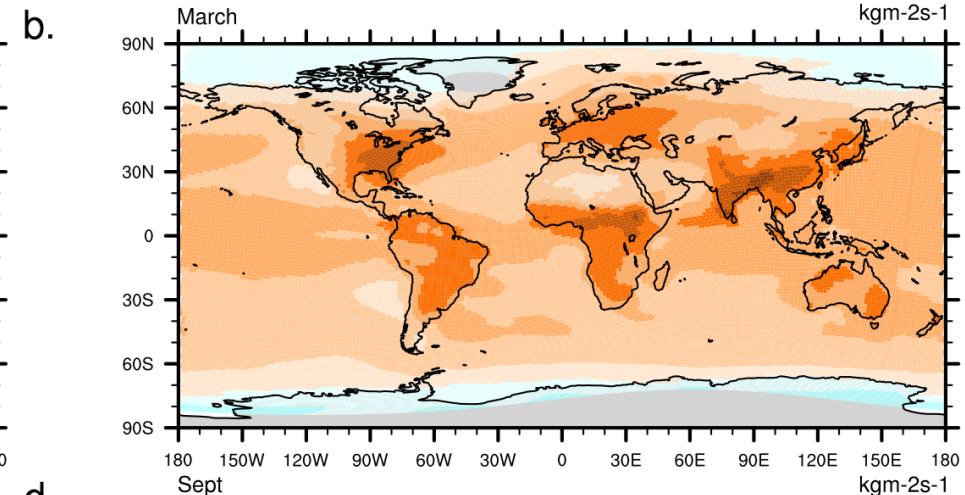
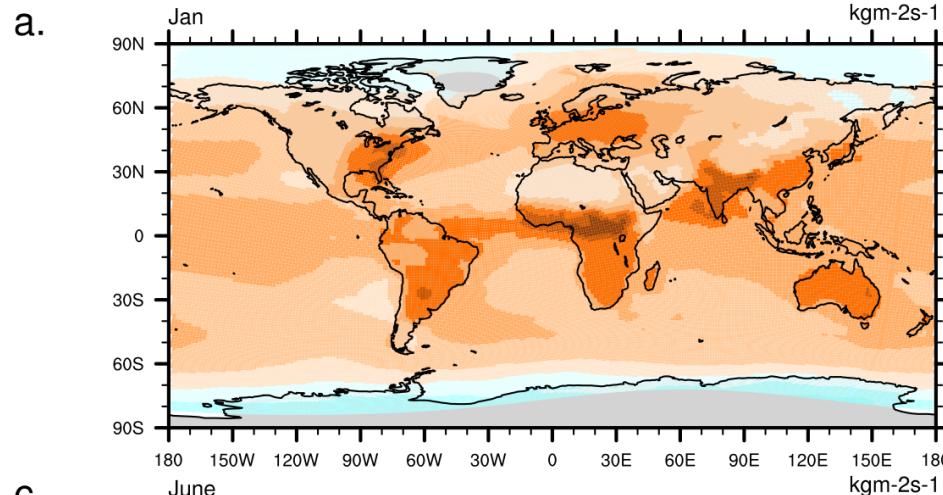
<https://blogs.reading.ac.uk/ccmi/forcing-databases-in-support-of-cmip6/>

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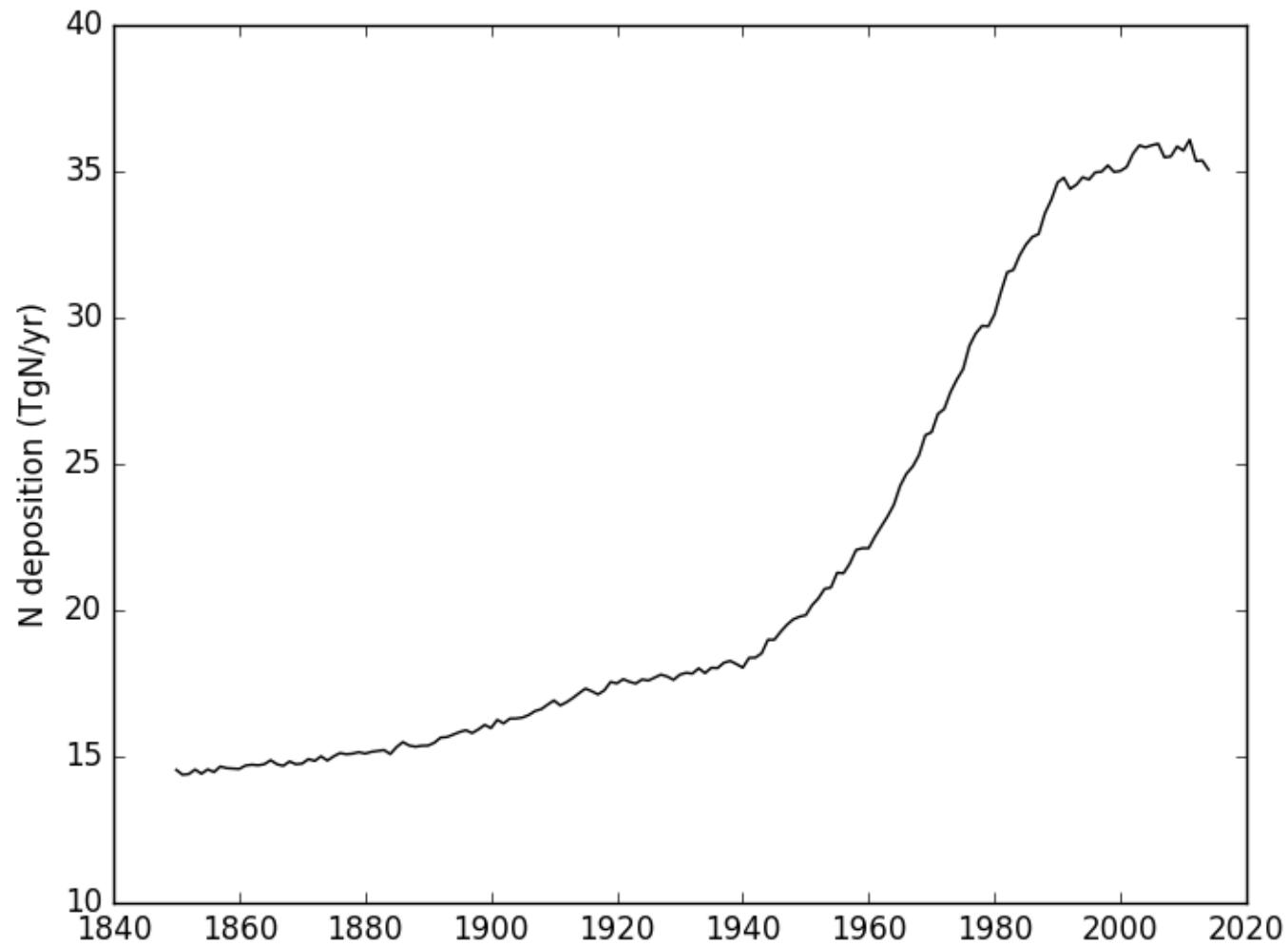
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~15 Tg N/yr

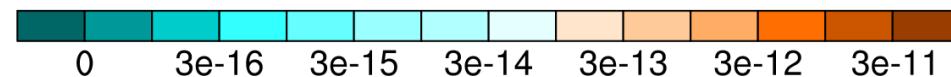
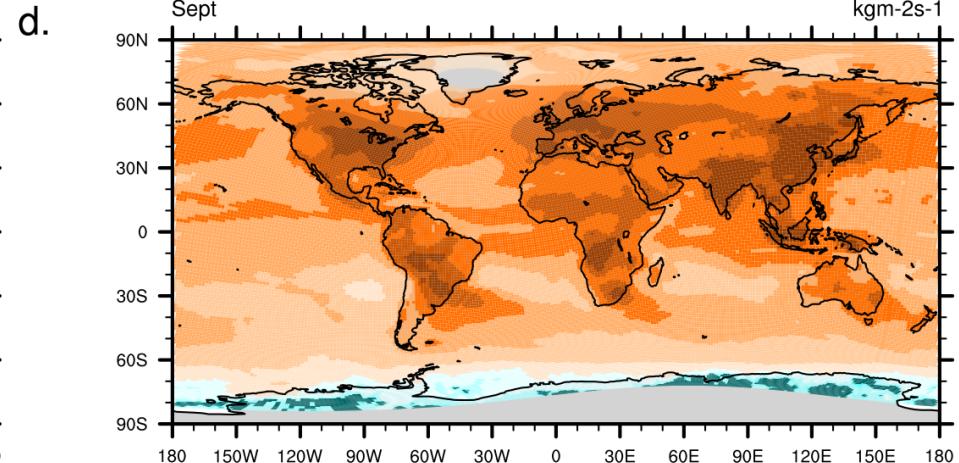
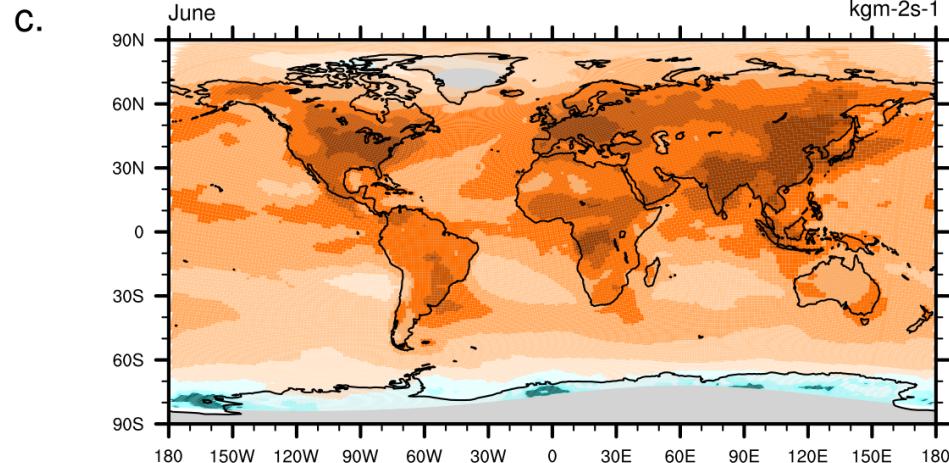
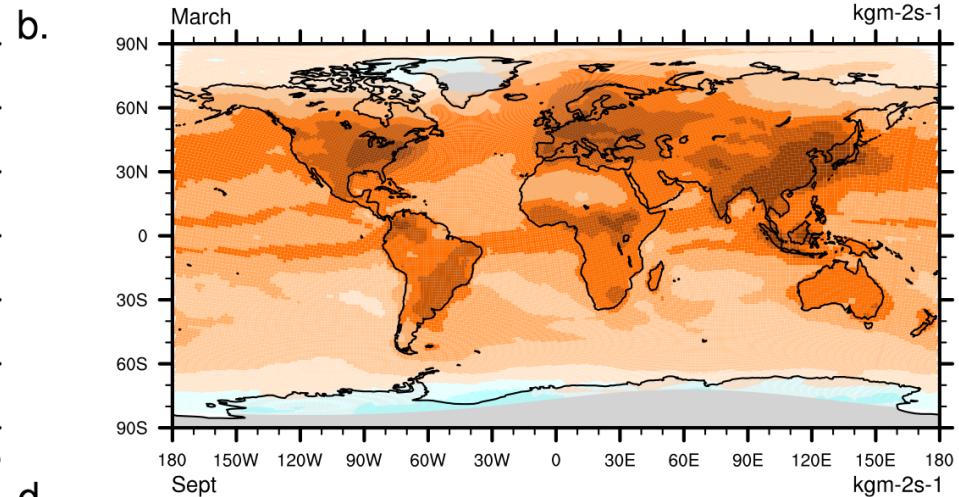
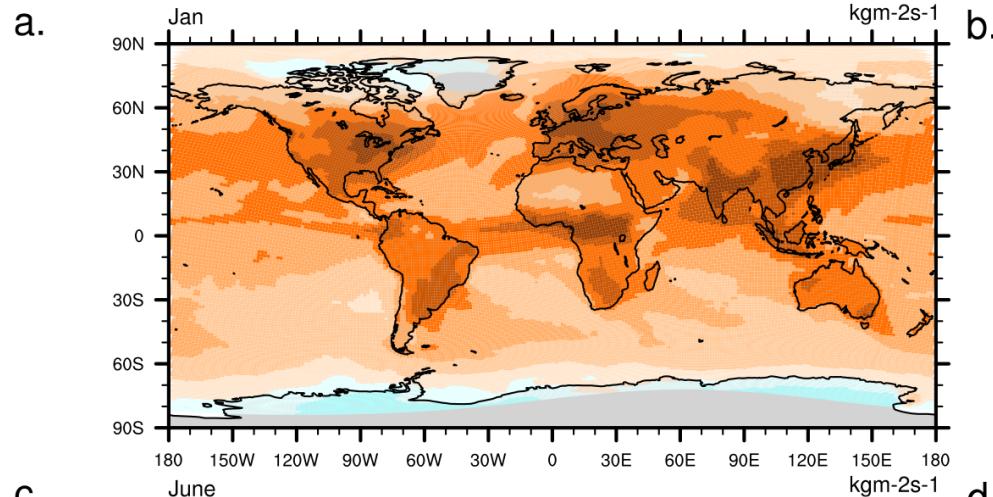


Nitrogen input 1850 - 2014



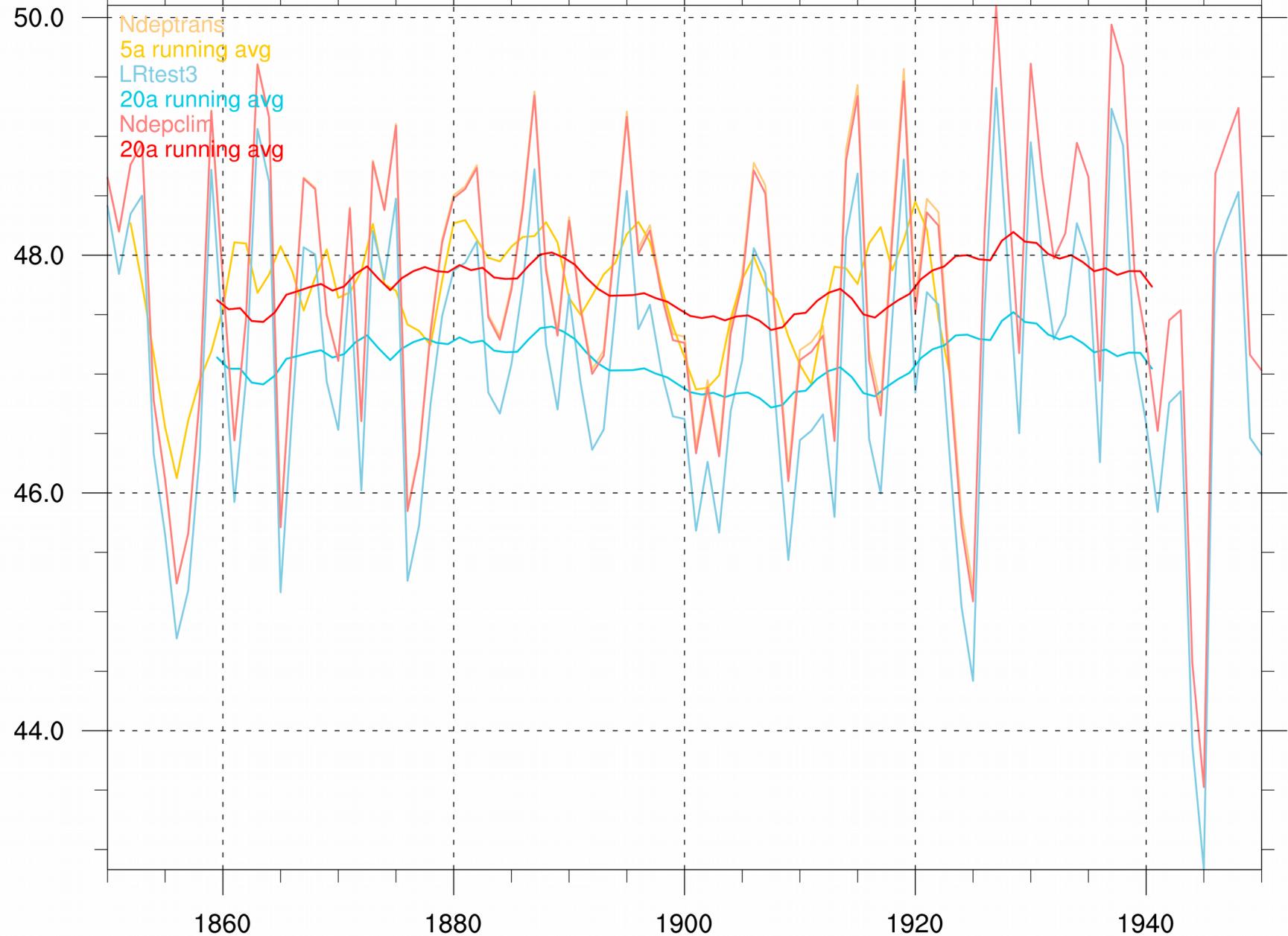
Nitrogen input - 2014

~35 Tg N/yr



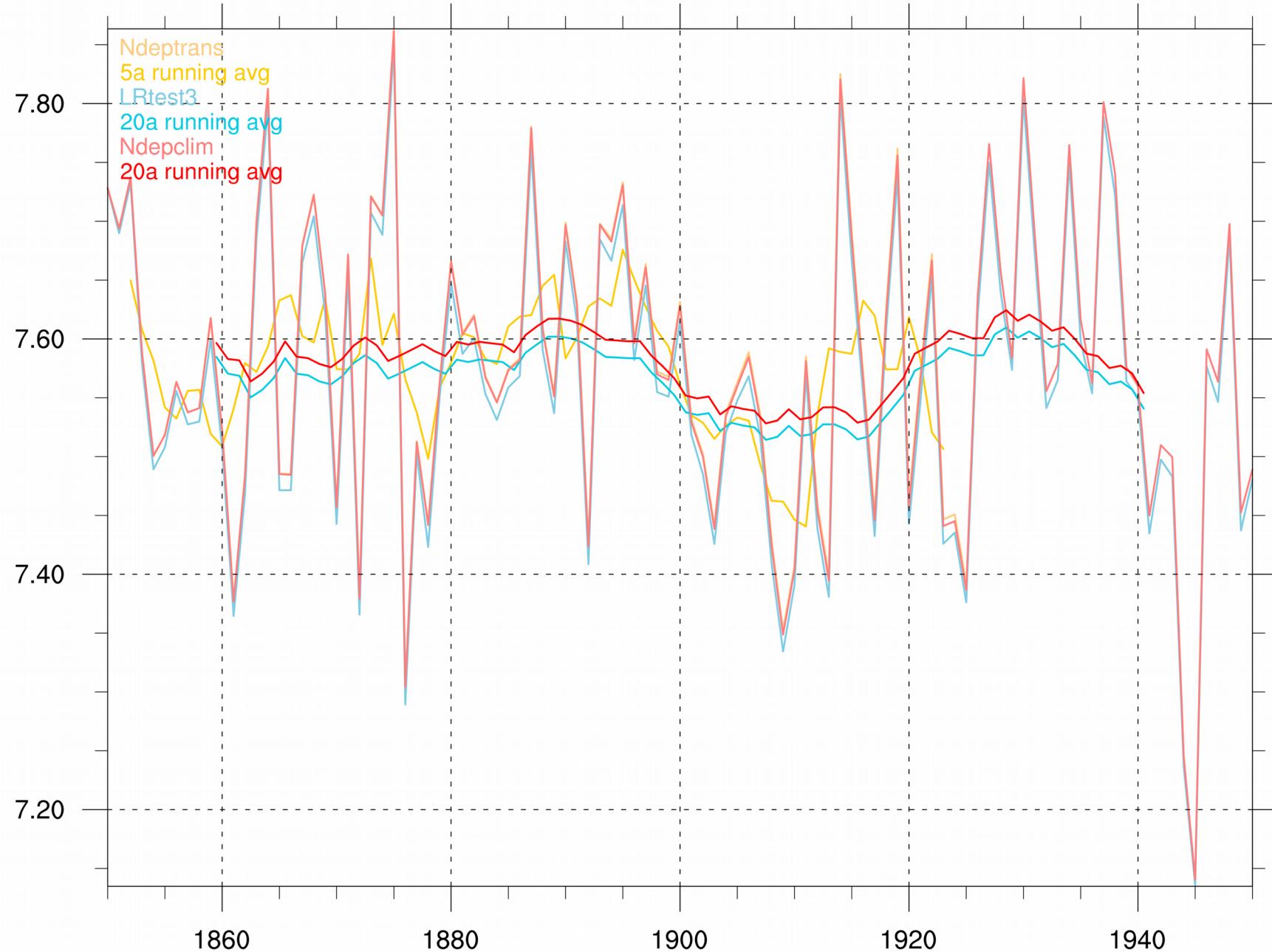
Global primary production [GtC yr-1]

(500)



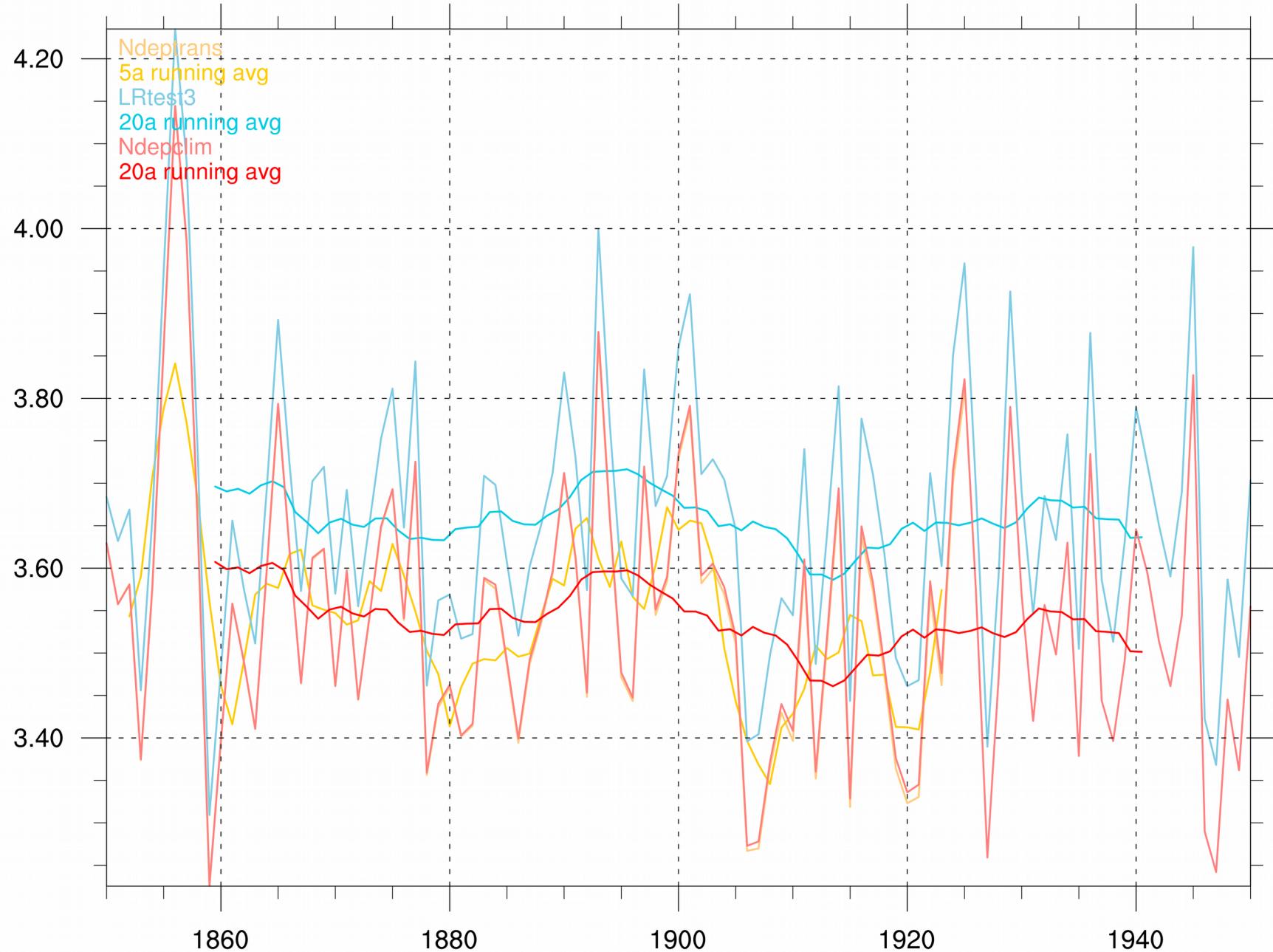
Global om export at 90m [GtC yr-1]

(502)



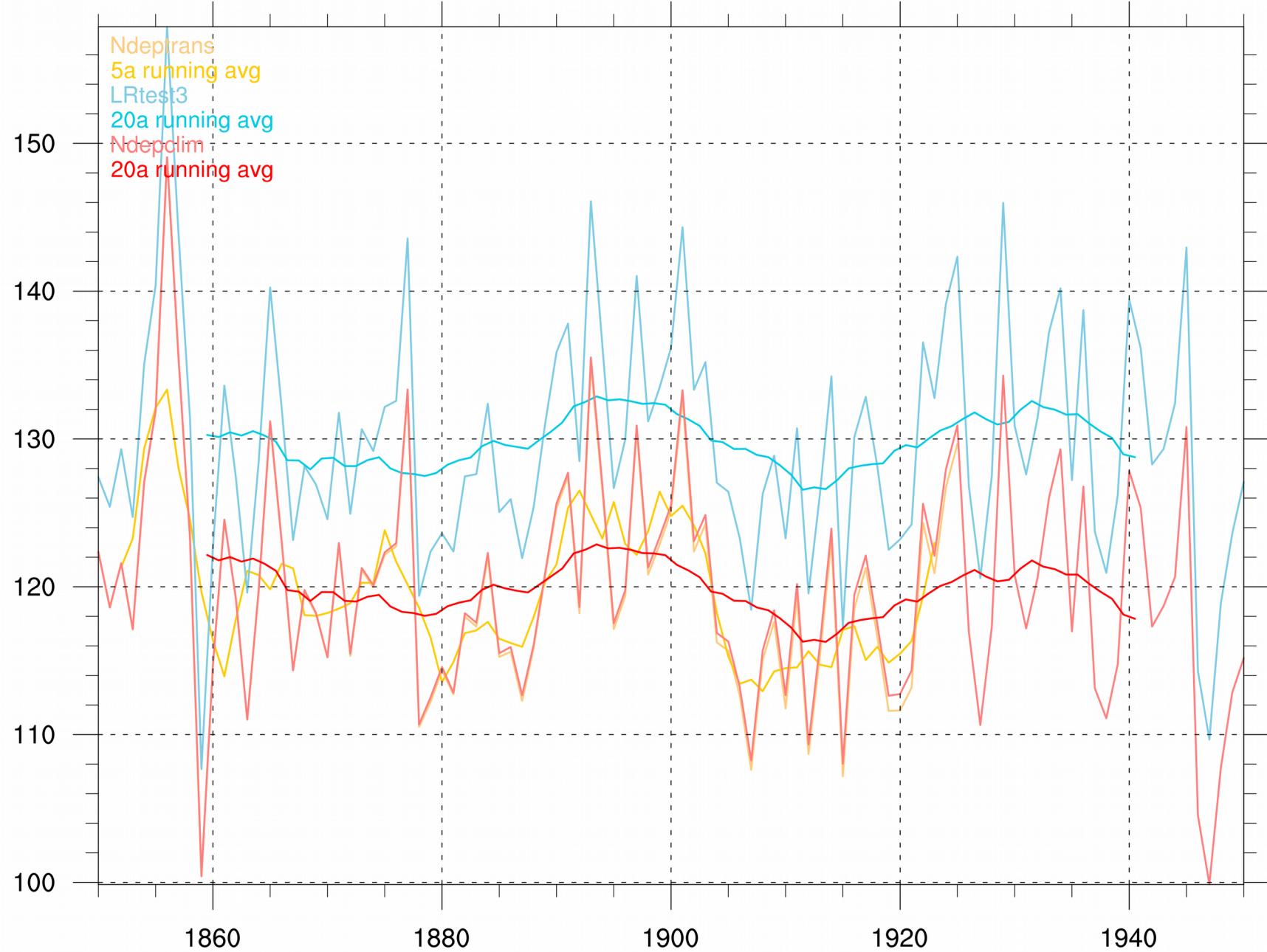
Global primary production cyano [GtC yr⁻¹]

(520)



N₂ fixation [TgN yr⁻¹]

(517)

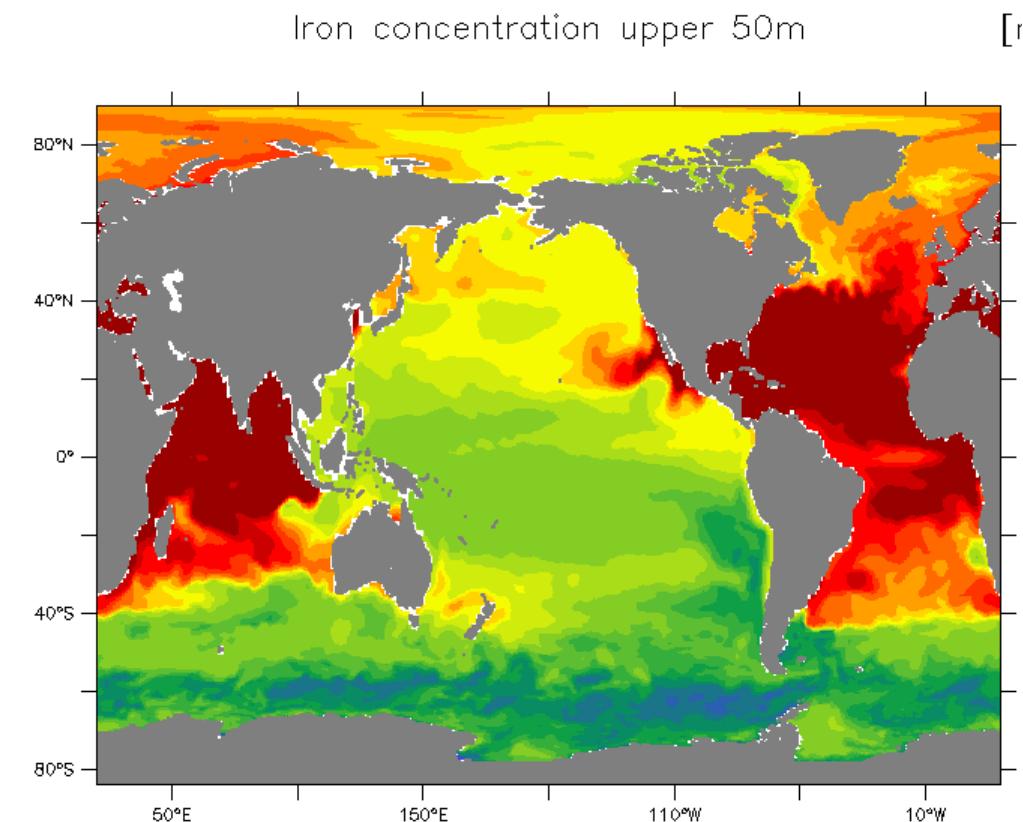
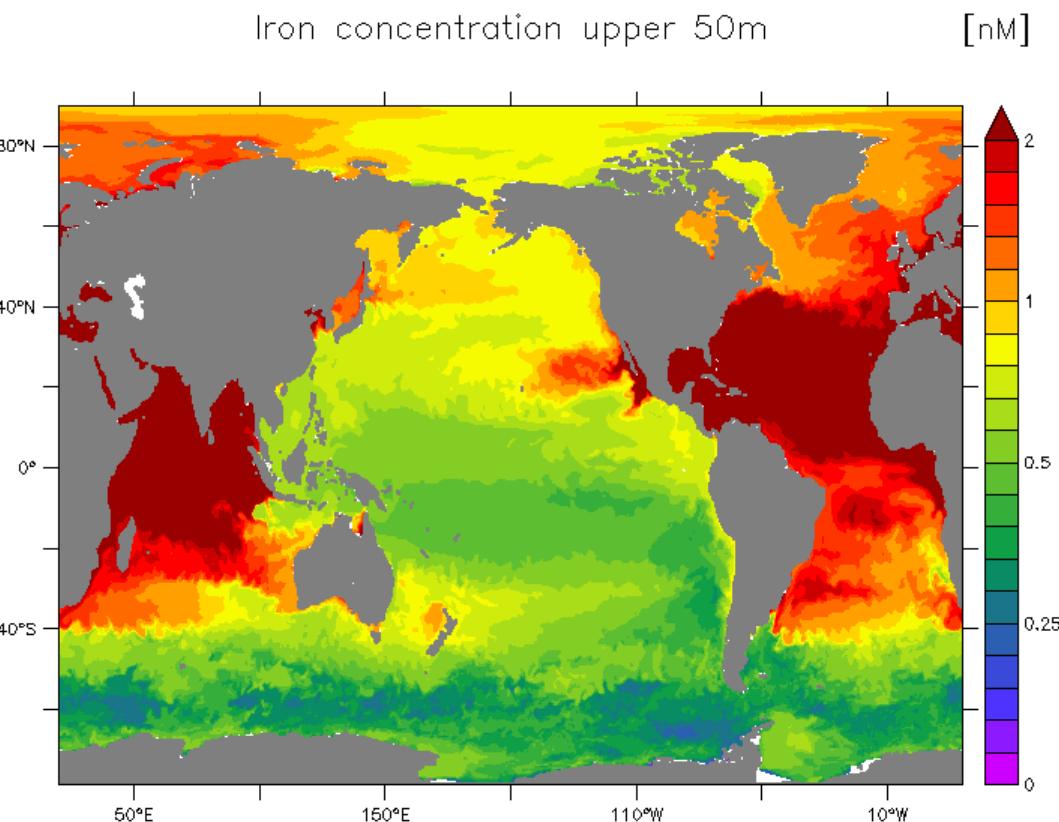


Iron surface concentrations

CMIP5 MR

(snapshot)

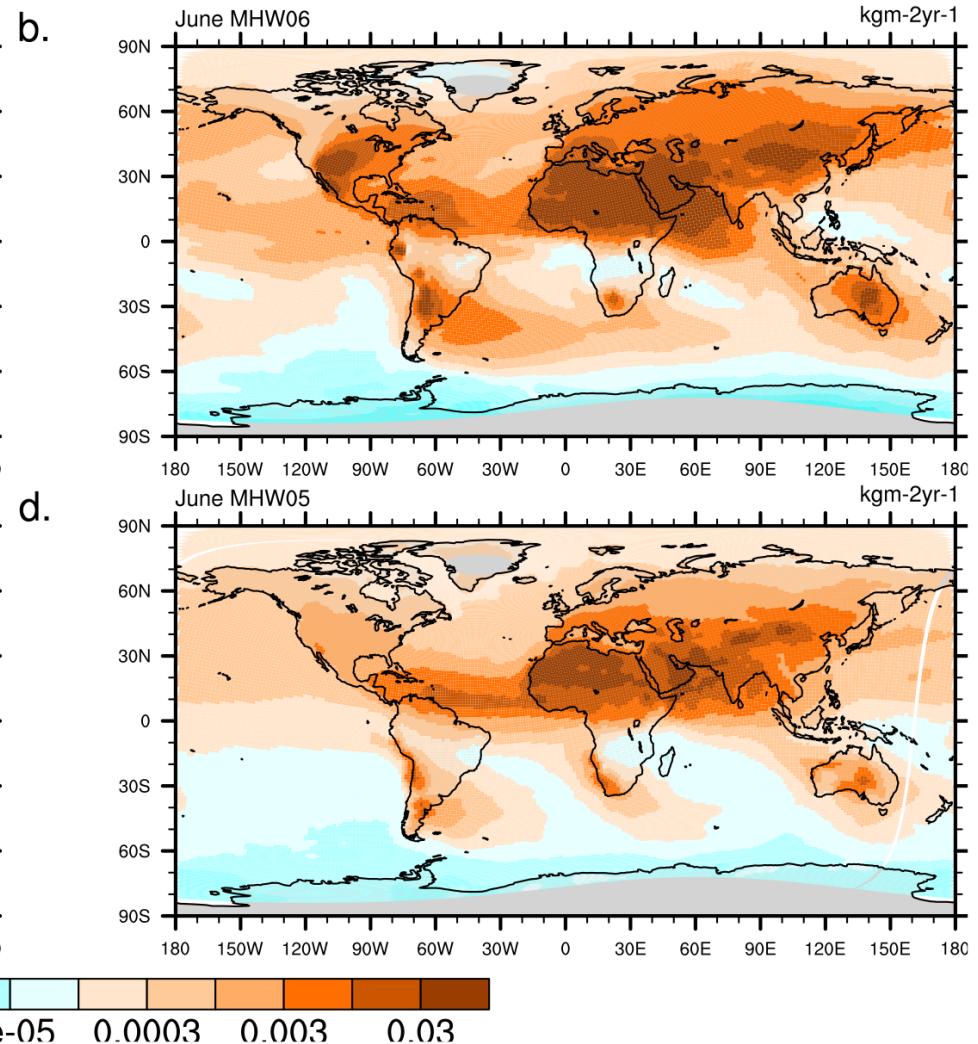
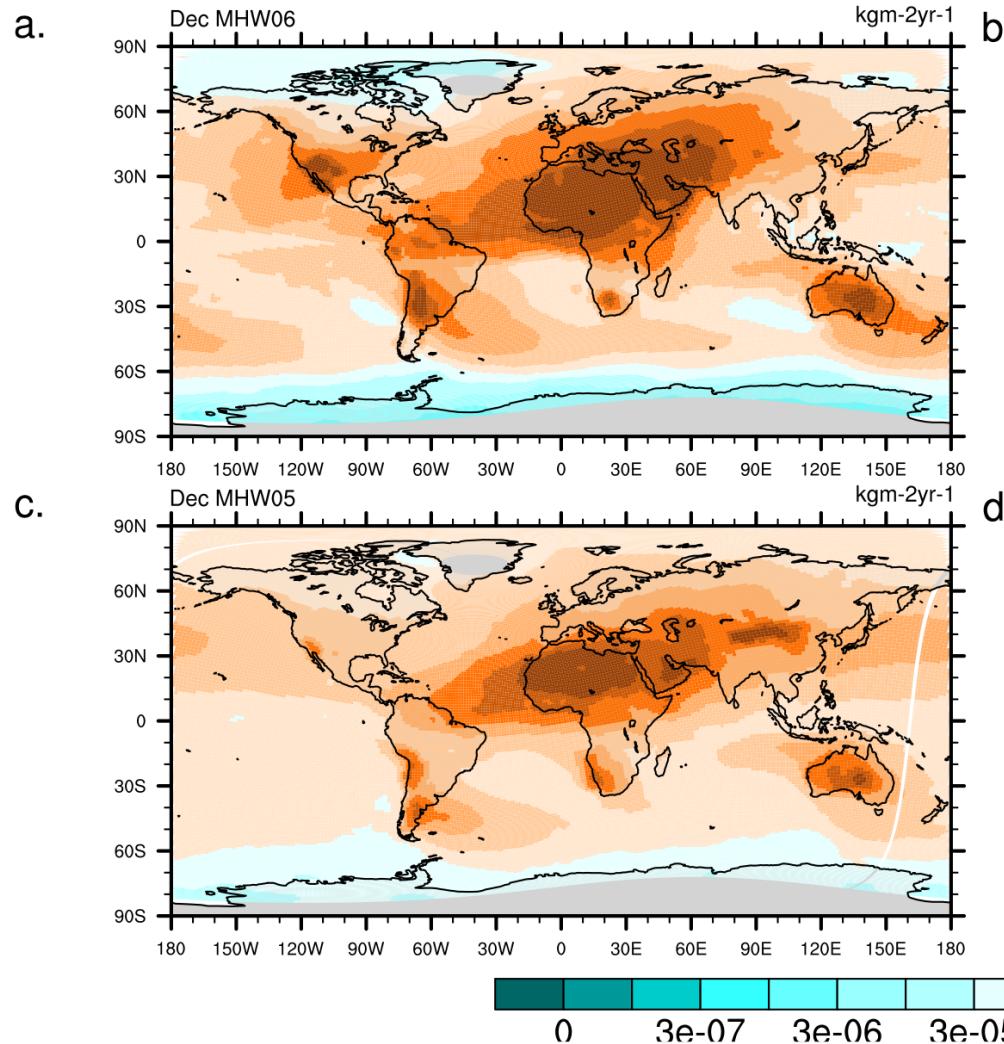
CMIP5-LR



Fe via dust depo

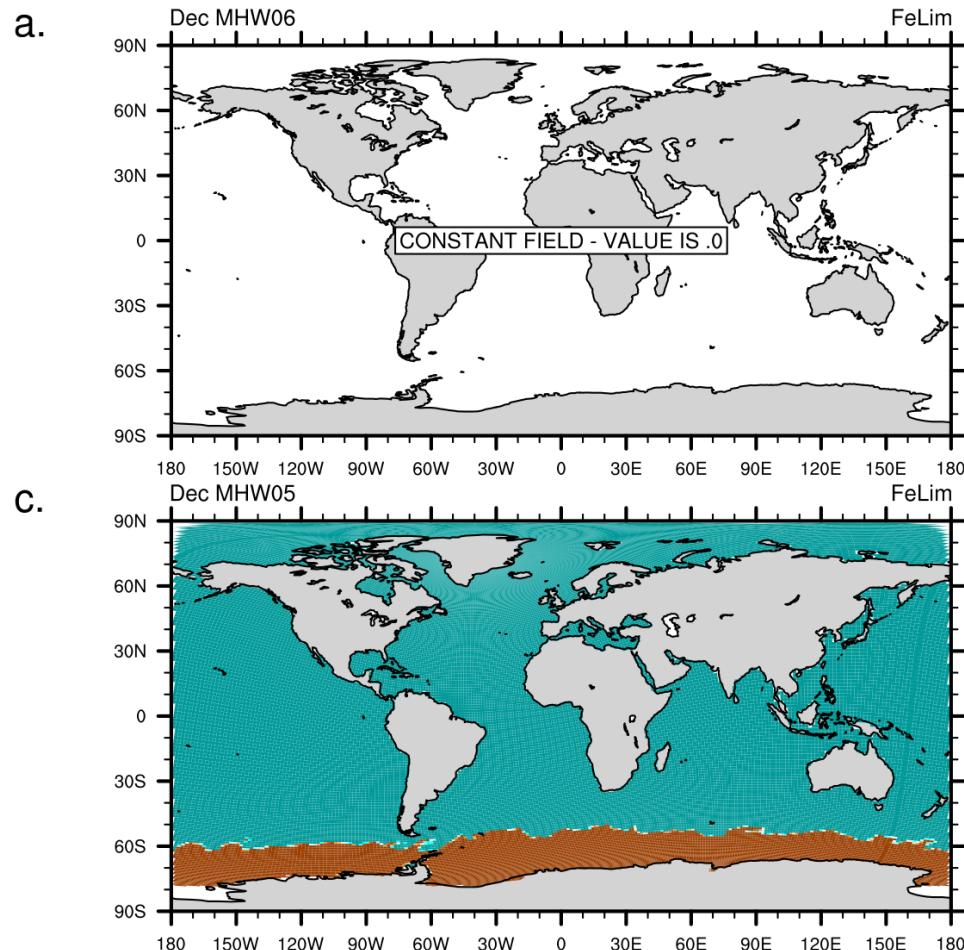
Mahowald 2006: 5.9 Gmol/yr (to ocean)

Maholwald 2005: 2.2 Gmol/yr

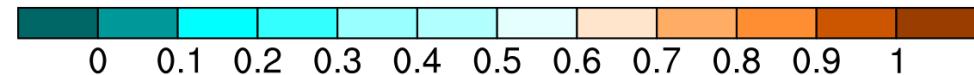
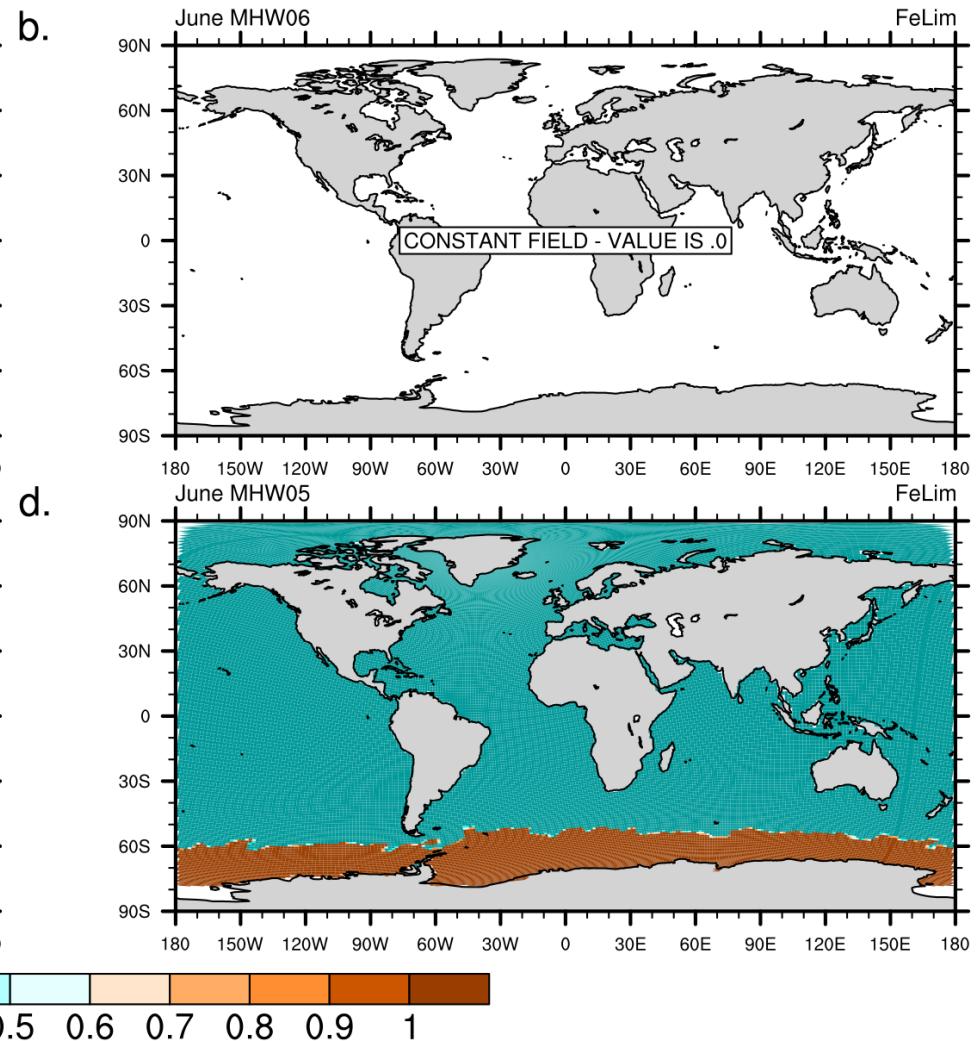


Iron limitation - LR

MHW06: 0.6nM ligands

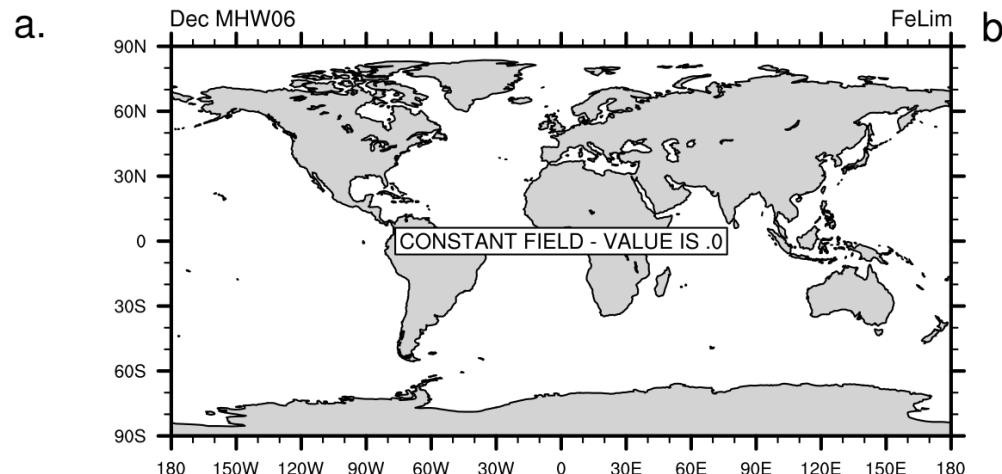


MHW05: 0.5nM ligands

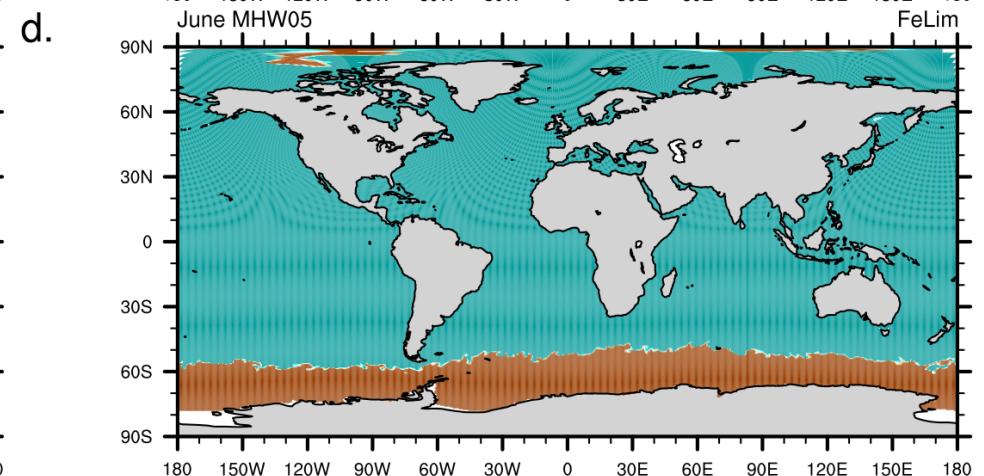
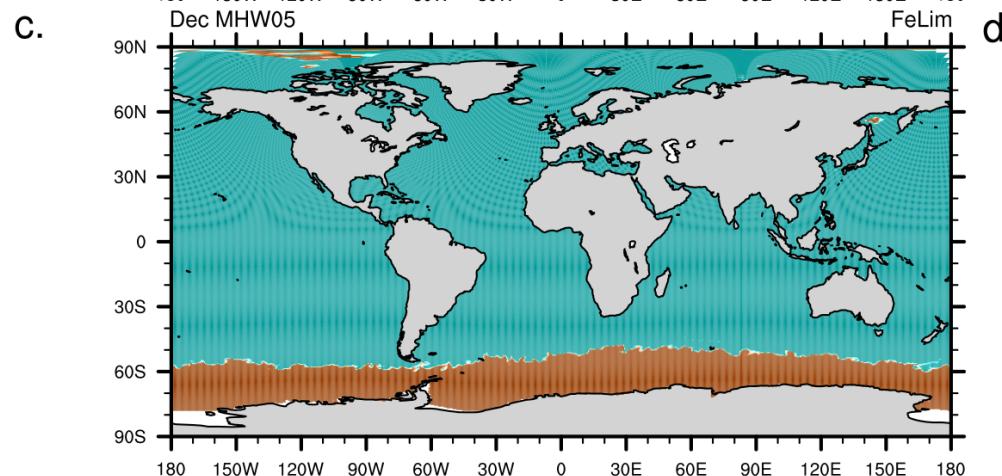
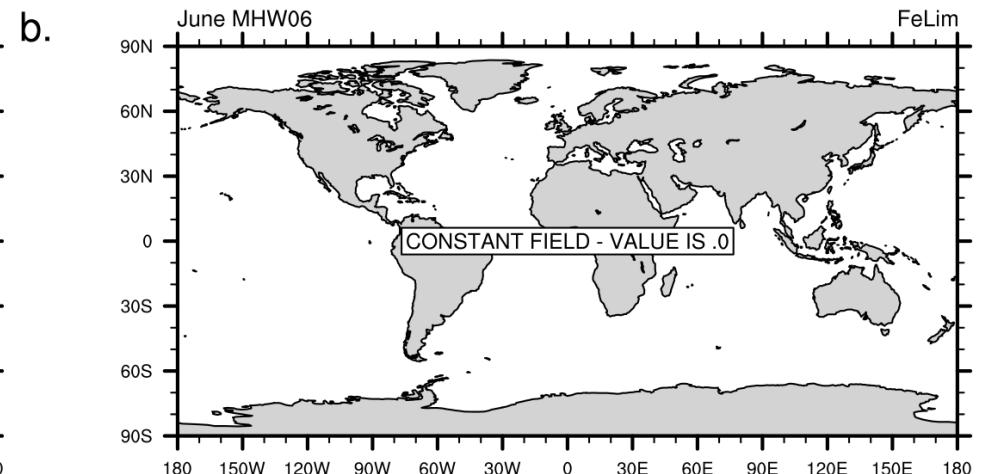


Iron limitation - HR

MHW06: 0.6nM ligands



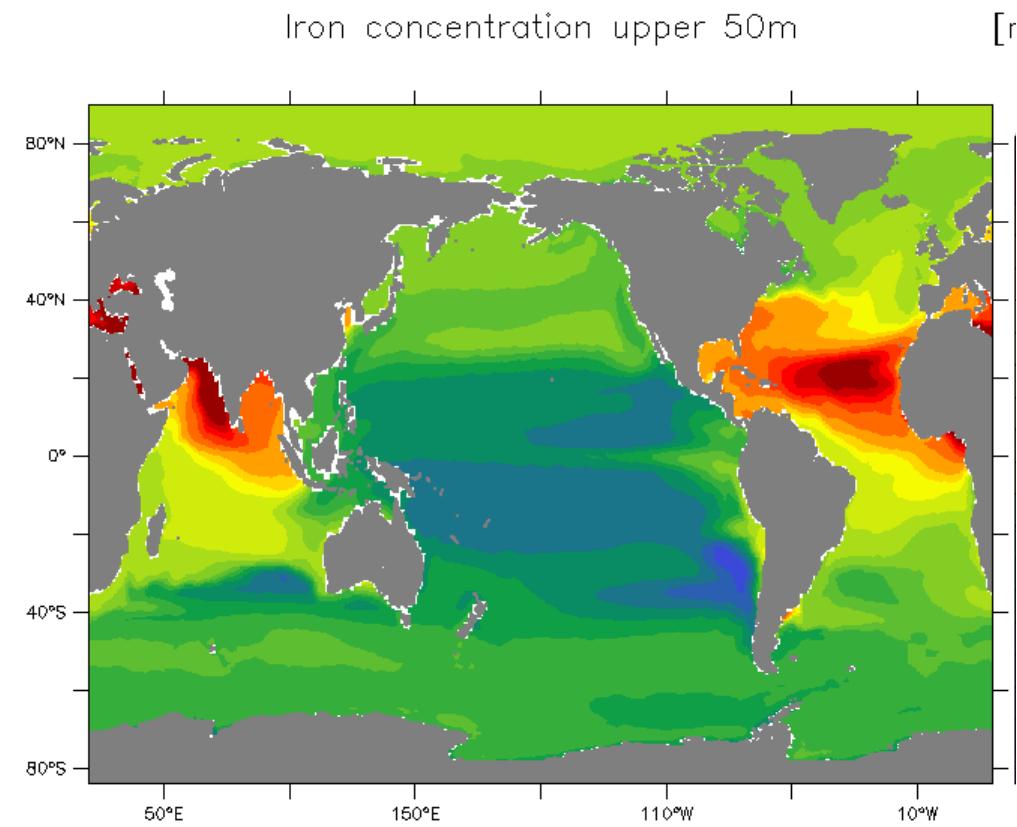
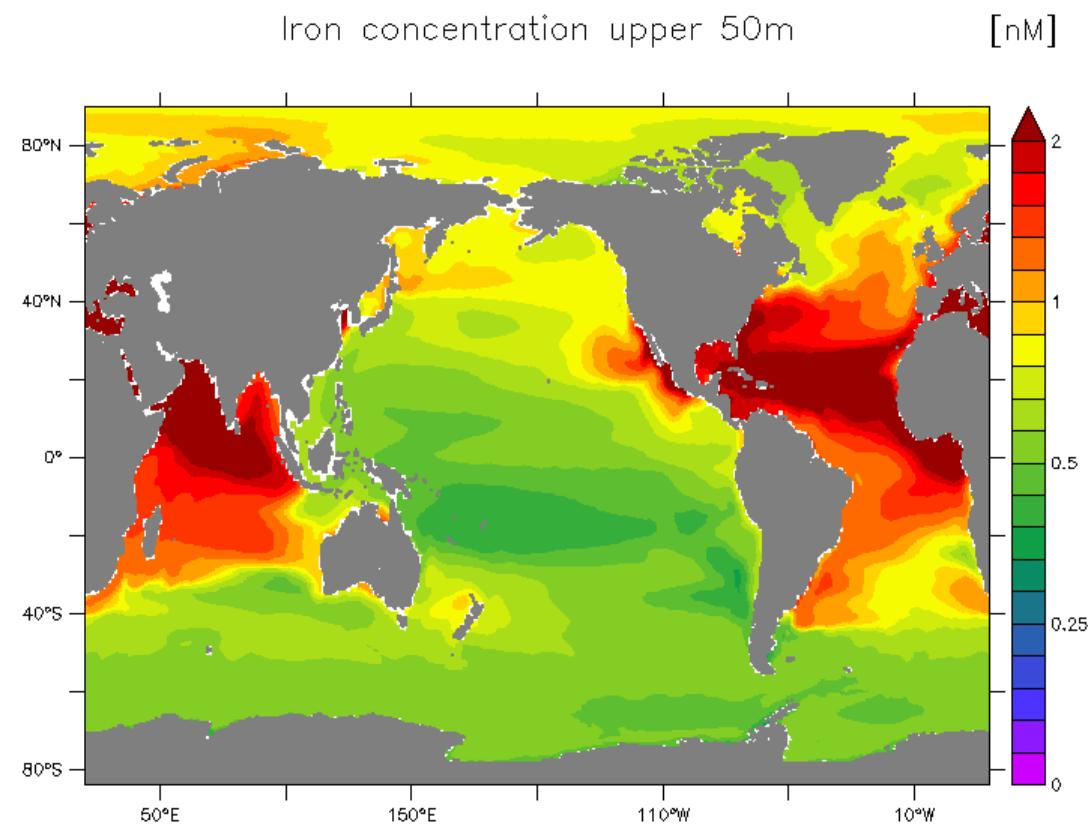
MHW05: 0.5nM ligands



Iron surface concentrations - LR

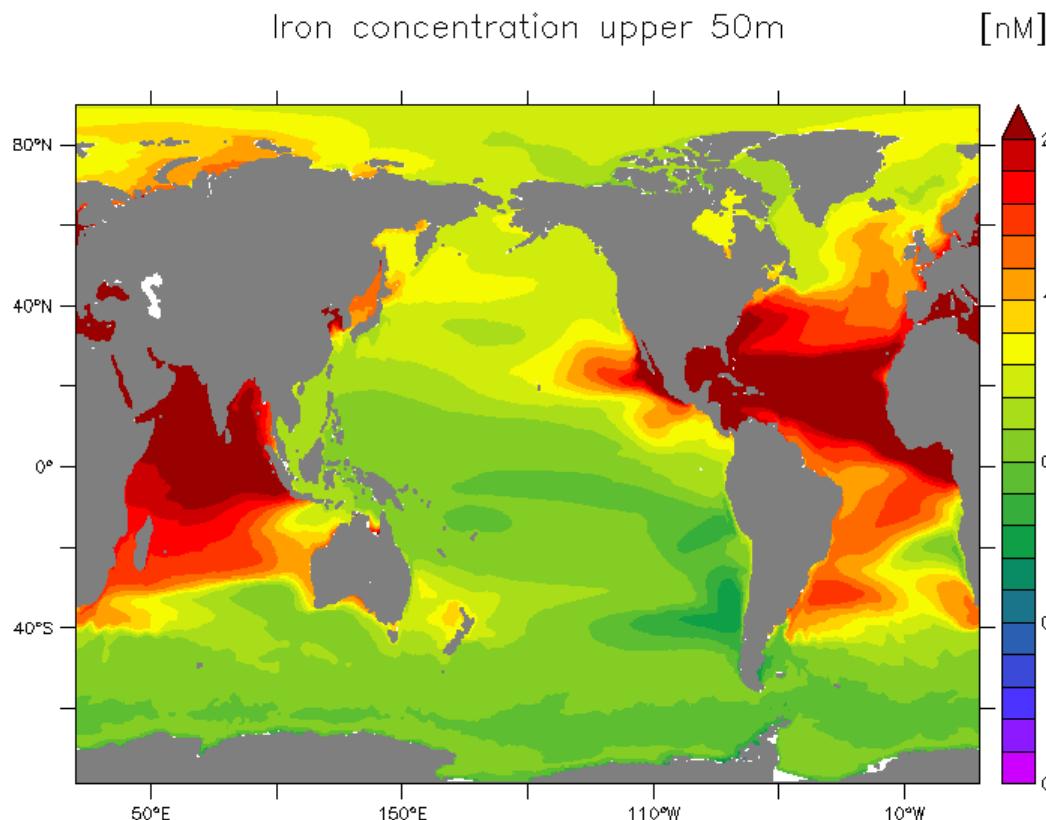
MHW06: 0.6nM ligands

MHW05: 0.5nM ligands

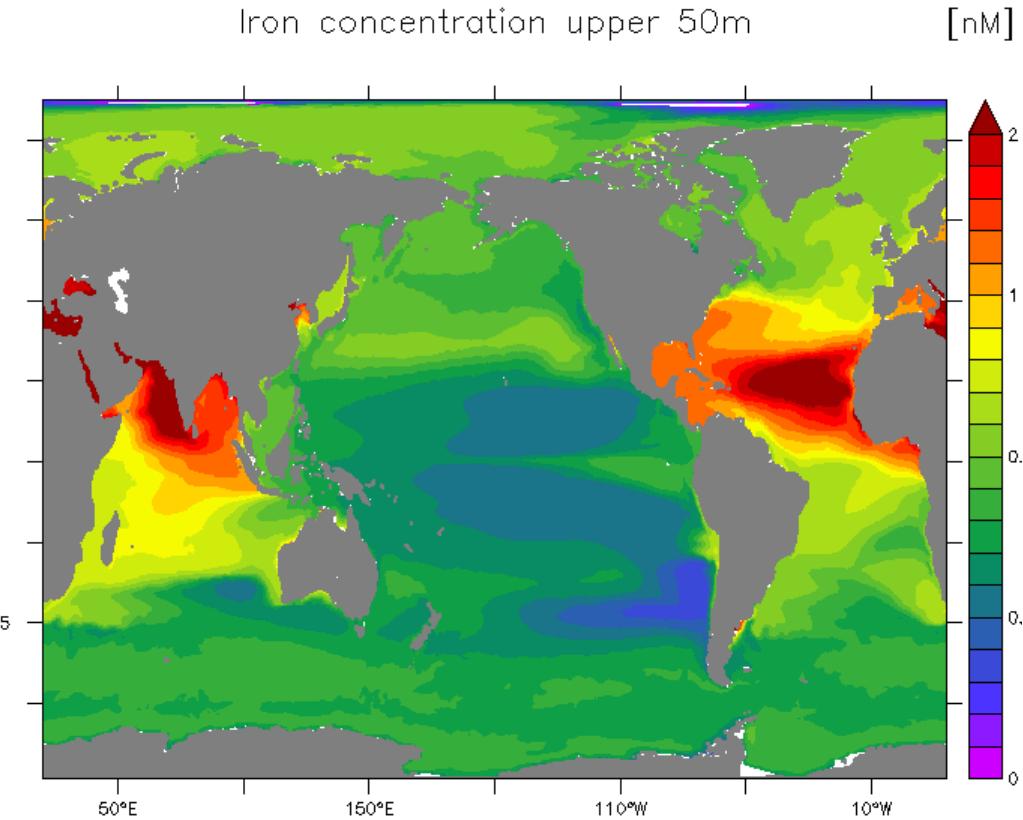


Iron surface concentrations - HR

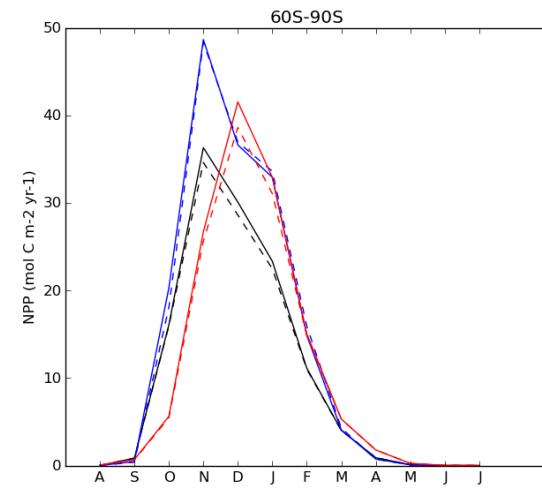
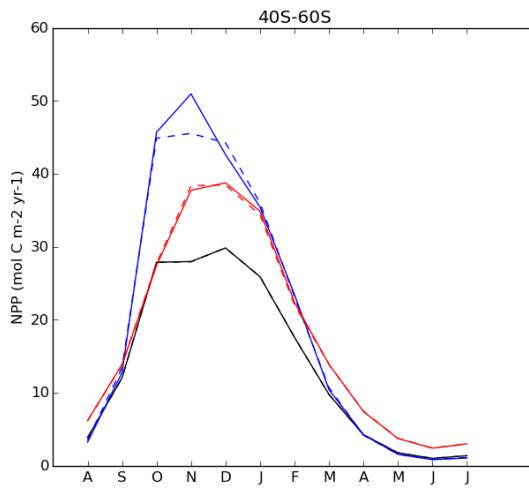
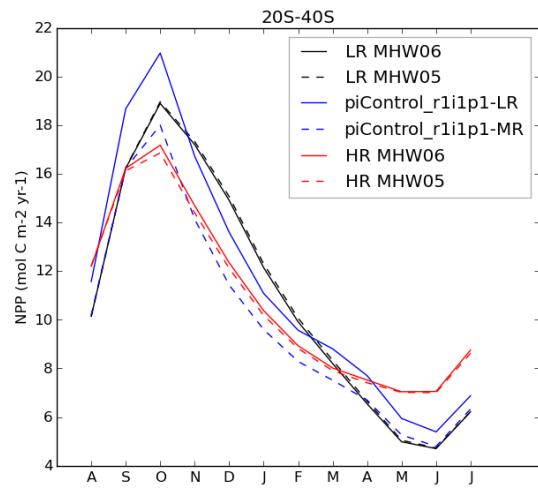
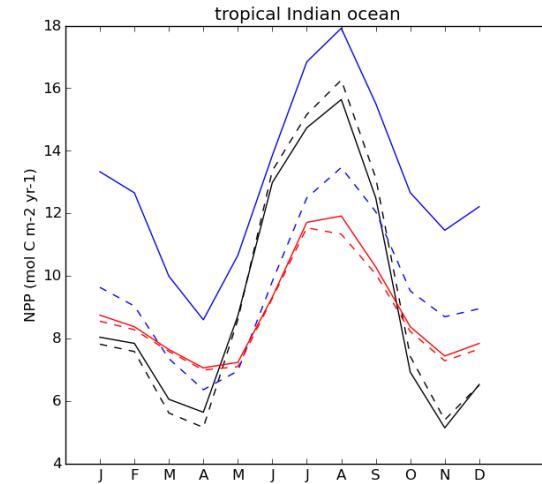
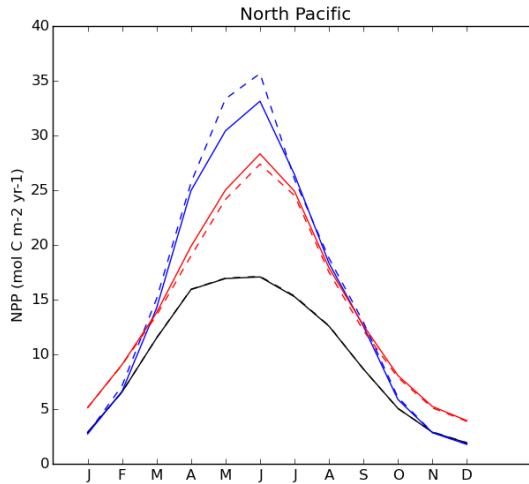
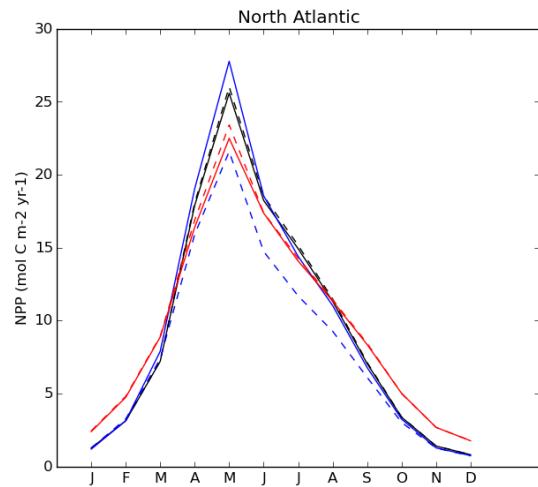
MHW06: 0.6nM ligands



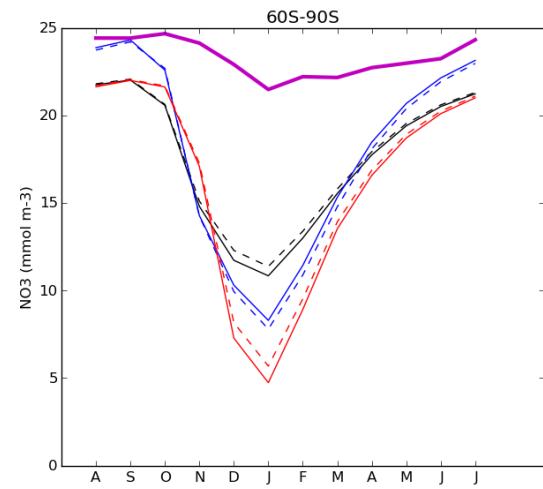
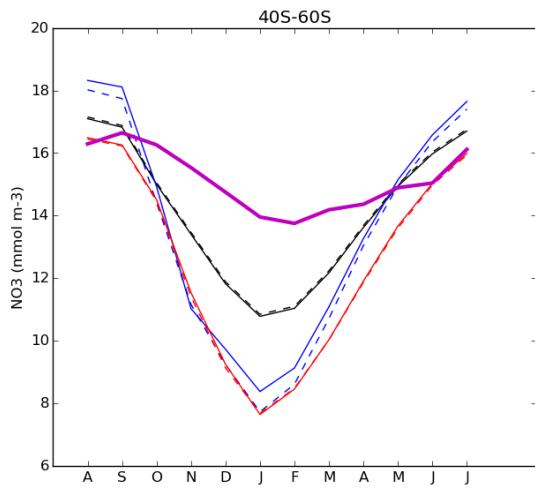
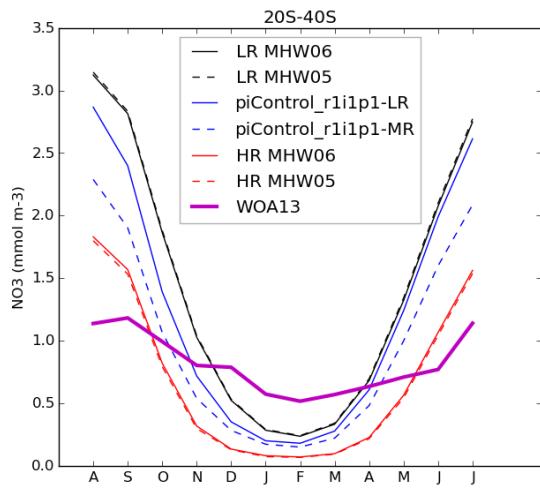
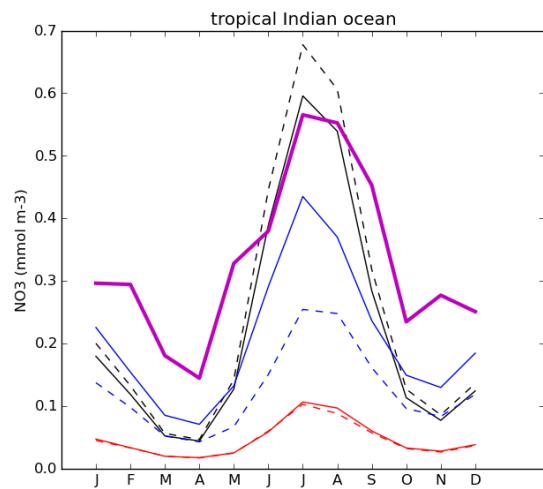
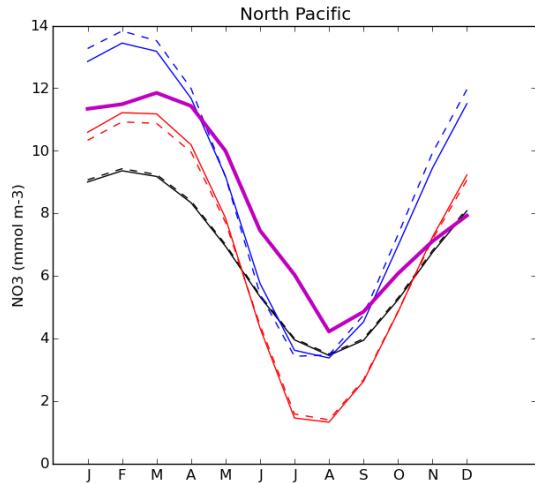
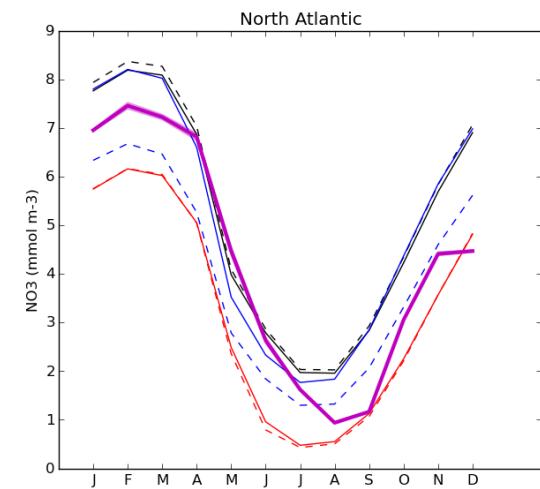
MHW05: 0.5nM ligands



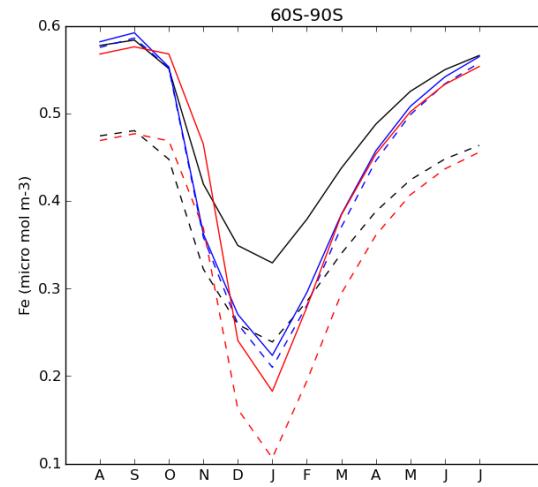
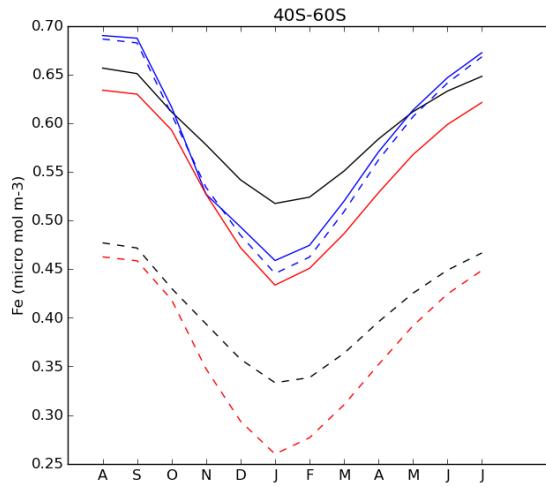
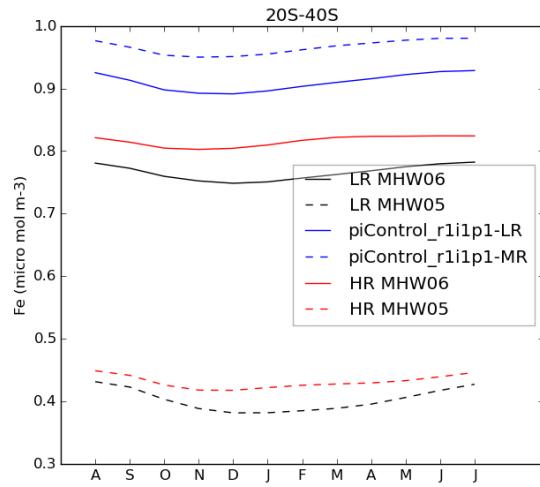
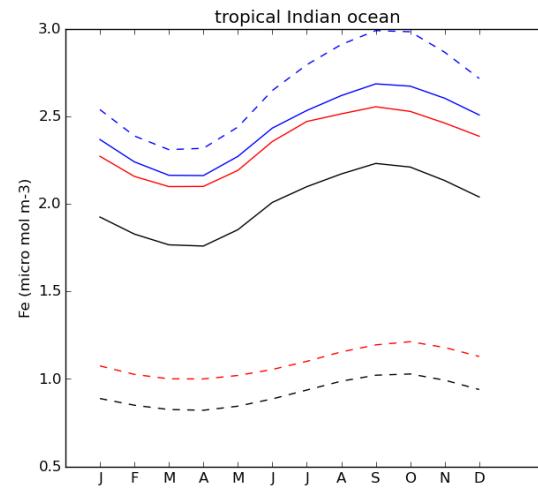
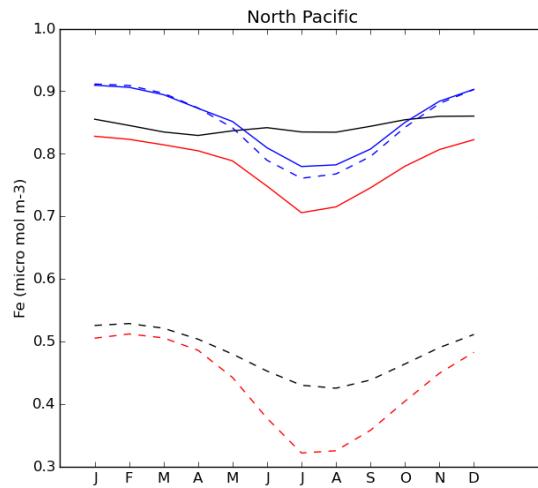
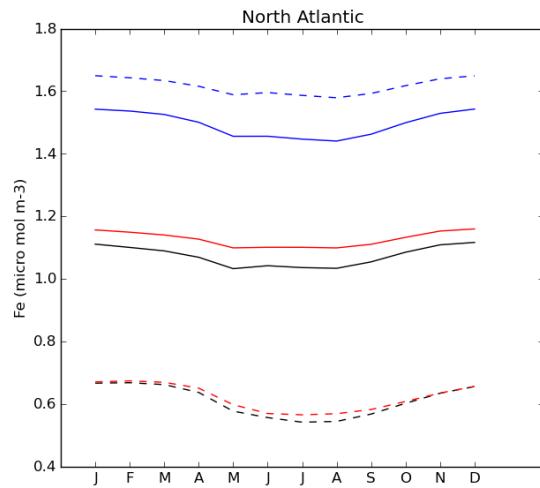
Primary productivity



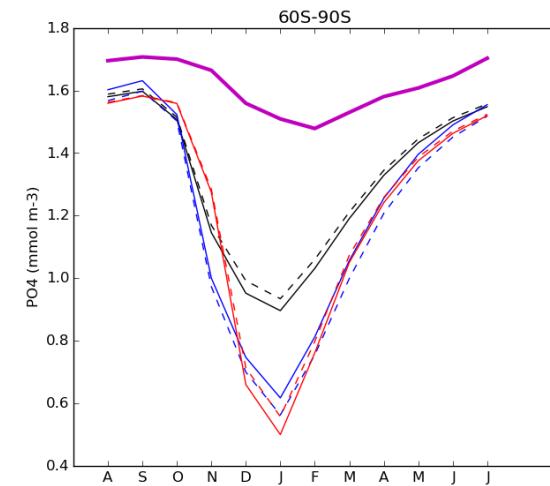
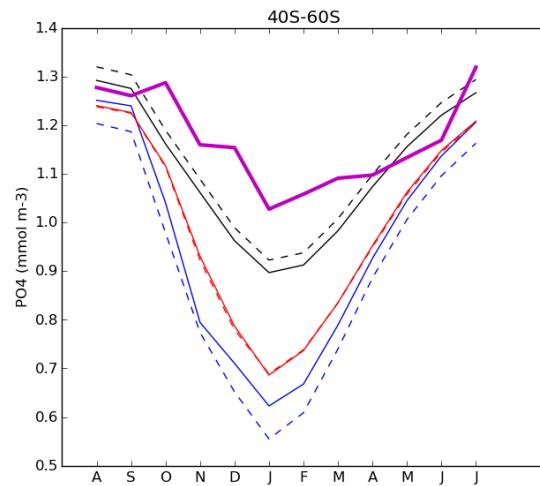
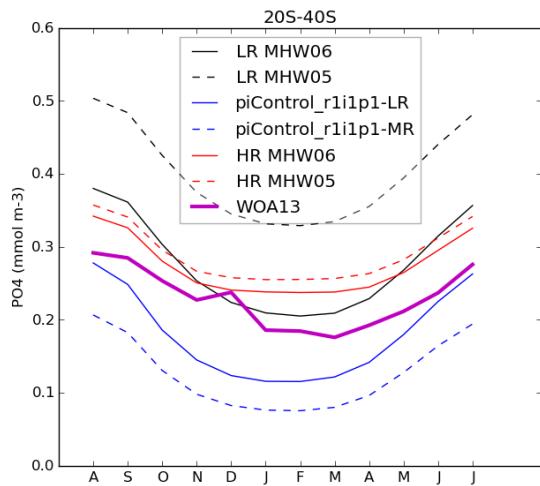
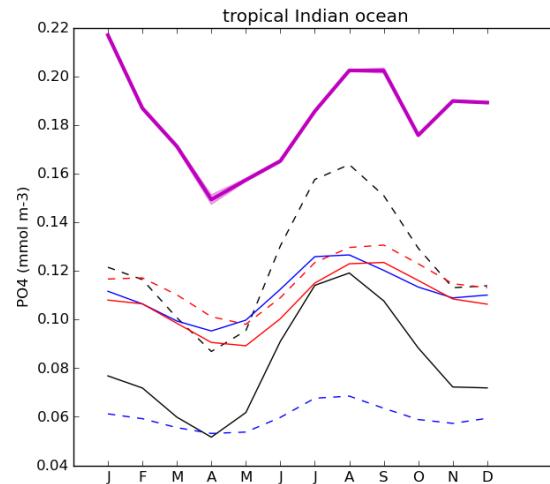
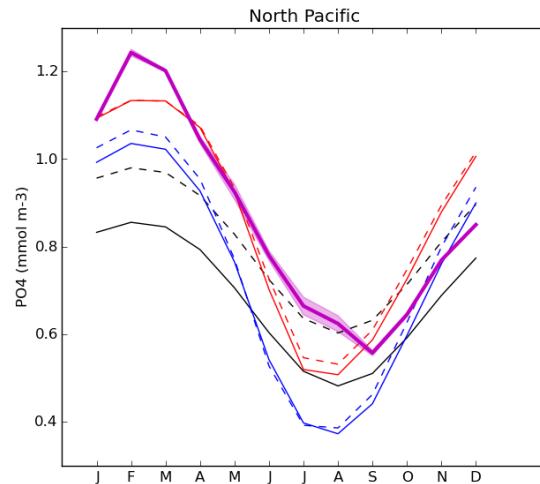
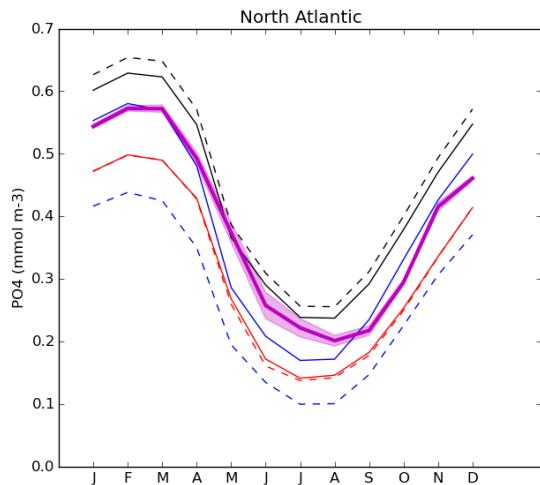
Nitrate



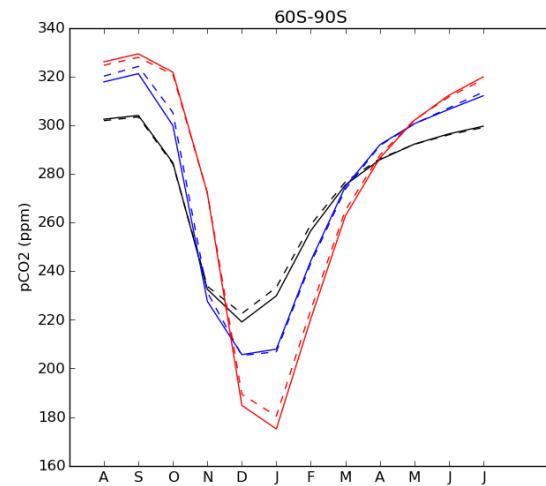
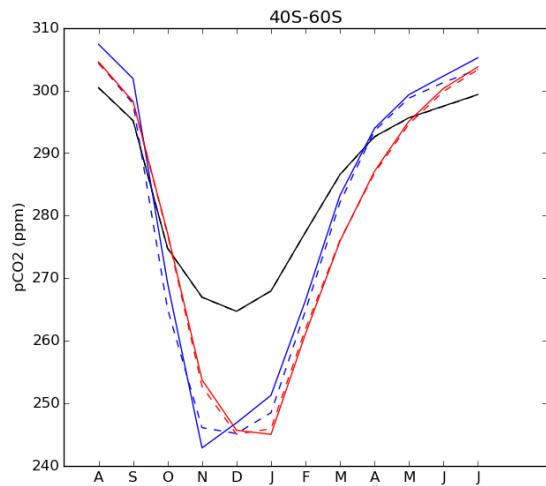
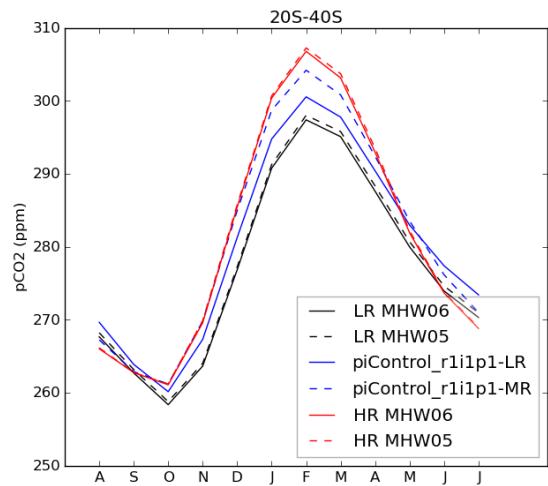
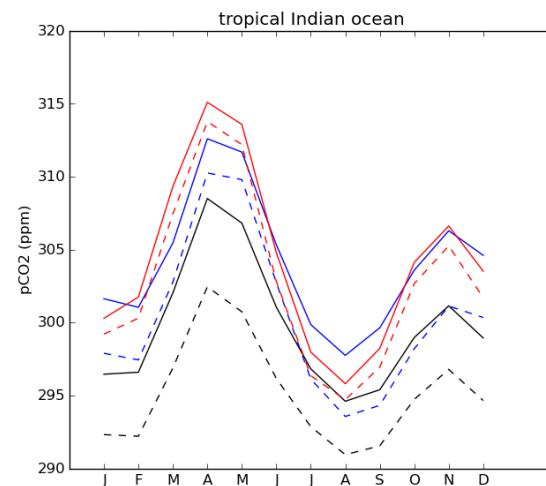
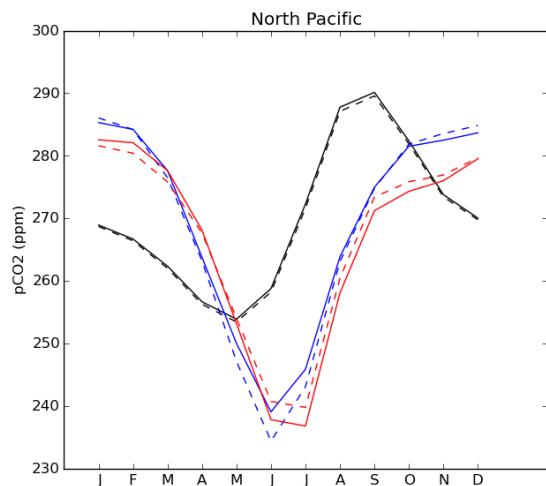
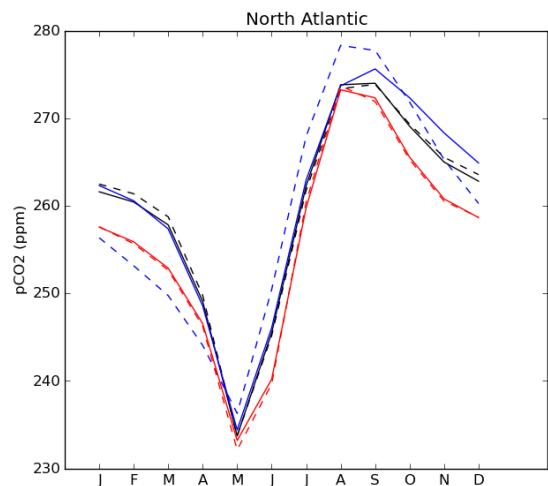
Iron



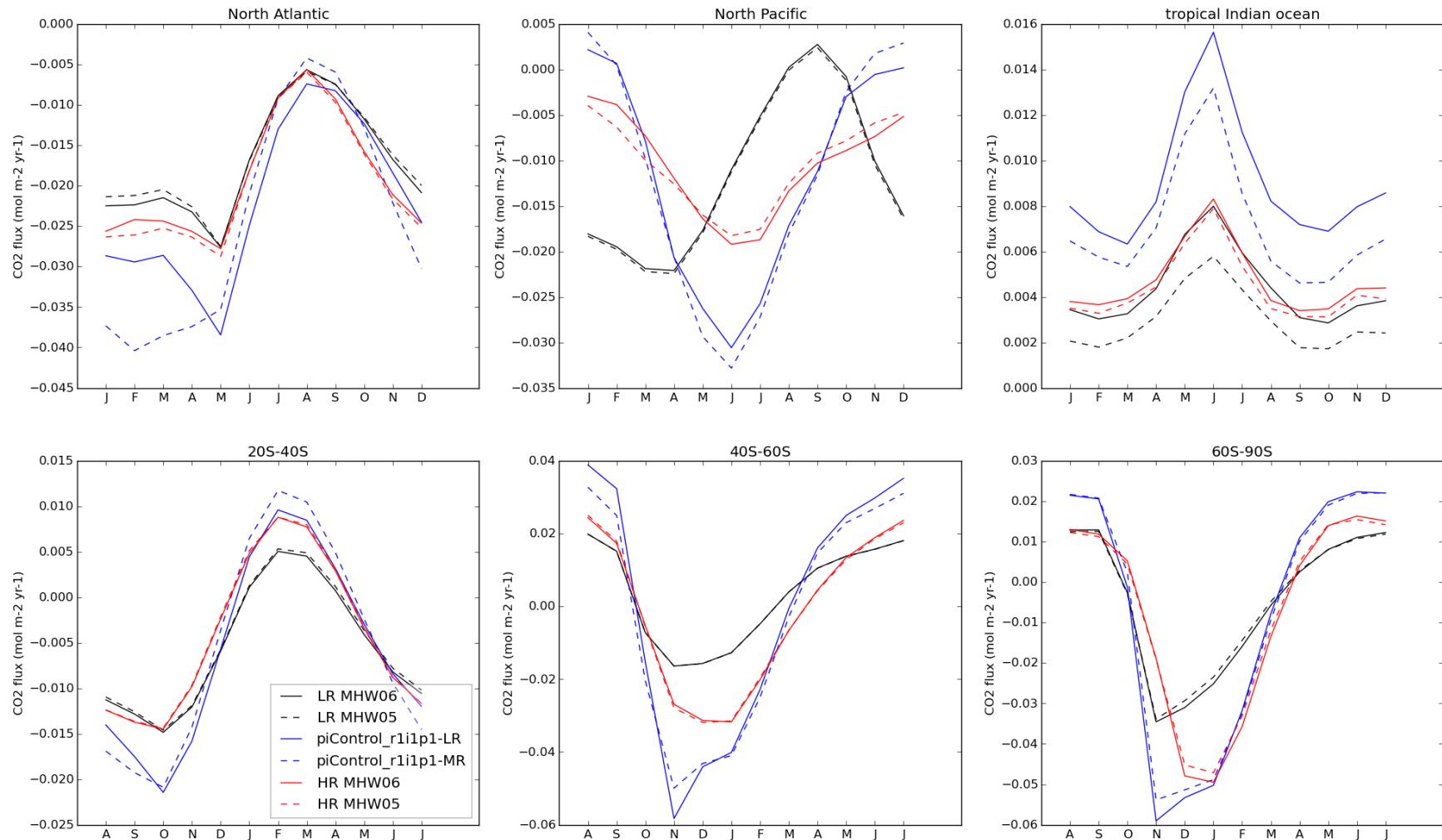
Phosphate



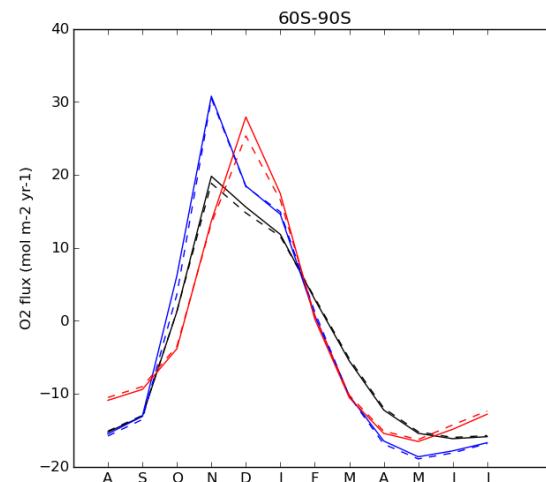
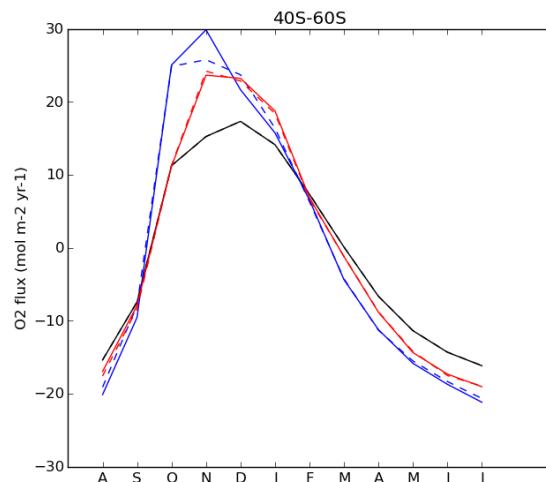
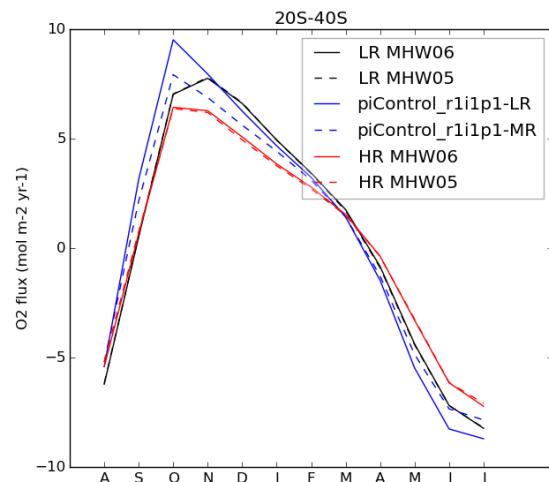
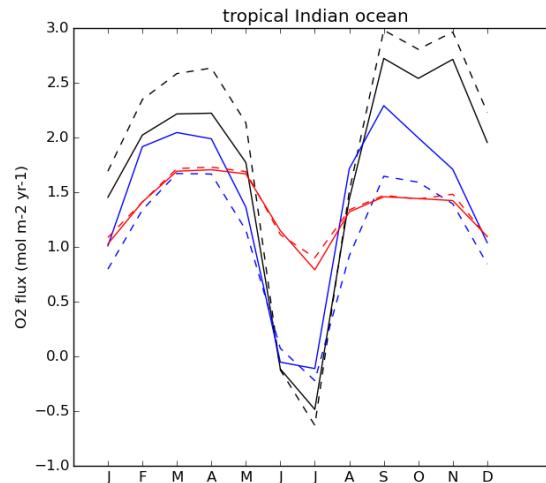
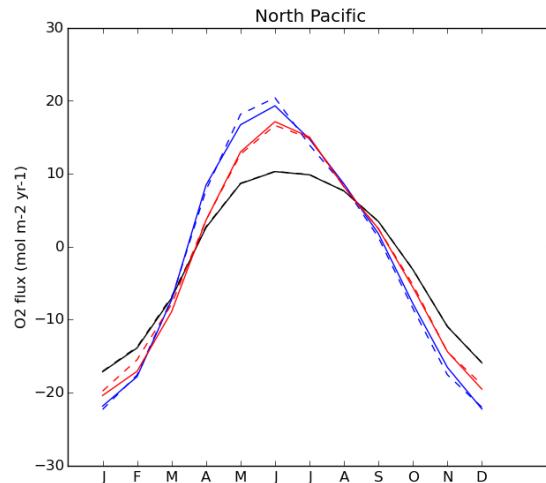
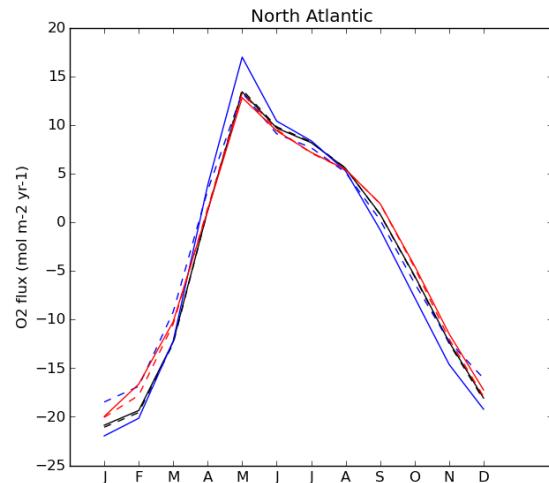
pCO₂



CO2flux

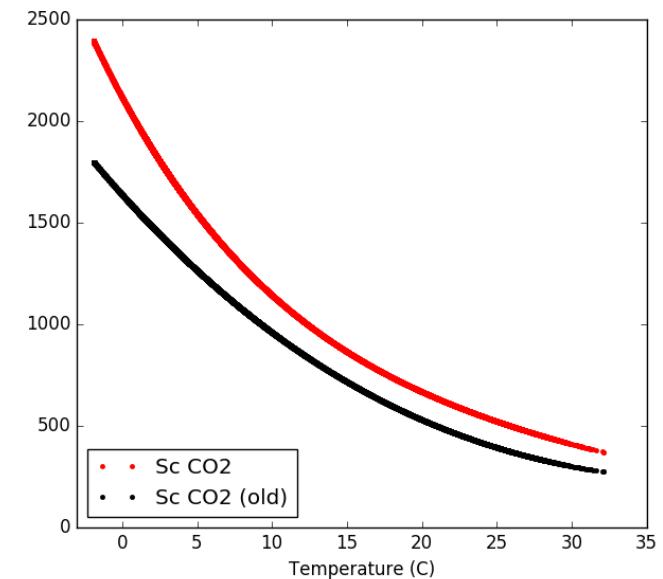
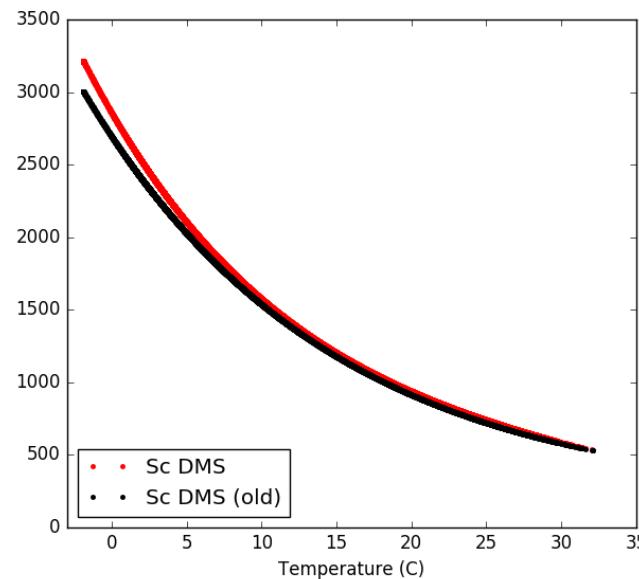
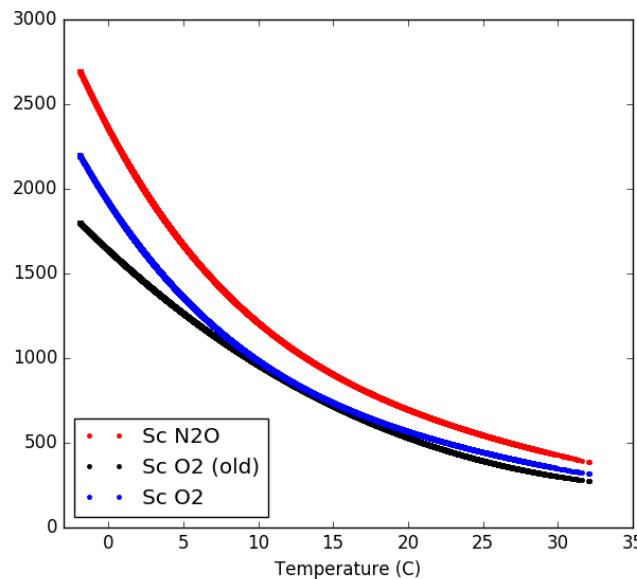


O2flux



Schmidt numbers, piston velocity

updated Schmidt numbers for: CO₂, O₂, N₂O, DMS (Wanninkhof'14)



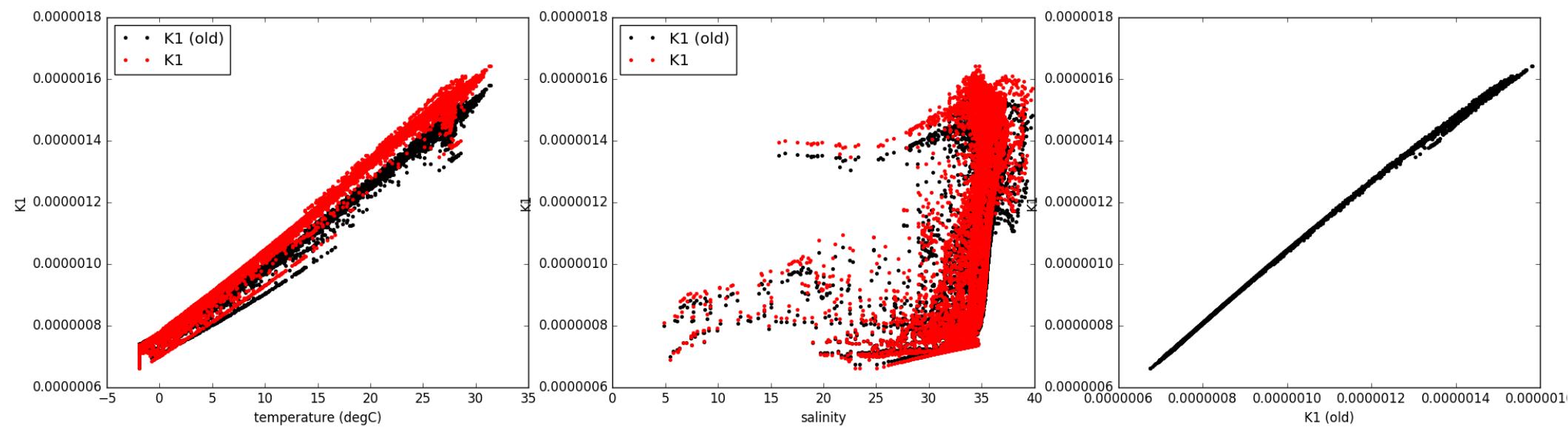
piston velocity:

Wanninkhof'14 : a=0.251
Wanninkhof'92 : a=0.337

$$kw = a \sqrt{\frac{Sc}{660}} u^2 (1 - f_i)$$

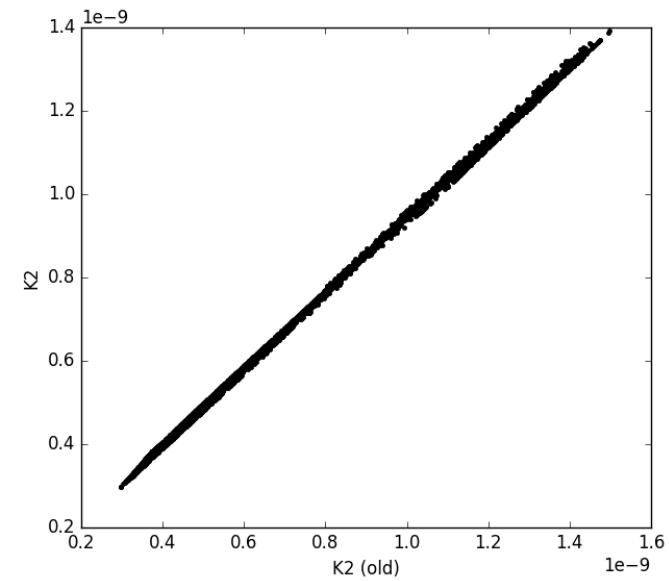
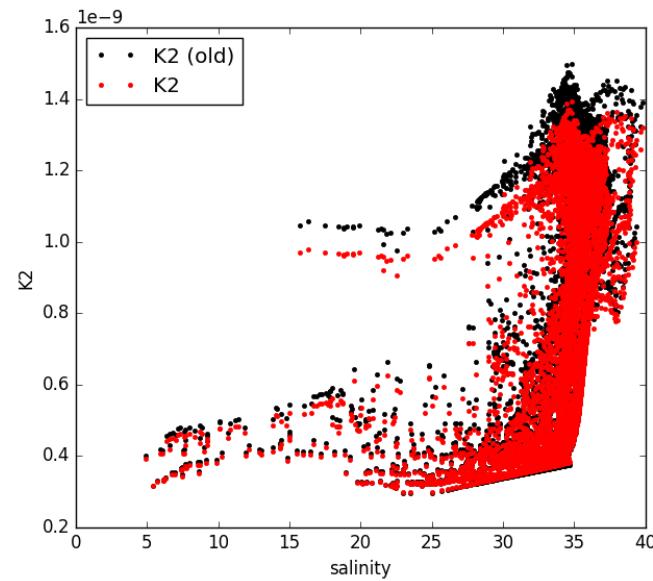
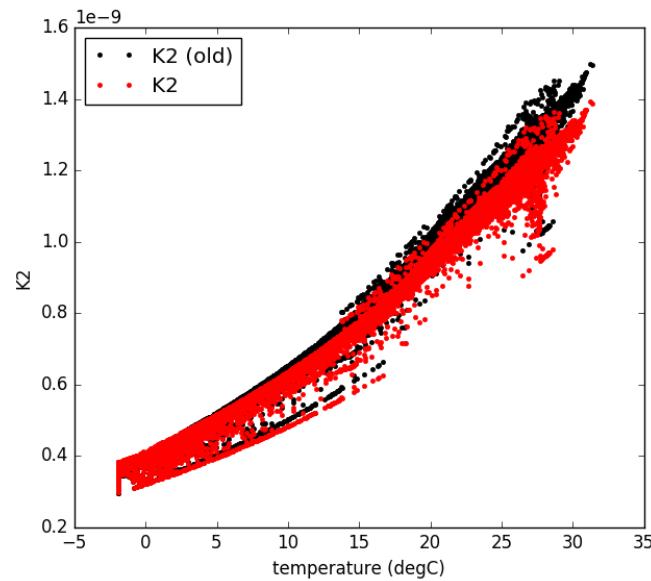
Carbon chemistry

updated equilibrium constants **K1**, **K2** (Luecker 2000), **Kw** (Millero1995)



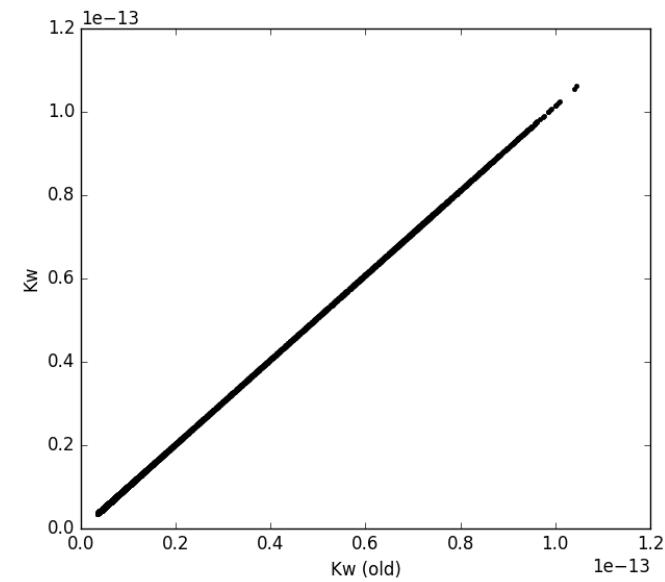
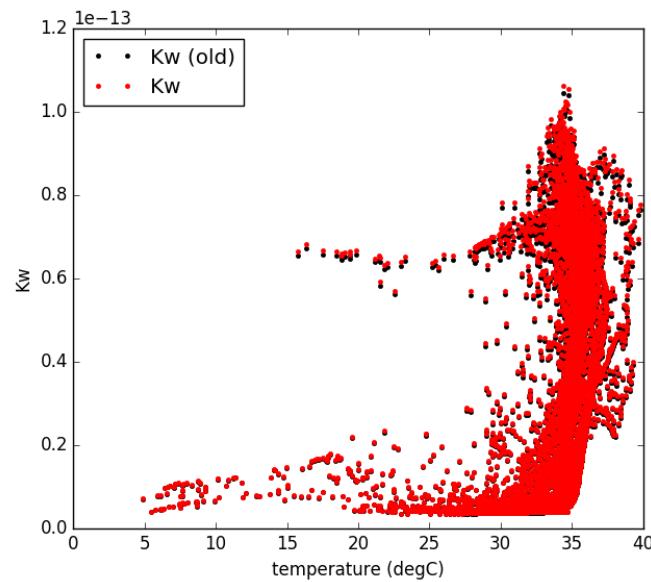
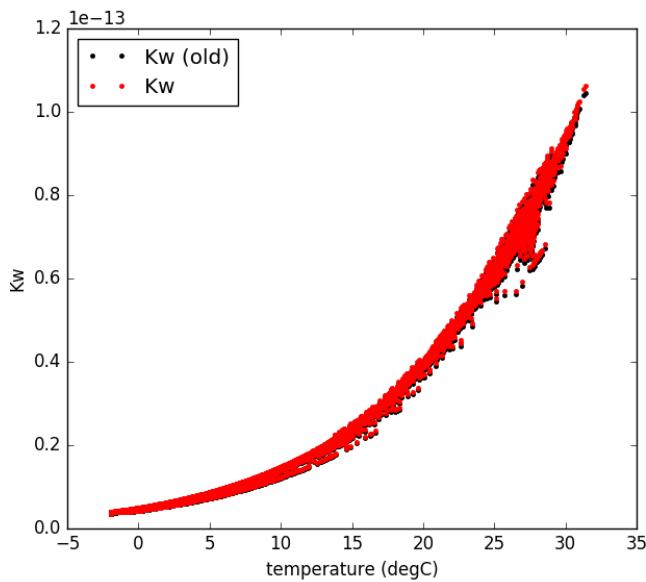
Carbon chemistry

updated equilibrium constants K1, **K2** (Luecker 2000), Kw (Millero1995)



Carbon chemistry

updated equilibrium constants K1, K2 (Luecker 2000), Kw (Millero1995)



consider: phosphoric, silicic acid in alk, convert all to total scale