

Sprinter 10

Phytoplankton community structure from ocean colour: methods, validation, intercomparison and application

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Why we want PFTs?

An Earth-system perspective of the global nitrogen cycle

Nicolas Gruber & James N. Galloway

With humans having an increasing impact on the planet, the interactions between the nitrogen cycle, the carbon cycle and climate are expected to become an increasingly important determinant of the Earth system.

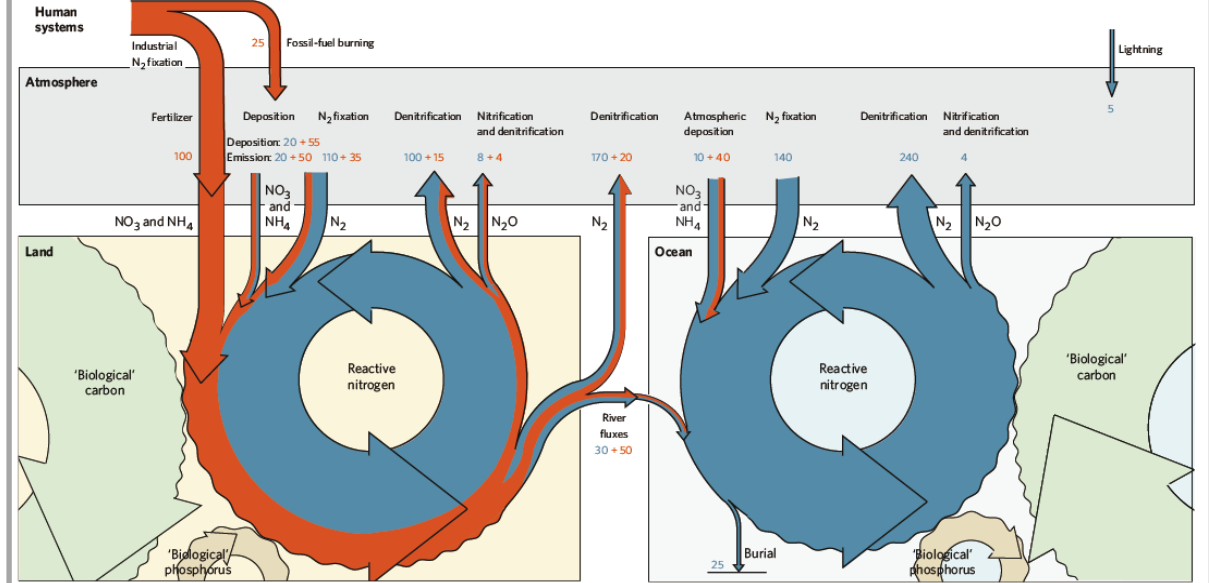
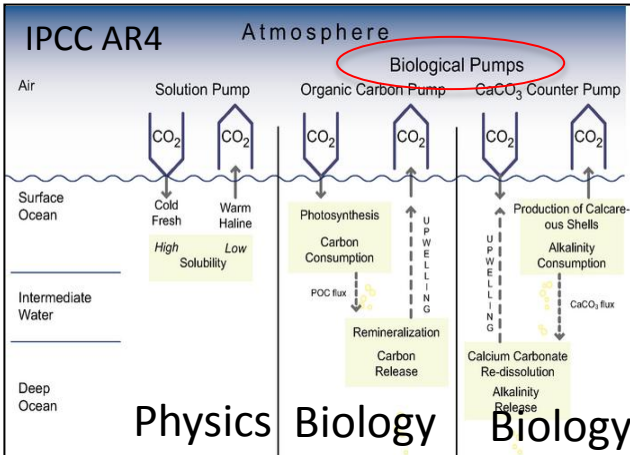


Figure 1 | Depiction of the global nitrogen cycle on land and in the ocean. Major processes that transform molecular nitrogen into reactive nitrogen, and back, are shown. Also shown is the tight coupling between the nitrogen cycles on land and in the ocean with those of carbon and

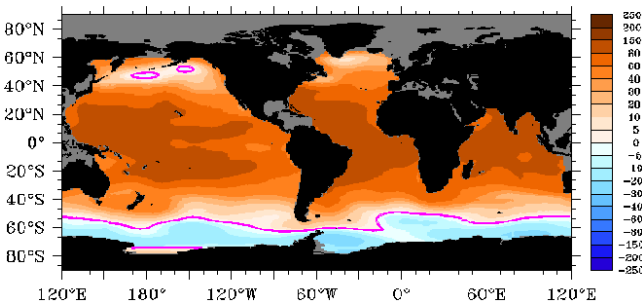
phosphorus. Blue fluxes denote 'natural' (unperturbed) fluxes; orange fluxes denote anthropogenic perturbation. The numbers (in Tg N per year) are values for the 1990s (refs 13, 21). Few of these flux estimates are known to better than +20%, and many have uncertainties of +50% and larger.^{13,21}



e.g) Coccolithophores

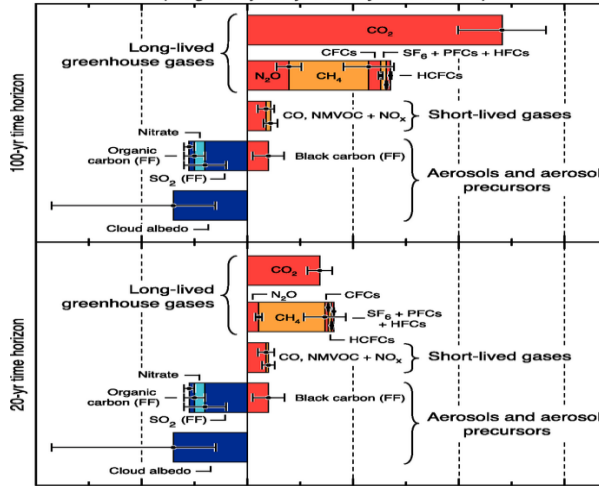
Orr et al., 2005

Year 2009



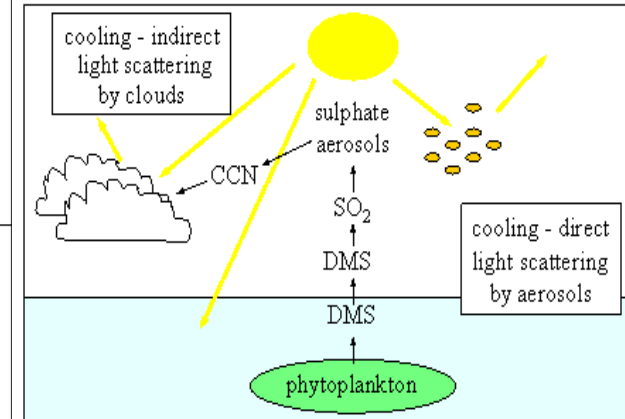
Also, Ca-fixers may be vulnerable to the ocean acidification, in such a case their change can be used to infer impact of the acidification on marine ecosystems

Integrated Radiative Forcing for Year 2000 Global Emissions (Weighted by 100-yr and 20-yr time horizons)



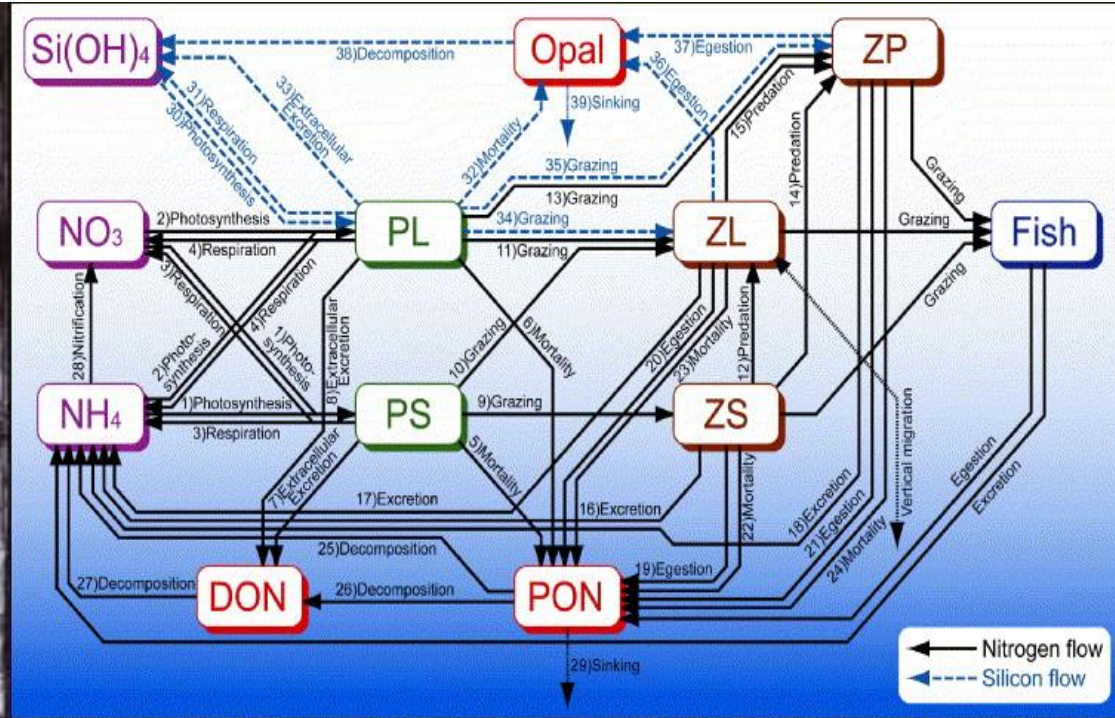
IPCC AR4¹ Integrated radiative forcing ($W m^{-2} yr^{-1}$)

<http://www.co2.ulg.ac.be/peace/intro.htm>



e.g.) Phaeocystis in the Southern Ocean

Who is playing a “critical role” within an ecosystem?
 Its answer is important for “ecosystem stability”, hence
 “ecosystem-based management”



Big eats small. Size is a matter.

Megrey et al., 2007