Some aspects of the biogeochemistry of organic matter in the northern Indian Ocean

Why the Bay of Bengal deserves more attention

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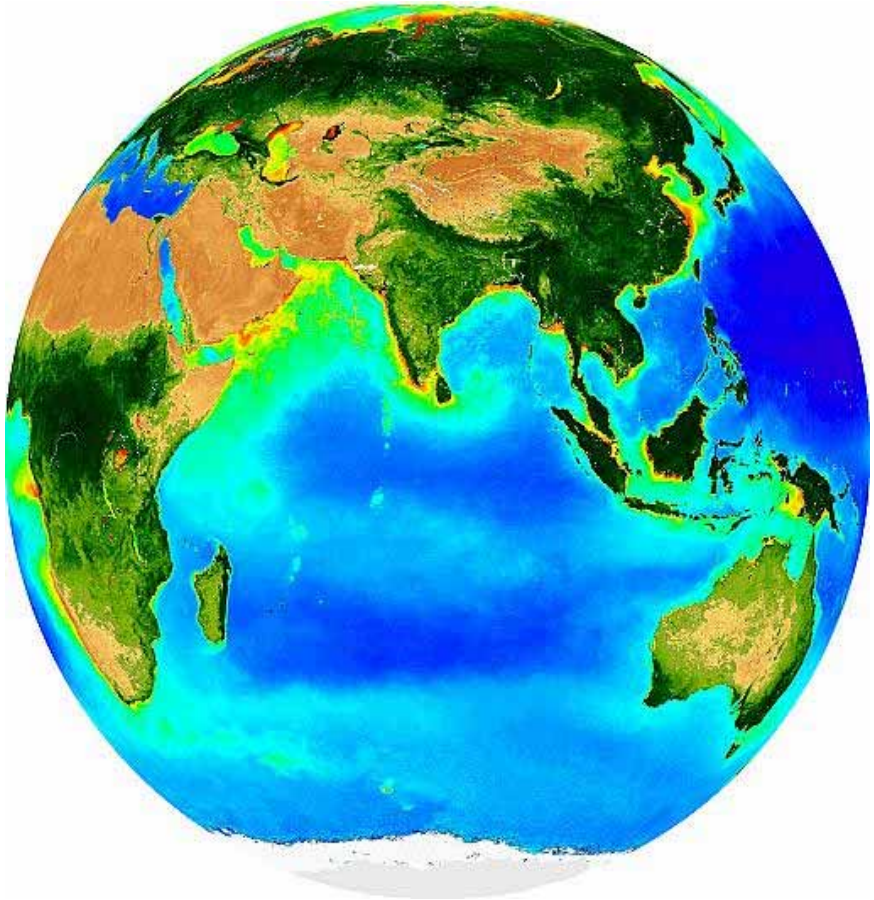
SIBER, 3-6 October 2006, Goa India



SeaWiFs: Boreal Summer

Bay of Bengal and Arabian Sea:

two twin seas?

- Monsoons: seasonality, reversal of wind fields and ocean circulation,
- closed by Euro-Asian Landmass: restricted deep-water circulation and renewal

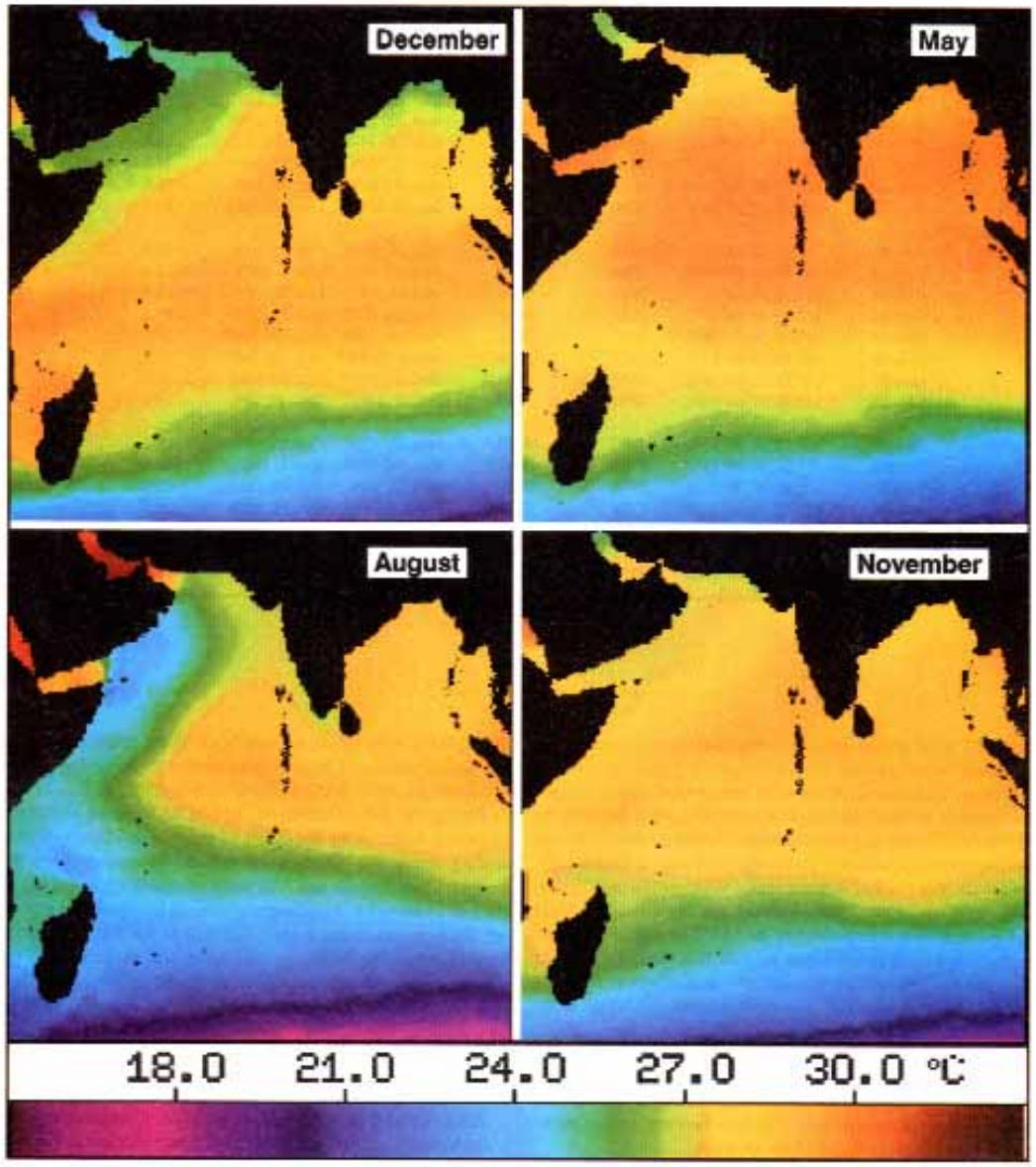
Therefore this talk...

.... will concentrate on the BoB

- organic carbon fluxes, composition and provenance
- characteristicss of BoB particulate nitrogen isotopic signal

- aims at highlighting some future research needs

Variation of Sea Surface Temperature

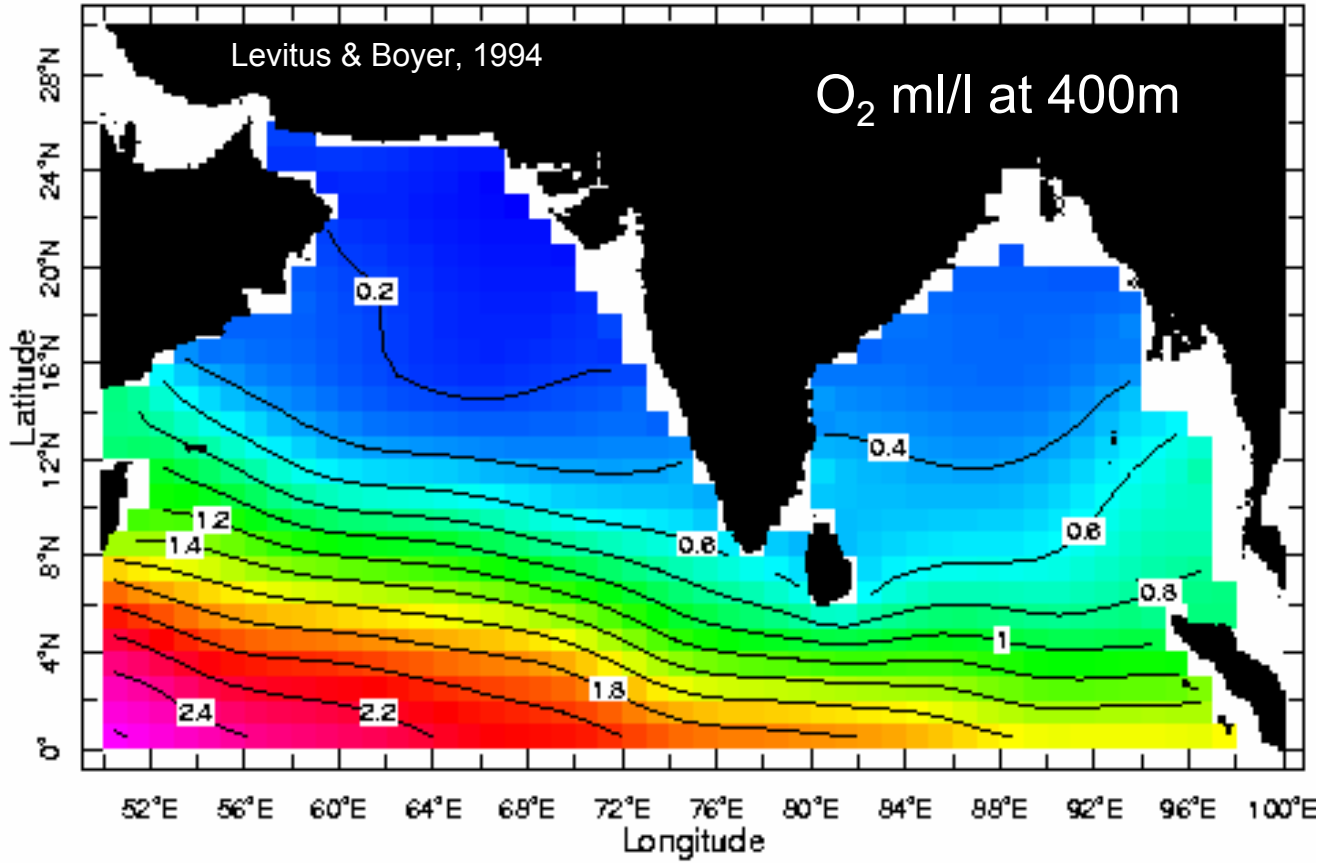


concevtive mixing

upwelling

Rixen et al. 1996, GRL

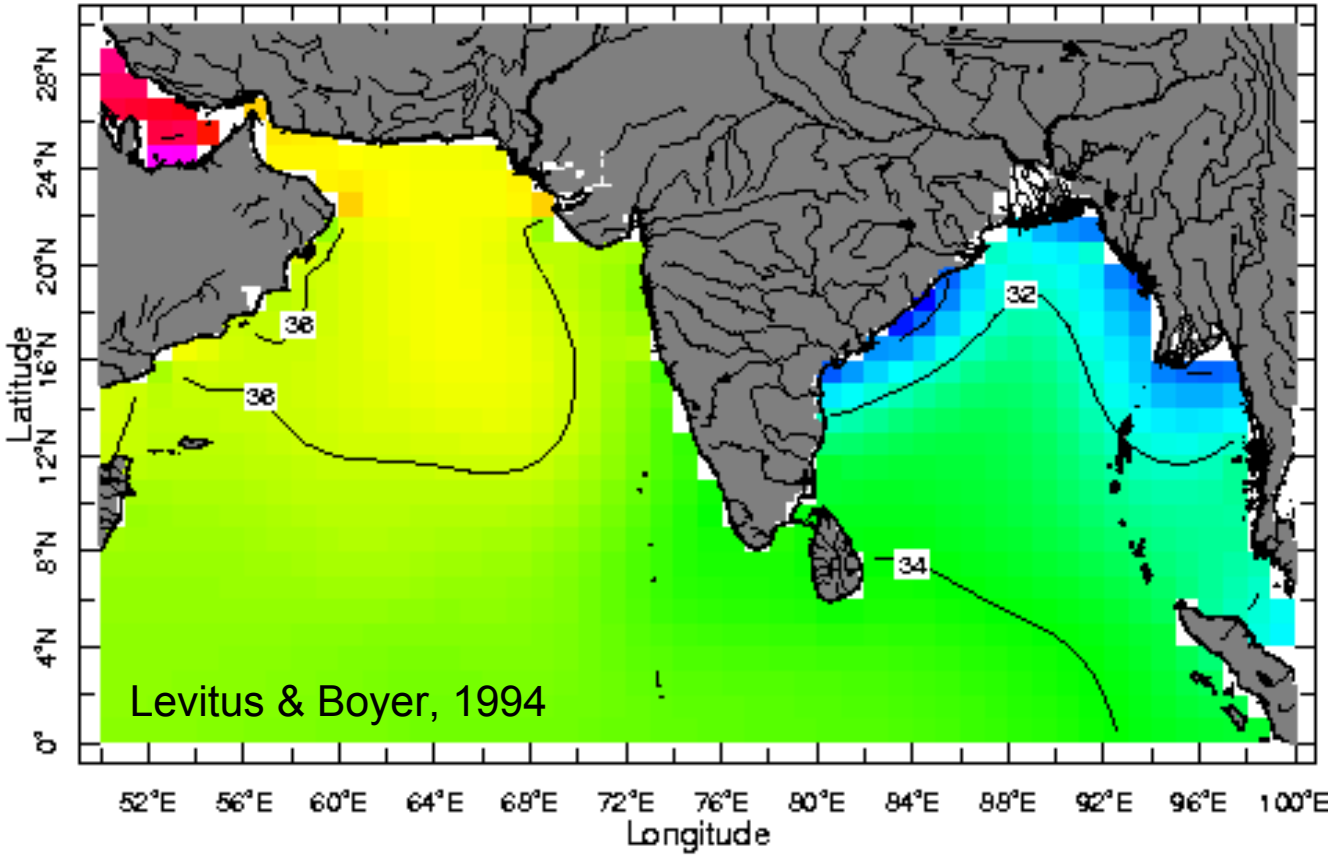
Oxygen Minimum Zone



OMZ as result of high productivity and weak ventilation

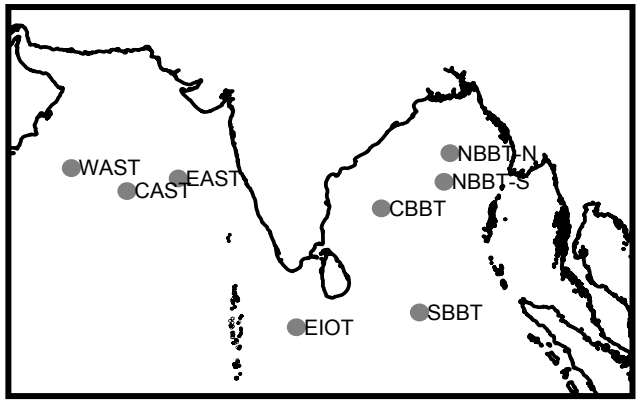
AS hot spot of denitrification

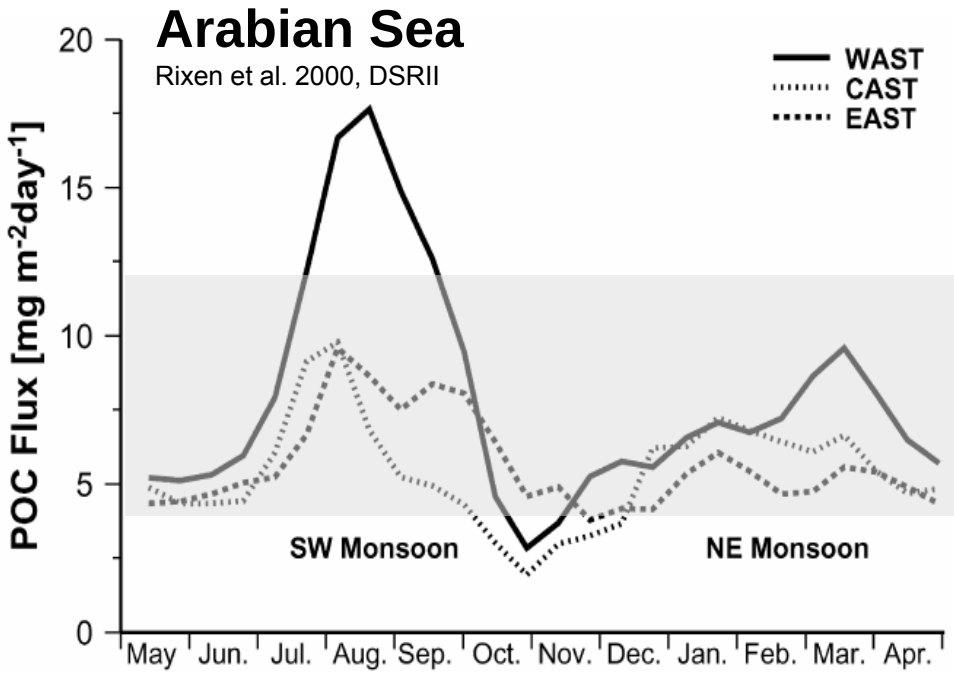
Fluvial Input

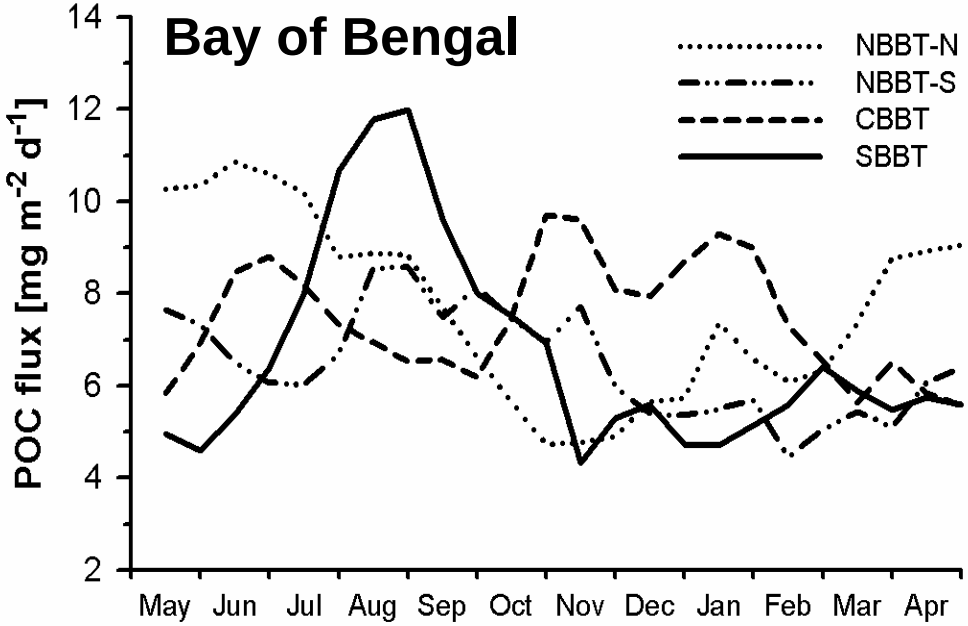


- hampers upwelling and mixing
- source of nutrients (DSi) and particulate matter
- connects BoB to human intervention on the continent

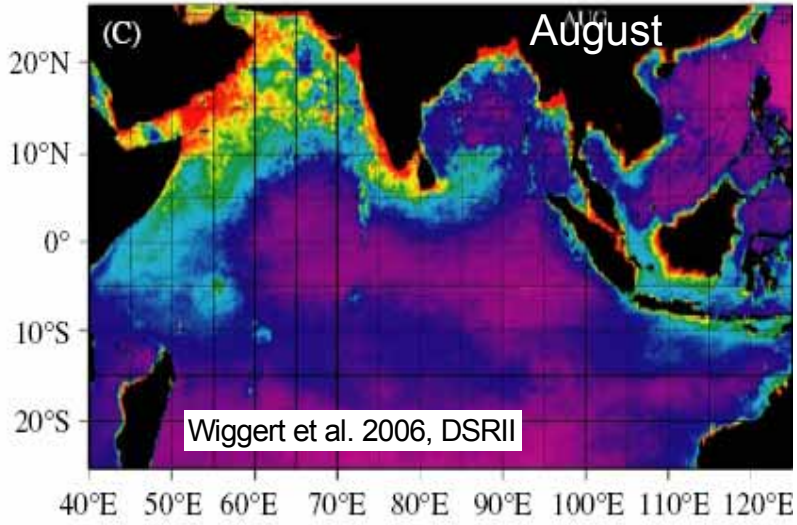
Seasonal Flux Pattern

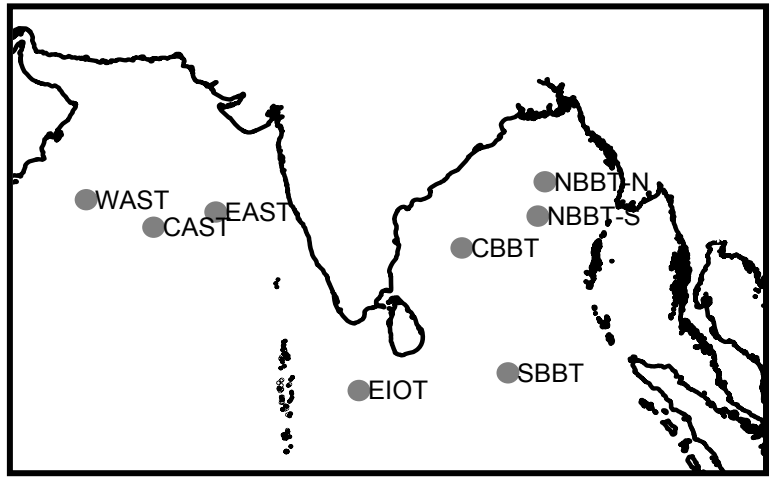


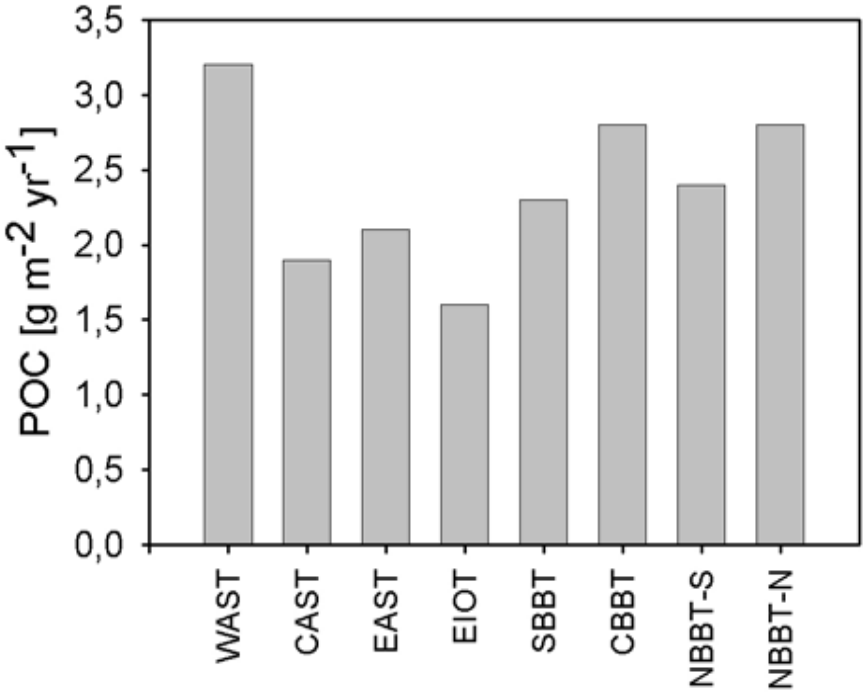




Annual POC Fluxes

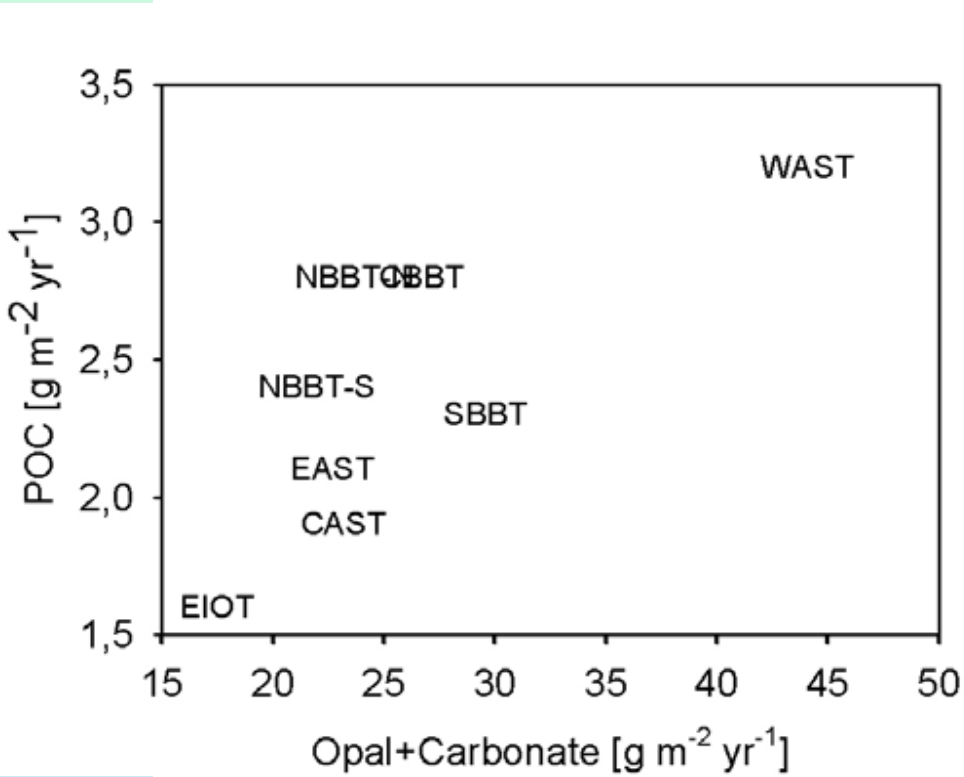


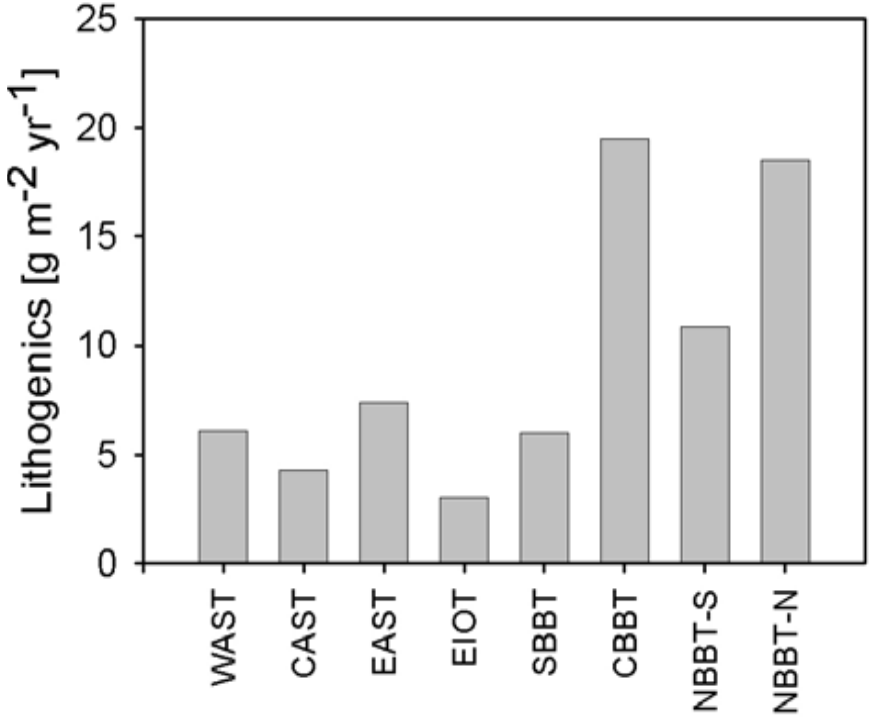




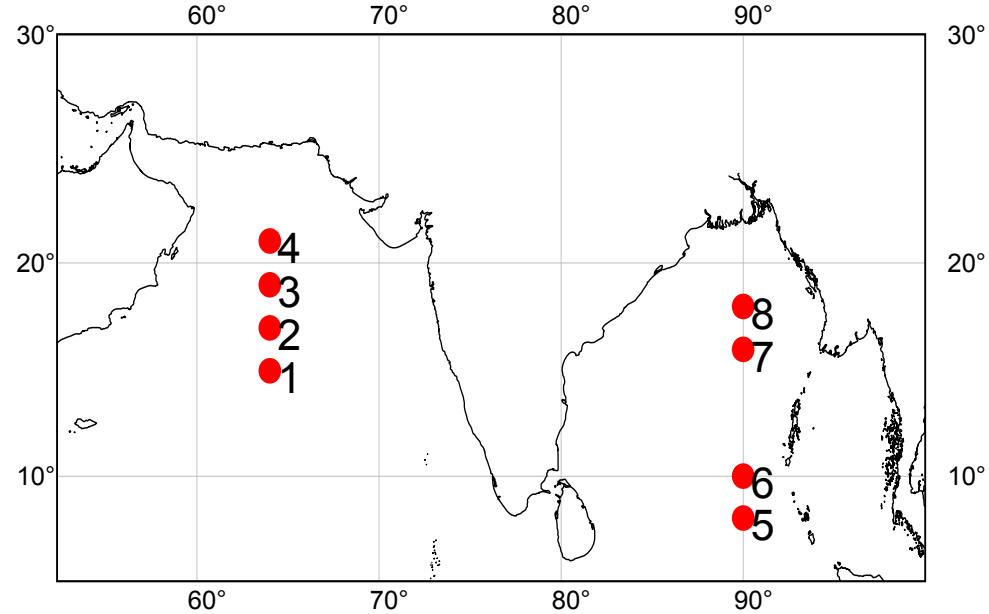
AS data from Haake et al. 1993

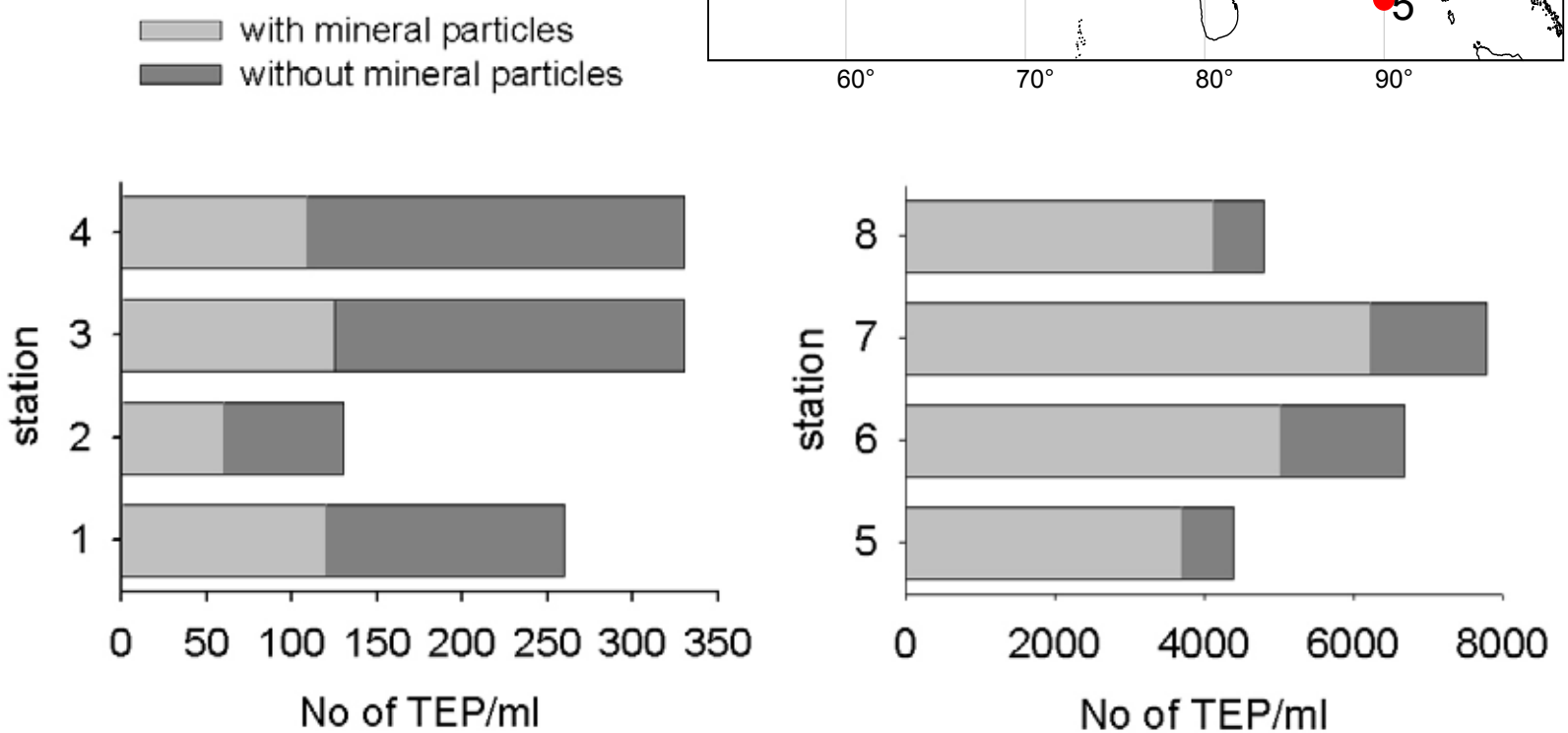
Influence of Terrestrial Matter?





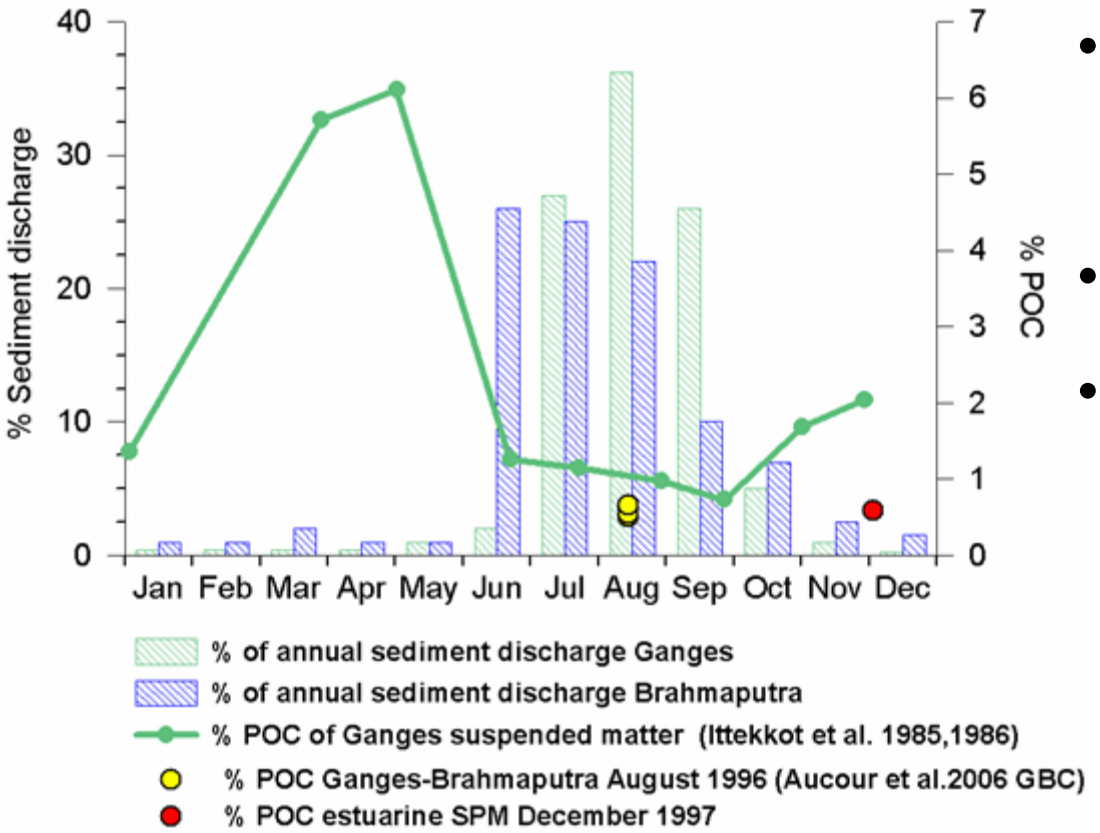
Organic Matter Express? „scavenging“





Data from Kumar et al. 1998 GRL

Quantification of riverine POC input

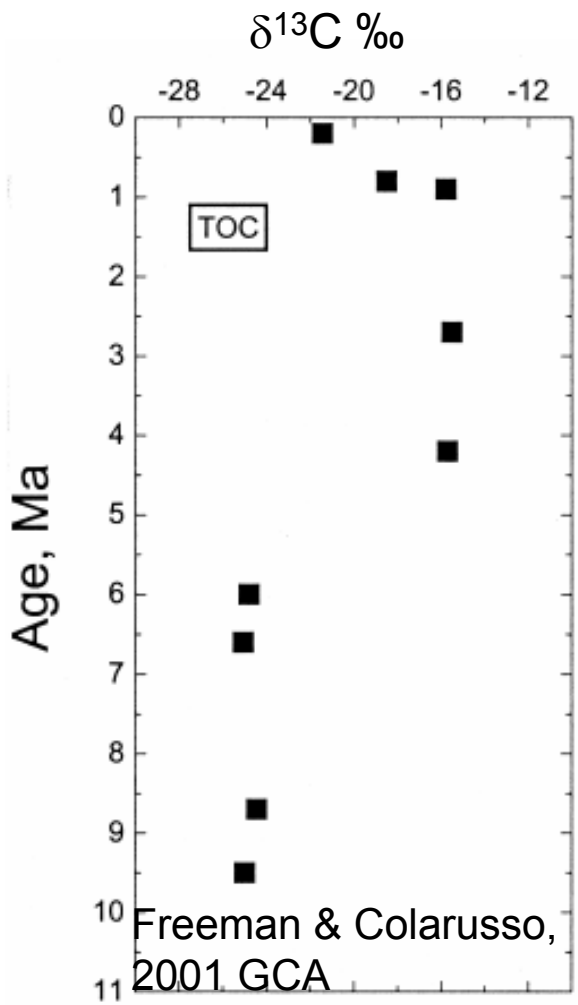


- G-B Sediment input: 1000 x 10^6 t yr^{-1}
- 6 x 10^6 t POC
- 2.7 g POC m^{-2} yr^{-1}

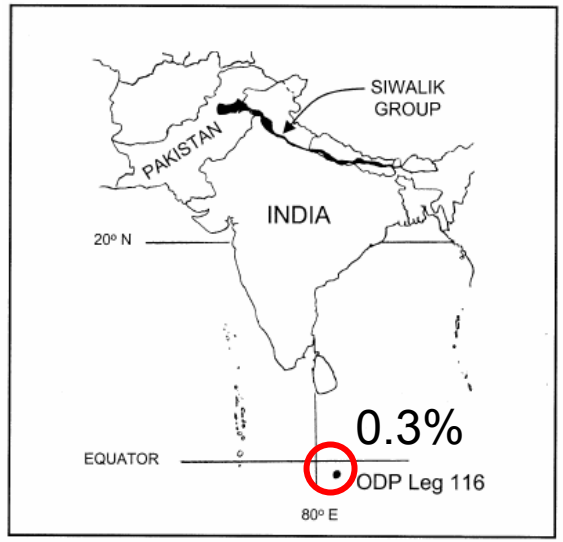
AR at trap sites BoB: 0.05-0.14 g POC m^{-2} yr^{-1}

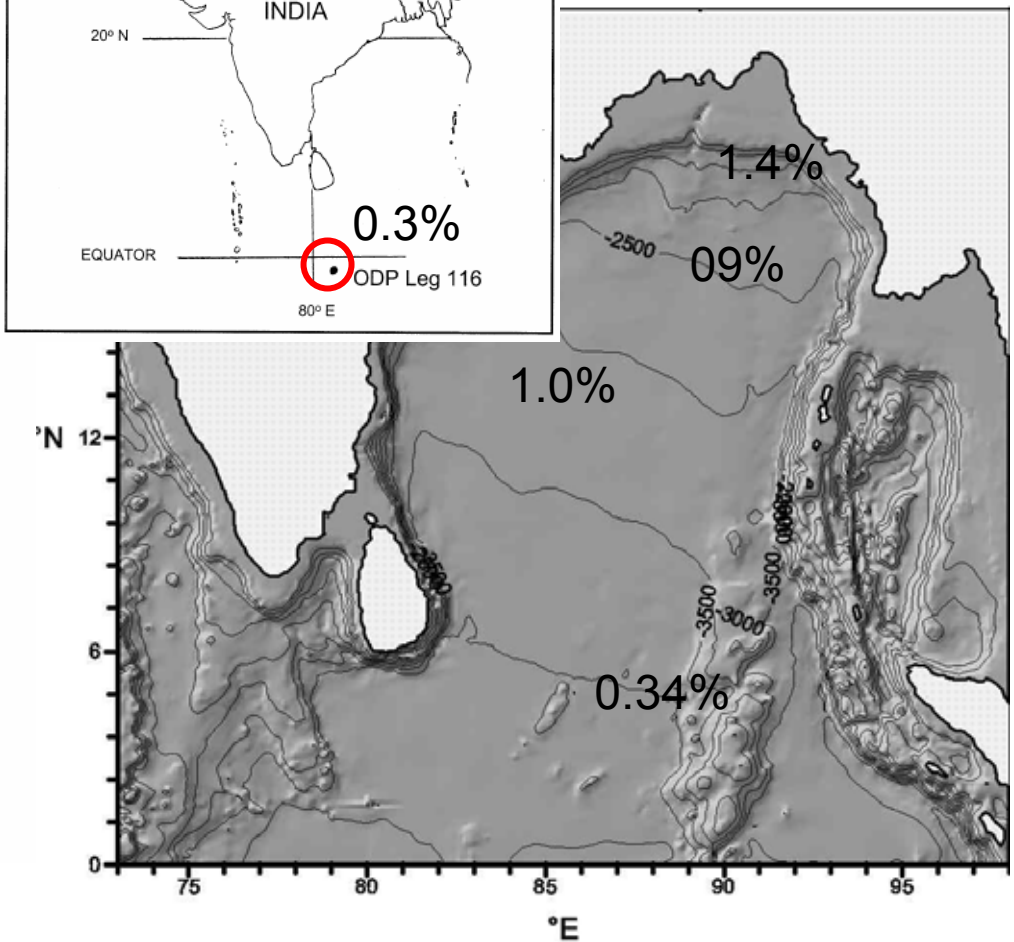
AS: 0.6-0.13 g POC m^{-2} yr^{-1}

Bengal Fan Organic Matter

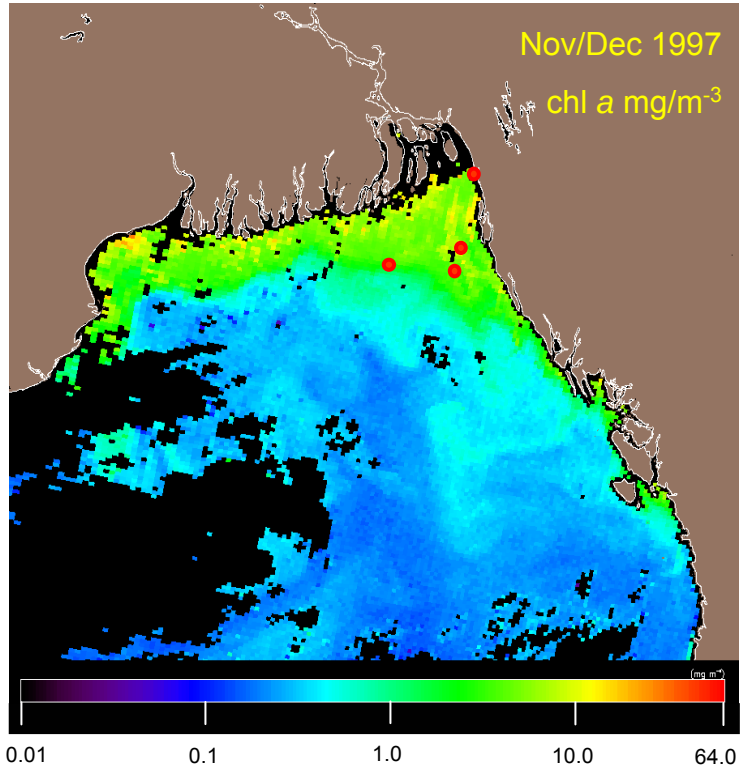


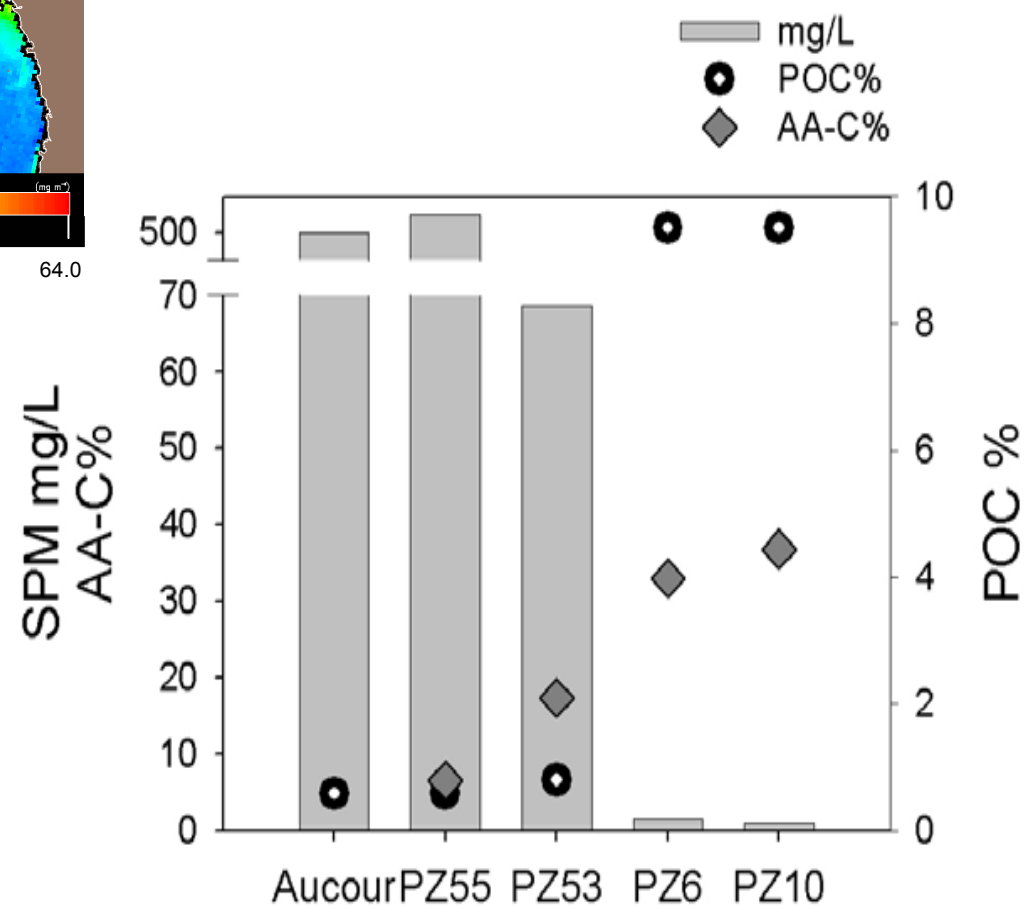
Freeman & Colarusso, 2001 GCA



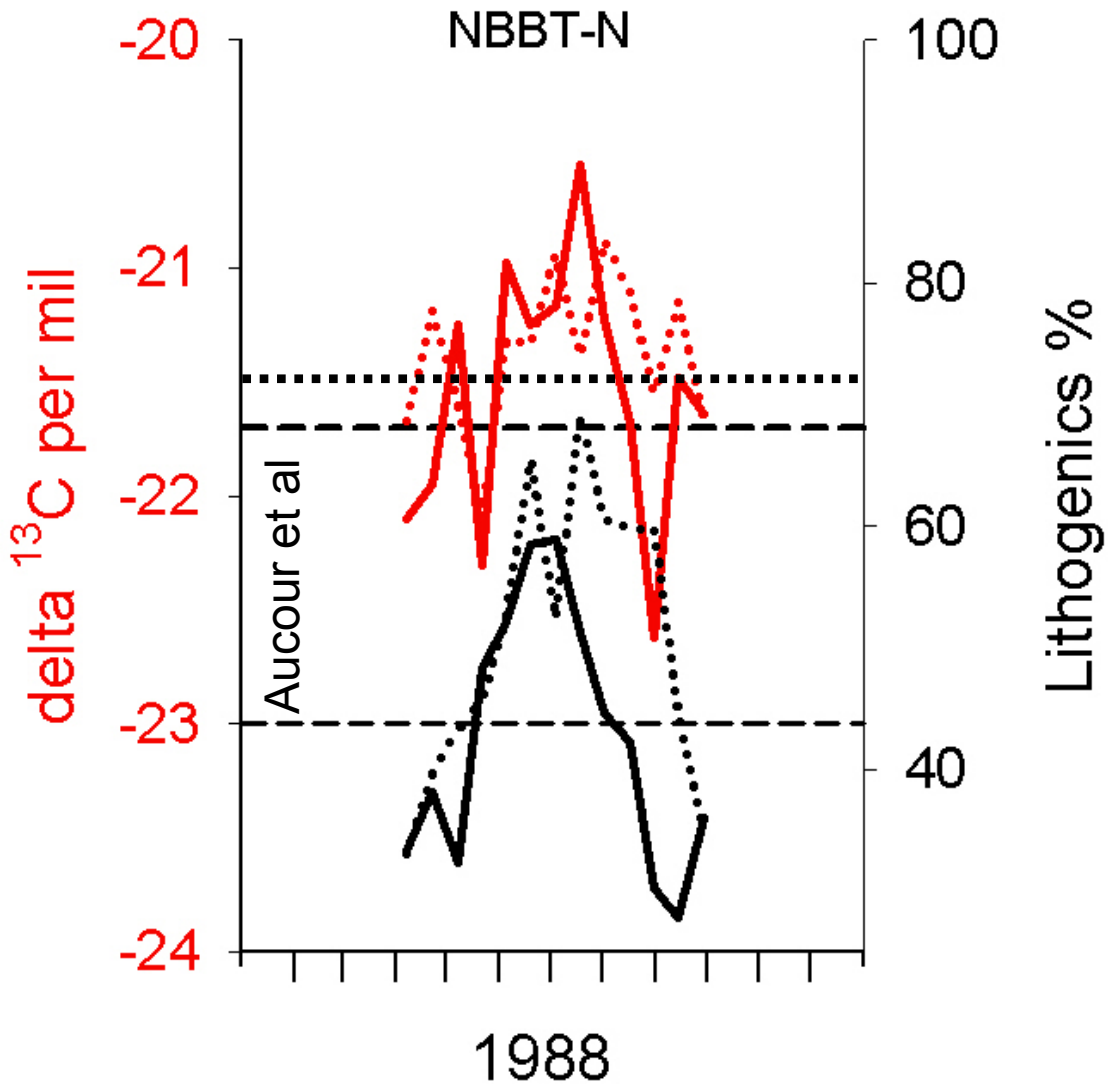


Quality of OM input

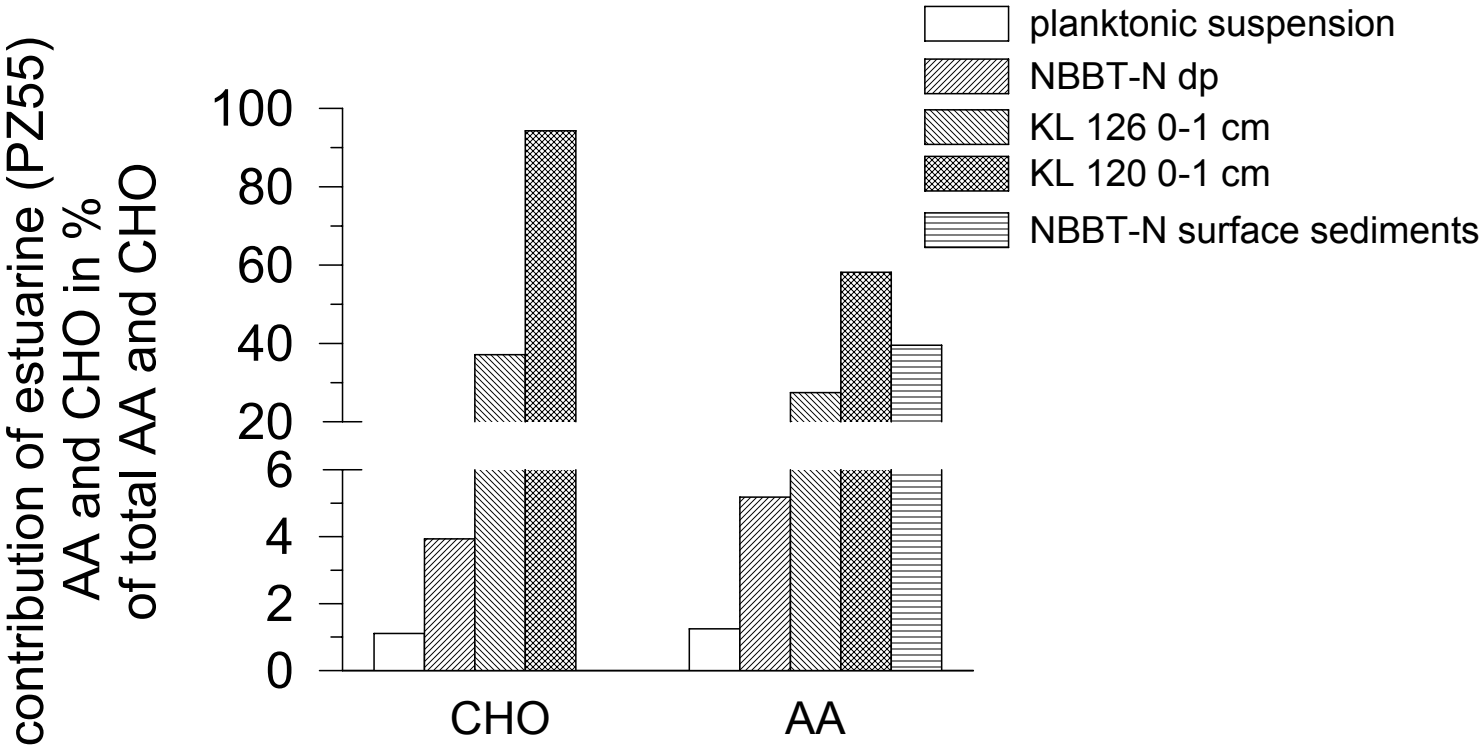




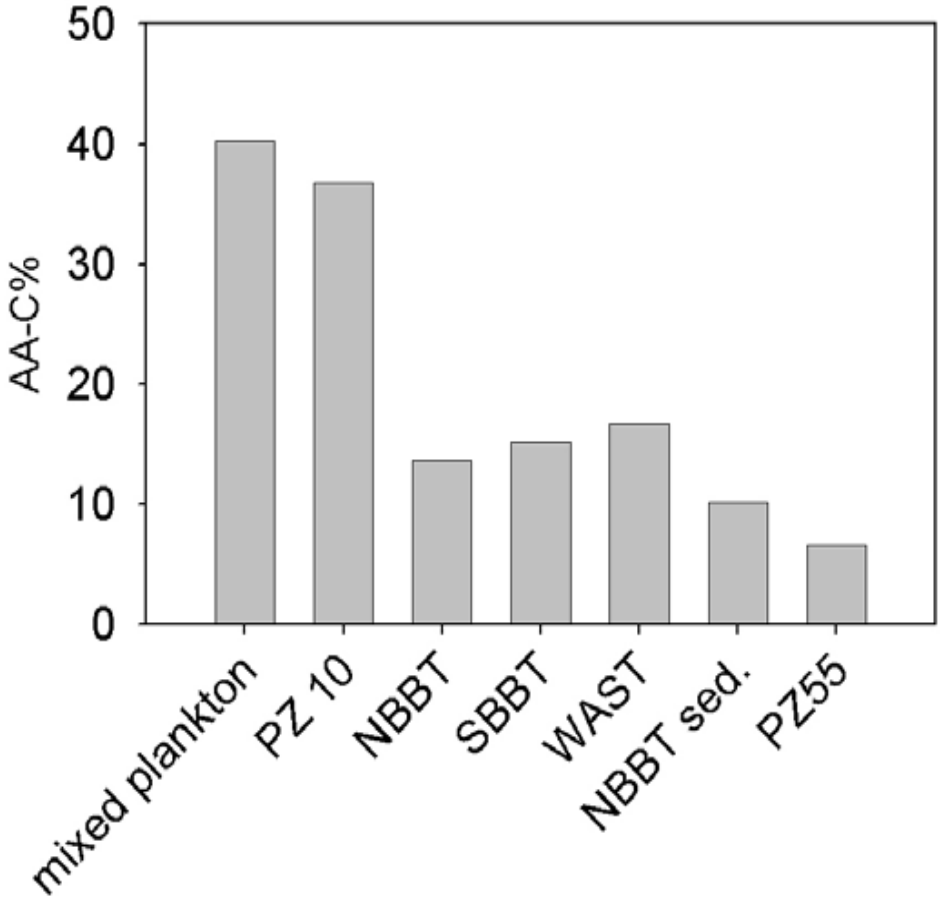
Terrestrial signal in sinking matter?

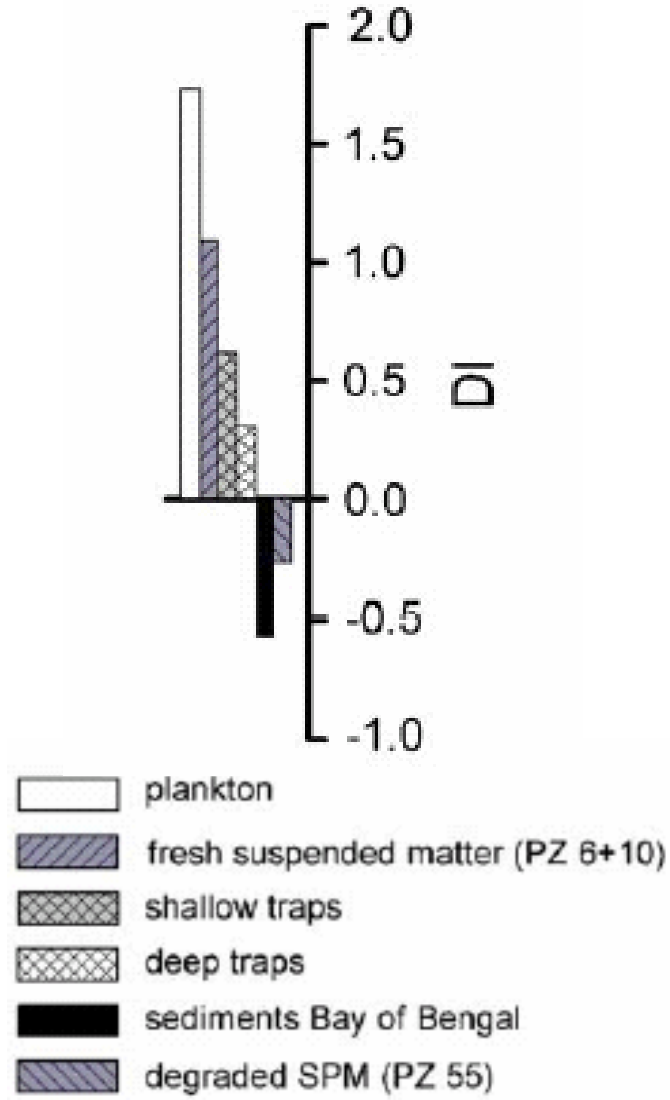


Reloading of Particles with Marine Organic Matter?



Quality of organic matter

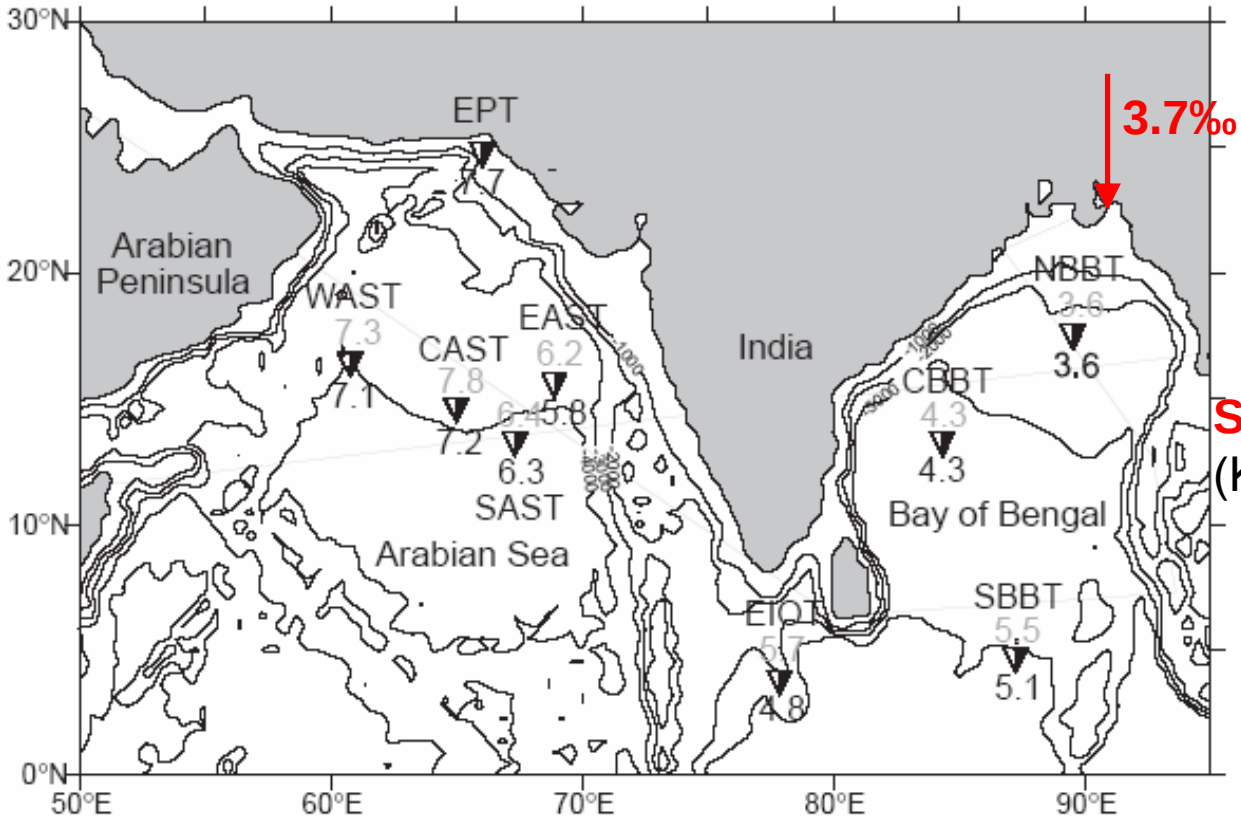




Nitrogen Isotopes

...another good reason
to go to the Bay

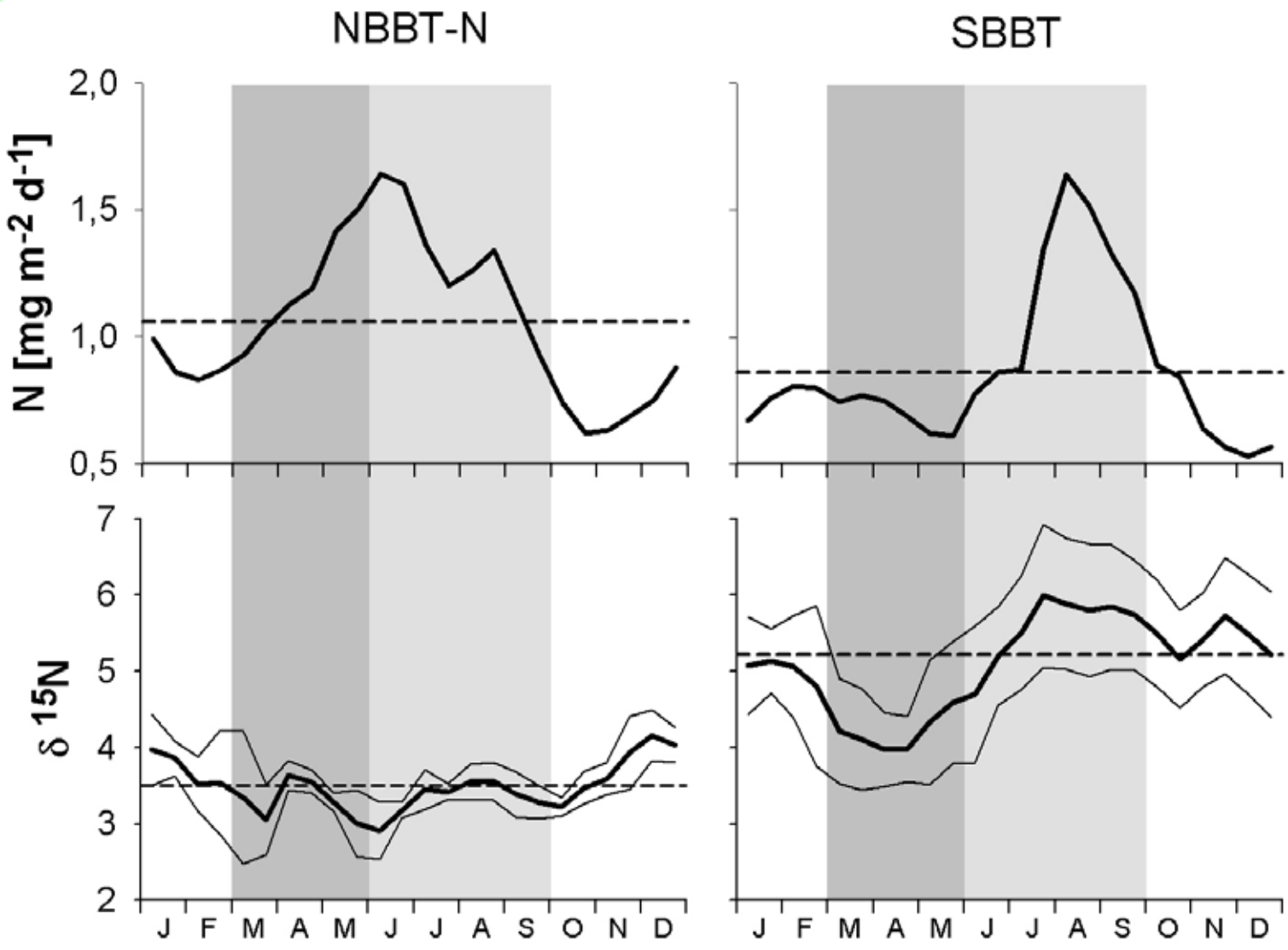
$\delta^{15}N$ in sinking particles

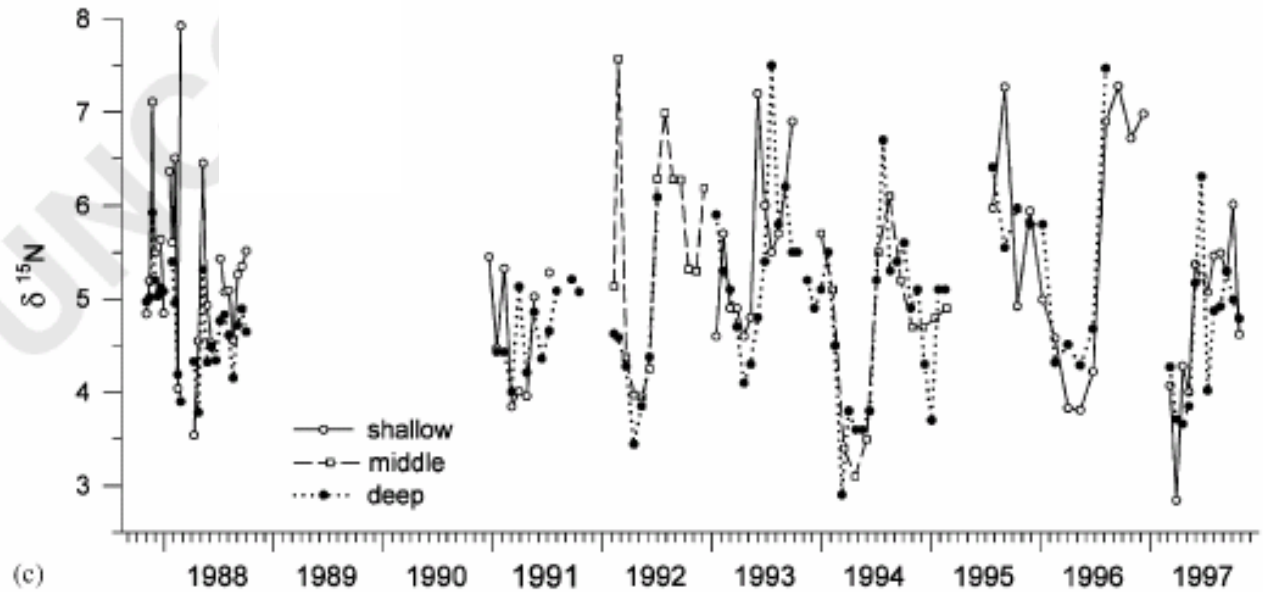


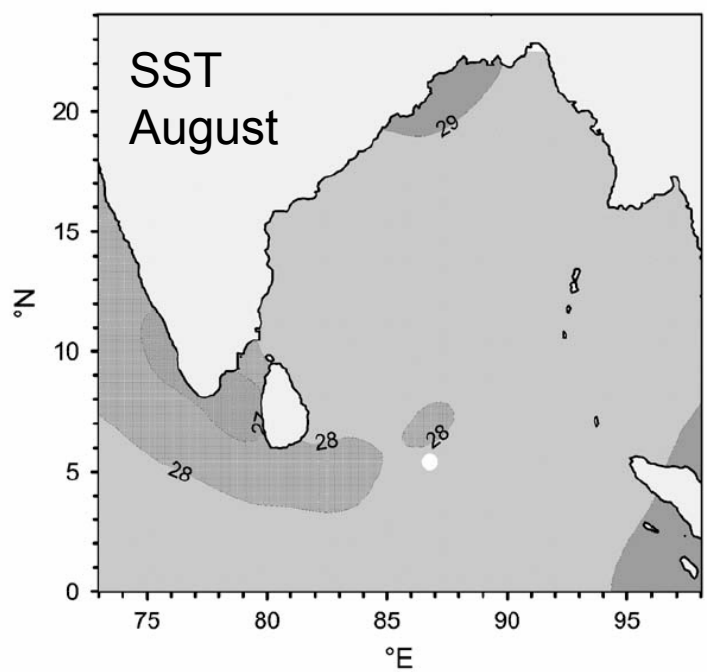
SPM 4‰
(Kumar et al. 2005

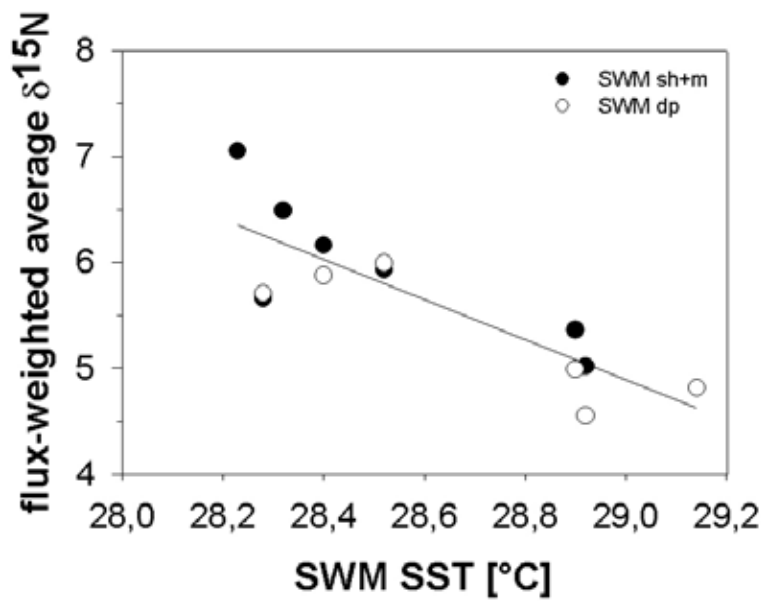
Gaye et al. 2005 Mar.Chem.

Seasonal distribution of $\delta^{15}N$ in sinking particulate matter









Unger et al. in press, DSR

Research needs

- particulate organic matter especially in sediments of the Bay of Bengal has to be characterized in order to trace pathways and quantify terrestrial organic material with respect to its role in the regional and global carbon budget

- more research has to be done on nitrogen isotopic composition of riverine and marine nitrate and DON and particulate organic matter in the Bay including investigation of the role of nitrogen fixation