Global Ocean Variability and Trends

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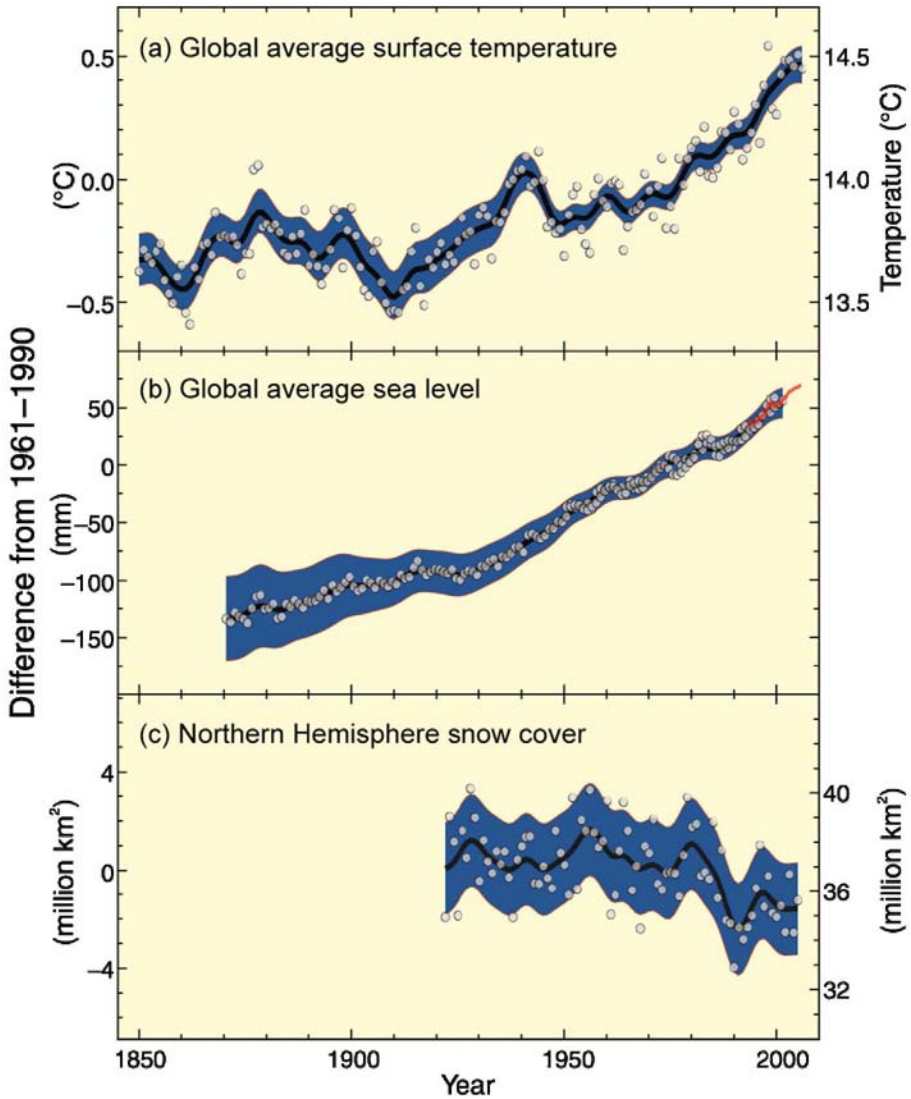
Miami, March 2008

Sea surface temperature and sea level changes

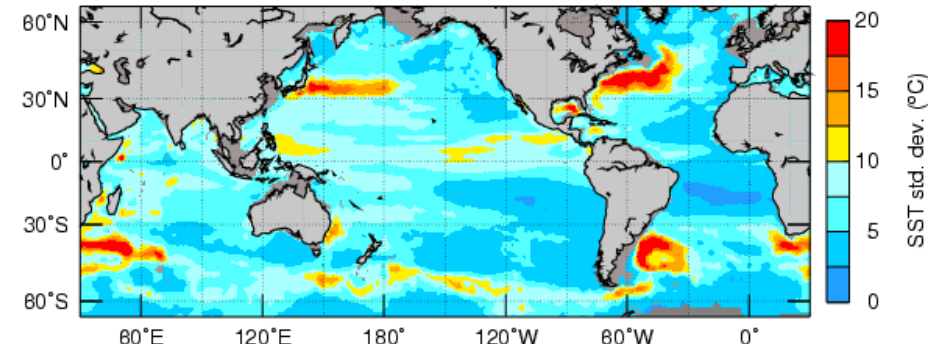


Source: IPCC Report

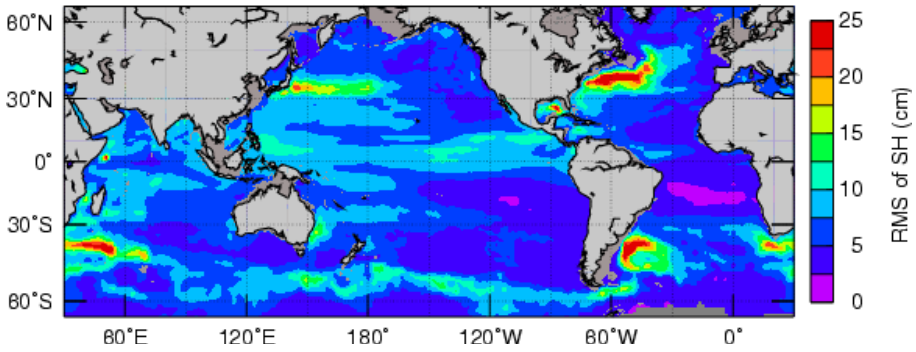
	1901-2005	1979-2005
Sea surface temperature trend (C/decade)	0.067 0 .018	0.133 0.057

	1961-2003	1993-2003
Sea level trend (mm/year)	1.8	3.1

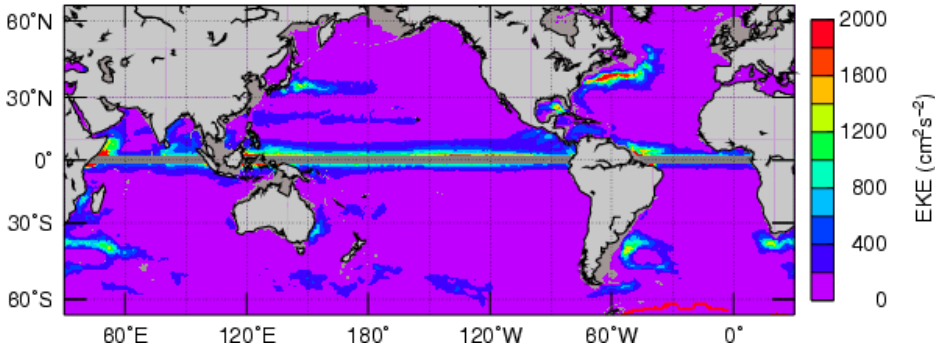
Global ocean variability 1993-2006



Std dev
sea surface temperature

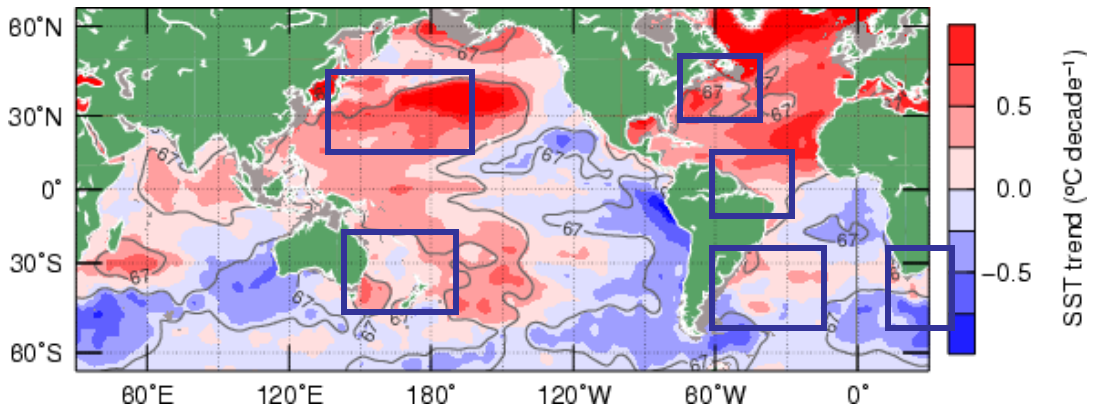


rms
sea height



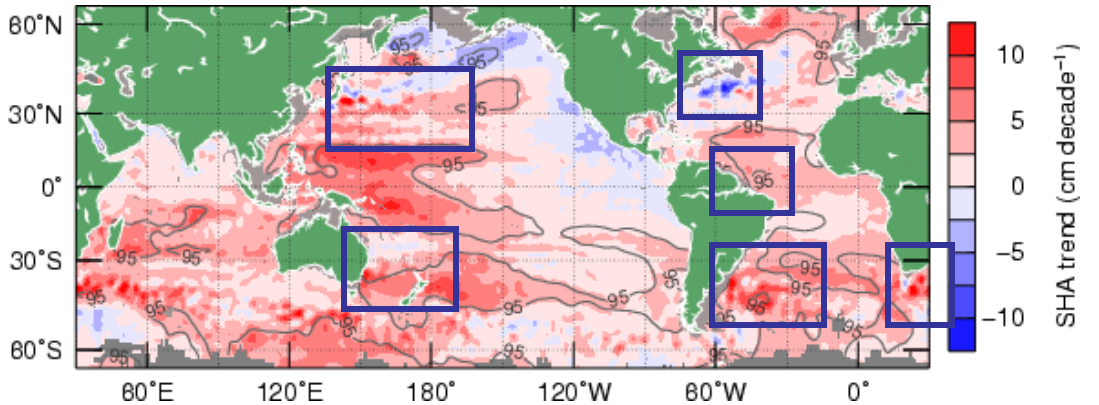
Eddy kinetic energy

Global ocean trends 1993-2006



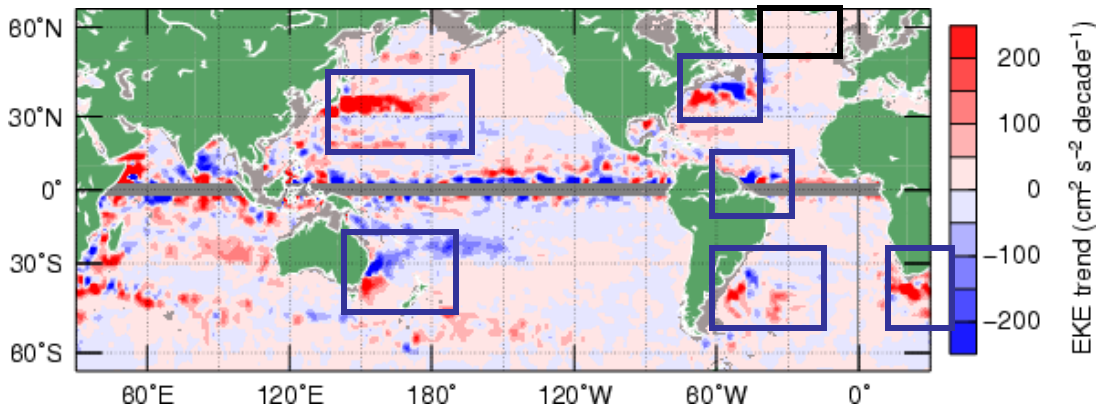
Sea surface temperature

NH = 2.3 C/dec
SH = -0.04°C/dec
Global = 0.14°C/dec



Sea height

NH = 0.6mm/yr
SH = 2.3mm/yr
Global = 1.6mm/yr

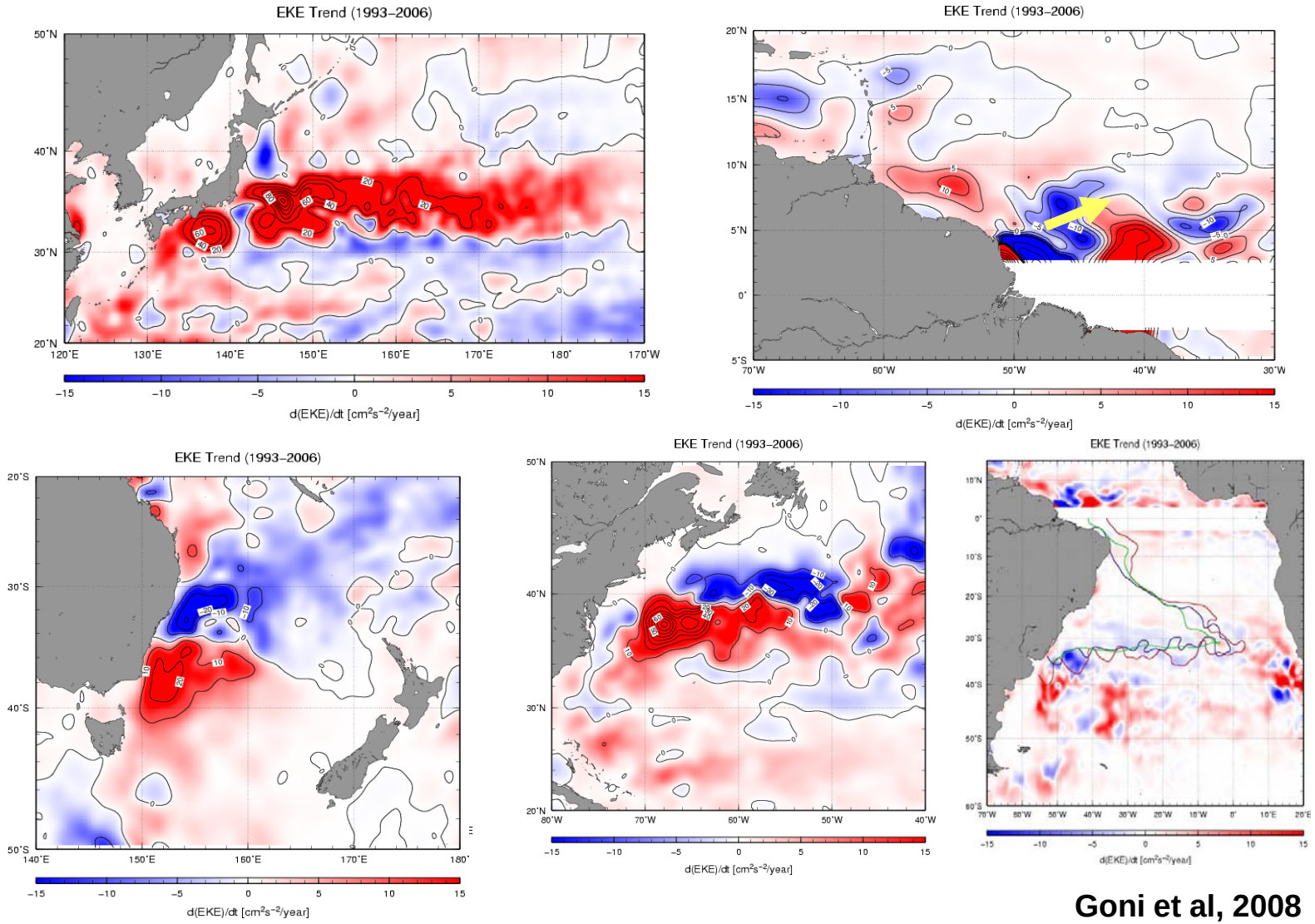


Eddy kinetic energy

NH = 0.82 cm^2s^{-2}/yr
SH = 0.66 cm^2s^{-2}/yr
Global = 0.74 cm^2s^{-2}/yr

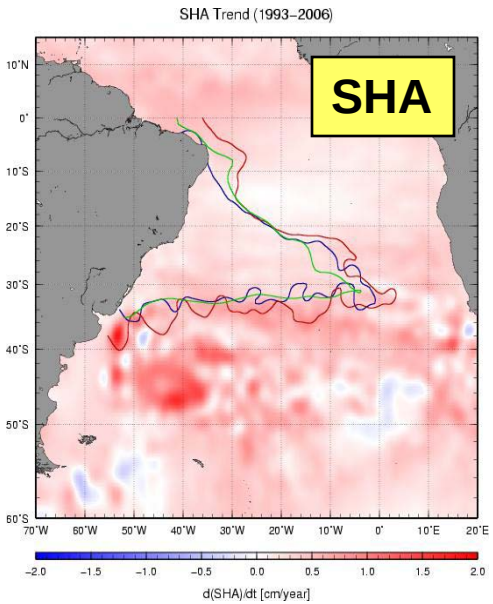
Goni et al, 2008

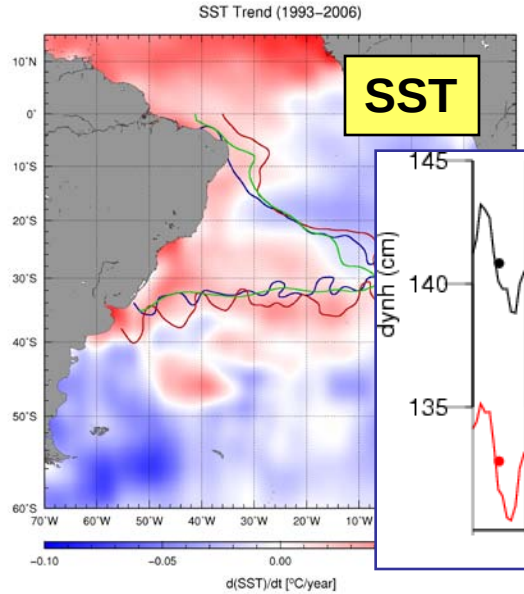
Ocean trends 1993-2006
Eddy kinetic energy

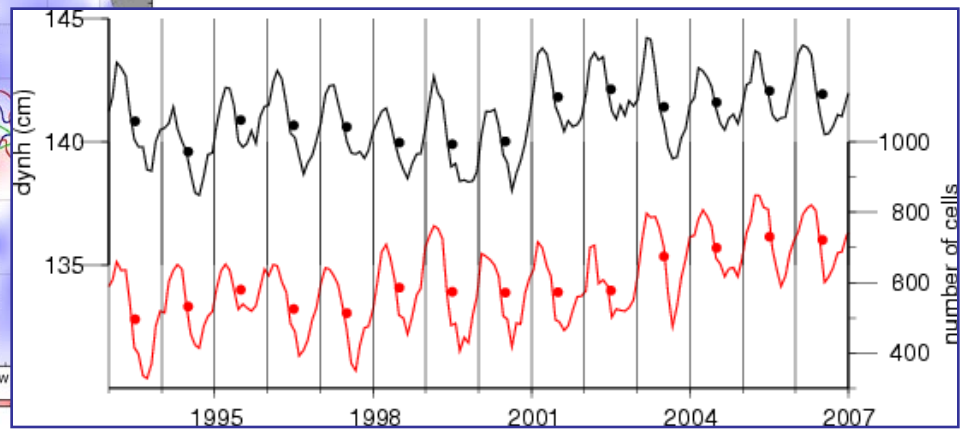


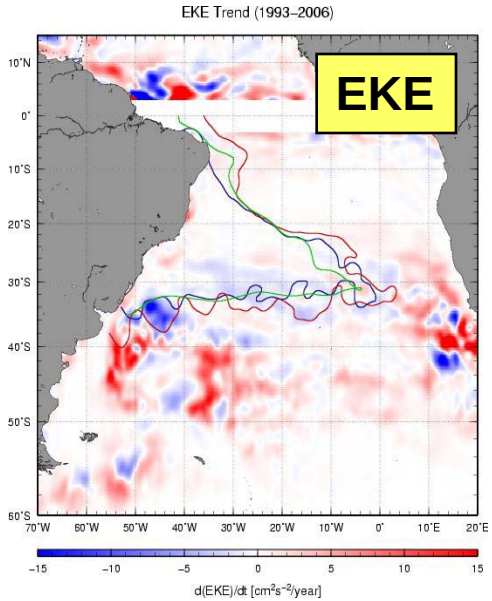
Goni et al, 2008

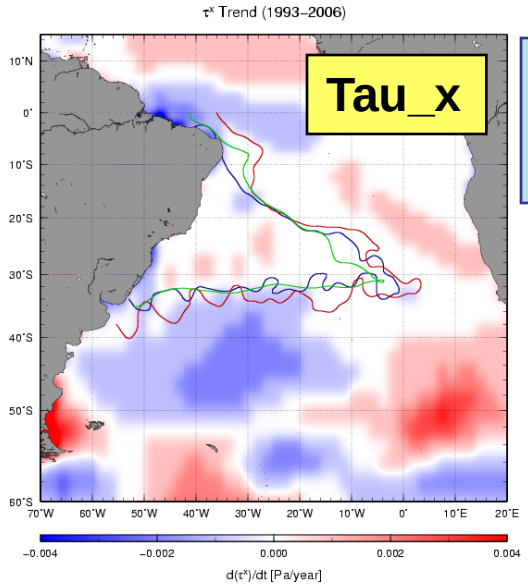
South Atlantic subtropical gyre









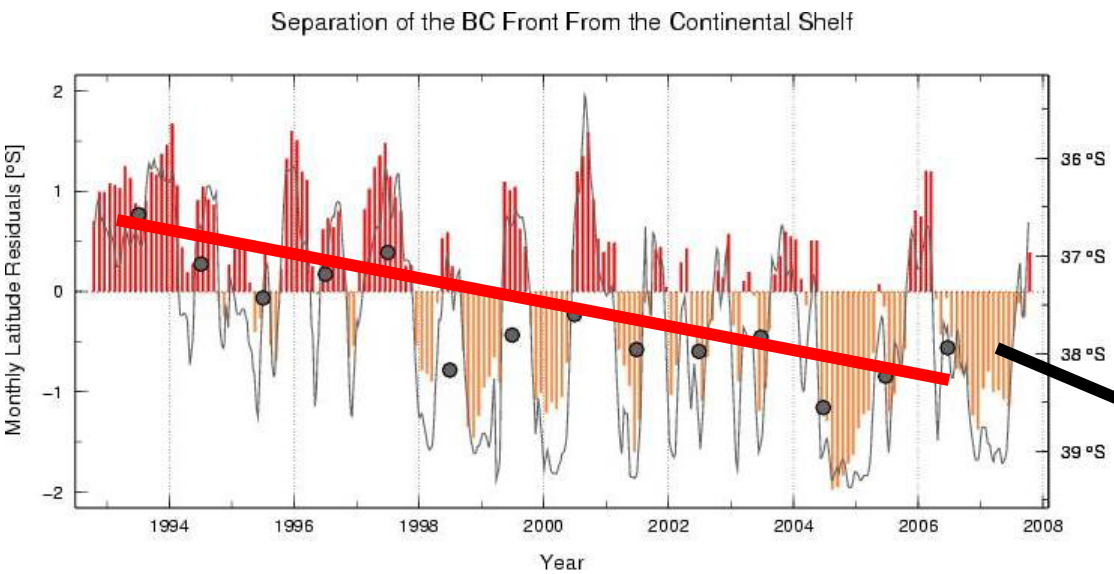


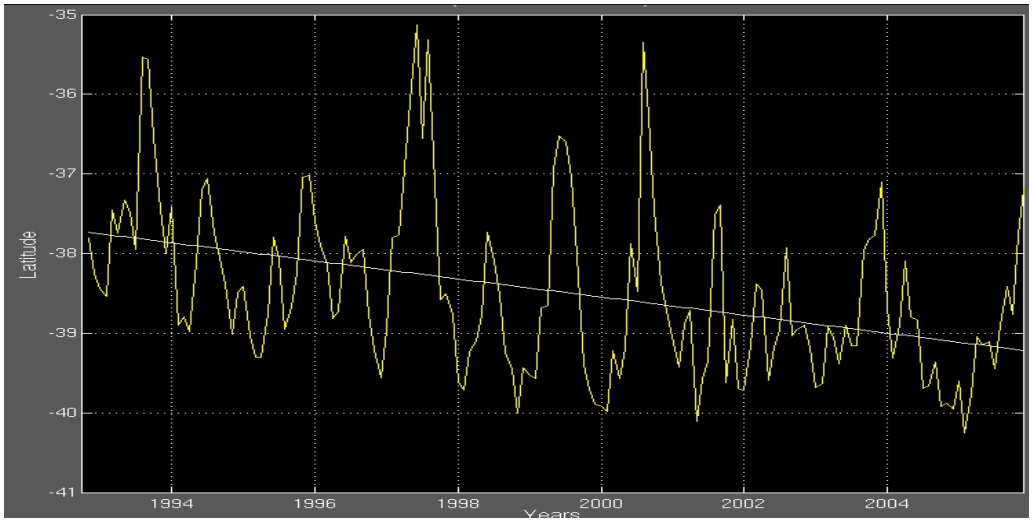
140 to 144 cm in dynh = 0.3 dynh cm per year

495 to 725 1x1 deg cells = 1.5×10^5 km^2 per year

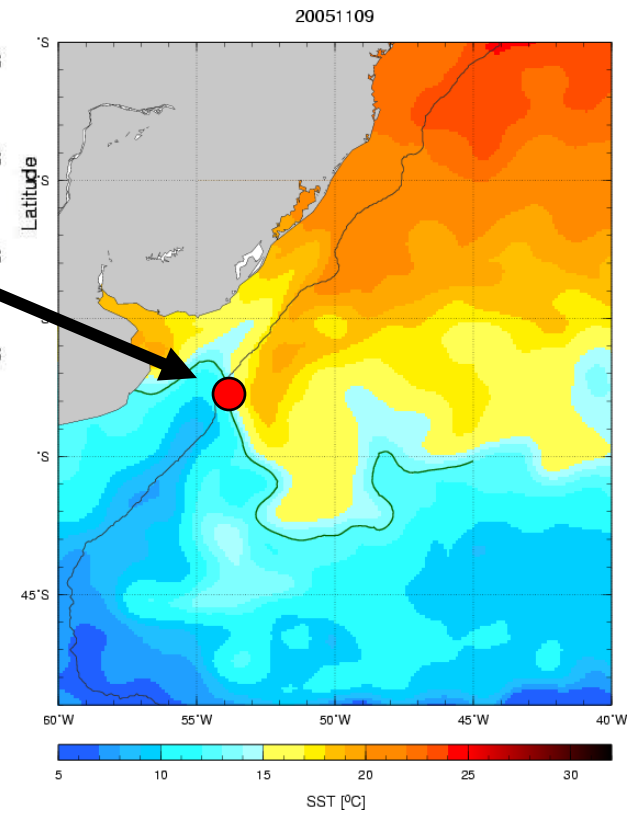
Goni et al, 2008

Global ocean trends and the South Atlantic subtropical gyre: Brazil-Malvinas Confluence region





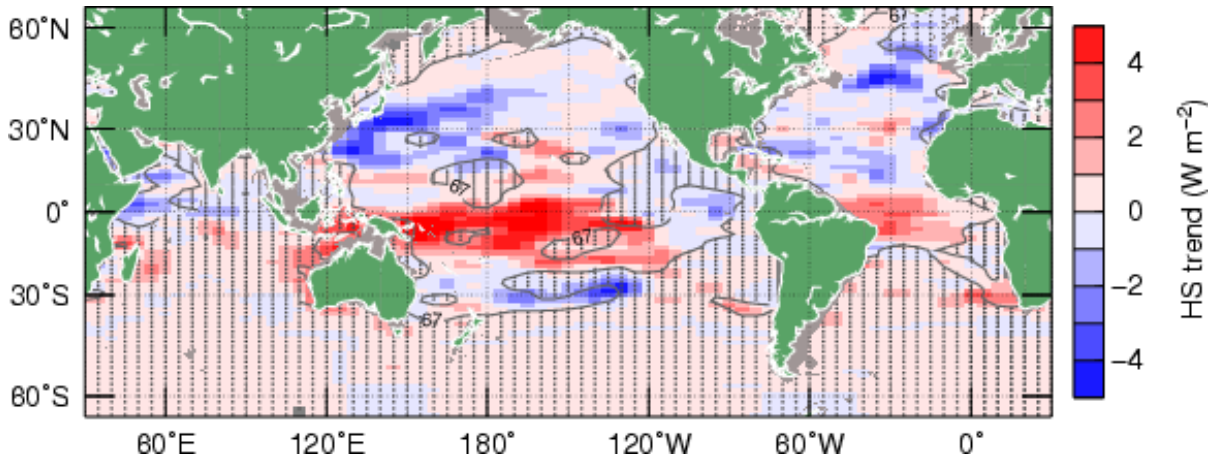
Garzoli, 2008



Goni et al, 2008

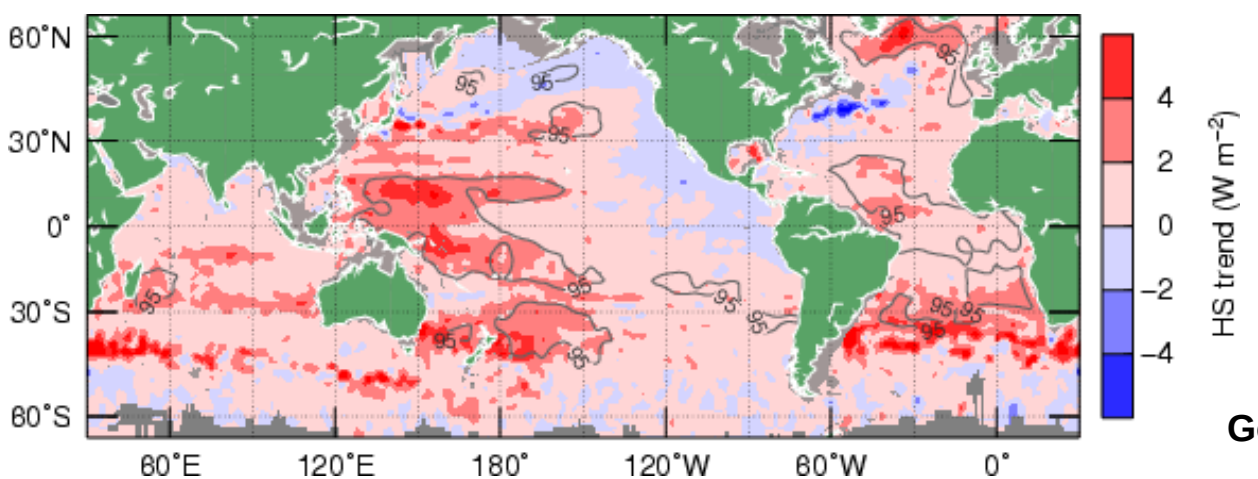
Global ocean trends 1993-2006

Heat storage mixed layer depth (XBTs + Argo)



NH = -0.4 w/m^2
SH = 1.9 w/m^2
Tot = 0.8 w/m^2

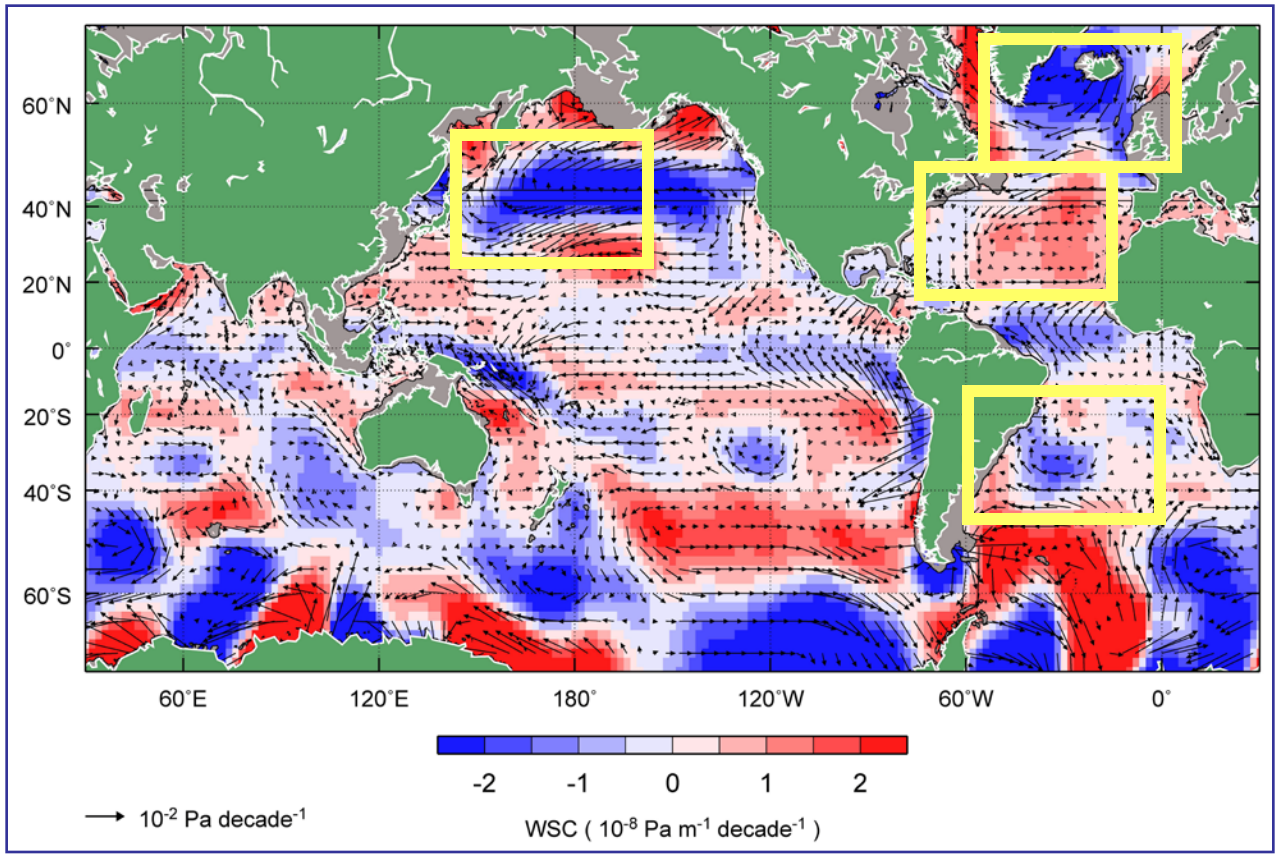
Heat Storage top 750m (Altimetry + XBTs + Argo)

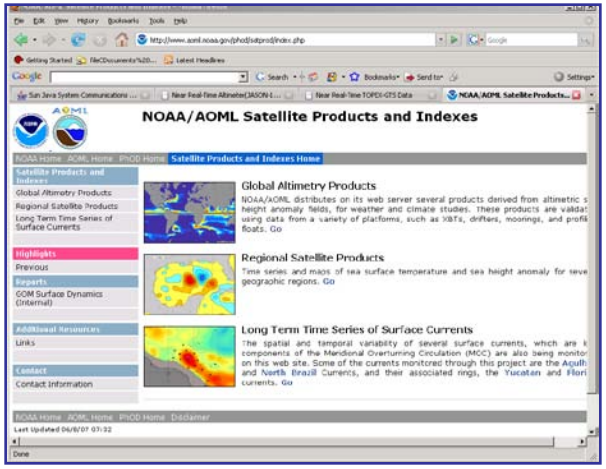
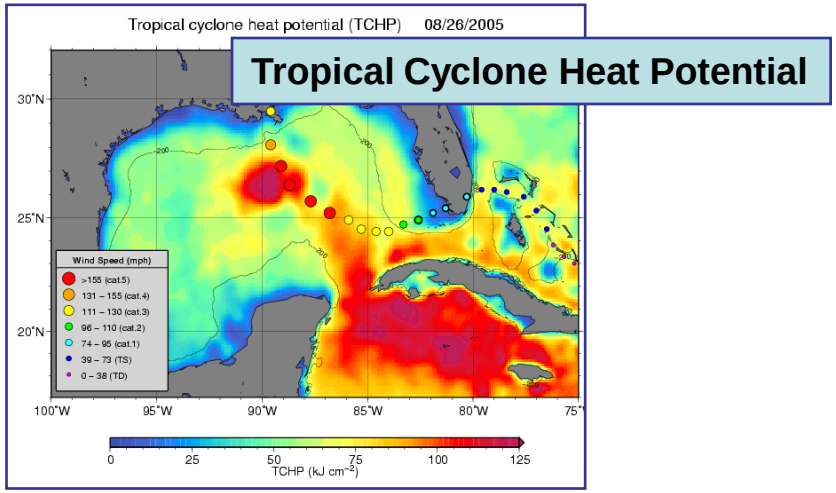
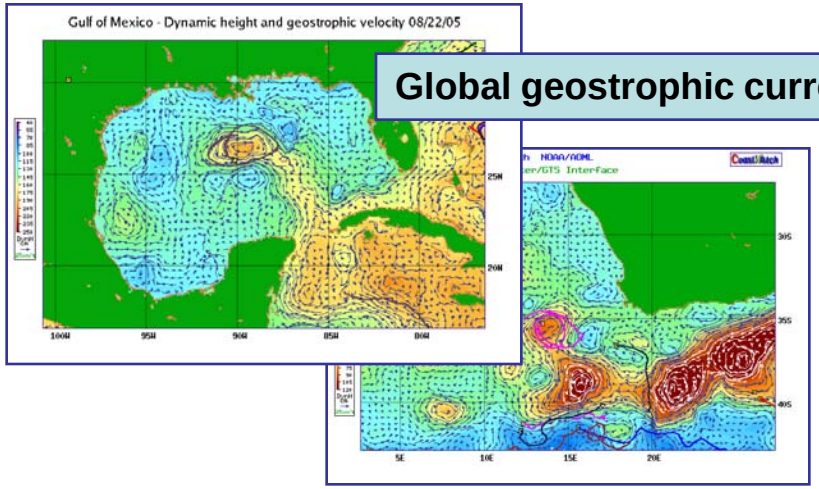
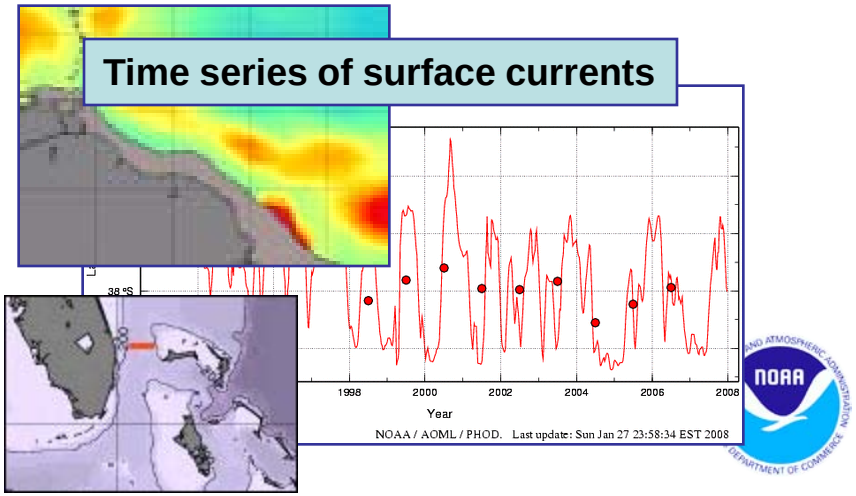


NH = 1.0 w/m^2
SH = 1.4 w/m^2
Tot = 1.2 w/m^2

Goni et al, 2008

Ocean trends 1993-2006
Wind stress curl



NOAA/AOML global and regional Real-time altimetry products

http://www.aoml.noaa.gov/phod/satprod/