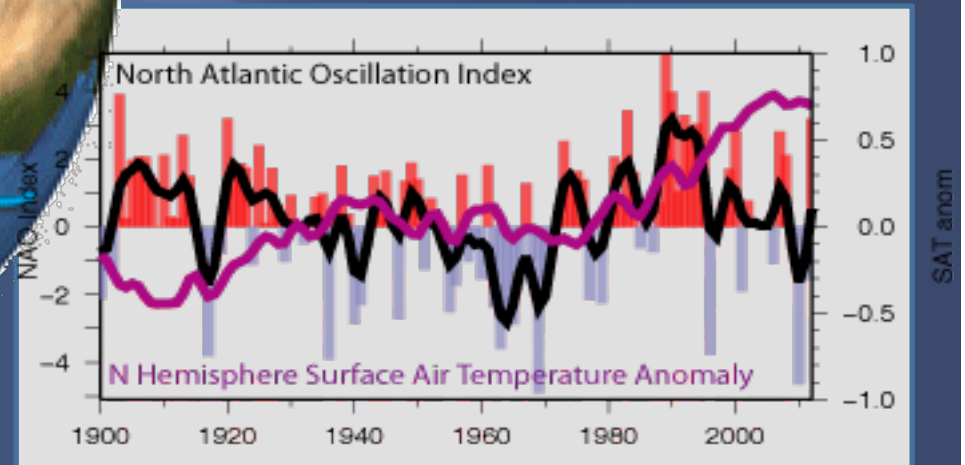
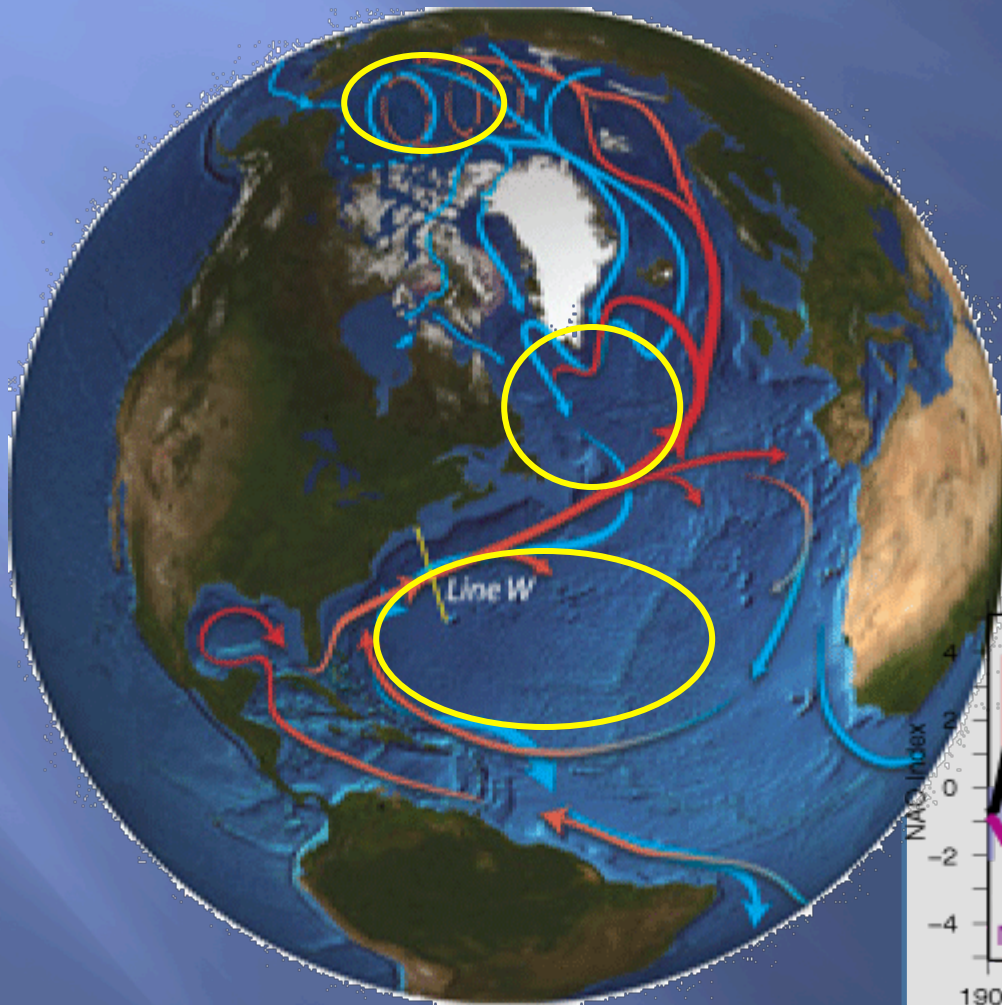


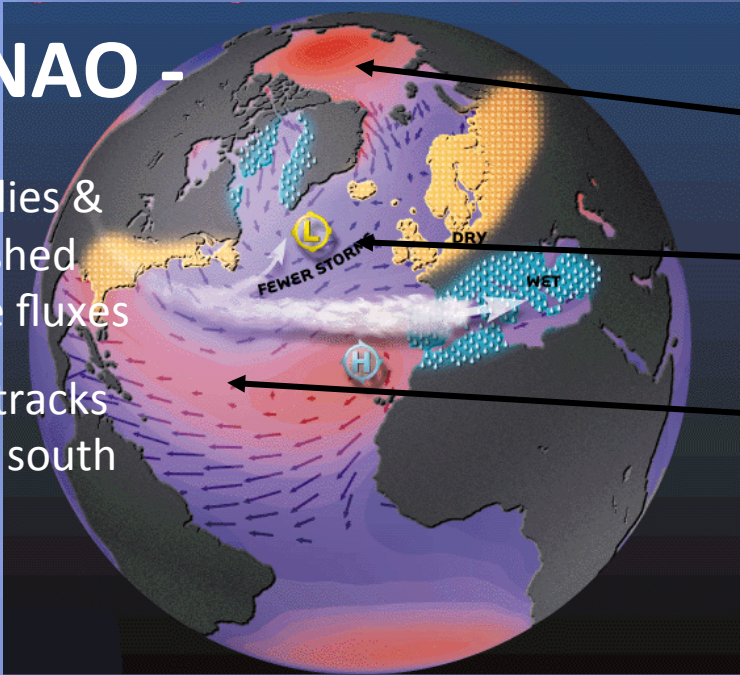
# Decadal Variability in the North Atlantic 1950 - 2010



## NAO -

Weak westerlies & diminished surface fluxes

Storm tracks shifted south



Sea ice accumulates, thickens

Subpolar  $T^{\circ}, S \uparrow$  Density  $\downarrow$

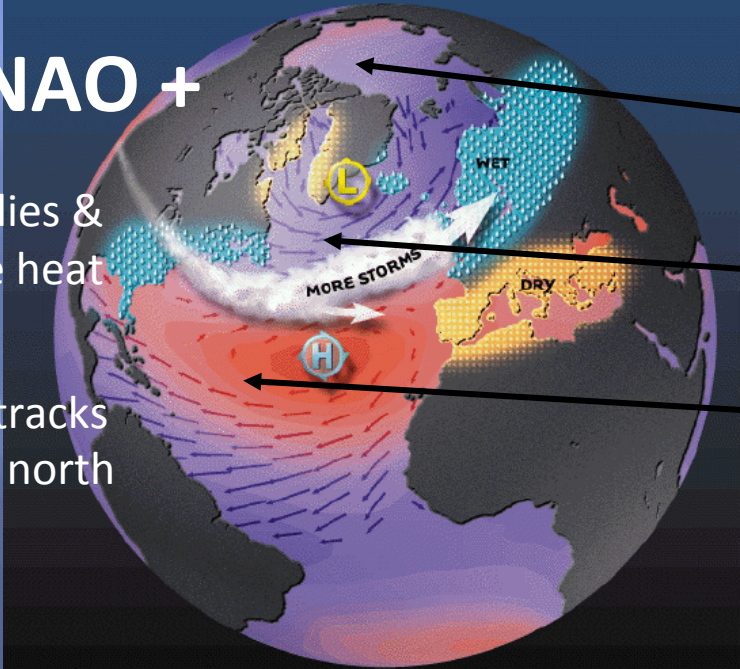
Subtropical thermocline shoals  
 $T^{\circ}, S$  content  $\downarrow$

**Enhanced cross gyre flows**

## NAO +

Strong westerlies & surface heat fluxes,

Storm tracks shifted north



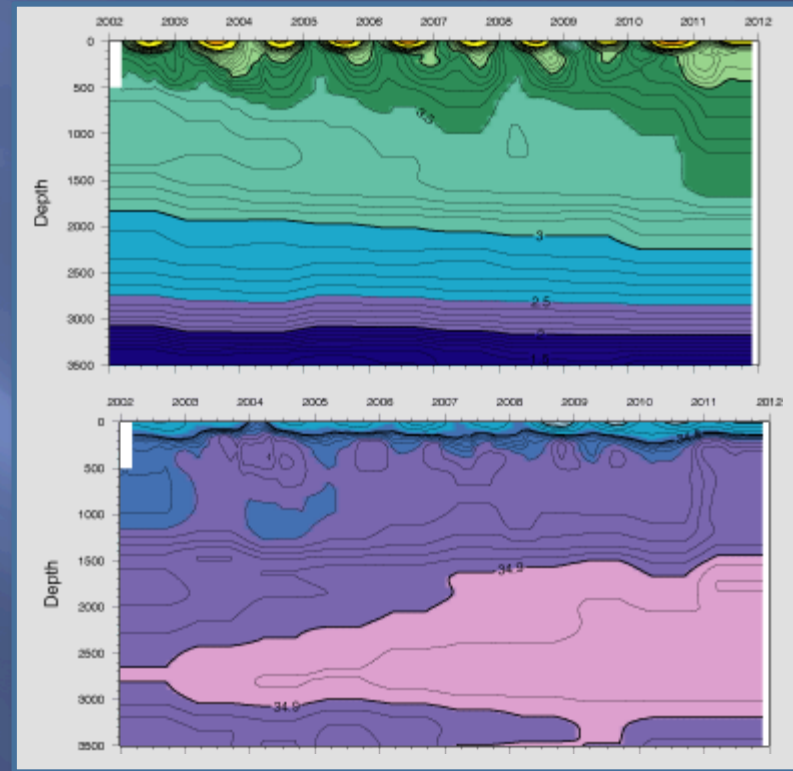
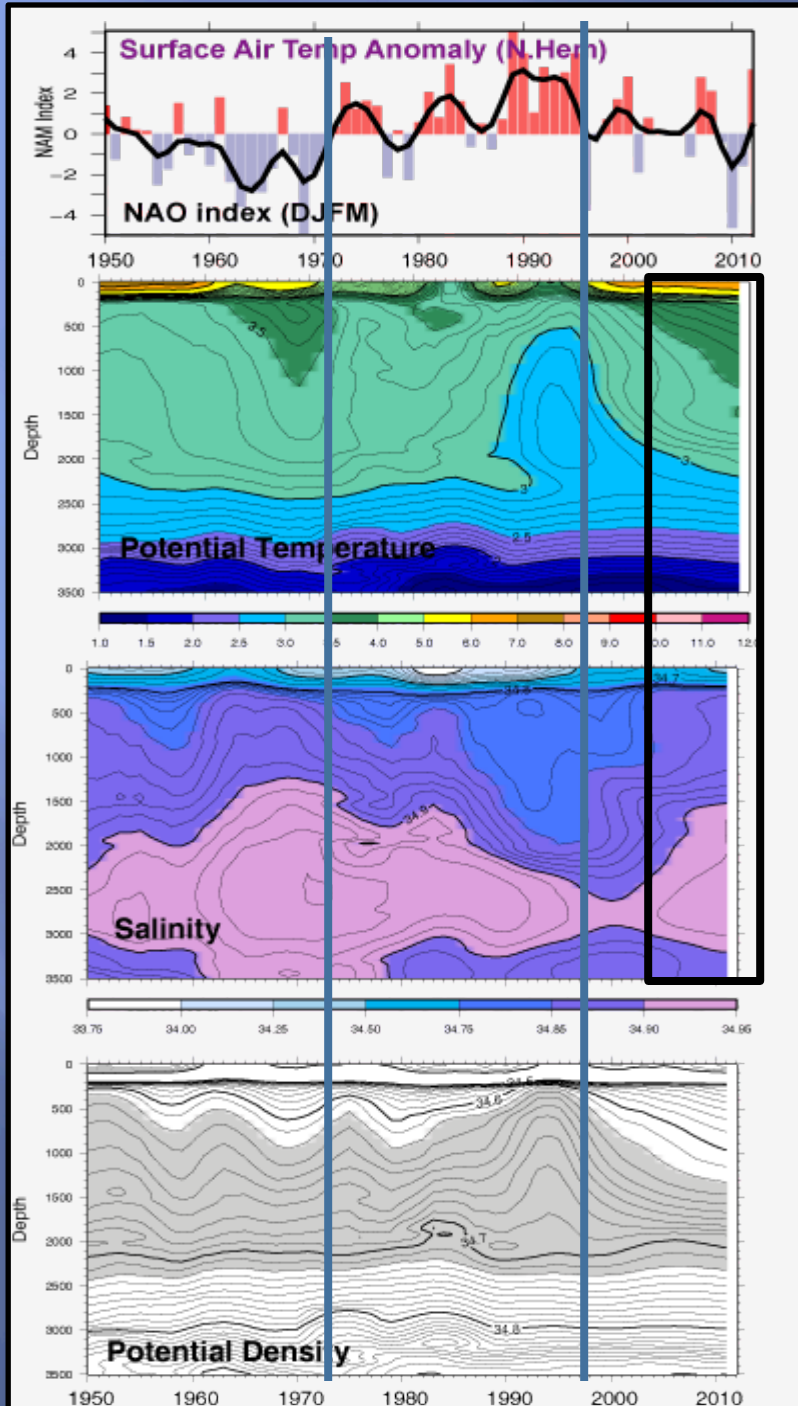
Enhanced export, thinning of Arctic sea ice

Subpolar  $T^{\circ}, S \downarrow$  Density  $\uparrow$

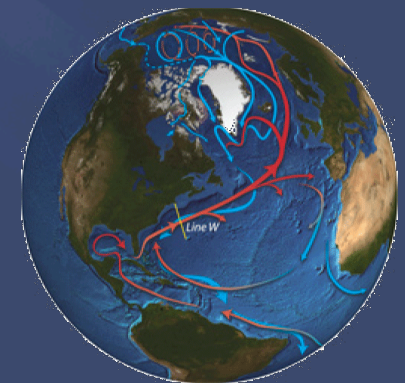
Subtropical thermocline deepens  
 $T^{\circ}, S$  content  $\uparrow$

**Reduced cross gyre flows**

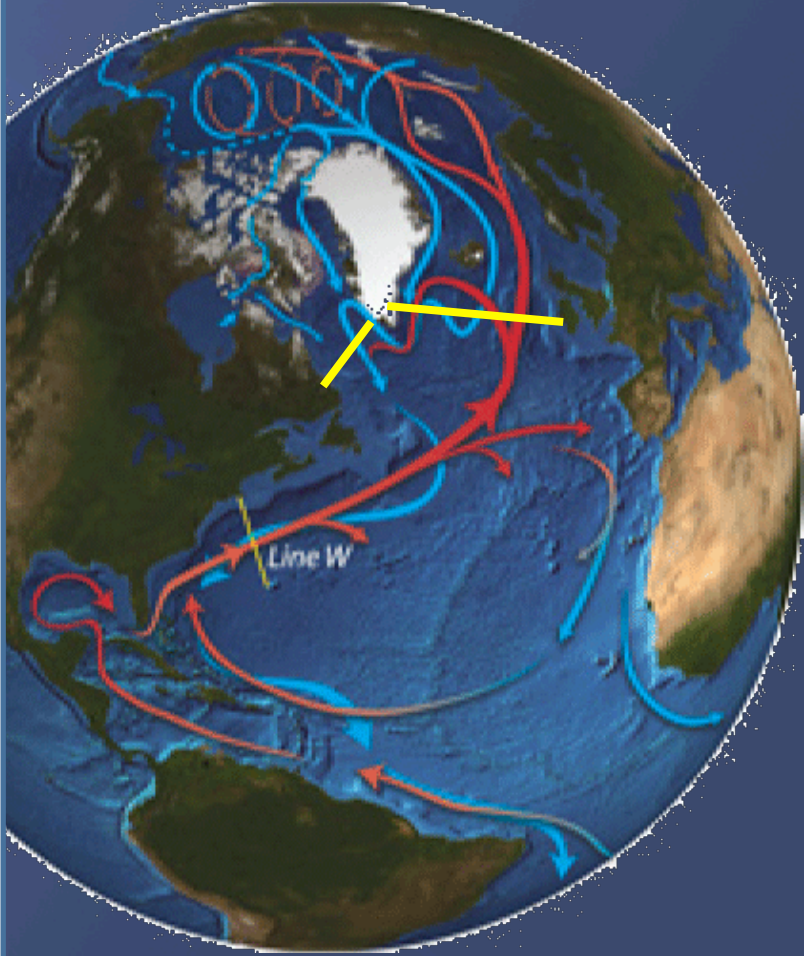
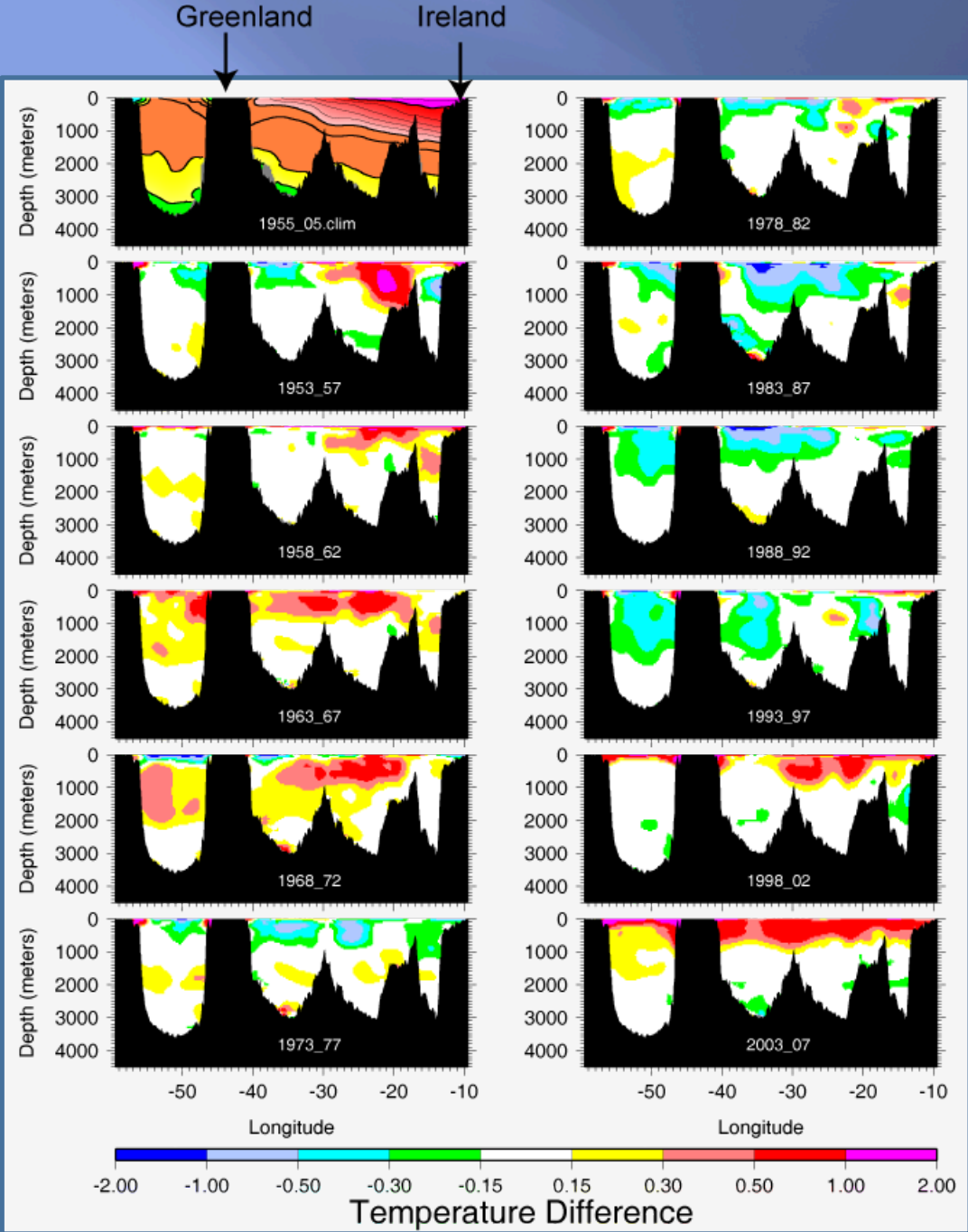
# Subpolar Gyre Properties



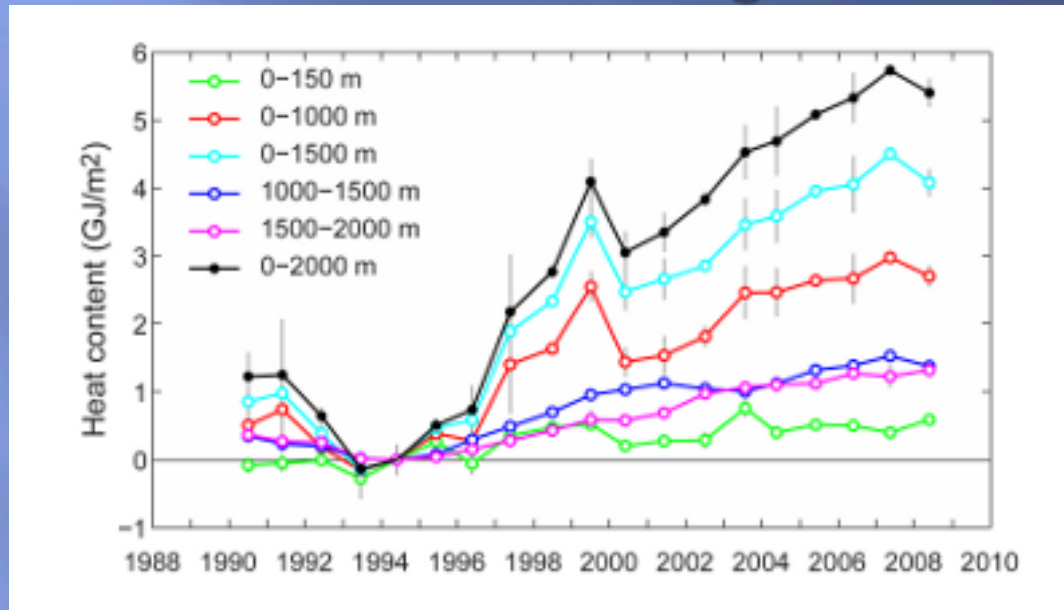
The last 10 years....



# Subpolar Gyre Properties

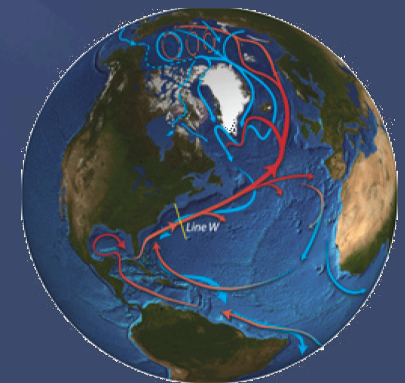
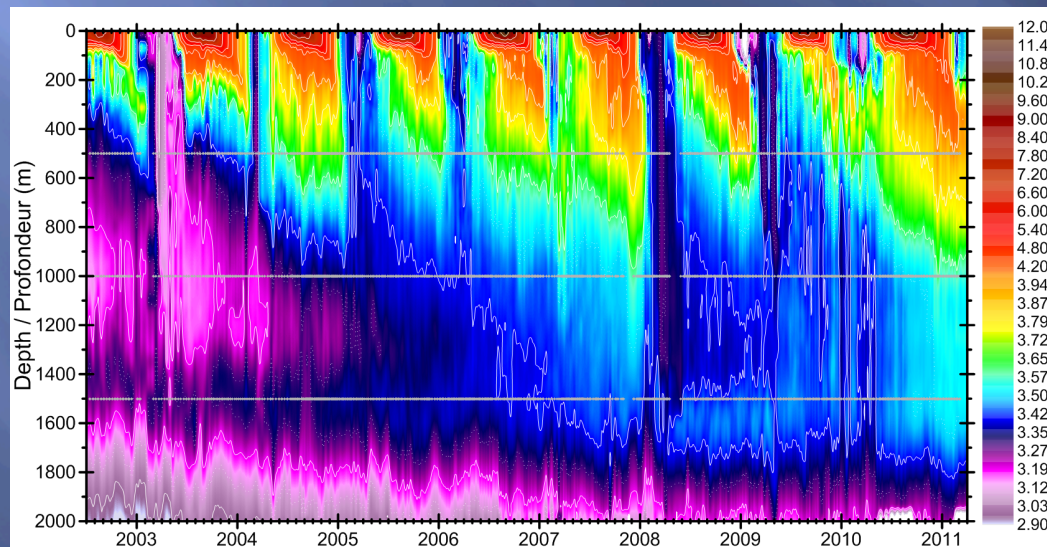


# Heat content of the entire subpolar gyre's upper 2000 m has been rising since the mid 1990s

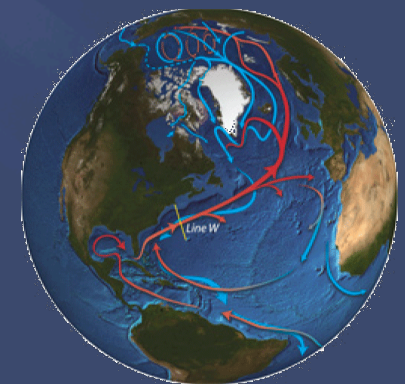
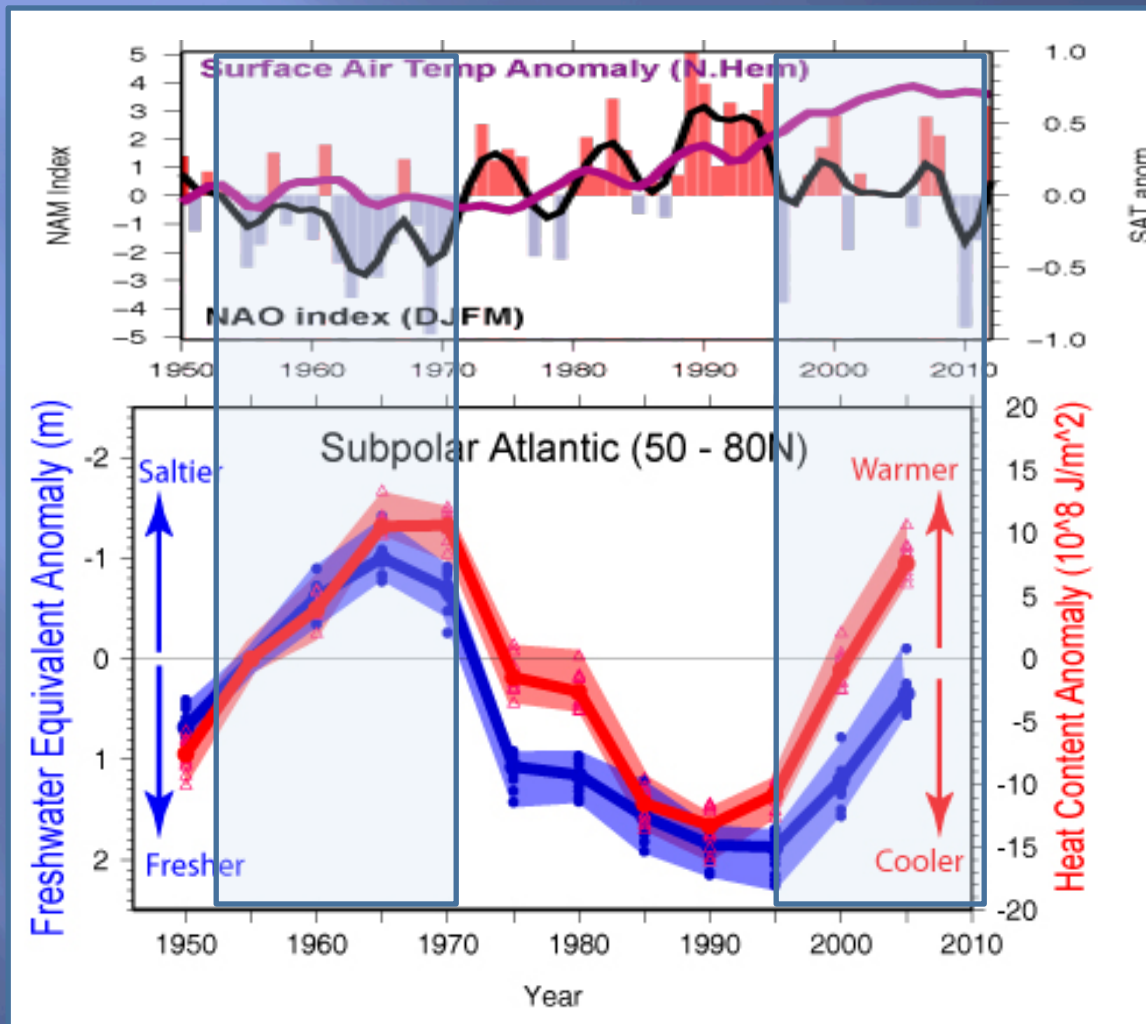


Argo floats now permit monthly resolution of temperature and salinity in regions where measurements are difficult

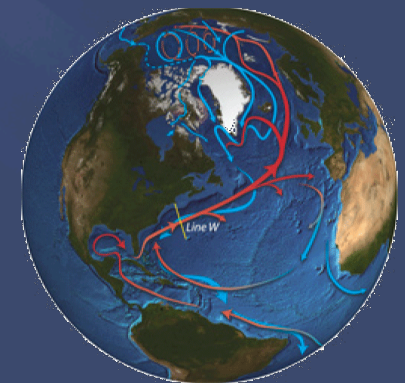
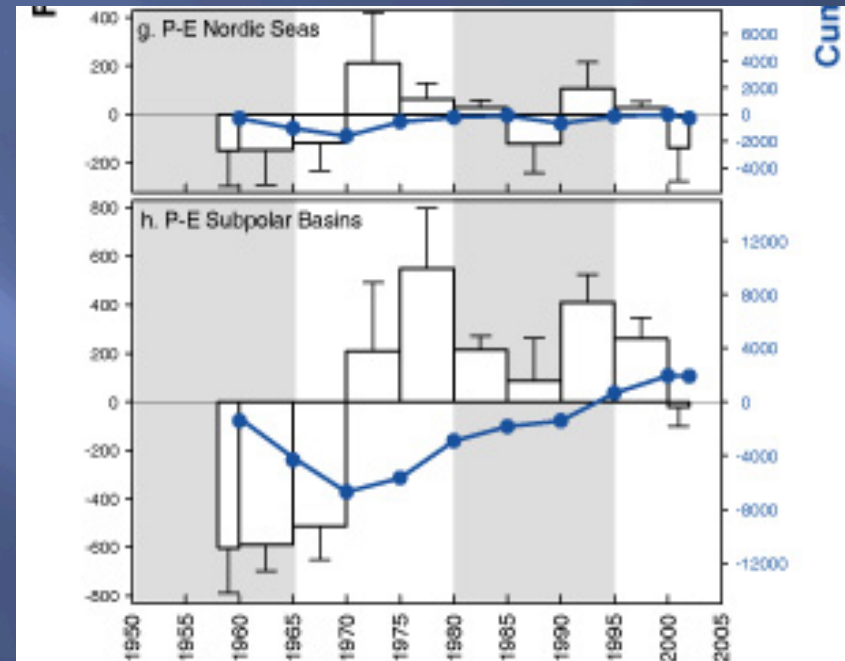
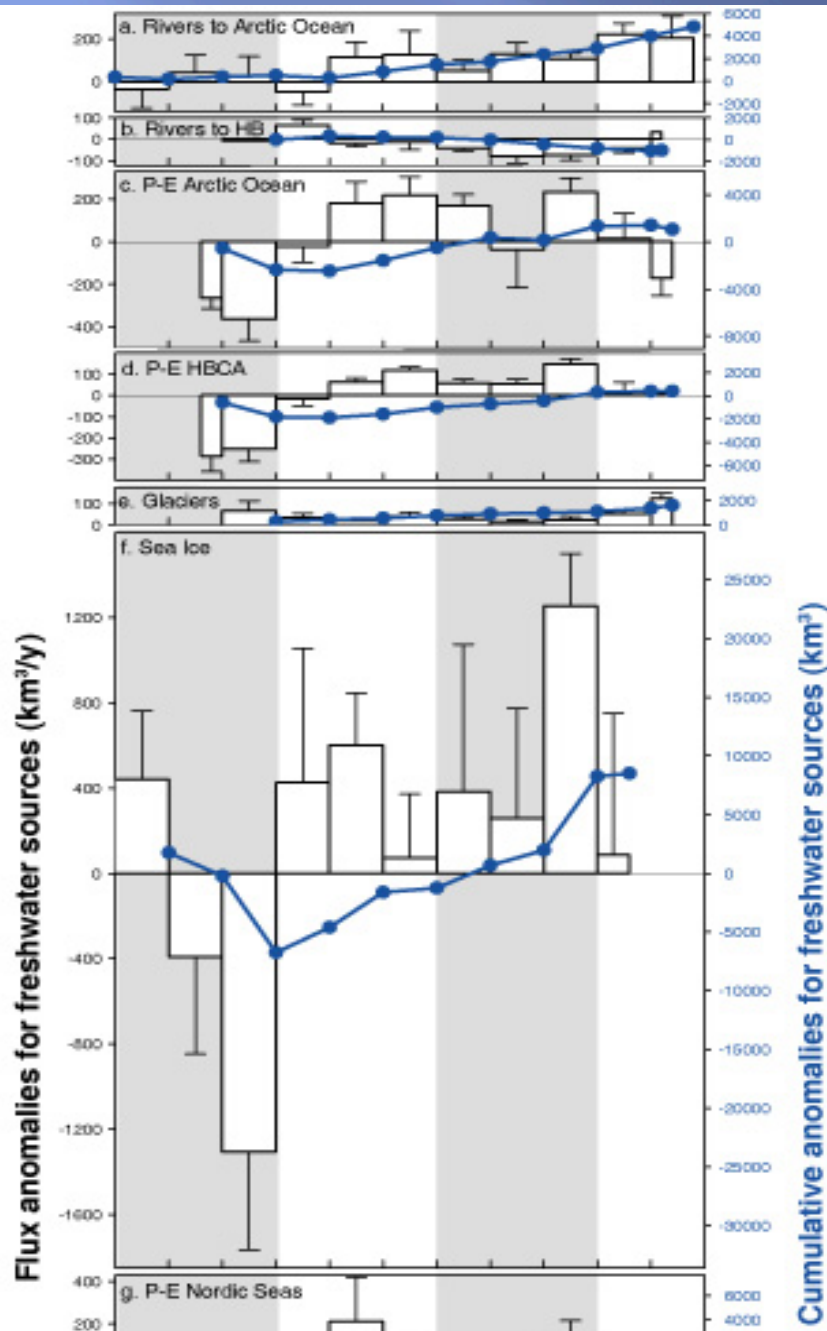
Courtesy of I. Yashayaev



# The NAO strongly influences heat and FW content in the subpolar seas

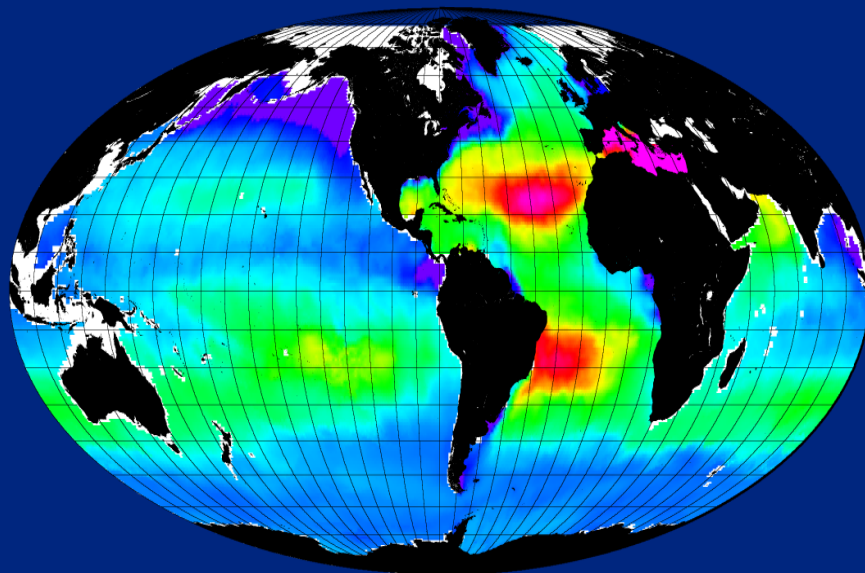


# High latitude FW sources

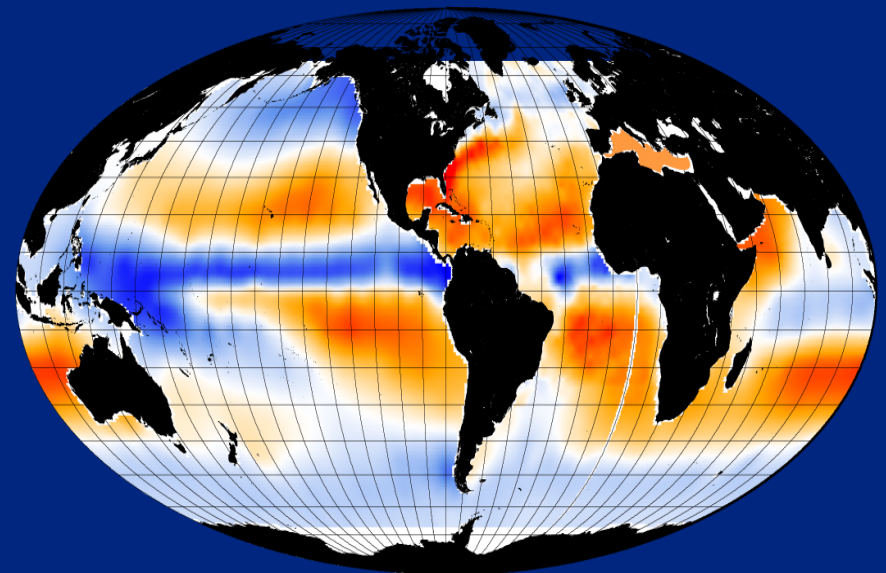


Peterson *et al.* (*Science*, 2006)

# Subtropical gyre is source of warm, saline waters



30.0 33.0 35.0 36.0 36.5 37.0 37.5 39.0  
Sea Surface Salinity



-200 -100 0 100 200 cm/yr  
net Precipitation net Evaporation

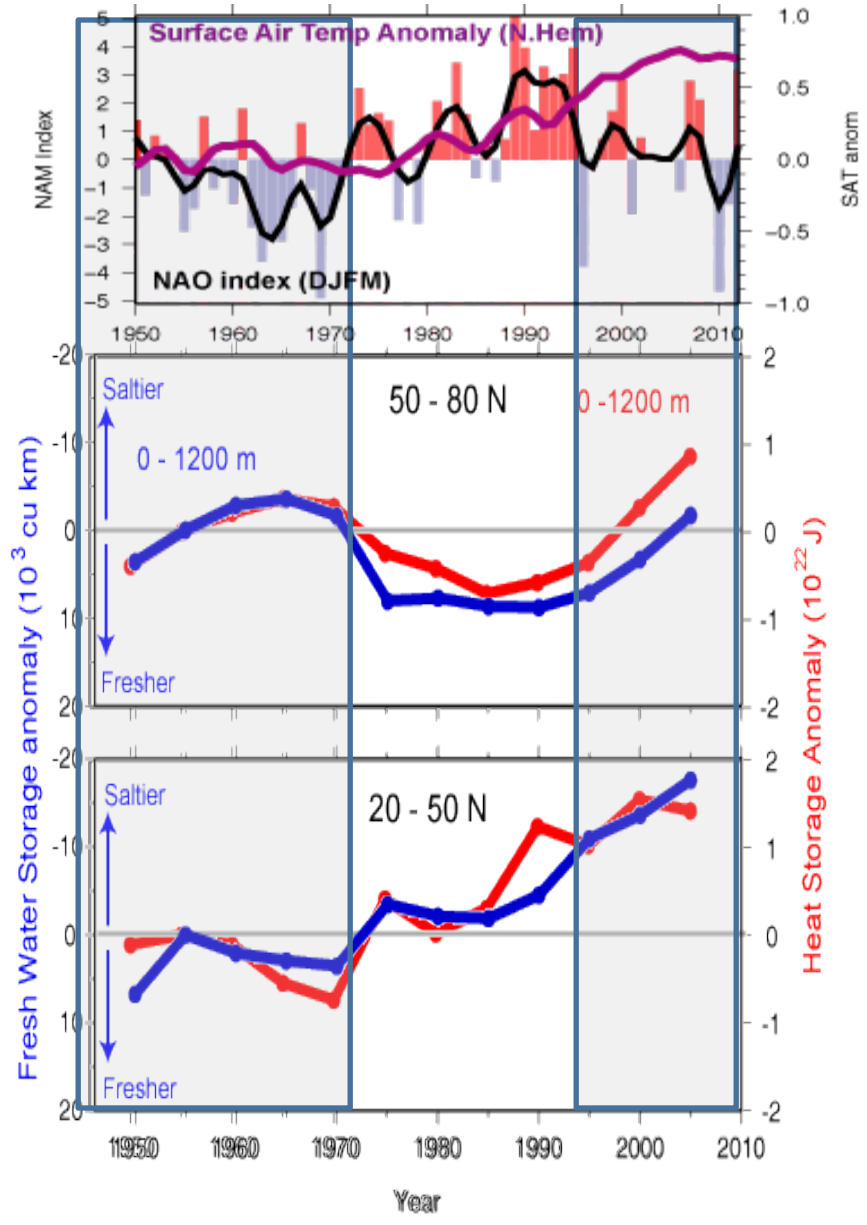
Evaporation minus Precipitation (E-P)



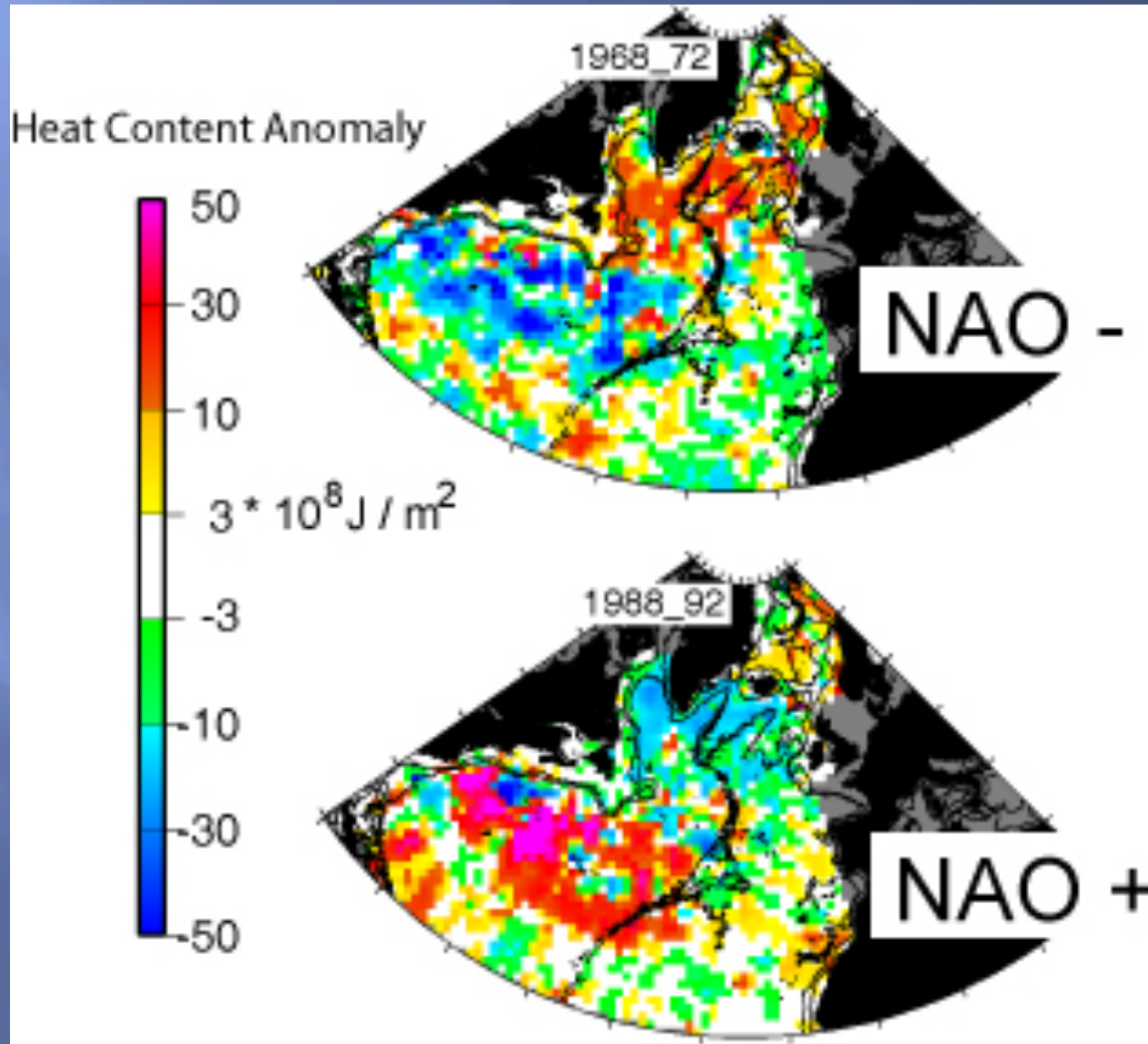
Volumetric  
heat and fresh  
water content  
anomalies

Subpolar Basins

Subtropical Basins



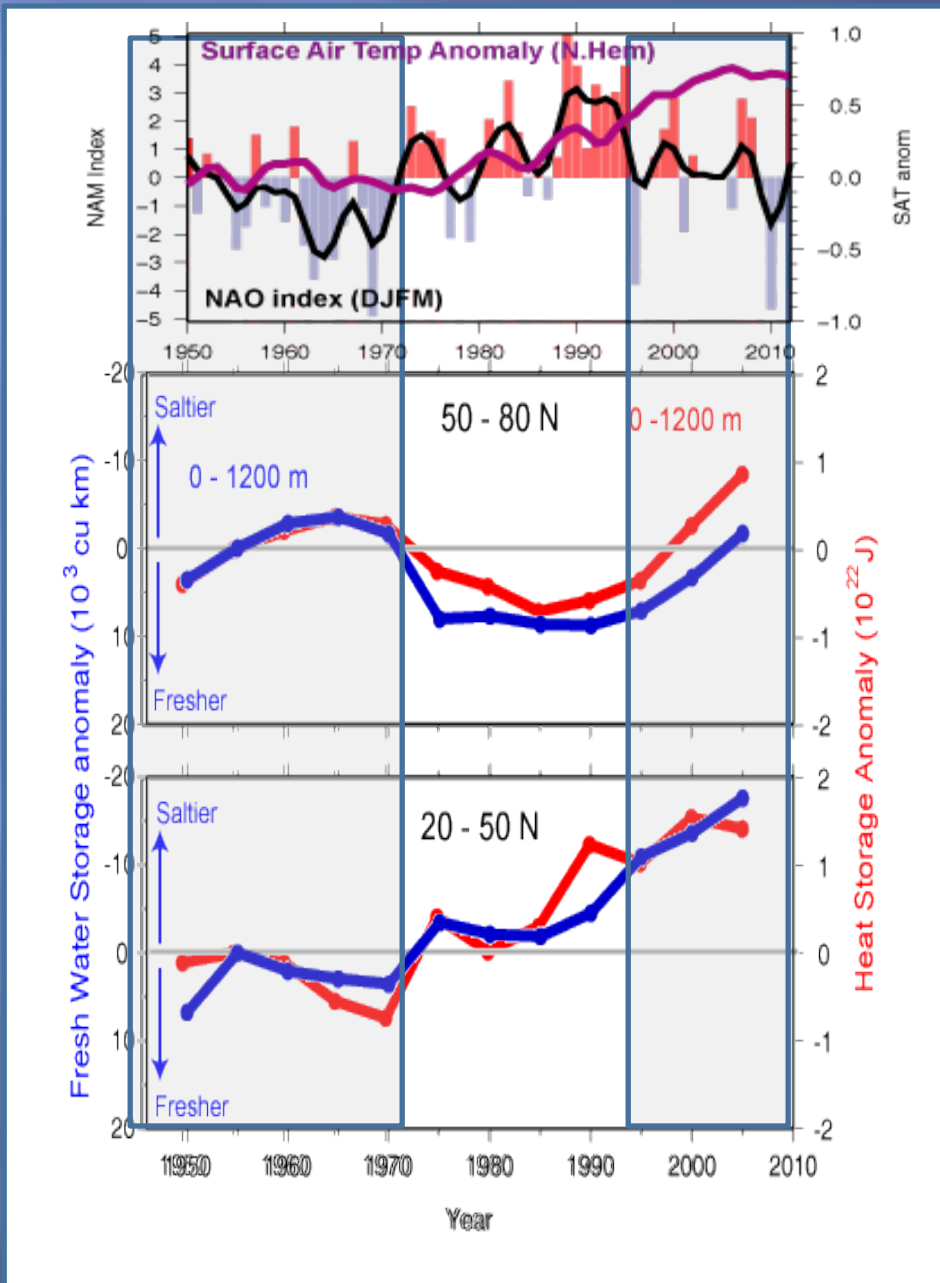
# Subpolar / Subtropical NAO dipole



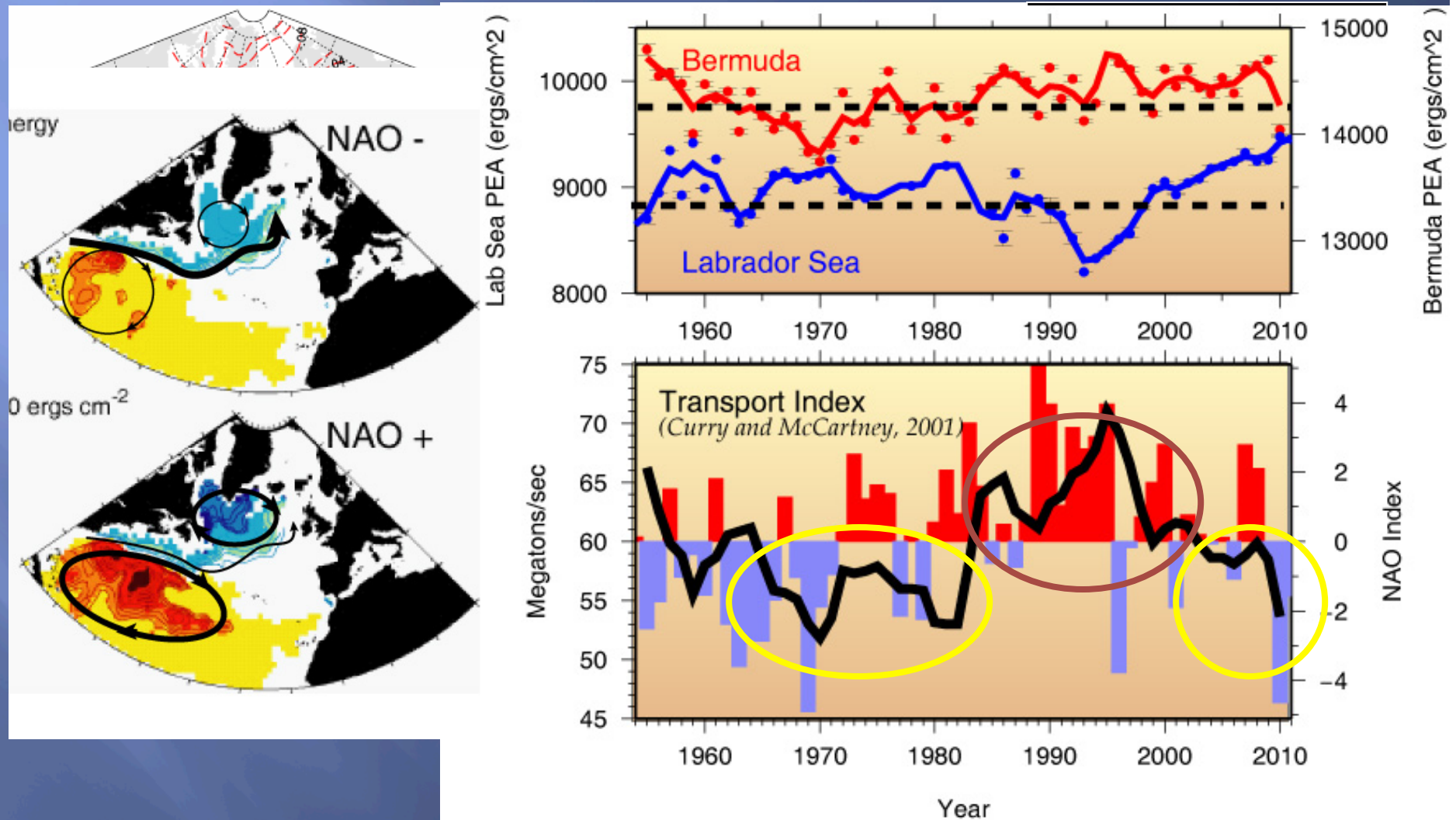
Volumetric  
heat and fresh  
water content  
anomalies

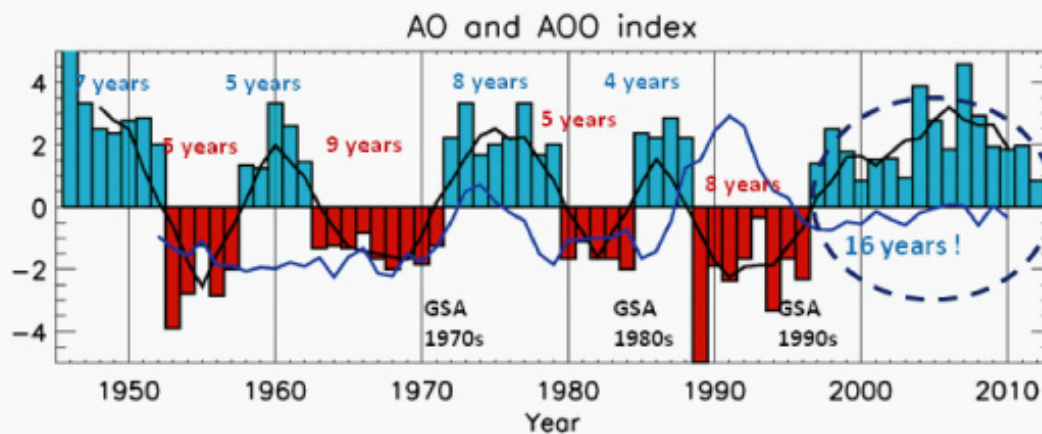
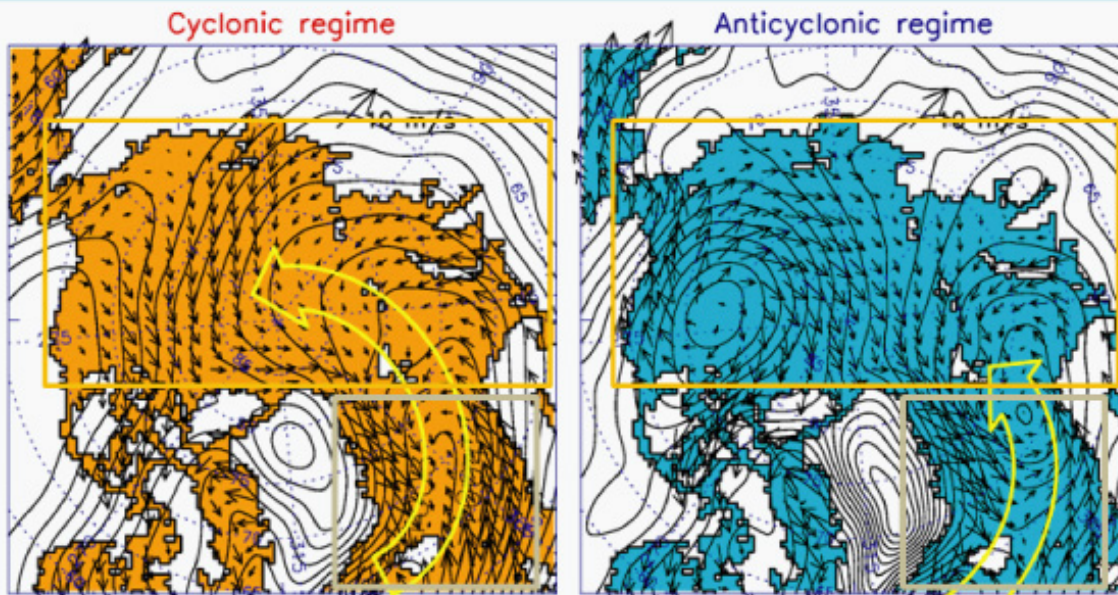
Subpolar Basins

Subtropical Basins

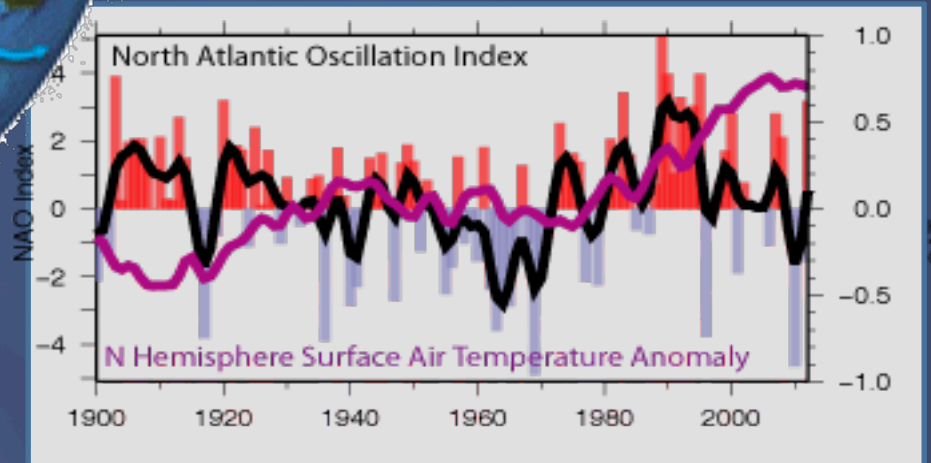
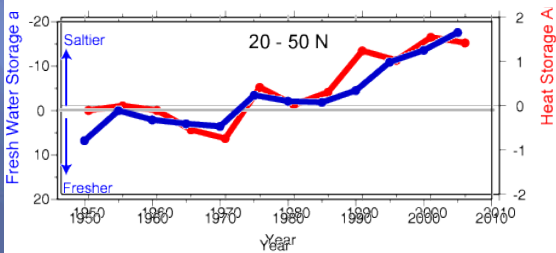
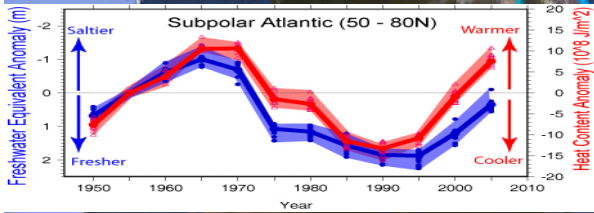
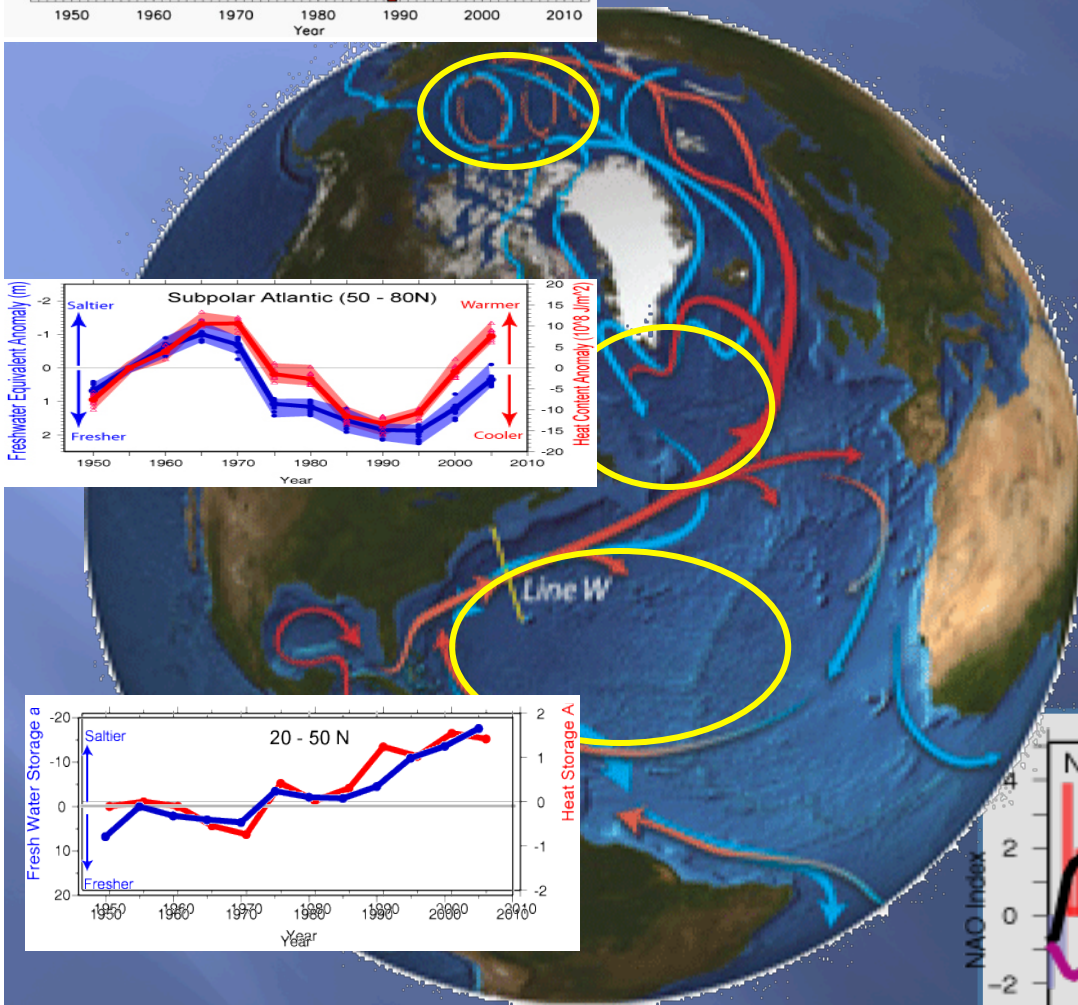
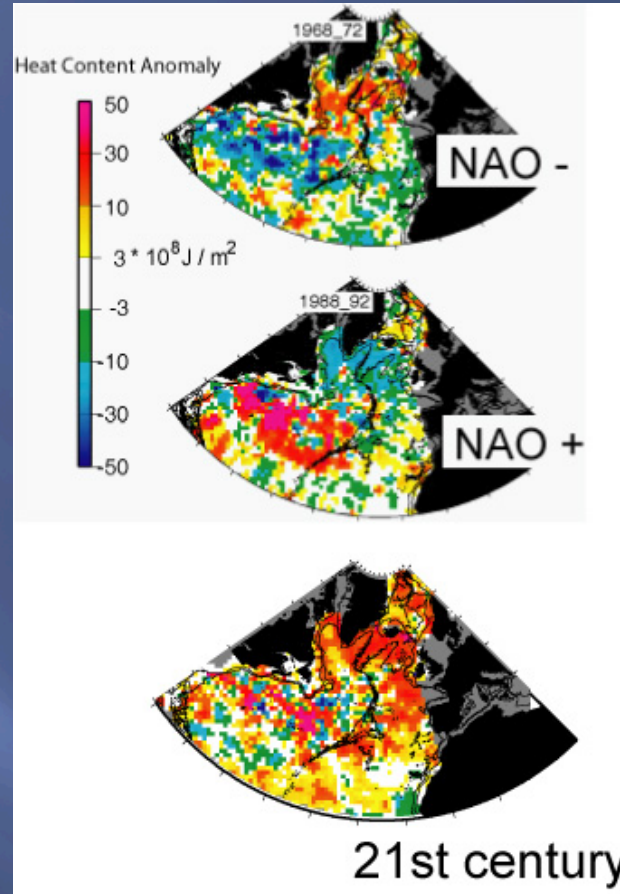
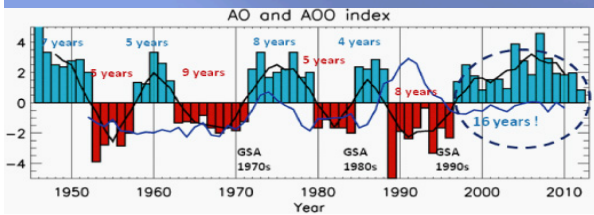


# NAO modulates strength and geography of the subpolar and subtropical gyres.





The Arctic's Beaufort Gyre has alternately accumulated and released FW into the North Atlantic. It has exhibited a persistent anticyclonic phase (accumulating FW) since the mid 1990s, even though the NAM has not been particularly pronounced.



Year