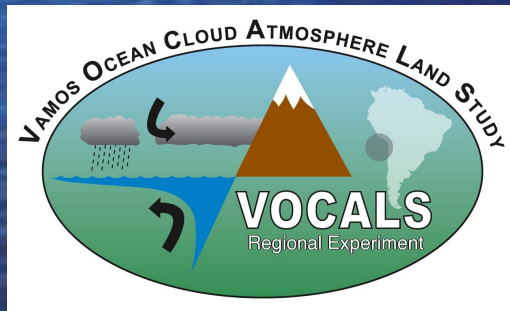


OCEAN PROPERTIES ACROSS THE SEP:

The role of oceanic processes on mixed layer depth and temperature

Fiamma Straneo, Carlos Moffat and Robert Weller



SUMMARY of LEG 2 Ocean Measurements

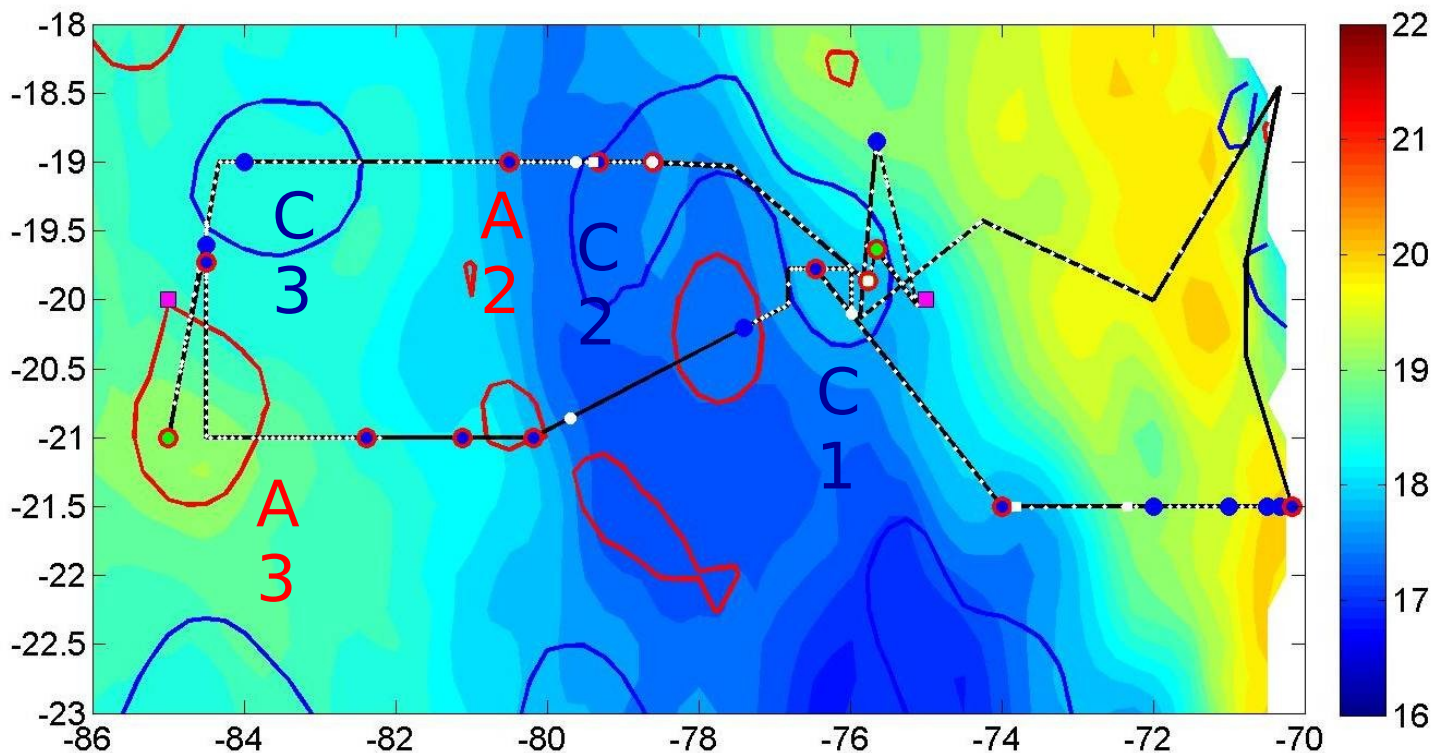
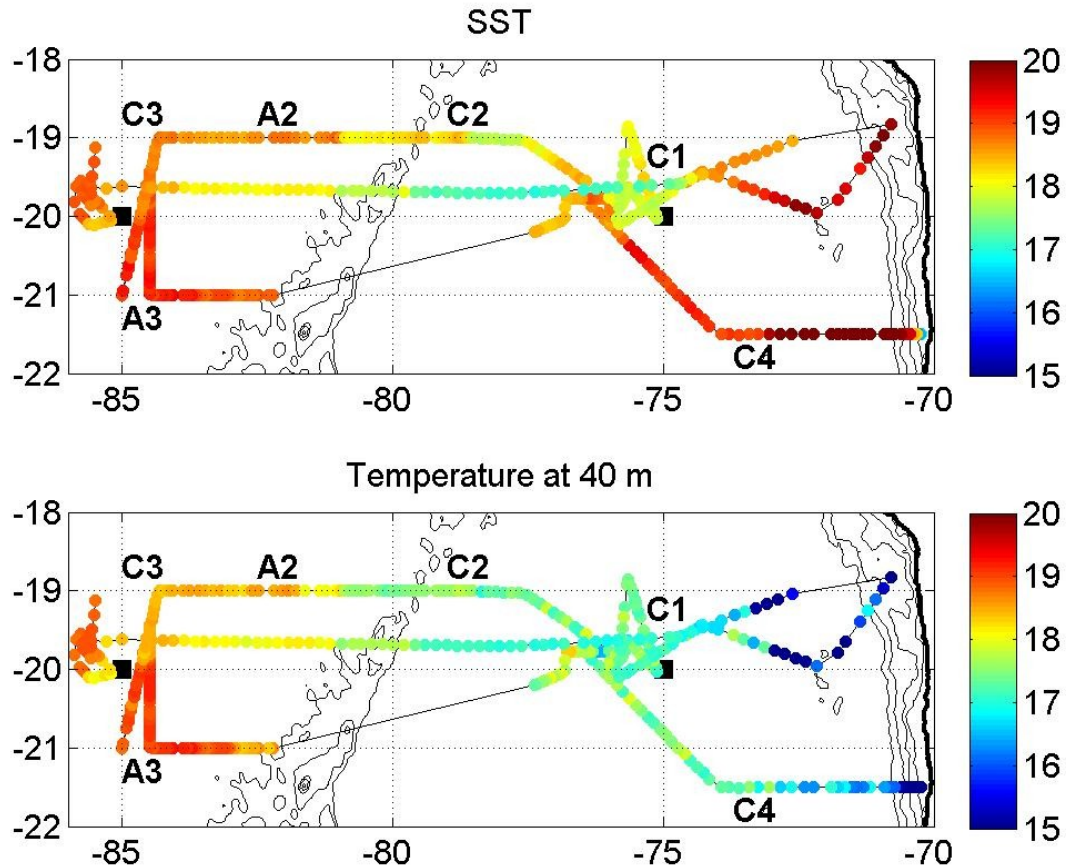


Figure: Brown's trajectory (black) and underway CTD sections (white dash) CTD stations (blue circles), VMP and CTD (blue with red rim), 24 hour monitoring stations (green circles – red rim), float and drifter deployments (white squares and circles), green circles Background field is SST from November 18th. Red and blue contours show the positive and negative 5 cm sea-surface height.

Oceanic Processes which affect SST

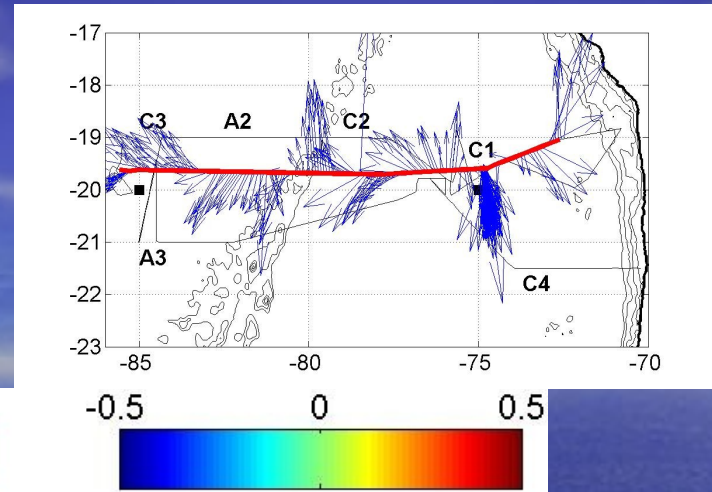
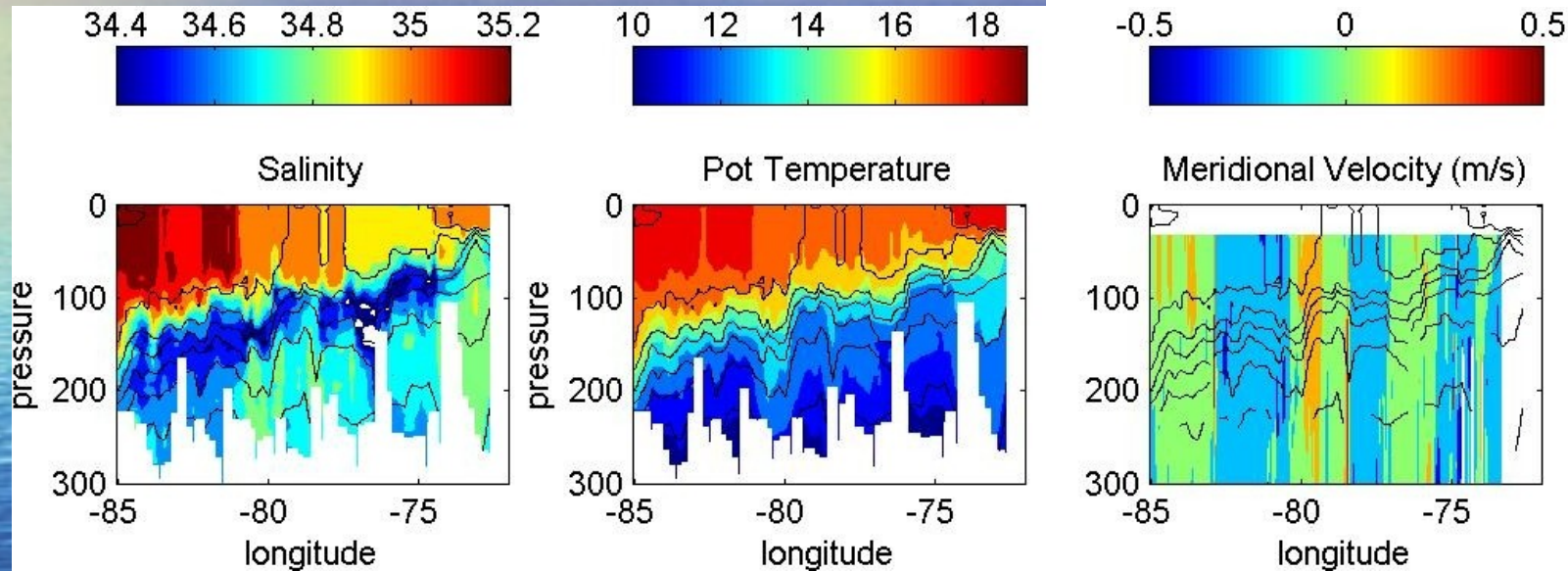


Cautionary Remark:

SST is strongly influenced by short term atmospheric variability

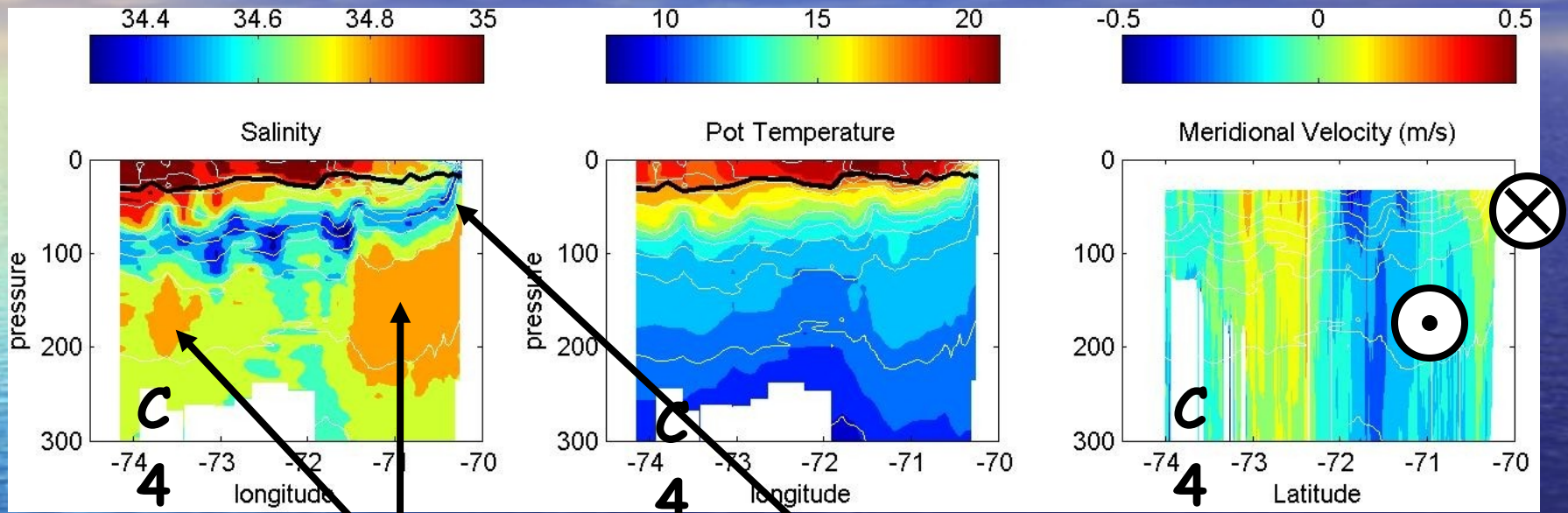
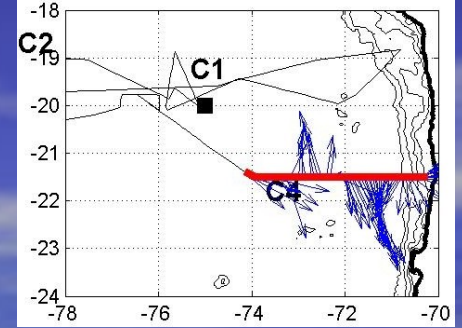
A better indicator of upper ocean heat content is the mixed layer temperature

Zonal Variations Across the SEP



1. Shoaling of the thermocline (W to E)
2. Salinity Decrease (W to E)
3. Shallower Mixed Layer (W to E)
4. Large flow variability

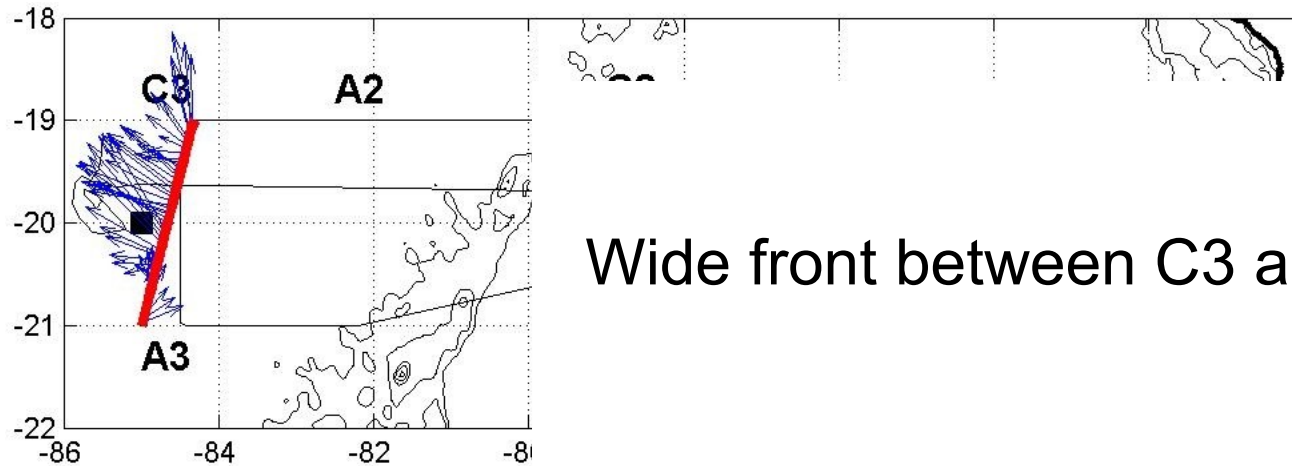
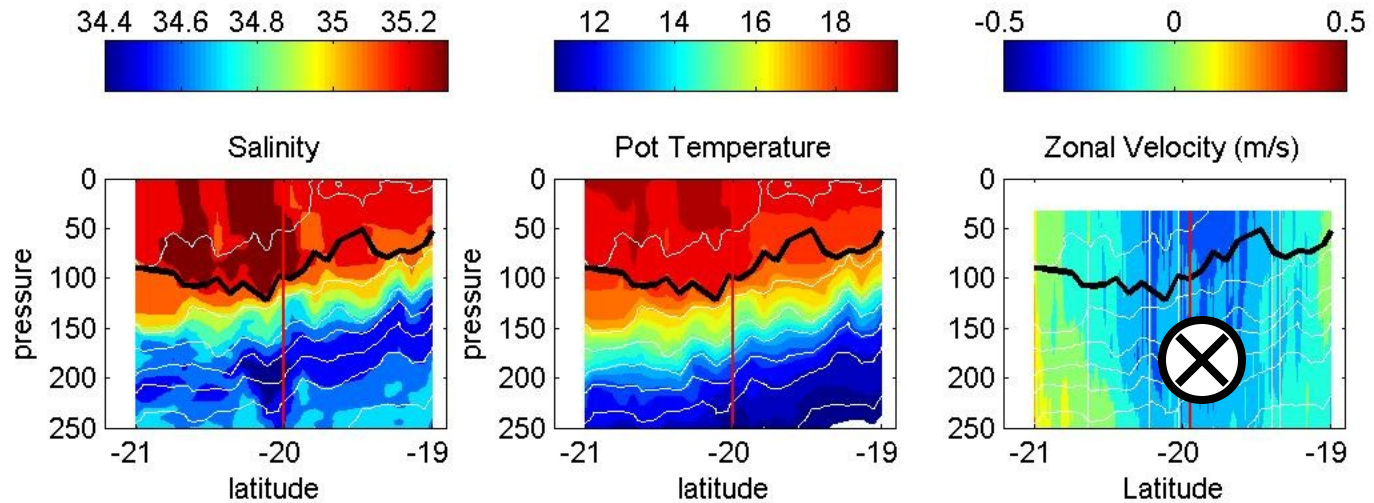
Coastal Upwelling Region



Cyclone has the same warm, salty sub-surface core as boundary current

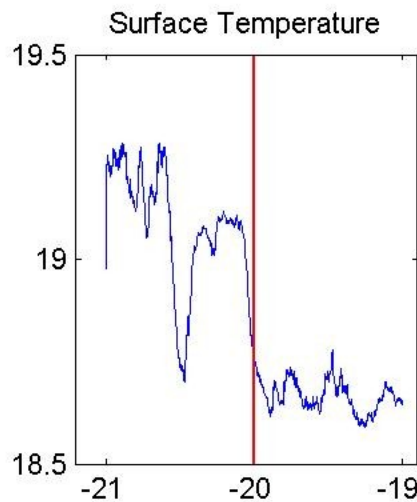
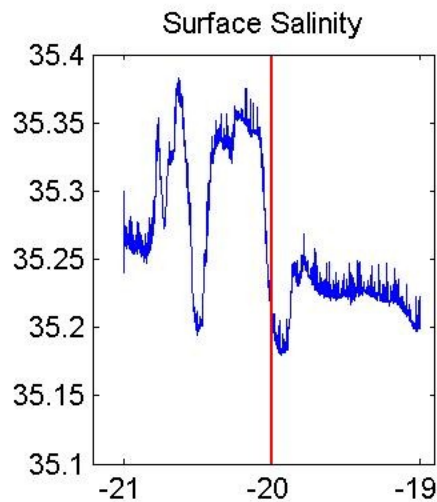
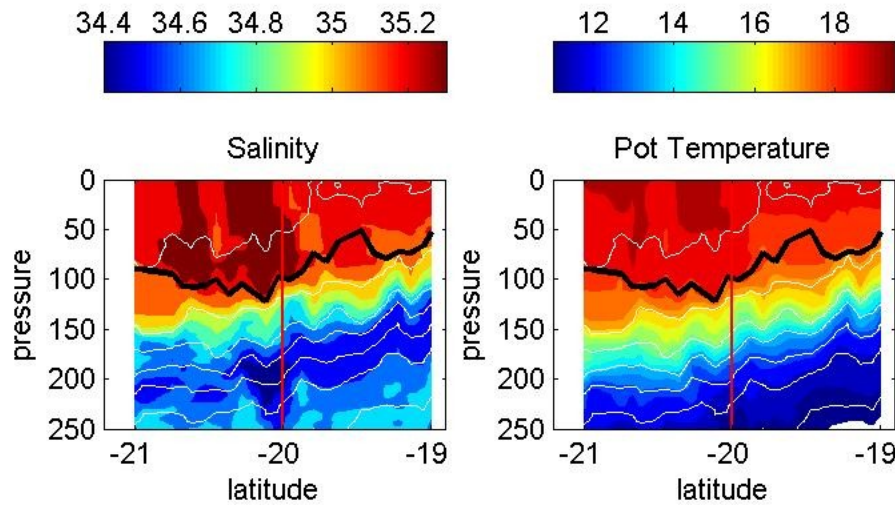
Upwelling of salinity minimum at the coast

Fronts



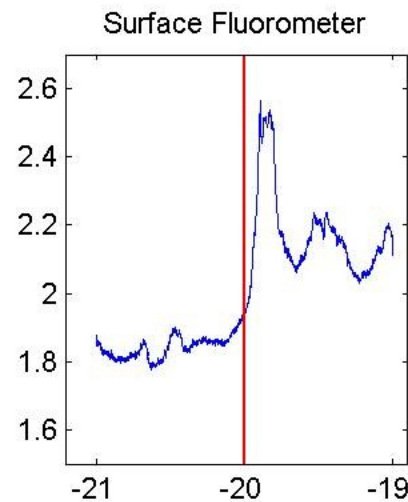
Wide front between C3 and A3

Fronts

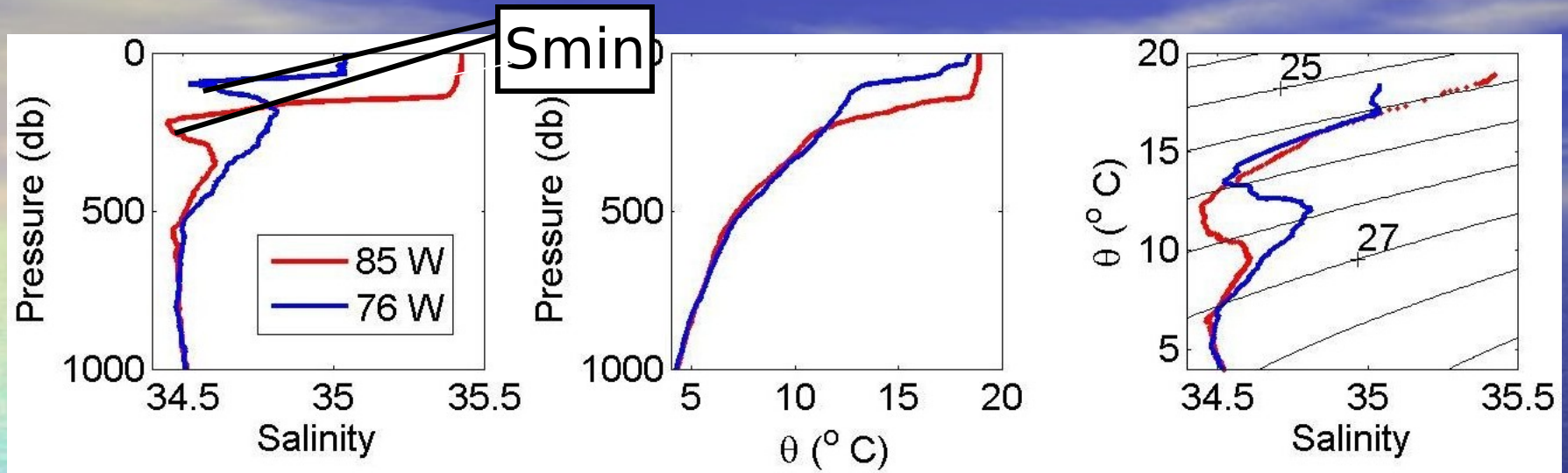


Front is associated with

- Strong jet
- sharp gradients in SST, SSS
- peak in fluorescence
- peak in seawater DMS



Oceanic Vertical Structure in the SEP



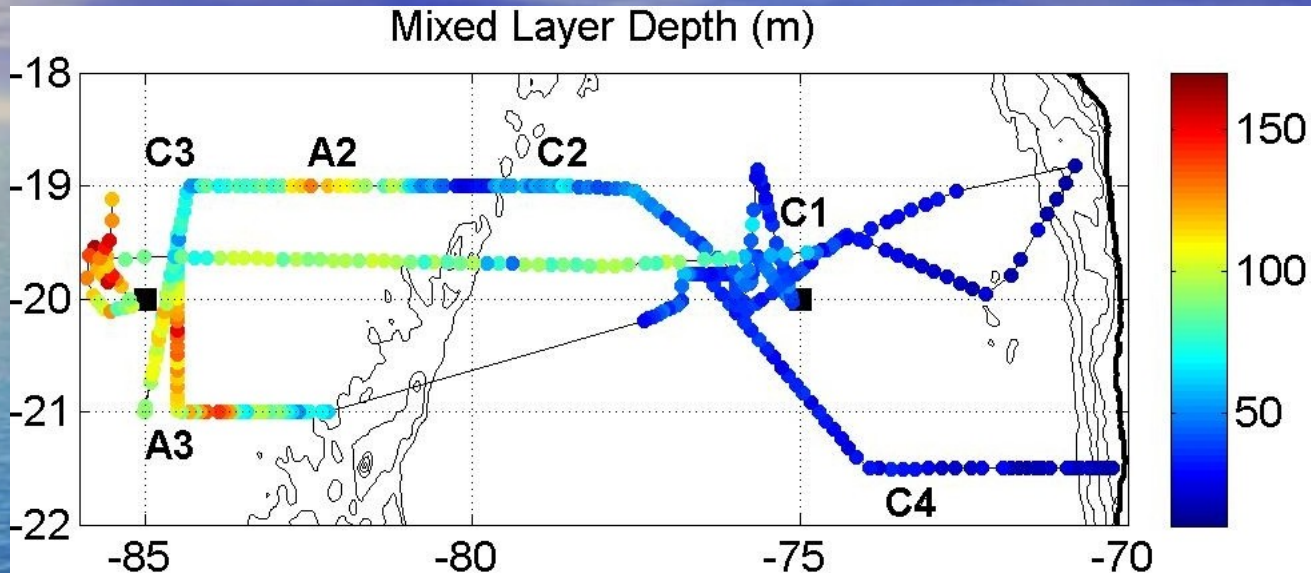
Temperature Structure in a typical SEP Water column

- Mixed layer (warm, salty)
- large temperature gradient at the base of the mixed layer
- salinity minimum at base

Distribution

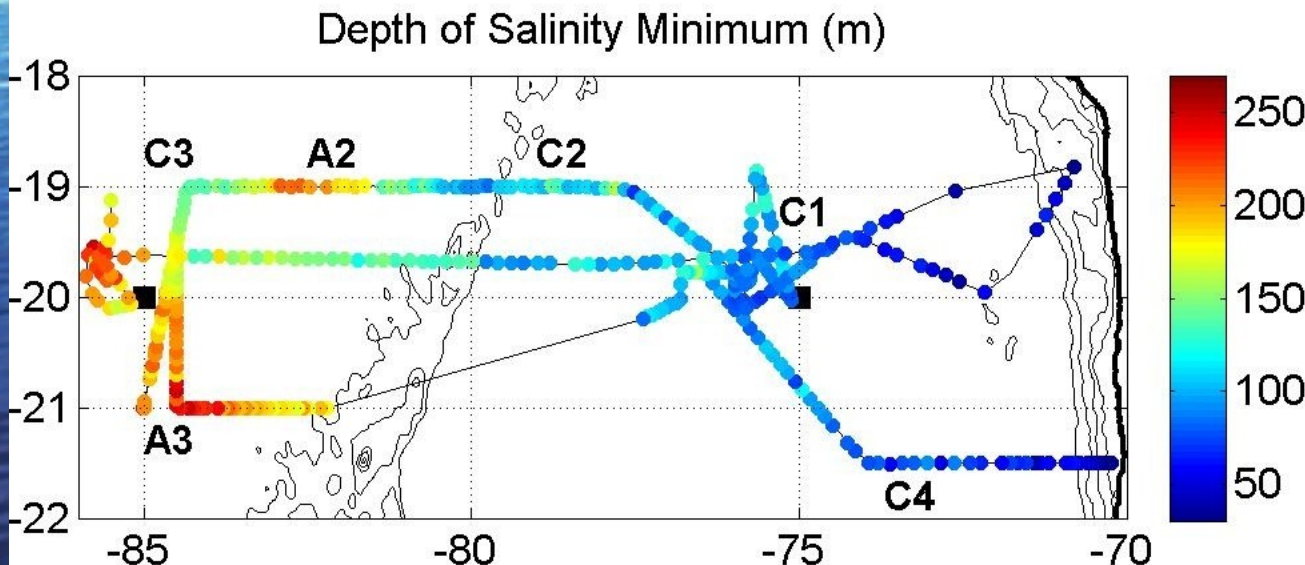
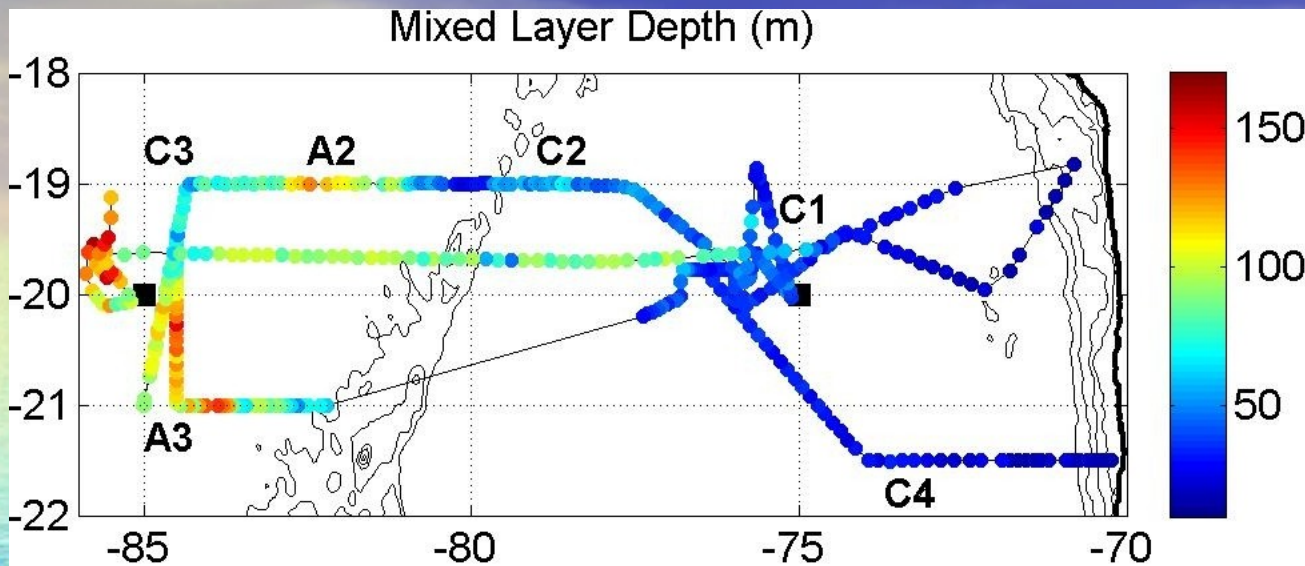
- Deep salinity minimum/warm ml/salty ml W
- Shallow salinity minimum/cold ml/fresher ml E

What controls the Mixed Layer Depth and Temperature ?



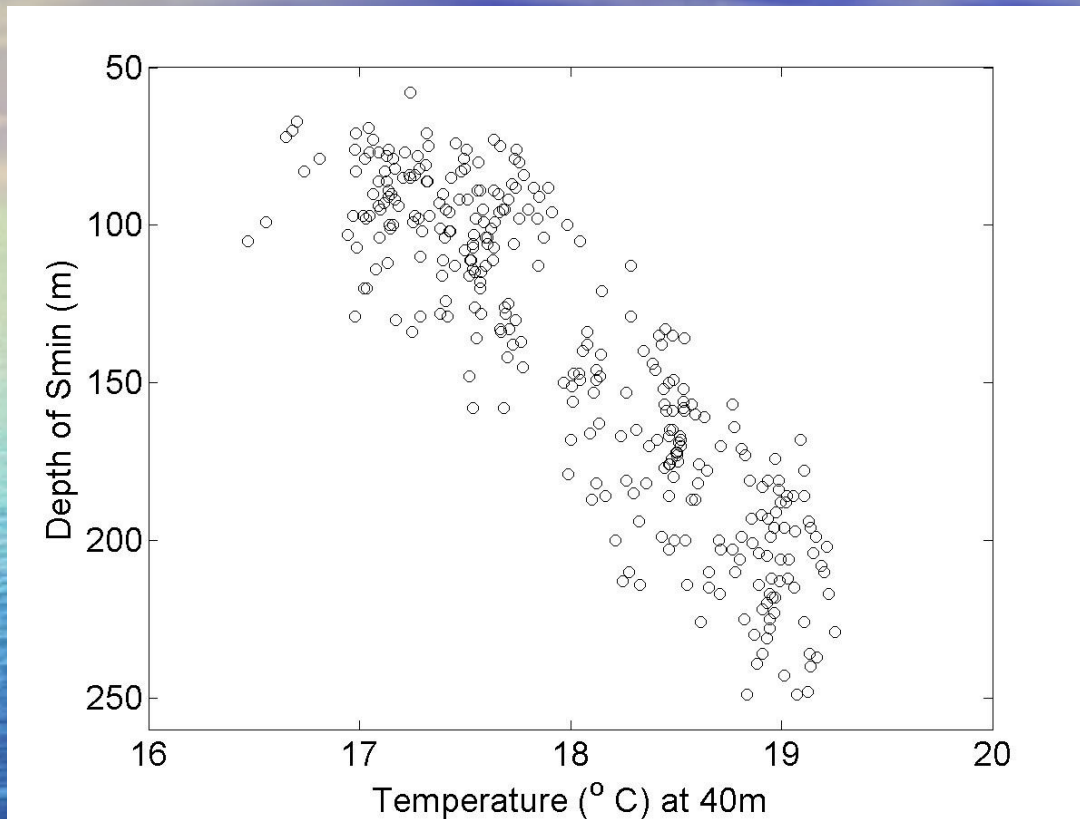
- large MLD range (0-200 m)
- MLD increases westward
- Strong MLD modulation by eddies

Mixed Layer Depth and Depth of Salinity Minimum



Strong Correlation
MLD and Smin (z)

Depth of Salinity Minimum and Mixed Layer Temperature



Strong Correlation
Smin (z) and T(40 m)
(for MLD > 50m)

→ Processes which control the depth of the thermocline (and Smin (z)) also control the temperature within the ML.

Summary

- 1.- MLT is a better indicator of the upper ocean heat content than SST
- 2.- High correlation between $S_{min}(z)$, thermocline depth, SSS, MLD and MLT (SST):
 - shallow thermocline/ $S_{min}(z)$ => shallow MLD, low SSS and MLT (and SST)
- 3.- SEP Properties are strongly affected by
 - Gyre scale shoaling of thermocline
 - Mesoscale eddies and fronts