Climatological Approaches to Environmental Uncertainty in the Middle Atlantic Bight

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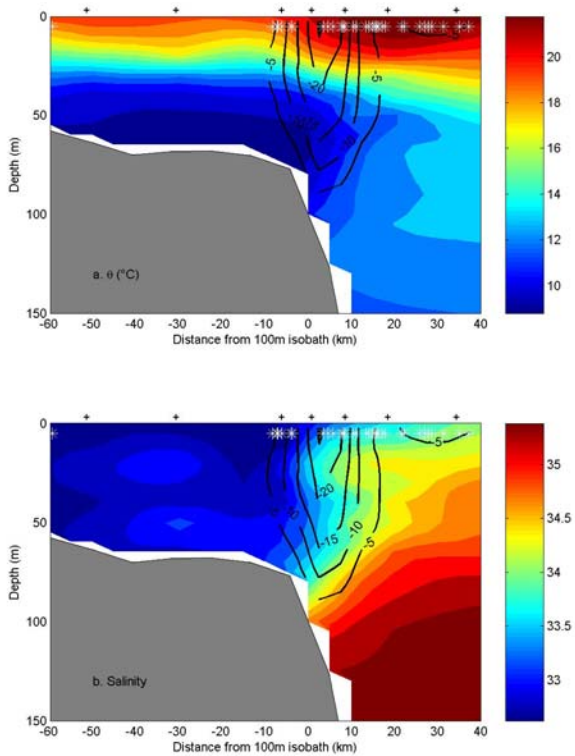
Outline

- Describe Climatological methodology and improvements over previous climatology
- Present regional and seasonal breakdowns of environmental uncertainty “hotspots”
- Comparison with synoptic data from the Shelfbreak PRIMER experiment
- Wind-driven flows near the front and acoustic duct formation

Previous Shelfbreak Climatology

Linder and Gawarkiewicz, JGR-Oceans, 1998

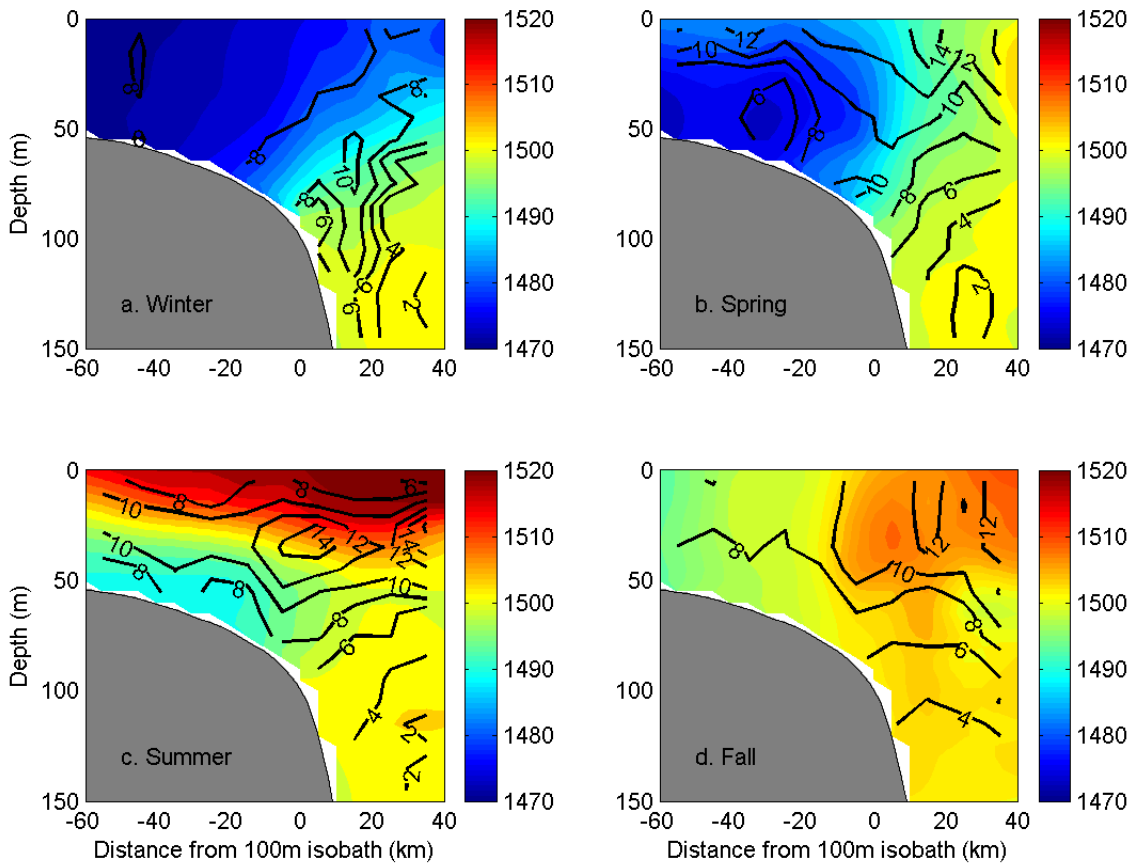
- Cross-shelf sections only
- Depth-bin averaging
- Bi-monthly averages
- Not focused on sound speed variations
- Limited data (NODC submissions)



New Methodology

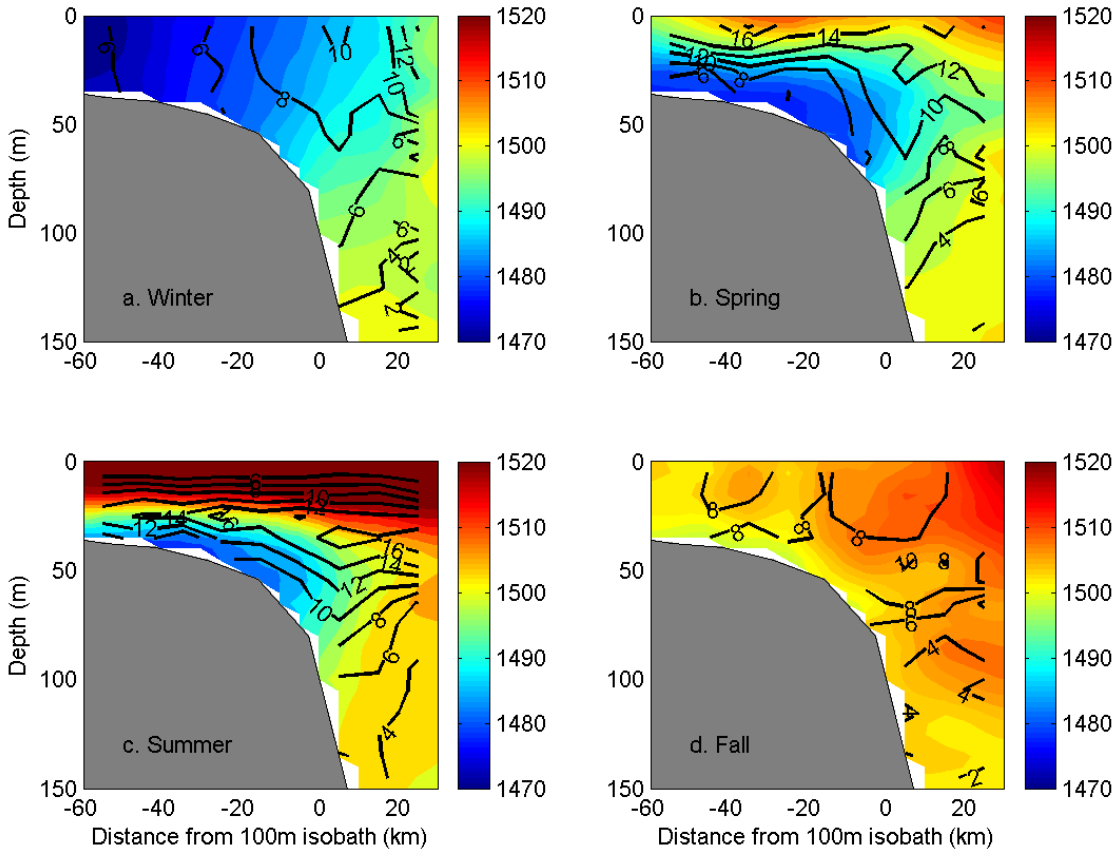
- Significantly greater amount of data (NMFS) and higher resolution in vertical
- Binned by distance from shelfbreak
- Spatial maps for near-surface, mid-depth, and 80-100 m (foot of shelfbreak front)
- Seasonal averaging

New England Shelf



Soundspeed- Means are color, Standard Deviations are contoured black lines

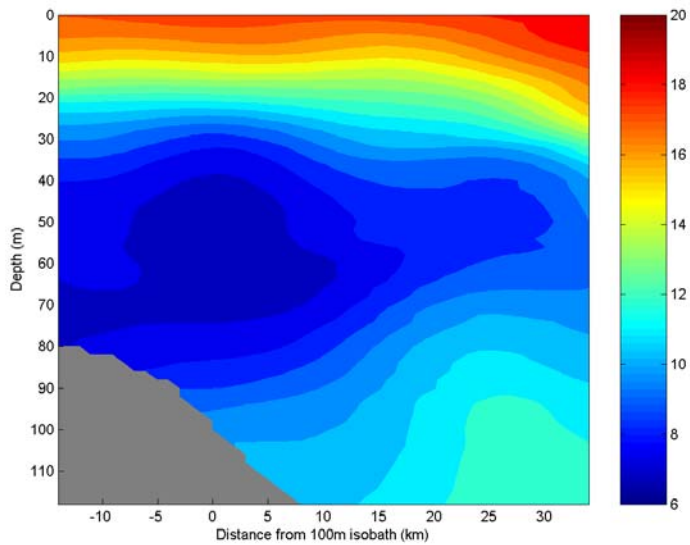
New Jersey Shelf



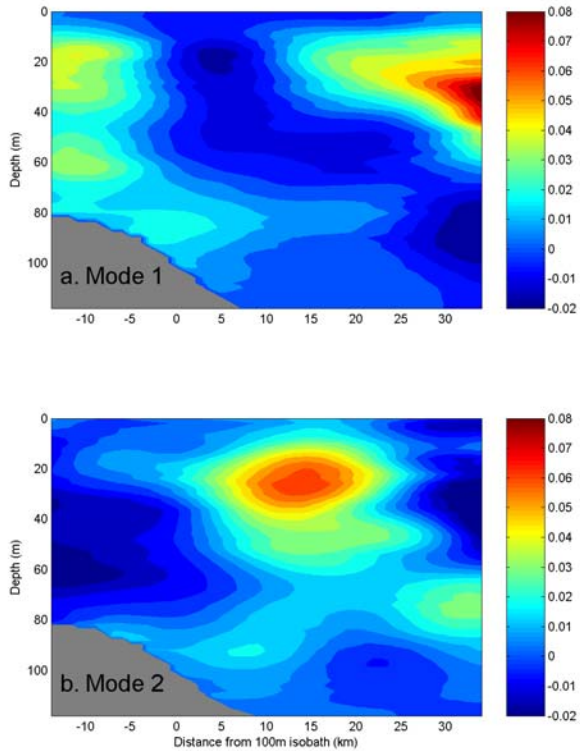
Broad maximum across shelf during spring due to buoyant plumes

Synoptic Comparison

Mean Summer PRIMER



First two EOF modes



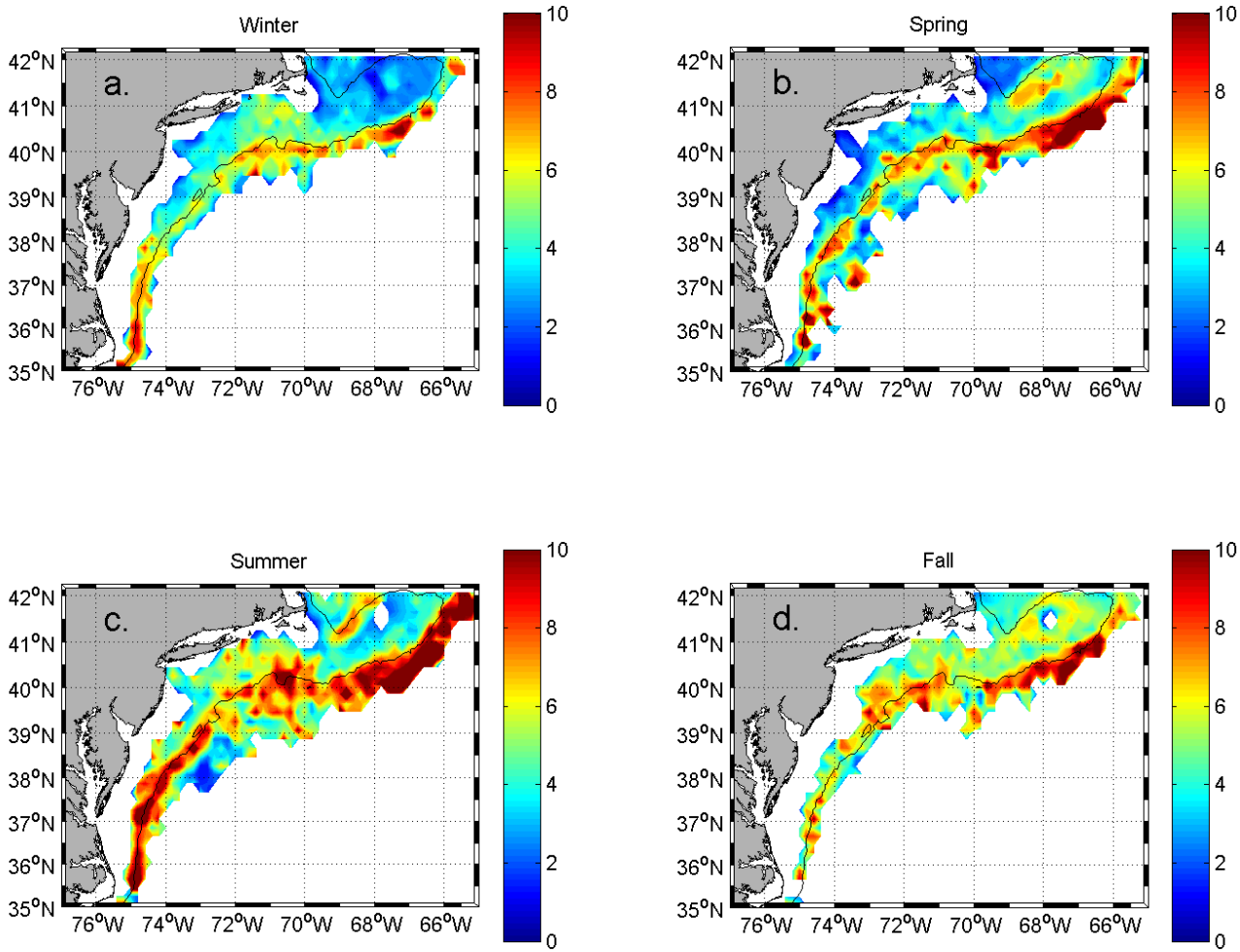
43% Of variance

28% Of variance

Dominant physical process- Frontal meandering

Period= 4 days Wavelength= 40 km Phase Velocity= 11 cm/s

Middle Atlantic Bight Mid-depth



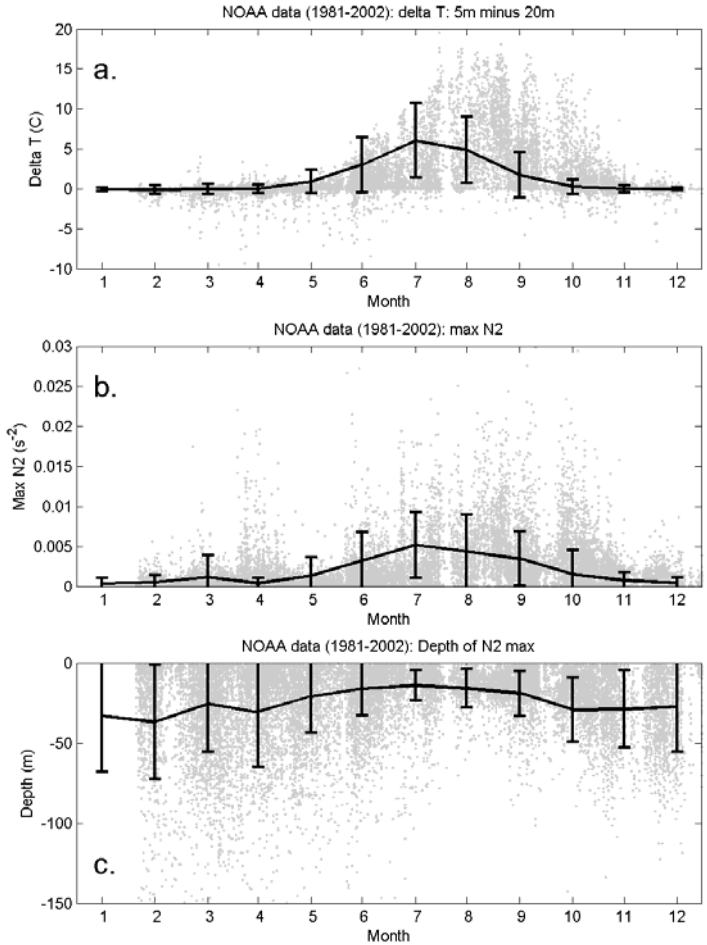
Greatest Uncertainty is at the shelfbreak

Seasonal Progression

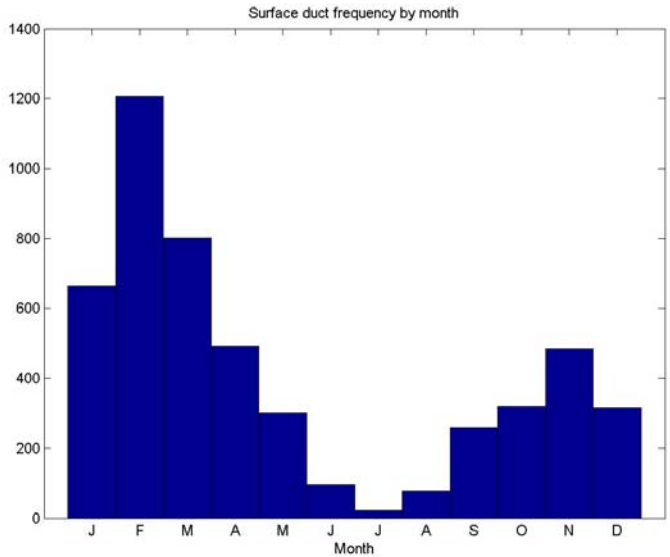
Temperature difference
5 m depth – 20 m depth

Maximum Stratification

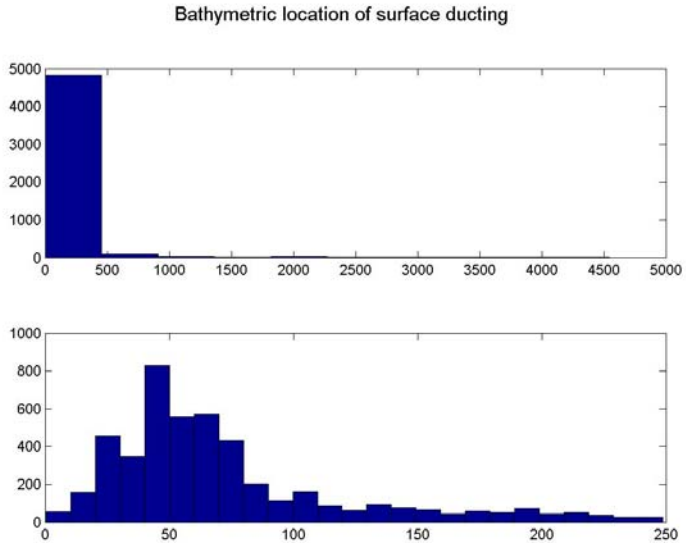
Depth of Maximum Stratification



Surface Ducting

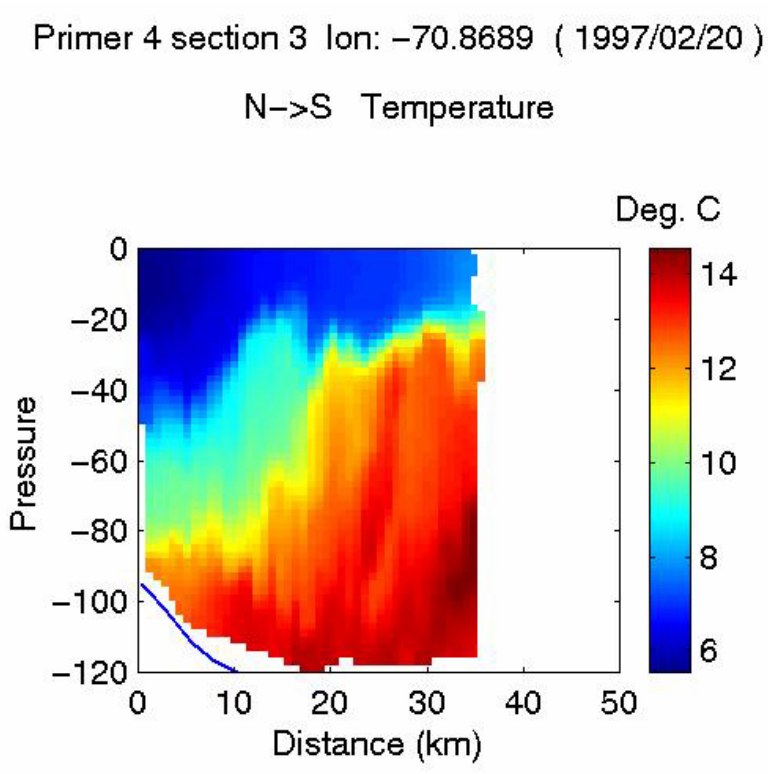


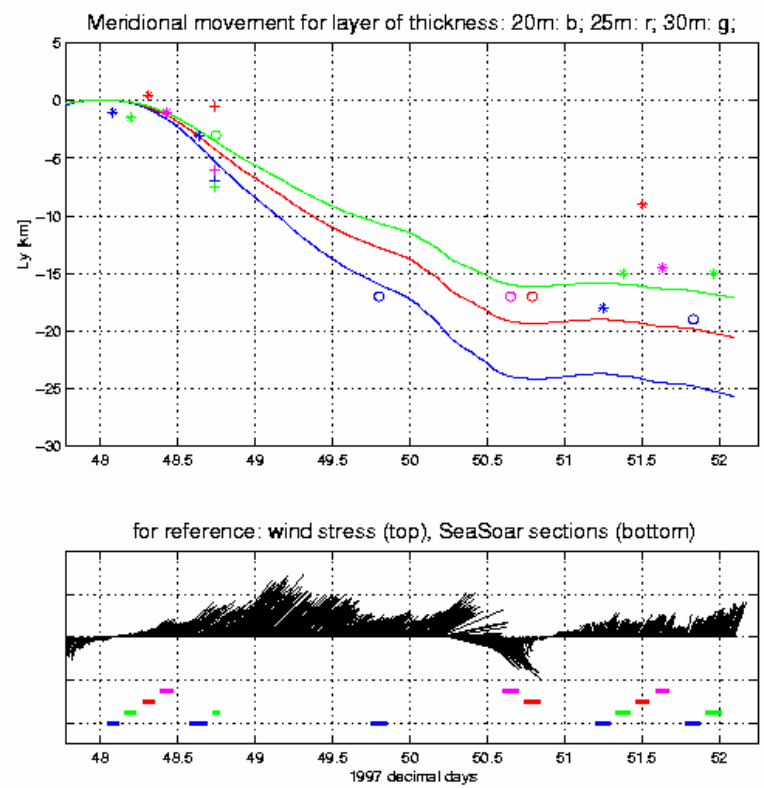
Breakdown by month



Breakdown by isobath

Wind-Driven Response





Summary

- Major hotspot for environmental uncertainty- Shelfbreak front
- Seasonal shifts- subsurface maximum in summer, surface maximum in winter
- Dominant processes- Summer- frontal meandering- Winter- wind forcing
- Regional issue- Buoyant plumes in spring off New Jersey
- Simple to present for applications