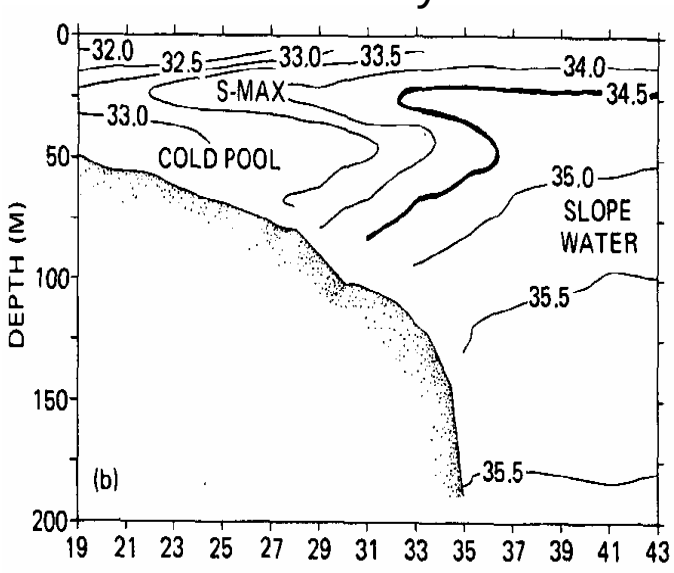
Thermohaline Intrusion in a Shelfbreak Front

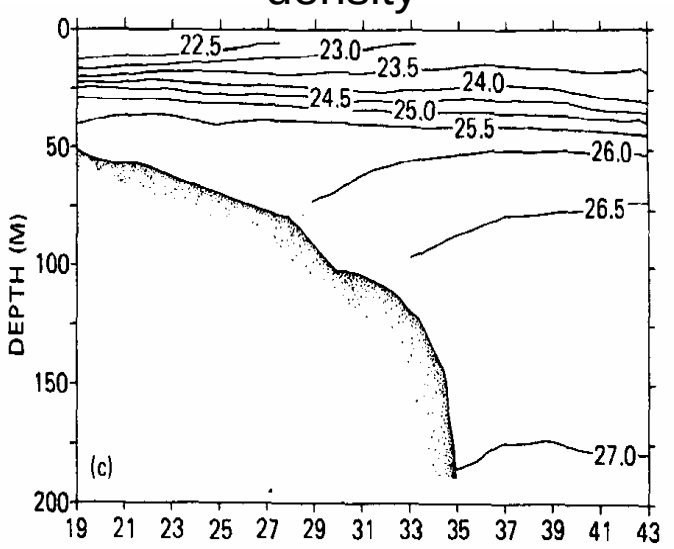
Dong-Ping Wang
School of Marine and Atmospheric Sciences
Stony Brook University

Thermohaline intrusion (Interleaving) in the Mid-Atlantic Bight shelfbreak front

salinity



density

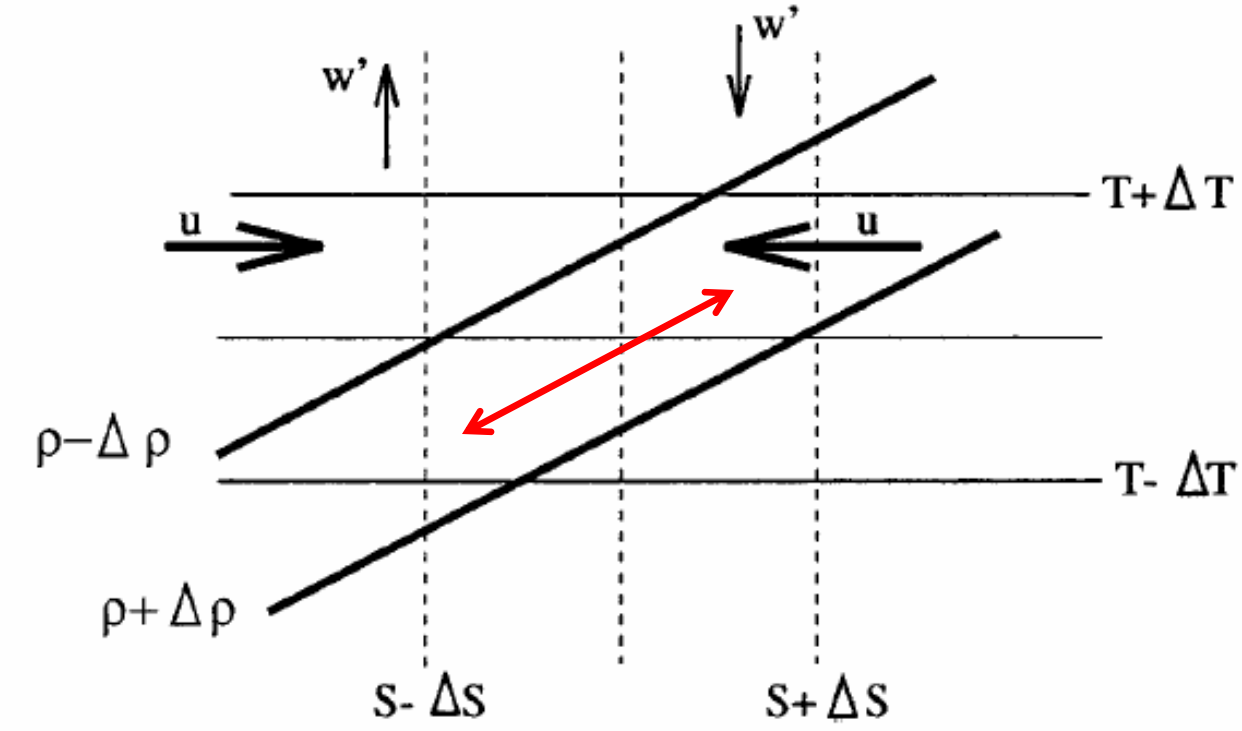


Summer; outer shelf
Depth of seasonal pycnocline
30 m thick
Salinity anomaly ~ 0.5

Burrage & Garvine, 1988

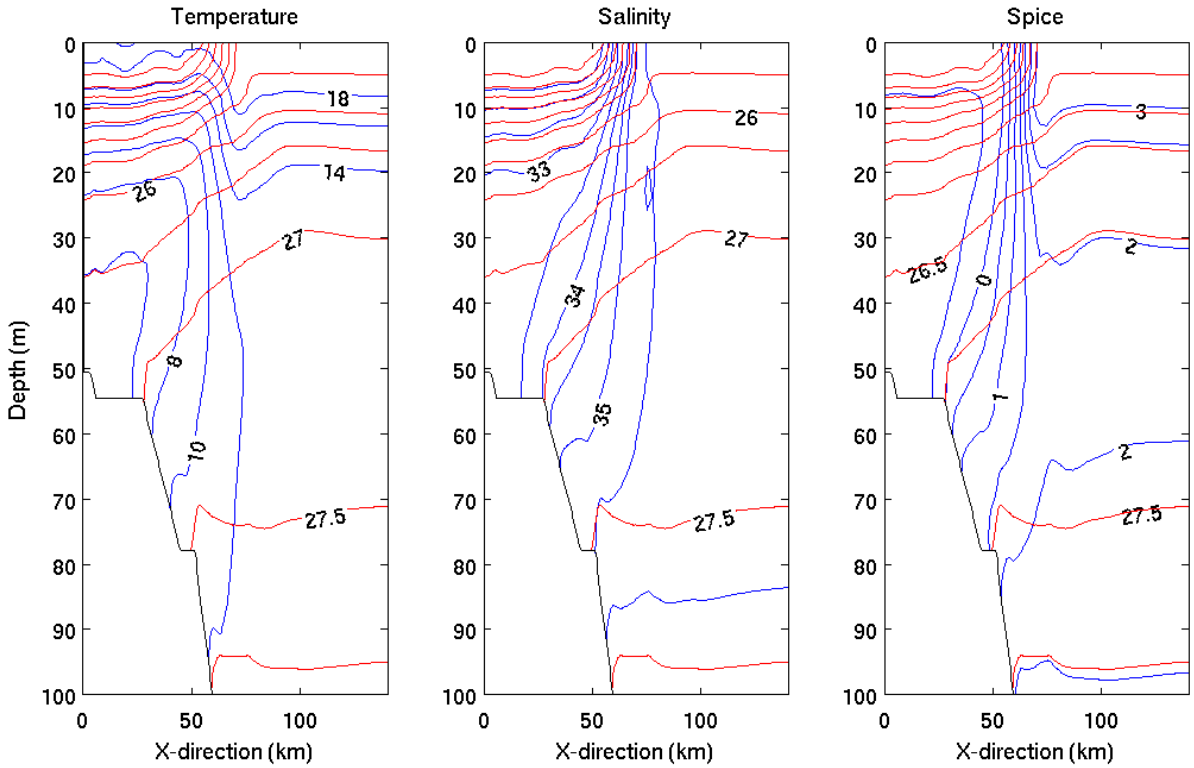
Lentz, 2003

Stirring by mesoscale eddies along isopycnals



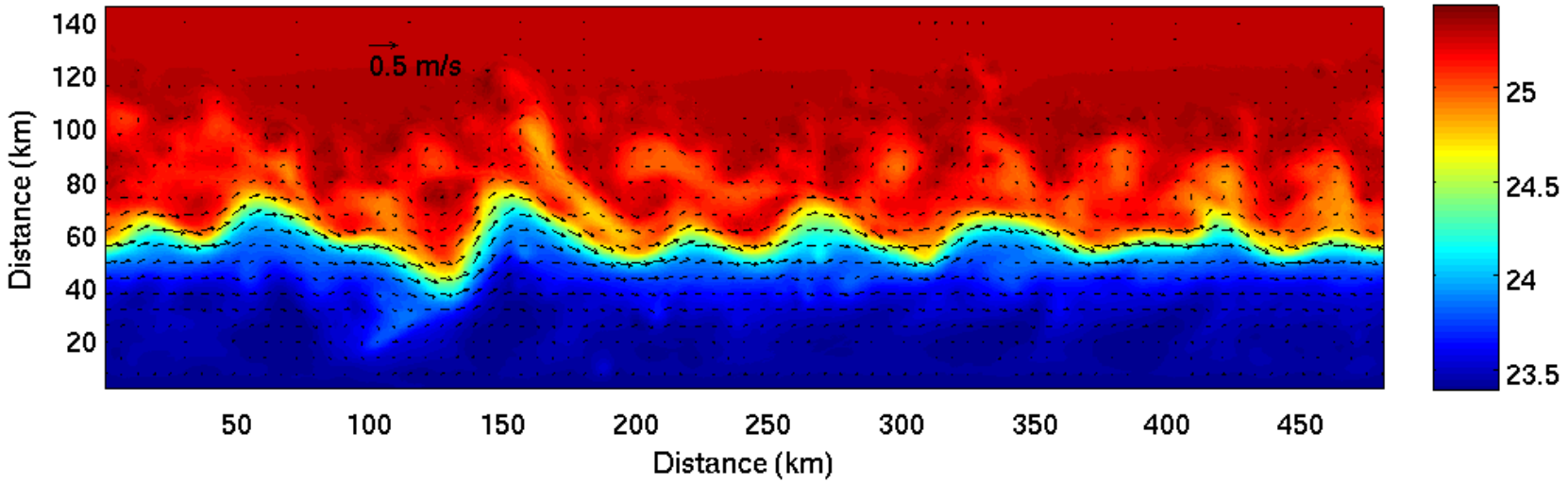
Klein et al 1998

Surface frontogenesis



Early summer stratification; shallow (~ 10 m) frontal jet
Deformation radius ~ 10 km
Periodic channel (960 × 300 × 40; ½ km grid)
No restoring

Meandering frontal jet



10 m depth

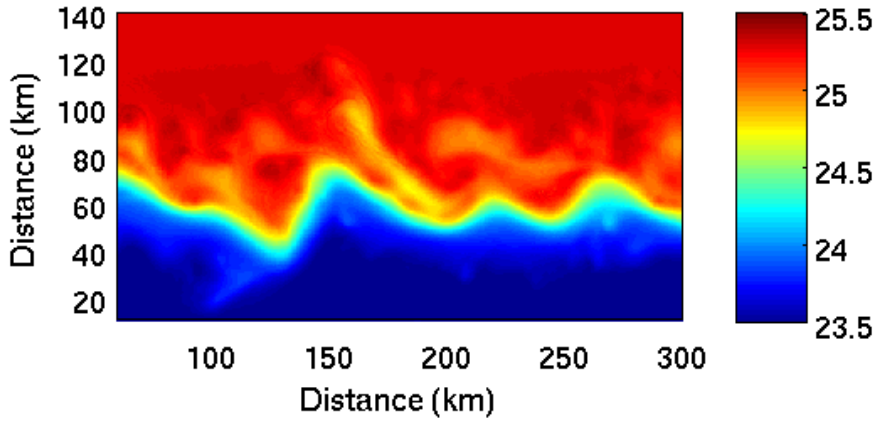
10 m depth

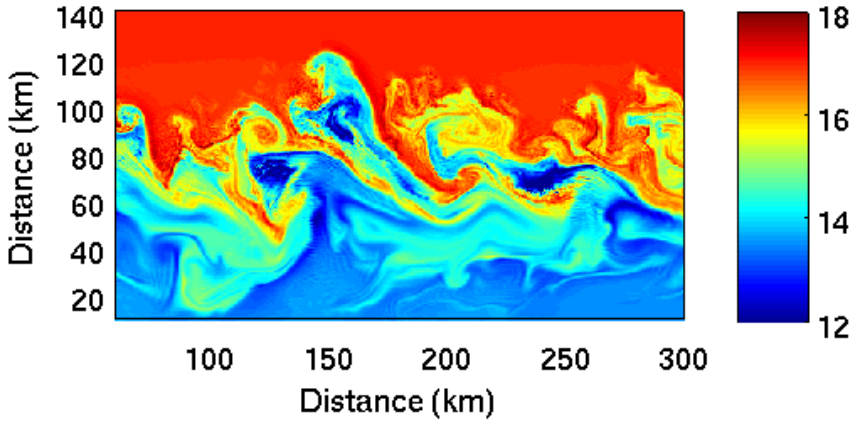
Density

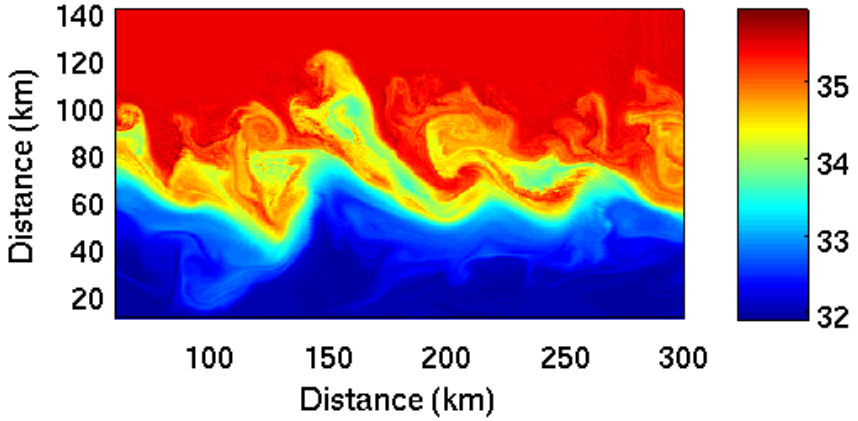
Temperature

Compensated

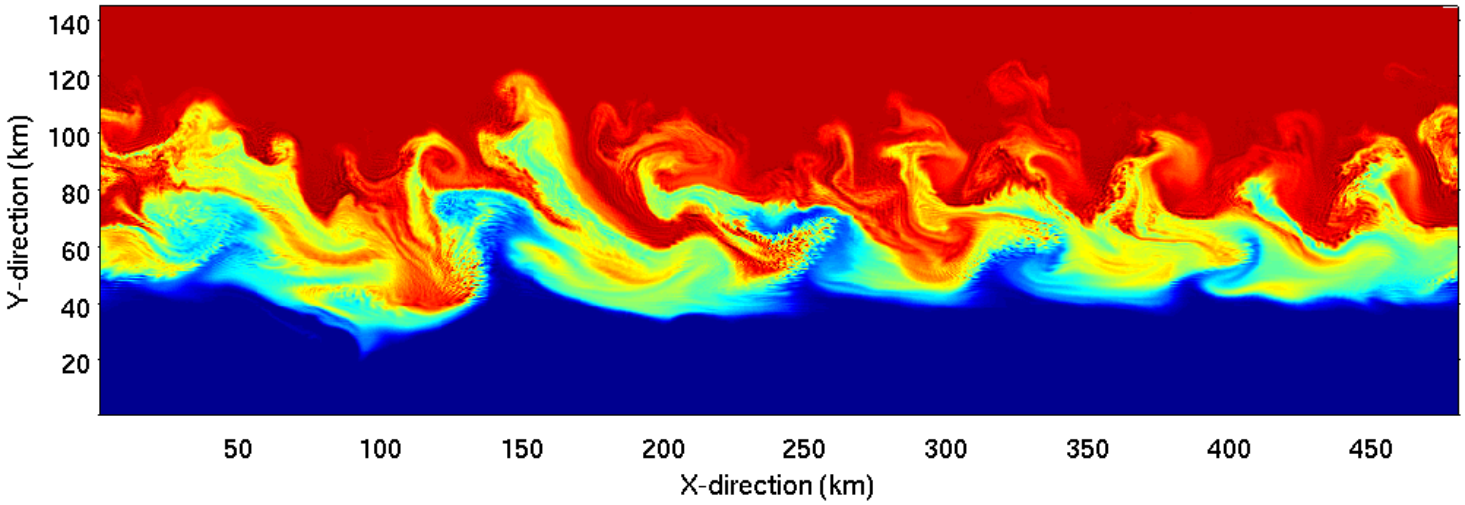
Salinity





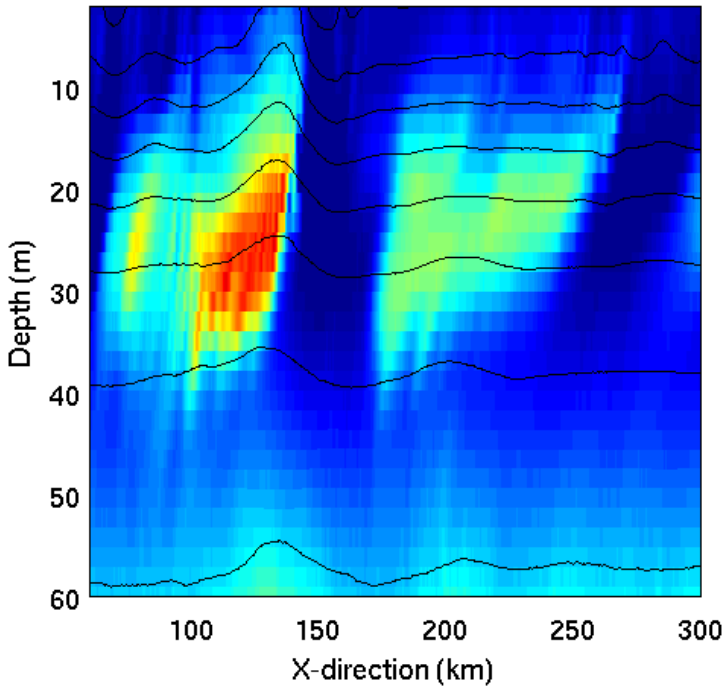


Temperature at the pycnocline

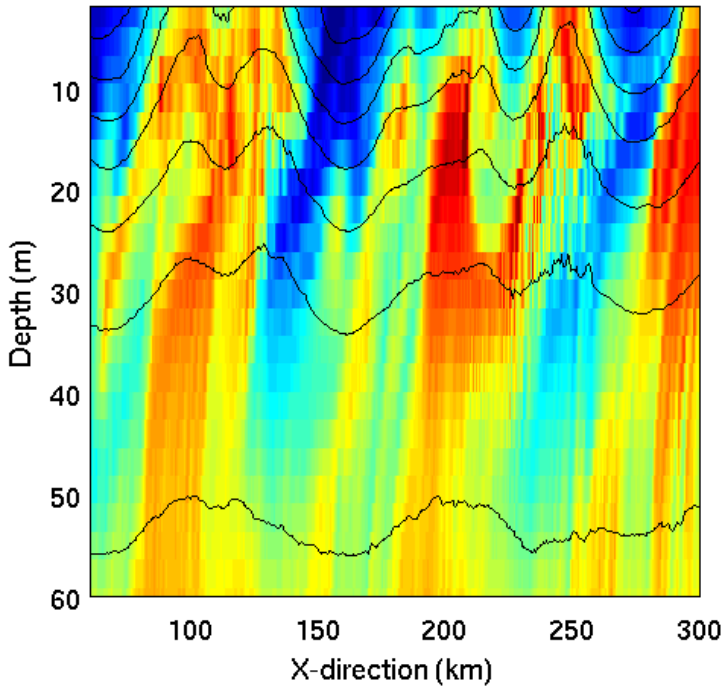


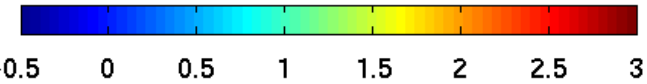
Slope (spicy) water intrusions

20 km inshore



shelfbreak





Summer; outer shelf
Depth of seasonal pycnocline
30 m thick
Salinity anomaly ~ 0.5

Surface frontogenesis shows energetic meso- and submesoscale eddies of intense upwelling and subduction

Thermohaline intrusions indicate nearly compensated temperature and salinity anomalies

Slope water intrusions are important for salt balance, nutrient input and larval recruitment on the shelf