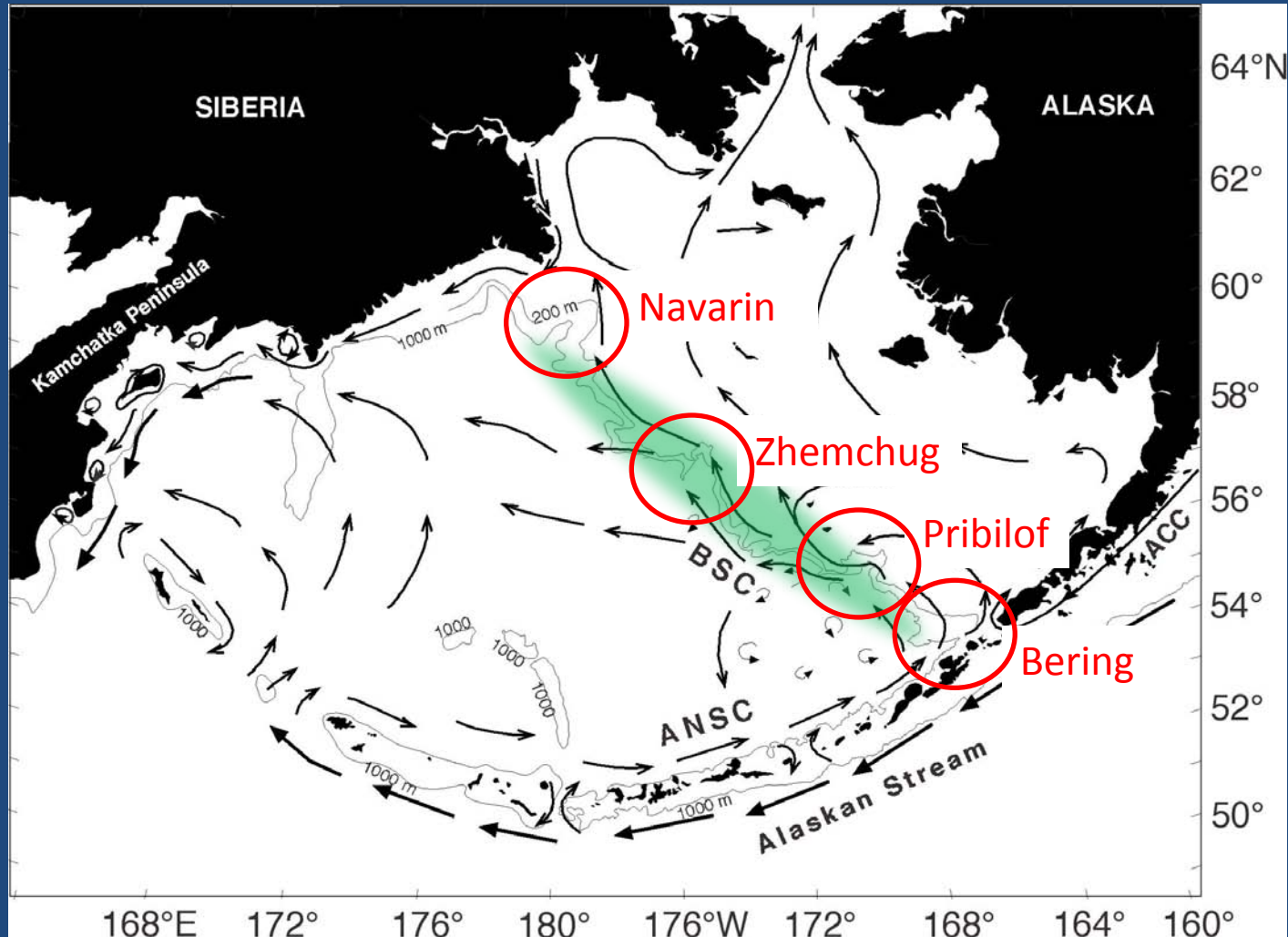


The Pribilof Eddy

Bering Sea

Carol Ladd, Phyllis Stabeno, and Julia O'Hern

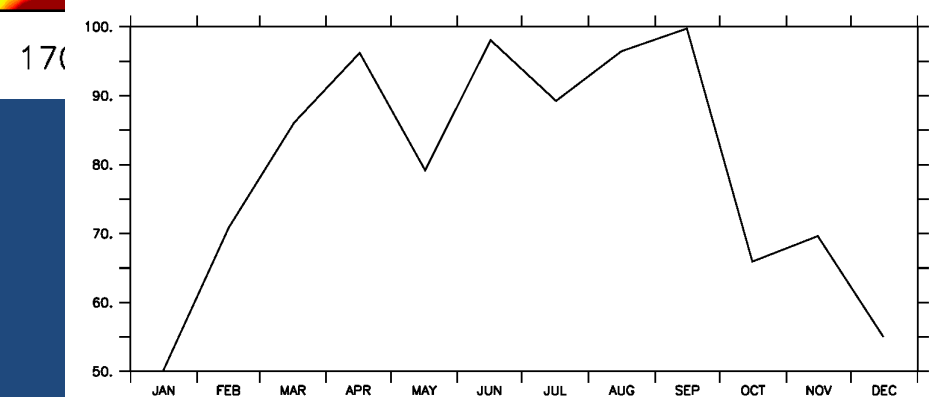
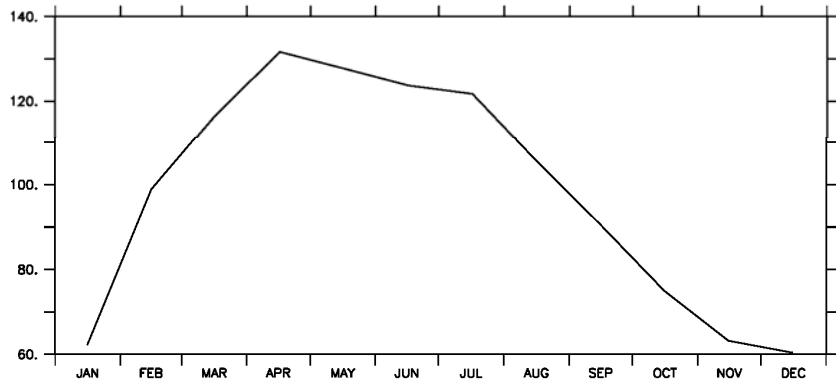
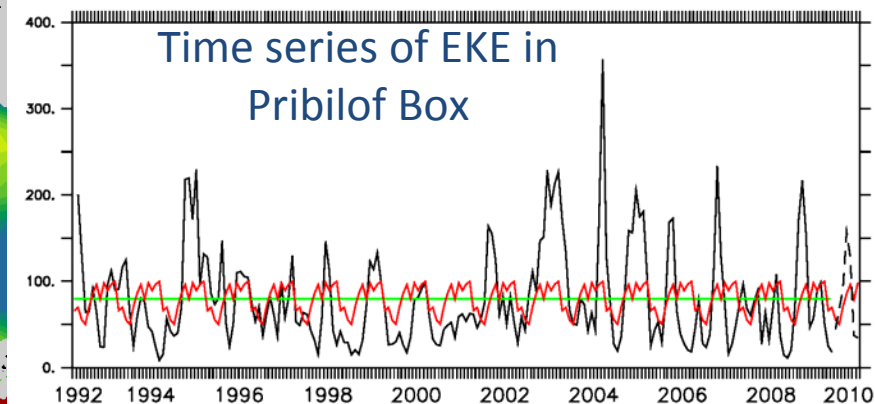
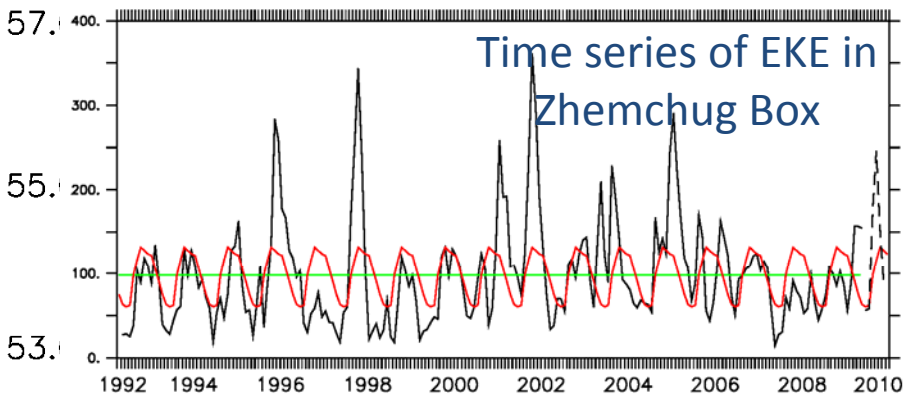
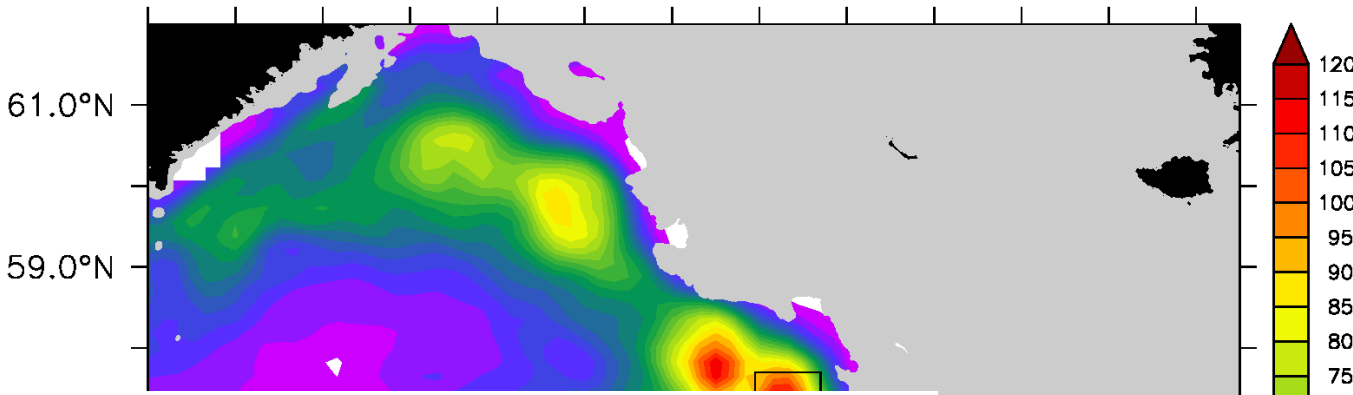


Importance of BS eddies

- High primary production at the shelf-break associated with eddies (Mizobata et al 2006, 2008)
- Eddies can mix iron-rich shelf water into the Green Belt (Hurst et al 2010)
- Eddies important to on-shelf transport, possibly important to fluxes to Arctic (Kinney et al 2009)
- Eddies have been identified as preferred foraging sites for apex predators such as fur seals and seabirds (e.g. Ream et al 2005; Bailleul et al 2010)

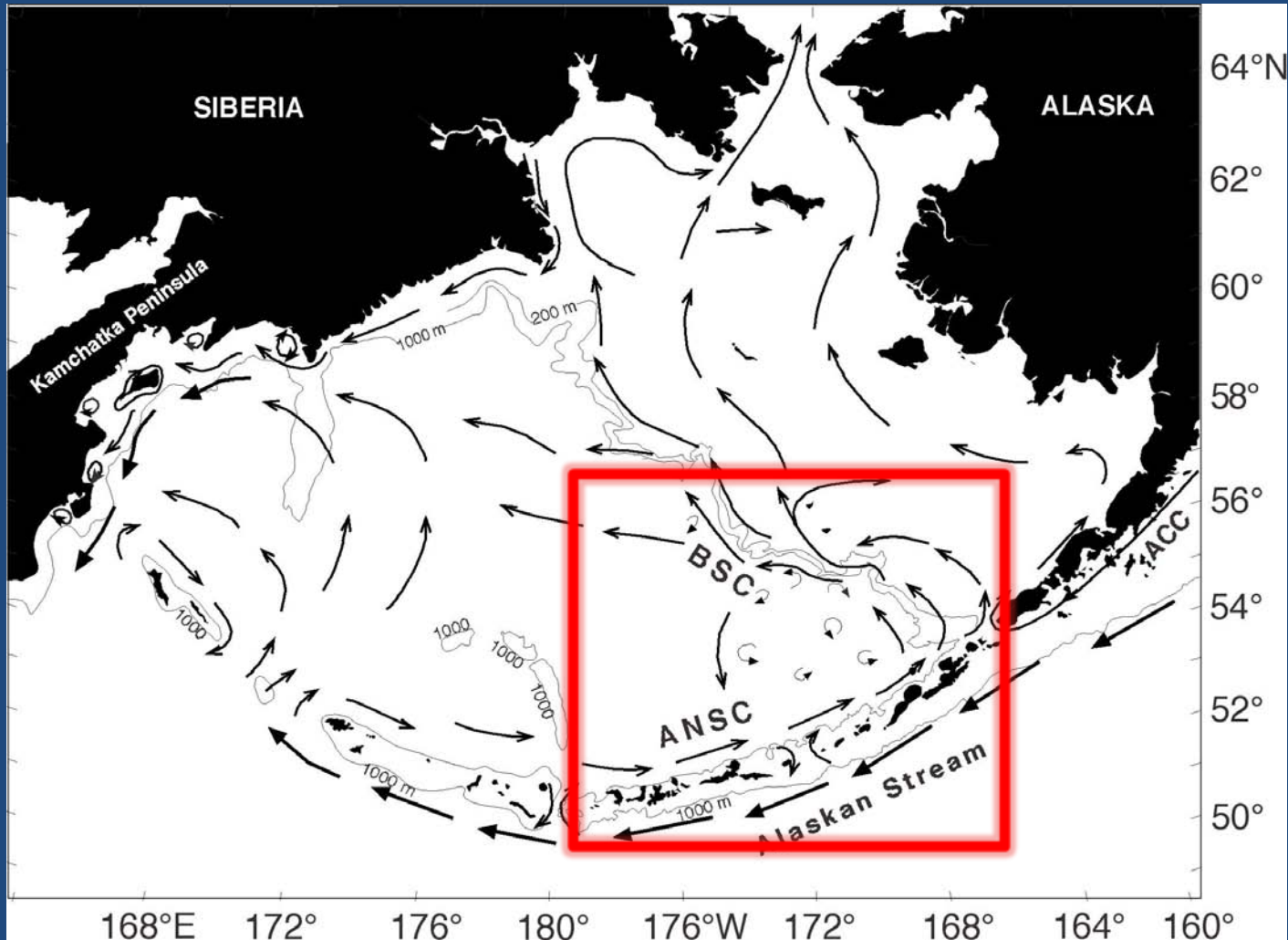
Eddy Kinetic Energy (cm^2/s^2)

(south)westward
propagation
pathways.

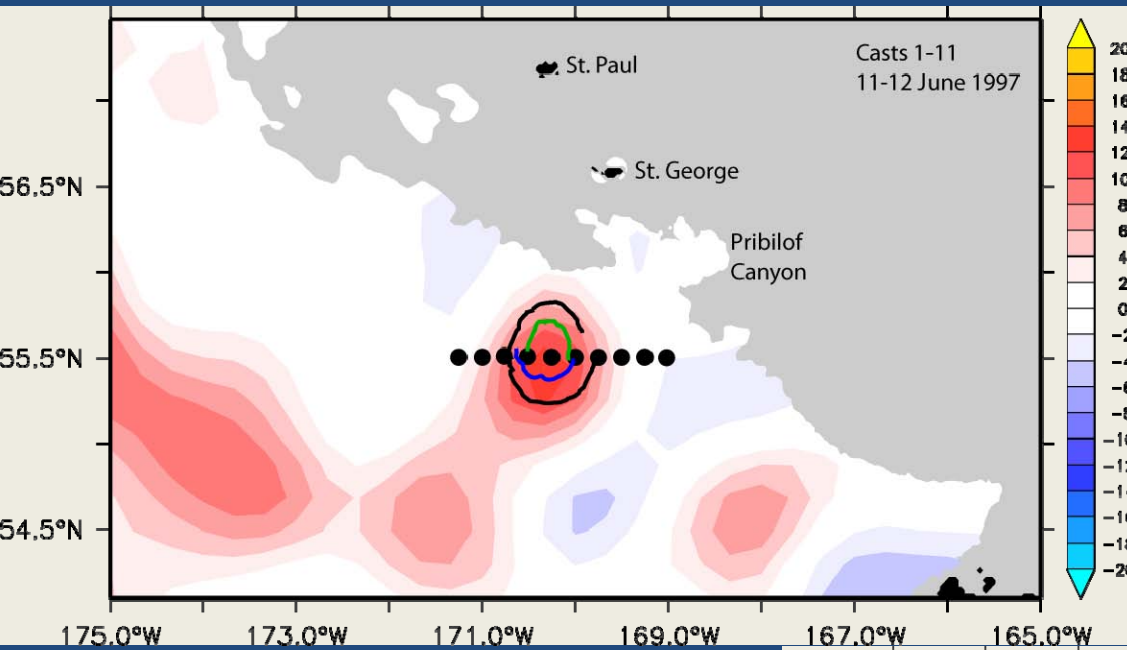


The Pribilof Eddy

Bering Sea



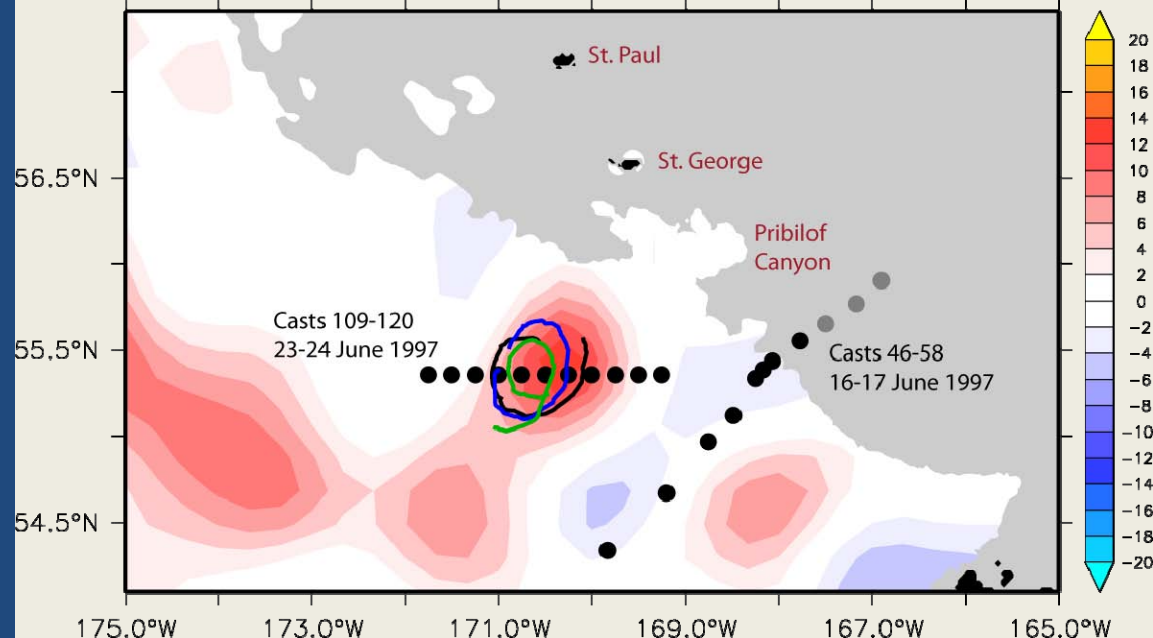
Data



- Altimetry sea surface height anomalies (cm)
- Drifter trajectories

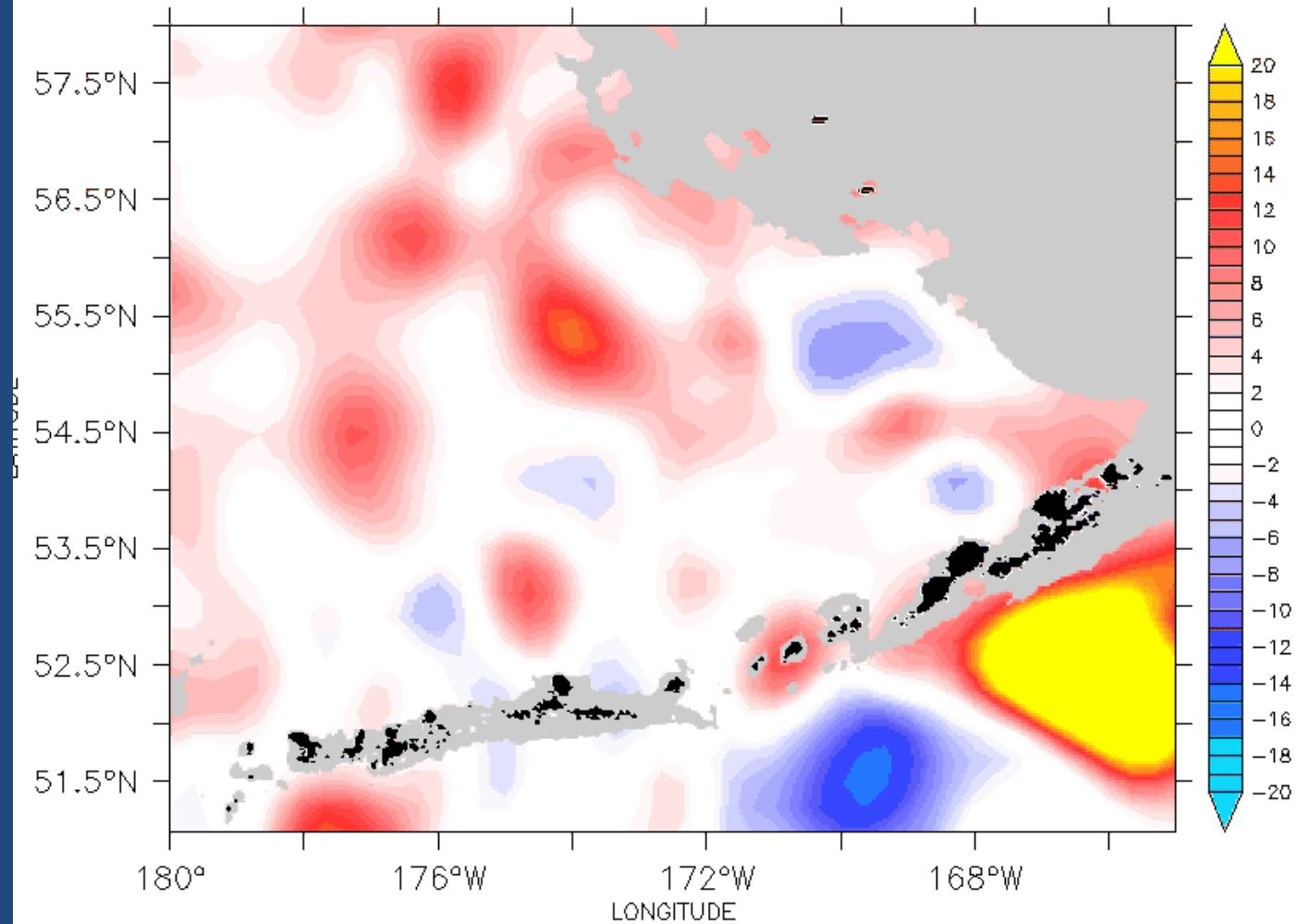
• 2 transects through eddy – 11 days apart

• Transect across shelf-break (in absence of eddy)



Altimetry & Drifters

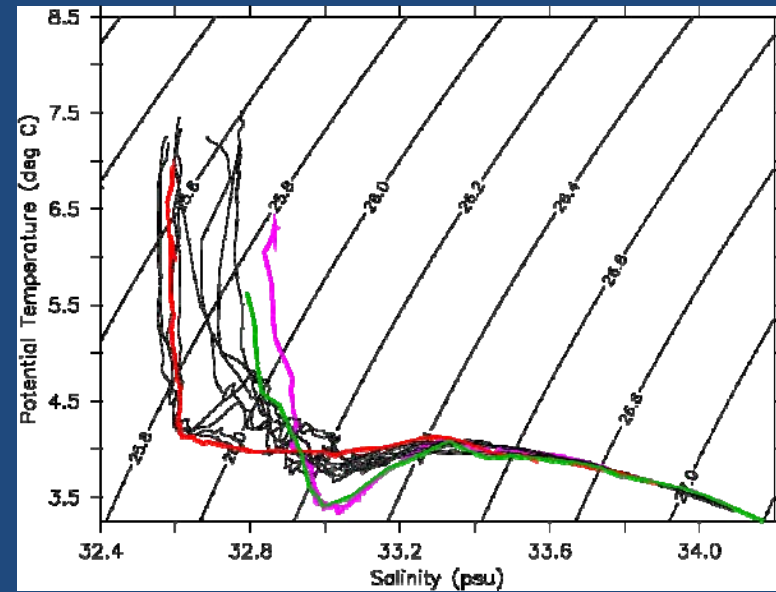
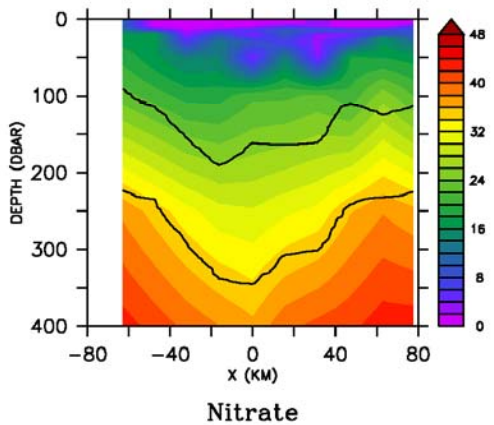
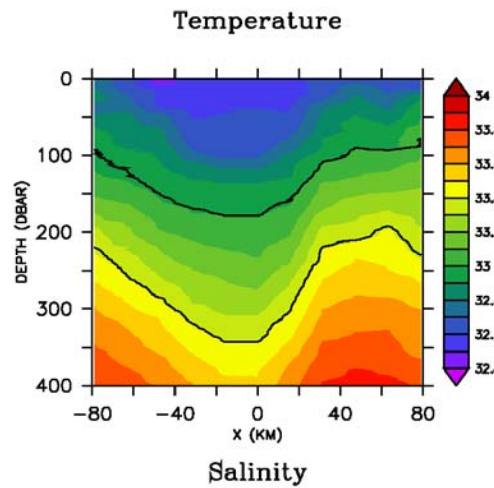
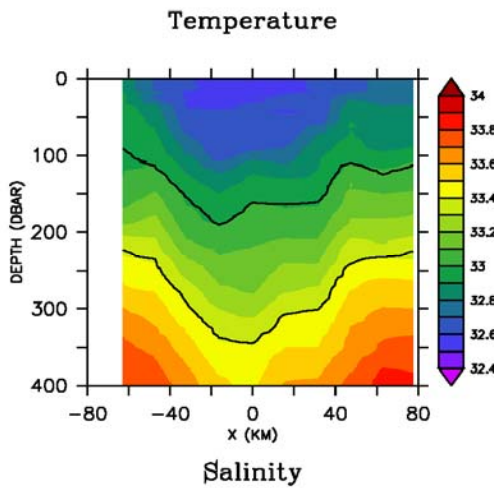
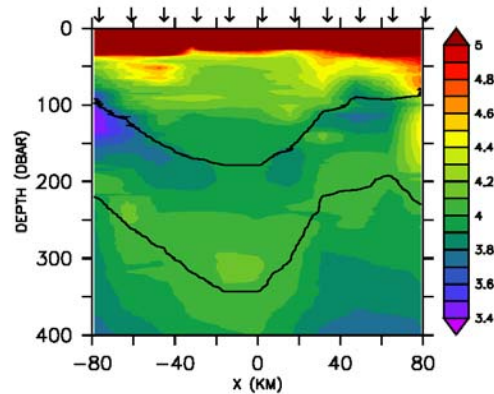
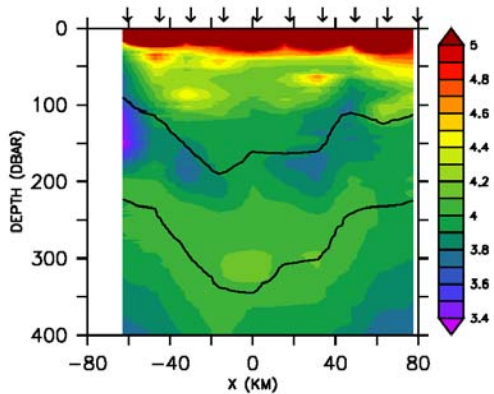
TIME : 01-APR-1997 00:00



GRID_0001[D=dt_ref_global_merged_msla_h,GT=T97]

11-12 June

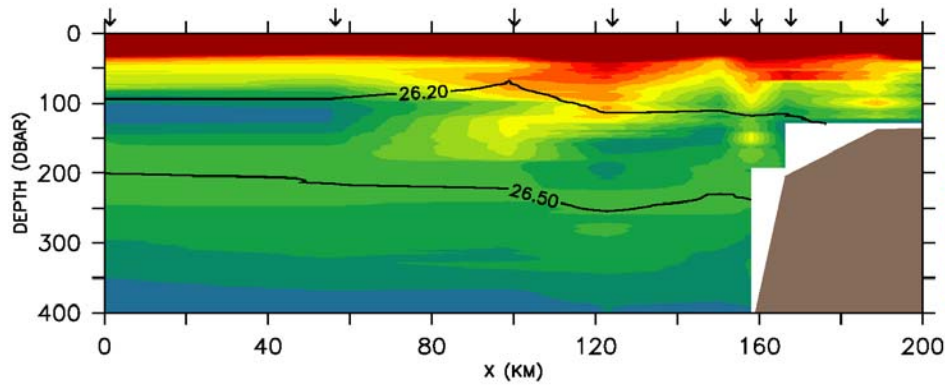
23-24 June



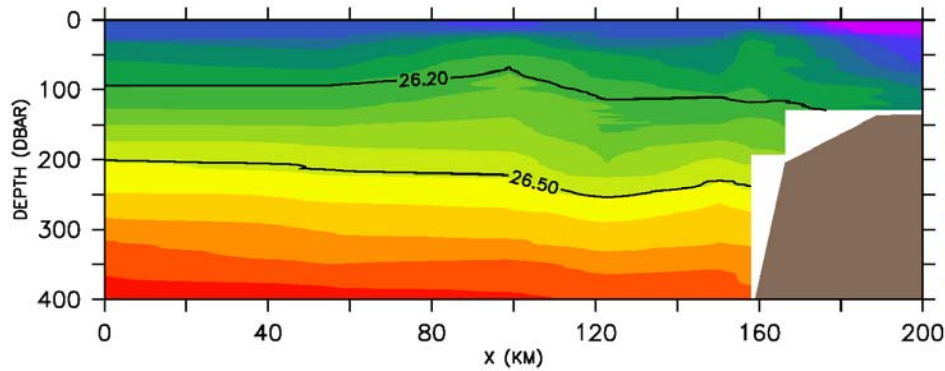
Red: center of eddy
Pink: outside of eddy
Green: average outside of eddy
Black: all other casts across eddy

Grey shading: 26.2 – 26.5 σ_t

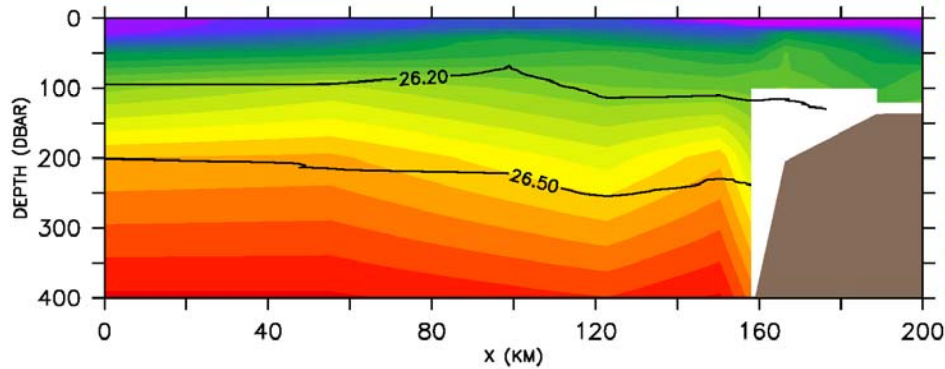
Transect across shelf-break (in absence of eddy)



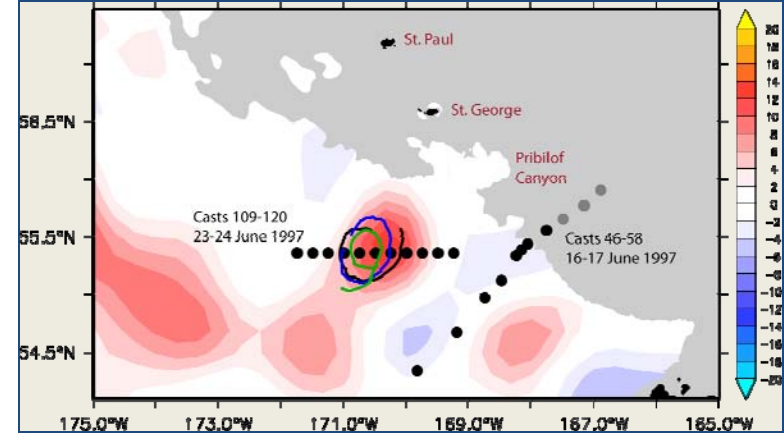
Temperature



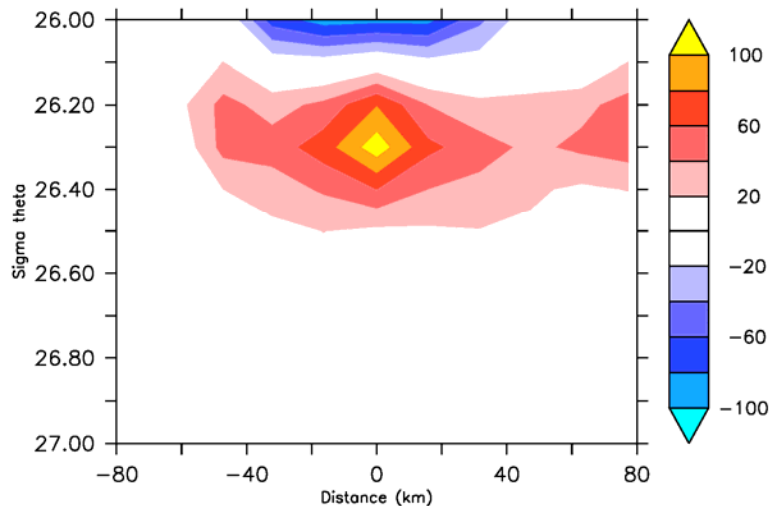
Salinity



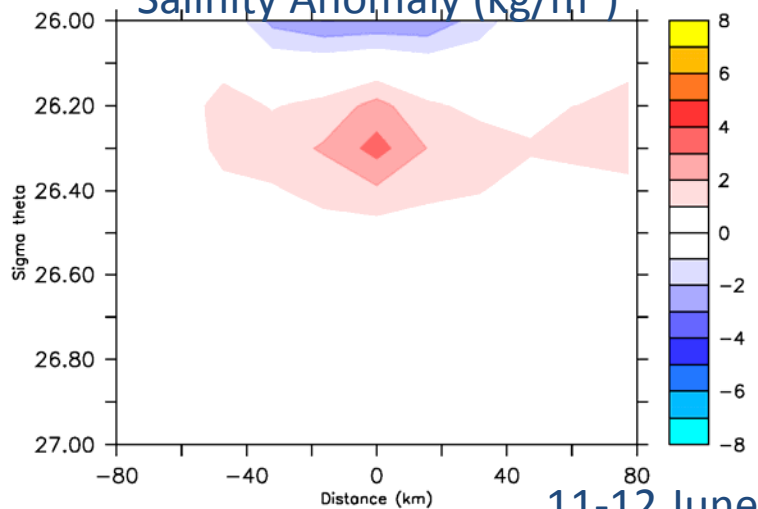
Nitrate



Heat Anomaly (MJ/m²)



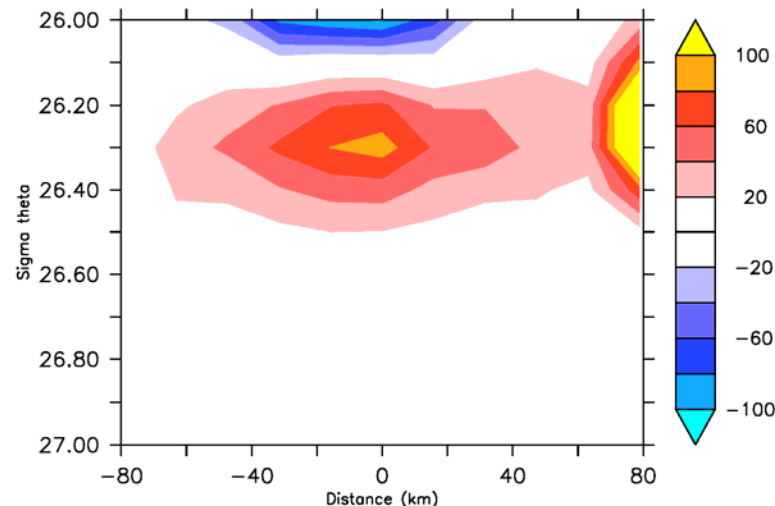
Salinity Anomaly (kg/m²)



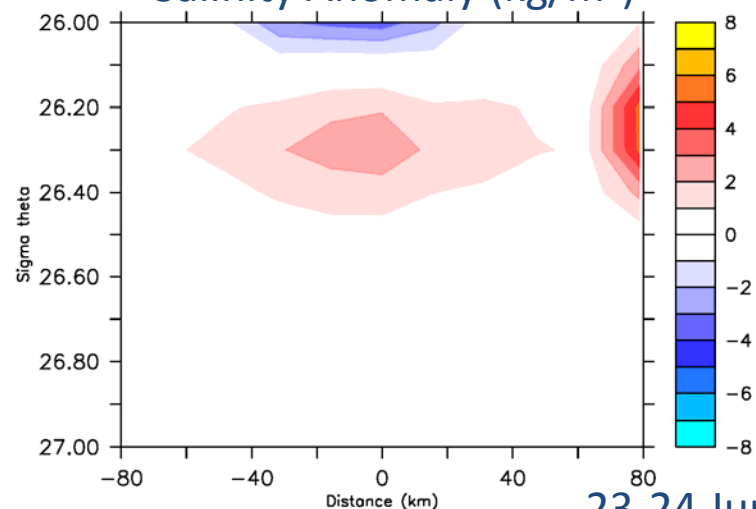
11-12 June

Heat anom: 8.3×10^{17} J
Salt Anom: 2.3×10^{10} kg

Heat Anomaly (MJ/m²)



Salinity Anomaly (kg/m²)

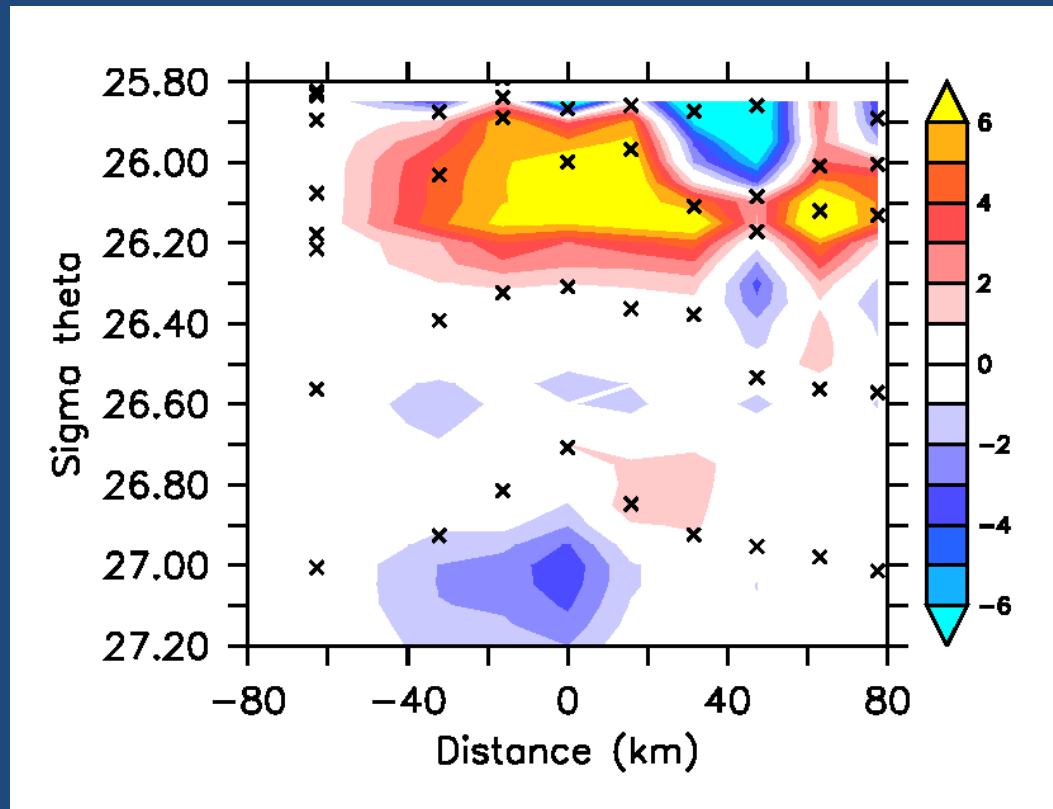


23-24 June

Heat anom: 7.3×10^{17} J (-11%)
Salt Anom: 1.9×10^{10} kg (-16%)

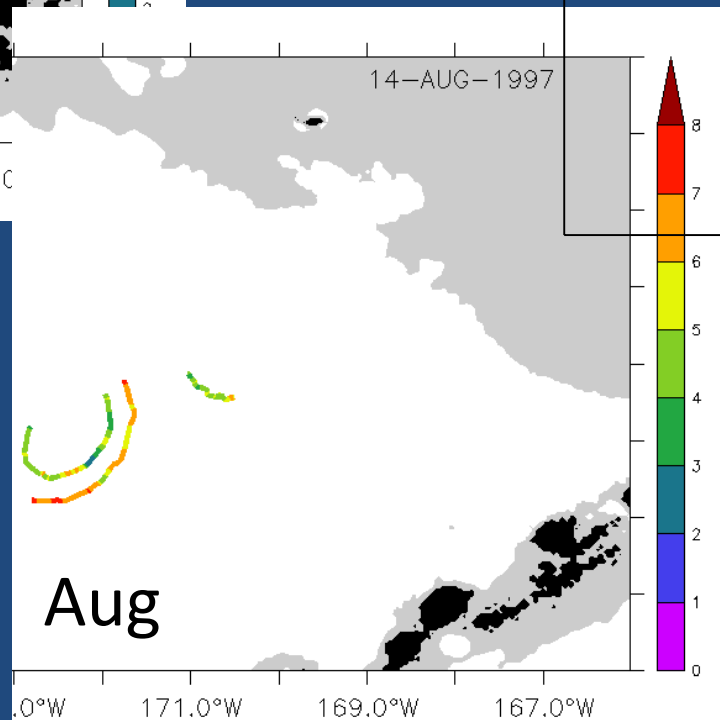
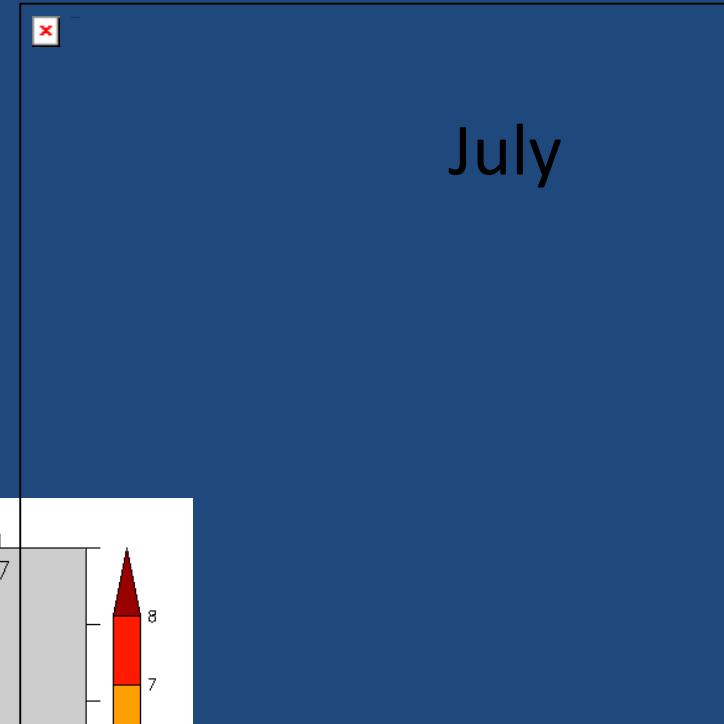
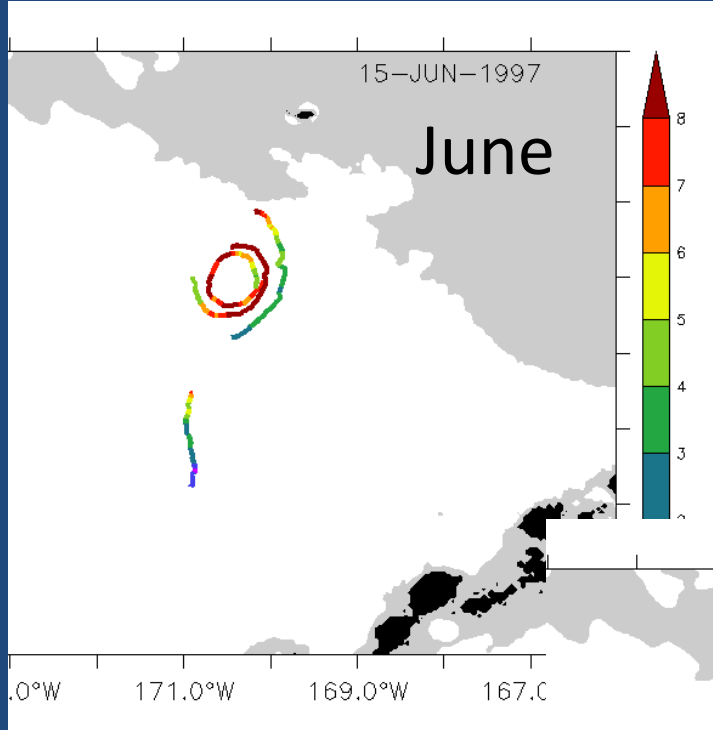
Heat anom: (-11%)
Salt Anom: (-16%)

Nitrate Anomaly (micromoles/l)



Nitrate anom: 3.0×10^9 moles
(anomaly from cast at western
edge of eddy)

Ocean Color Drifters (mg chl)



Summary

- Eddy energy in the eastern Bering Sea is stronger near the canyons (strongest at Zhemchug)
- Stronger eddy energy during summer, weak during winter
- Strong interannual variability
- Pribilof Eddy:
 - Eddy radius of ~60 km (~60-80% of GOA eddy radius)
 - Heat and salt content anomalies (in $26.2 - 26.5 \sigma_\theta$) about an order of magnitude smaller than in GOA
 - Positive nutrient anomalies at densities that can be brought to surface during fall/winter mixing events – may enhance production in the basin (not just at the shelf-break)
 - Source of anomalous waters appears to be bottom waters of outer shelf
 - Total lifetime of ~10 months

Thank you