

A Comparison of Oceanographic Sections Across the Bering Sea Shelf: Spring and Summer 2008

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Line 2008

Temperature

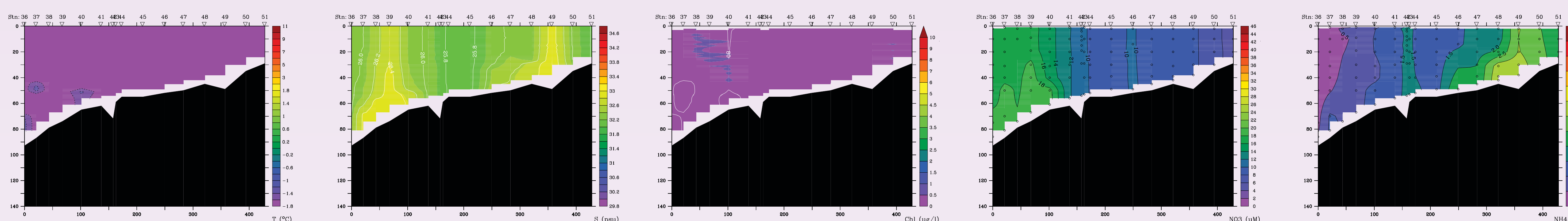
Salinity & Density

Chlorophyll & Oxygen Saturation

Nitrate

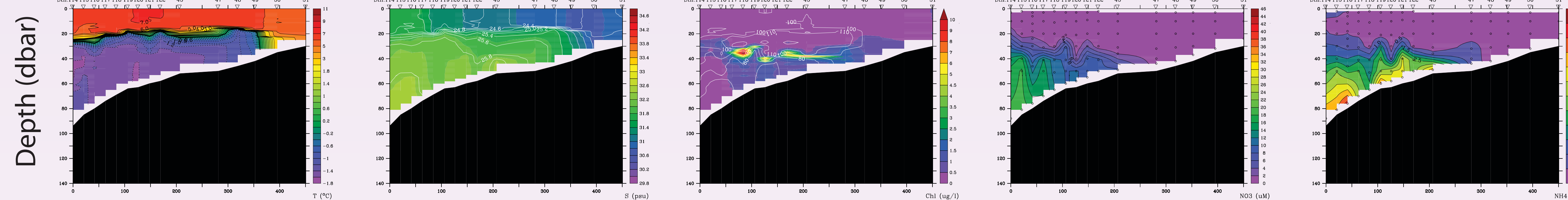
Ammonium

11-14 Apr

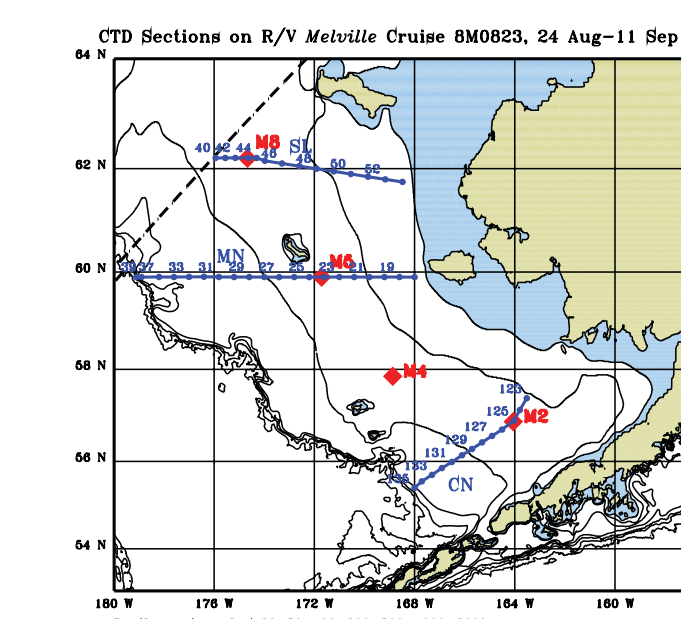
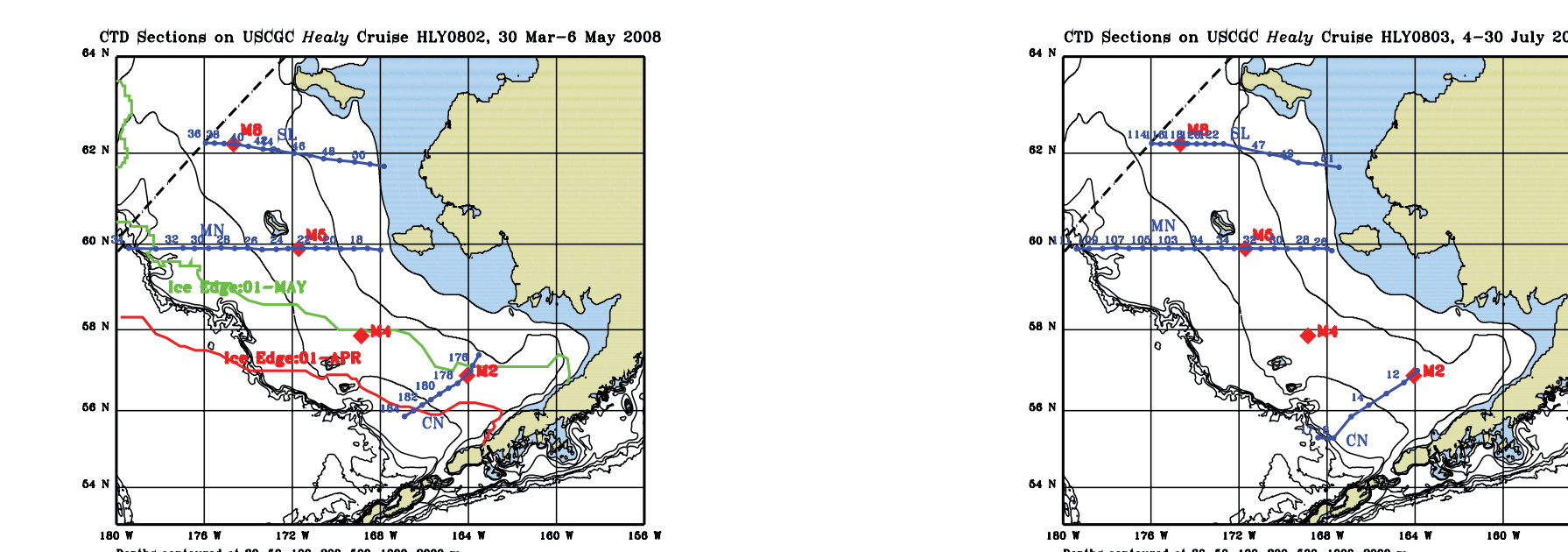
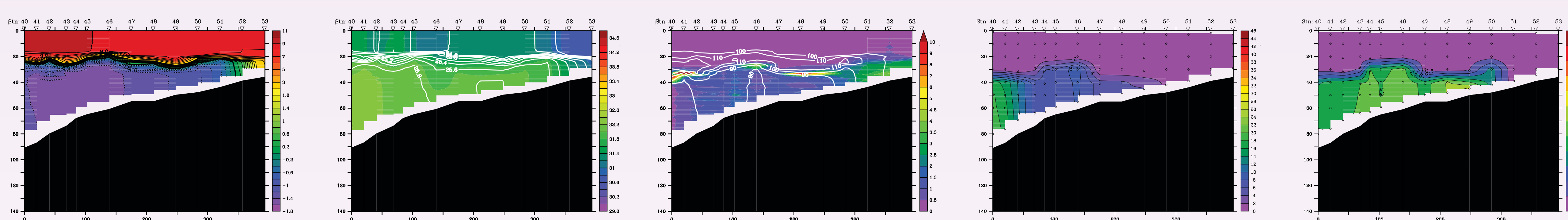


SL

12-13 & 26-27 Jul



30-31 Aug



Sampled 3 Lines over 3 Periods

Apr-May (Healy Cruise HLY0802)

Prolonged ice cover on SL and MN Lines

- Sampled prior to spring bloom
- Unstratified, well mixed to 50-60 m
- Frigid temperatures (-1.7 °C) set up Cold Pool (T < 2 °C)
- Higher salinities on the SL Line
- Freshening on the inner shelf of the MN Line
- Very low chlorophyll and under-saturated oxygen
- Plentiful nitrate and low ammonium on the middle and outer shelf
- Low nitrate and higher ammonium on the inner shelf (post-bloom?)

Abbreviated ice cover on CN Line

- Ice-free during sampling
- Warmer and weakly stratified on middle shelf
- Bloom conditions
 - High chlorophyll
 - Supersaturated oxygen
 - Depleted nitrate
 - Elevated ammonium

July (Healy Cruise HLY0803)

Strong ice-melt influence on SL and MN Lines

- Stratified by ice melt (salinity controls density)
- Cold Pool (T < 2 °C)
 - Capped by fresher, warmer water
 - Tongue (T < 0 °C) formed by surface warming on MN Line
 - Tidal mixing on inner shelf erodes Cold Pool, bounding it
- Production just below the pycnocline
 - Intense subsurface chlorophyll maximum
 - Subsurface supersaturation of oxygen
- Nutrient dynamics
 - Nitrate stripped in upper layer and on inner shelf
 - Ammonium high on middle shelf with tongue on outer shelf

Weak ice-melt influence CN Line

- Stratification due to salinity and temperature
 - Pycnocline weak
 - Cold Pool narrower with no sub-zero temperatures
- Low production
 - Low chlorophyll in upper layer with slight oxygen super-saturation
 - No chlorophyll or supersaturation below weak pycnocline
- Nutrient Dynamics
 - Salt and nitrate intrude shoreward at depth and diffuse upward
 - Ammonium high on middle shelf with tongue on outer shelf

Aug-Sep (Melville Cruise 8M0823)

Dwindling ice influence

- Surface warming enhancing stratification especially on CN Line
- Cold Pool tongue disappears on MN Line
- Freshening on the inner shelf of the MN and CN Lines (runoff or Alaska Coastal Current?)
- Intensified summer production
 - Broadened chlorophyll and supersaturation of oxygen
- Ammonium concentration lower on SL Line

Questions:

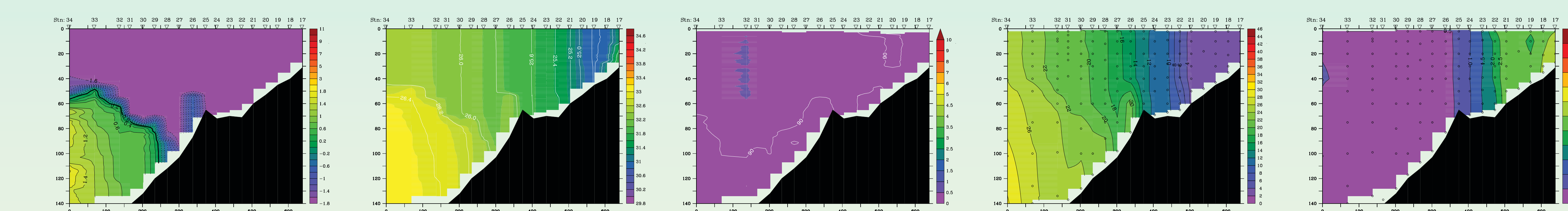
- Will the future (warming) Bering Sea shelf evolve from SL-Line conditions toward CN-Line conditions?
- Why is there an absence of dissolved nitrogen on the inner shelf in summer?
- What causes the spatial and temporal variability in production?

Lessons Learned:

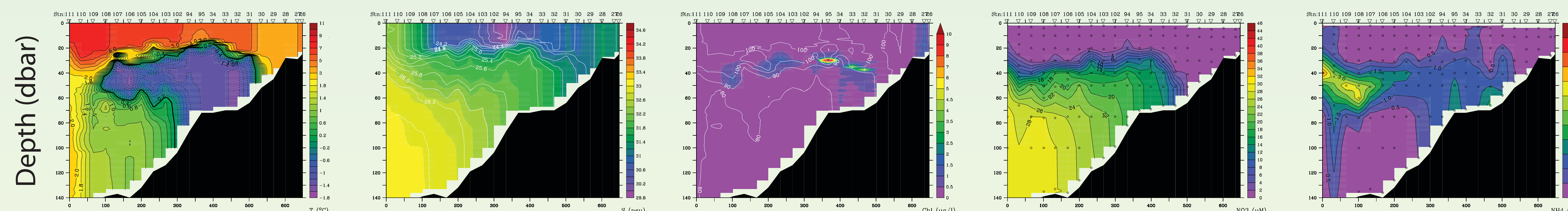
- Should sample the inner shelf on the CN Line
- Should sample the outer shelf on the SL Line
- Should contrast ice-covered and ice-free conditions

MN

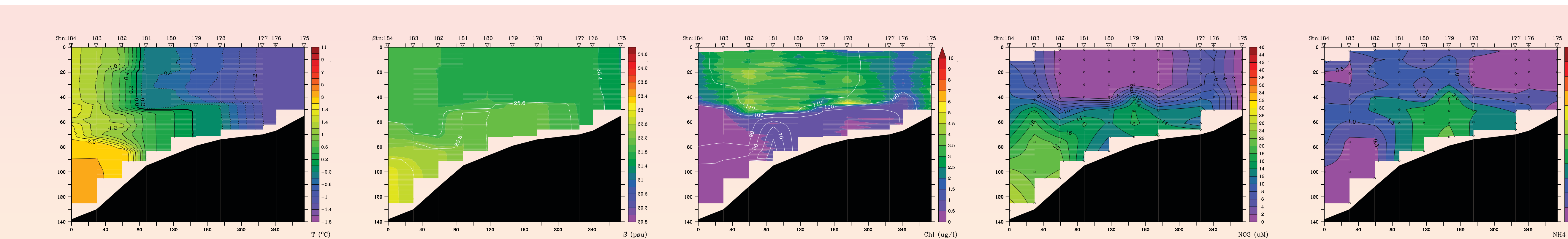
9-10 & 23-25 Jul



27-29 Aug

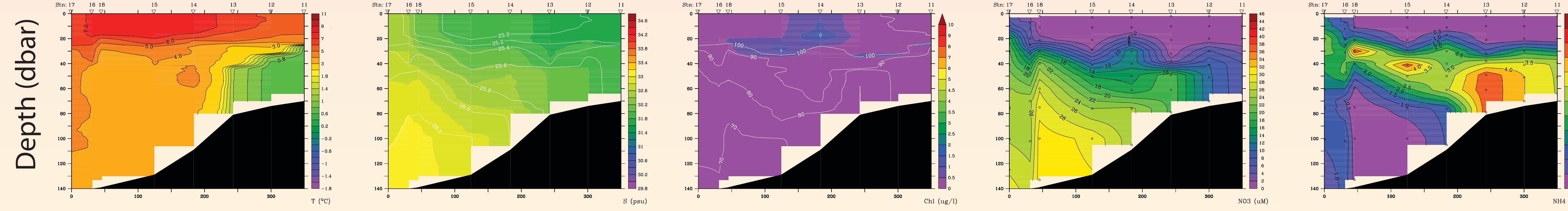


5-6 May

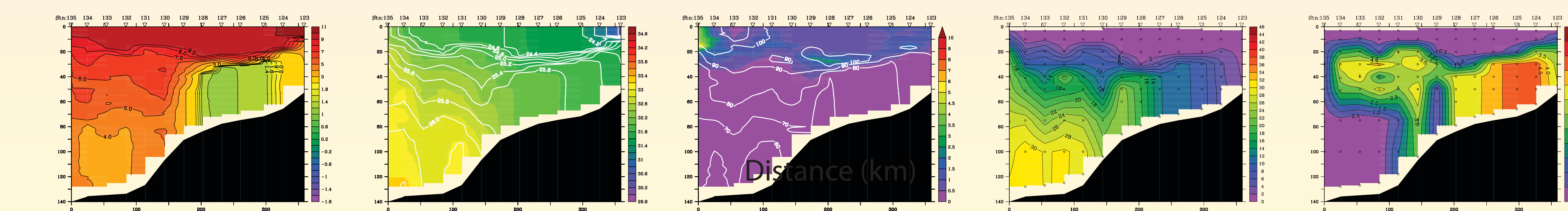


CN

5-7 Jul



6-7 Sept



Distance (km)