Video Plankton Recorder studies during the 2004 RUSALCA Cruise

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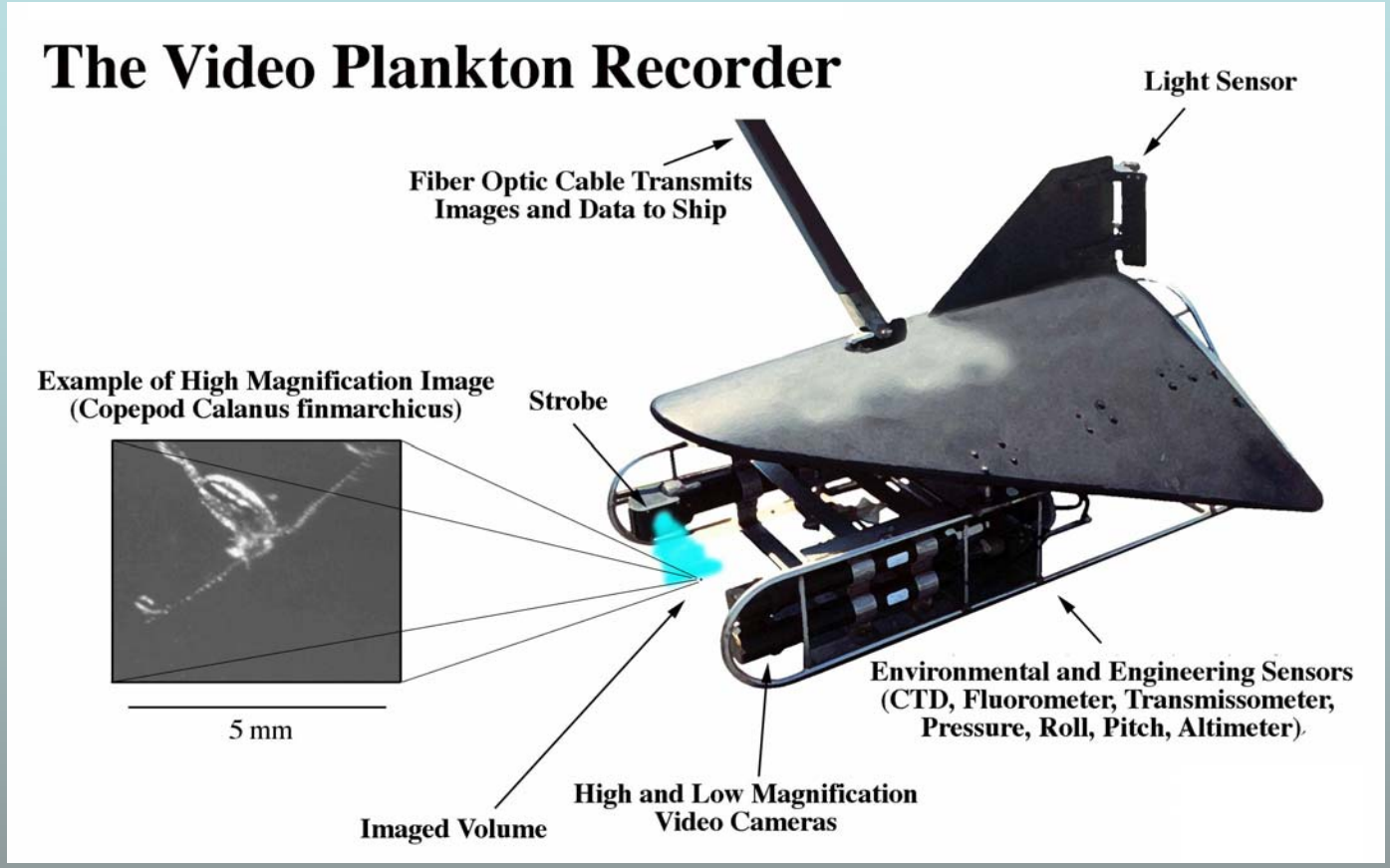

- An underwater microscope
- Identifies and enumerates plankton and particles
- Yields type specific abundances (#/L) and coincident hydrography

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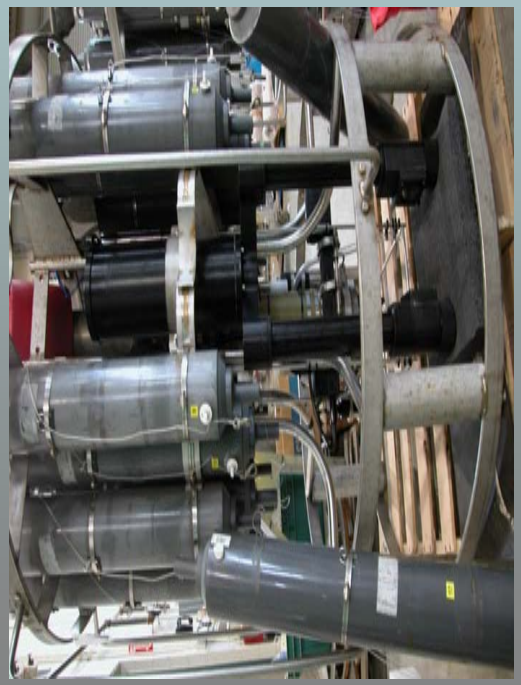
AutoVPR



Data Collection

- AutoVPR - self contained
- The AutoVPR was mounted on the CTD Rosette
- Data were collected on most CTD casts
- All together, 75 casts were obtained
- Field of view is 12.5 mm x 9 mm
- Depth of field = 13.33 cm so imaged volume = 14.54 ml

Steps in VPR Data Analysis

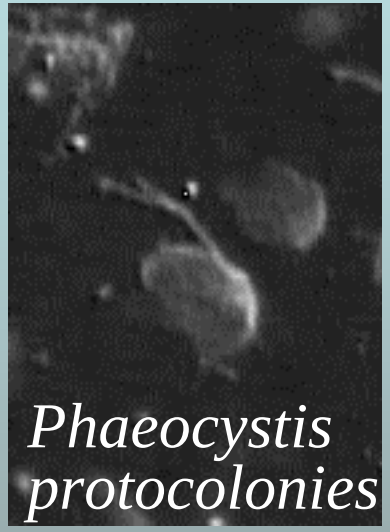
- Focus detection and image extraction from raw data files
- Establish “training set” of manually identified images
- Develop classifier
- Automatically classify images
- Review and correct classifications
- Merge taxonomic identifications with coincident pressure, temperature, salinity, and density

RUSALCA Analysis to Date

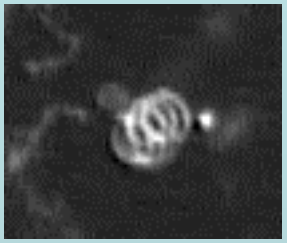
- All casts have been run through the focus detection and image extraction program
- A set of training images has been sorted
- Preliminary classification has occurred

Copepods	Phaeocystis colonies and protocolonies
Medusae	
Larvaceans	Ophiuroid larvae
Marine Snow	Ctenophores
Diatom Chains	Other phytoplankton

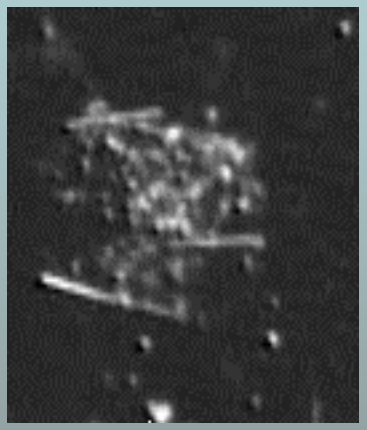
Examples of Images

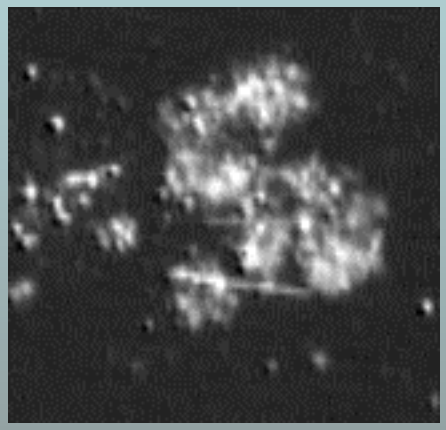


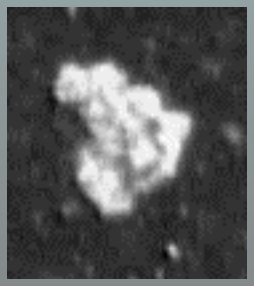
Ophiuroid Larva



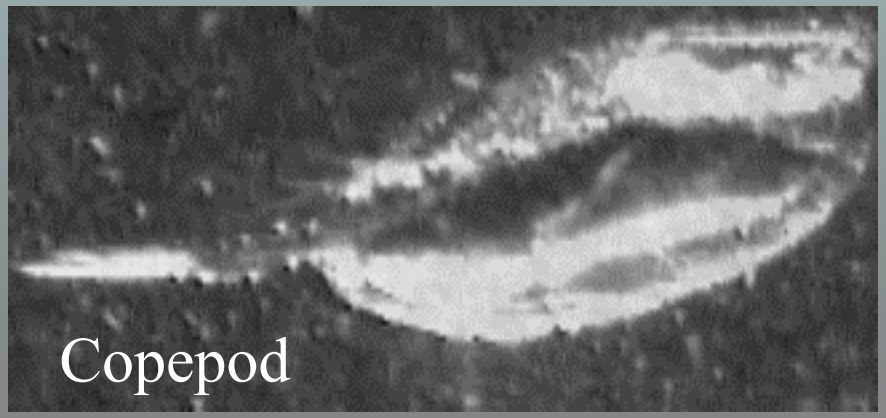
Senior moment….







Marine Snow



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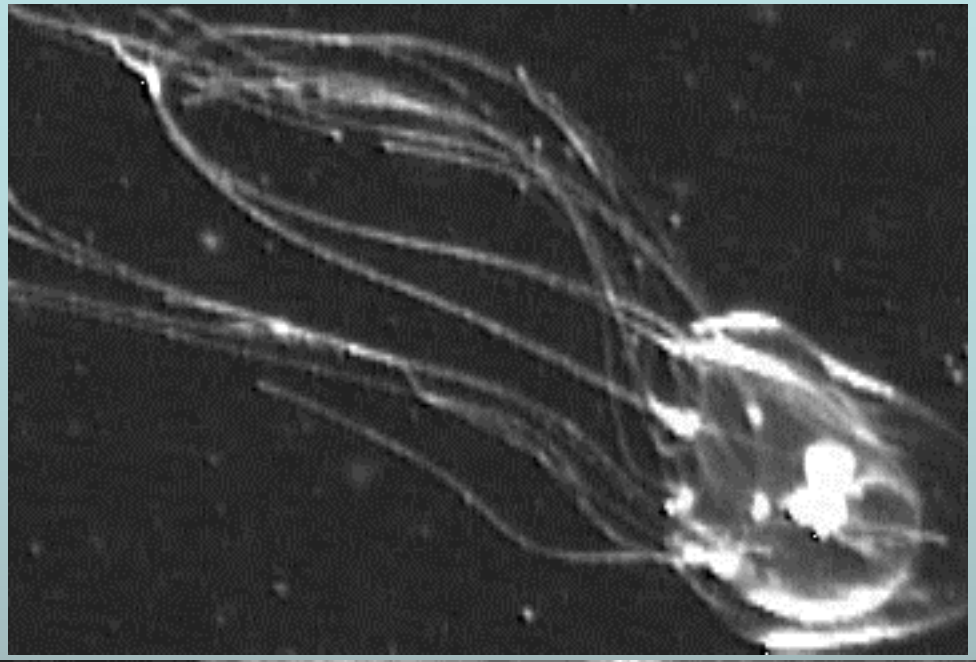
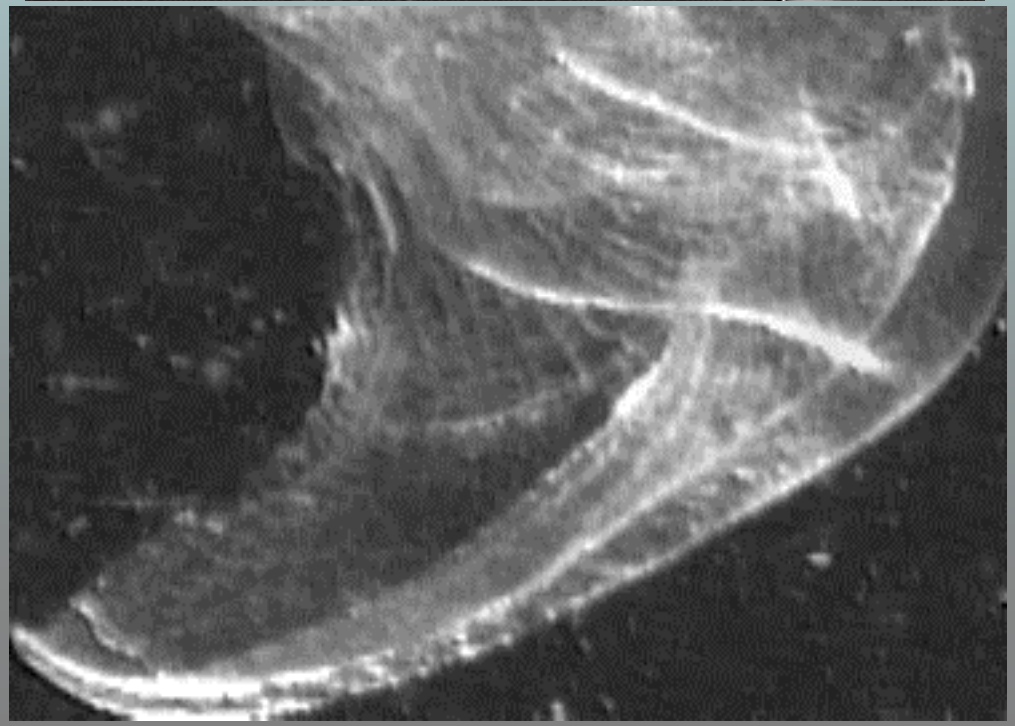
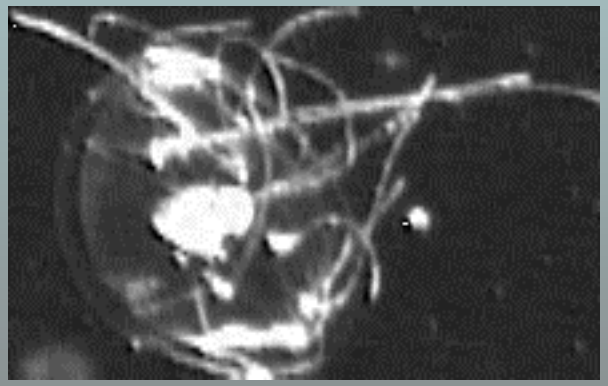


The VPR is very good at imaging fragile forms





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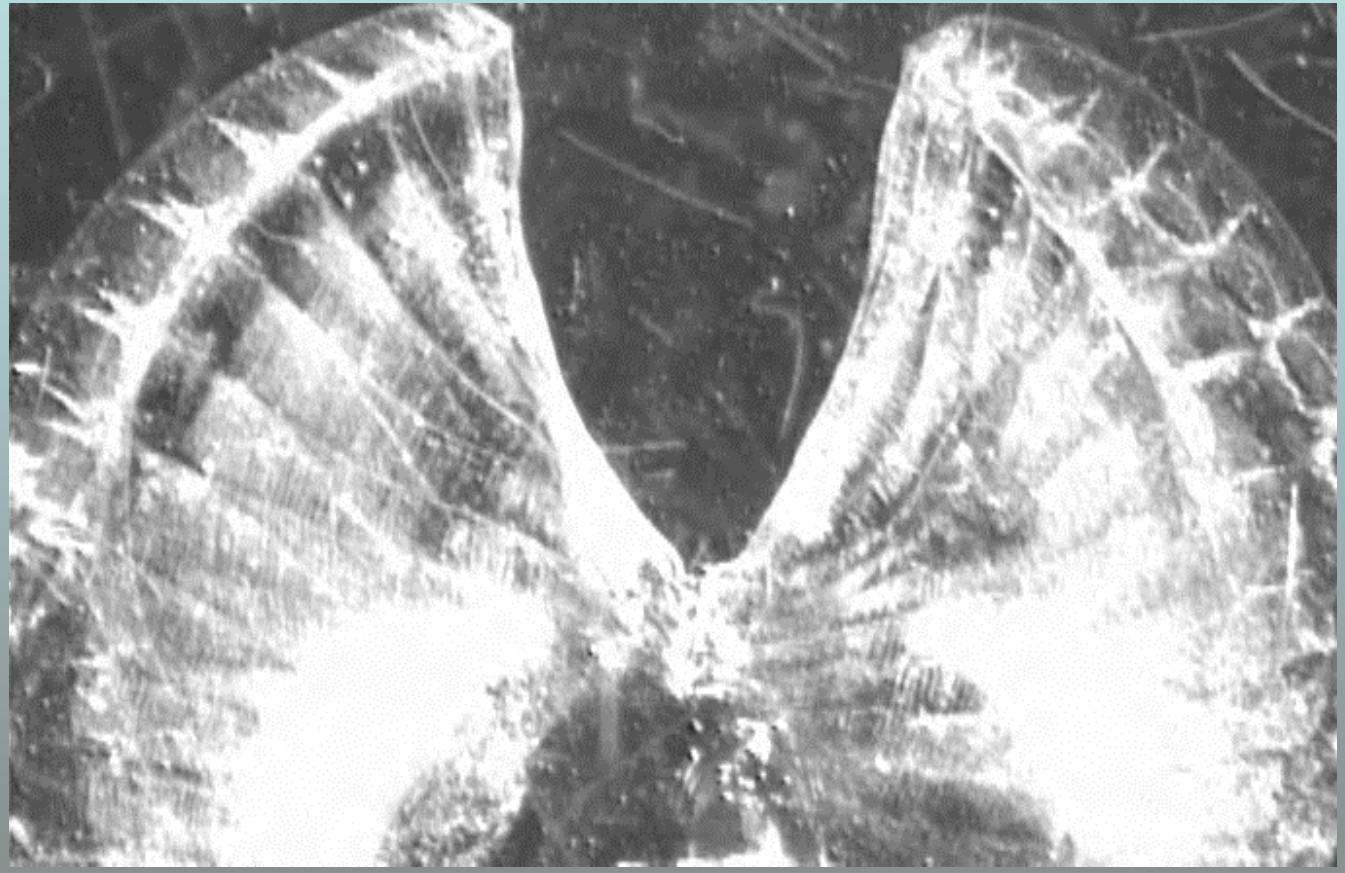
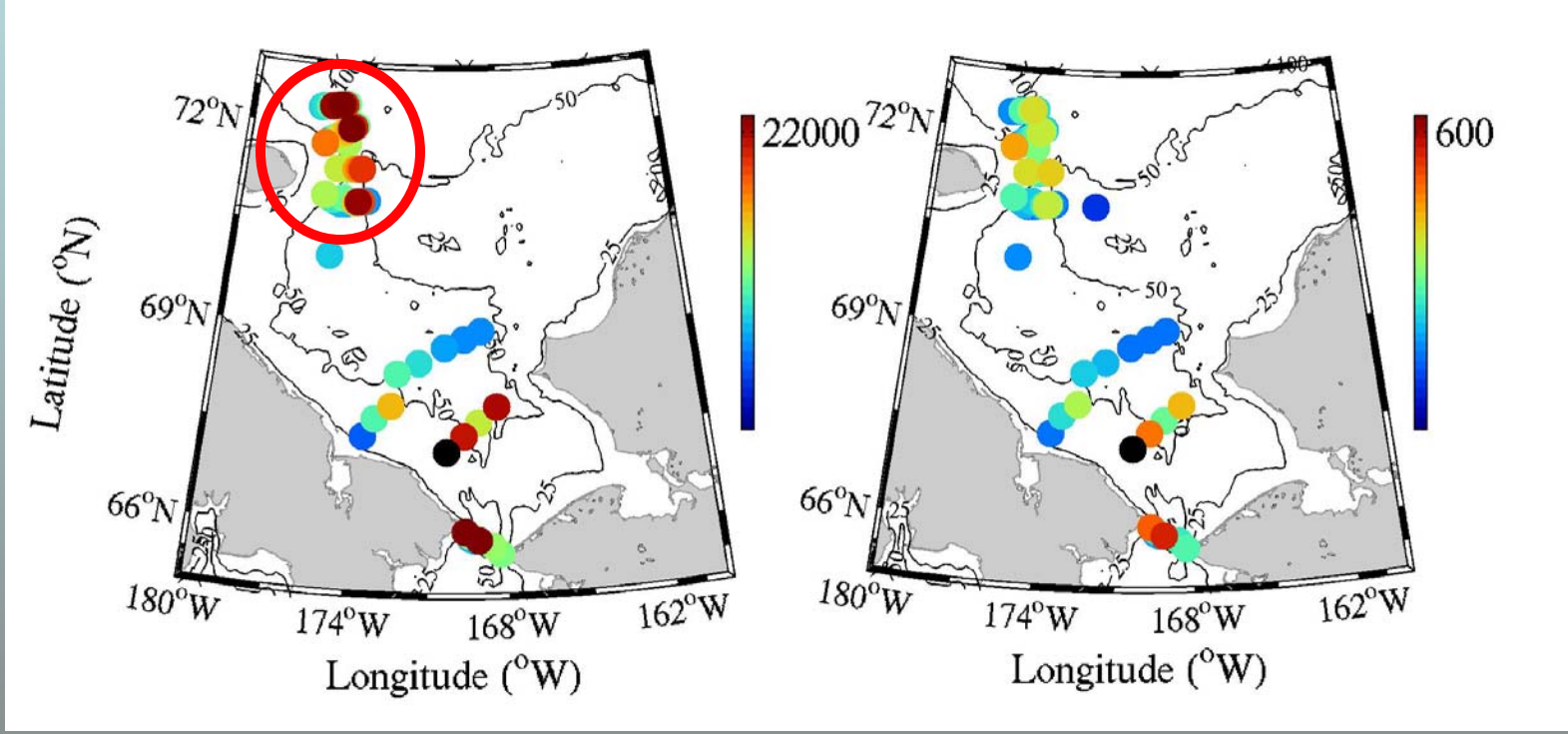


Total Number of Images Collected at Each Station

Total Images

Total Images/Cast Depth



- Very high abundances of plankton/particles
- Considerable variability
- Greatest number of images in southern region north of Bering Strait and in Herald Canyon

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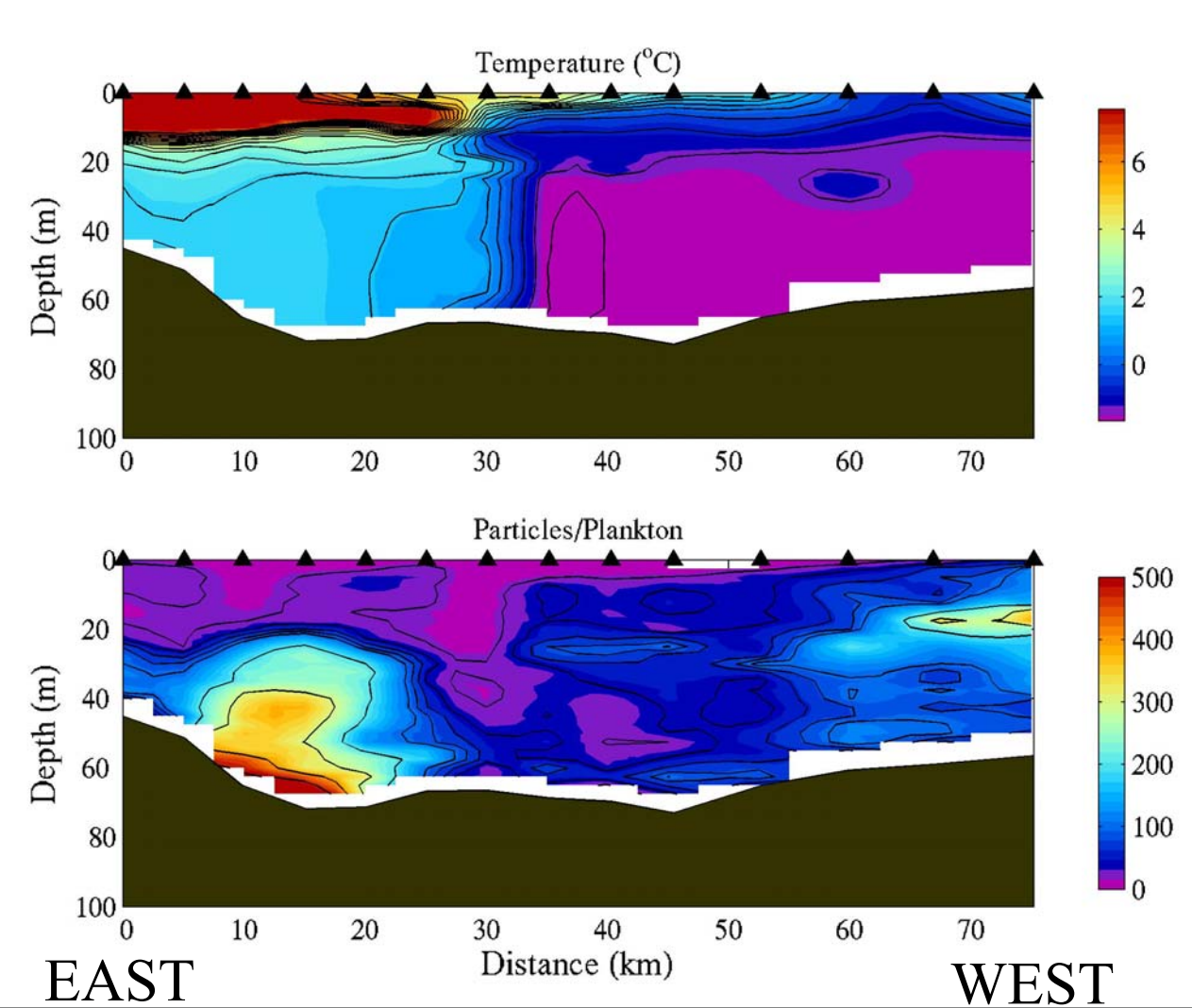
Vertical Distribution from HS1



Two distinct distributions on each side of the canyon

Distributions associated with hydrography

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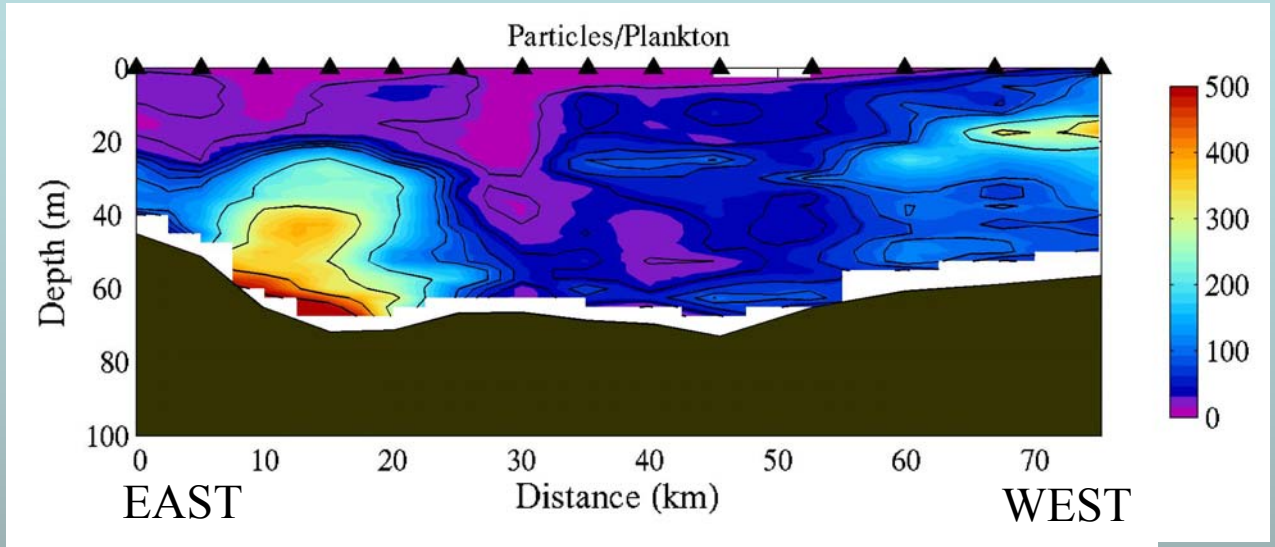
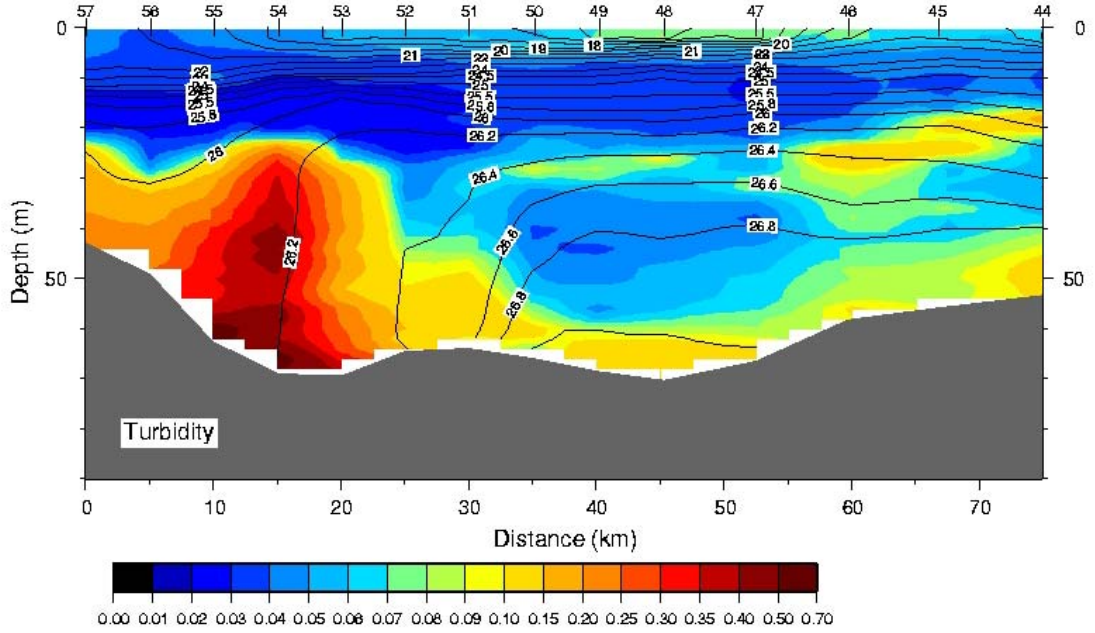
Vertical Distribution from HS1

Total Particles from VPR

Turbidity from CTD





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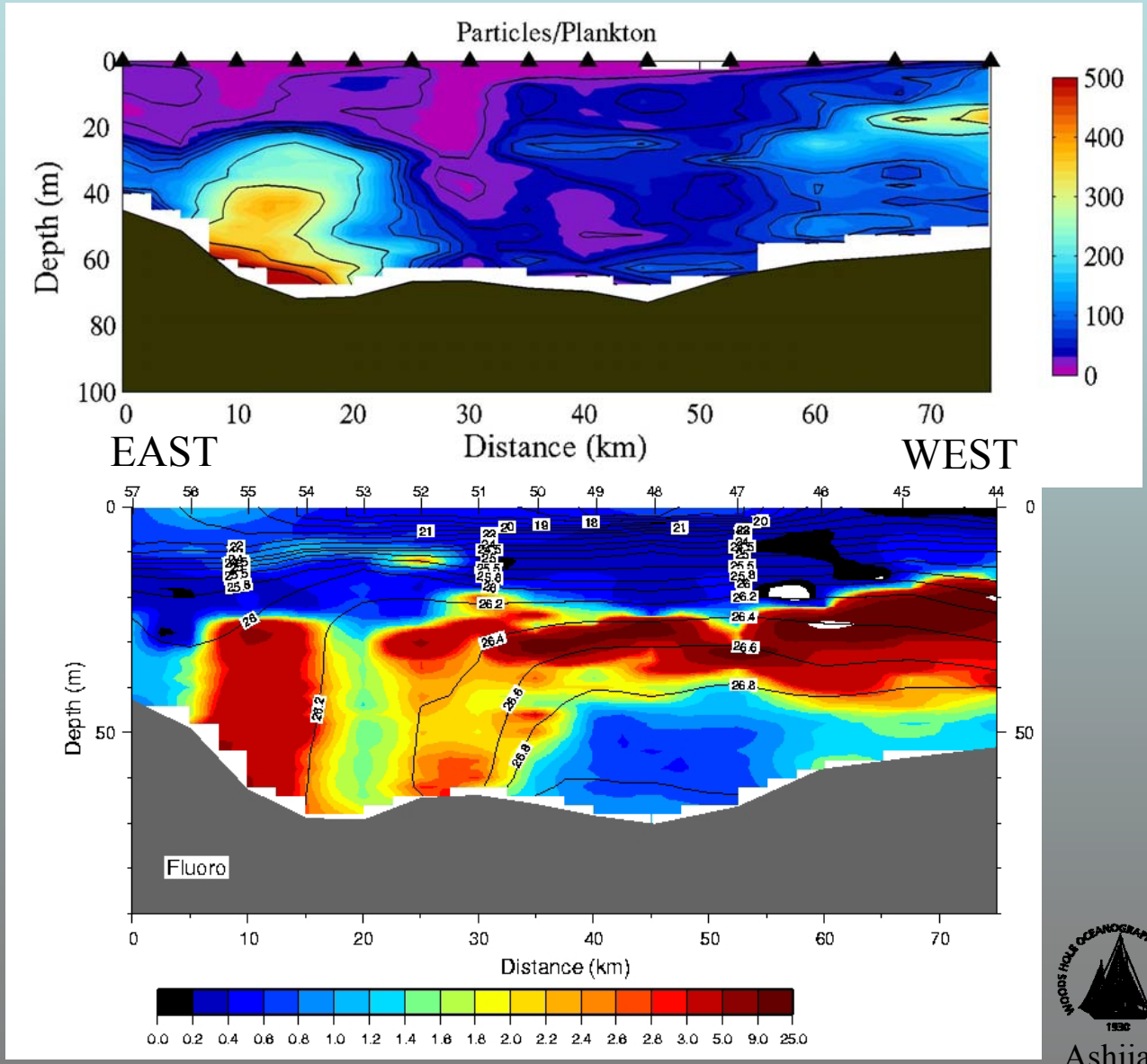
Vertical Distribution from HS1

Total Particles from VPR

Fluorescence from CTD



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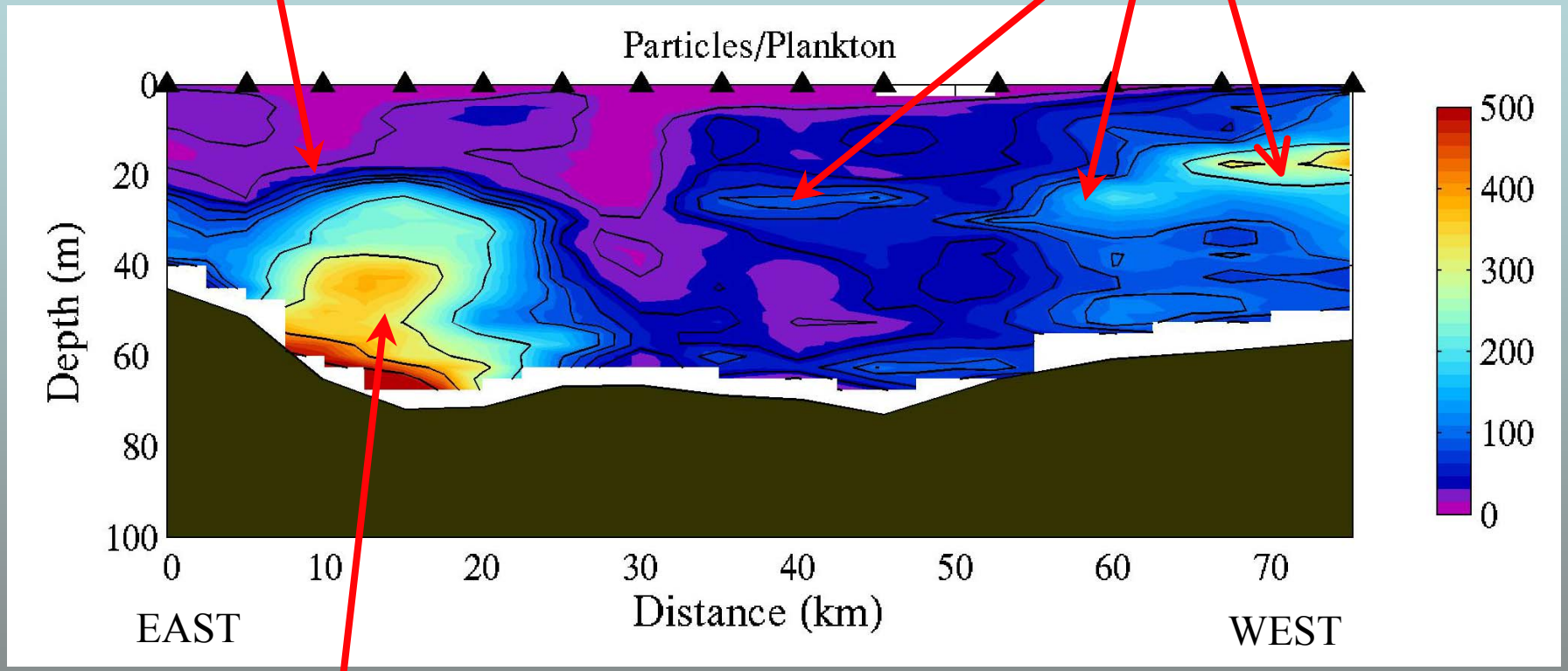
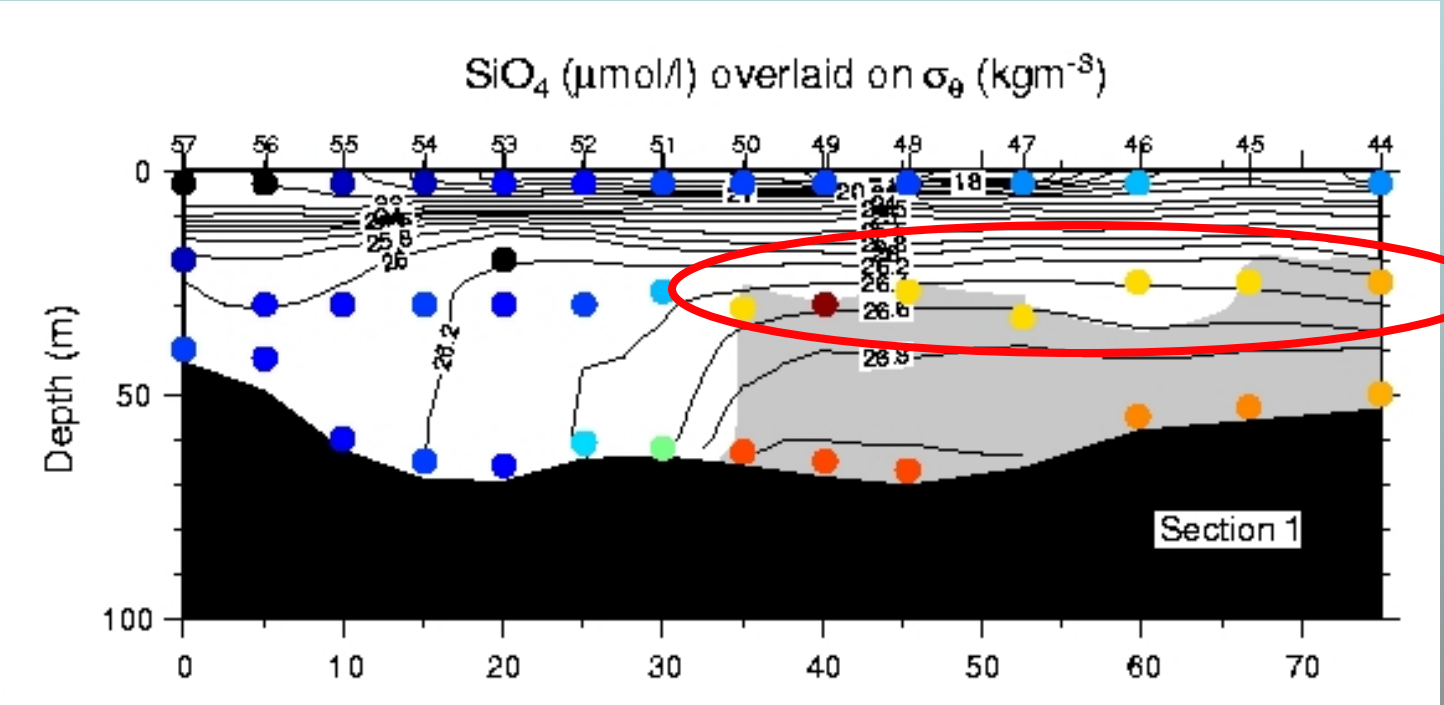
What are the particles? (HS1)



Marine Snow - Detached Bottom Boundary Layer (Pickart)

Silicate (from T. Whitledge via B. Pickart)



- High SiO_4 just below high abundances of *Phaeocystis* but not below diatoms chains

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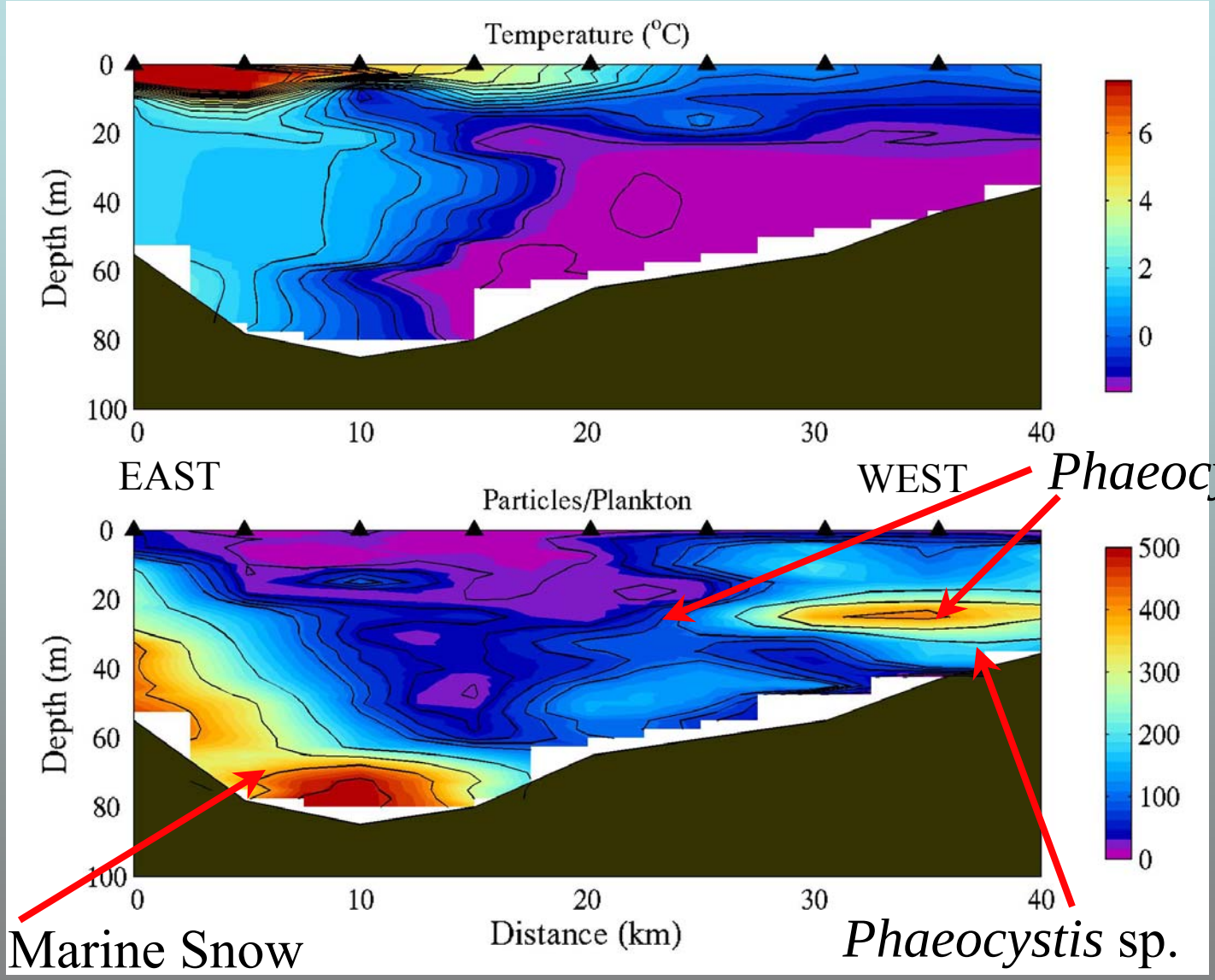
Vertical Distribution from HS2



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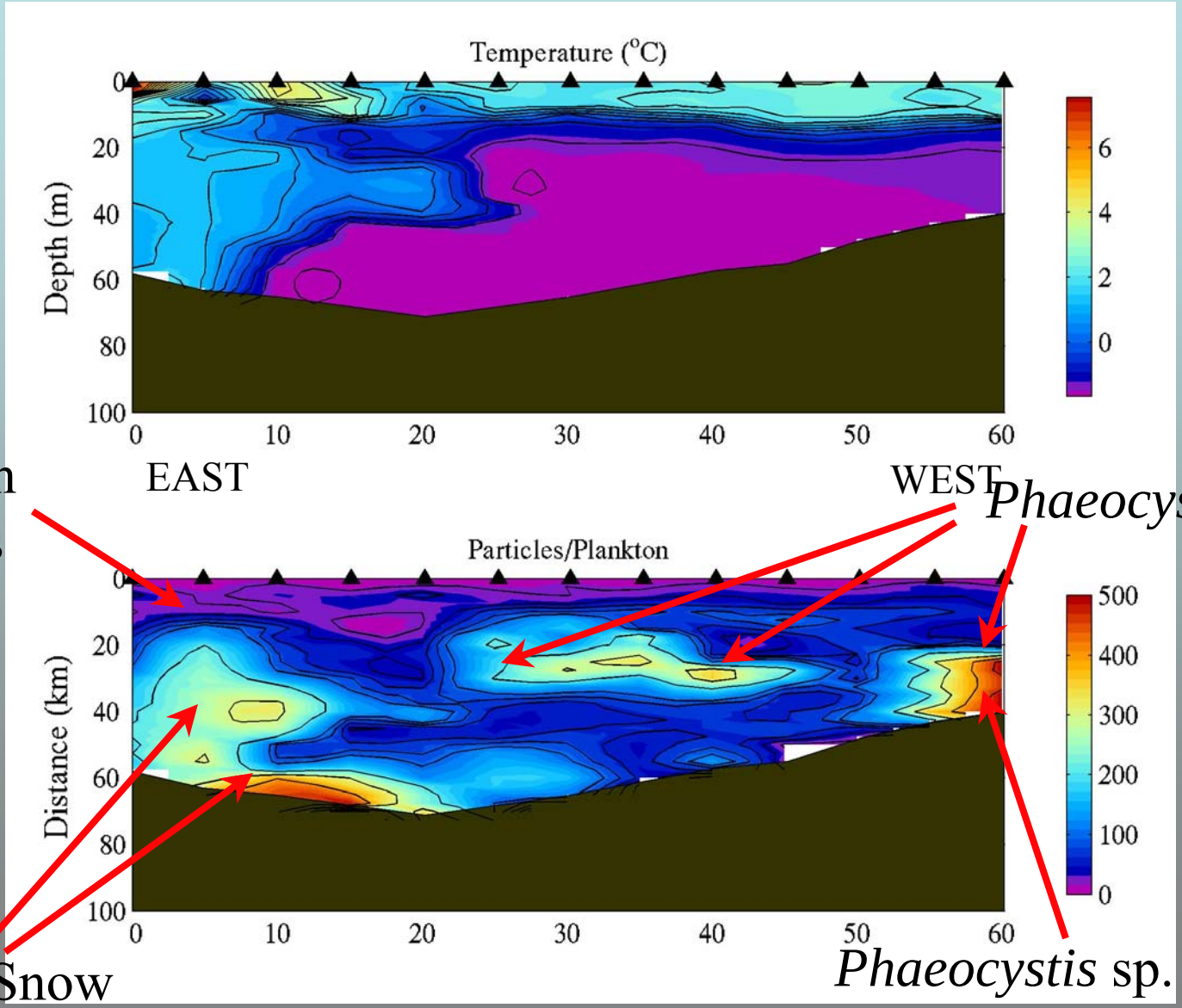
Vertical Distribution from HS3



Diatom Chains

Phaeocystis sp.

Marine Snow

Phaeocystis sp. marine snow

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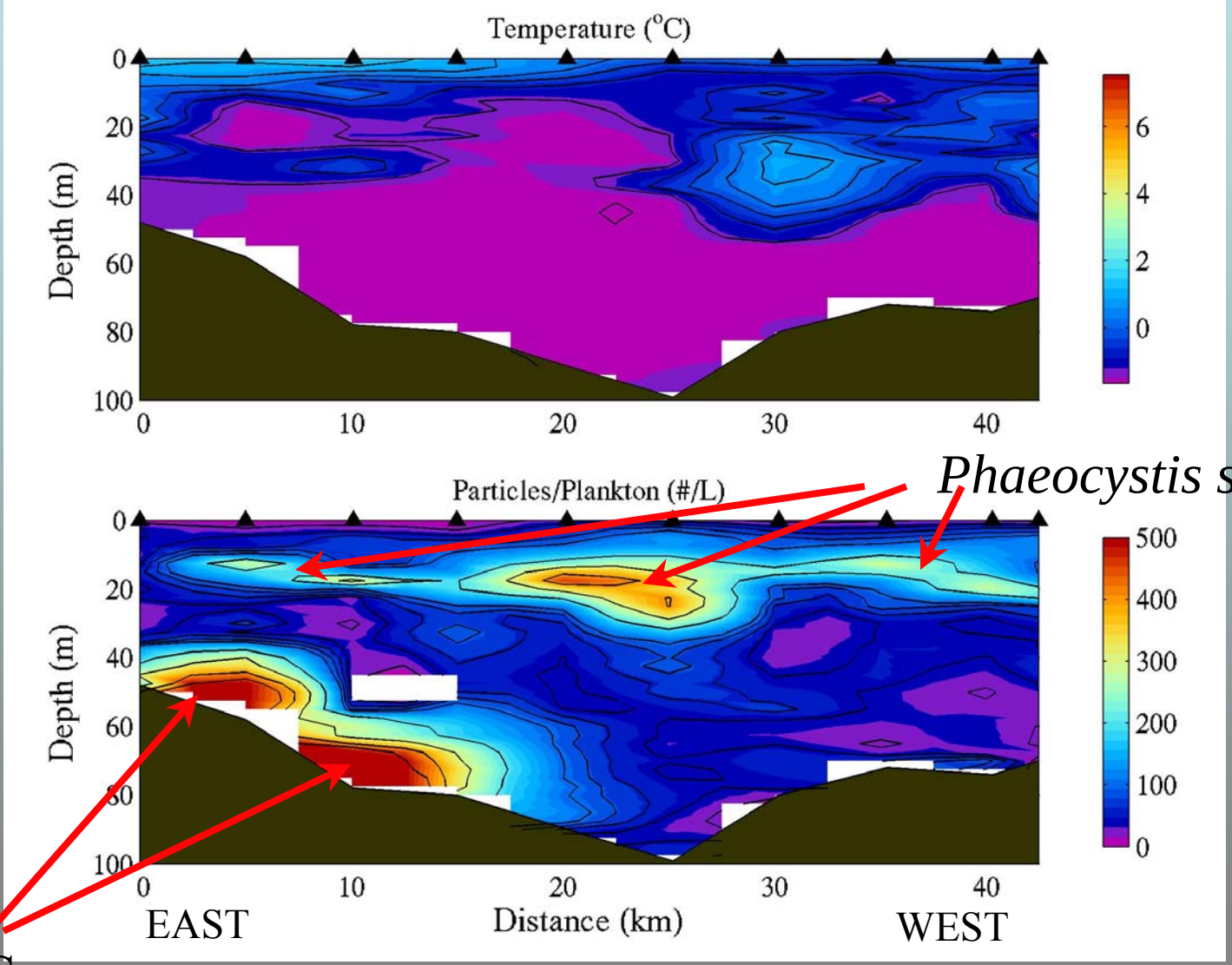
Vertical Distribution from HS4



Phaeocystis sp.

Marine Snow

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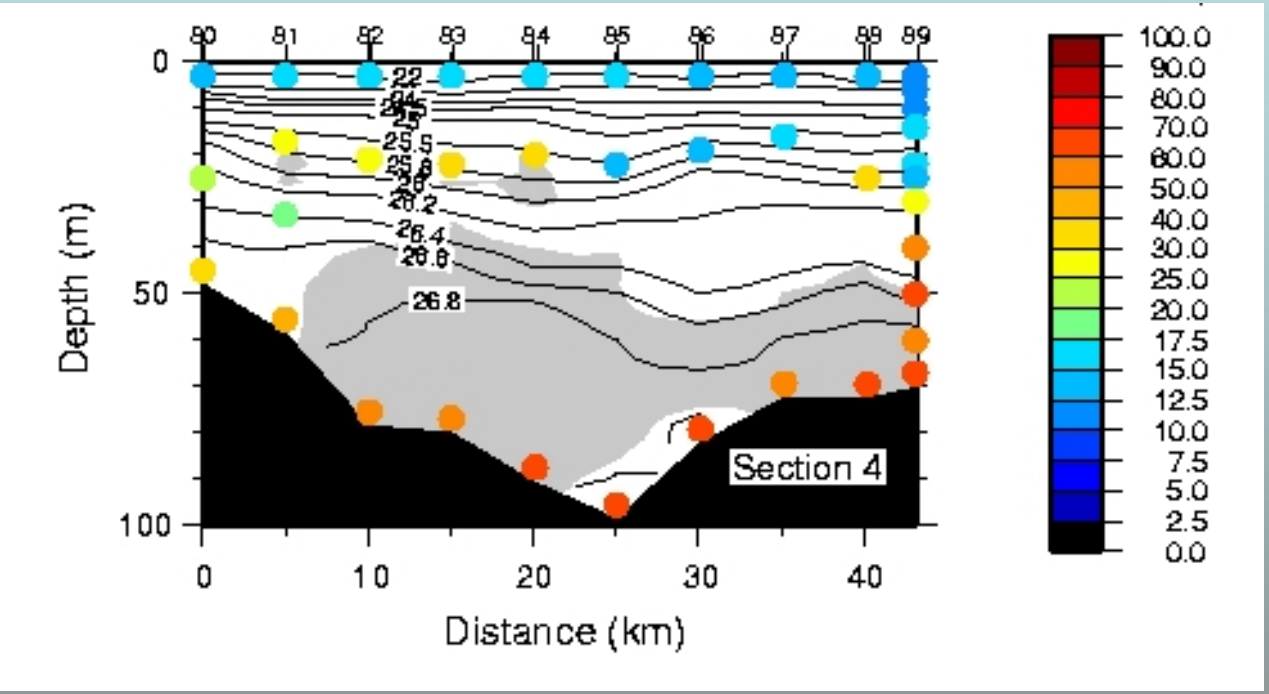
Silicate from HS4



- Here the high SiO4 extends almost all the way across the section, associated with *Phaeocystis* bloom that also extends across the section

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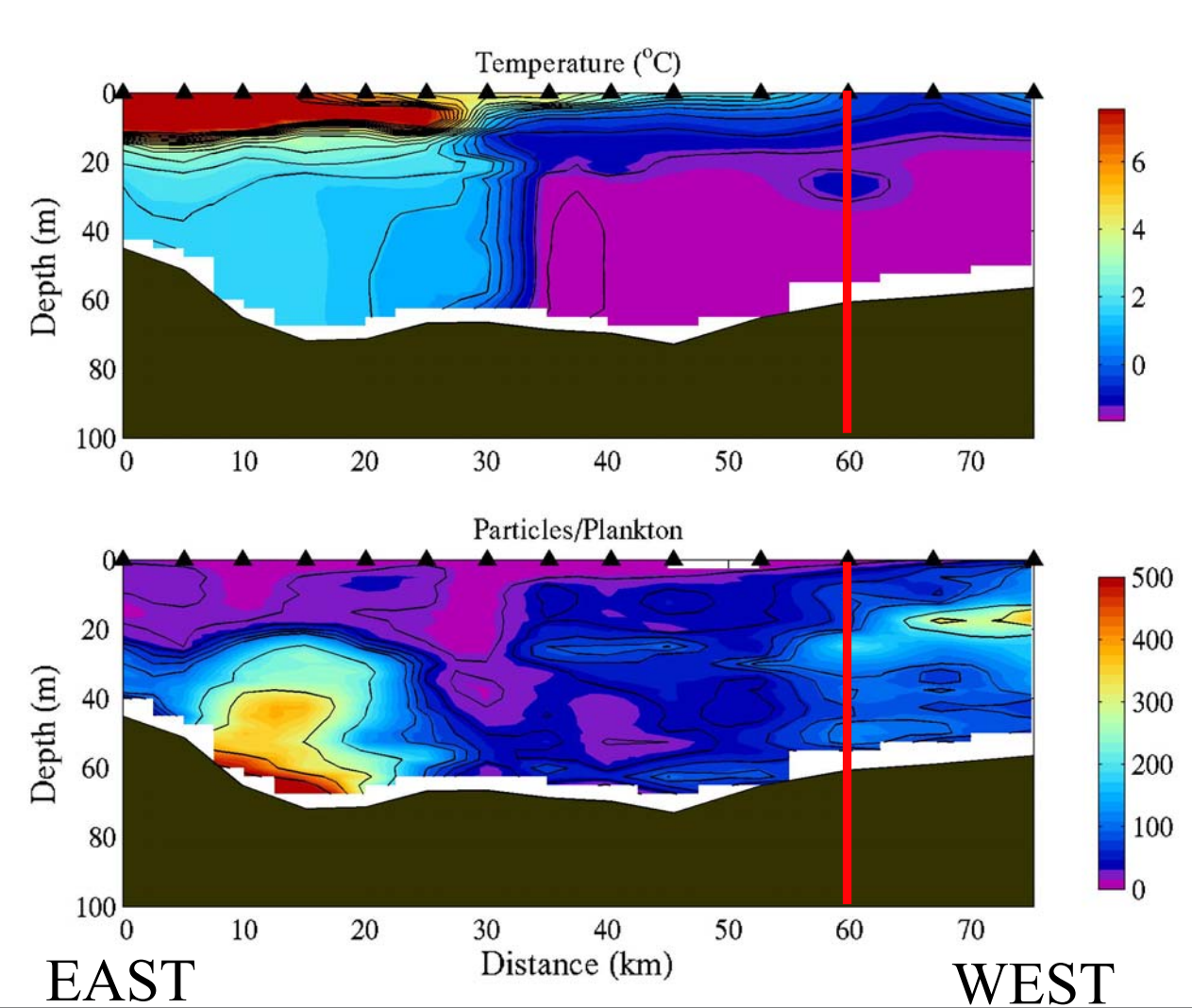
Vertical Distribution from HS1



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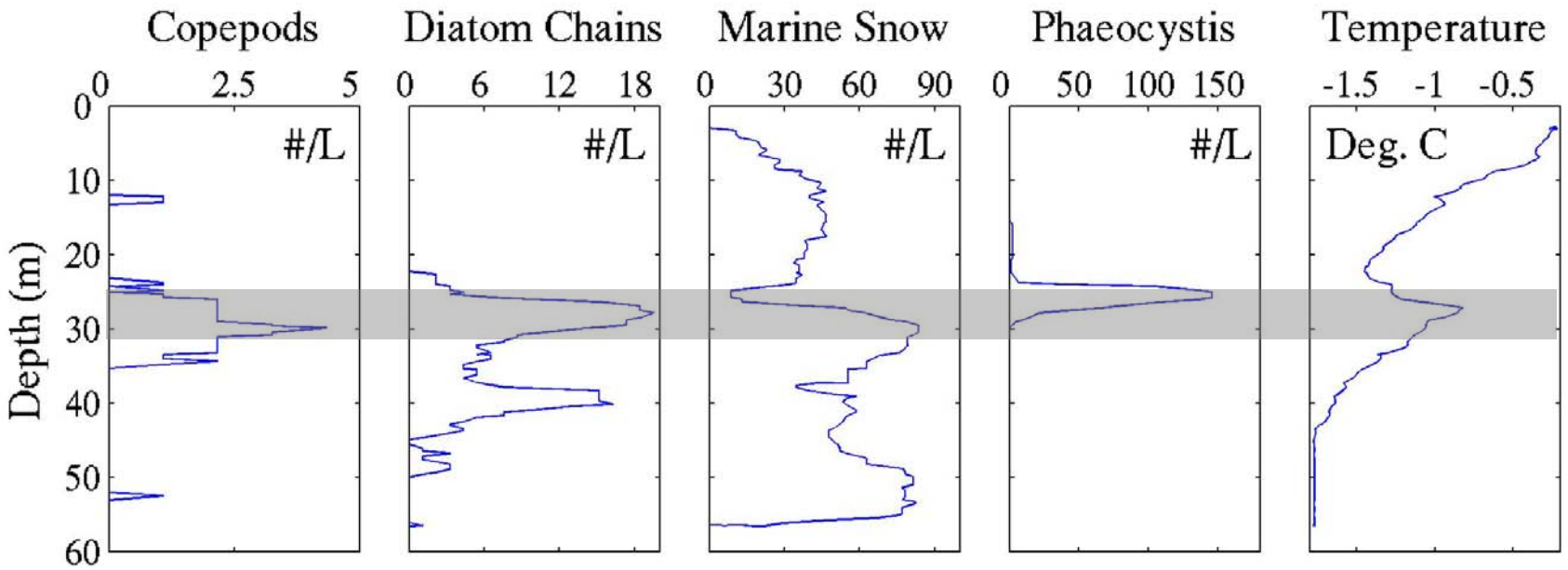
Vertical Distribution of Taxa
(VPR 27 on HS1)



- All show a peak at around 25-30 m, associated with a peak in temperature
- The gradient in *Phaeocystis* concentration is extremely sharp.

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Next steps

- Finish classifying images and merge taxonomic information with physical data
- Calculate marine snow carbon
- Calculate particle and taxa fluxes by considering in-situ velocity together with lADCP velocities (with B. Pickart)

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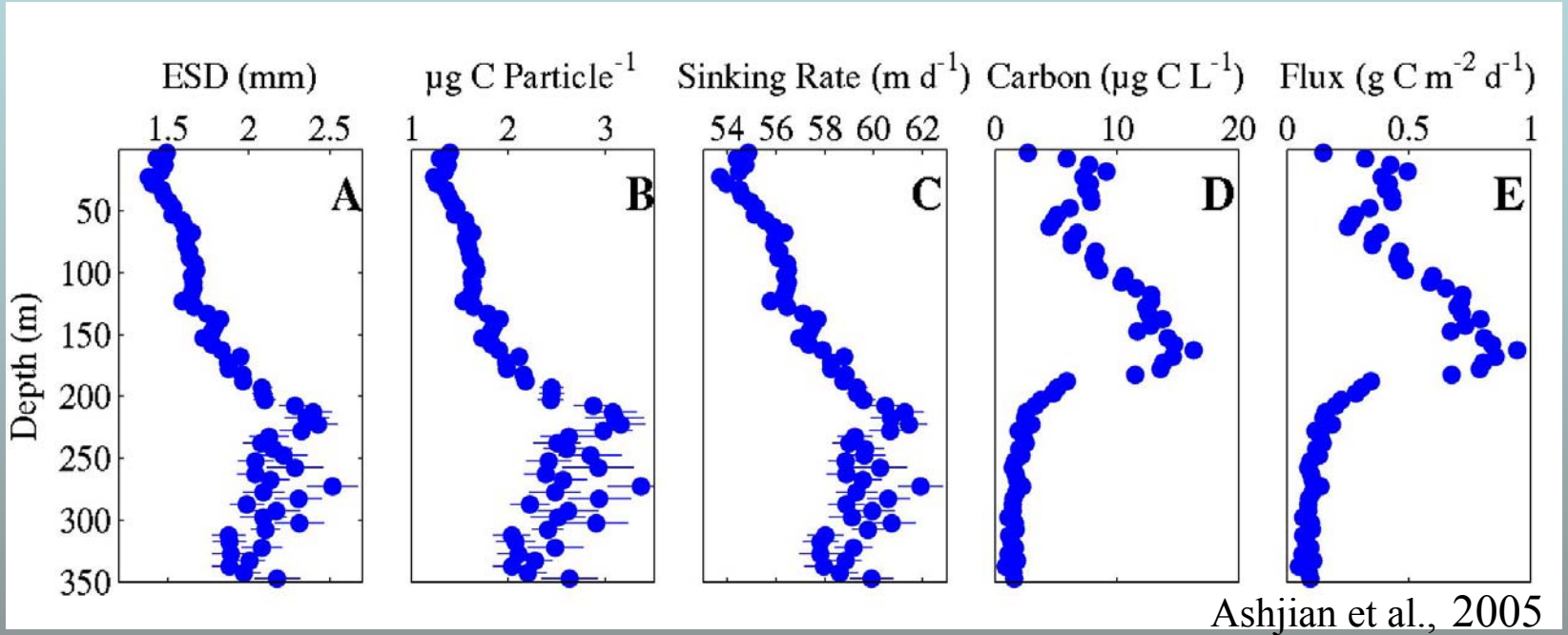
Calculating carbon from marine snow size

(Means ± SE of all profiles from SBI Summer 2002 Cruise)



Ashjian et al., 2005

- Particle carbon: µg C = 0.99*ESV$^{0.52}$ (Alldredge, 1998)
- Particle sinking rate: m d^{-1} = 50* ESD$^{0.26}$ (Alldredge and Gottschalk, 1988)

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Preliminary Findings

- Very high abundances of plankton/particles on Chukchi Shelf
- Similarities between total plankton/particles and turbidity. We can identify the particles causing the turbidity
- Persistent very thin, intense layer of *Phaeocystis* extending from the west in high SiO_4 water at top of cold winter water
- Thin layer of diatom chains also found extending from the east
- Marine snow in detached bottom boundary layer. Some of this has high fluorescence; need to check type of marine snow (e.g., diatoms present?)
- Other taxa/particles are present in lower abundances; their distributions will be described once classification is complete

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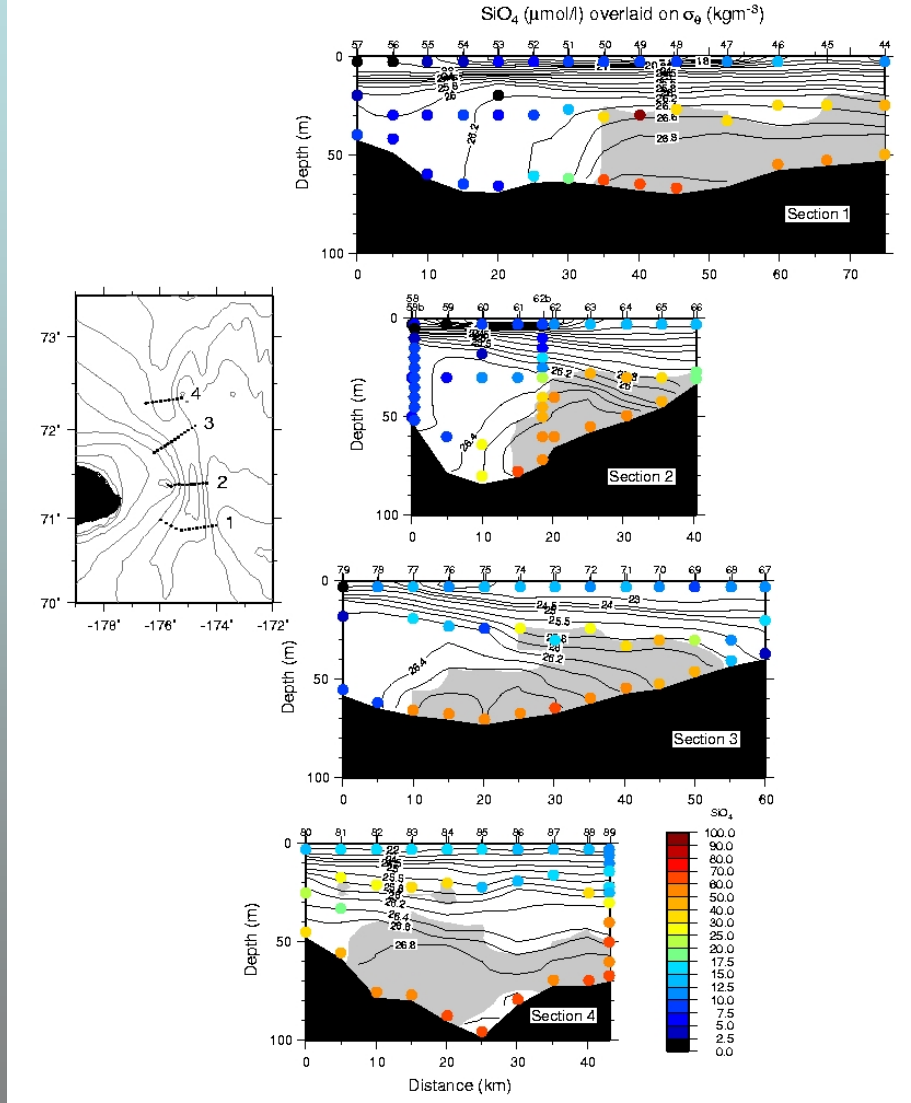
SiO4 (µmol/l) overlaid on σθ (kgm-3)
Section 1
Section 2
Section 3
Section 4
Depth (m)
Distance (km)
SiO4
73°
72°
71°
70°
-178°
-176°
-174°
-172°
1
2
3
4

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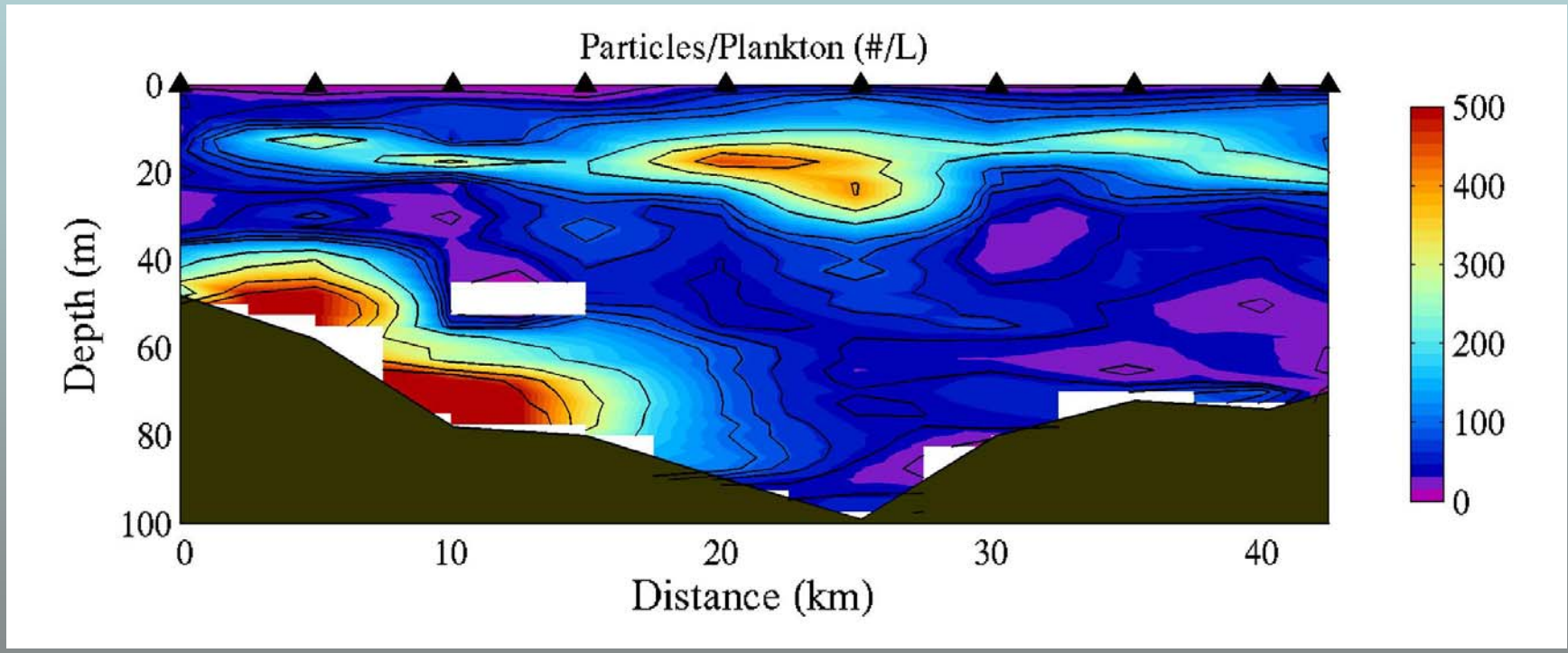
Vertical Distribution from HS4



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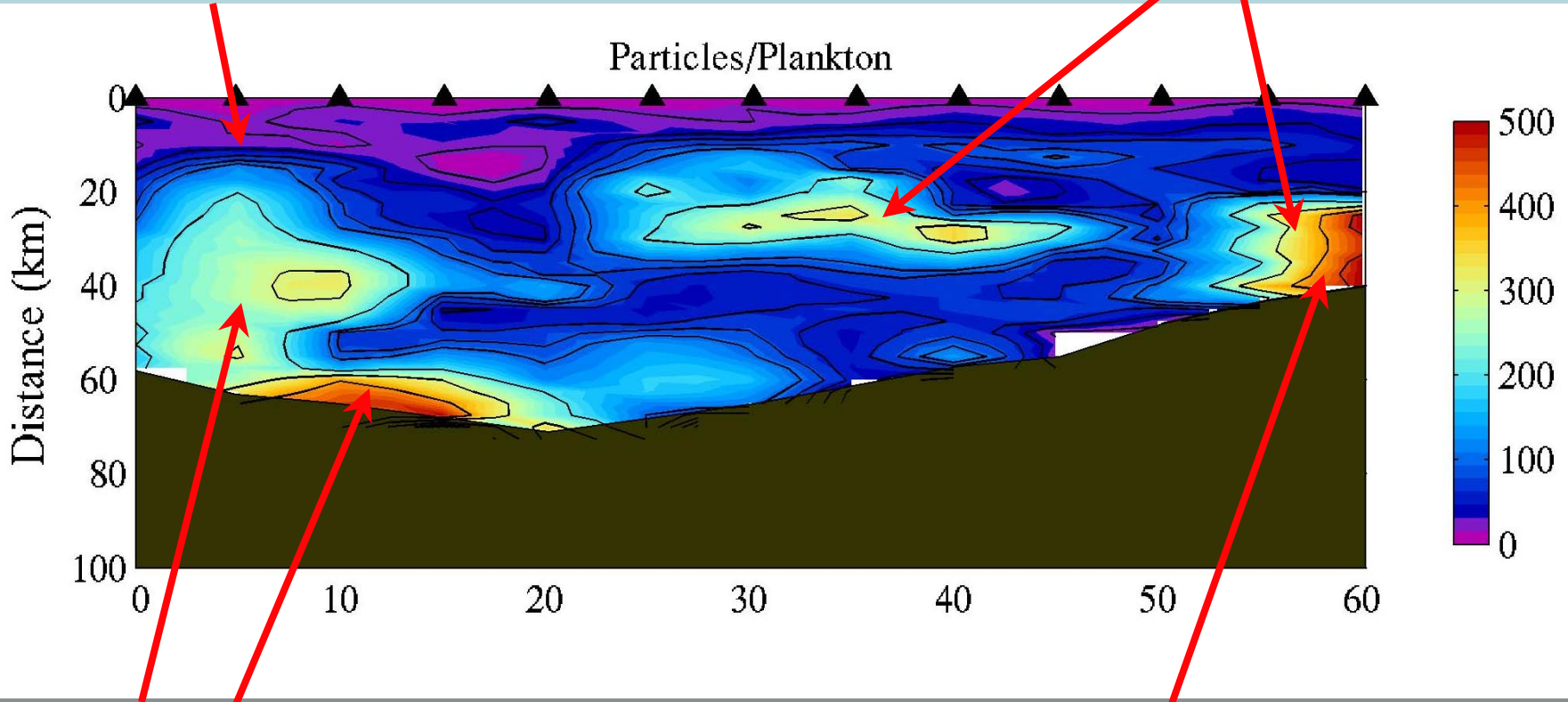
Vertical Distribution from HS3

Diatom Chains

Phaeocystis sp.



Marine Snow

Phaeocystis sp.
marine snow

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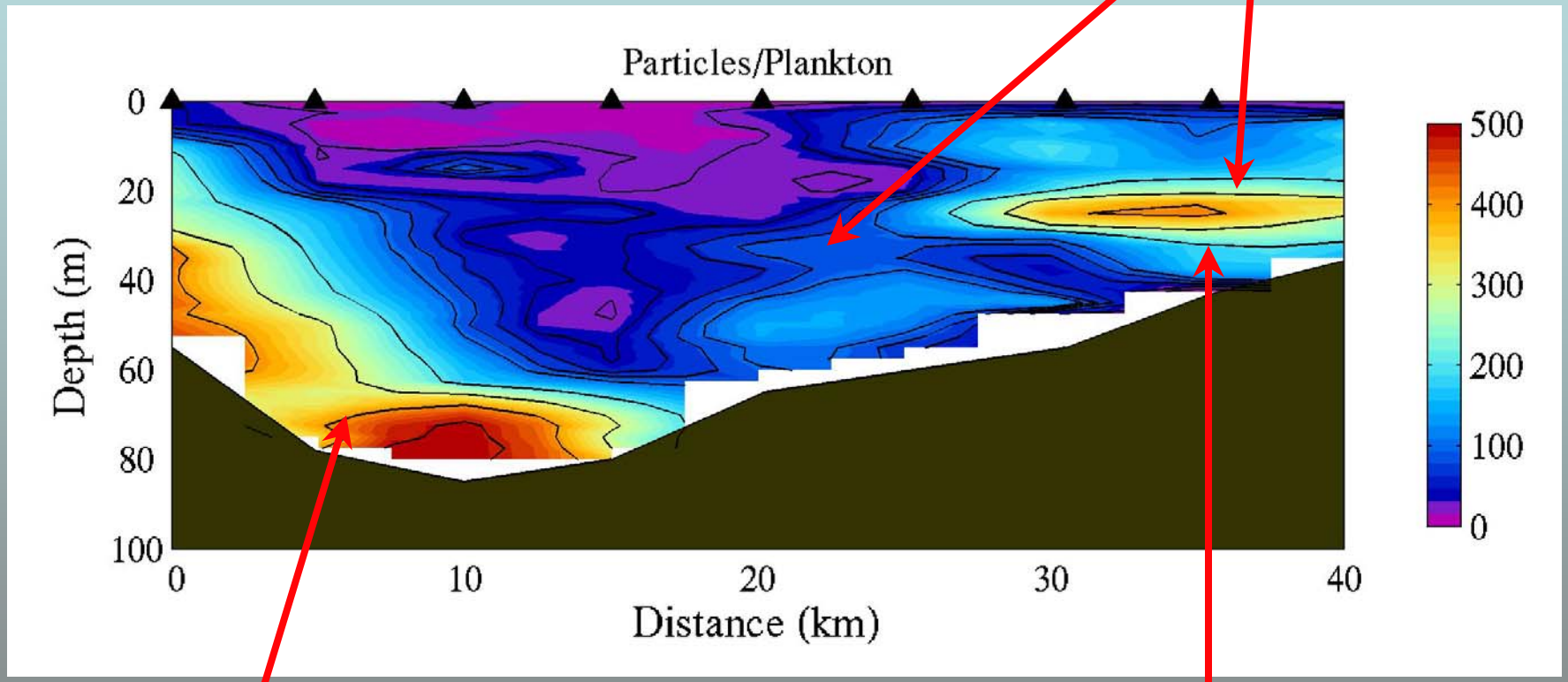
Vertical Distribution from HS2

Phaeocystis sp.



Marine Snow

Phaeocystis sp.
marine snow

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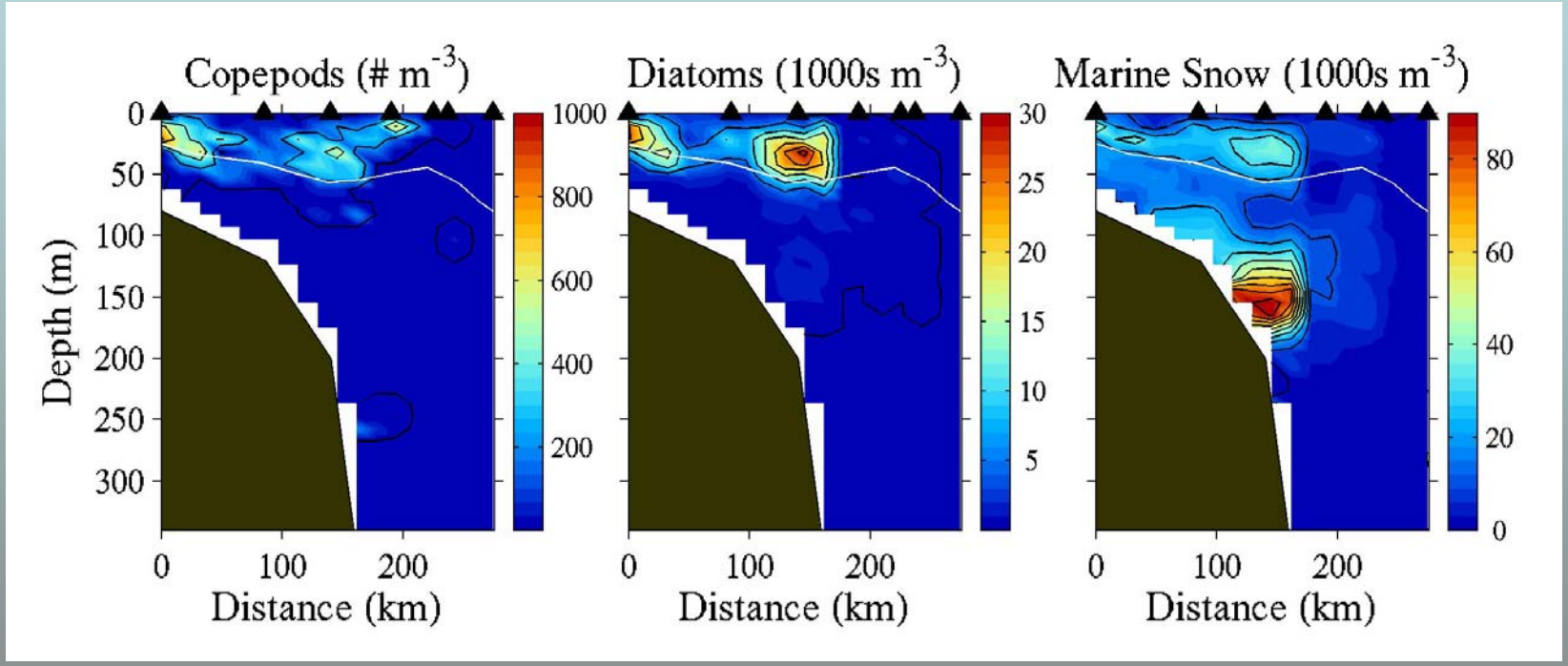
Transect Along Barrow Canyon from SBI 2002 Summer



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