

# Using remote sensing observations to address the role of calcifiers in high-latitude seas

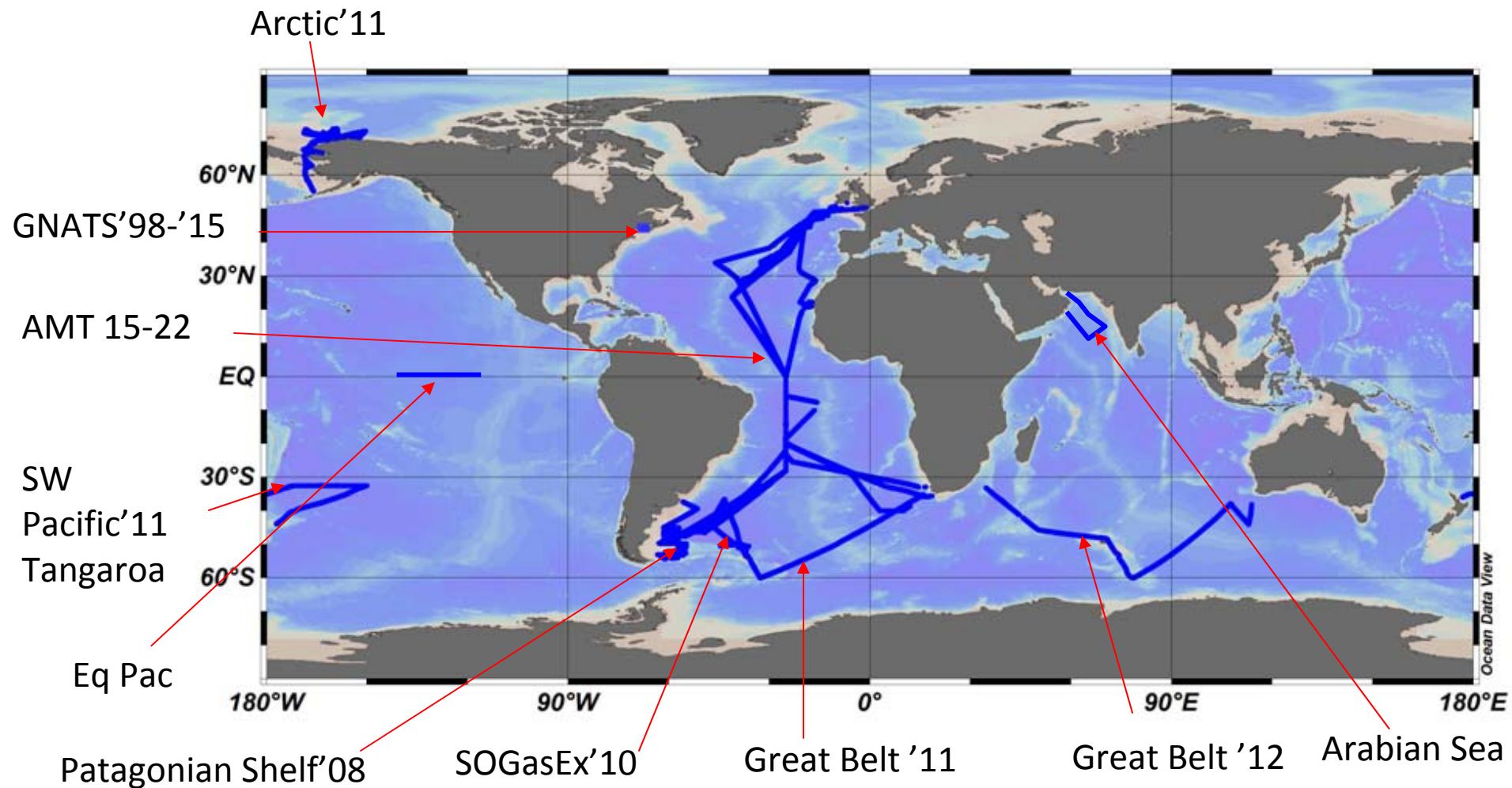
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# High-Latitude Calcifiers

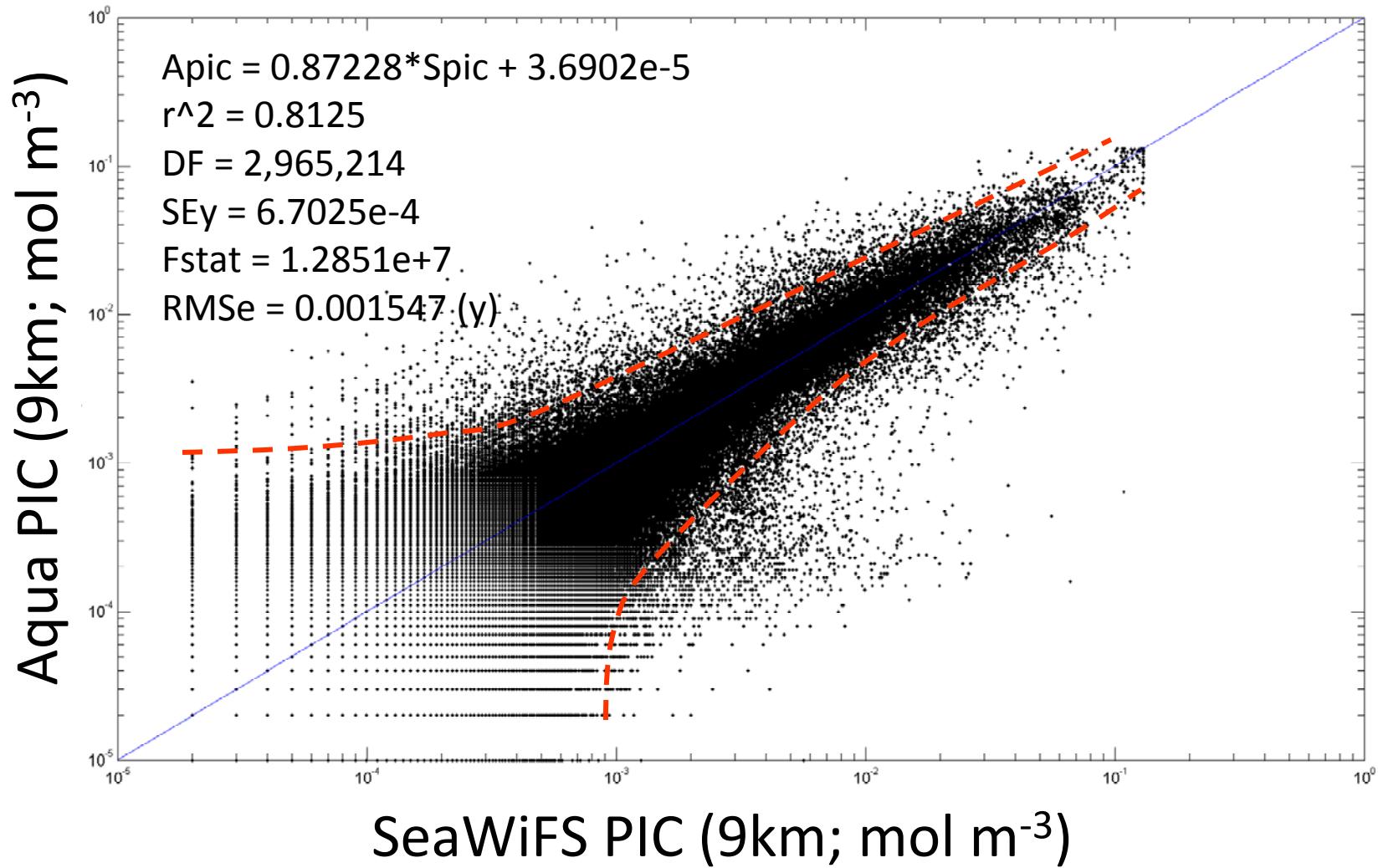
- Only talking about coccolithophores here
- Largest coccolithophore blooms happen at high latitude
- Diversity of coccolithophore assemblages decreases moving poleward, with *Emiliania huxleyi* becoming the dominant species (not only one!)
- Northern Hemisphere hot spots: North Atlantic South of Iceland, Barents Sea, Bering Sea. Note,
- Southern Hemisphere hot spots: Great Calcite Belt (including Patagonia Shelf, Sub-Tropical Fronts, Sub-Antarctic Front; Agulhas Front)

Many major cruises to study coccolithophores-  
both northern and southern hemisphere; sampled  
over >212,000 km...



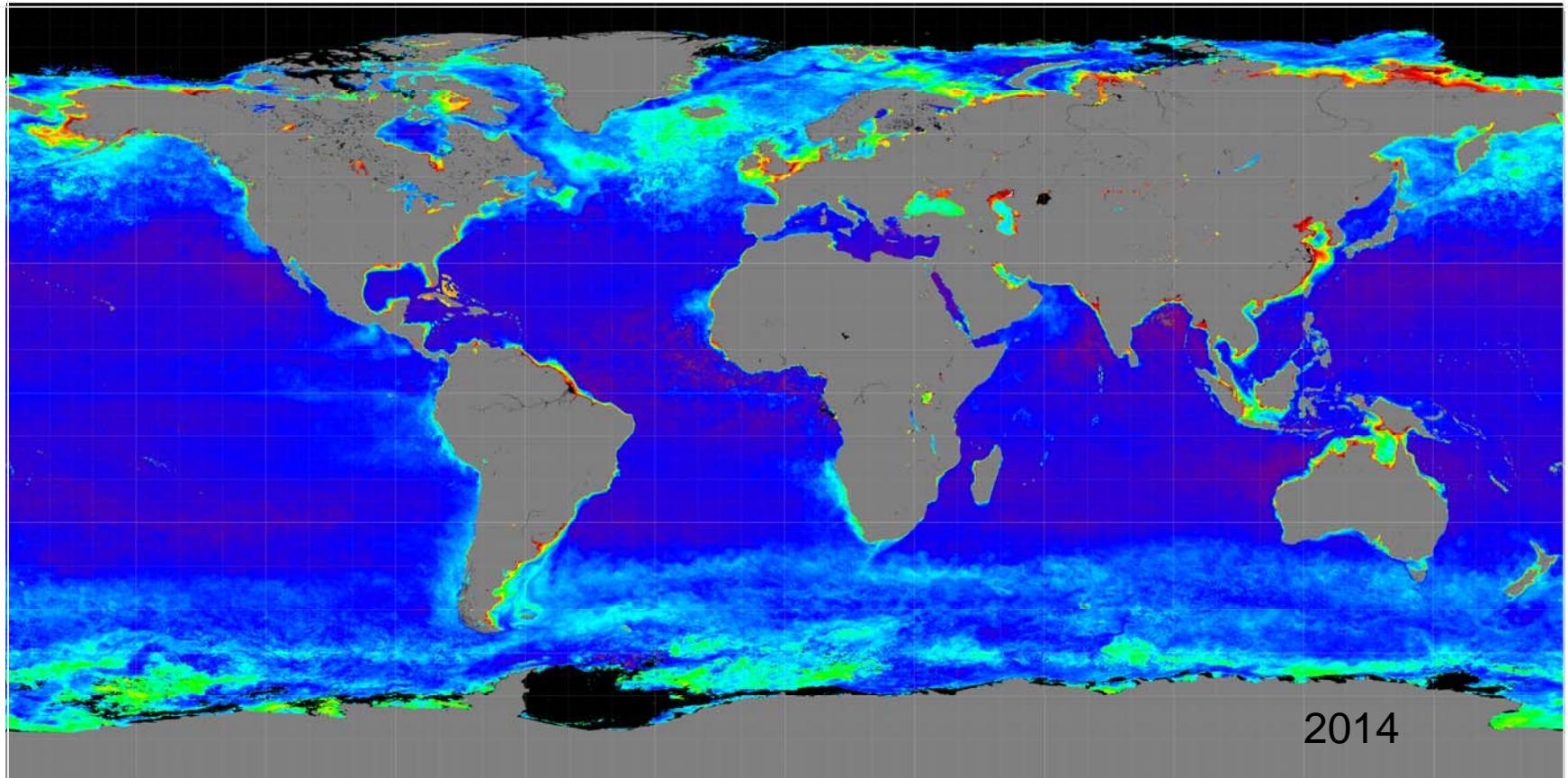
## PIC Algorithm Performance: Collection 6

# Sensor intercalibration- Aqua and SeaWiFS



Log Scales

# Global PIC



2-band/3-band PIC algorithm

Collection 6; 2002-2010; global

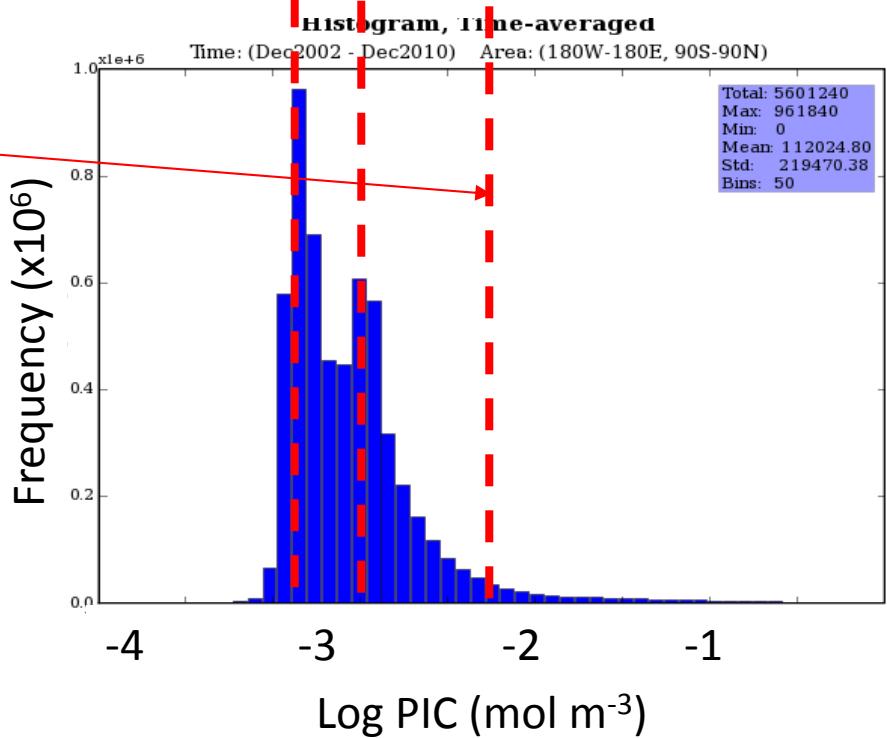
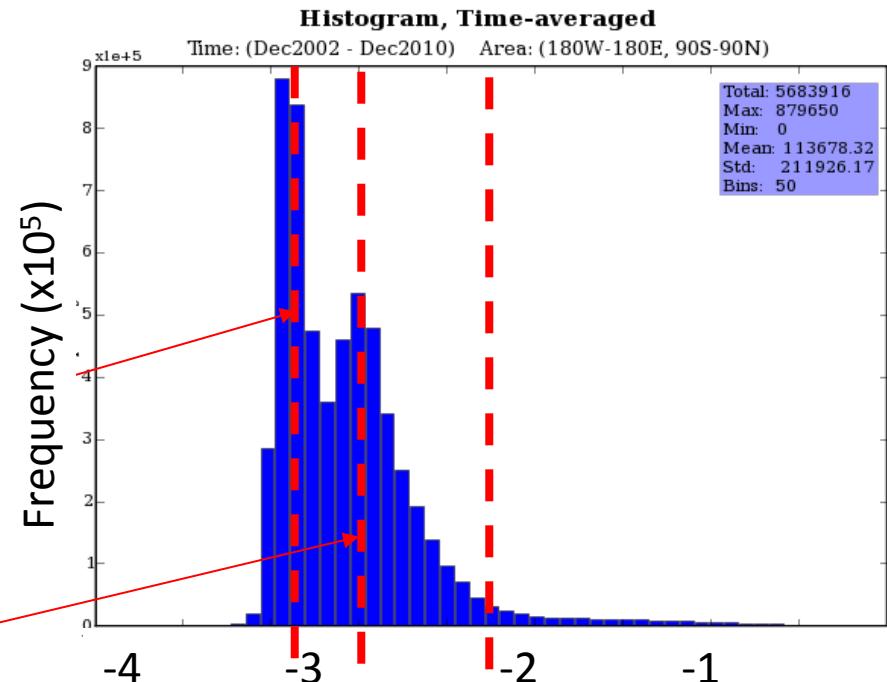
## MODIS AQUA

Subtropics

Temperate and sub polar

High Lat. Summer blooms

## SeaWiFS

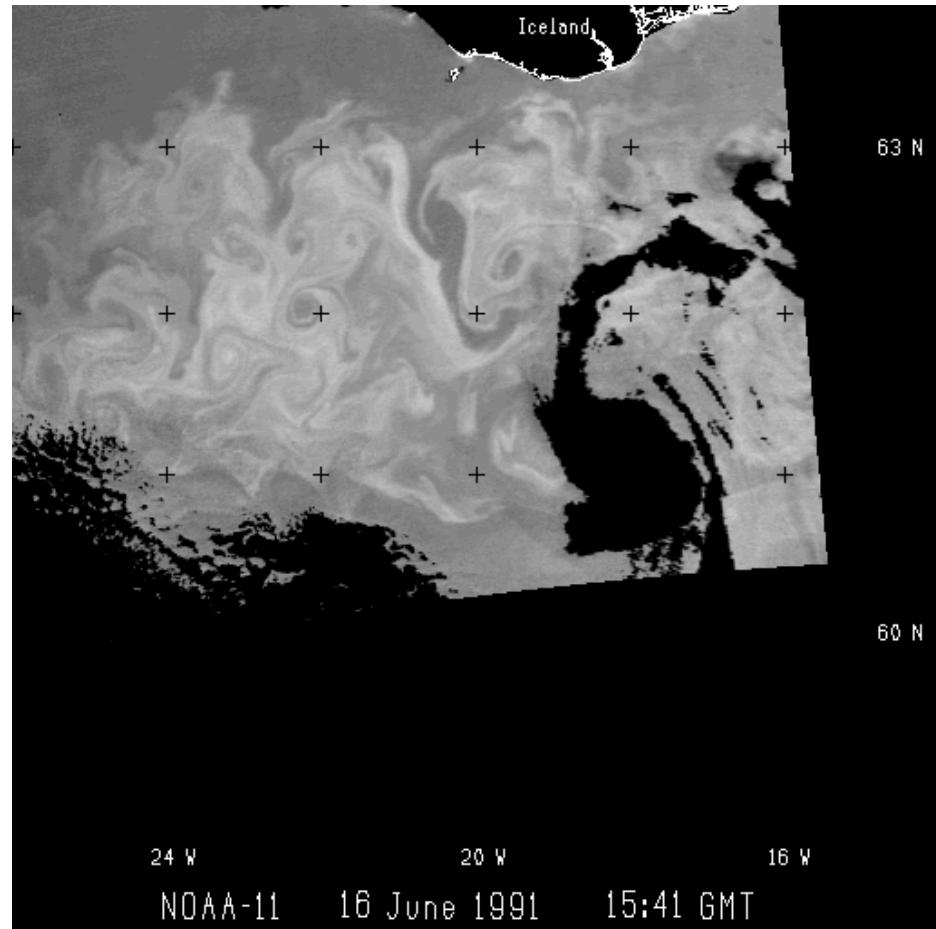


# AVHRR- June 18, 29 and July 1, 1991 composite

GLOBAL BIOGEOCHEMICAL CYCLES, VOL. 7, NO. 4, PAGES 879-900, DECEMBER 1993

## A BIOGEOCHEMICAL STUDY OF THE COCCOLITHOPHORE, *Emiliania huxleyi*, IN THE NORTH ATLANTIC

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Total area = 0.5 million km<sup>2</sup>

1991  
Coccolithophore  
bloom South of  
Iceland

Outside  
Bloom

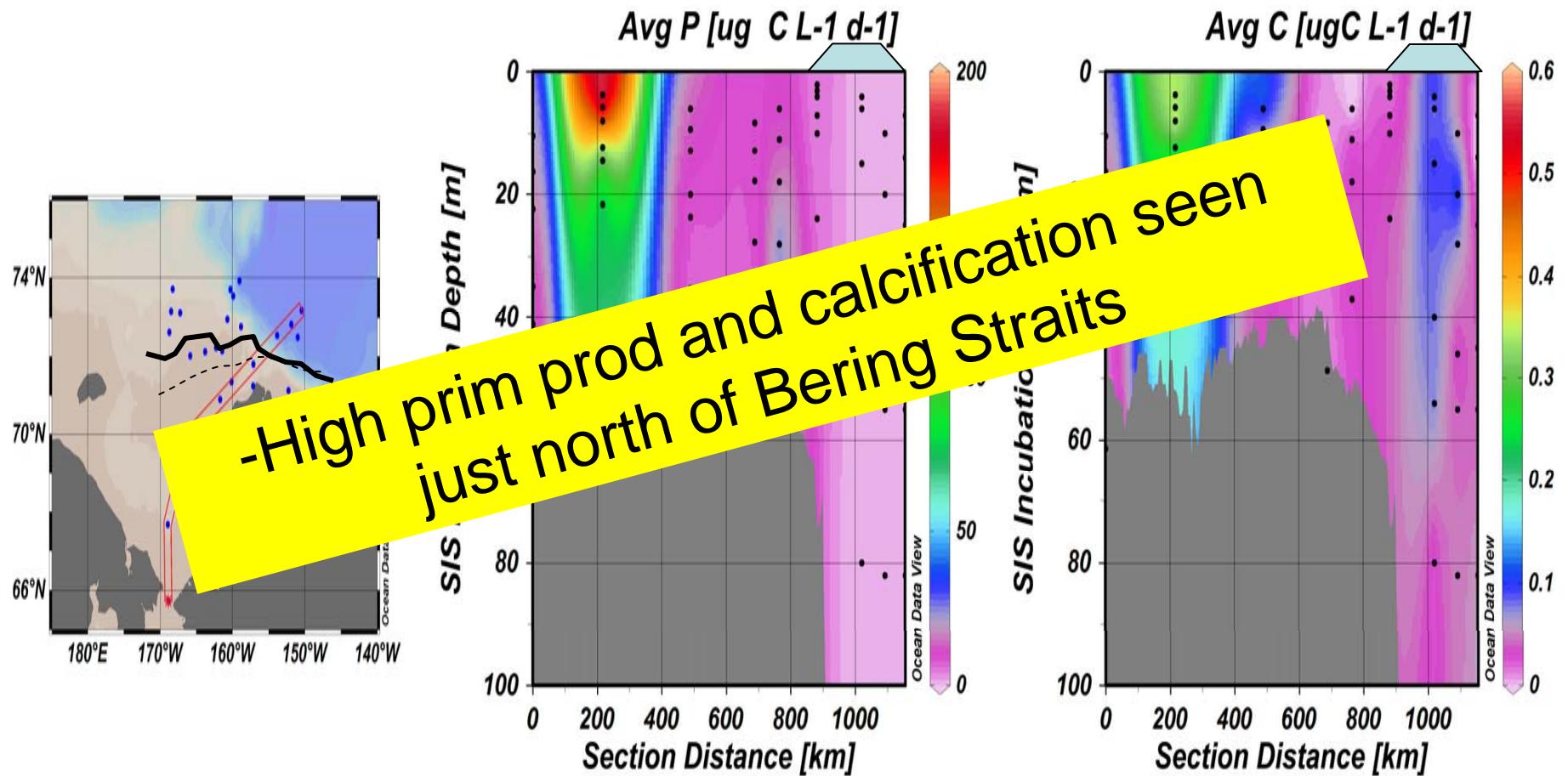


Constant color chip  
for comparison of water  
color

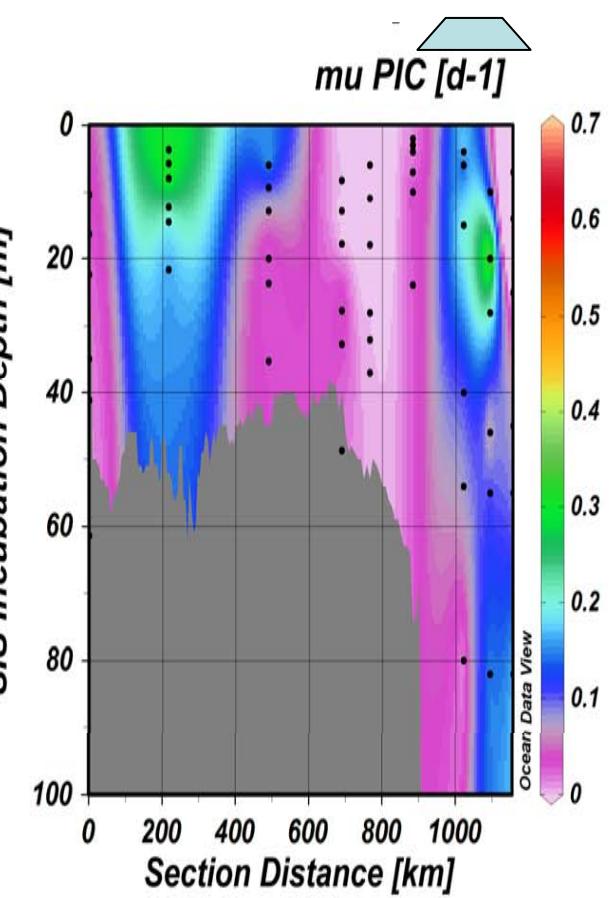
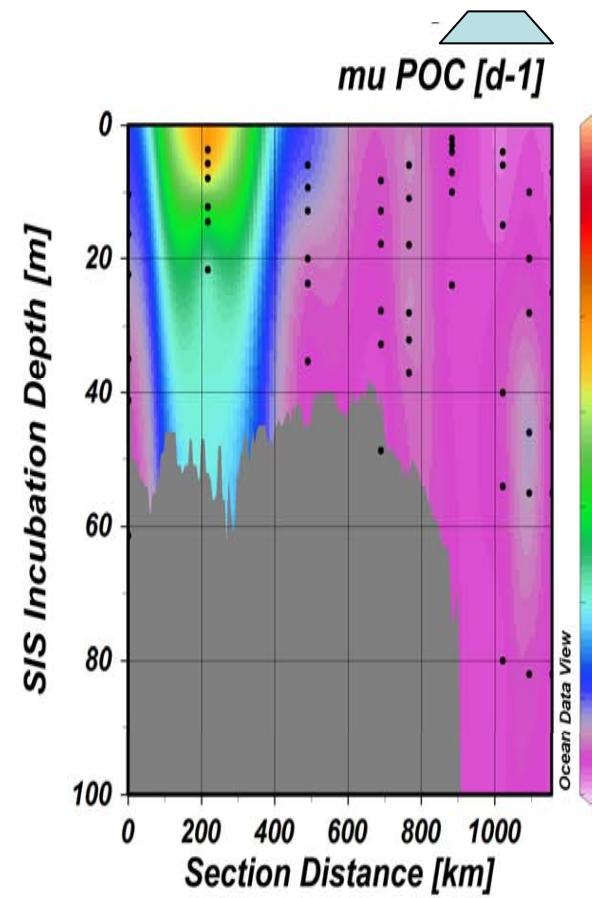
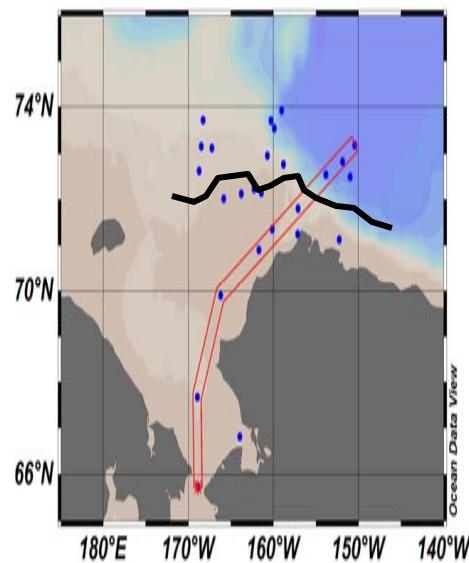
Inside  
Bloom



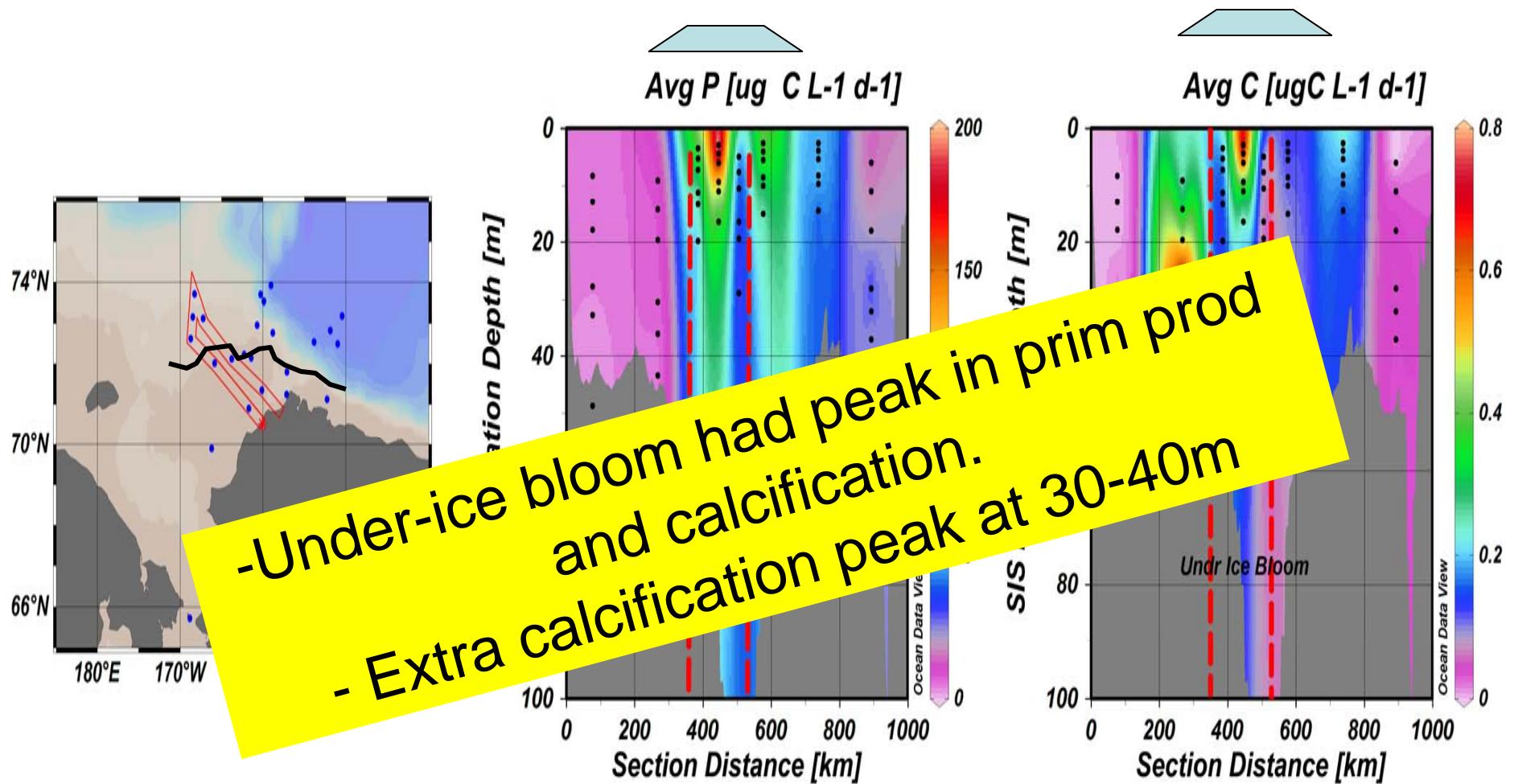
# C fixation Bering Straits to Canadian Basin



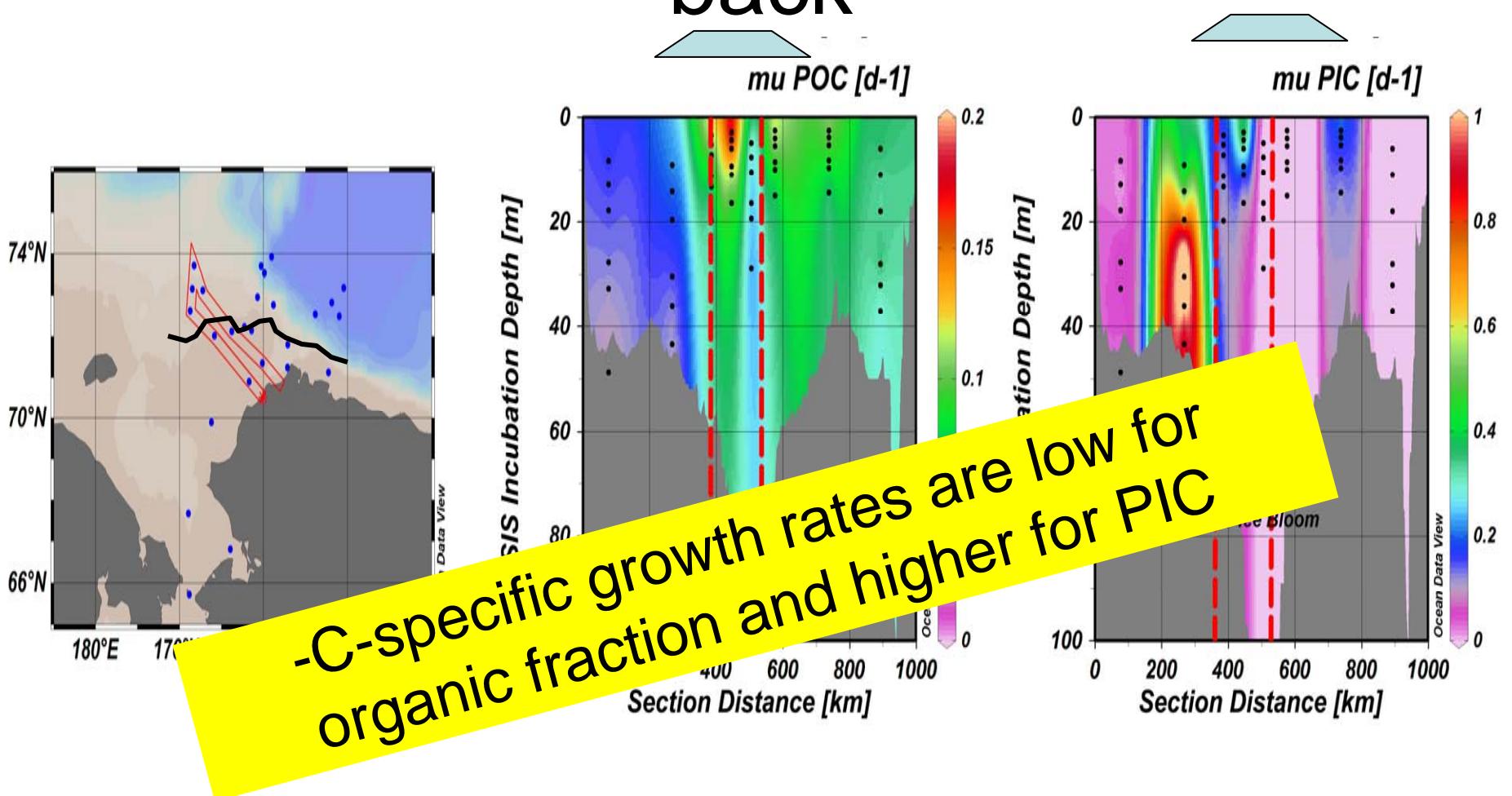
# POC- and PIC-specific growth; Bering Straits to Canadian Basin

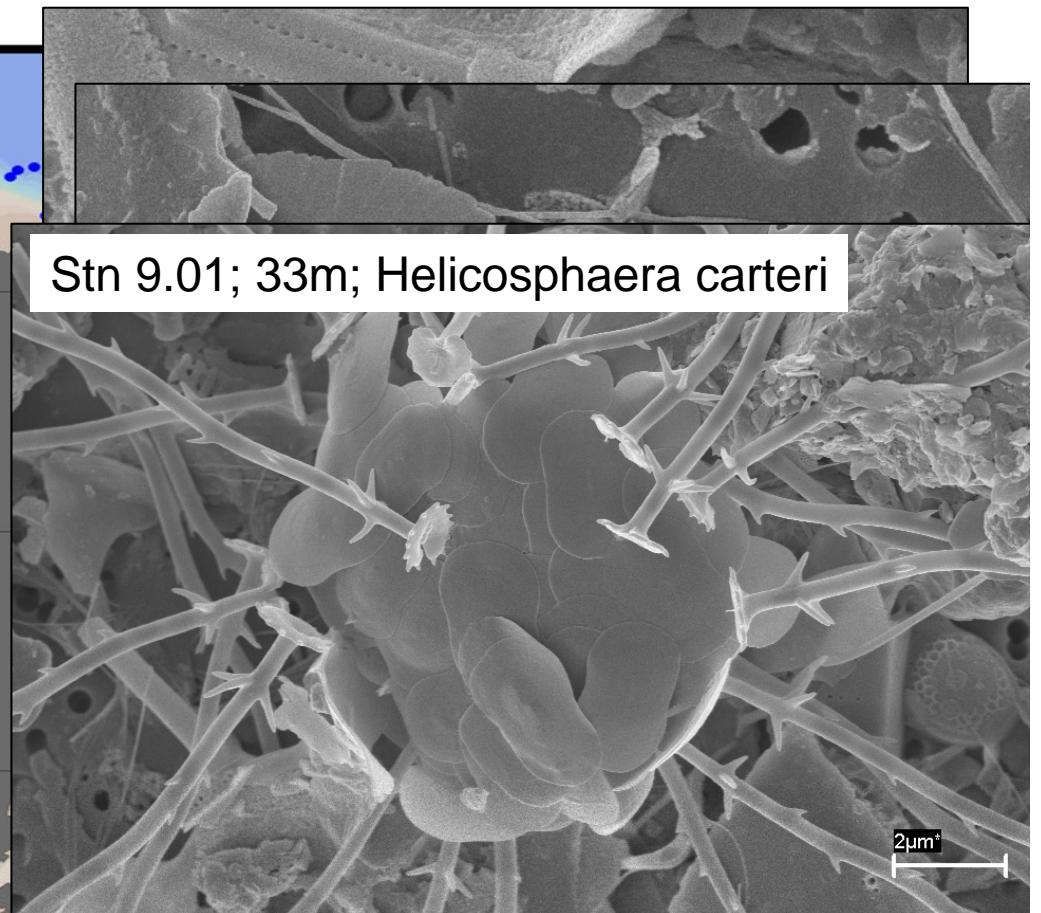
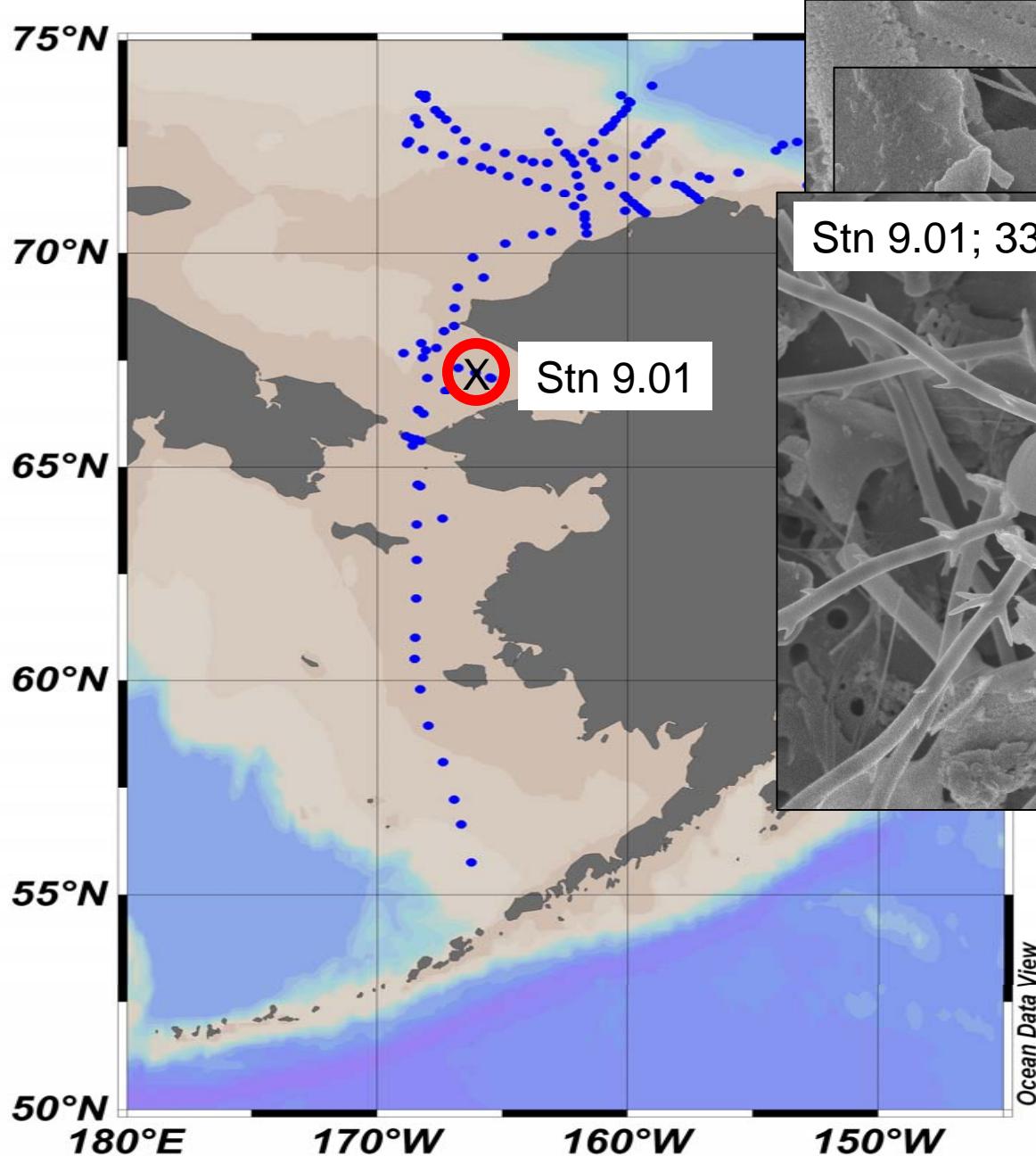


# C fixation NW Alaska to Under Ice Bloom and back

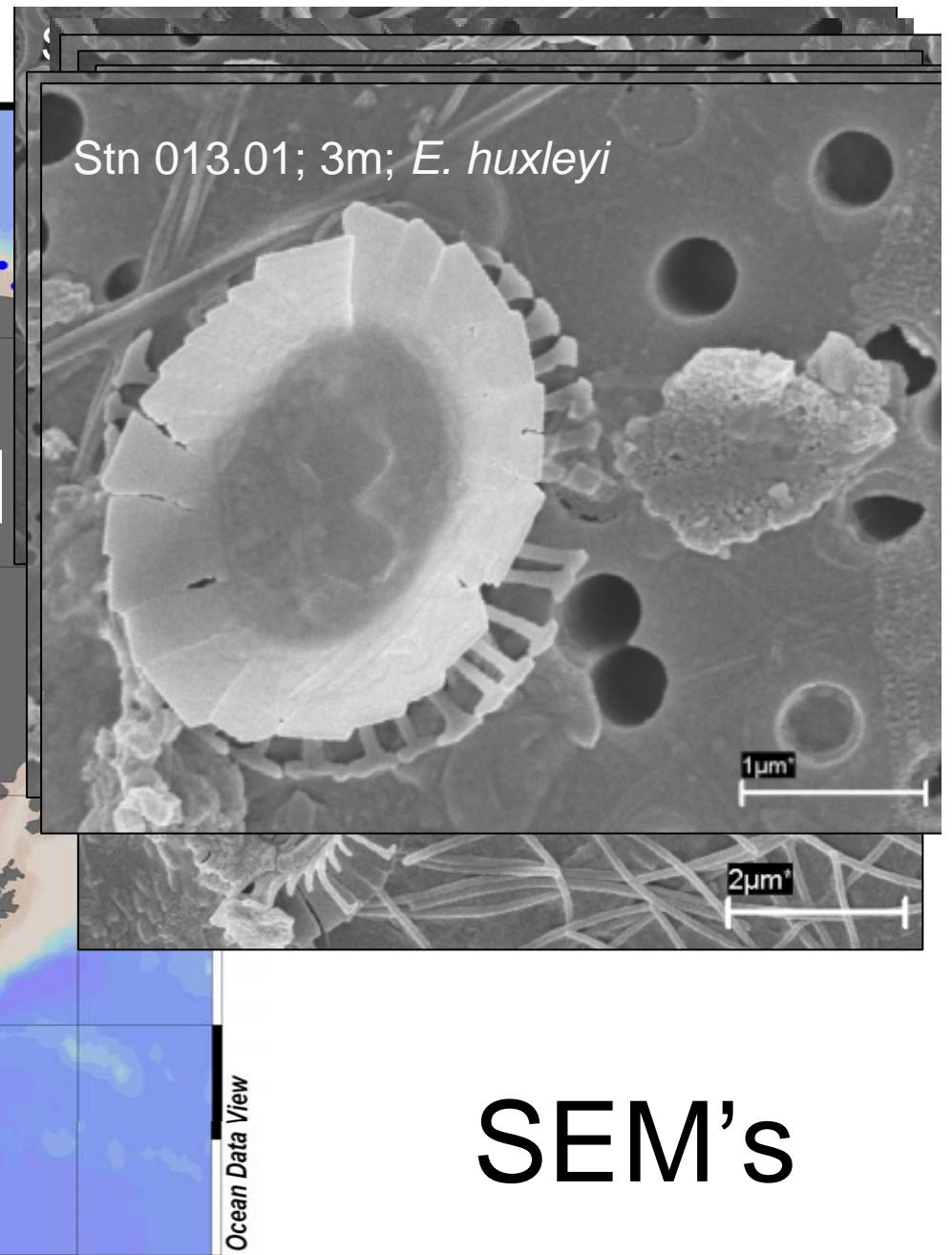
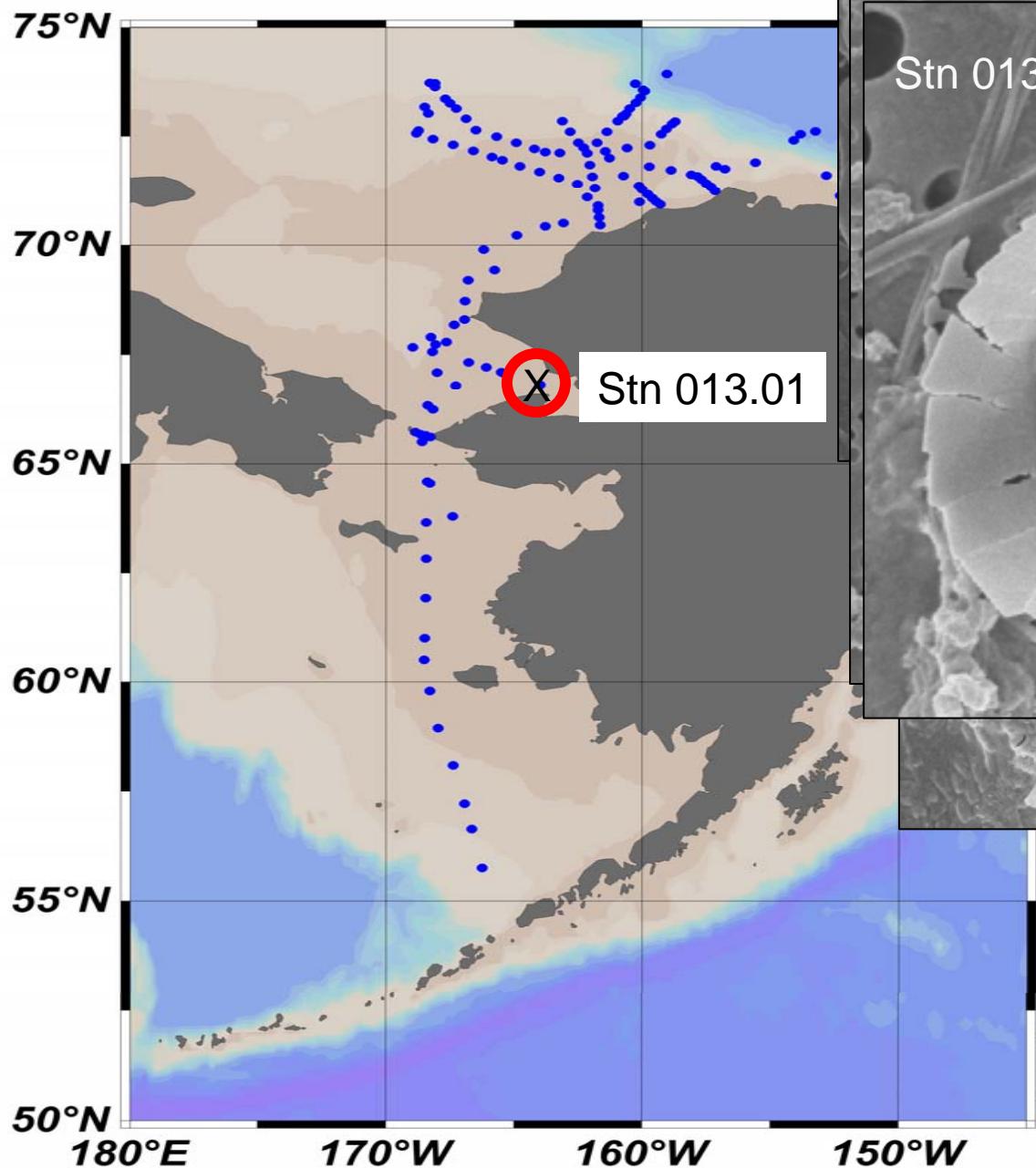


# POC and PIC-specific growth; NW Alaska to Under Ice Bloom and back





SEM's



SEM's

75°N

70°N

65°N

60°N

55°N

50°N

180°E

170°W

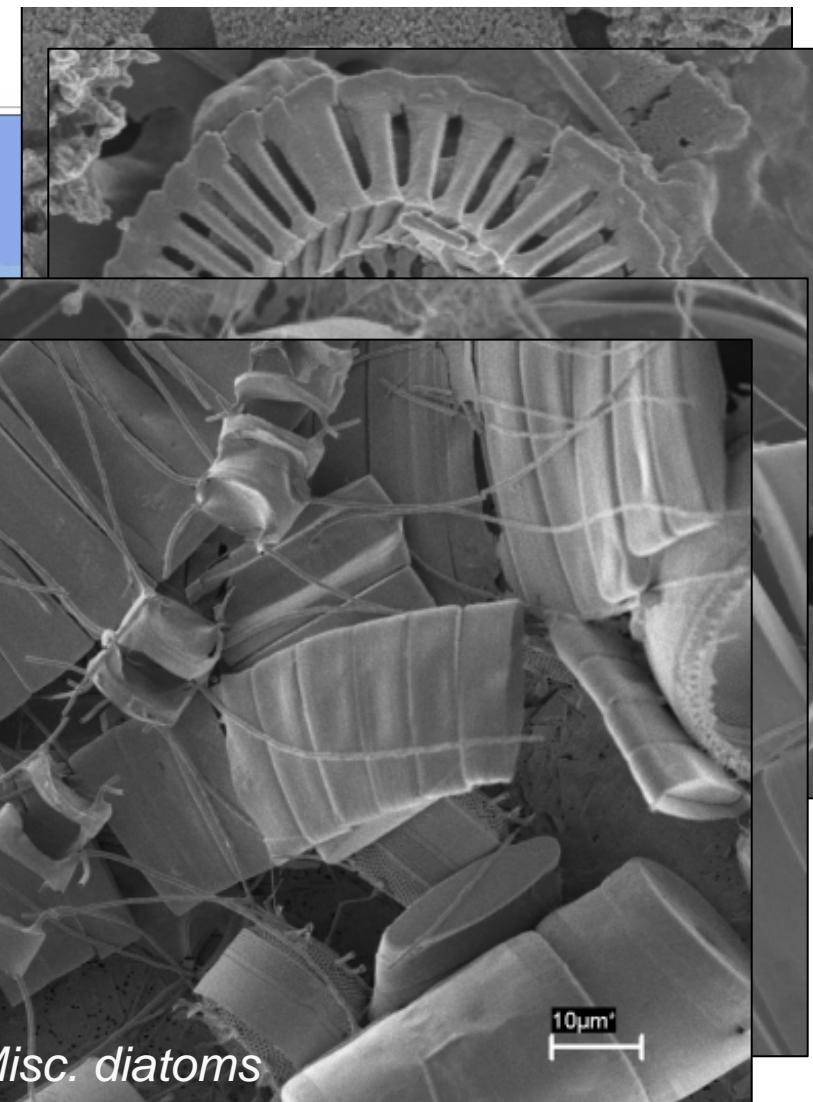
160°W

150°W



Stn 056.01

Stn 56.01; 64m; *Misc. diatoms*



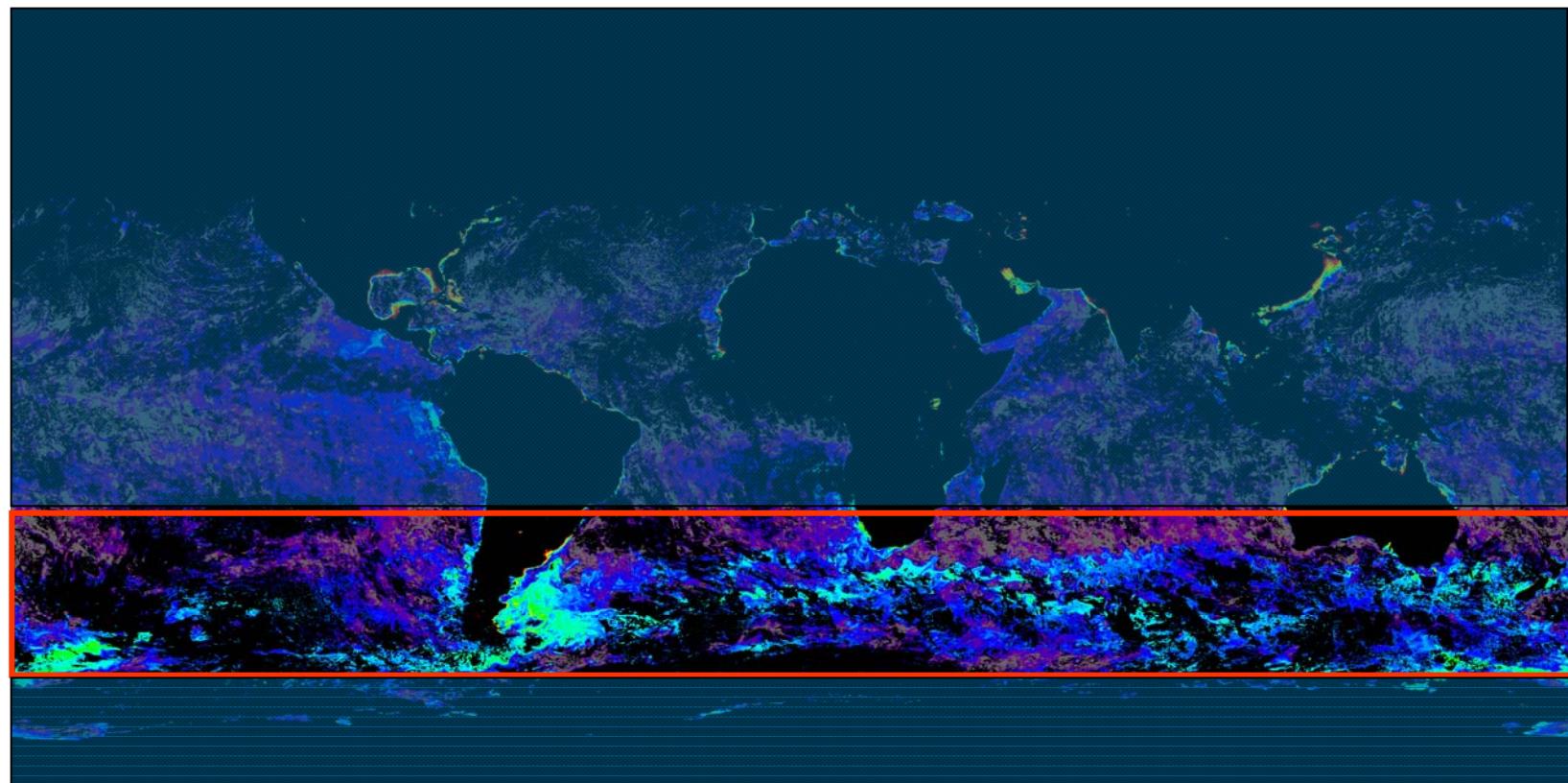
Ocean Data View

SEM's

Viewing at the global scale:

### The great calcite belt

- 52 million square kilometers
  - ~16% of the global ocean
- Contains over 1/3 of the PIC in the ocean



# Summary

- PIC from coccoliths is optically important in the high-latitude regions, north and south.
- Calcification is measurable in high latitudes
- Coccolithophores are present and growing under the northern ice cap. Blooms will likely extend poleward with continued ice loss
- The Great Calcite Belt is an optically-important region of the Southern Ocean, and dominates the global PIC budget
- *Thank you!*