Diatom Identification in the Gulf of Mexico

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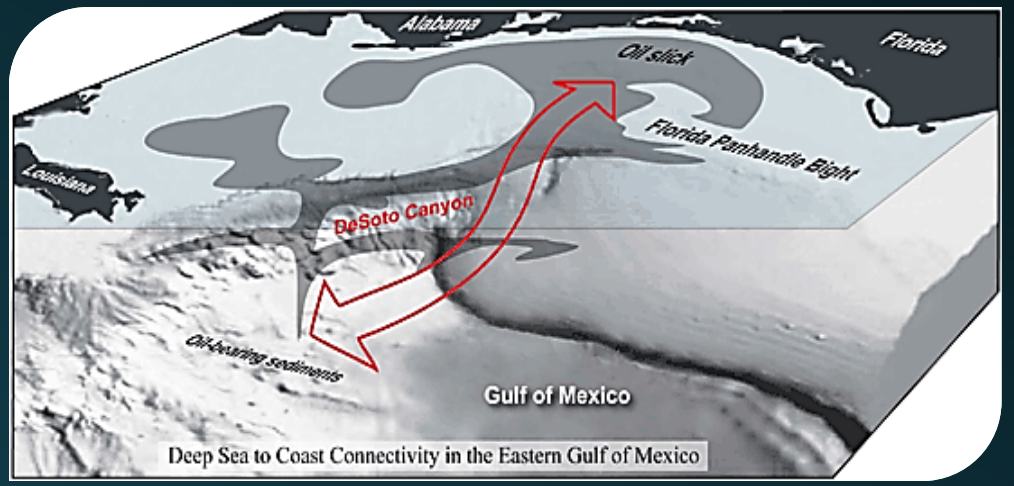
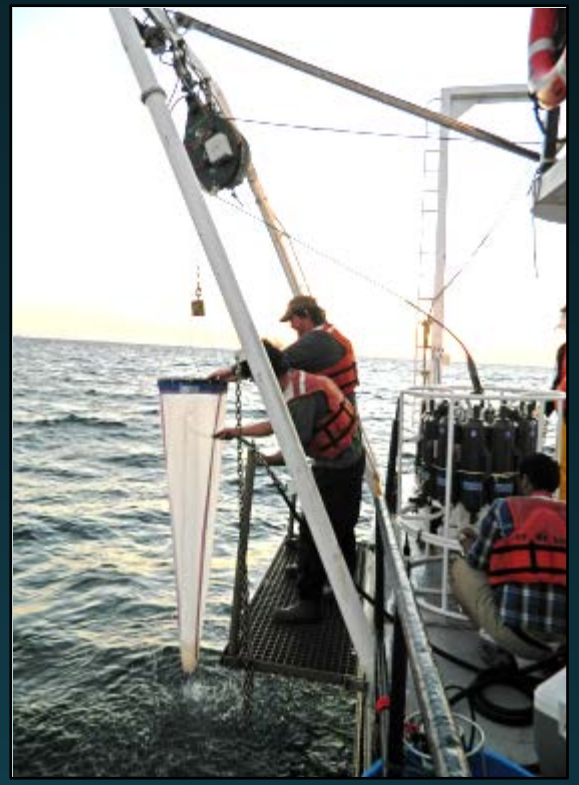
Deep-C Consortium

- Formed after Deep horizon blowout
  - Examine transport of oil in vicinity of DeSoto Canyon and its effects on local ecosystems
- Looking at Phytoplankton
  - Two methods: coarse grain (NET) & fine grain (FILTER)



Purpose of Methods

- Coarse Grain
  - Vertical plankton tows = water column and community structure
- Fine Grain
  - Filter water samples = species, pigment, and location

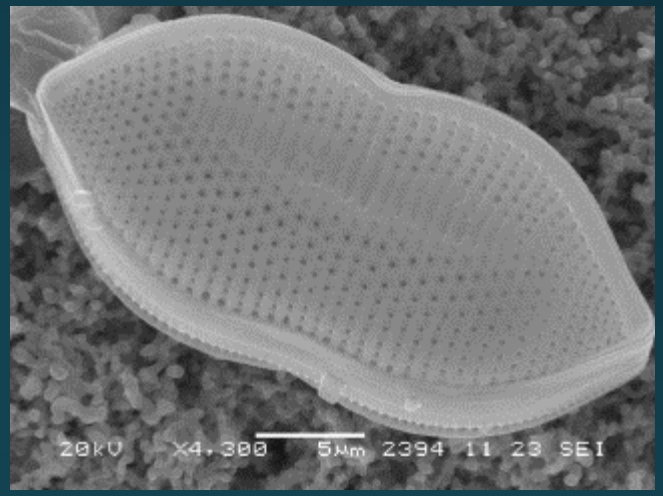


Structure & Importance of Diatoms

- Responsible for ~20% of global carbon fixation
- Remains can assess past environmental conditions and change
- Silicate mineral has industrial applications
- Emerging use in the production of biodiesel

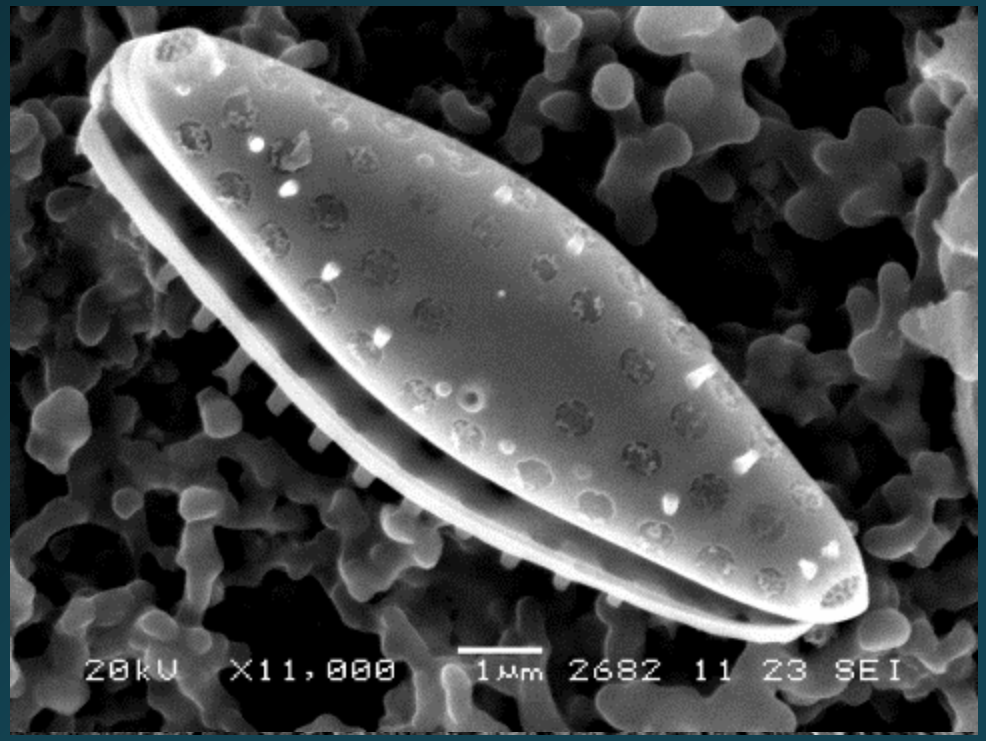
Structure & Importance of Diatoms

- Photosynthetic eukaryotic organisms
  - Cell wall contains silica and organic matter
  - Silicon is found in cytoplasm, mitochondria, and metabolic process
  - Silicon regulates gene expression



Motility

- Raphes
  - Secretes polysaccharides to form gels, threads, pads
- Labiate Process
  - Secretes mucilage
- Strutted Process
  - Secretes chitin fibrils

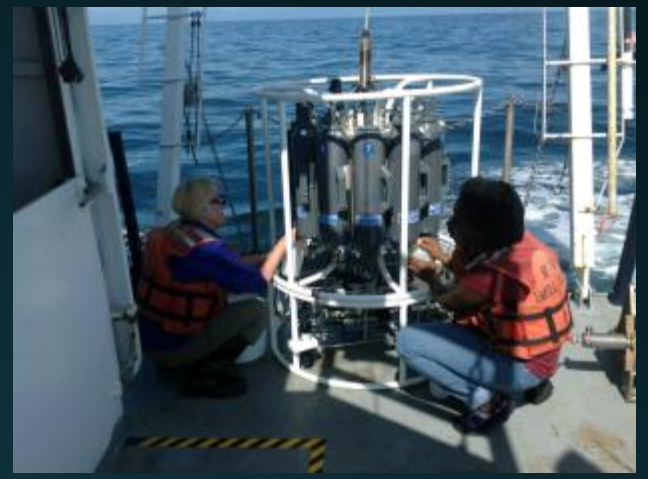


Pigmentation

- Chlorophyll a
- Xanthophyll fucoxanthin (golden brown pigment)
  - Protects photosystem
- Chlorophyllide c_1, c_2
  - Traps sunlight
- Pheophytin

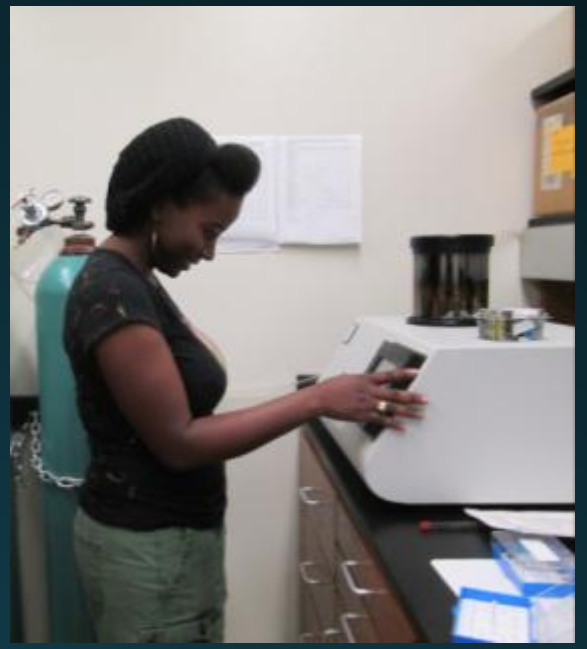
Collecting Samples

- Collected water samples using CTD
  - ranging from surface to 1177 m
  - Collected the Deep Chlorophyll Maxima
- Filtered water samples



Treating Samples: Filter

- Pieces of filter placed on SEM stub
- Sputter coated to be analyzed



Treating Samples: Net

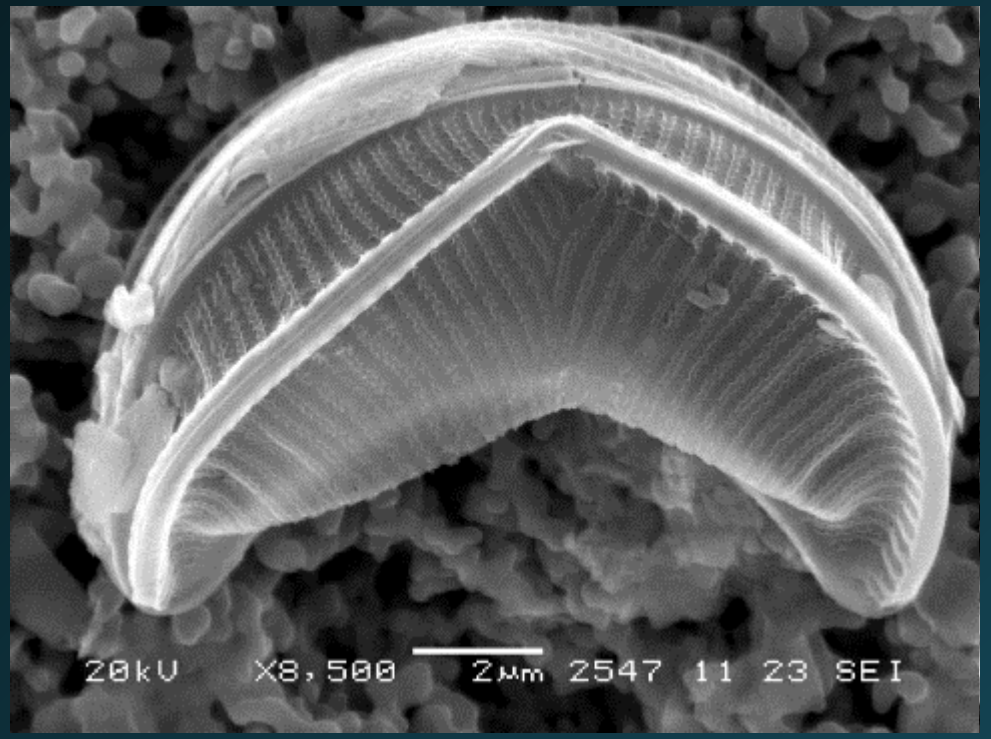
- Preserved net samples
  - Added nitric acid
  - Pinch of potassium dichromate
- Centrifuged 10 times
- Samples were placed on two microscope slides and one SEM stub

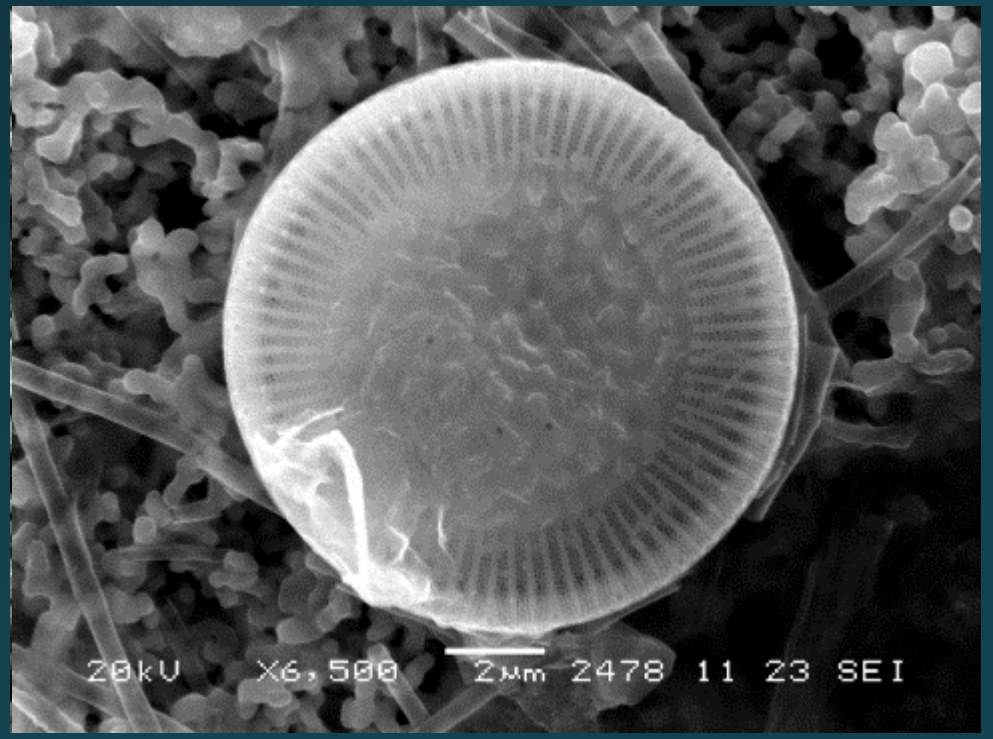
Treating Samples: Pigment

- Extract pigments using High Pressure Liquid Chromatography system (HPLC)
  - System is ran through a C18 column
  - Separation: Mobile Phase A and B
  - Detector: Photo diode array and Fluorescence

Analyzing: Filter

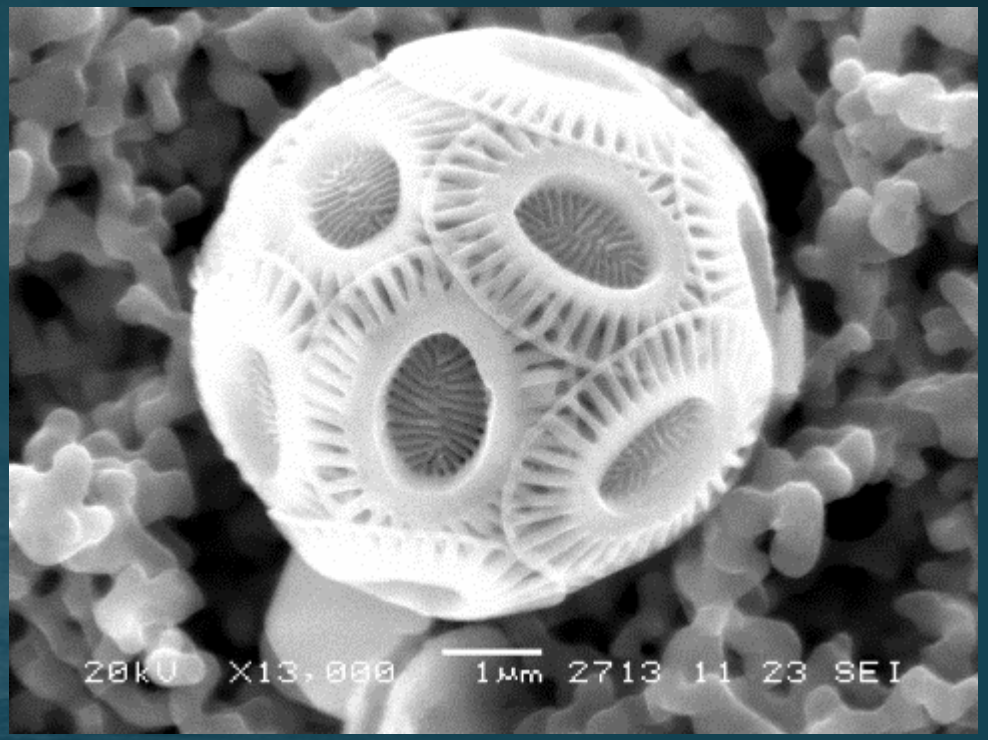
- Different diatom species were viewed in SEM

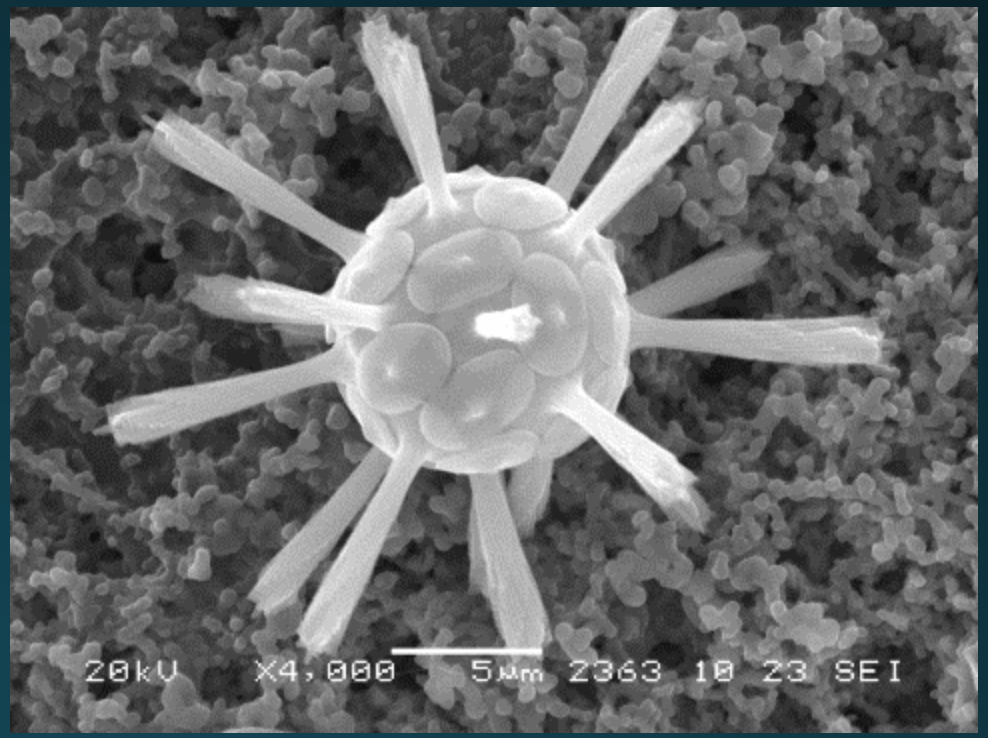




Analyzing: Filter

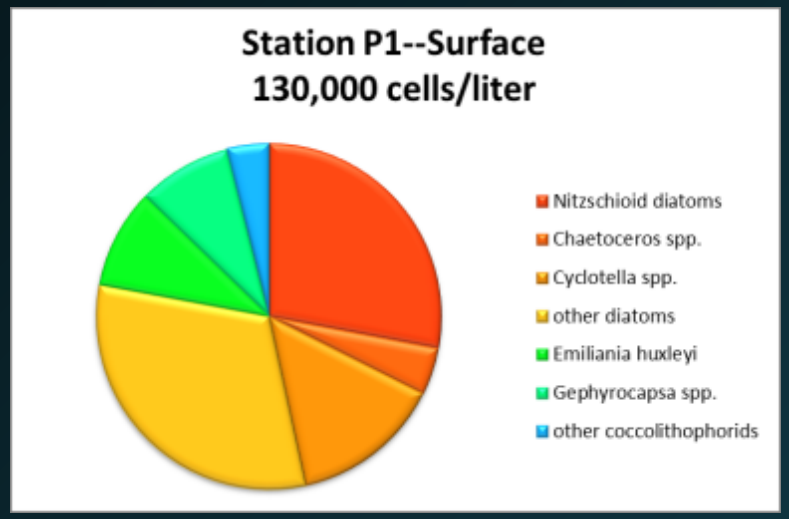
- We also noticed coccolithophores

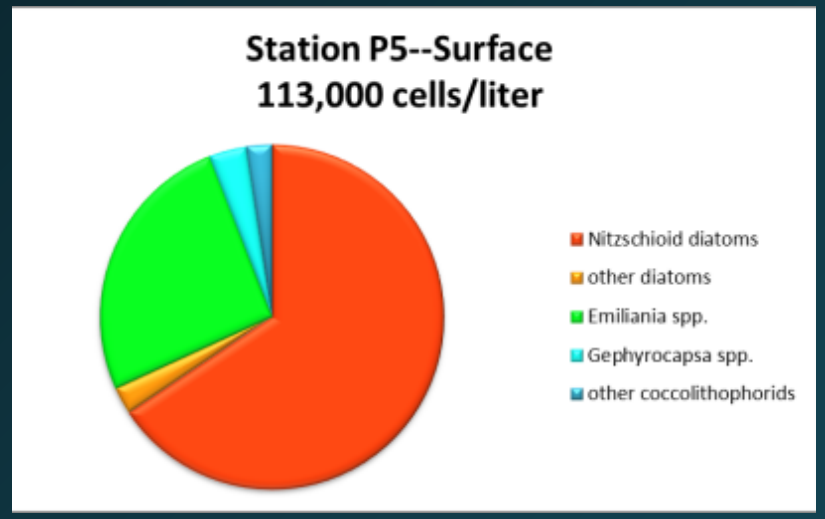


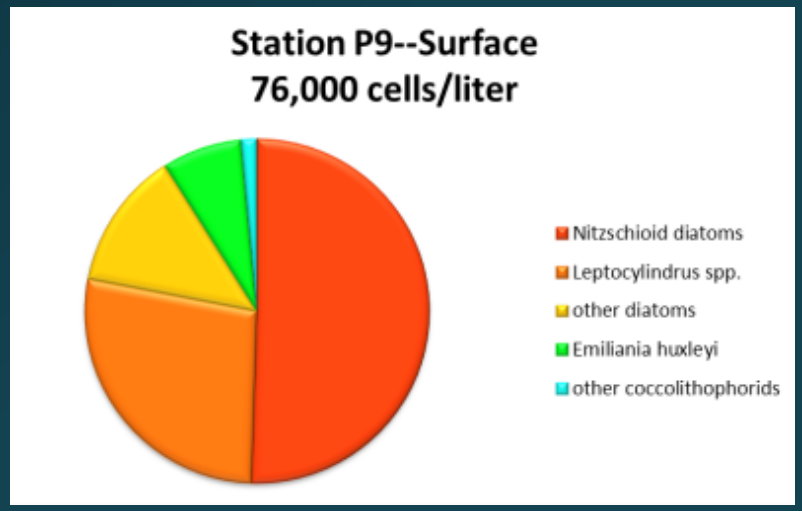


Analyzing: Filter

May 2012

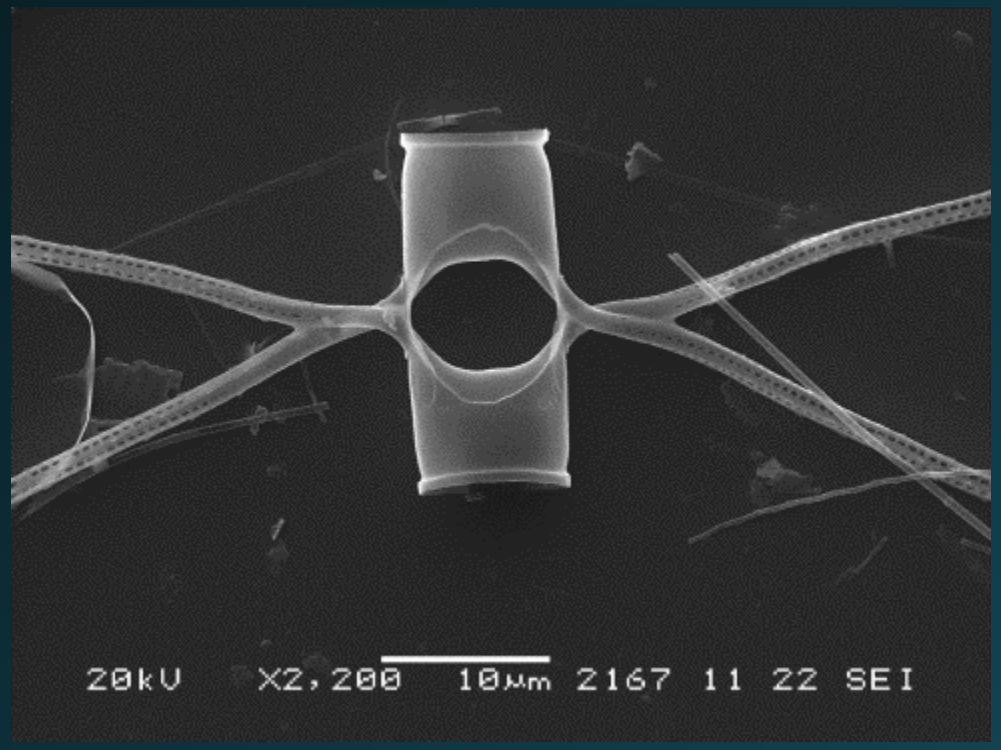


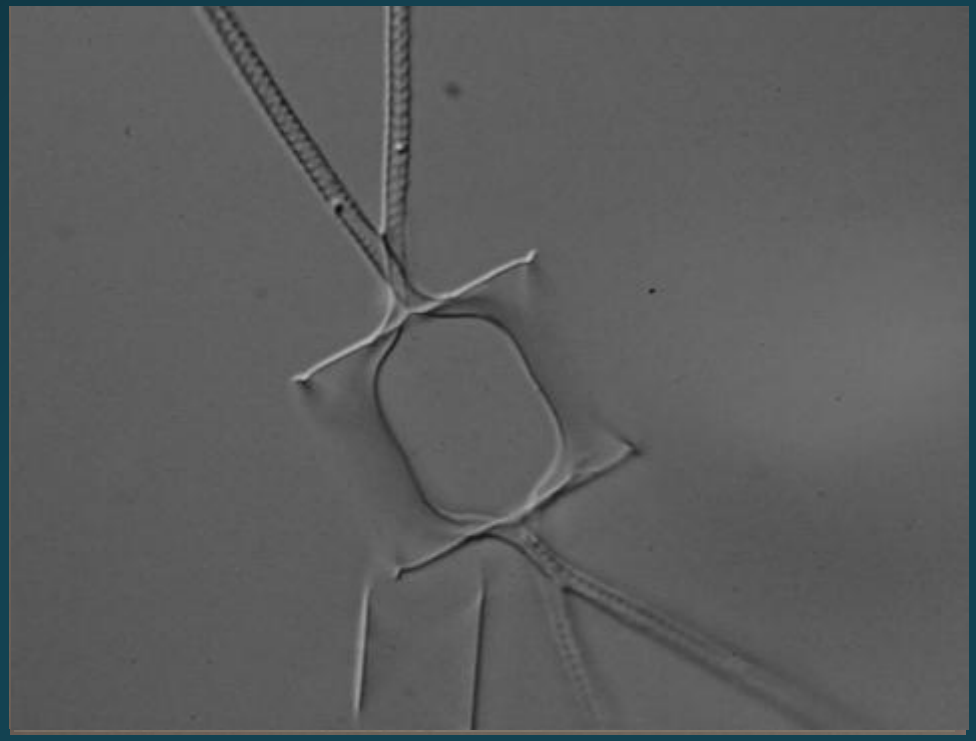




Analyzing: Net

- Diatoms were counted and viewed in SEM and light microscope





Analyzing: Net

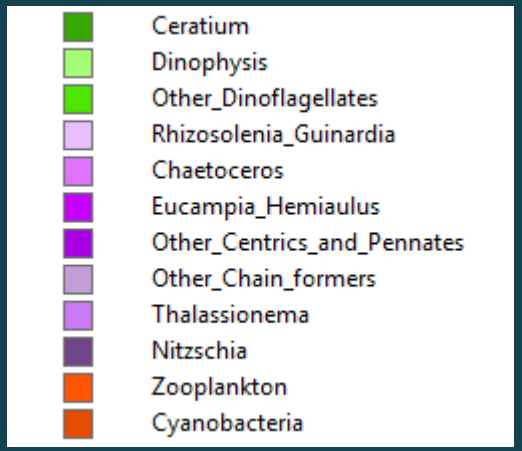
- We also noticed a pattern between diatoms, zooplankton, and dinoflagellates

Analyzing: Net

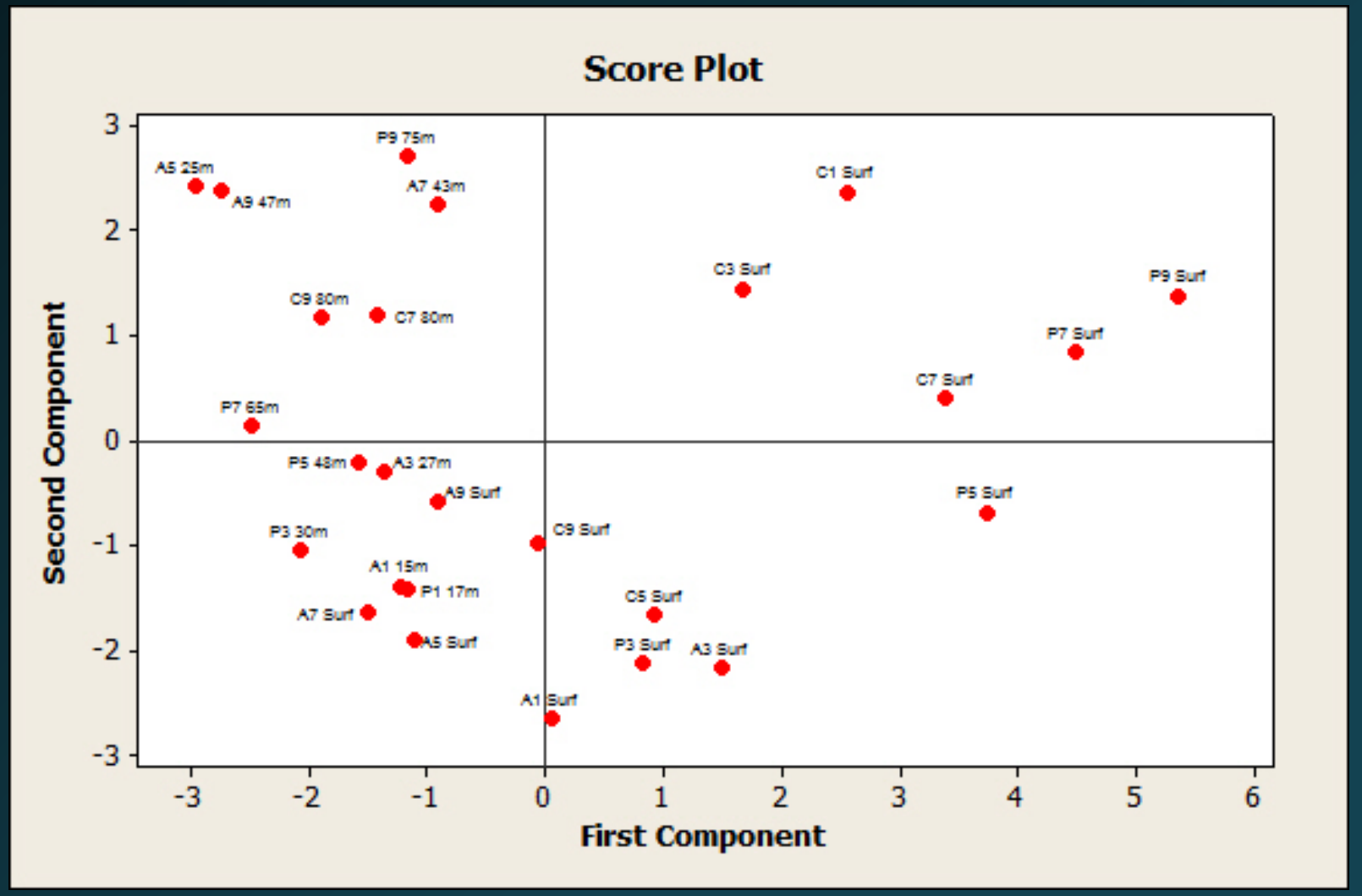
March 2011

March 2012

Legend



Analyzing: Pigment



The Connection

- Discover and Identify different communities
- Scientific guess of what we should find and the amount
- Try understand the behavior of diatoms

Acknowledgements