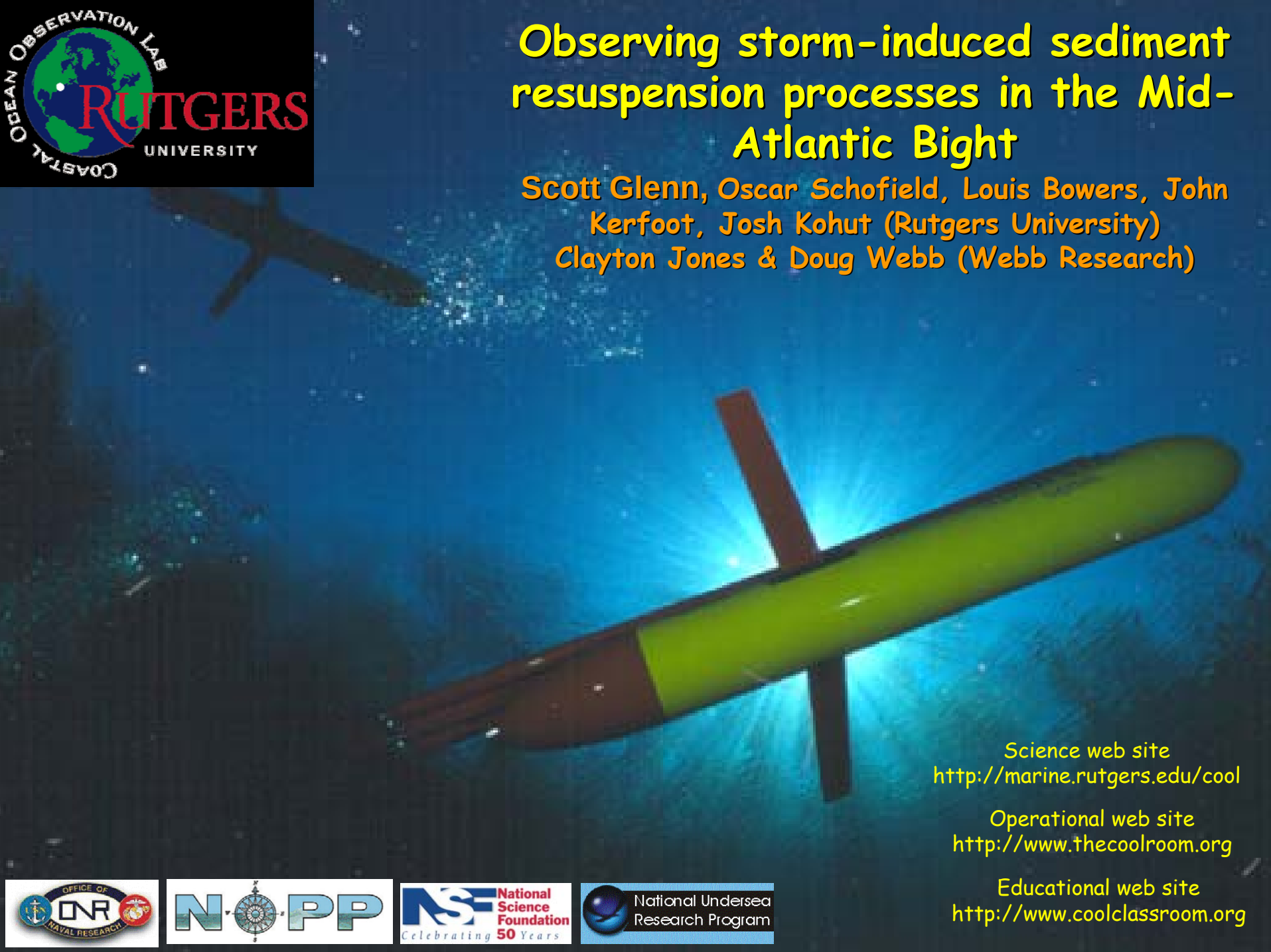
Observing storm-induced sediment resuspension processes in the Mid-Atlantic Bight

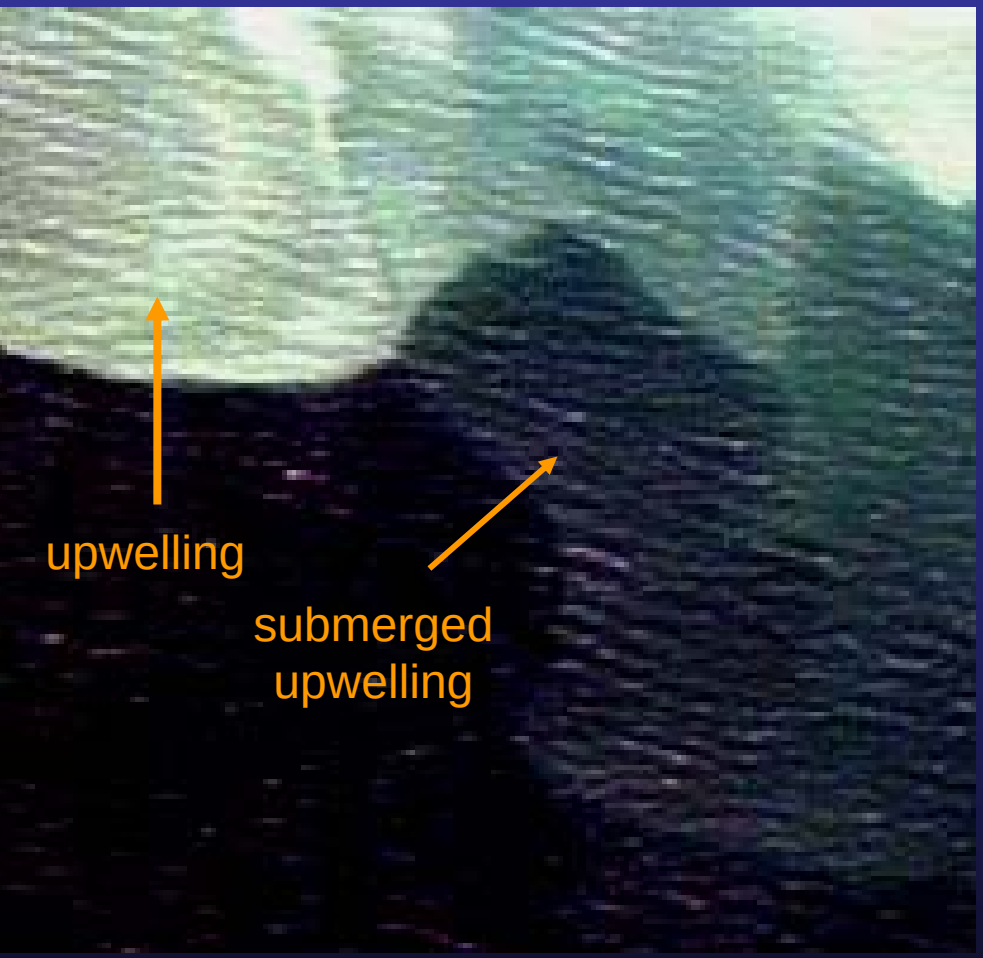
Scott Glenn, Oscar Schofield, Louis Bowers, John Kerfoot, Josh Kohut (Rutgers University)
Clayton Jones & Doug Webb (Webb Research)

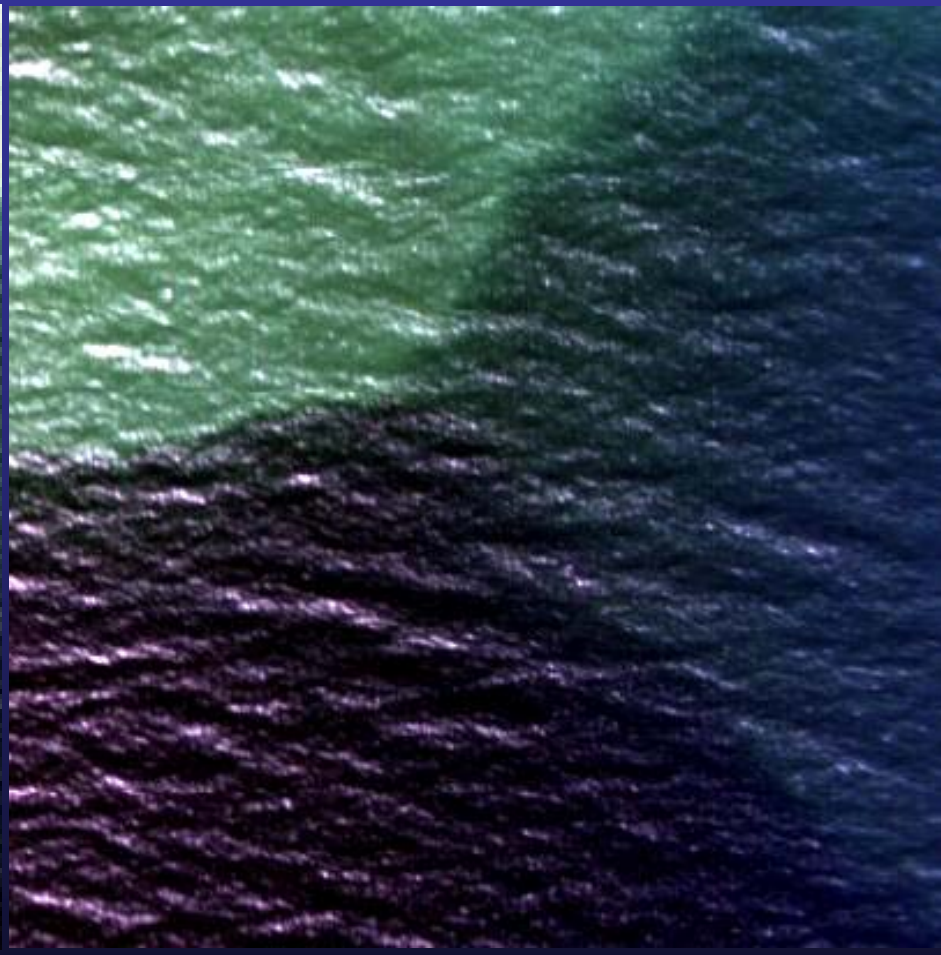


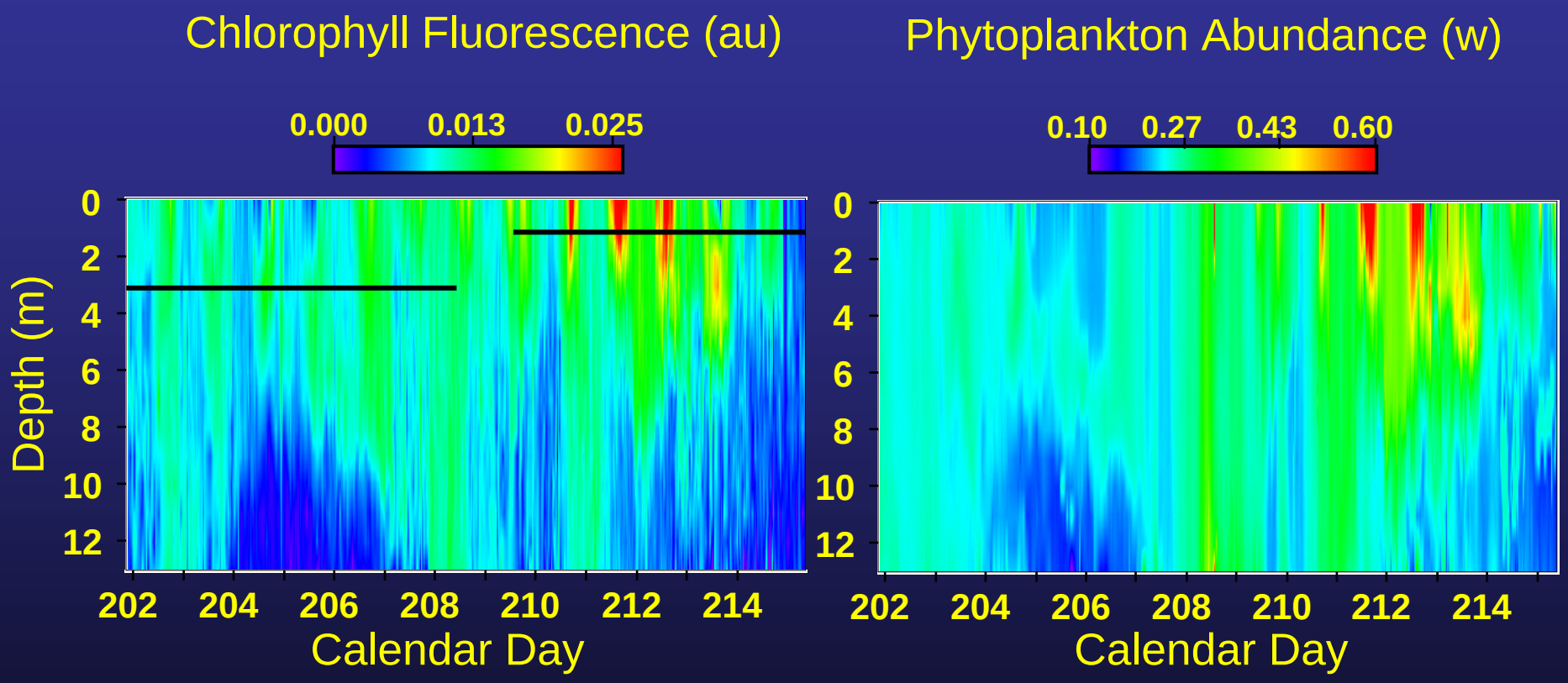
Science web site
http://marine.rutgers.edu/cool

Operational web site
http://www.thecoolroom.org

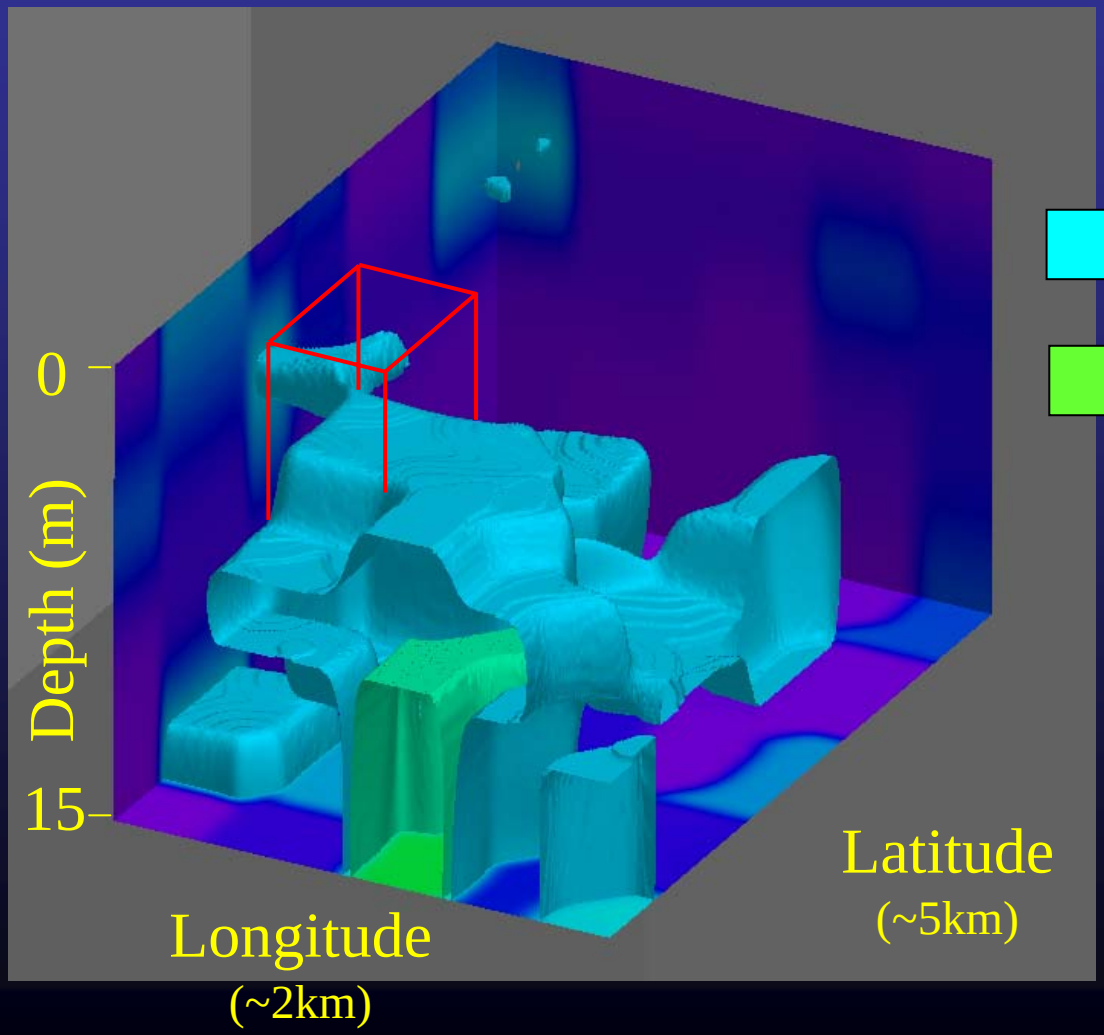
Educational web site
http://www.coolclassroom.org


upwelling
submerged
upwelling




Chlorophyll Fluorescence (au)
0.000
0.013
0.025
Depth (m)
0
2
4
6
8
10
12
202
204
206
208
210
212
214
Calendar Day
Phytoplankton Abundance (w)
0.10
0.27
0.43
0.60
0
2
4
6
8
10
12
202
204
206
208
210
212
214
Calendar Day

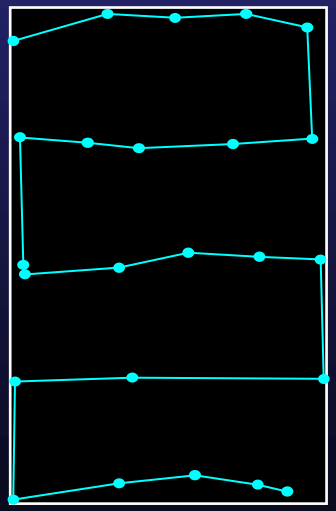
Ship Grid Patterns

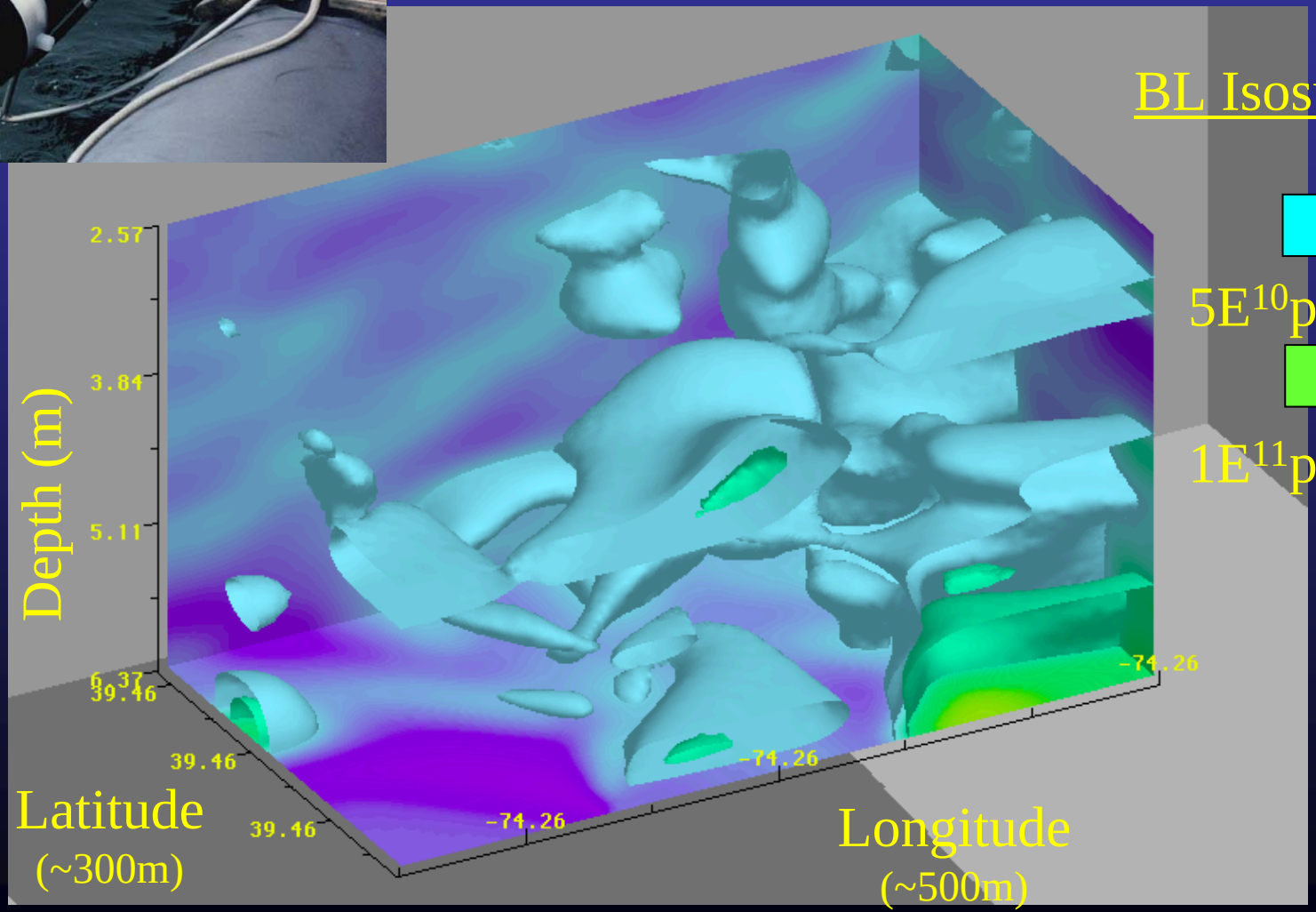


BL Isosurfaces

$1E^{10}$ ph/s/35L

$3E^{11}$ ph/s/.35L




BL Isosurfaces
5E10ph/s/.35L
1E11ph/s/.35L
Depth (m)
2.57
3.84
5.11
6.37
39.46
39.46
39.46
Latitude
(~300m)
-74.26
-74.26
-74.26
Longitude
(~500m)

My ship on campus

CODAR Network

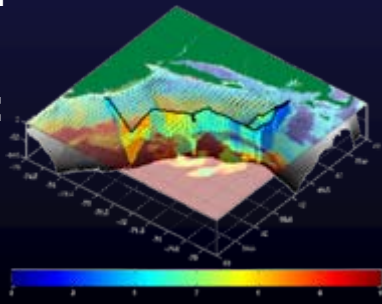
L-Band & X-Band Satellite Systems

Mission Planning

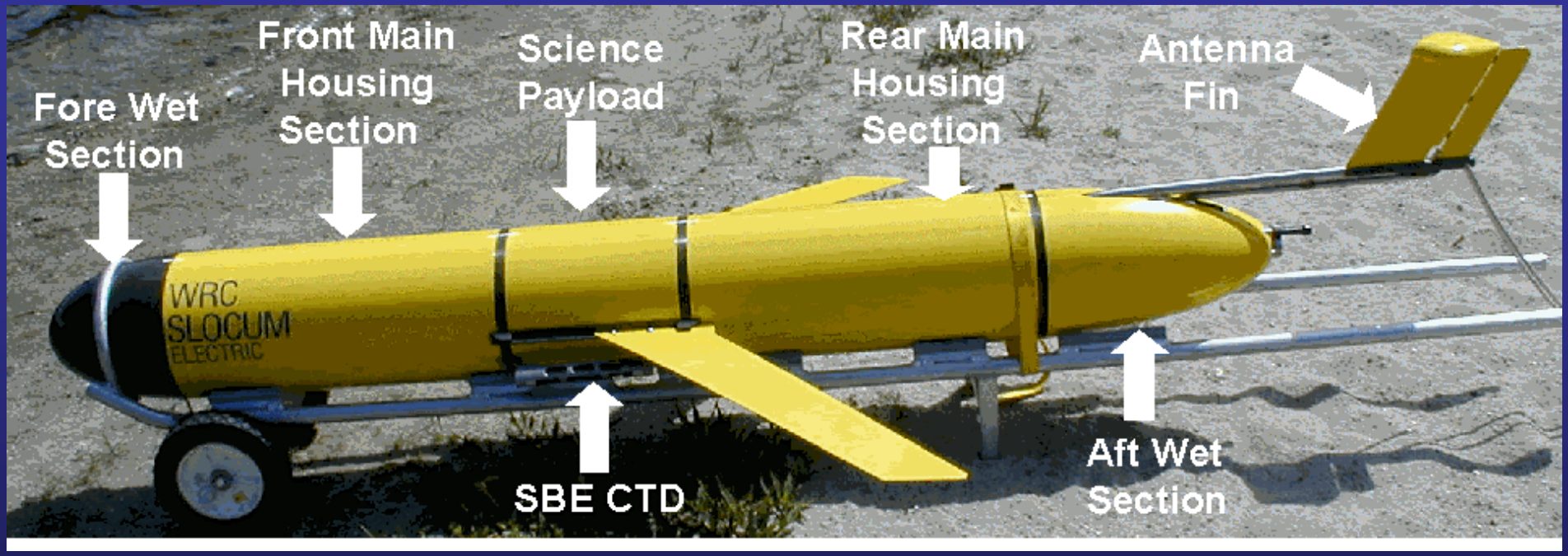
Operations & Communications Station

A "Stommel" View of the Ocean: WWW & Interactive 3-D

Glider Fleet



Slocum Coastal Glider



Glider Specs.

Length: 1.5 m Hull Diameter: 21.3 cm
Weight: 52 kg

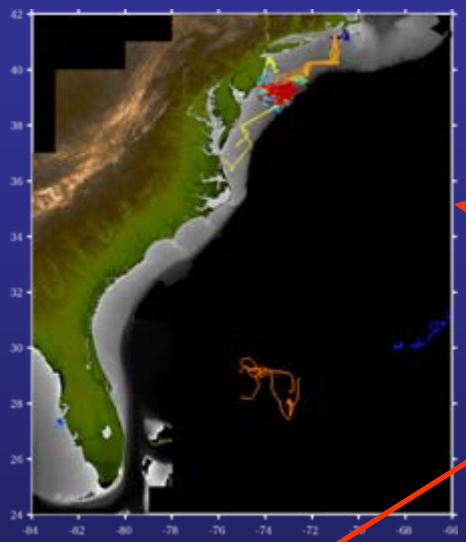
Science Bay Specs.

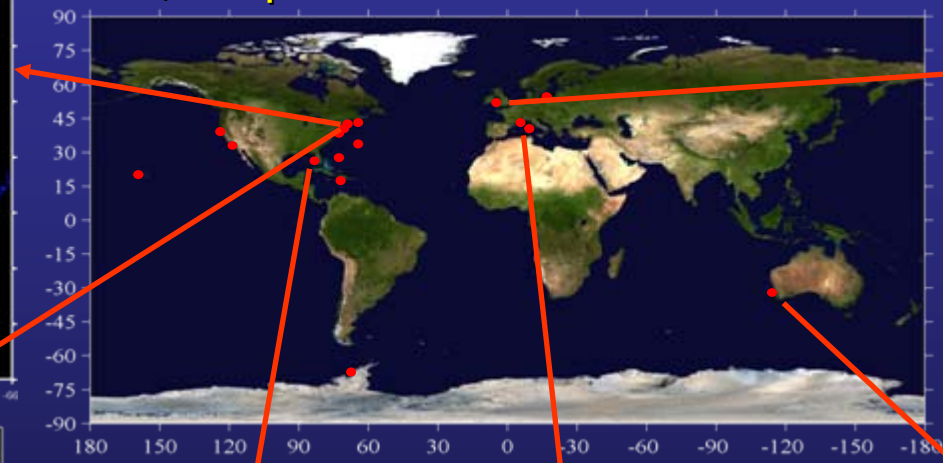
Length: 30 cm Diameter: 21.3 cm
Max. Payload Weight: 4 kg

Rutgers Slocum Glider Fleet

129 deployments worldwide (2003 – present)

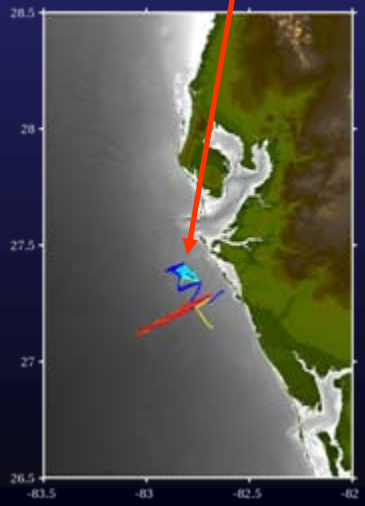
> 40,000 km flown (Earth's circ. ~ 40,000 km)
> 1900 days in water
~ 300,000 profiles



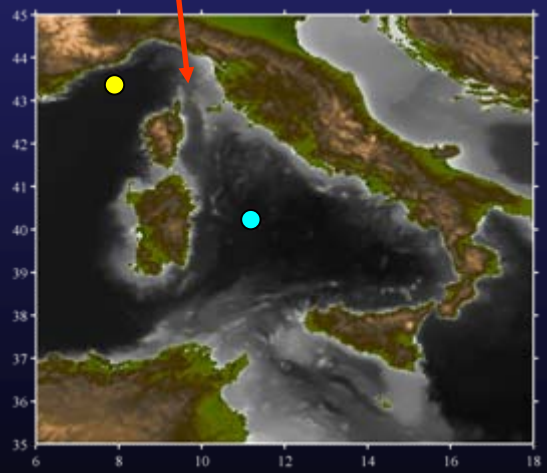


Liverpool Bay Coastal Observatory

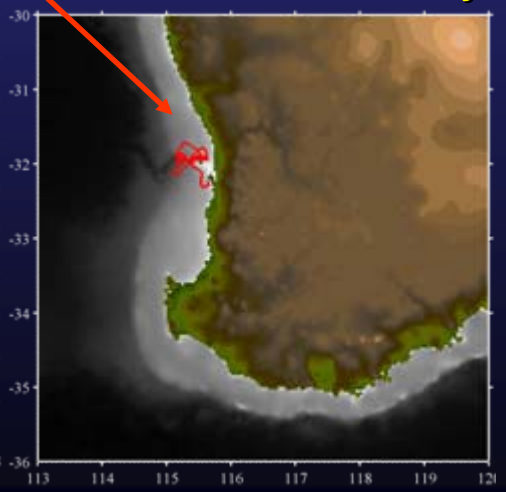
Mid-Atlantic Shelf



West Florida Shelf

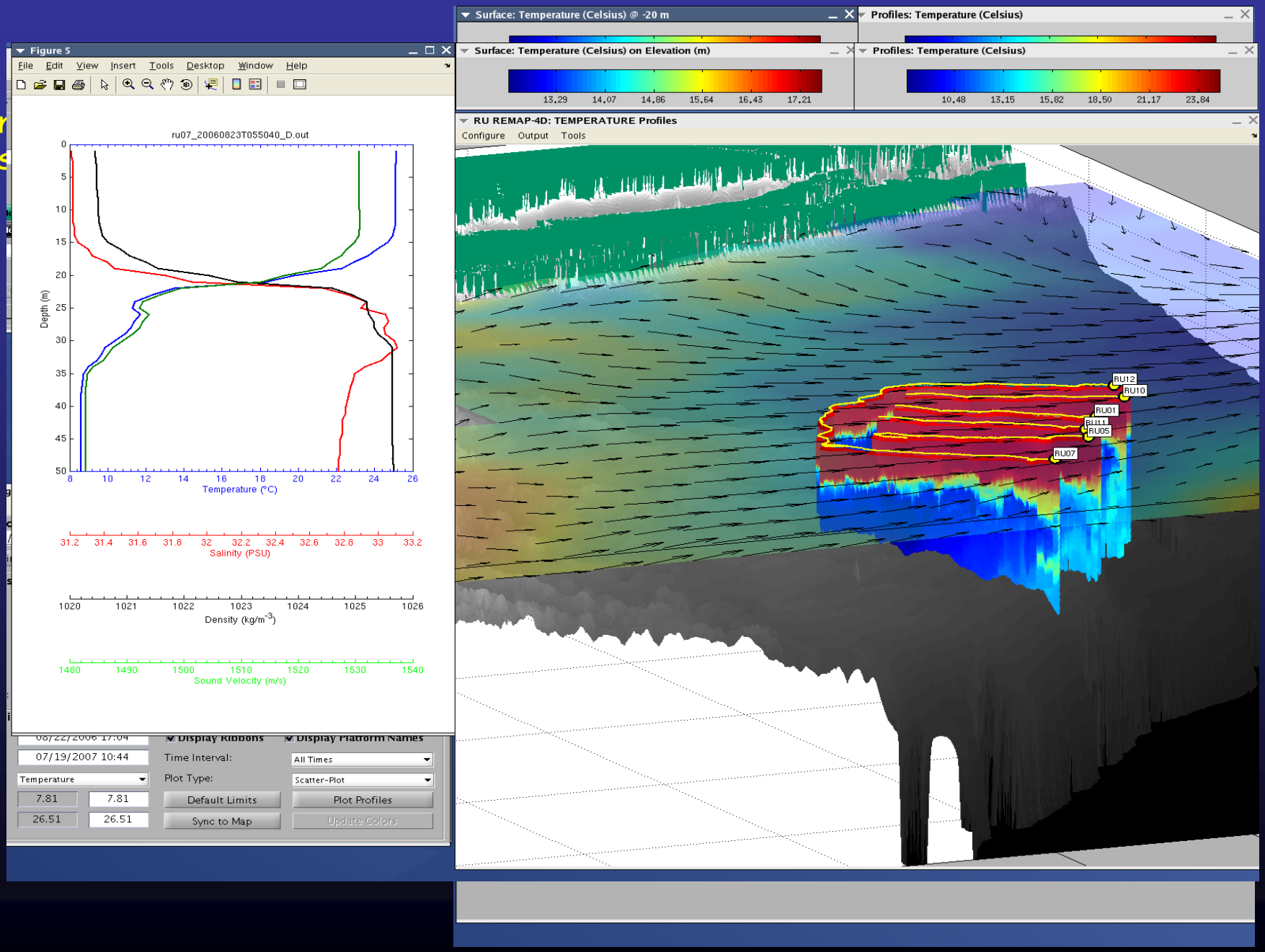


Mediterranean Sea



Perth, Australia

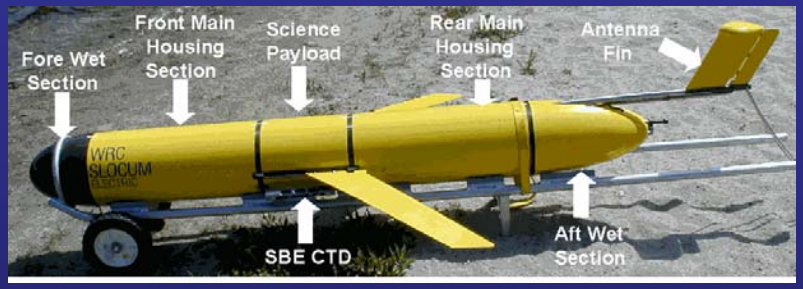
Developing interactive visualization: ONR Glider Consortium (TTI)



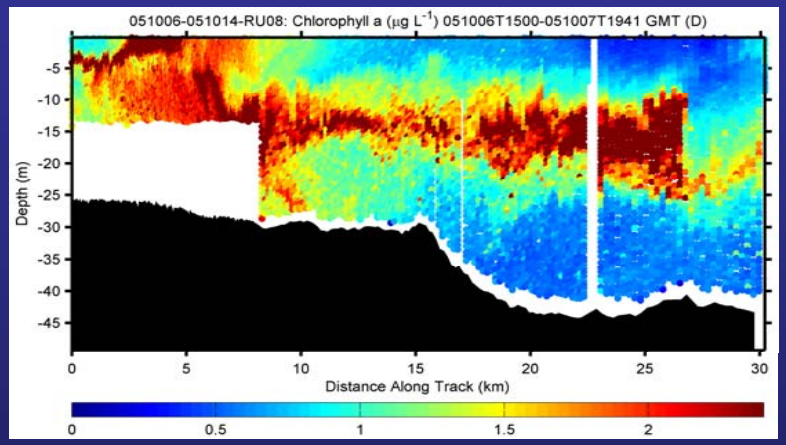
- PHYTOPLANKTON

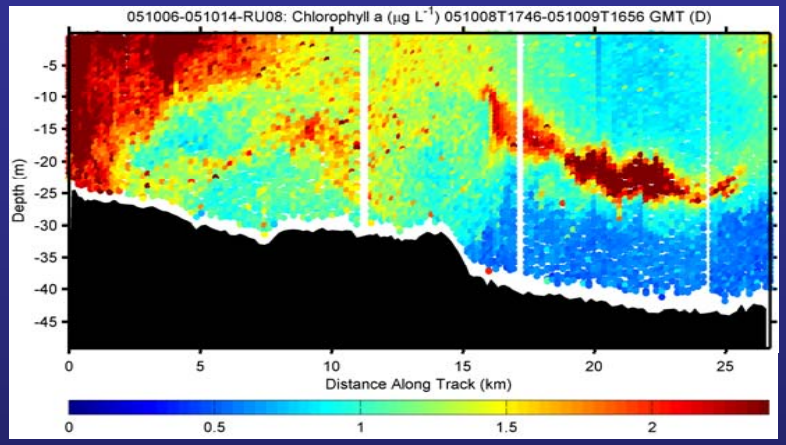
The are many new sensors that are available that will now allow a complete characterization of the phytoplankton.

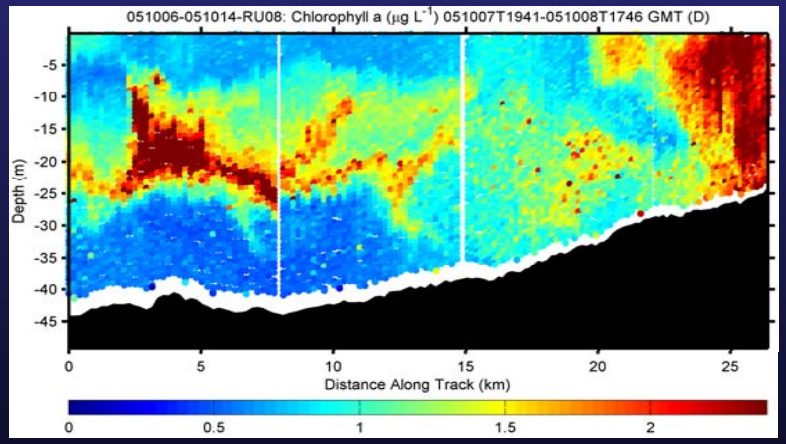
Bio-optical sensors to map the concentration of the phytoplankton present

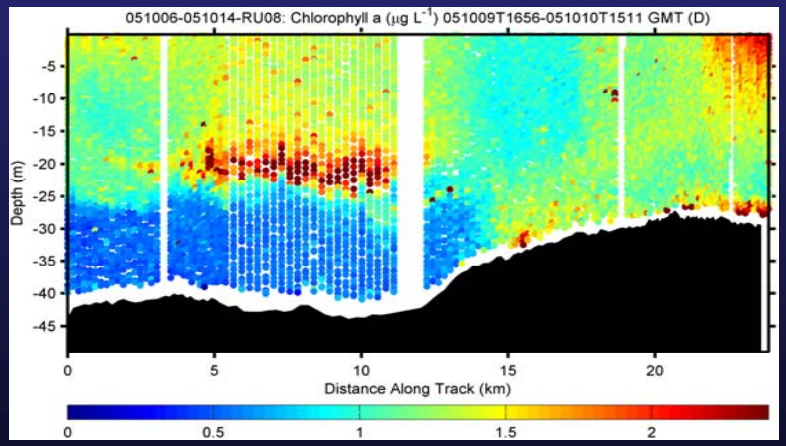


OASIS 2005
Chlorophyll fluorescence



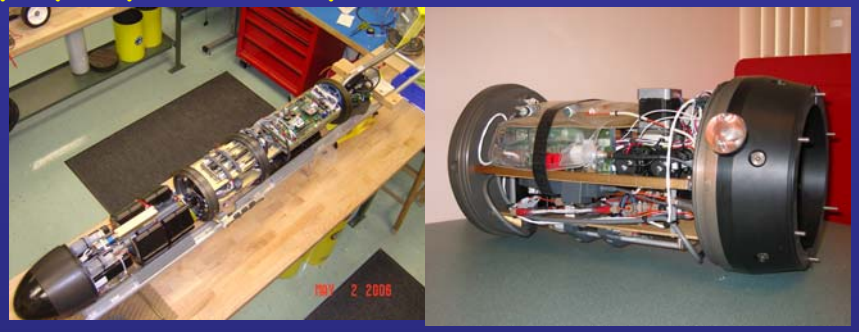






The are many new sensors that are available that will now allow a complete characterization of the phytoplankton.

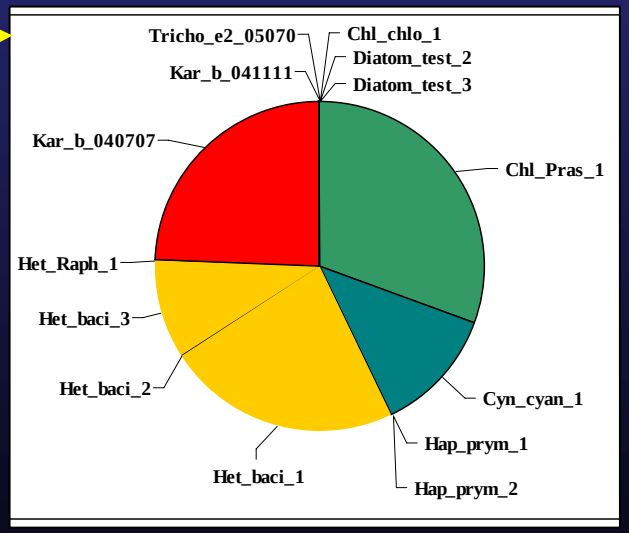
Mapping the **type** of the phytoplankton present



REMUS/BreveBuster HAB
Community Structure
01/21/05 1736hrs 1.4m

Signal processing approaches

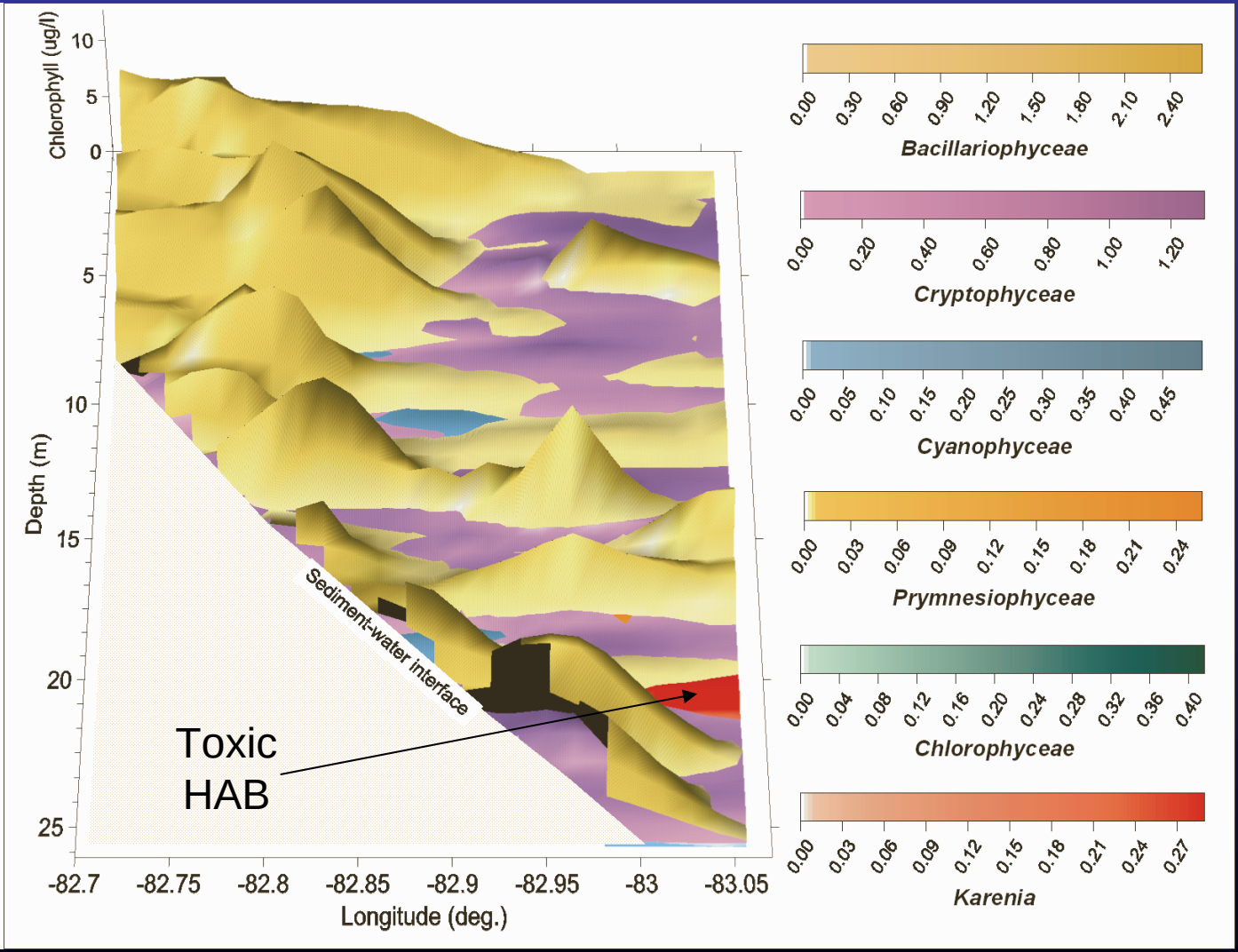
Phytoplankton discrimination



From Gary Kirkpatrick

The are many new sensors that are available that will now allow a complete characterization of the phytoplankton.

Mapping the **type** of the phytoplankton present



Color = Phytoplankton taxa

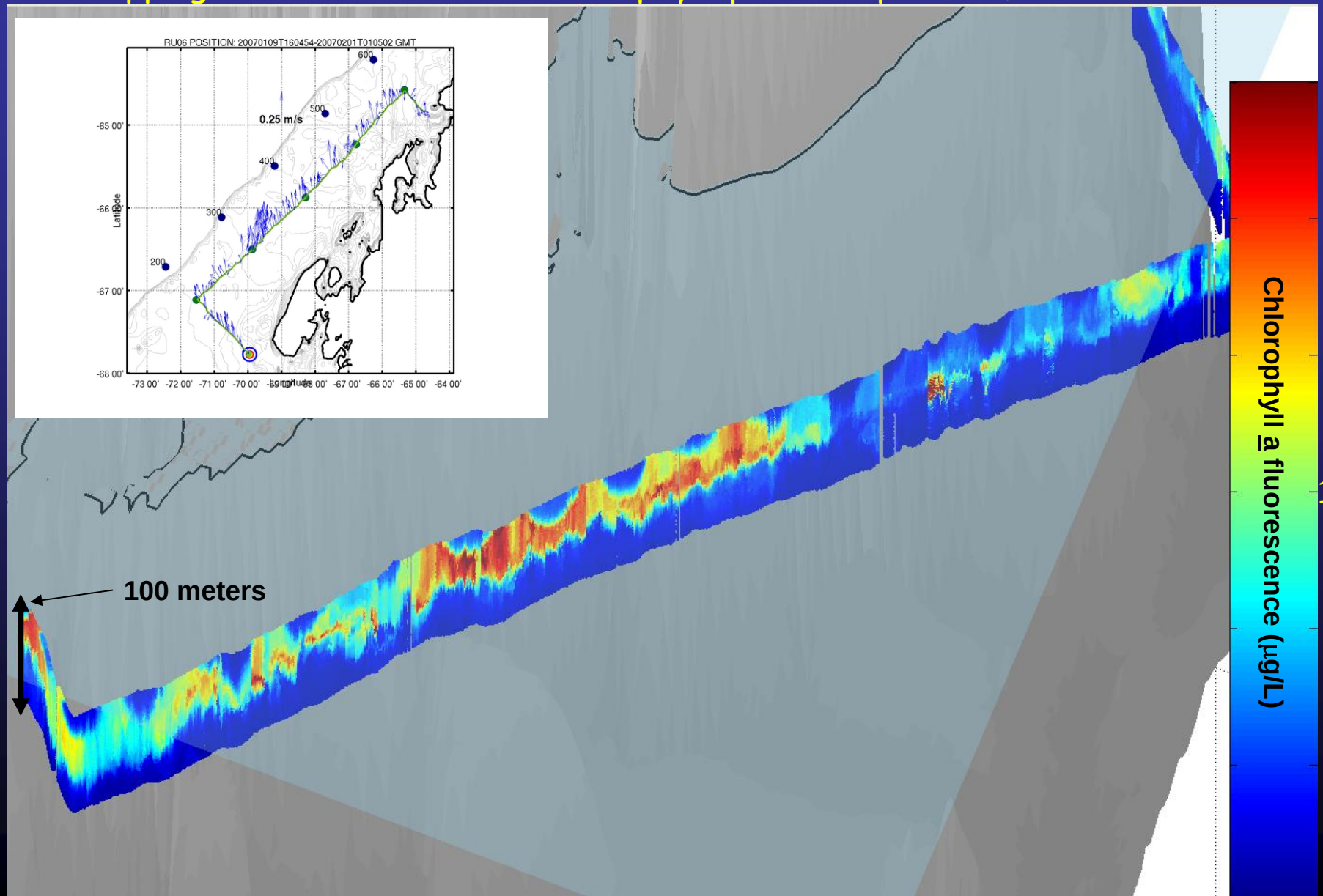
Peak height = concentration

onshore

offshore

The are many new sensors that are available that will now allow a complete characterization of the phytoplankton.

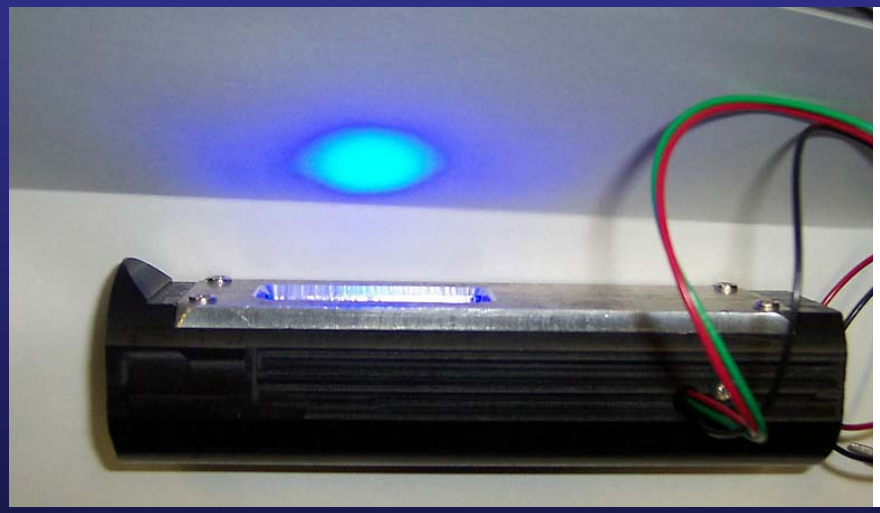
Mapping the concentration of the phytoplankton present, fluorescence



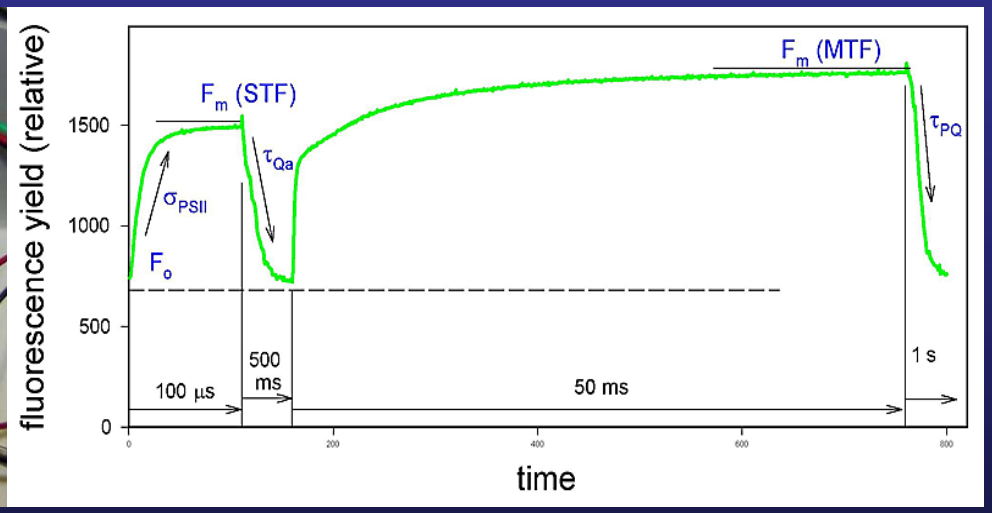
The are many new sensors that are available that will now allow a complete characterization of the phytoplankton.

Soon (summer 2008) we will be mapping the **health** of the phytoplankton present

Prototype FIRE sensor

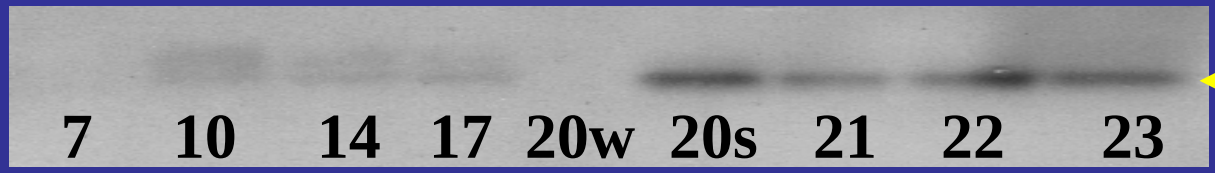


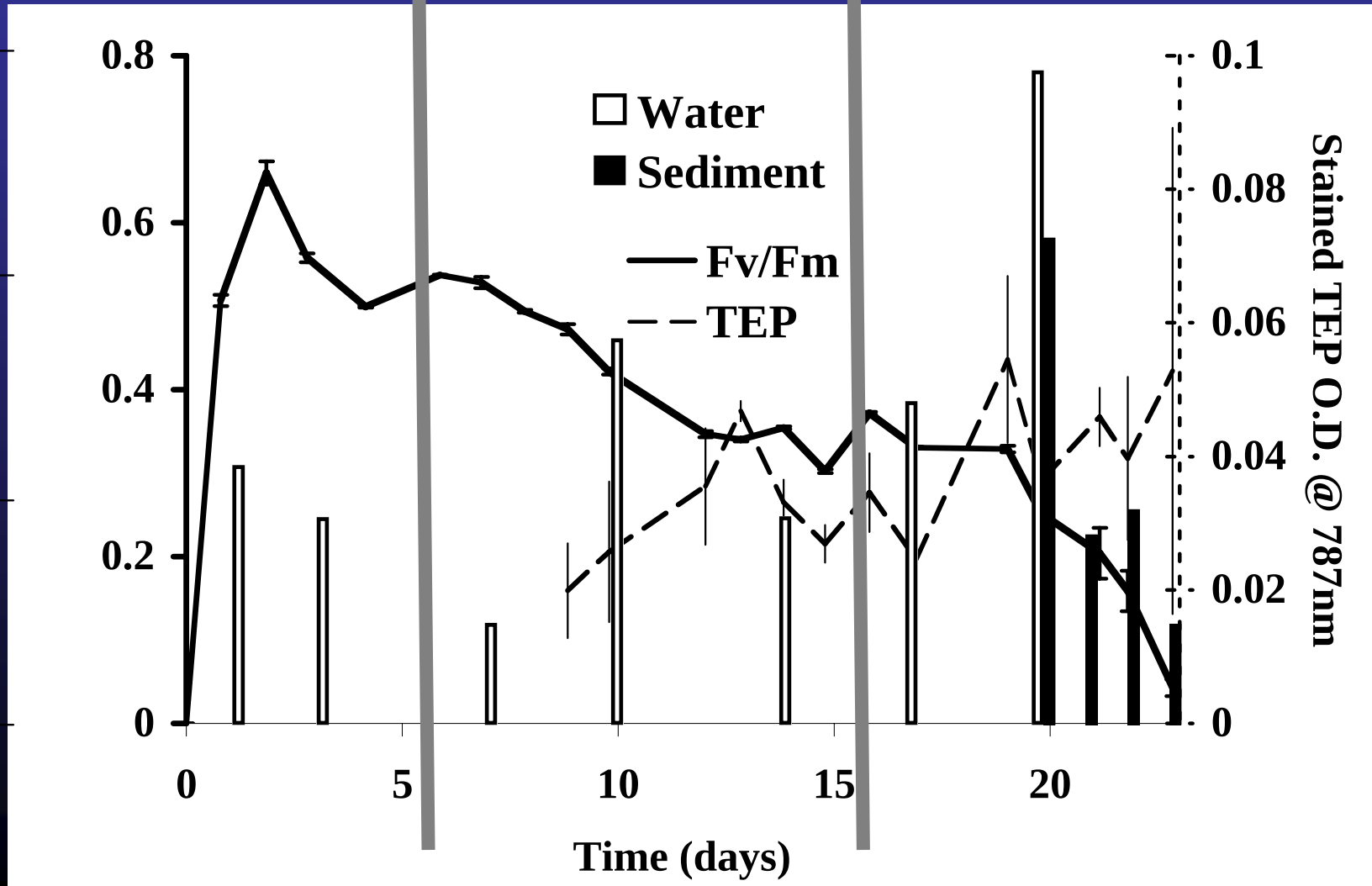
Fluorescence response



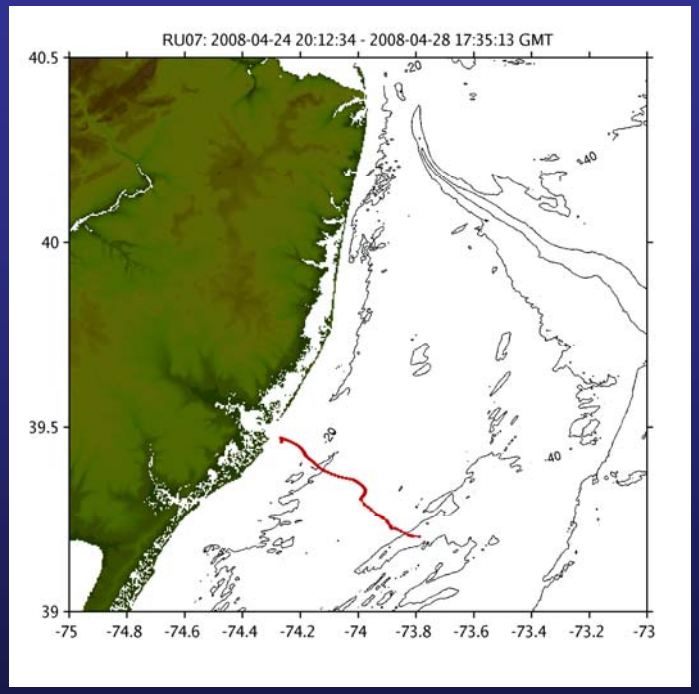
A prototype fluorescence induction sensor for a glider. The sensors measures the Fluorescence kinetic response. The kinetics can tell us about how healthy the phytoplankton are.

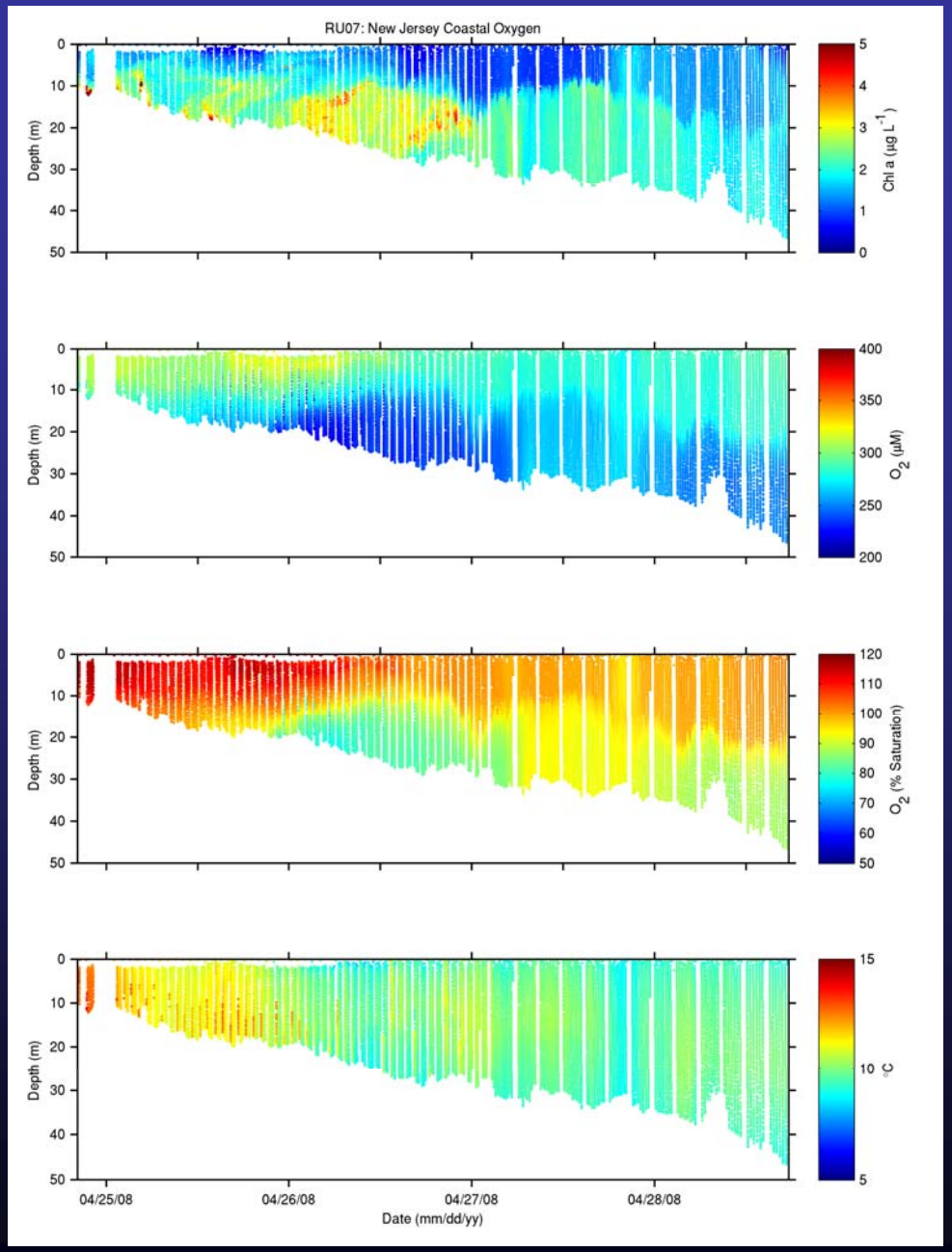
TpMnSOD Western blot





- Oxygen

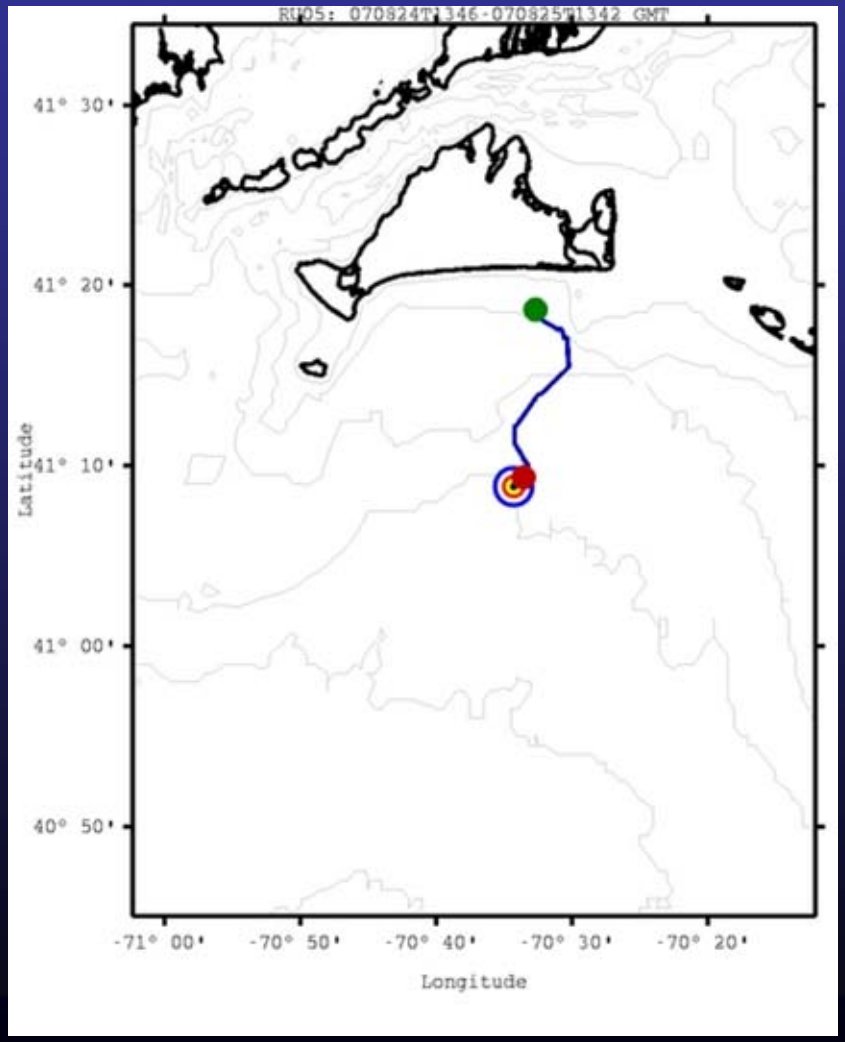

RU07: 2008-04-24 20:12:34 - 2008-04-28 17:35:13 GMT
40.5
40
39.5
39
-75
-74.8
-74.6
-74.4
-74.2
-74
-73.8
-73.6
-73.4
-73.2
-73
-20
-40


RU07: New Jersey Coastal Oxygen
Depth (m)
Chl a (µg L-1)
O2 (µM)
O2 (% Saturation)
°C
Date (mm/dd/yy)
04/25/08
04/26/08
04/27/08
04/28/08

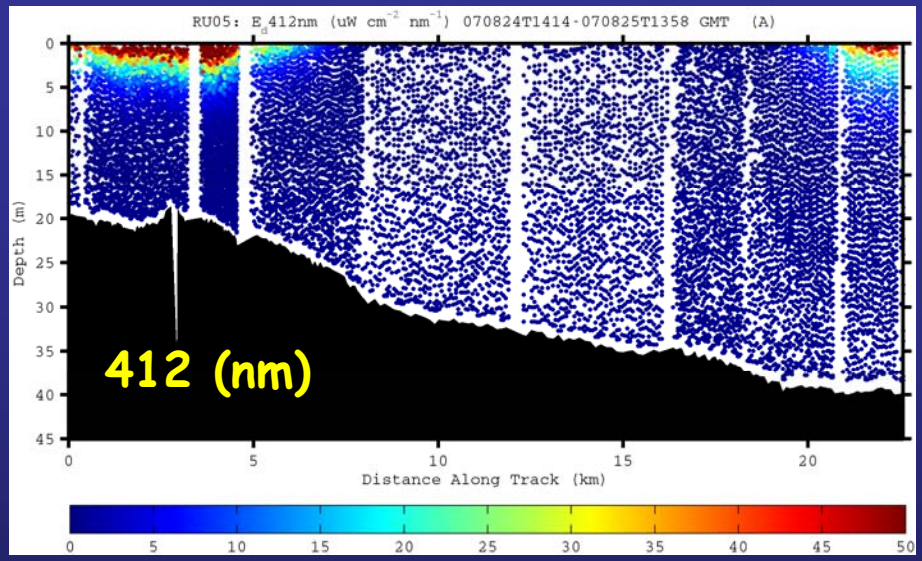
- Light

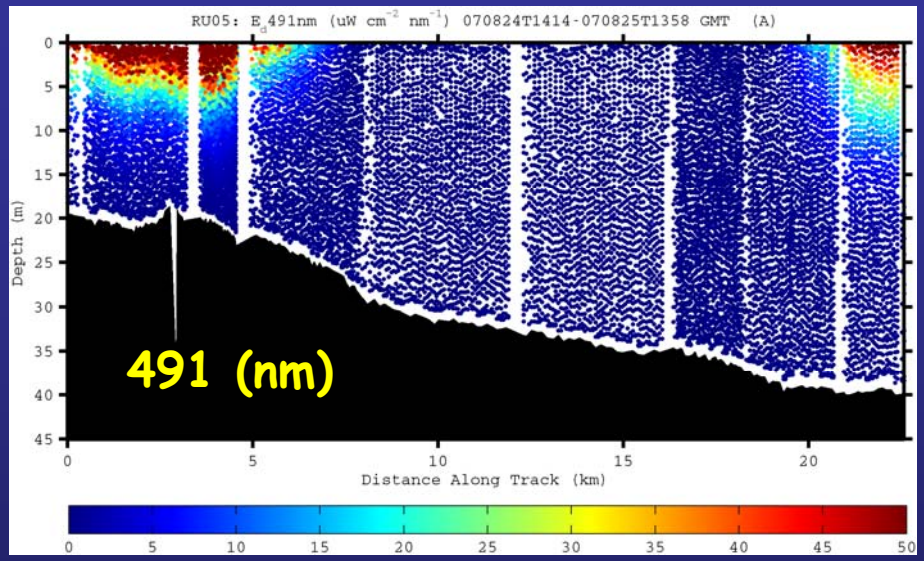
AOP Sensors on Gliders

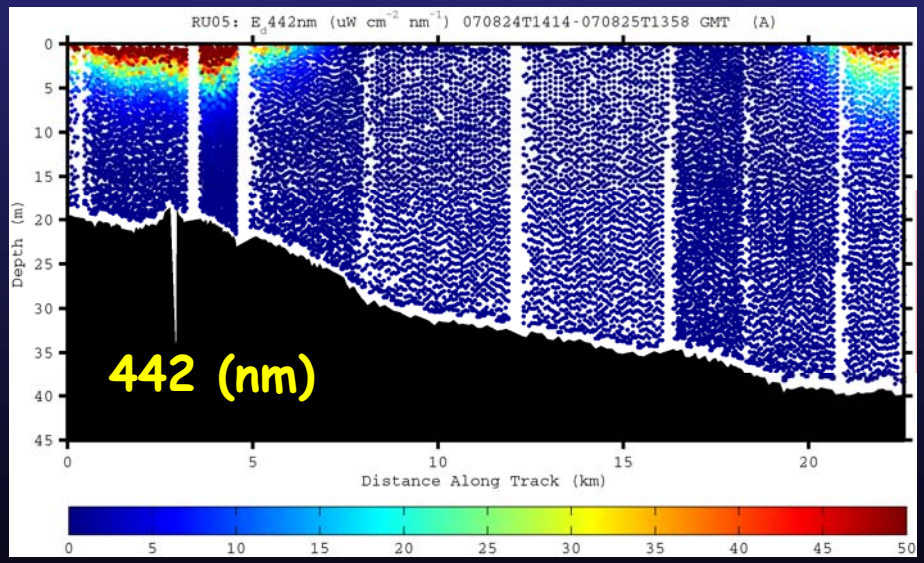
Spectral radiometry

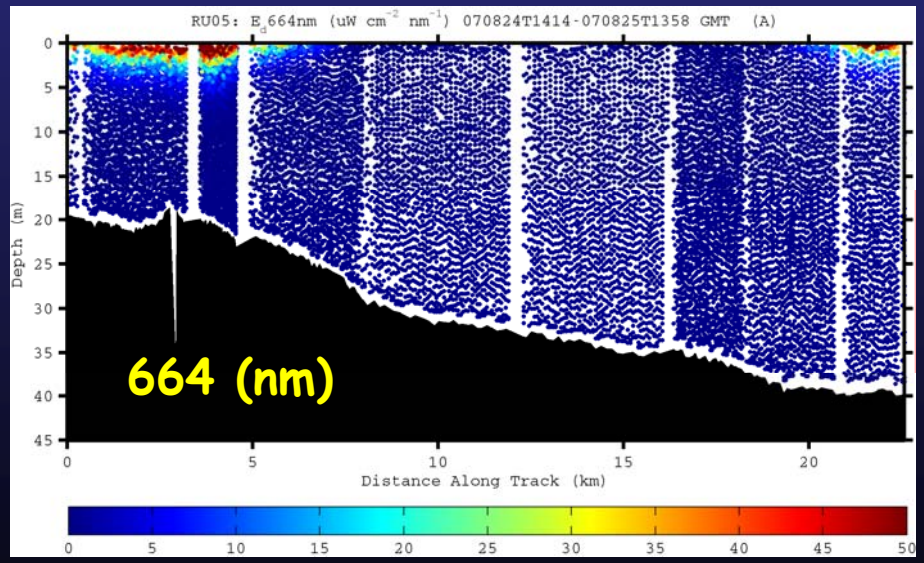


Spectral Irradiance (downcast)



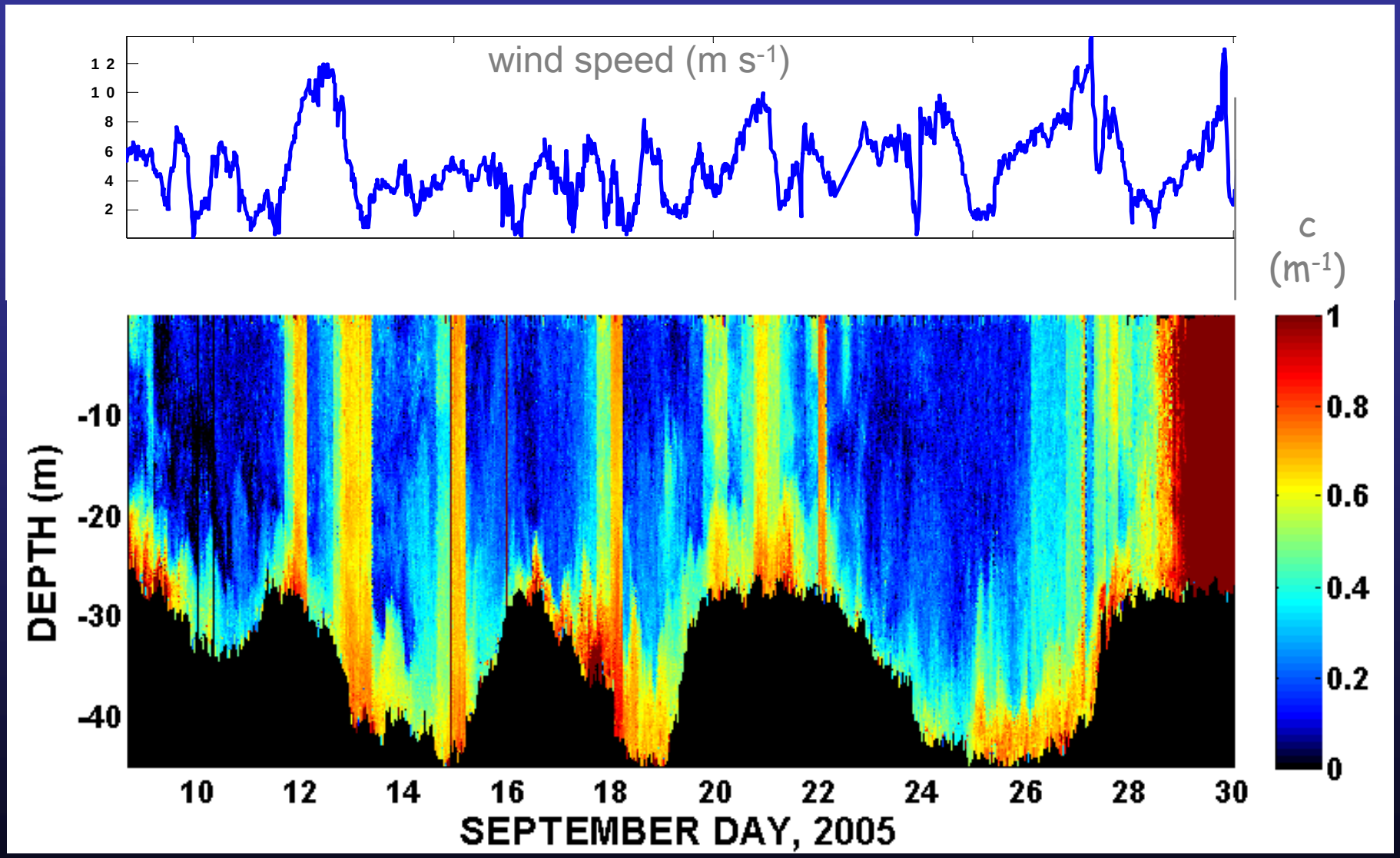


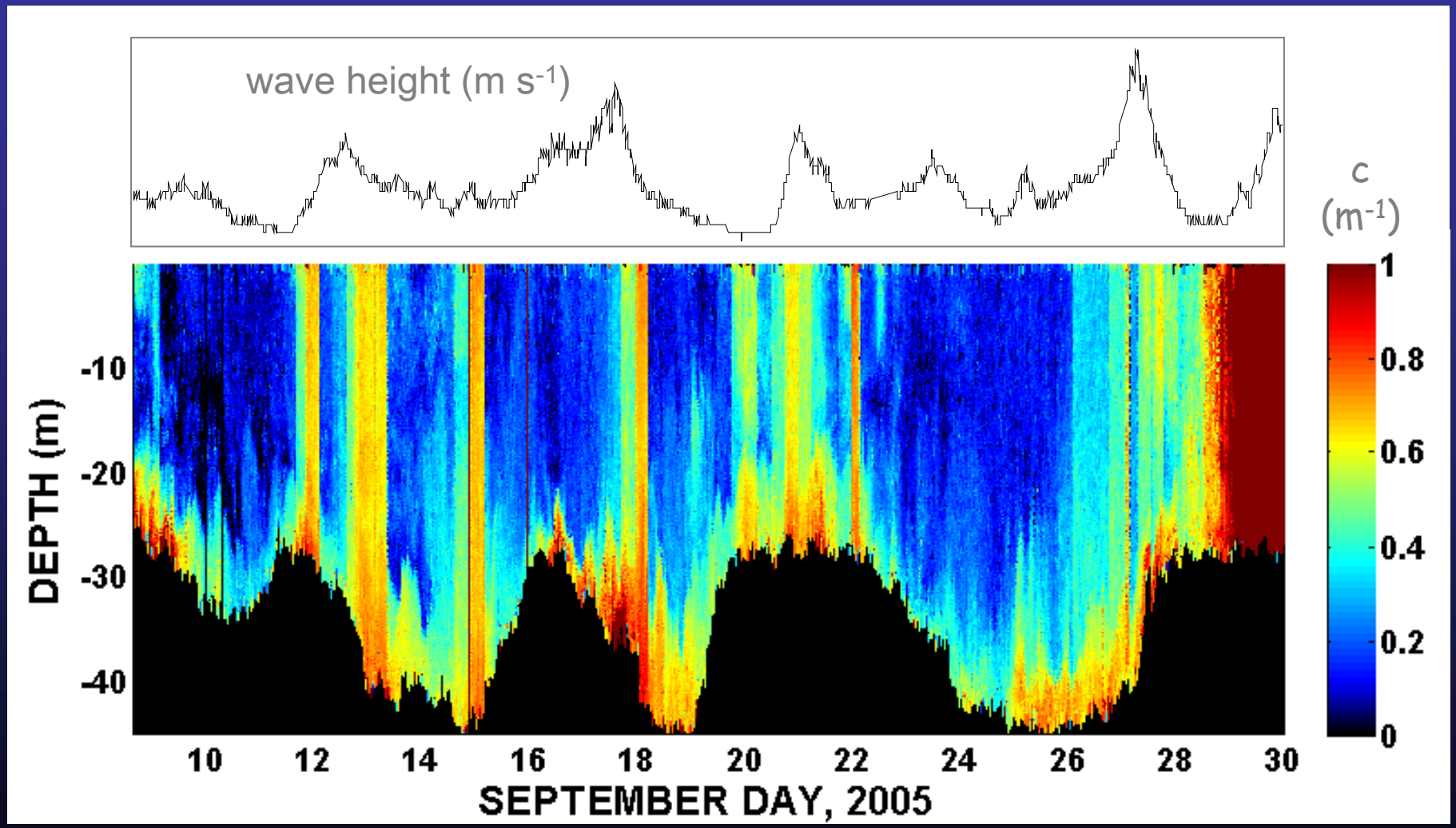




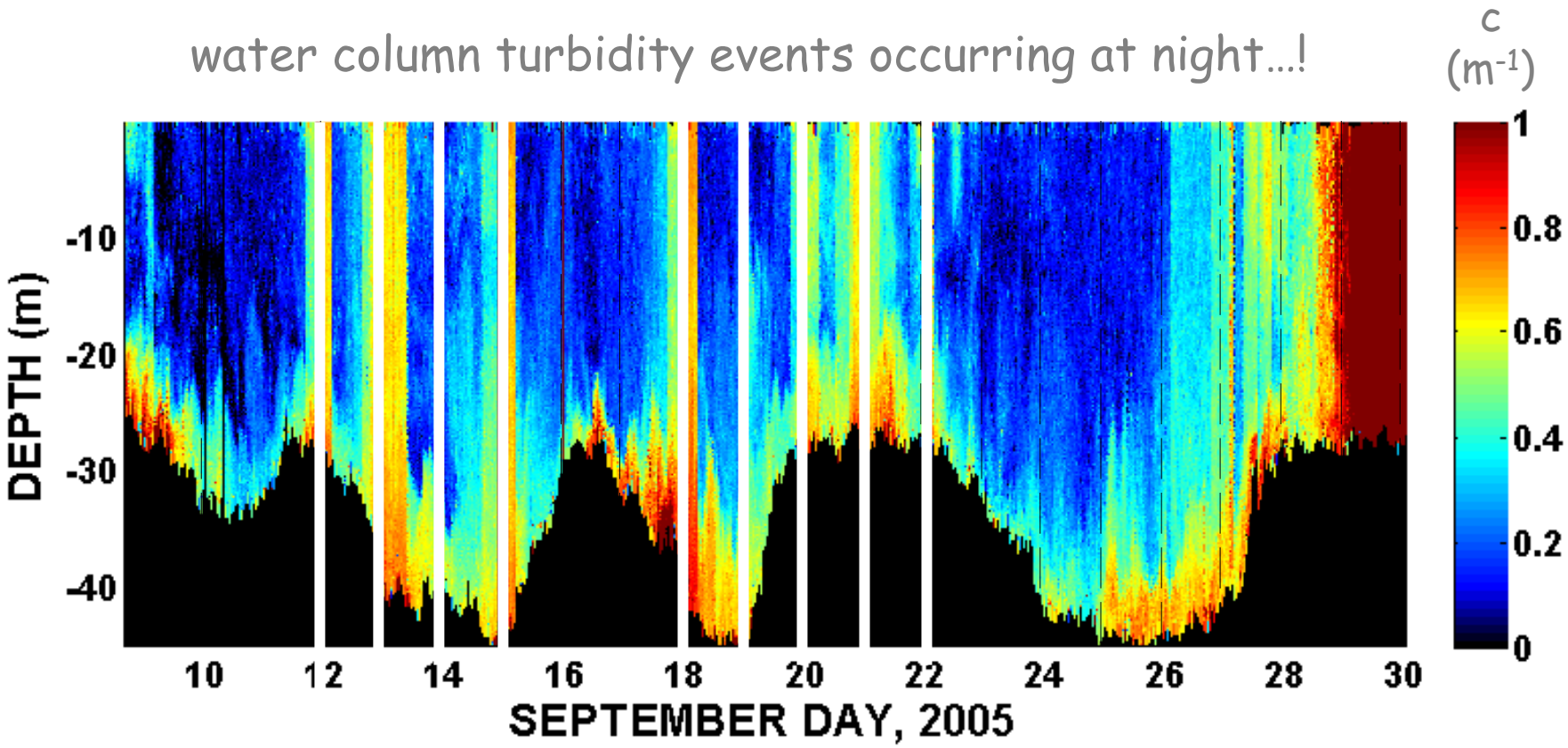
- High trophic levels?

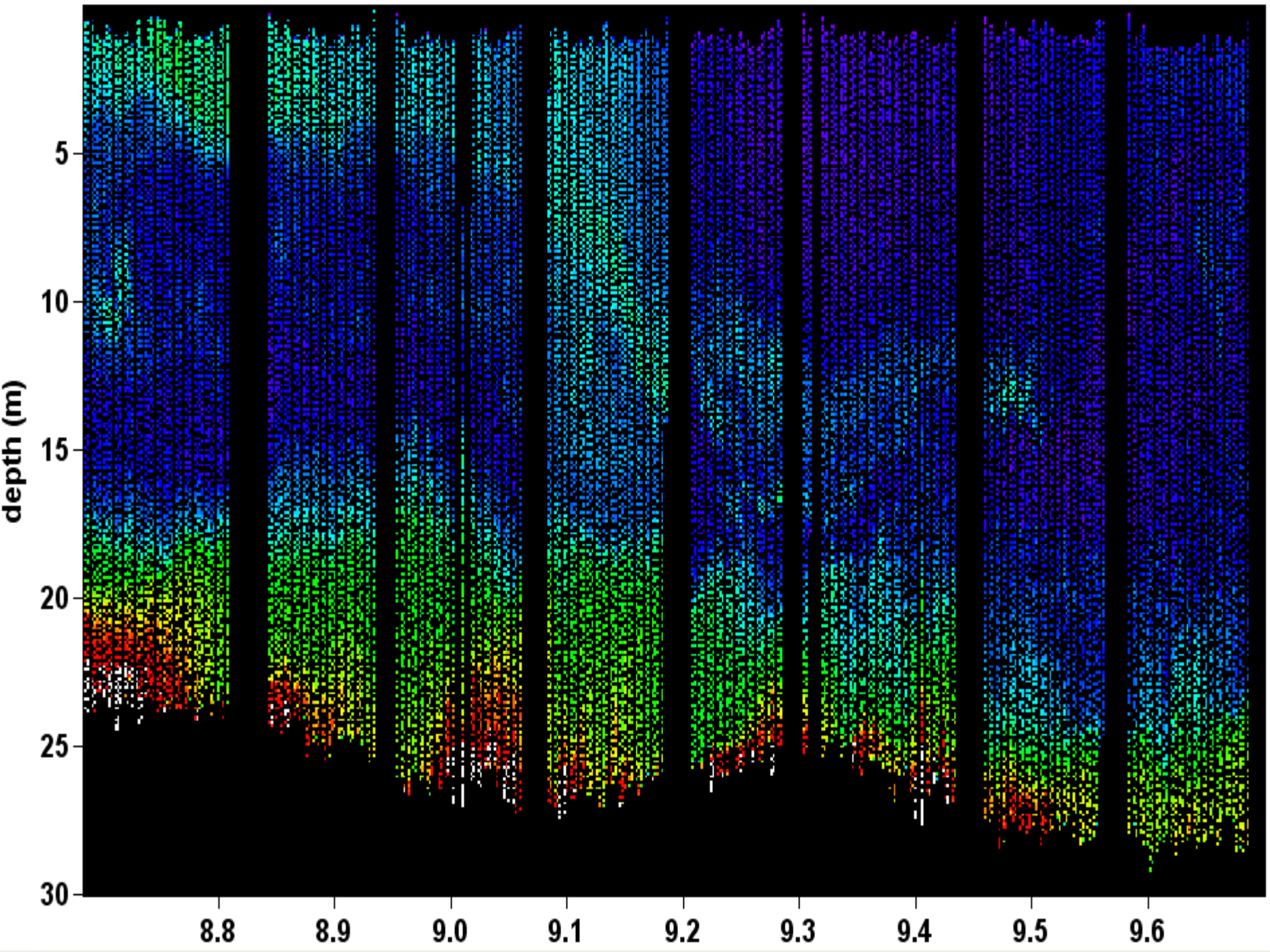
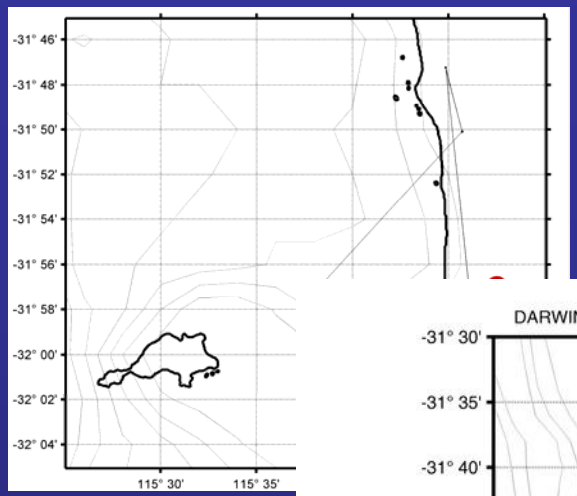
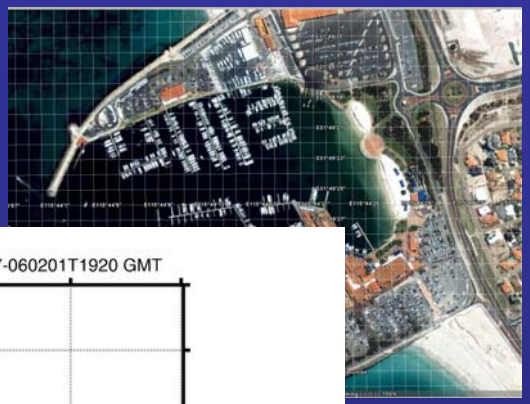
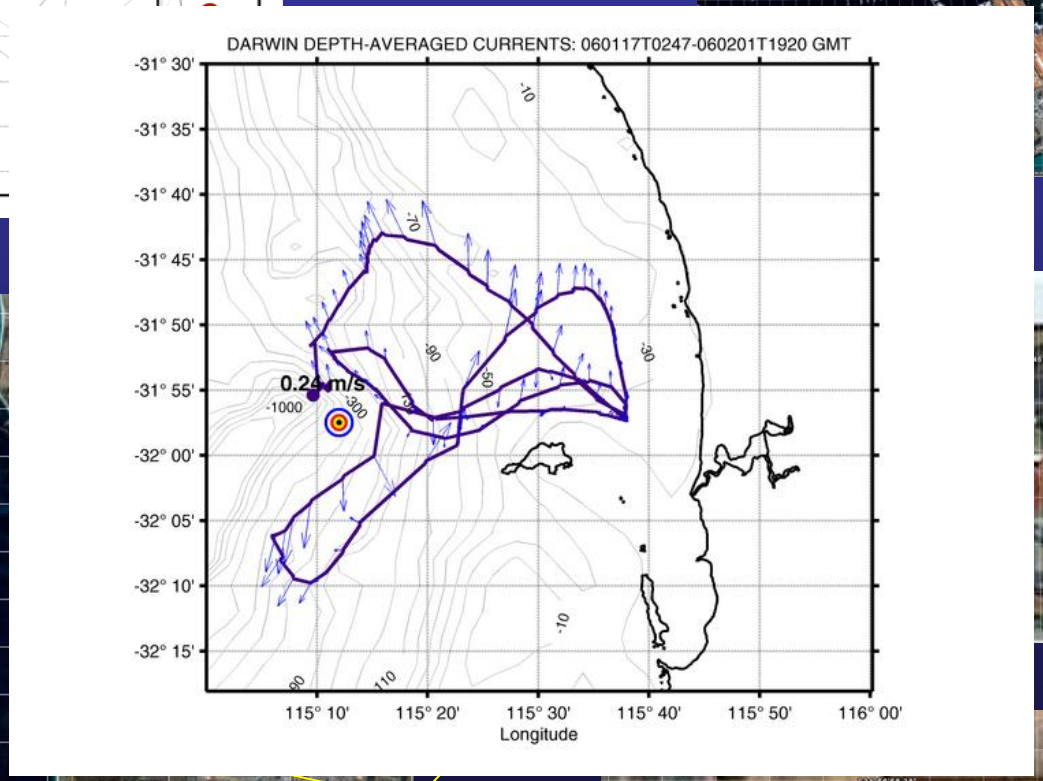
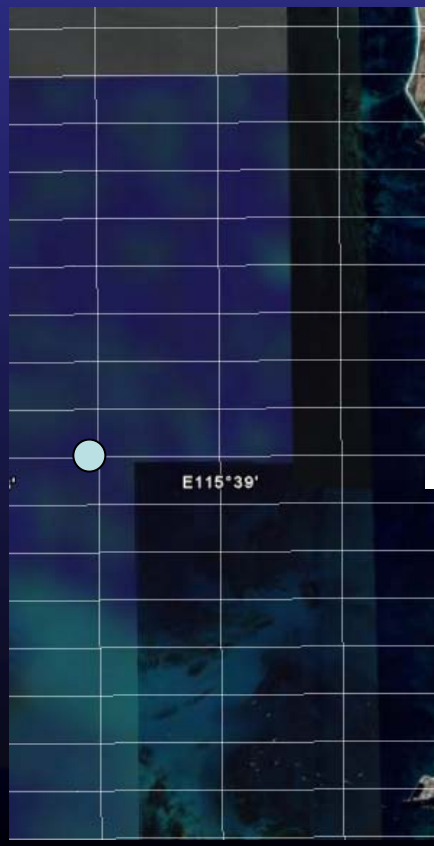
Storms at Martha's Vineyard?




wave height (m s-1)
c
(m-1)
DEPTH (m)
-10
-20
-30
-40
10
12
14
16
18
20
22
24
26
28
30
SEPTEMBER DAY, 2005
1
0.8
0.6
0.4
0.2
0

water column turbidity events occurring at night…!




depth (m)
5
10
15
20
25
30
8.8
8.9
9.0
9.1
9.2
9.3
9.4
9.5
9.6

Darwin's Odyssey – January 11, 2006