

# Autonomous underwater glider observations off central Oregon and the Oregon Coastal Ocean Observing System (OrCOOS)

Jack Barth, Kipp Shearman, Anatoli Erofeev, Tristan Peery, Murray Levine,  
Walt Waldorf and Craig Risien

College of Oceanic and Atmospheric Sciences (COAS)  
Oregon State University



**Oregon State**  
UNIVERSITY

**OSU**

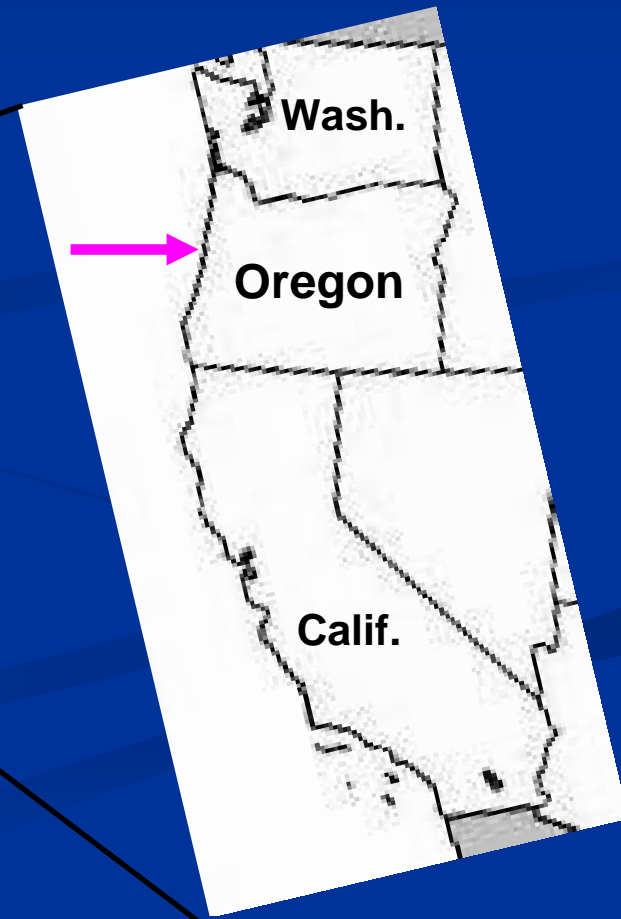
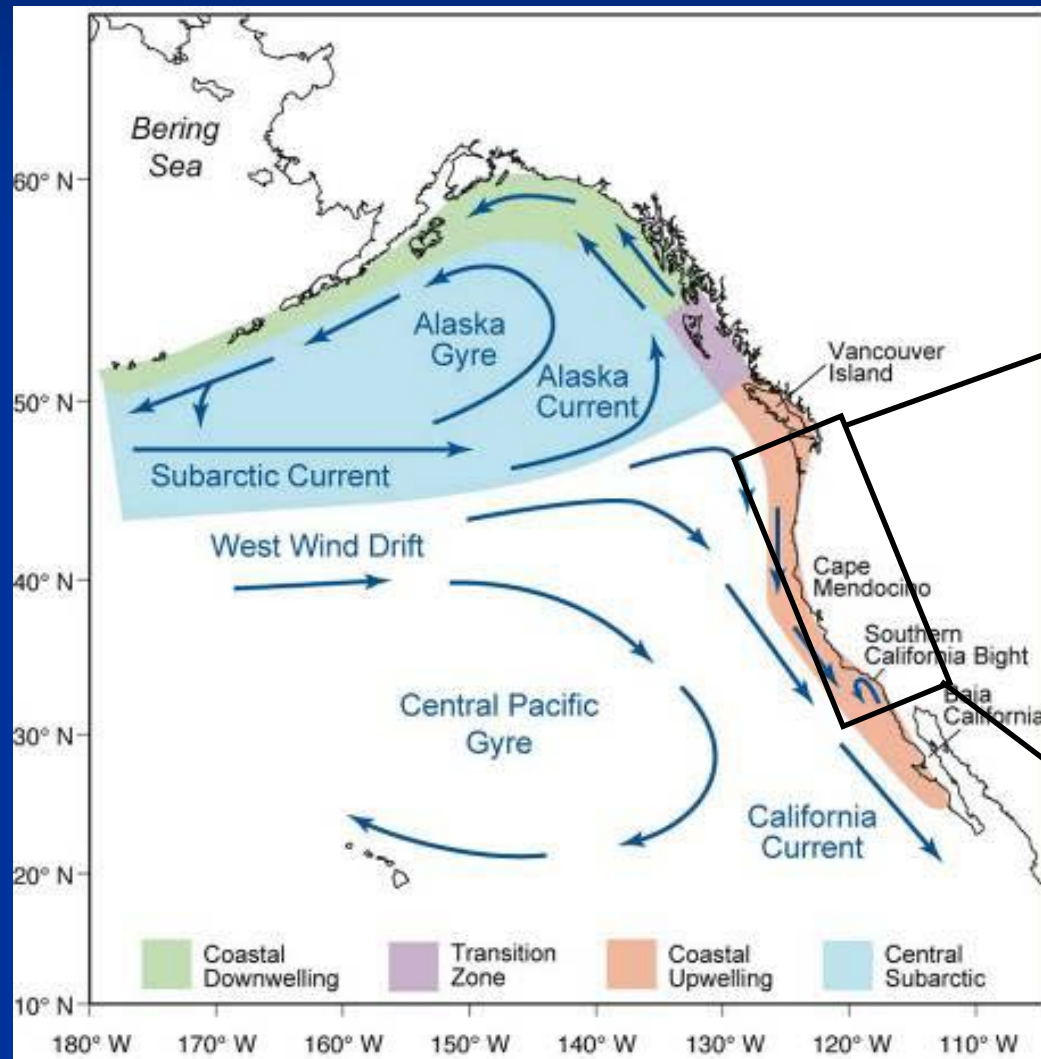
**OrCOOS**  
Oregon Coastal Ocean Observing System



# Outline

- Ecosystem Dynamics in the Northeast Pacific
- Coastal Ocean Observing

- Gliders
- Hypoxia in 2006 and 2007
- Summary



# Recurring hypoxia on the Oregon inner shelf

## Normal Inner-Shelf Rockfish Community



Dungeness crab  
piles in intertidal



2004

Invertebrate die-offs  
and anoxia



2006



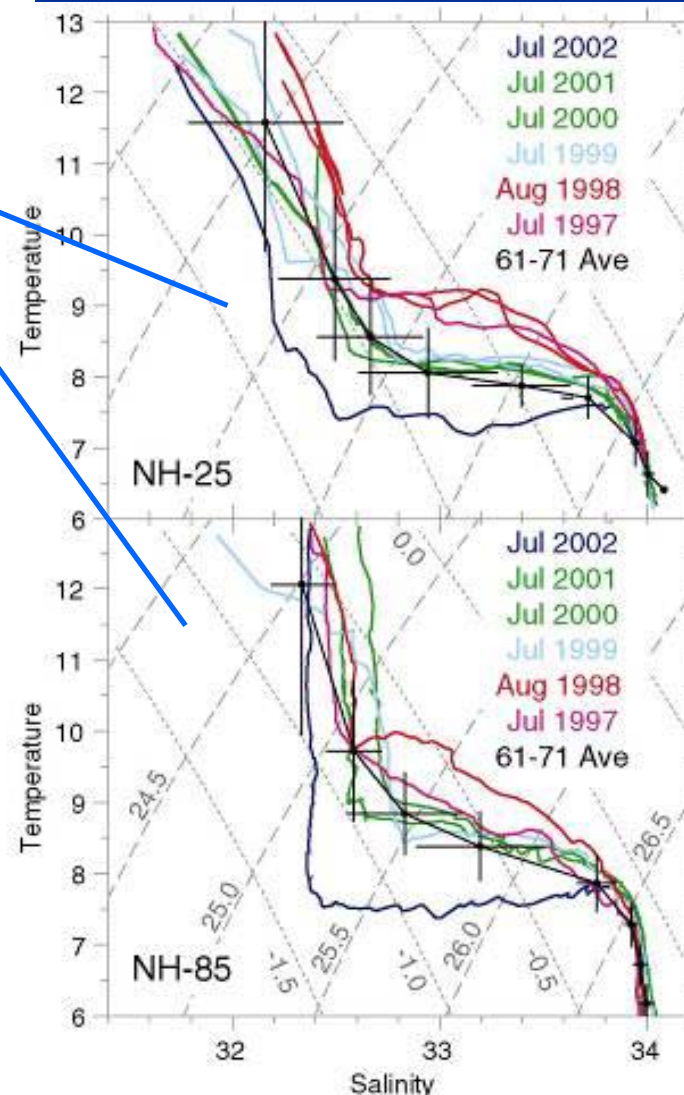
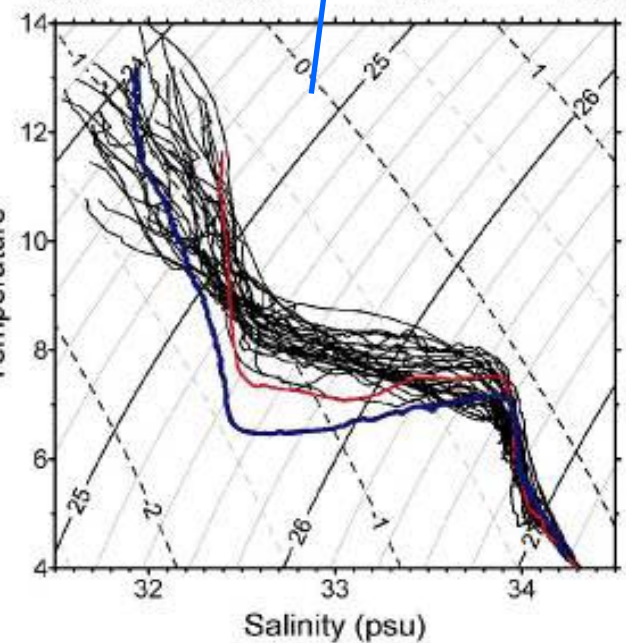
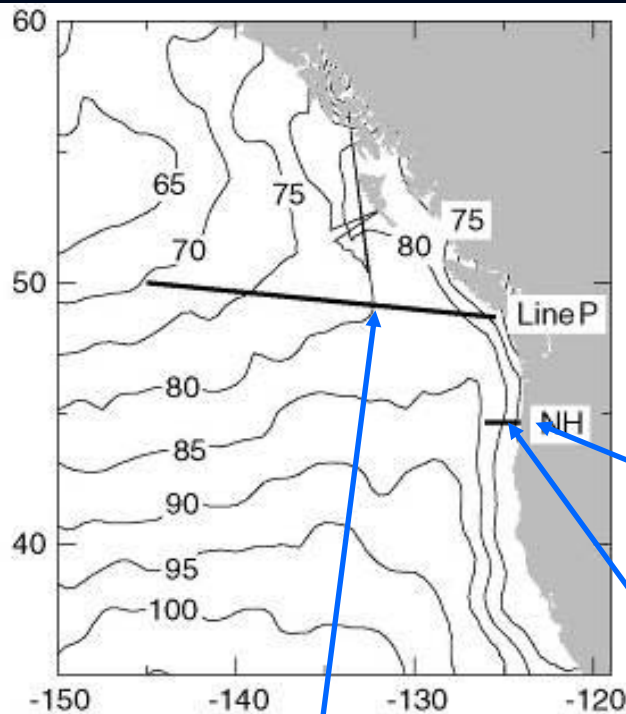
July 2002



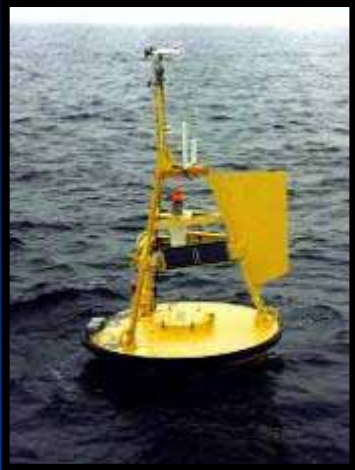
Grantham et al. (2004)  
Chan et al. (2007)



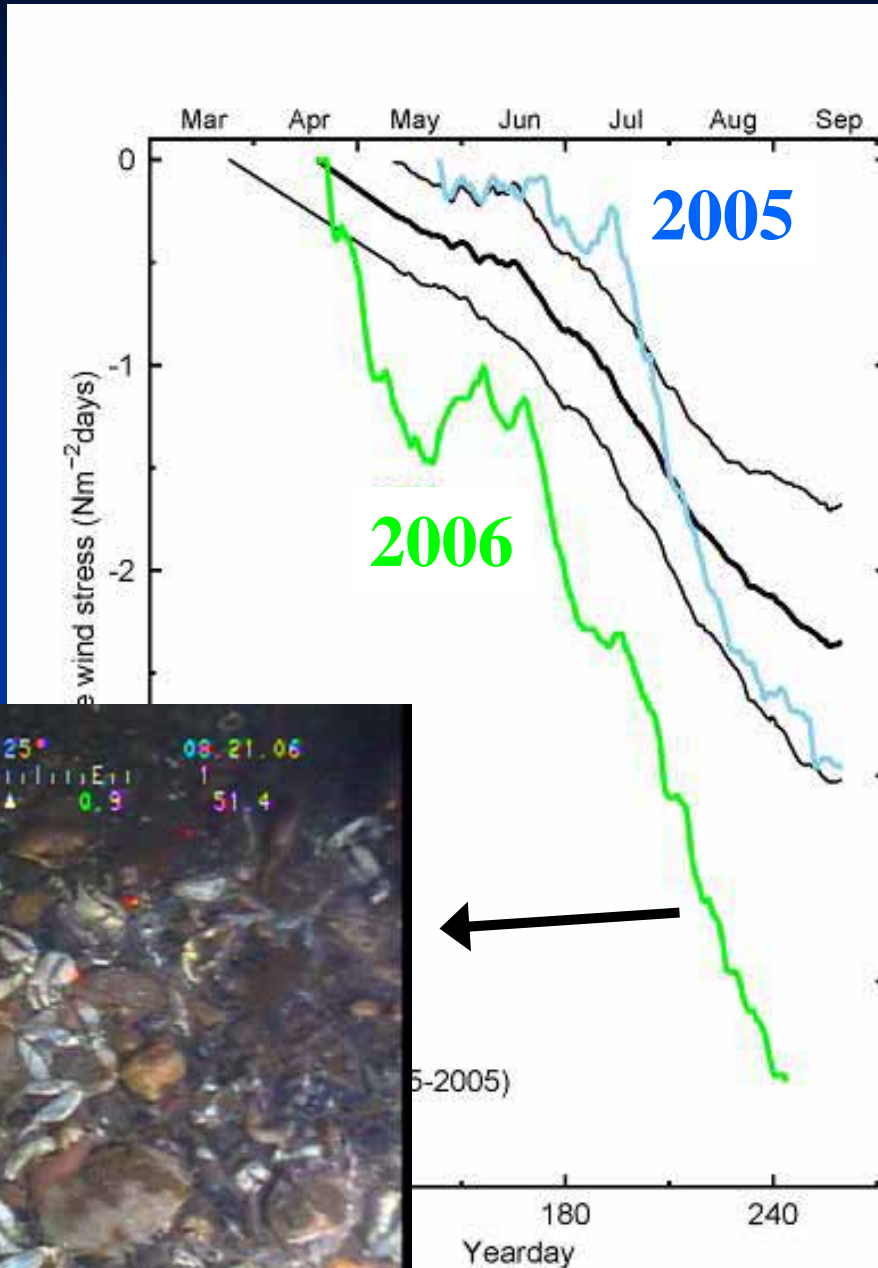
# Remote forcing (2002): Invasion of nutrient-rich subarctic water into the CCS



# Local Forcing (2006): Supercharged upwelling



Cumulative  
wind stress  
since Spring  
Transition



Equatorward,  
Upwelling  
favorable

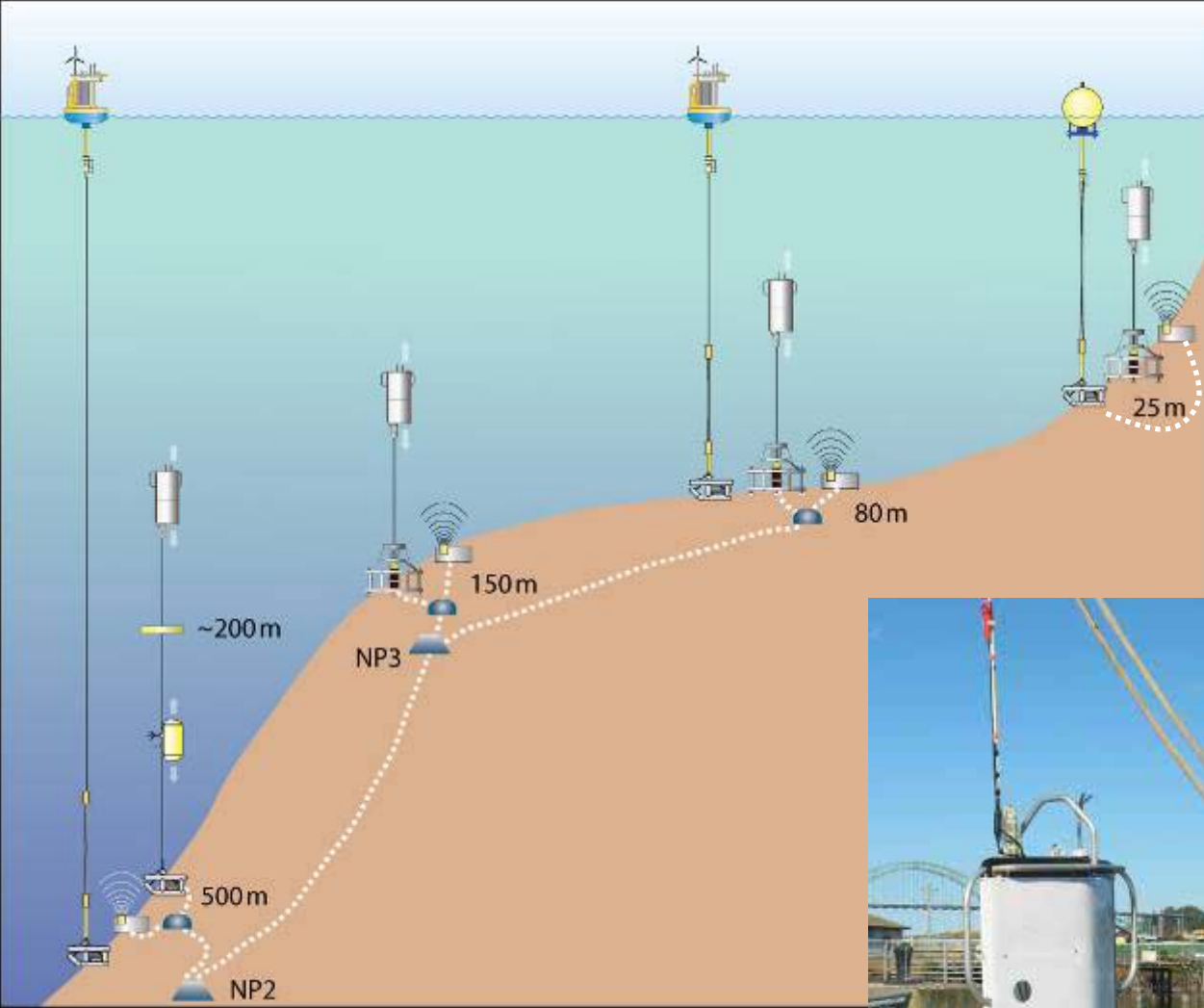


twice as much  
upwelling  
as normal



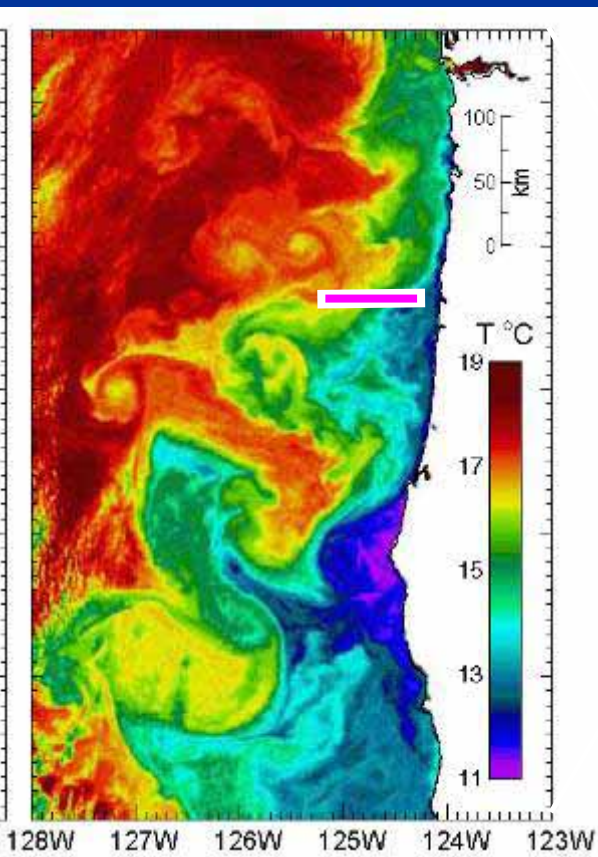


# Coastal Ocean Observing



# Autonomous Underwater Vehicle Gliders

cross-margin  
transect twice  
per week  
since April  
2006





7 ft long  
100 lbs in air

GPS, Iridium and  
Freewave Antennae  
in tail fin

Aanderaa Optical  
Dissolved Oxygen  
sensor

Glider Control and  
more batteries

Science Bay

Air bladder

Pitch Batteries

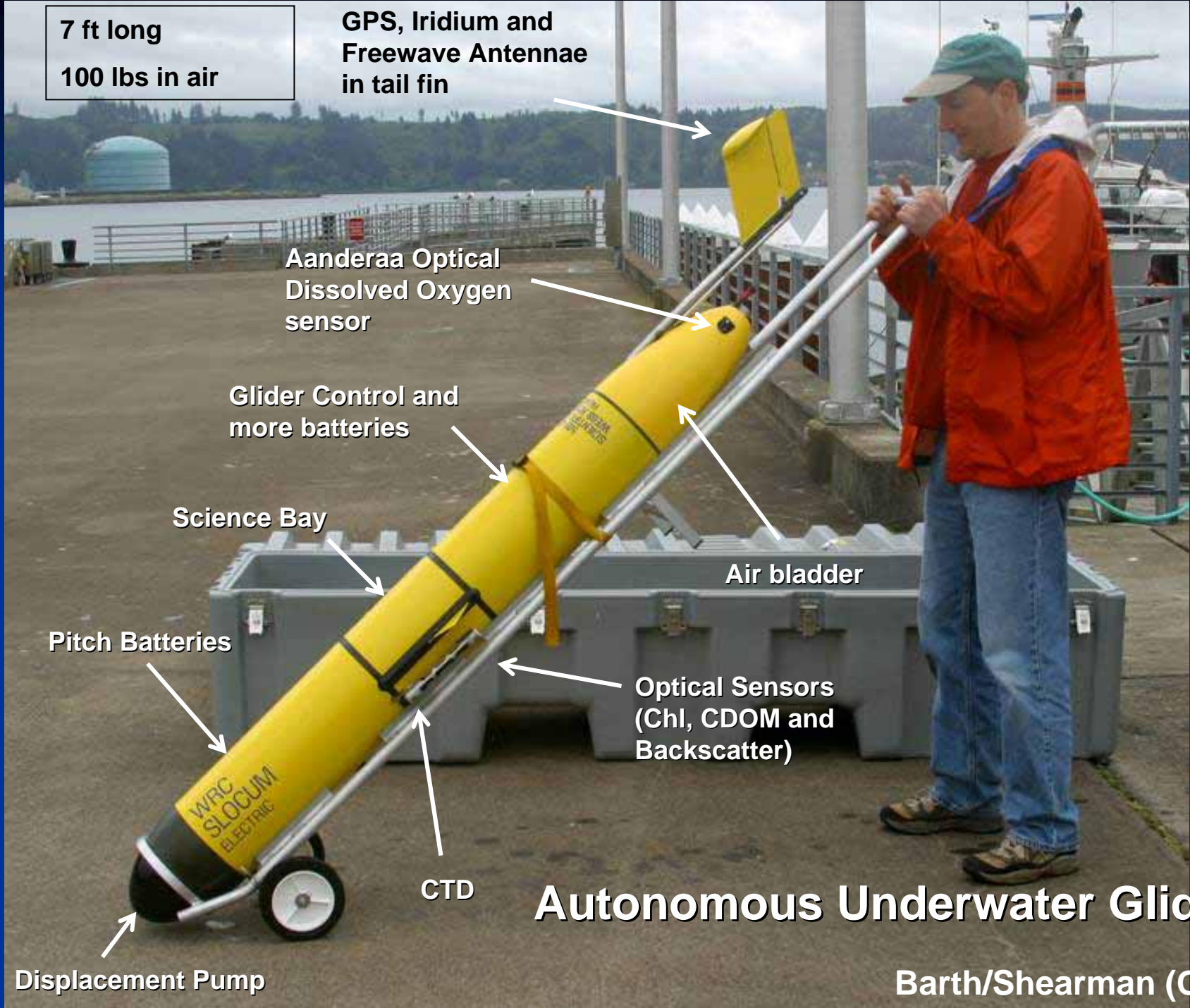
Optical Sensors  
(Chl, CDOM and  
Backscatter)

CTD

Displacement Pump

# Autonomous Underwater Glider

Barth/Shearman (OSU)







**Glider Bob**  
**February**  
**2005**



**Bob Smith**

## The OSU Glider Fleet

**Two Webb gliders**

**1000 m SeaGlider in**  
**Fall 2007 (California**  
**Undercurrent)**



**Glider Jane**  
**June 2005**

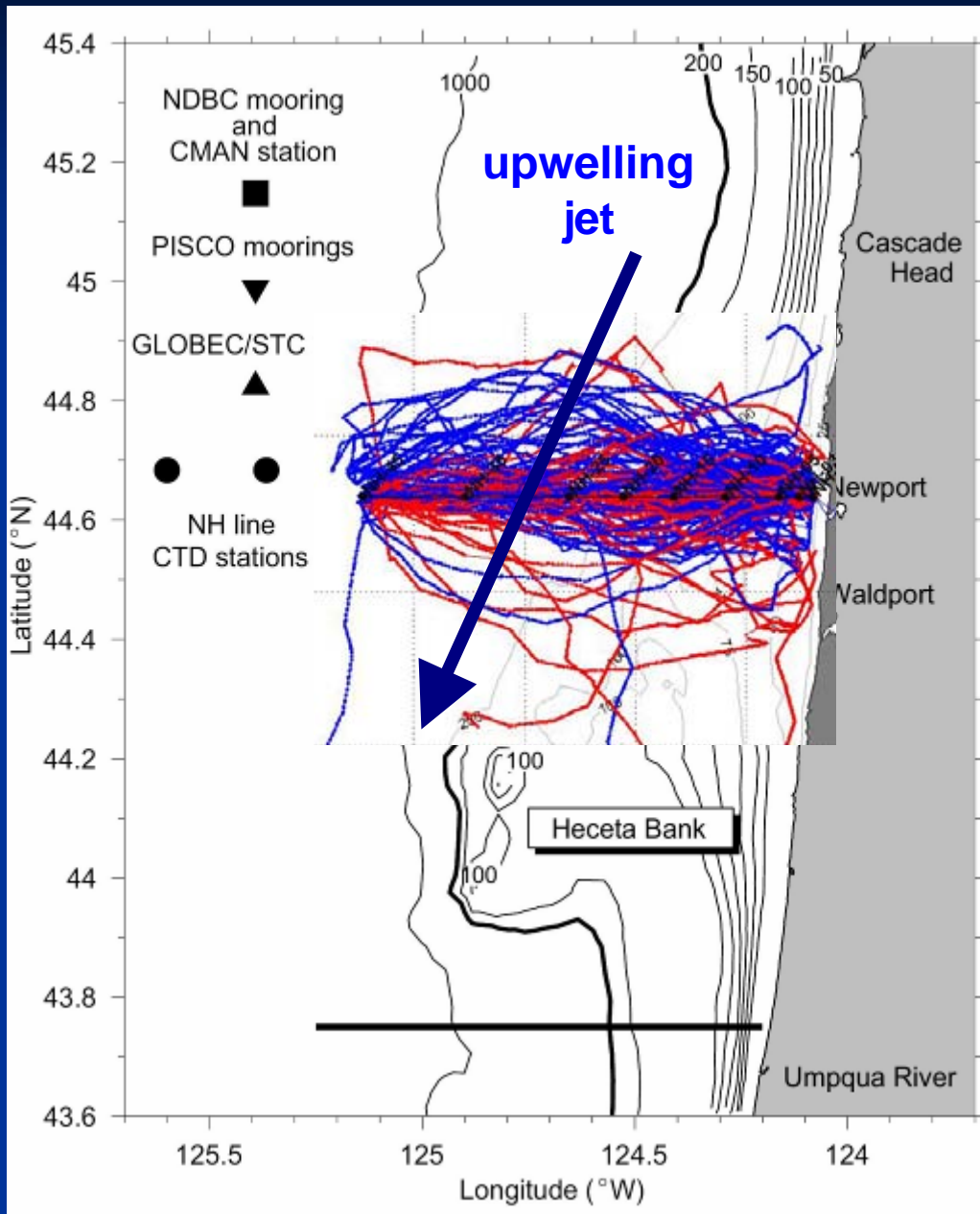


**Jane Hoyer**



**Barth/Shearman (OSU)**

# OSU Glider Operations



## Newport Line

- 90 km cross-shelf
- strong currents (50+ cm/s)
- abrupt bathymetry
- historical observations

• April 2006– October 2007

• 431 glider-days

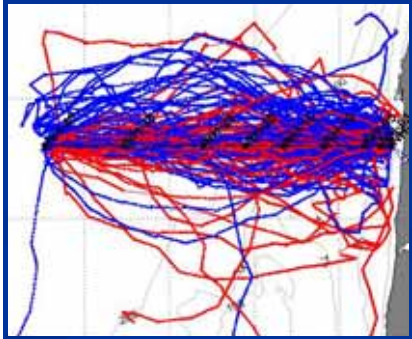
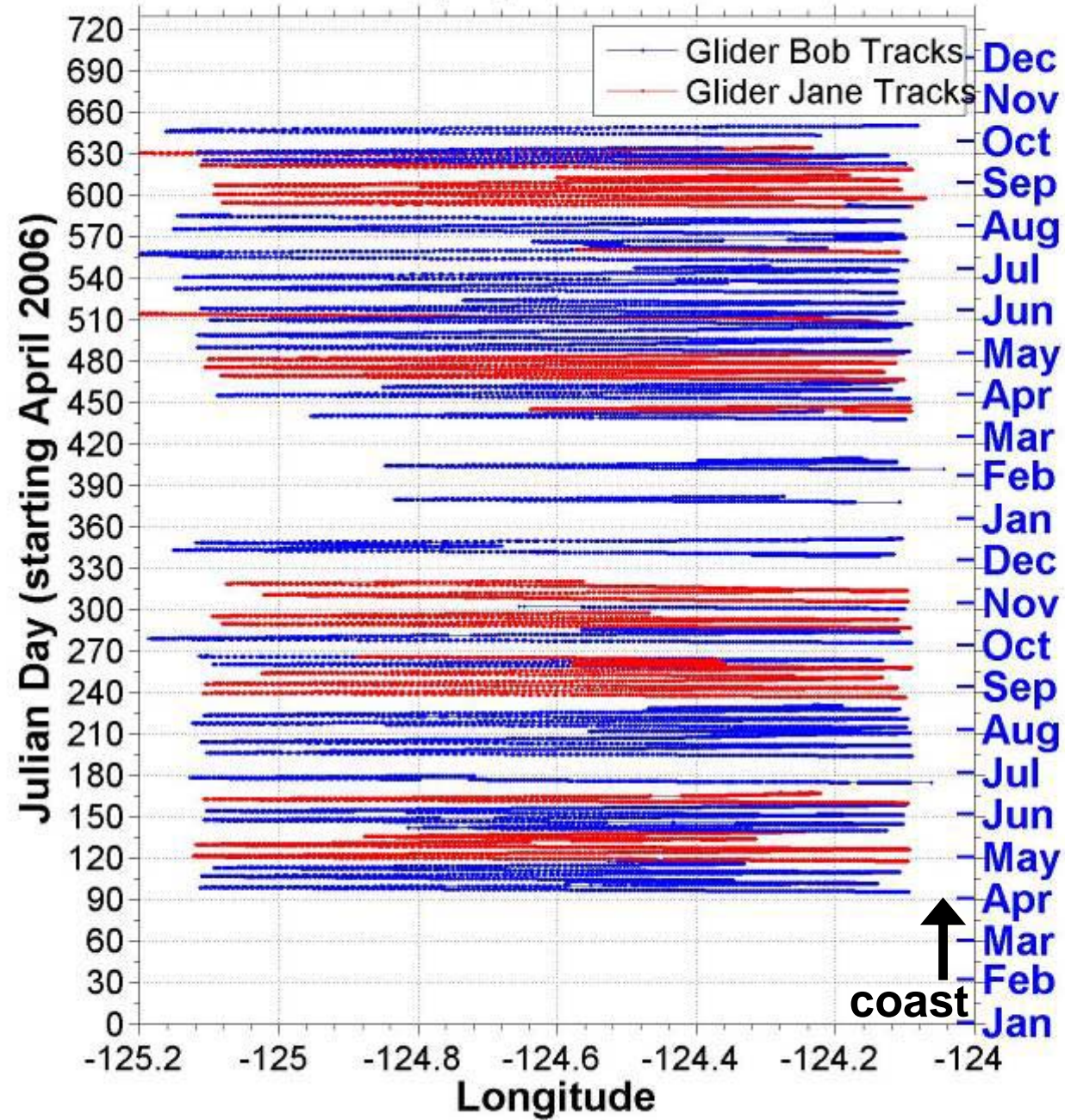
• 11,050 km

• 170 sections

• 55,832 profiles



# Glider Positions, April 2006 - October 2007



# Summary

1. AUV gliders can conduct year-round repeat sampling in coastal and boundary current regions
2. Gliders can presently carry a suite of physical and bio-optical sensors
3. Gliders have been equipped with acoustics (ADCPs, hydrophones), but mission duration is shortened
4. Gliders are appropriate for long-term observations at slow speeds. Higher speed sampling can be done from propeller-driven AUVs

