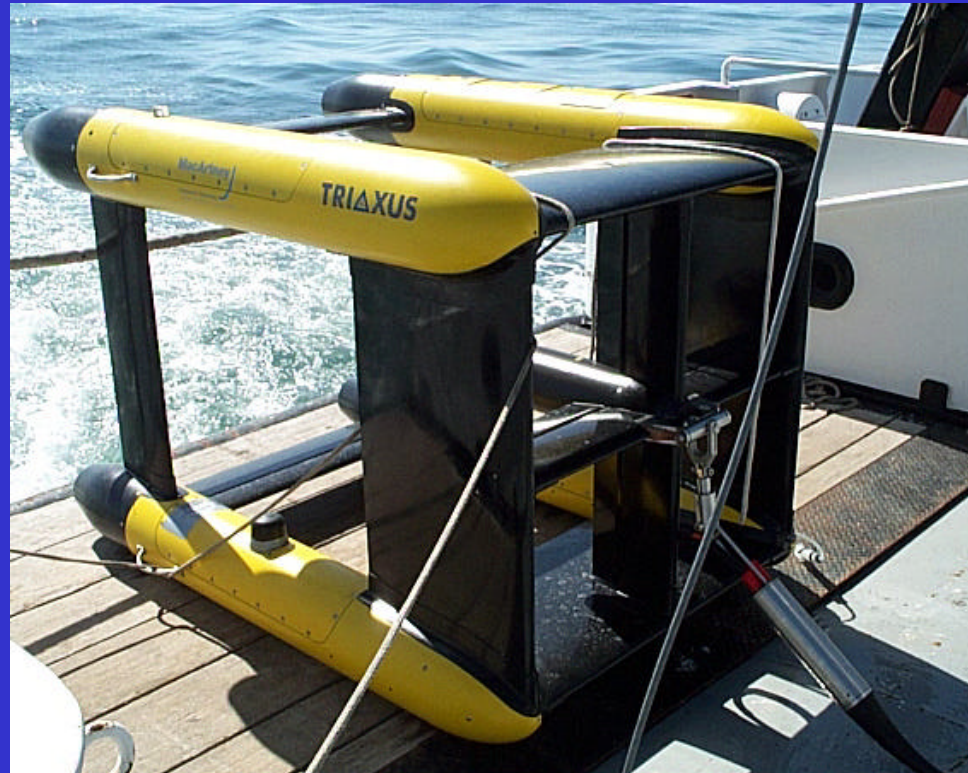


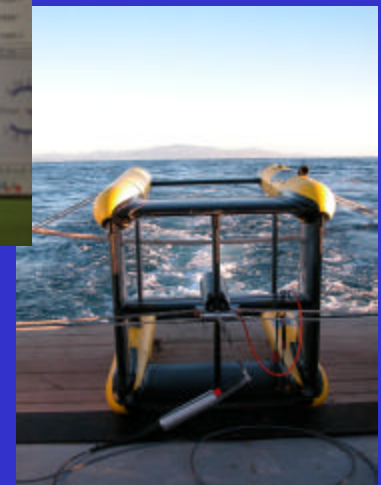
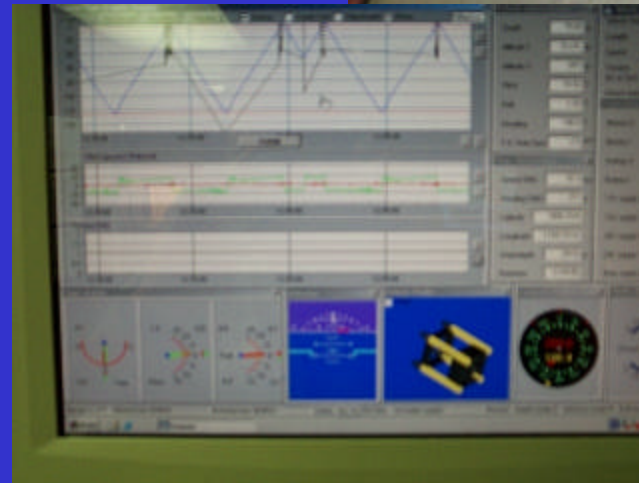
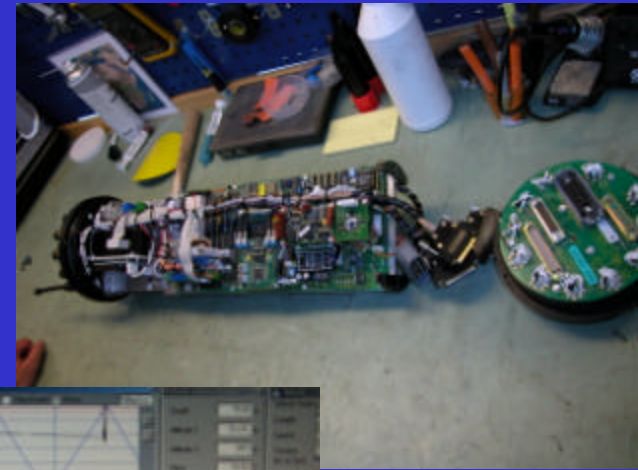
TRIAXUS MacArtney A/S



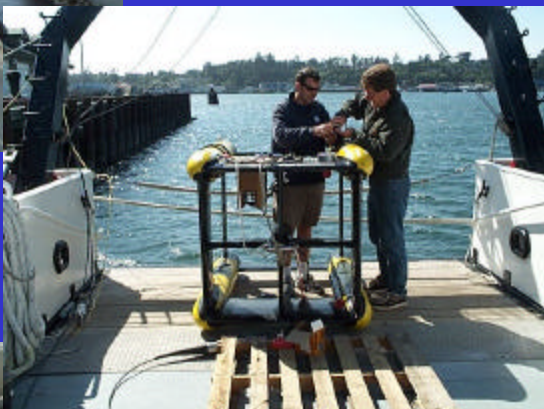
Stewart Lamerdin
Moss Landing Marine Labs
R/V Point Sur

Vehicle Overview

- Box kite design
- Works on a .393" Fiber Optic cable
- 8 RS232/422/TTL channels, 4 analog channels, with user selectable 12, 24, or 48VDC power
- Vertical and horizontal undulations
- Large payload capacity
- Positively buoyant
- Windows interface software



Vehicle Setup



- Approximately 2 hour setup time for entire system
- Permanently installed sensors
- Additional data channels for user supplied instrumentation

Example of a Recent Setup



Triaxus payload

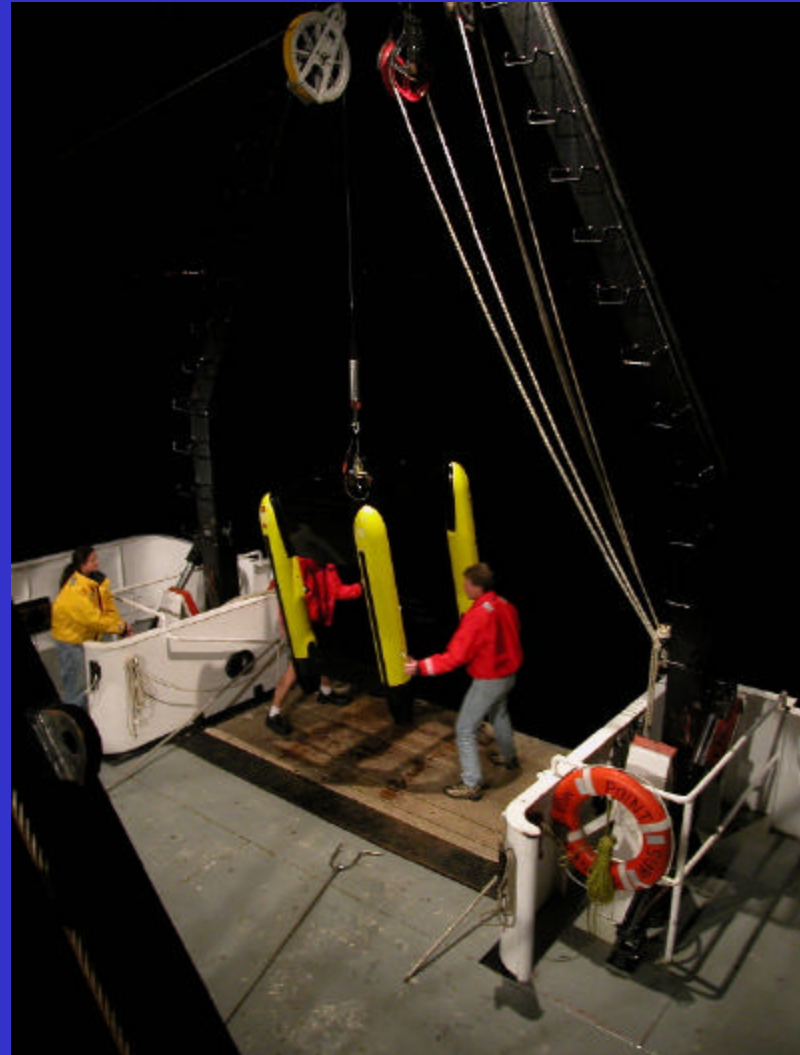
- SBE9plus CTD
 - Dissolved Oxygen
 - Fluorometer
 - Transmissometer
- BOT LOPC with fluorometer and CTD
- ISUS Nitrate Sensor
- 2- OS200 CTD's
- LISST 25
- RDI 1200kHz ADCP

Area of operation: Columbia River, WA

Deployment and Recovery

- Minimum of 3 personnel and a winch operator
- Bridge responsibilities
- Weather considerations

Future modifications:
deck mounted vehicle cradle



Vehicle Operation

- Technicians required
- Scientist participation.....No!
- Determining operating parameters
 - Minimum water depth for operation
 - Undulation depth
 - Surface and bottom proximity
- Communication with the bridge

Vehicle Usage on R/V Point Sur

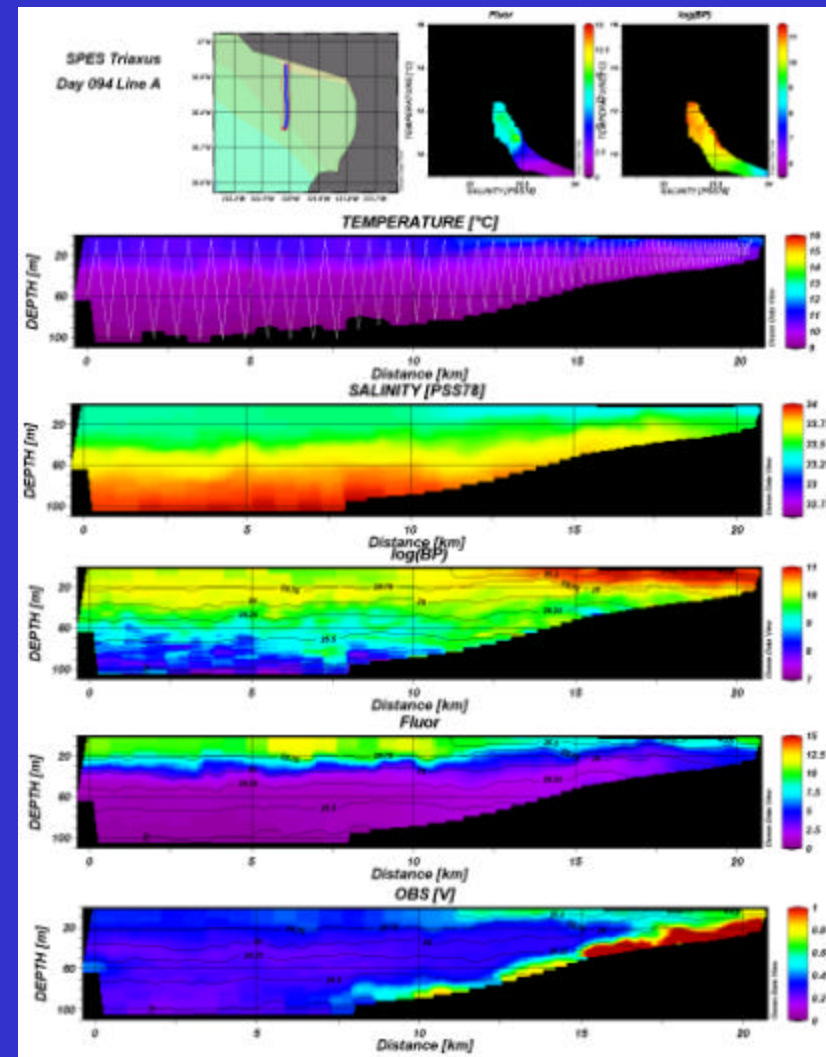
- 92 days in 2004
- 94 days funded for 2005



Concerns: “dedicated” technician to repair and modify vehicle

Data Quality

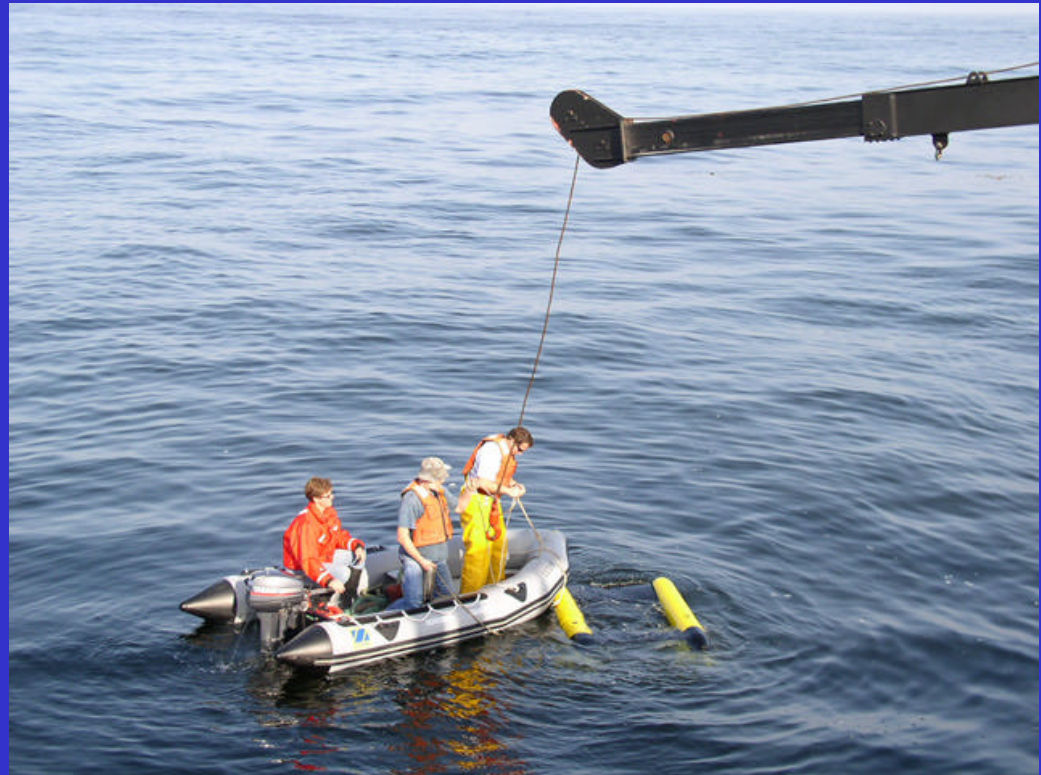
- Good for most sensors
- Hysteresis in certain sensors
- Reliable way to sync additional sensors with CTD data
- Development of in-house software



Plots courtesy of S. Haddock (ONR funded, N00014-00-1-0842)

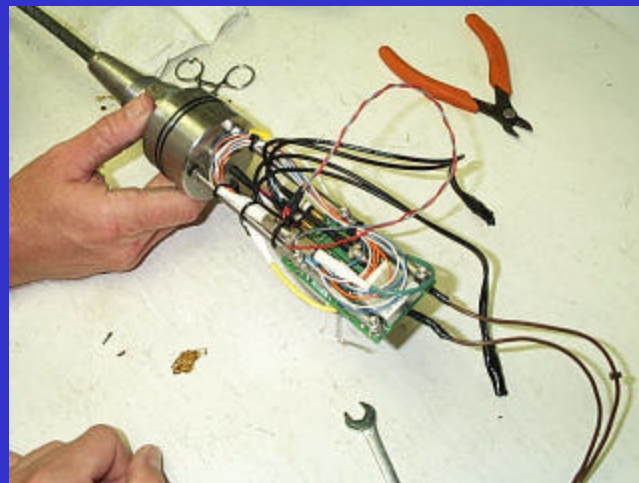
Recovery Aids

- Installed xenon flasher, radio beacon, and LF transponder
- Positively buoyant
- Weak link

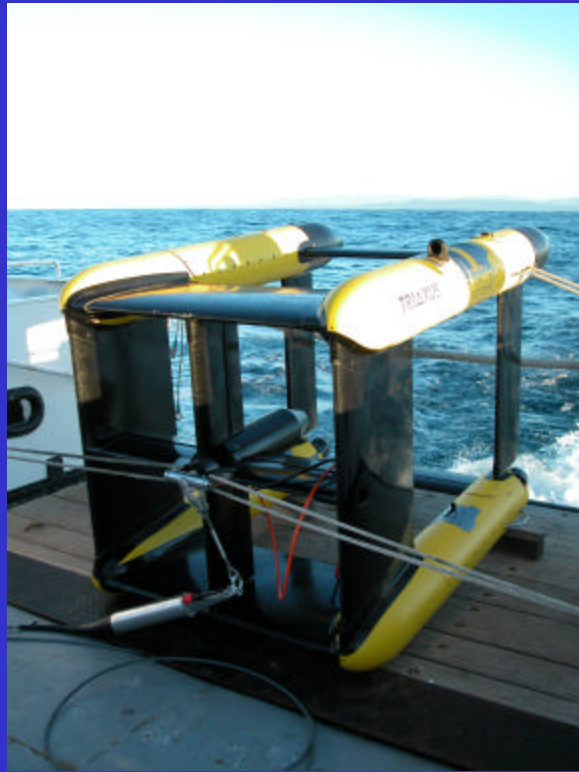


Operational “Issues”

- Termination designs
- Depth capabilities
- Fouling
- Cable abrasion and wear



Addressing Depth Capabilities



Current Version D 200m



New Version E 400m

Customer Support

- Support has been very good
- MLML and Univ of Washington's Applied Physics Lab contributions
- Problems resolved in a timely manner
- Spares are readily made available
- Willing to help with any problems, many times from home

Triaxus Summary

PROS

- Setup time
- Sensor payload
- Undulation depths
- Customer support
- Manufacturer committed to the vehicle

CONS

- Termination
- Fouling



Triaxus Summary

- The Triaxus is a very good vehicle for near coastal and open ocean where a large sensor payload capacity is needed
- The vehicle can be operated in depths as shallow as 10m and can undulate reliably to 175m
- Towing speeds can vary from 5 to 10kts, with vertical undulation speeds up to 1m/s
- Roll control of the vehicle is excellent, giving researchers the ability to strap or mount additional sensors to the exterior of the vehicle

Triaxus Summary (cont'd)

- Setup time is minimal
- Only two technicians are required to operate the Triaxus 24 hours/day
- The manufacturer is committed to this vehicle and constantly upgrading hardware and software
- MacArtney A/S is in the process of testing a larger version of the Triaxus that can reach the 400m mark that was initially specified