Real-time Ocean Observing

WA State ORA briefing

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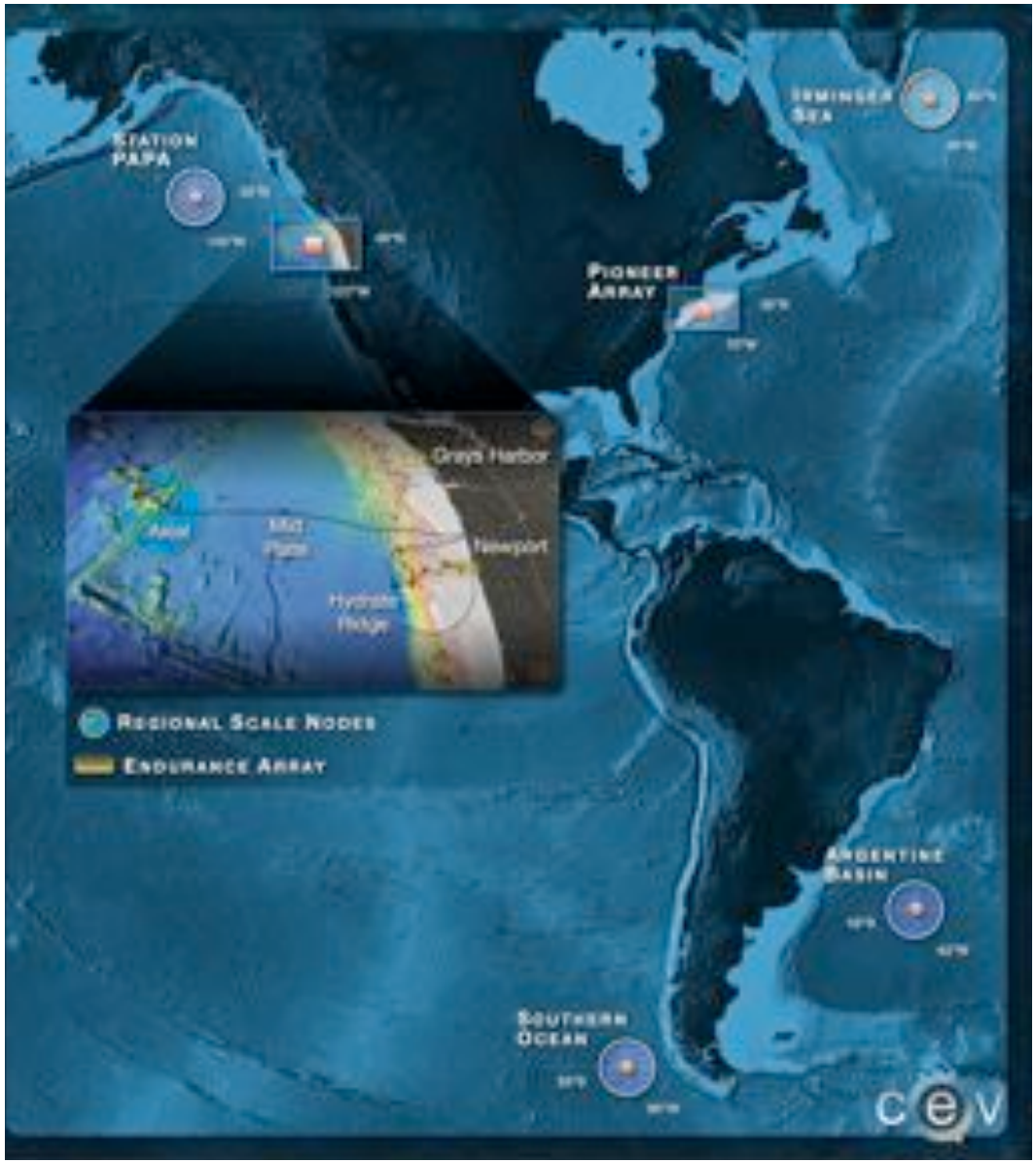
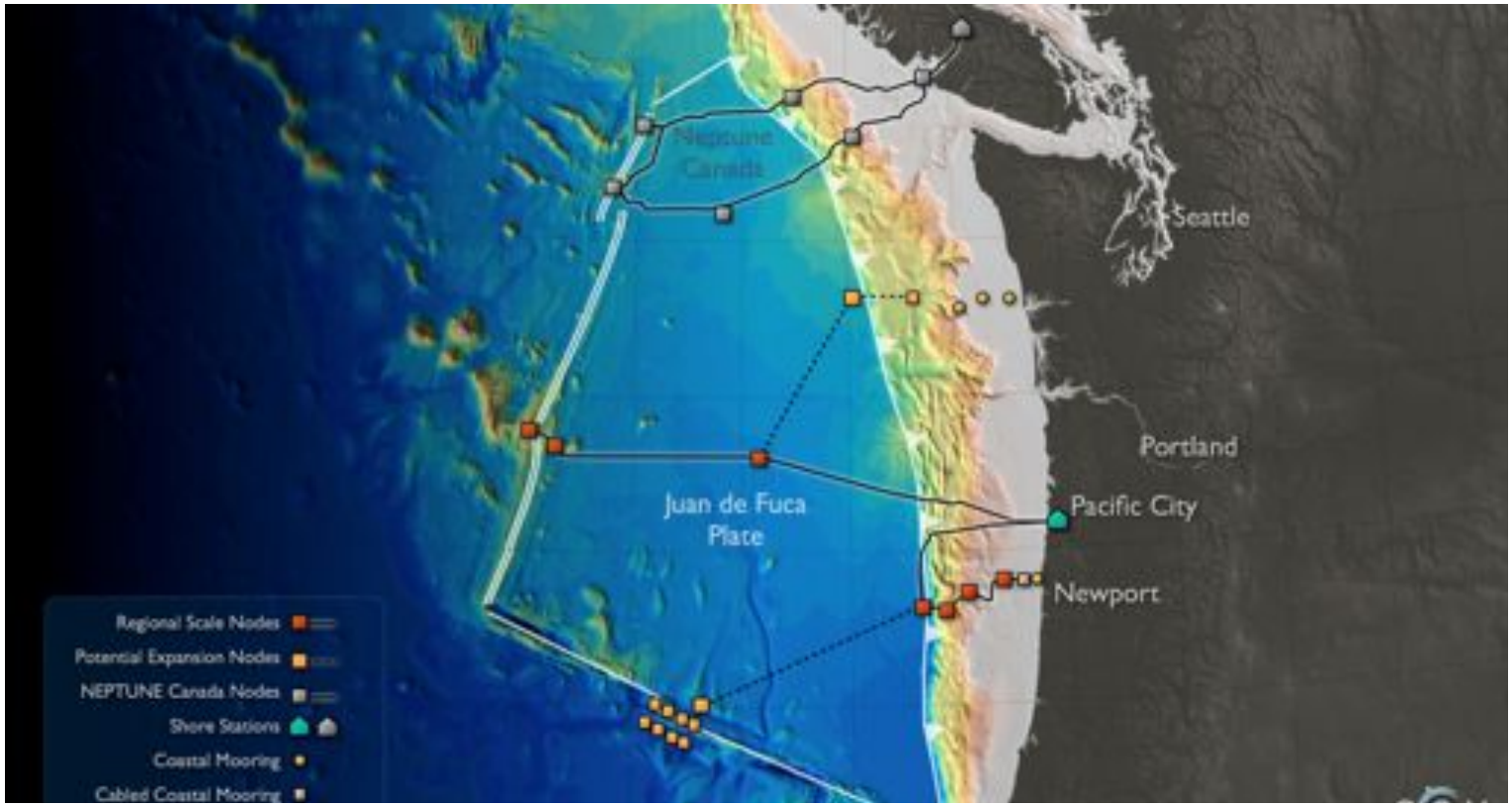
Ongoing Projects (science-focused)

- NSF Ocean Observing Initiative
  - Regional Scale Nodes – $140M to UW
- Canada NEPTUNE project
- Monterey Canyon
- Numerous coastal/local sites

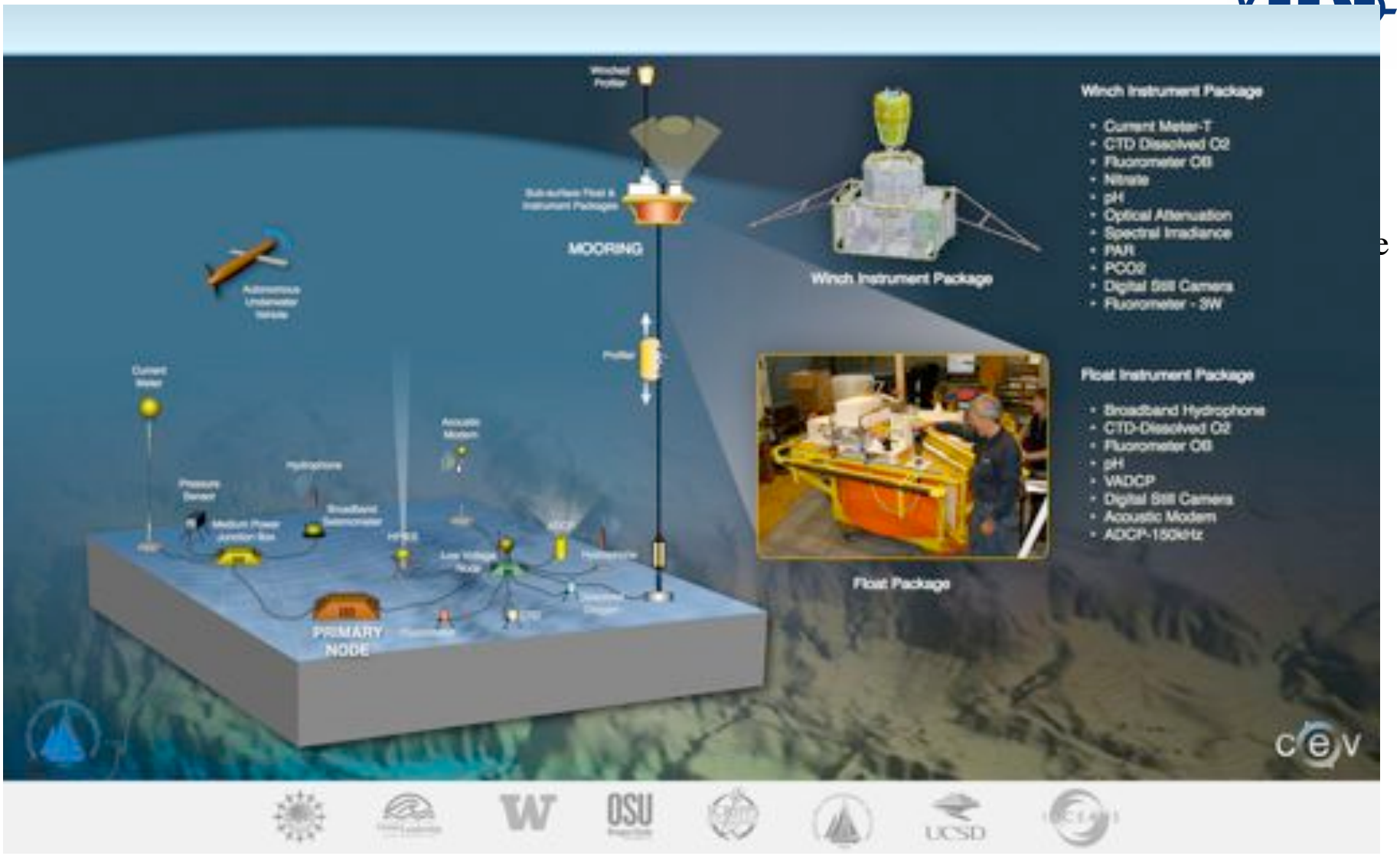
Regional Scale Node

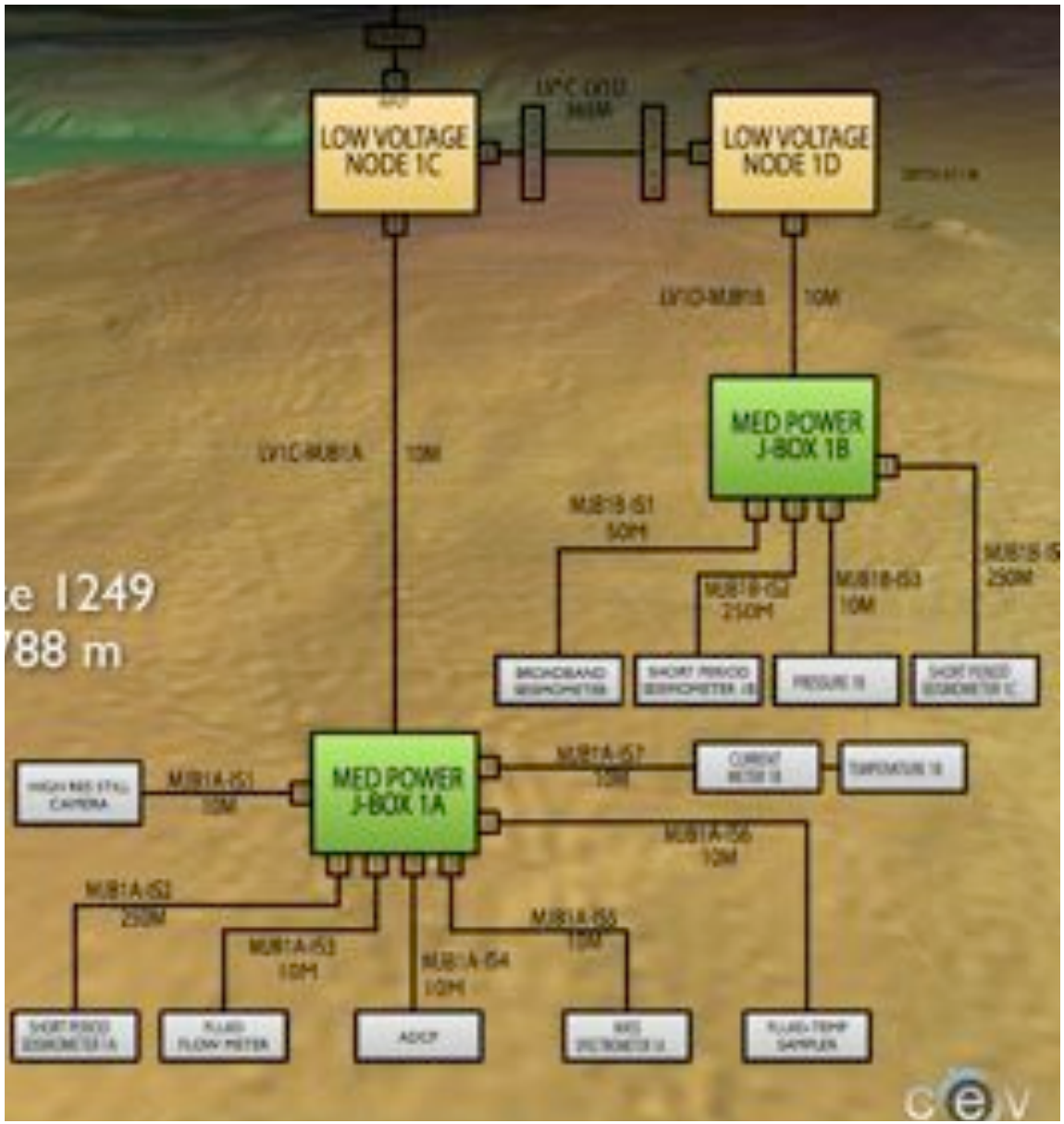




Regional Scale Node

- Shore Station in Pacific City, OR
- xxx km of Backbone Cable
- 6 Primary Nodes
  - 10kV, 9kW, 10 GbE
- 1 Upgradeable Pass-Thru Node
- 2 Coastal Endurance Arrays
- 3 Water Column Profiling Moorings
- xx 10kV, 10GbE Expansion Ports
- xx Secondary Nodes & J-Boxes
- ~xxx ROV–mate Instrument Ports

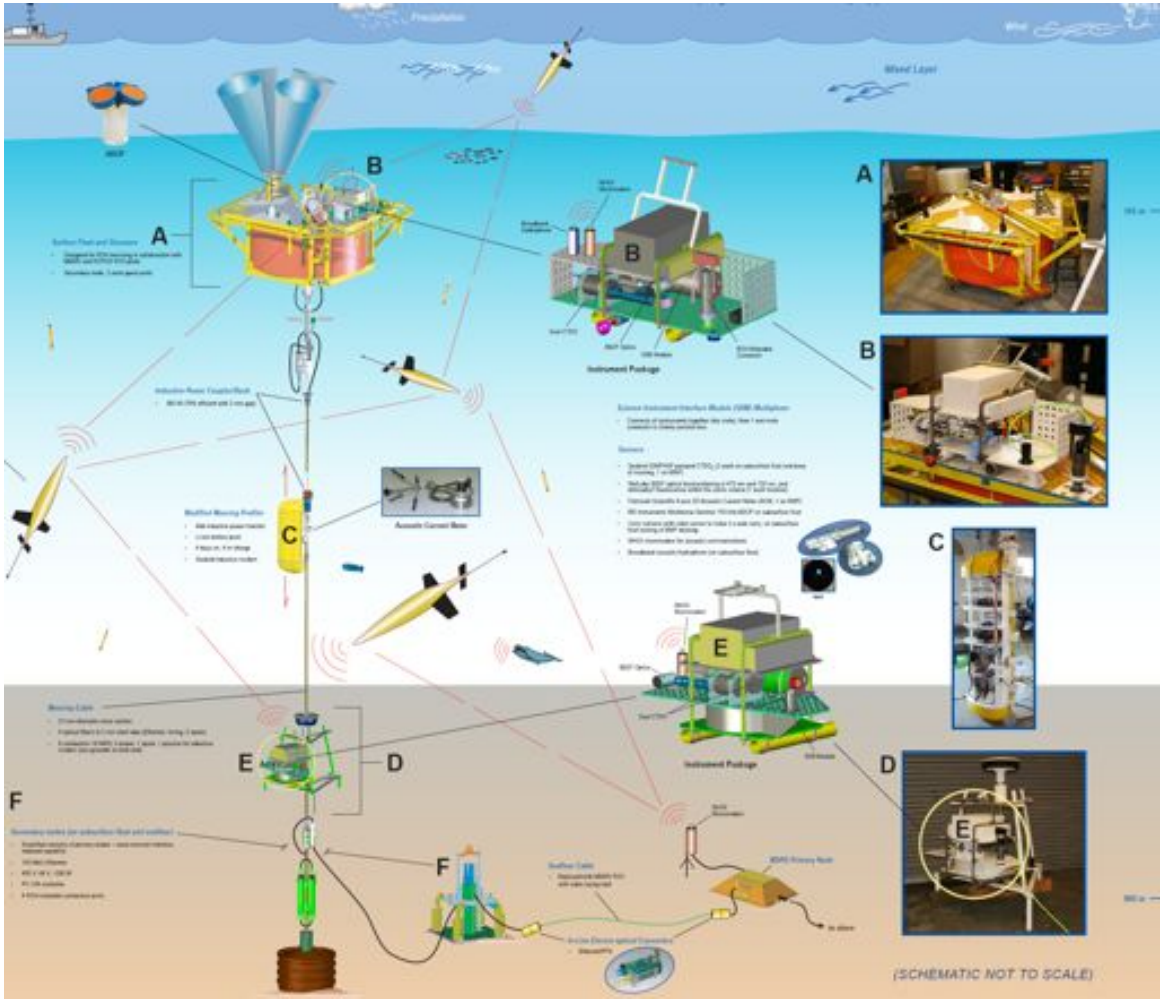

MOORING
PRIMARY NODE
Winch Instrument Package
Winch Instrument Package
• Current Meter-T
• CTD Dissolved O2
• Fluorometer CB
• Nitrate
• pH
• Optical Attenuation
• Spectral Irradiance
• PAR
• PCO2
• Digital Still Camera
• Fluorometer - 3W
Float Package
Float Instrument Package
• Broadband Hydrophone
• CTD-Dissolved O2
• Fluorometer CB
• pH
• VADCP
• Digital Still Camera
• Acoustic Modem
• ADCP-150kHz
cev
UCSD



System integration:

- many components with various power and communication specifications
- trend toward "smart" systems
- Coms: multiplex to ethernet, then send over fiber optic
- Power: step-down supply, galvanic isolation, ground fault monitoring
- Interconnections: ROV

Example: ALOHA/MARS mooring testing at Seahurst in 2008



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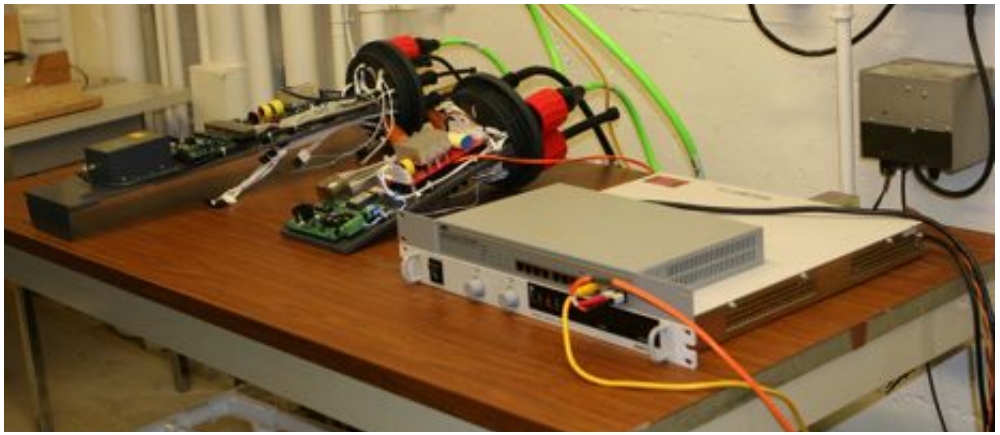

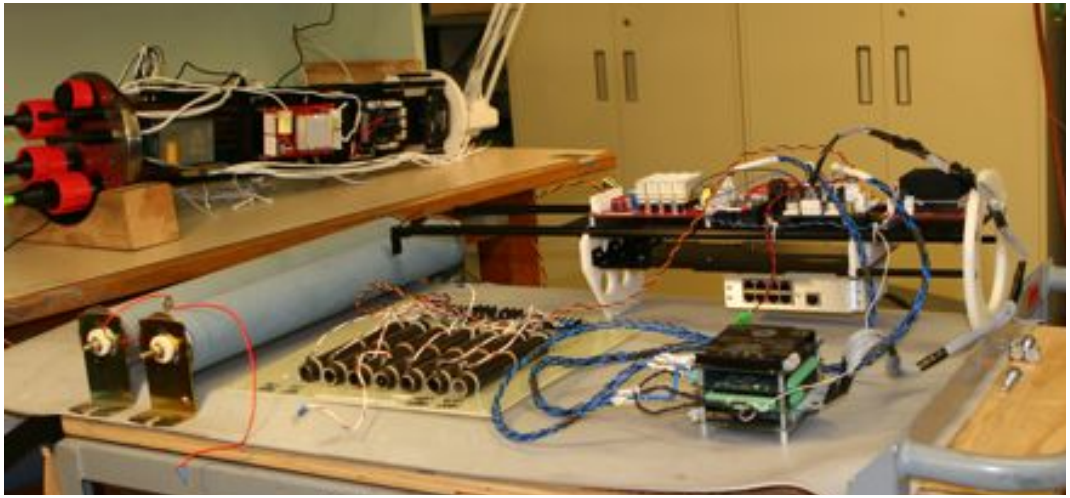

- PC-104 controller
- 400-48V dc (Vicor)
- MOSFET and deadface switches, software controlled
- Ground fault detection
- 8-port 100baseT Ethernet switch
- Two guest ports
- Can feed 400 V on any port
- 4 channel SIIM boards – 12V, RS-232

Example: ALOHA/MARS mooring testing at Seahurst in 2008

Conclusion: real-time ocean observing is here

- Expensive
- Data incomplete, not omniscient
- Data still require analysis/interpretation
- Data does not equal understanding
- Must be guided by rational hypotheses and rigorous probabilities

Application to marine energy

- Needs to be cost-effective
- Needs to be robust– energy sites are harshest
- Need avoid interference with devices
- Needs to be scalable/upgradable

Application to marine energy - conceptual

- Fiber optic to ethernet: real-time observations
- Robust nodal architecture, "daisy chain" interconnections
- Simple retrievals for service/upgrade (independent of device testing) – surface connectors, not ROV
- Option to aim/orient sensors