Observatory
ROV and AUV Requirements

UNOLS Observatory Working Group
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Observatory Phases (coastal, regional, moored)

- Planning
- Installation
- Preliminary Operations
- Operations

Each phase would have two different types of activities:

- Infrastructure
- Science

Some premises:

•Intervention tasks related to the infrastructure should be predictable and well-defined, therefore should be appropriate for commercial contracts

•Observatories will generate much work similar to our conventional vehicle science ops, and are probably best suited to a facility such as we operate presently

Observatory Installation/Maintenance System (vessel, ROV deck gear)

- Focused capability, rather than general purpose
- For Regional observatory: higher sea-state capability
    - Dynamic Positioning
    - ROV launch/recovery

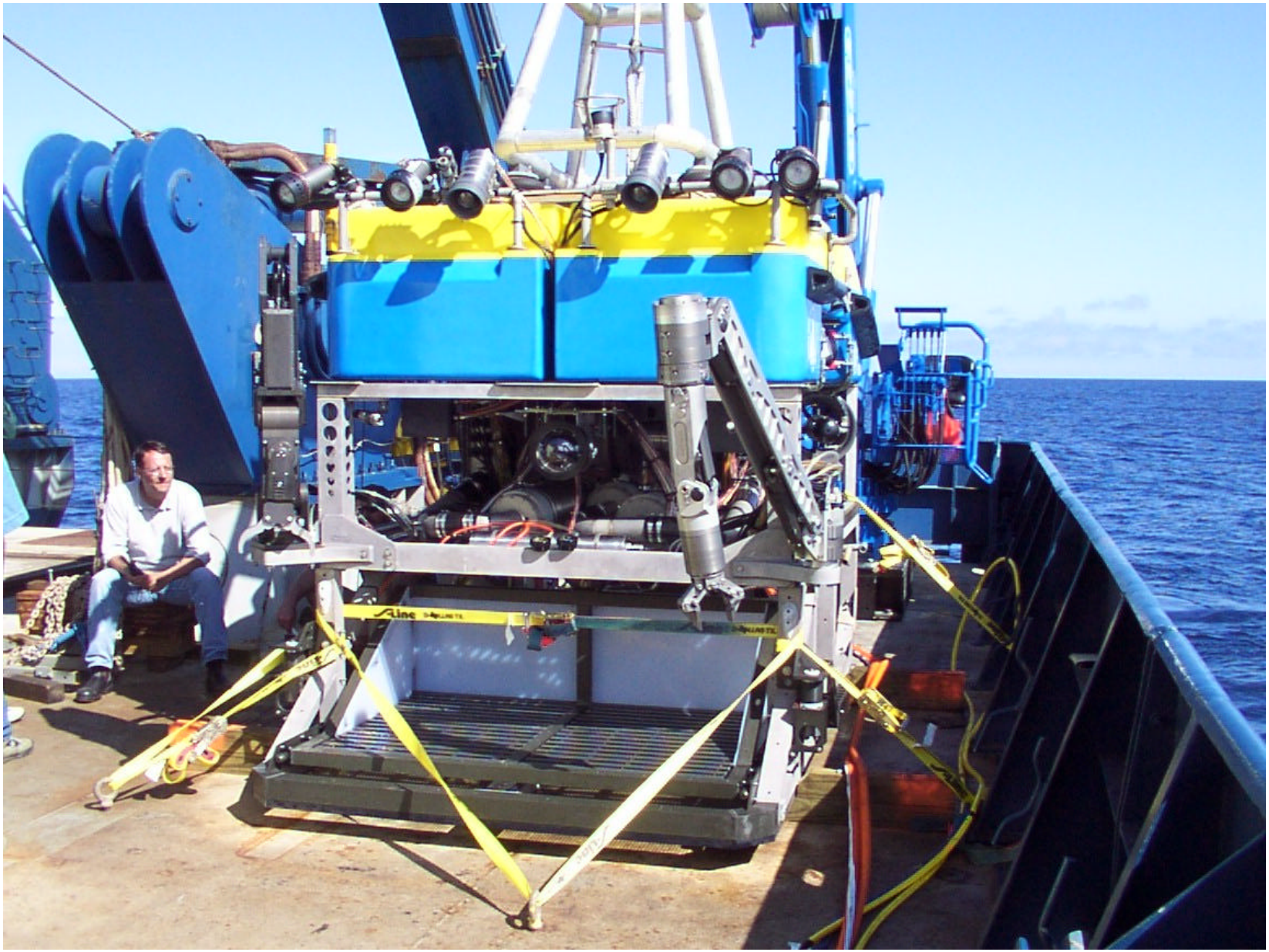
ROV: sufficient capabilities

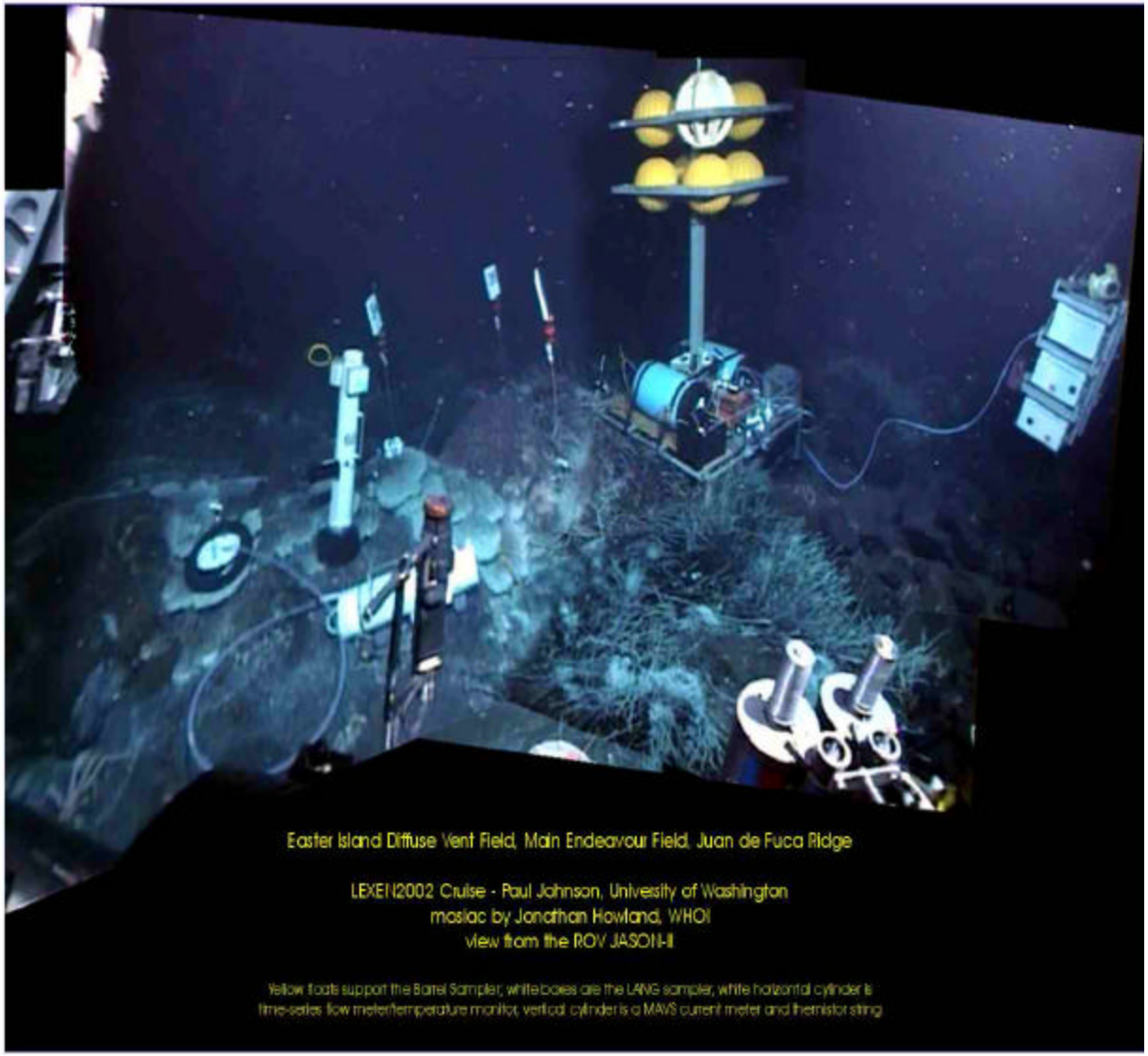
Depth (3000 m offshore oil rov?)
Power (shorter, larger cable?)
Manipulation: friendly subsea infrastructure
Reduced crew
Limited mission flexibility
Leave deck space free
Don’t need: mapping, data logging, compatibility with tow vehicles (argo, 120, etc), large control vans, large science parties

General Purpose Science ROV

- Jason2
- ISIS


JASON
WOODS HOLE
NOAA
ONR

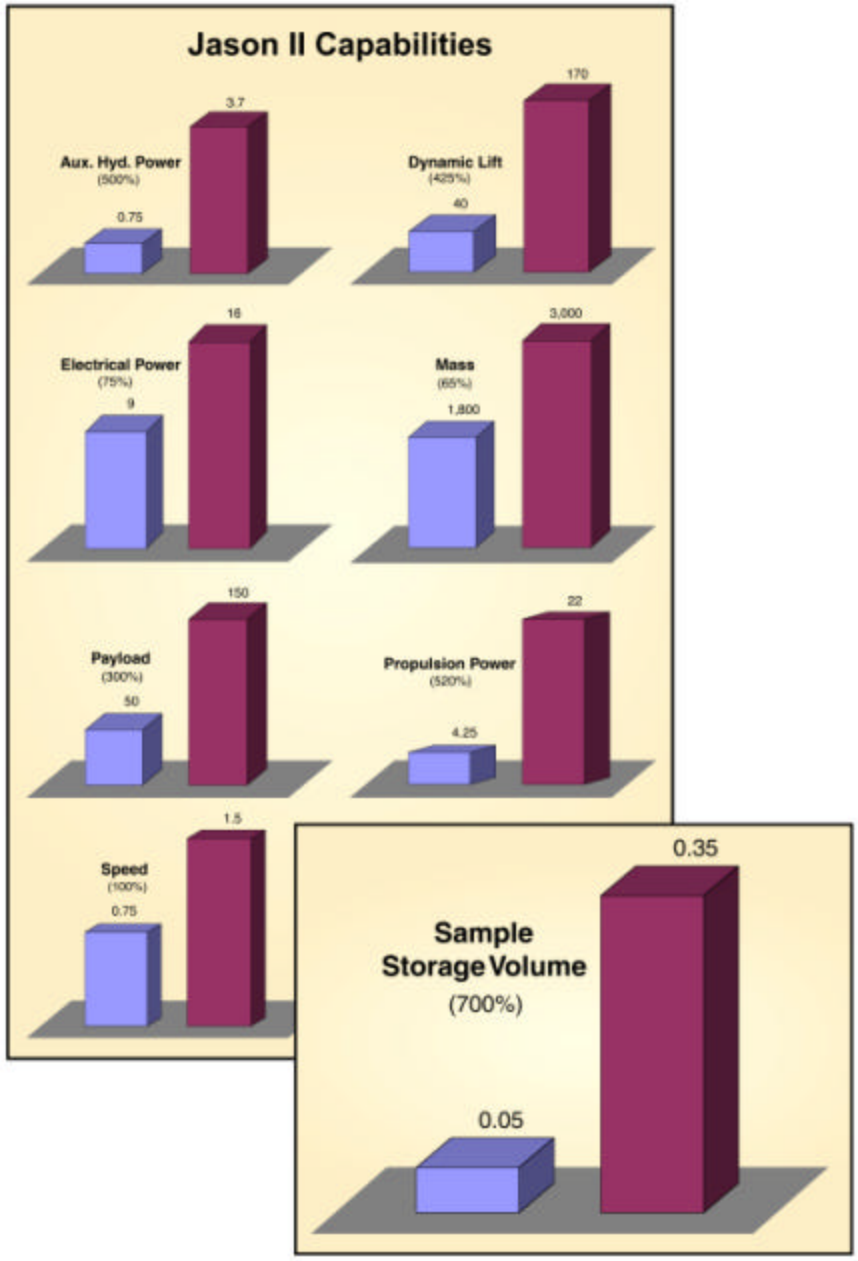




Easter Island Diffuse Vent Field, Main Endeavour Field, Juan de Fuca Ridge

LEXEN2002 Cruise - Paul Johnson, University of Washington
mosiac by Jonathan Howland, WHOI
view from the ROV JASON II

Yellow floats support the Barrel Sampler, white boxes are the LANS sampler, white horizontal cylinder is time-series flow meter/temperature monitor, vertical cylinder is a MAVS current meter and thermistor string

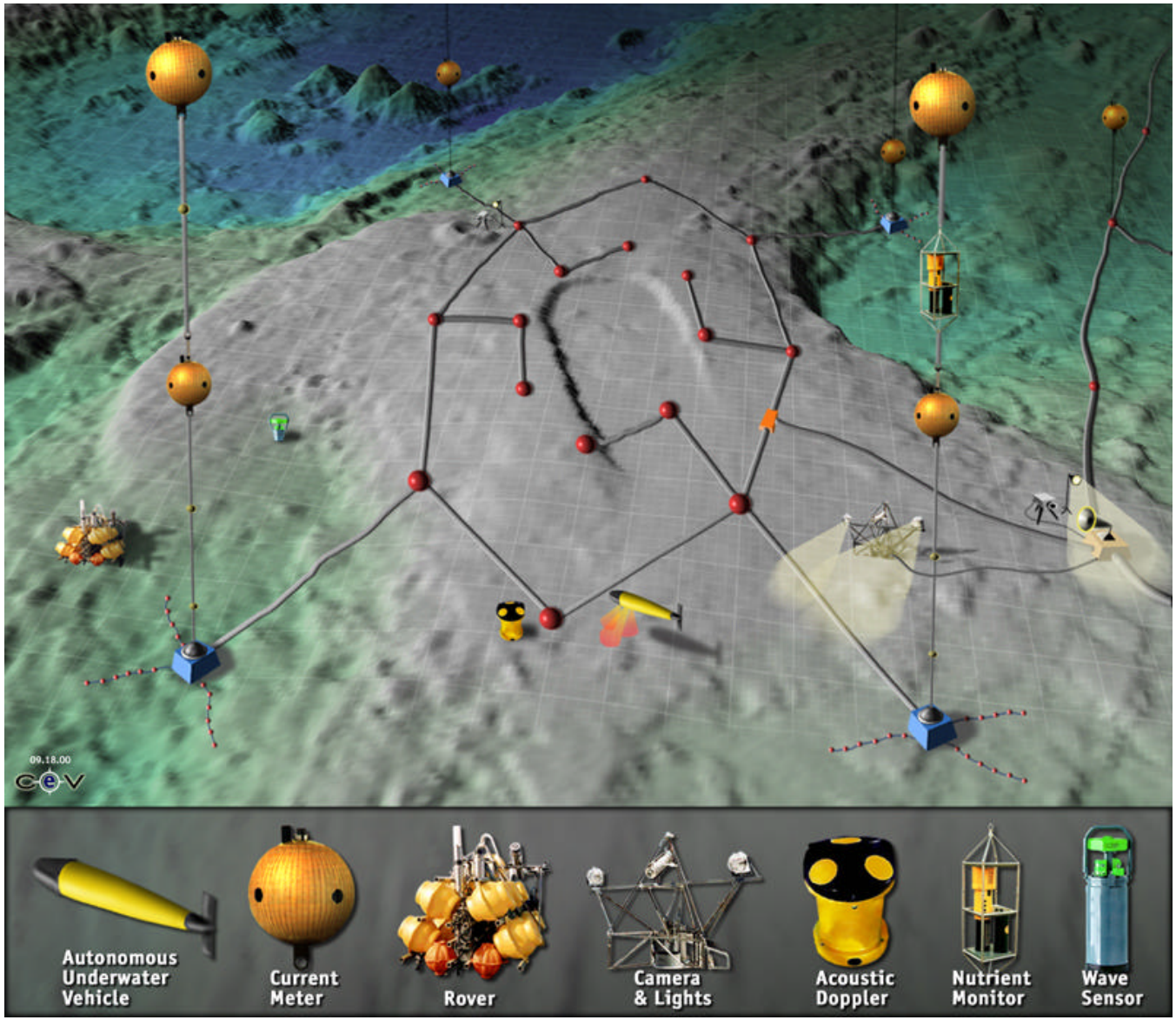

Jason II Capabilities
Aux. Hyd. Power
(500%)
0.75
3.7
Dynamic Lift
(425%)
40
170
Electrical Power
(75%)
9
16
Mass
(65%)
1,800
3,000
Payload
(300%)
50
150
Propulsion Power
(520%)
4.25
22
Speed
(100%)
0.75
1.5
Sample
Storage Volume
(700%)
0.05
0.35

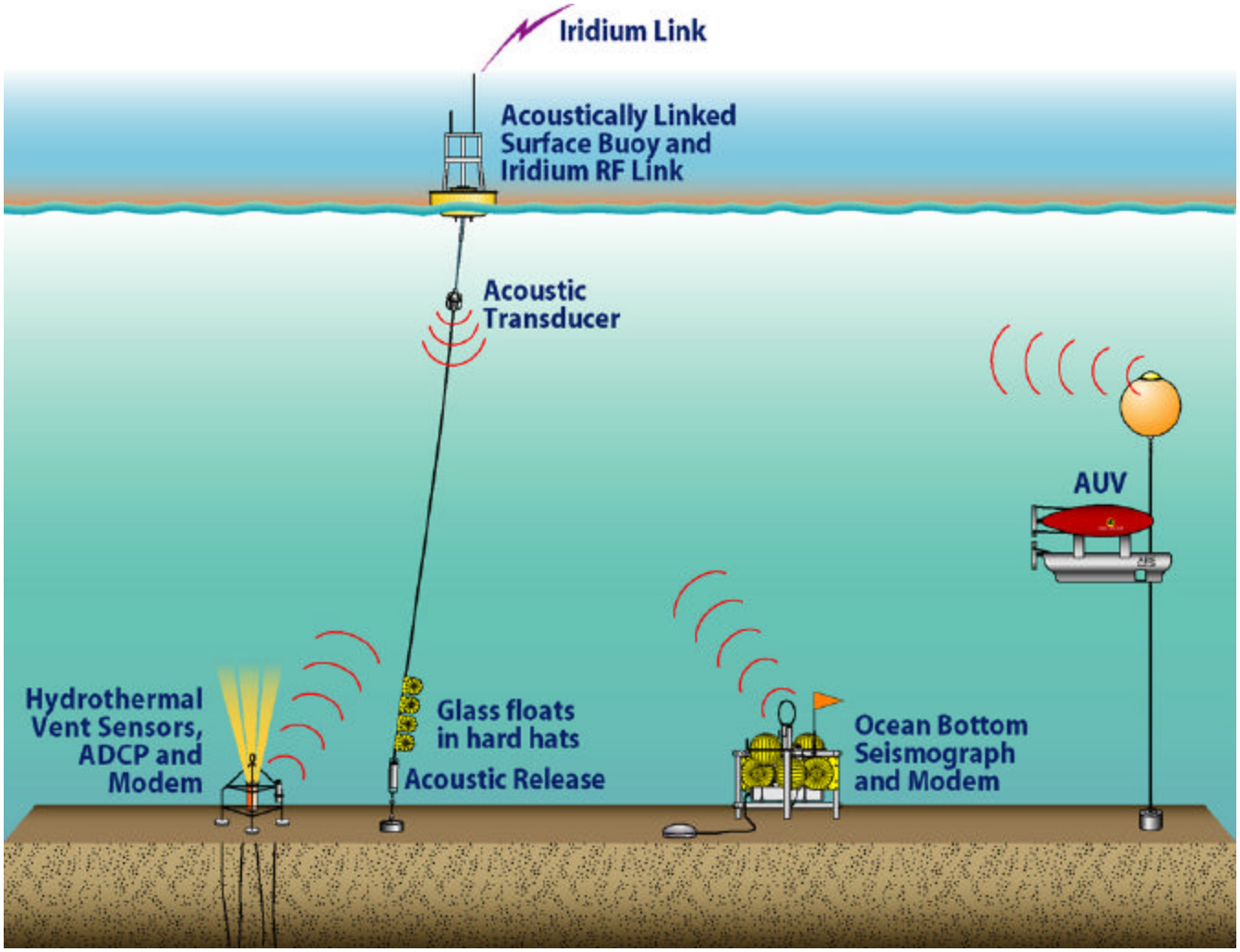
Conventional science ROV capability

•Is our present facility capability sufficient for both observatory and non-observatory needs?

•If not, how should facility be expanded?

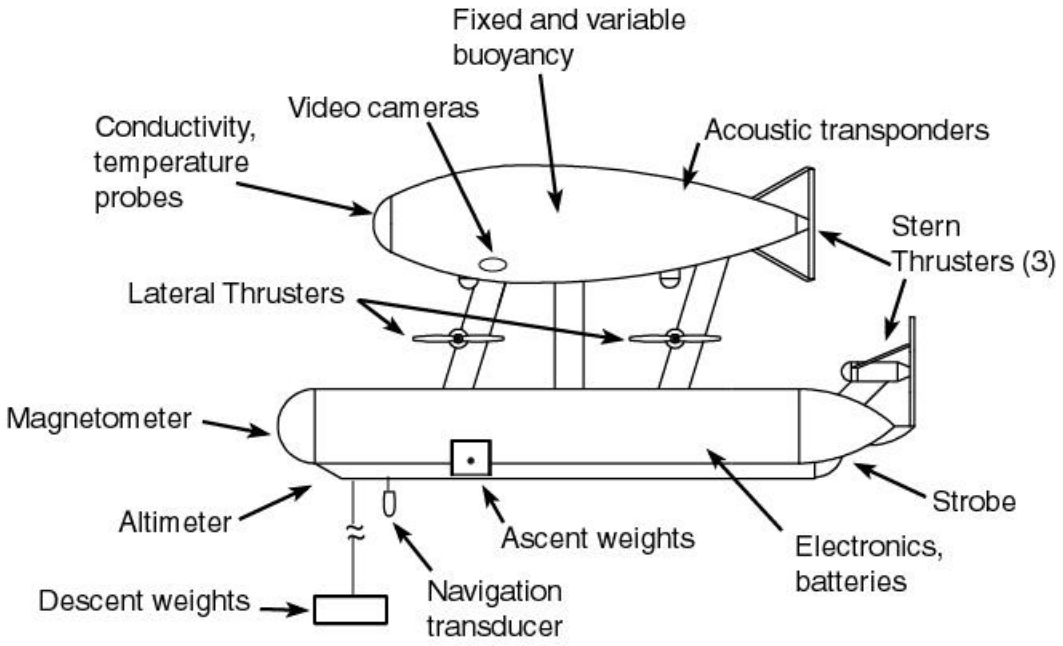
AUVs and Observatories



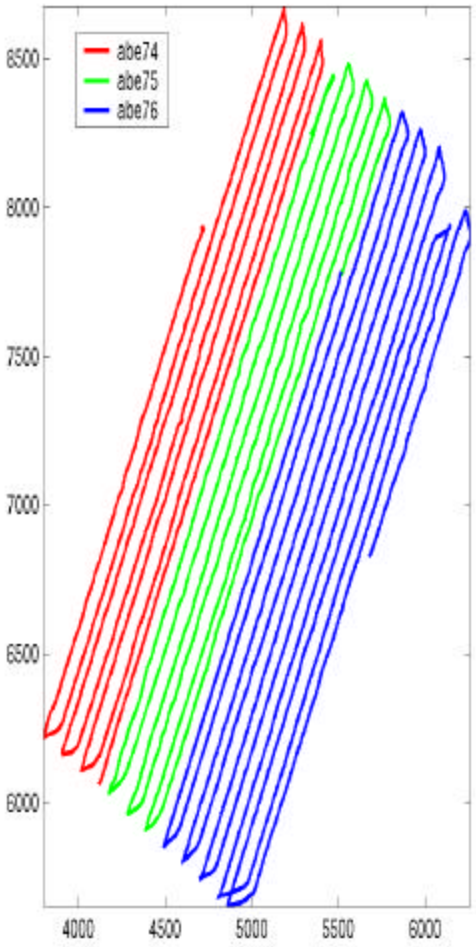


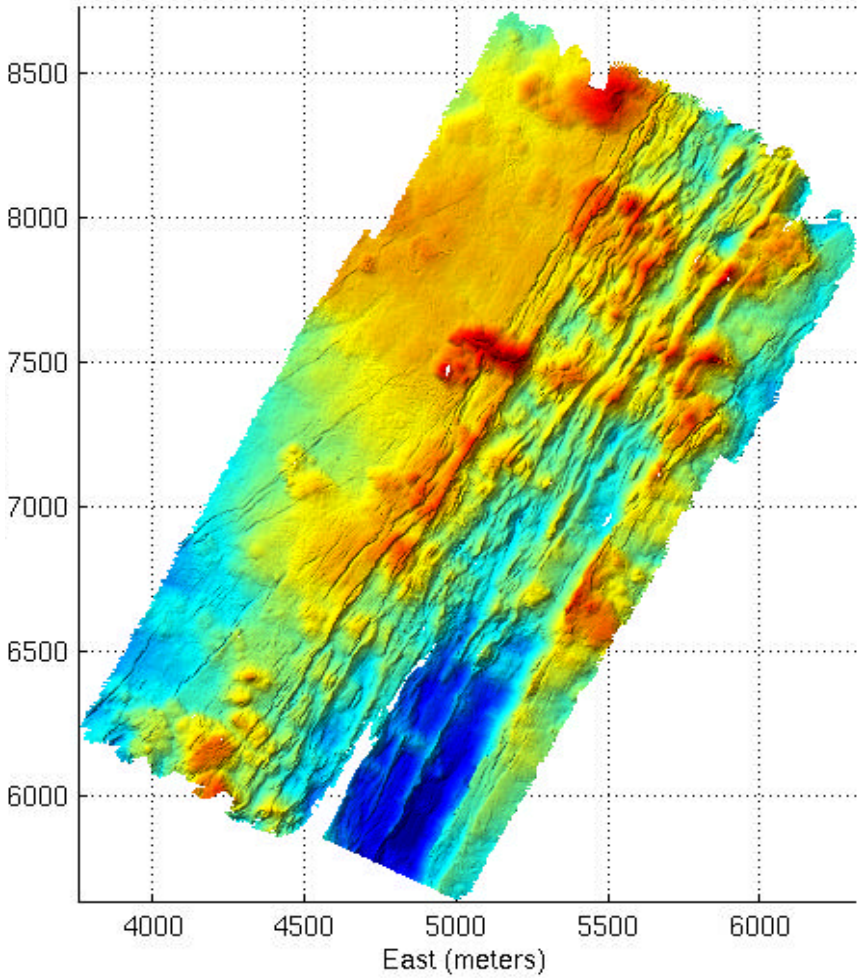
Moored Observatory hosting AUVs

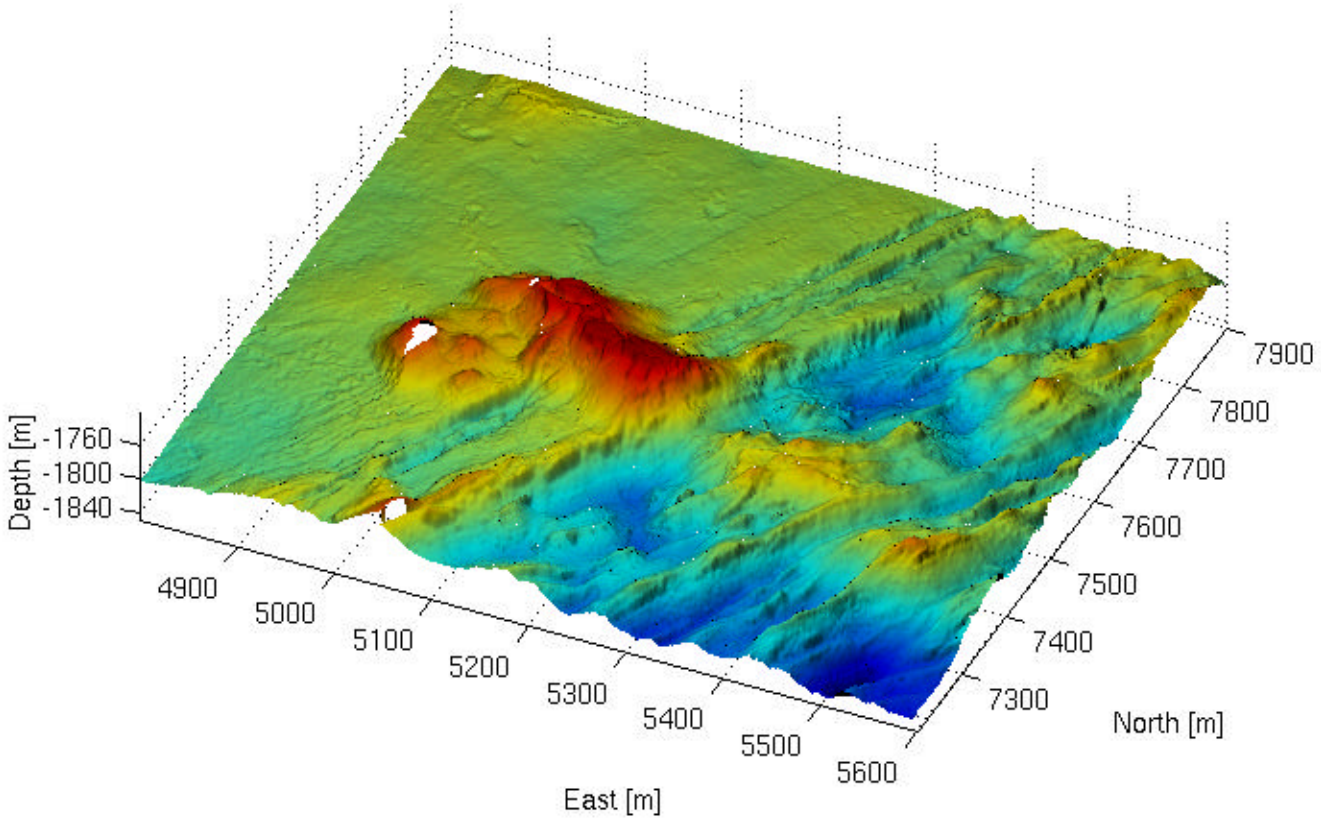
The Autonomous Benthic Explorer (ABE)

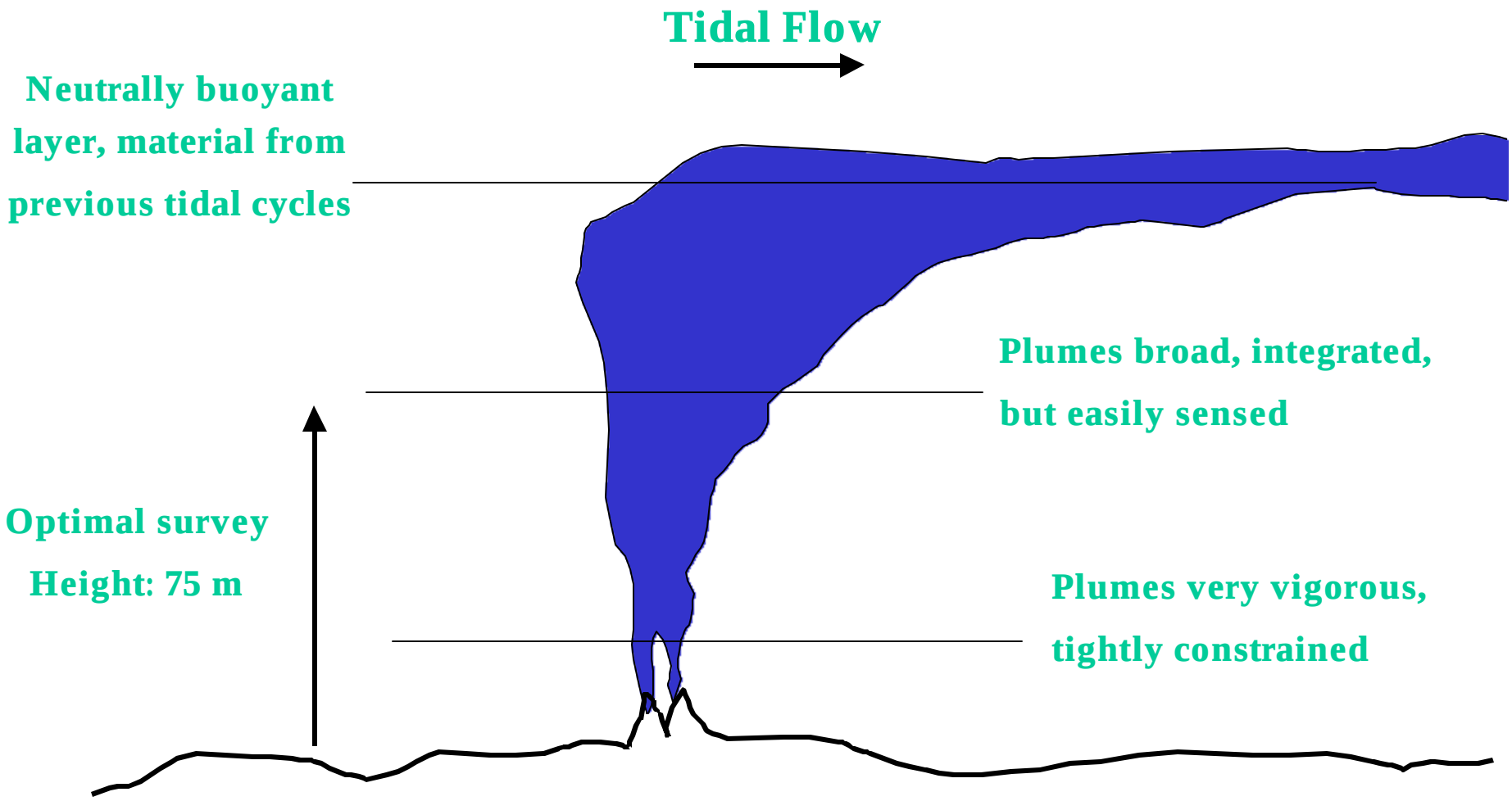


Multibeam sonar on ABE
Explorer Ridge (Embley et al)





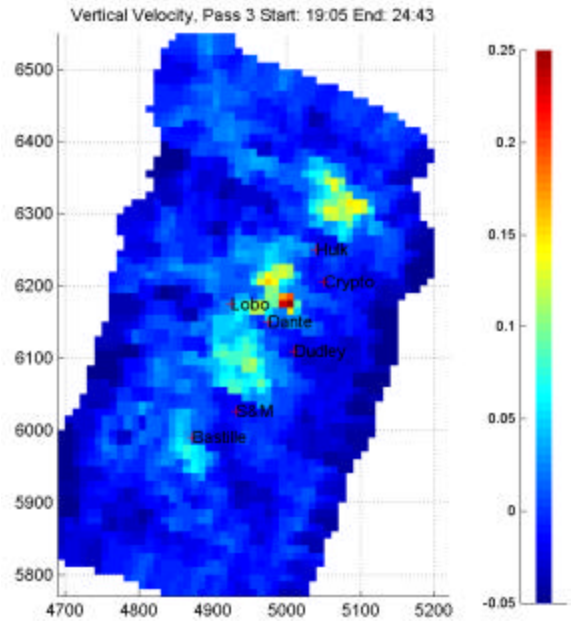

Depth [m]
-1760
-1800
-1840
4900
5000
5100
5200
5300
5400
5500
5600
East [m]
7900
7800
7700
7600
7500
7400
7300
North [m]

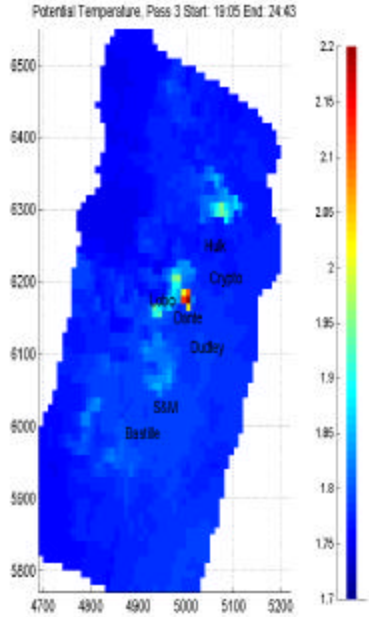


Survey strategy: “Mow the Flow” at the optimal height

(McDuff, Viers, Stahr)

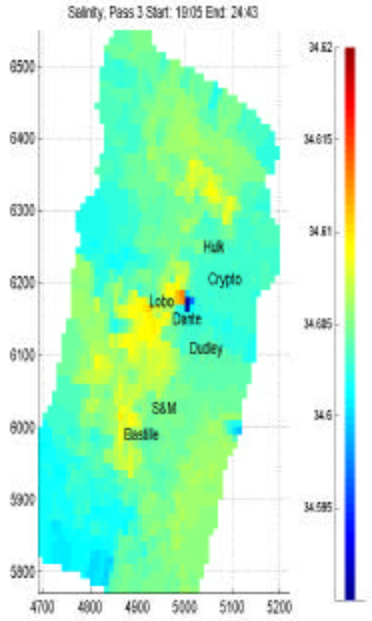
Vertical velocity

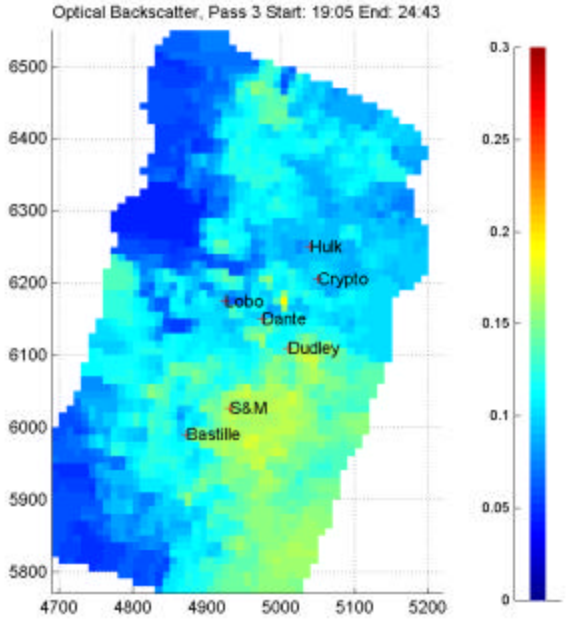




Temperature

Salinity





Optical backscatter

AUV development: transition from expeditionary operations to observatory-based operations

- Define roles of AUVs for each phase of observatory development
- Technology development
  - Vehicles
  - Docking systems
  - Sensor packages
  - Navigation/comms infrastructure
- Demonstrations
- Operations