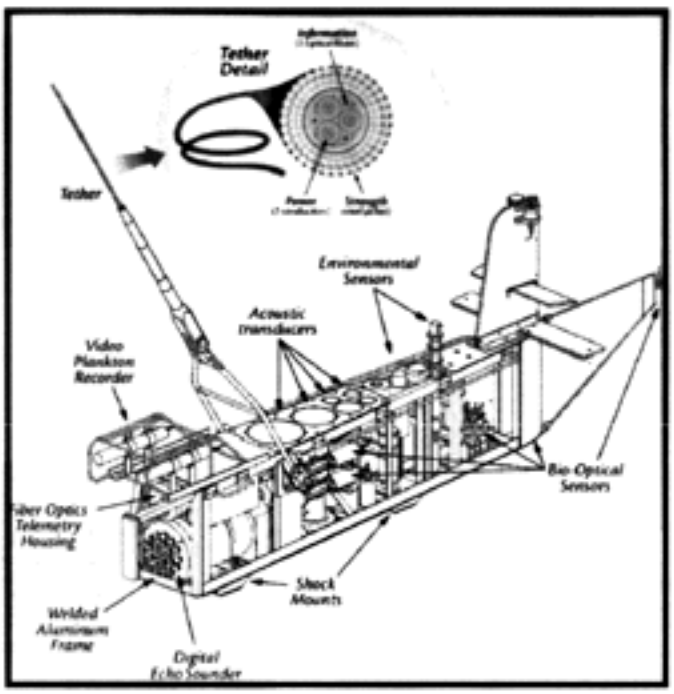
2001 RVOC Meeting

Winch and Wire Discussion

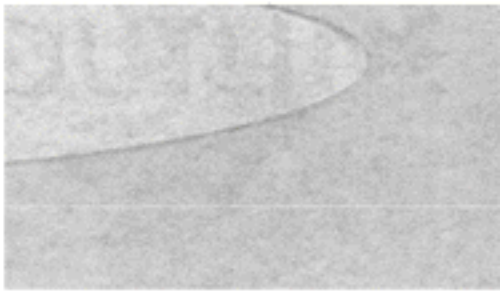
Future Science Needs

Peter H. Wiebe
WHOI



23 October 2001
URI, Narragansett

OUTLINE



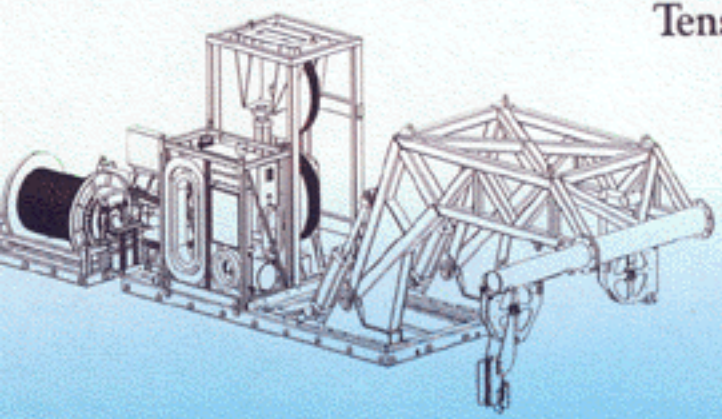
1) Some background.

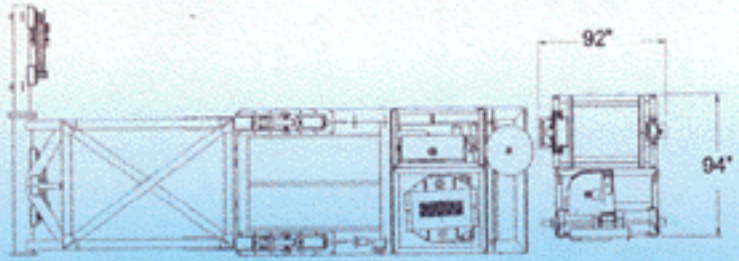
2) Thoughts about the current state of affairs

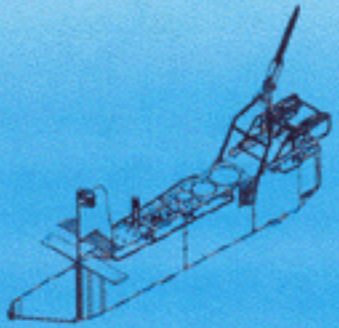
3) Future Needs

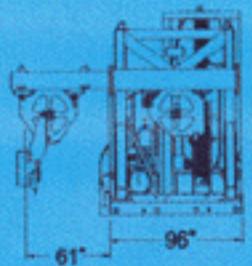
4) Issue of wire size and strength

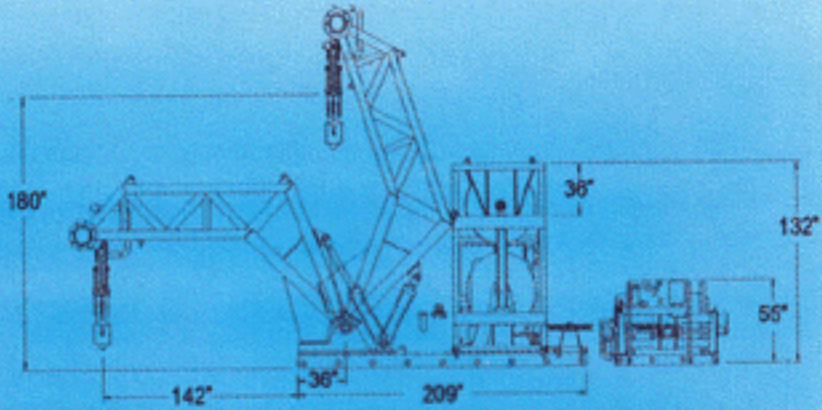
The Dynacon BIOMAPER II Winch, Slack Tensioner, and Deck Handling System







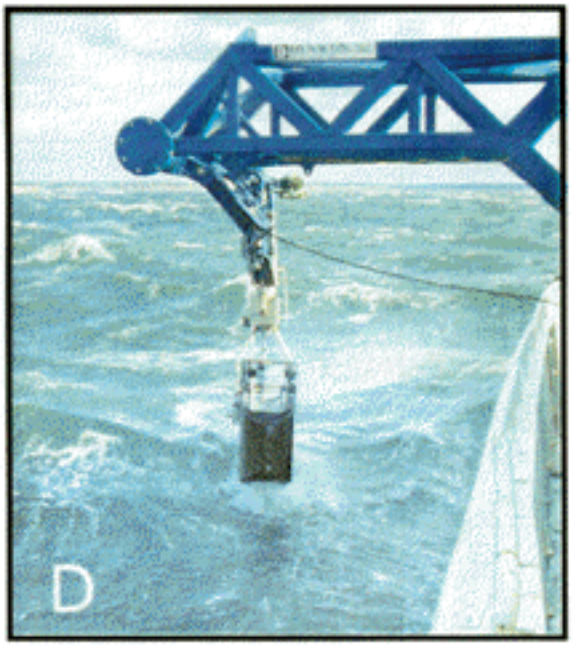


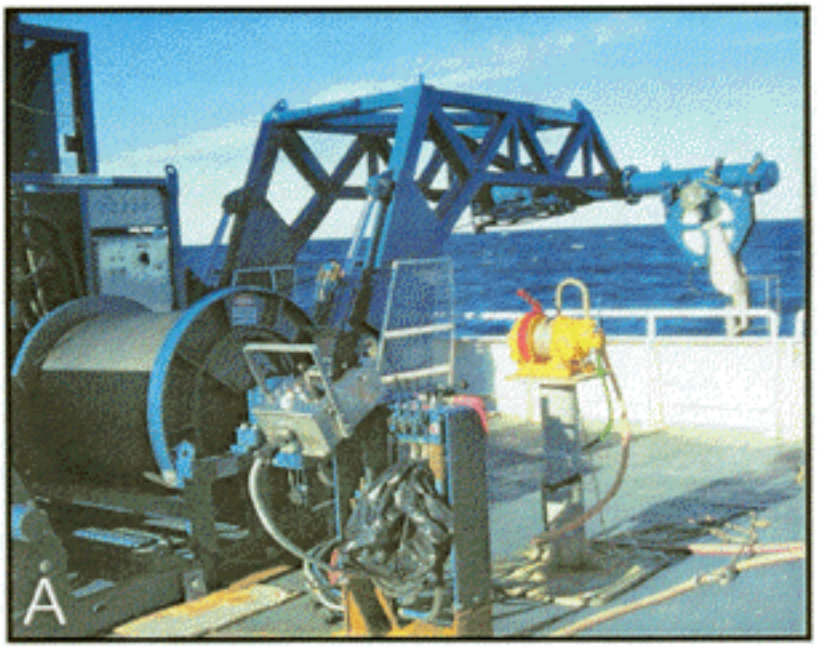


Wiebe et al., ICES CM 1999/M:07


C


B


D


A

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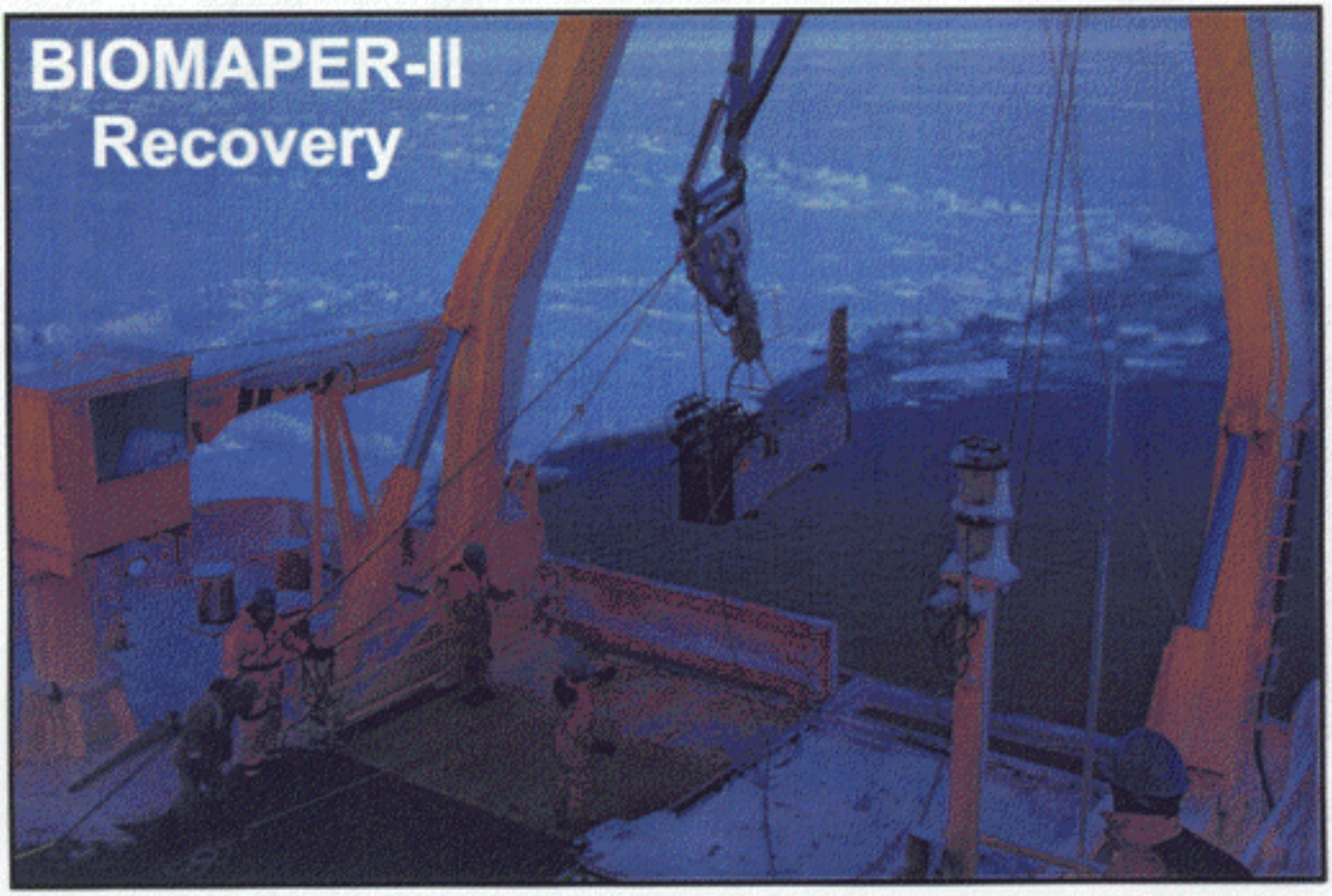

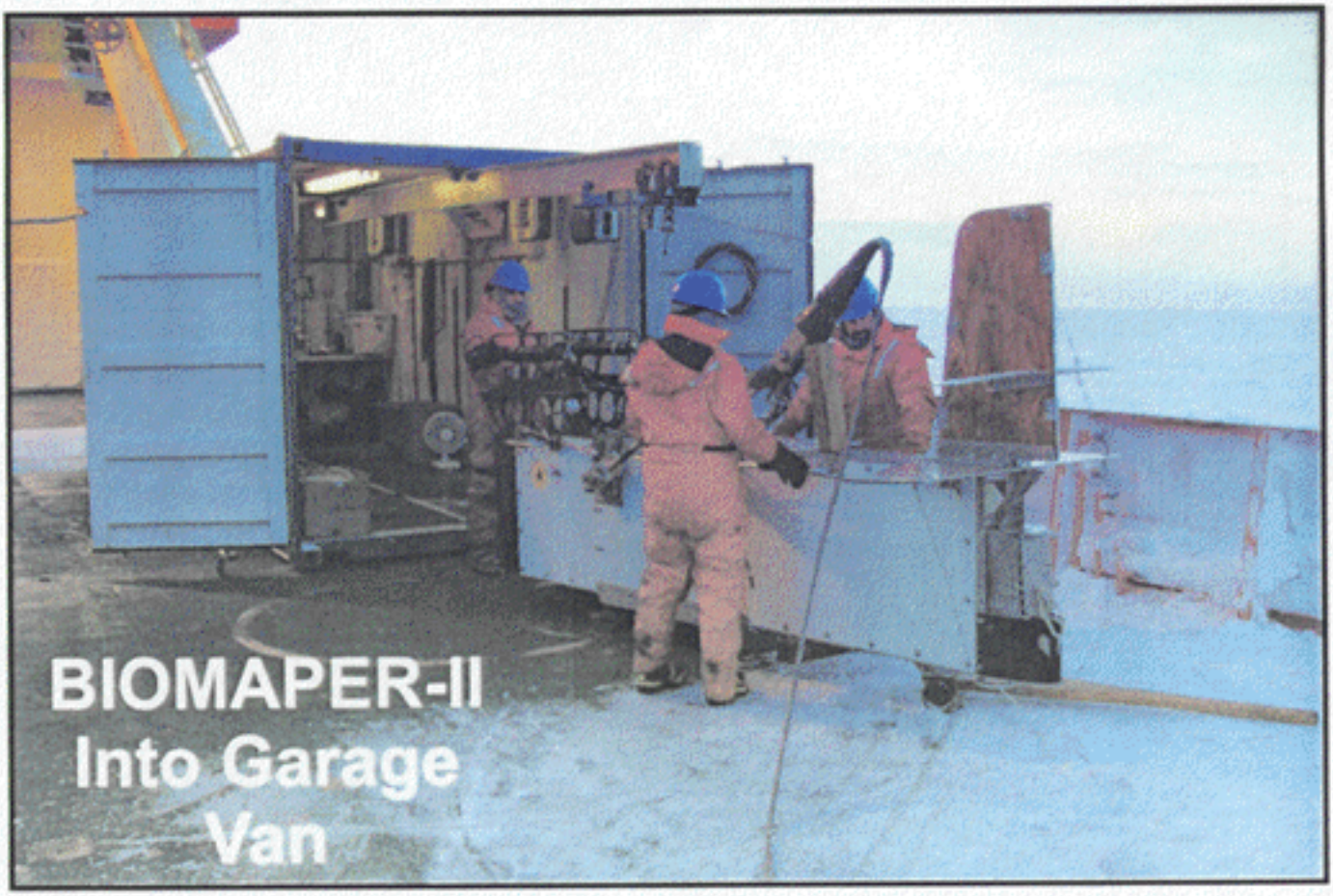

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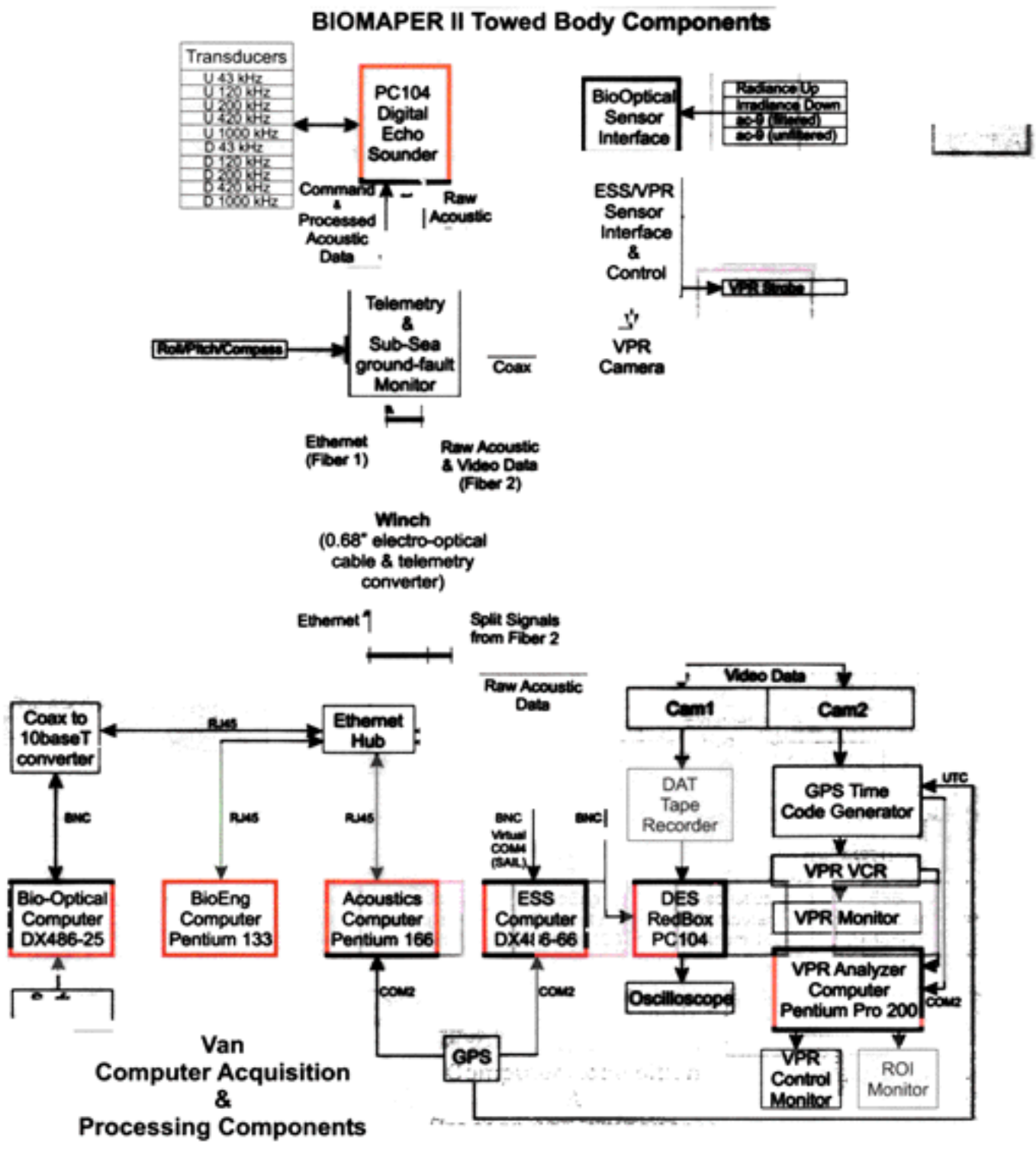
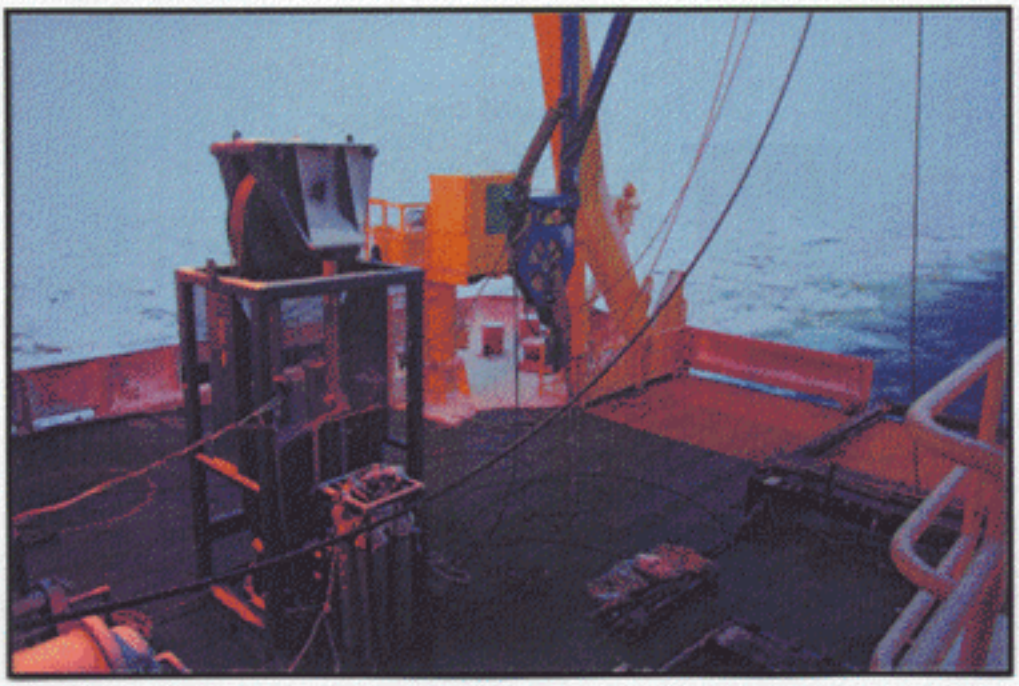
BIOMAPER-II Control Van

BIOMAPER II Schematic Diagram





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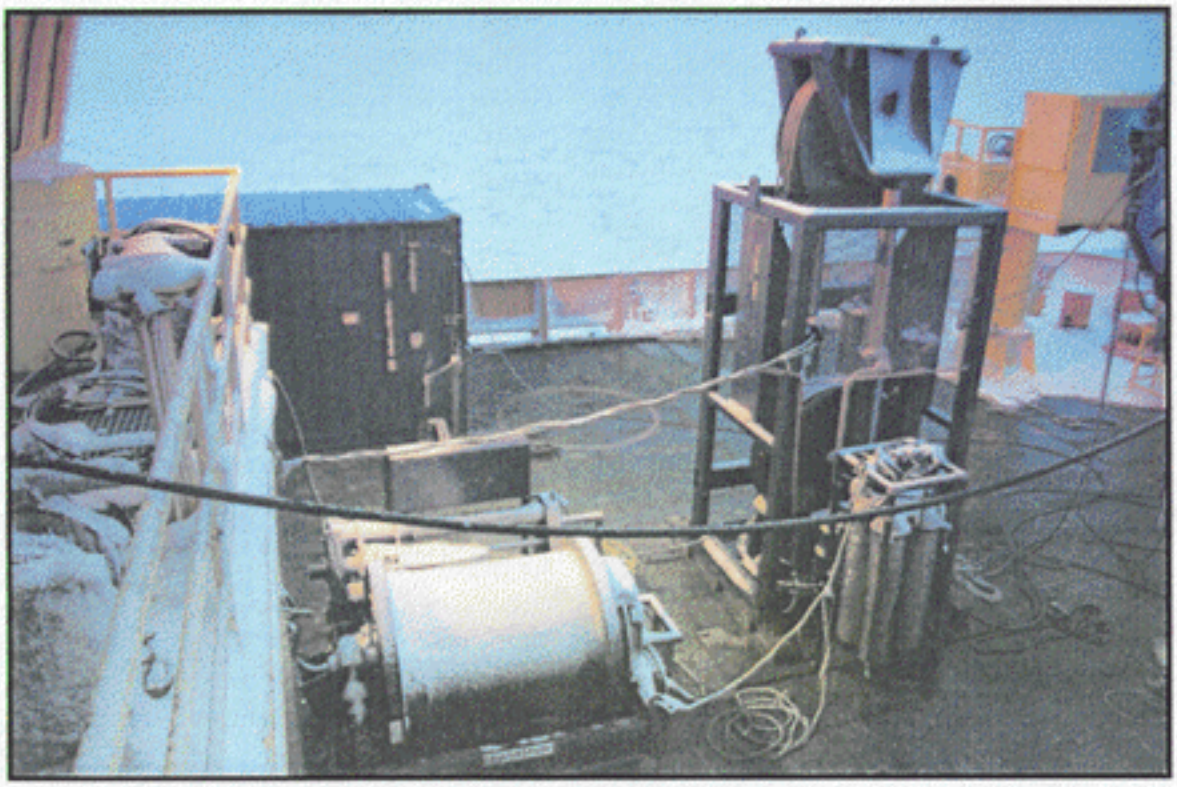
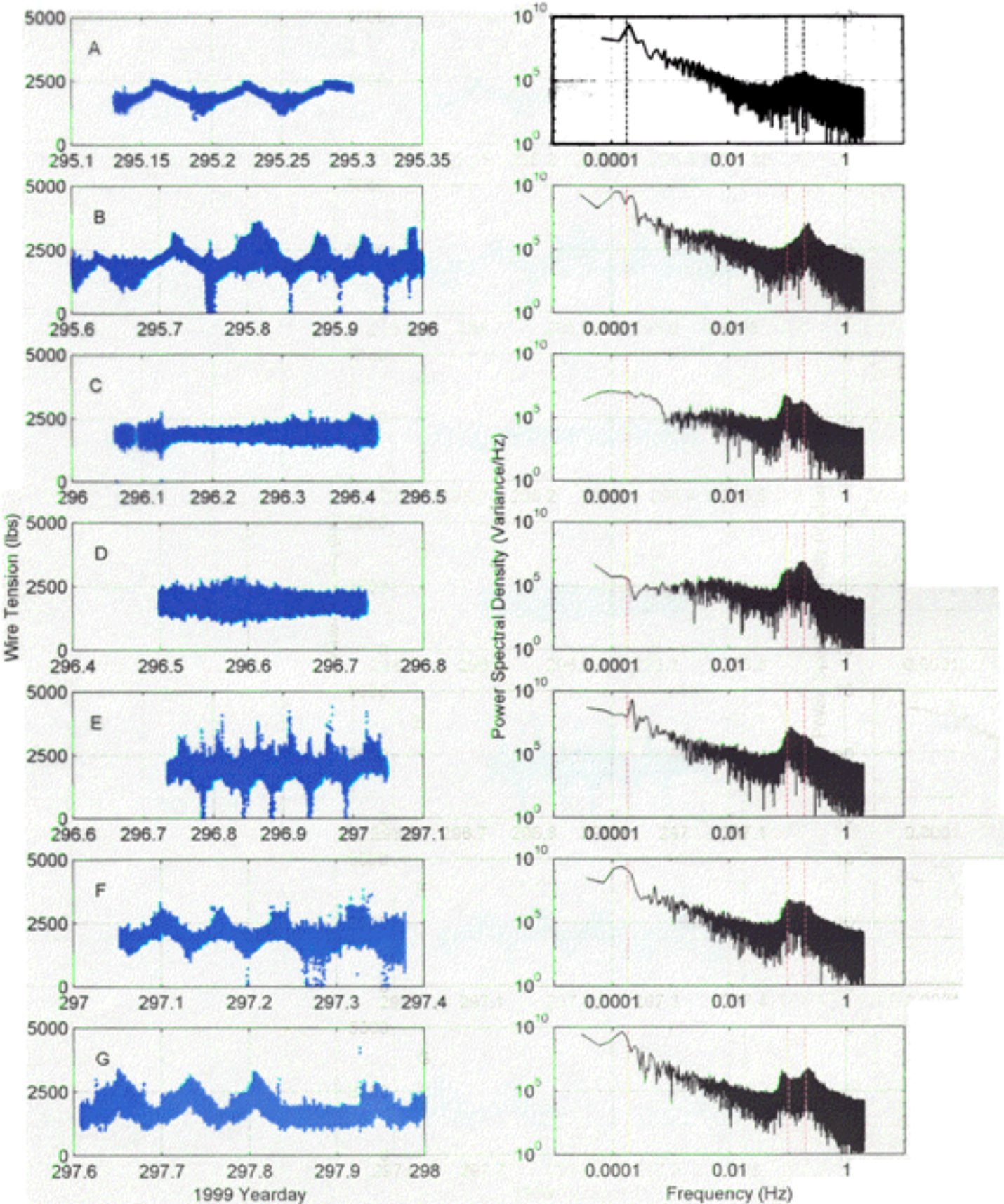
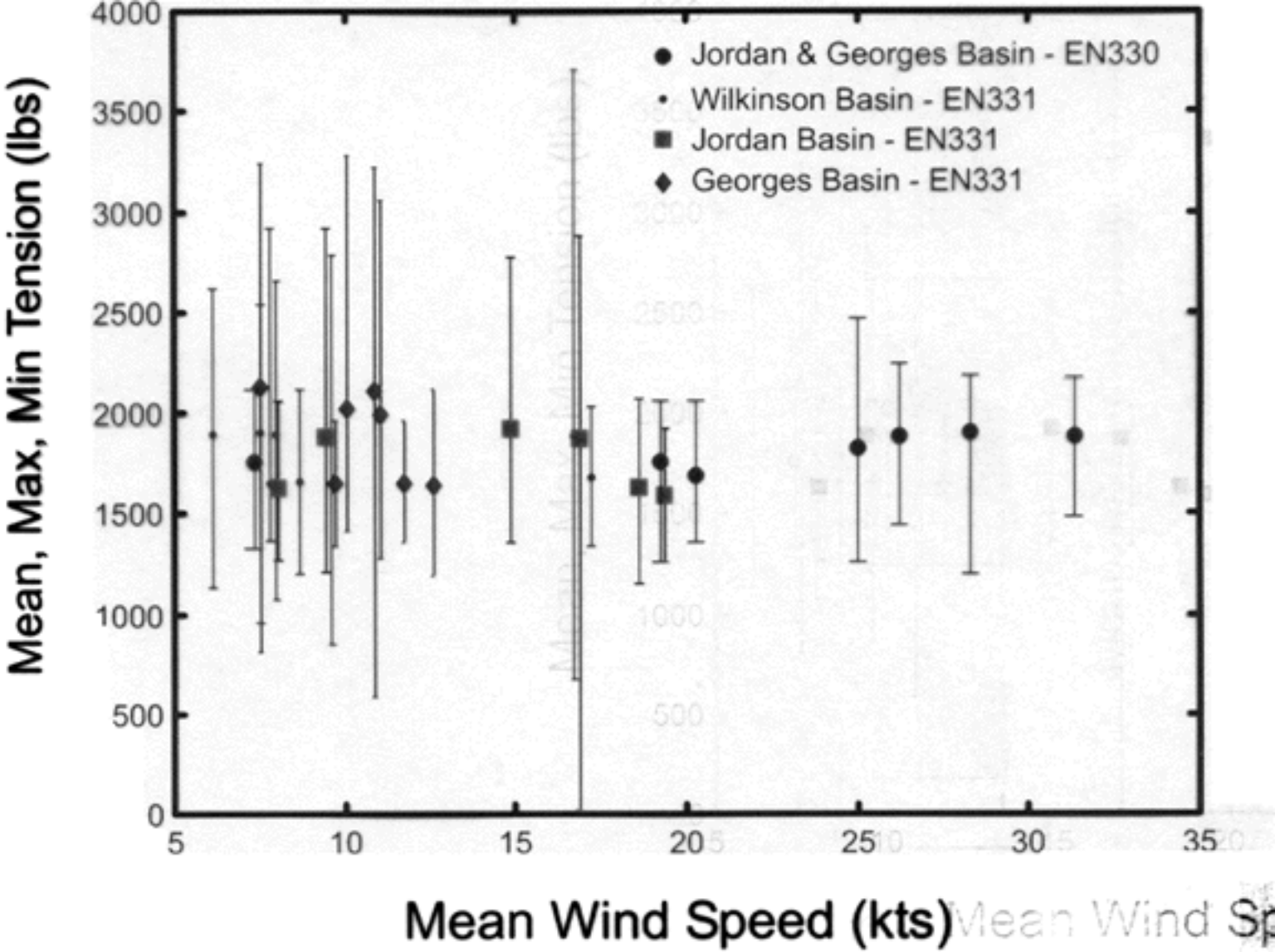
Antarctic

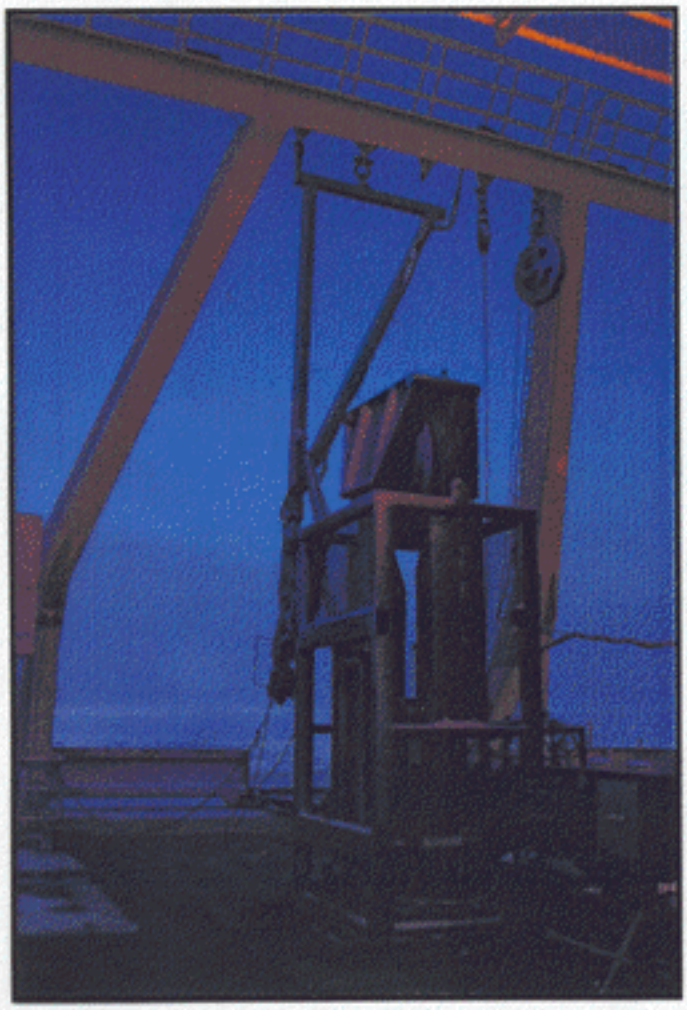
BIOMAPER-II
Stiff-Arm and
Slack Tensioner

BIOMAPER-II
Slack Tensioner,
winch, and van




A
B
C
D
E
F
G
5000
2500
0
295.1 295.15 295.2 295.25 295.3 295.35
295.6 295.7 295.8 295.9 296
296 296.1 296.2 296.3 296.4 296.5
296.4 296.5 296.6 296.7 296.8
296.6 296.7 296.8 296.9 297 297.1
297 297.1 297.2 297.3 297.4
297.6 297.7 297.8 297.9 298
Wire Tension (lbs)
1999 Yearday
10^{10}
10^{5}
10^{0}
0.0001
0.01
1
Power Spectral Density (Variance/Hz)
Frequency (Hz)


Jordan & Georges Basin - EN330
Wilkinson Basin - EN331
Jordan Basin - EN331
Georges Basin - EN331
Mean, Max, Min Tension (lbs)
Mean Wind Speed (kts)
0
500
1000
1500
2000
2500
3000
3500
4000
5
10
15
20
25
30
35



BIOMAPER-II
Stiff-Arm and
Slack Tensioner

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BIOMAPER-II
Slack Tensioner and
winch

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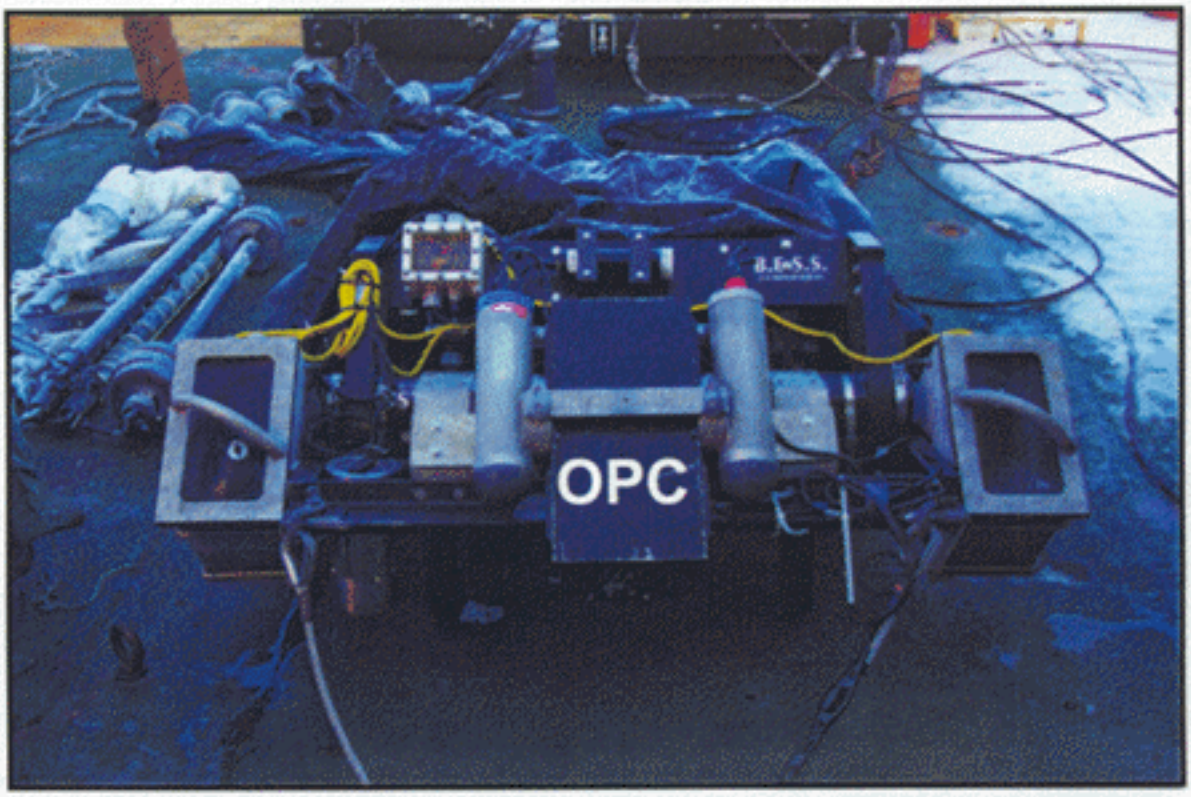
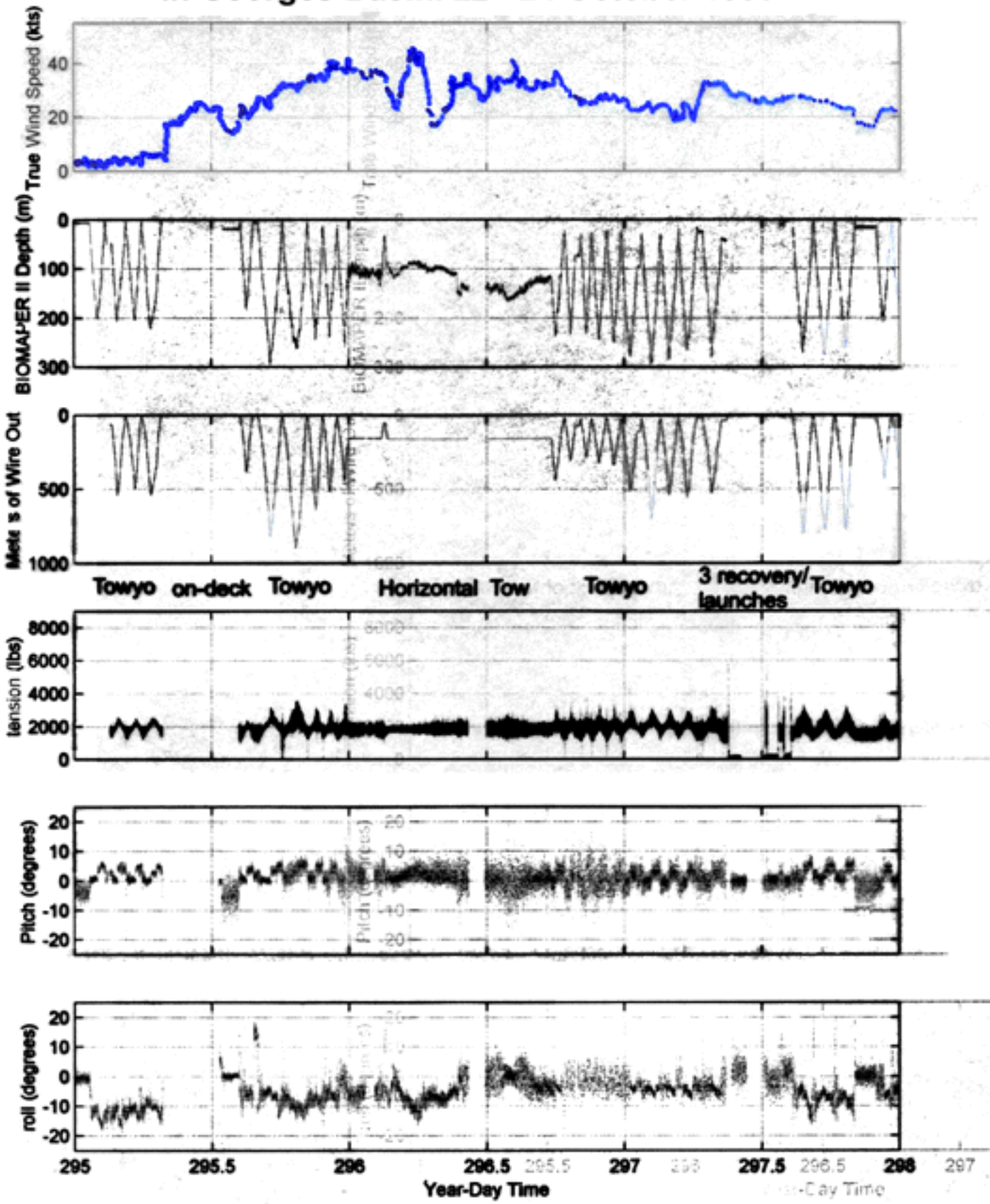
MOCNESS & OPC



BIOMAPER II Tow Engineering Data during Gale in Georges Basin. 22 - 24 October 1999



Thoughts about the current state of affairs

In spite of the increasing use of AUV's, the need for improved towing capabilities and handling systems for over-the-side gear will increase during the next decade. AUVs also need improved handling systems.

Towed/profiled instrumentation will increase in variation and complexity during the next decade as sensors, microprocessors/support electronics, and data storage units continue to improve in speed and capacity and are reduced in size. But some sensors (i.e. acoustics) will remain large and heavy.

The sensors will have significantly higher resolution and higher sampling rates that in turn will generate a need for significantly higher data processing capabilities and increased bandwidth for data telemetry.

More of the processing will take place on the towed vehicles to reduce some of the bandwidth requirements, but there are limits to this processing if the raw data are needed for future calibration corrections or for alternate ways to process the raw data in the post-processing phase of the analyses.

Problems associated with towing instrumentation behind the vessel (ship's wake turbulence, ship disturbance of biological patterns - fish school avoidance or attraction) will be overcome by having tethered self-propelled vehicles moving ahead of the ship.

Categories of Instrument Packages

Towed versus Profiled

- Profiled
  - Passive (CTD's, Large Volume Filtering System -LVFS & MULVFS)
  - Active (ROV's)
- Towed
  - Slow versus high speed vehicles.
  - Shallow versus deep towed vehicles.
  - Active versus passive towyoing.

Examples of towed instruments:

- Net Systems such as
  - MOCNESS
  - BIONESS
  - MULTINET
  - RMT1&8
- Multi-samplers
  - ARIES
  - LHPR
- Active light weight undulating towed bodies
  - SeaSoar
  - Batfish
  - ScanFish
- Passive heavy or light weight towed or towyo'd bodies
  - Deep Tow
  - BIOMAPER-II

Some Future Science Needs

More conductors and increased use of fiber optic technology are needed. This will require more technicians trained to setup, maintain, and repair optical conductors and terminations.

Vehicles will be towed at higher speeds and greater depths and there is a need to reduce cable strum and vibration.

Increased need for motion compensations systems and over-the-side handling gear.

Motion compensation systems currently available need improvements.
- increased motion compensation.
-automatic pressure adjustment capability

With or without motion compensation, there is a need for increased use of docking mechanisms that can capture the returning instrument after it leaves the water and before it gets close to the ship.

Look ahead sensors are needed that allow adequate warning that submerged features are ahead.

Improved display of relevant towing parameters that the operators are using to "fly" the vehicle are needed on the towing vessel's bridge and throughout the ship.

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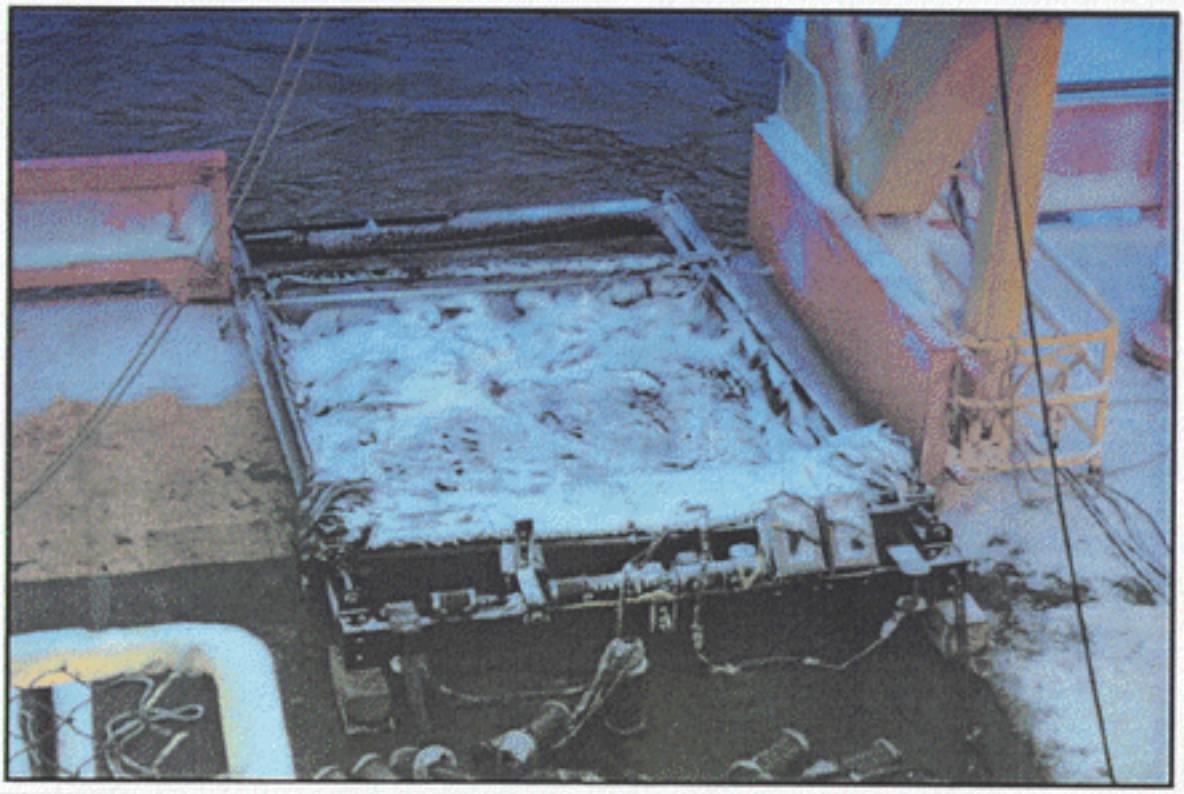
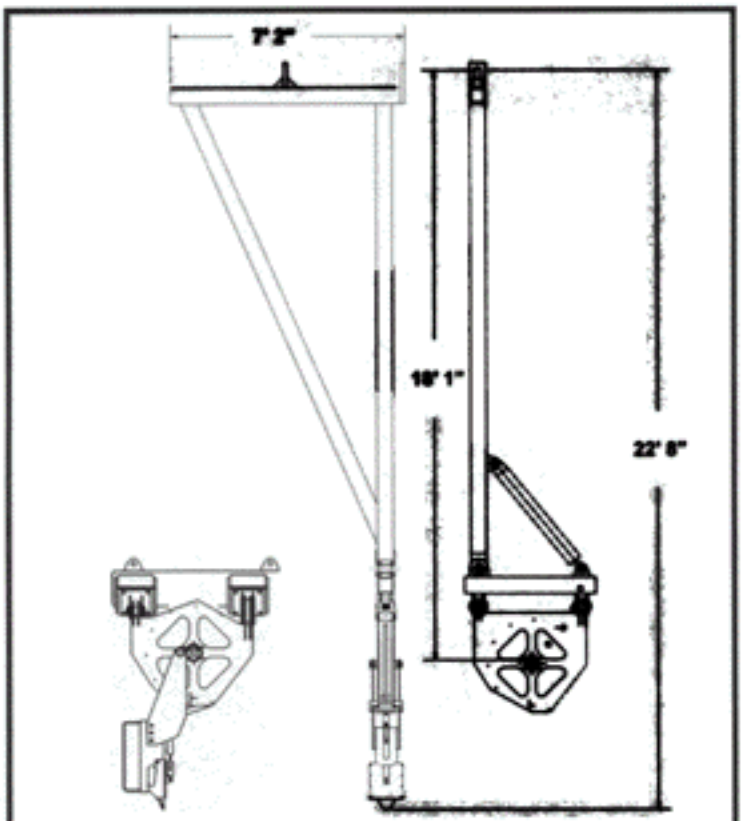
MOCNESS 10 m^2 Trawl





Over-boarding Sheave
and Docking Mechanism

Stiff-Arm for R/V NB Palmer
Stern A-frame