Load Handling System Symposium
(INMARTECH Meeting – October 2006)

EXPLICIT GOAL

Review of existing technologies and systems to develop a set of standard Functional Requirements (specs) to show “Proof of Concept” for new capabilities.

~ NOT to evaluate any particular vendor~

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- *Looked at numerous systems, vendors, and vessels both domestically (US) and world-wide.*
- *Talked with vessel operators and technical staff.*
- *Committee combined various features and capabilities into one set of "Functional Requirements".*
- *Web Site: www.unols.org > Committees > RVOC > LHS Symposium.*

Load Handling System Symposium (INMARTECH Meeting – October 2006)

- Two systems produced following “Functional Requirements” developed during the study (*Caley Ocean Systems, Ltd*):
  - R/V *SHARP (Delivered – funded by UD)*
  - R/V *KILO MOANA (In progress)*
- Conceptually the same – different handling appliance and size of winch.
- Final Phase - Field evaluations after installation and systems in operation.

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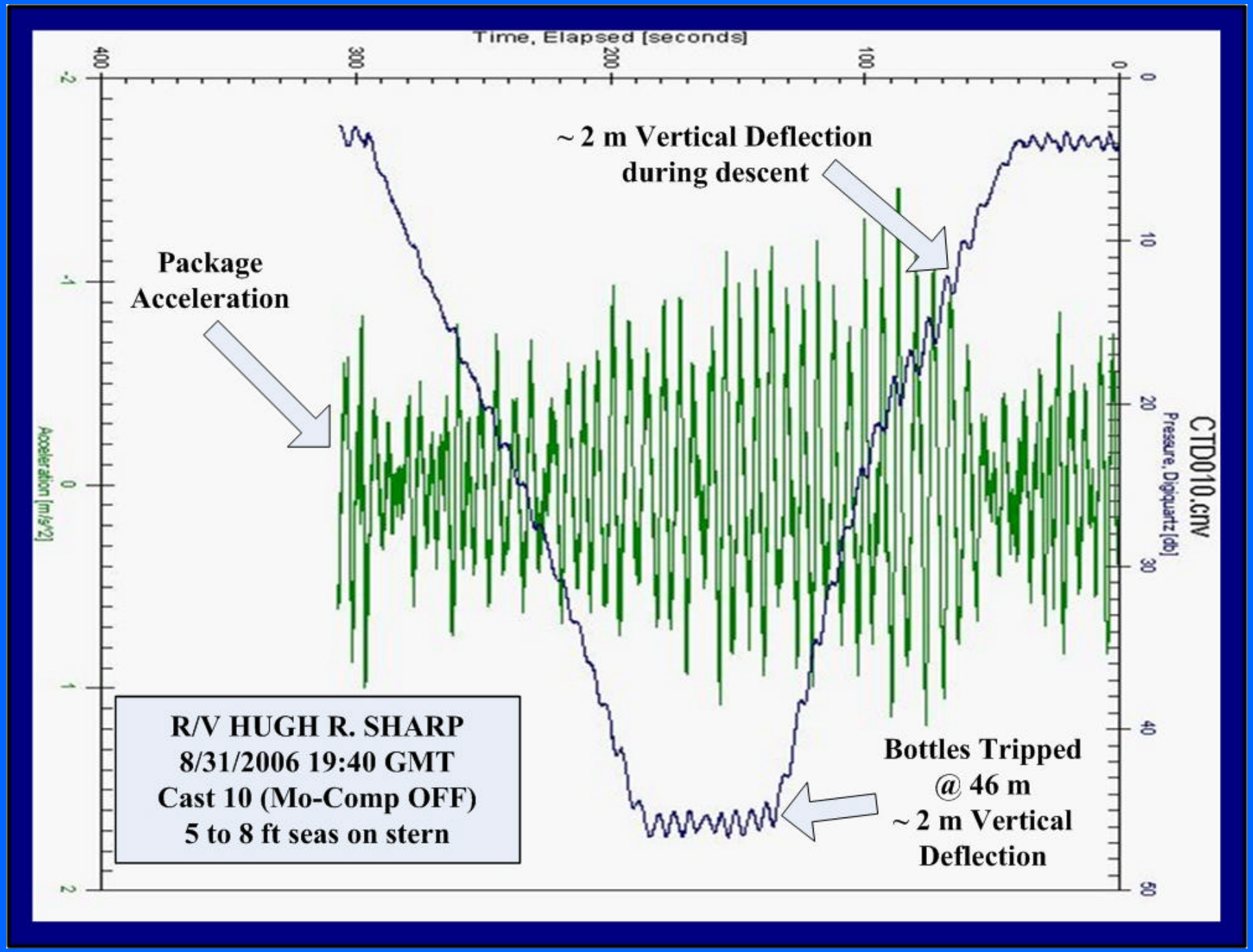
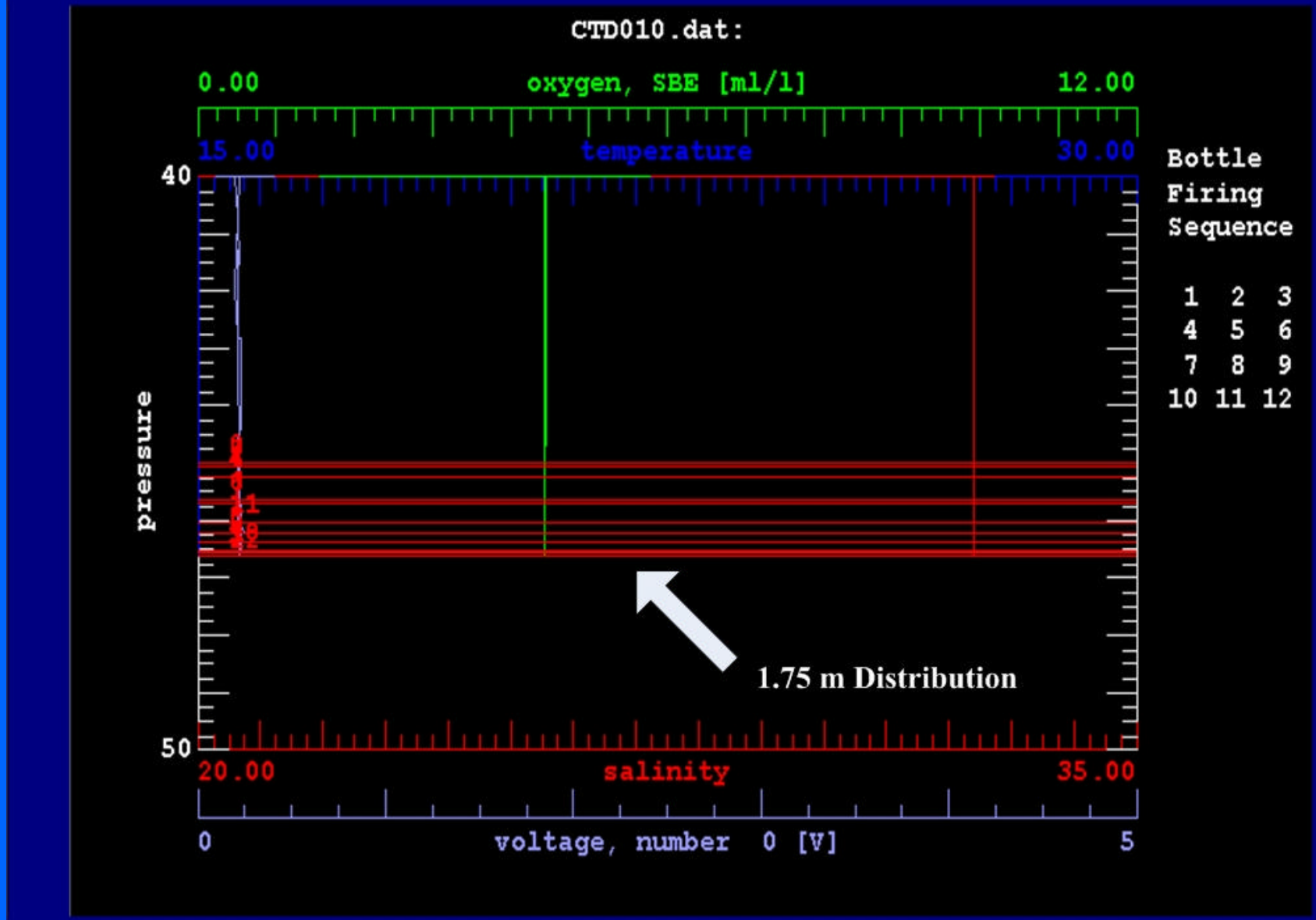
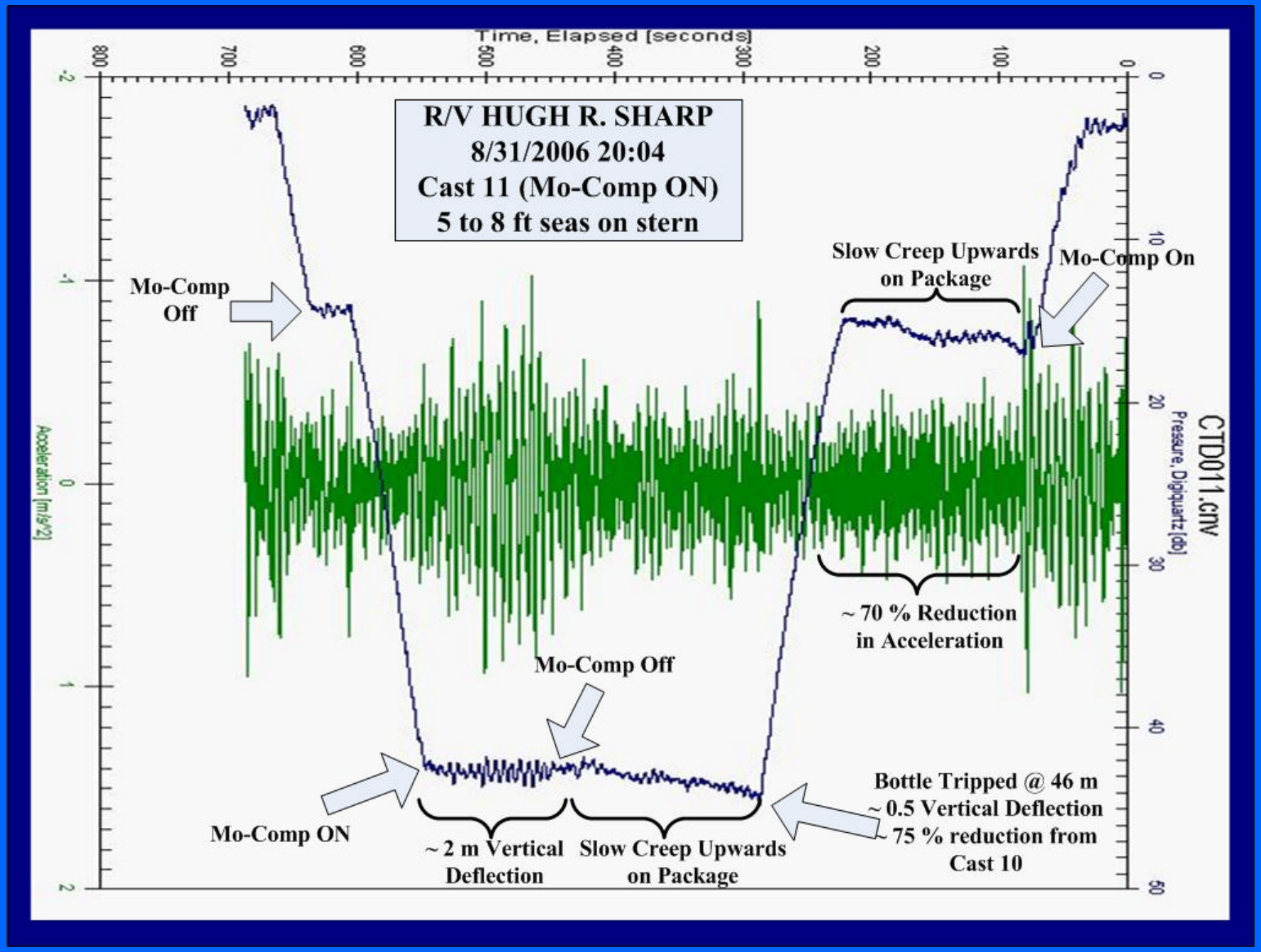
New Capabilities

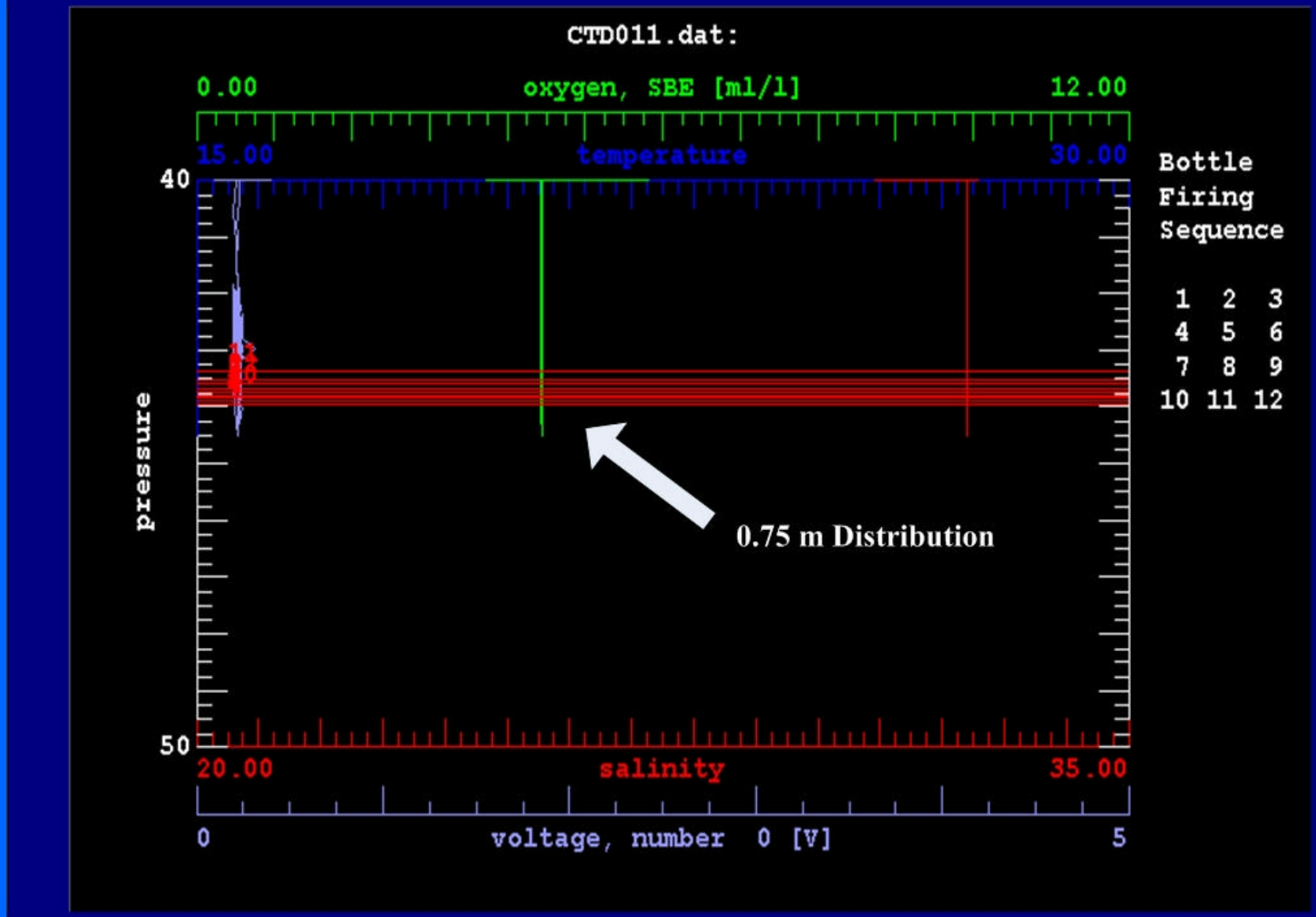
- Motion Compensation by winch pay-in/pay-out – reduces heave of package in water column for better data resolution and lower cable strain.
- Docking Head with “Auto-Position” capability – no tag lines. Operator can set package on deck without assistance.
- “Tow Mode” (Auto Render) – used for towing and in dealing with wire SWL issues.

Play Movies Here!


Time, Elapsed [seconds]
400
300
200
100
0
-2
-1
0
1
2
Acceleration [m/s^2]
0
10
20
30
40
50
Pressure, Digiquartz [db]
CTD010.cnv
~ 2 m Vertical Deflection during descent
Package Acceleration
R/V HUGH R. SHARP
8/31/2006 19:40 GMT
Cast 10 (Mo-Comp OFF)
5 to 8 ft seas on stern
Bottles Tripped @ 46 m
~ 2 m Vertical Deflection


CTD010.dat:
0.00
oxygen, SBE [ml/l]
12.00
15.00
temperature
30.00
40
pressure
50
20.00
salinity
35.00
0
voltage, number 0 [V]
5
Bottle
Firing
Sequence
1 2 3
4 5 6
7 8 9
10 11 12
1.75 m Distribution


Time, Elapsed [seconds]
800
700
600
500
400
300
200
100
0
R/V HUGH R. SHARP
8/31/2006 20:04
Cast 11 (Mo-Comp ON)
5 to 8 ft seas on stern
Slow Creep Upwards
on Package
Mo-Comp On
Mo-Comp
Off
~ 70 % Reduction
in Acceleration
Mo-Comp Off
Mo-Comp ON
~ 2 m Vertical
Deflection
Slow Creep Upwards
on Package
Bottle Tripped @ 46 m
~ 0.5 Vertical Deflection
~ 75 % reduction from
Cast 10
Acceleration [m/s^2]
-2
-1
0
1
2
Pressure, Digiquartz [db]
0
10
20
30
40
50
CTD011.cnv


CTD011.dat:
0.00
oxygen, SBE [ml/l]
12.00
15.00
temperature
30.00
40
pressure
50
20.00
salinity
35.00
0
voltage, number 0 [V]
5
Bottle
Firing
Sequence
1 2 3
4 5 6
7 8 9
10 11 12
0.75 m Distribution

CTD Accelerations

% Improvement	Maximum	Minimum	Average	*Standard Deviation
Overall	51.7%	38.4%	76.8%	**62.6%**
Descent	60.2%	68.5%	124.5%	**77.0%**
At Depth	47.2%	23.1%	205.9%	**65.9%**
Ascent	33.8%	39.8%	49.9%	**57.6%**

ACCELERATIONS (m/s^2)

Motion Compensation ON	Maximum	Minimum	Average	Standard Deviation
Overall	0.5700	-0.9000	-0.0011	0.1549
Descent	0.4700	-0.4600	0.0053	0.1352
At Depth	0.5700	-0.9000	-0.0047	0.1690
Ascent	0.49000	-0.59000	-0.00292	0.15019

Motion Compensation OFF	Maximum	Minimum	Average	Standard Deviation
Overall	1.1800	-1.4600	-0.0046	0.4136
Descent	1.1800	-1.4600	-0.0216	0.5868
At Depth	1.0800	-1.1700	0.0044	0.4959
Ascent	0.7400	-0.9800	-0.0058	0.3539

For each cast, depth ≥ 15m

**The standard deviation is defined as the average amount by which scores in a distribution differ from the mean, ignoring the sign of the difference.*

***Data taken from two back-to-back CTD casts to the same depths. For comparison purposes, only data at or deeper than 15 meters were analyzed*

Thanks to: Tim McGovern, UH

Control Panel

Issues To Be Evaluated

- *Cost* – was it worth it? ($500 - $750K)
- Complexity – can we handle it? (*no pun intended!)*
- Motion Compensation – does it work? Is it of benefit to BOTH vessel and science? Appears so – but:

Need tests with greater depth/higher tensions

- Docking Head – Does it work? Is it safer? Appears so.
- "Tow Mode" (Auto Render) – Does it work? Is it safer? How do we test? Can it satisfy USCG and ABS? In Progress.
- ABS Standards – Comparison with same system under Sub-Chapter U. Weight savings? Greater Operational flexibility?

In Progress.

Step Forward?

Time will tell . . .

Final Word
(Related Subject)

- *DRAFT* UNOLS Wire Safe Working Load (SWL) standards currently under review by RVOC Safety Committee.
- Reviewed by RVTECH on October 16th
- Eventual Inclusion in RVSS
- Submission to ABS and US Coast Guard?