



INMARTECH 2016

4-6 October

Bergen, Norway

**UNOLS Wire Pool Experience Using
Synthetic Ropes in a Gravity Coring
Application**

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Synthetic Evaluation Objectives

- **Utilize synthetic rope for a gravity coring operation**
- **Evaluate different rope materials and constructions as alternatives for 14 mm (9/16") diameter trawl wire rope**
- **Evaluate the performance of synthetic rope with existing ships' equipment**

Immediate Concerns

- **Type of Winch: Traction or Direct Drive?**
- **Vessel and availability?**
- **Can traction heads be re-conditioned adequately for synthetics?**
- **Level wind properly?**
- **Knife into the core of the storage drum?**
- **Slippage on the traction heads?**
- **Will the synthetic be snagged by rough traction sheaves?**
- **What rope materials and constructions should be tested?**
- **If a jacketed rope is tested will there be relative movement between jacket and core?**

Try something and see what happens

Preparations

R/V Endeavor



R/V Endeavor Traction Winch

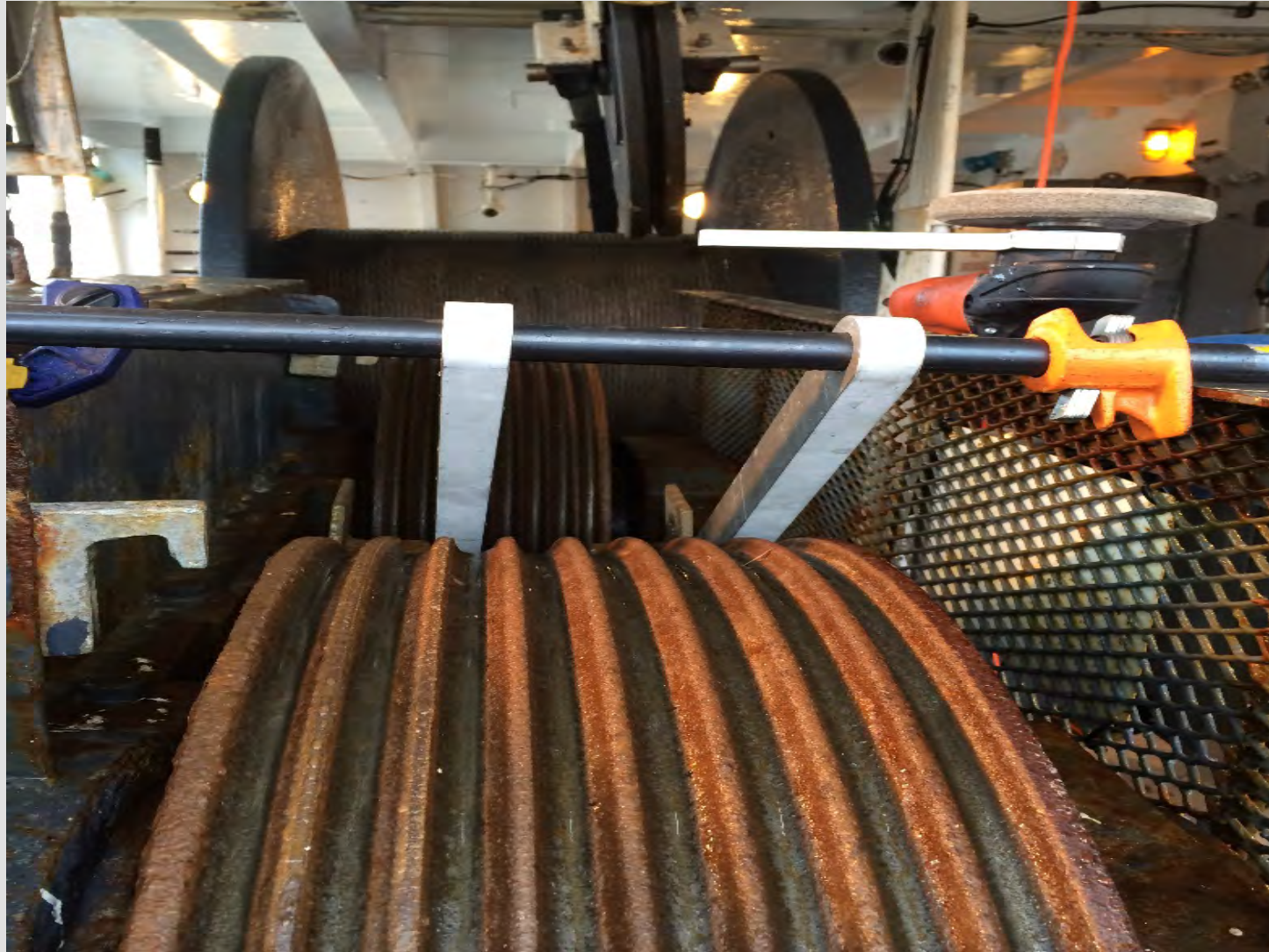


Traction Sheaves

Storage Drum

**DA
ER**
AWAY
WHEN RUNNING

Re-conditioning the traction sheaves





**Pivoting
grinders
with wire
wheels and
Scotch-Brite
discs**







Protected from the elements

**Tool Coating Wax applied
Wrapped in plastic**

Synthetic Ropes Tested

Phillystran

- Name: PST
- Diameter = 14 mm (9/16")
- MBS= 14,742 kg (32,500 lbs.)
- 7 strand "wire lay" construction with an overall braided jacket
- Technora Aramid Fiber
- Specific Gravity = 1.39
- Elongation @ 30% of MBS = 1.25%
- Sample Length = 1000 m

Samson

- Name: Unnamed
- Diameter = 14 mm (9/16")
- MBS= 14,742 kg (32,500 lbs.)
- 12-strand single braid construction
- Dyneema DM-20 Fiber
- Specific Gravity = .98
- Elongation @ 30% of MBS = .96%
- Sample Length = 1000 m

Operations Plan

- **Install each rope individually onto the traction winch and conduct heavy lift tests at the dock**
- **Go to sea with the Phillystran rope installed and conduct coring operations**
- **At sea off-spool the Phillystran rope and wind the Samson rope**
- **Conduct coring operations with the Samson rope**

**WINDING THE SAMSON PRODUCT
ONTO THE
R/V ENDEAVOR WINCH**





SMOKING

10' BLACK
20' GREEN
25' BLUE
30' RED

Load Testing the Samson Product



**2,268 kg
(5000 lbs.)
load test**



**4,536 kg
(10,000 lbs.)
weight**



**6,804 kg
(15,000 lbs.)
Load Test**

Phillystran product wound onto the winch and load tested, lifting 2,268, 4,536 and 6,804 kg successfully.



Gravity Coring Operations

R/V Endeavor

Cruise EN-576

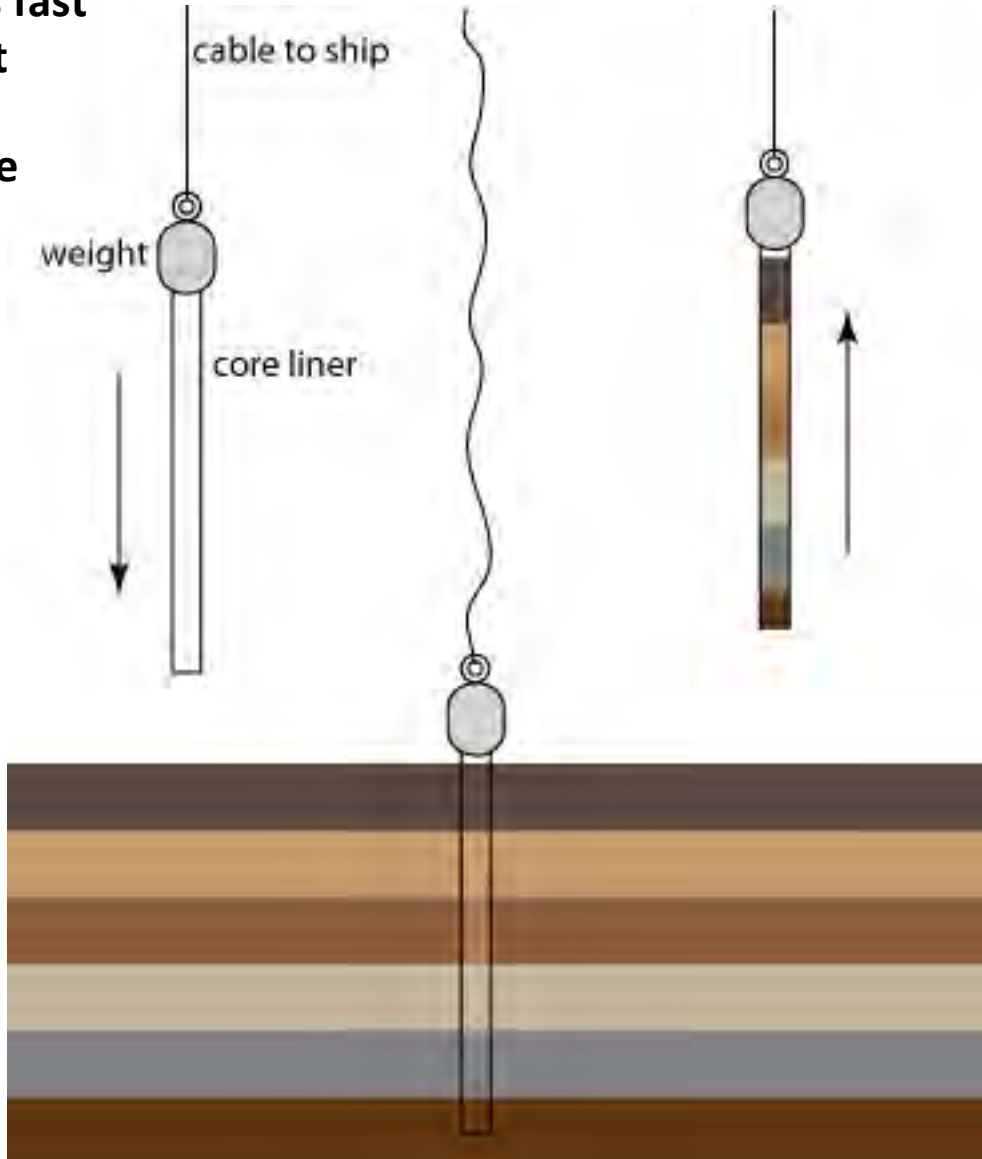
April 12 to 15, 2016

Corer attached to the ship using synthetic line.

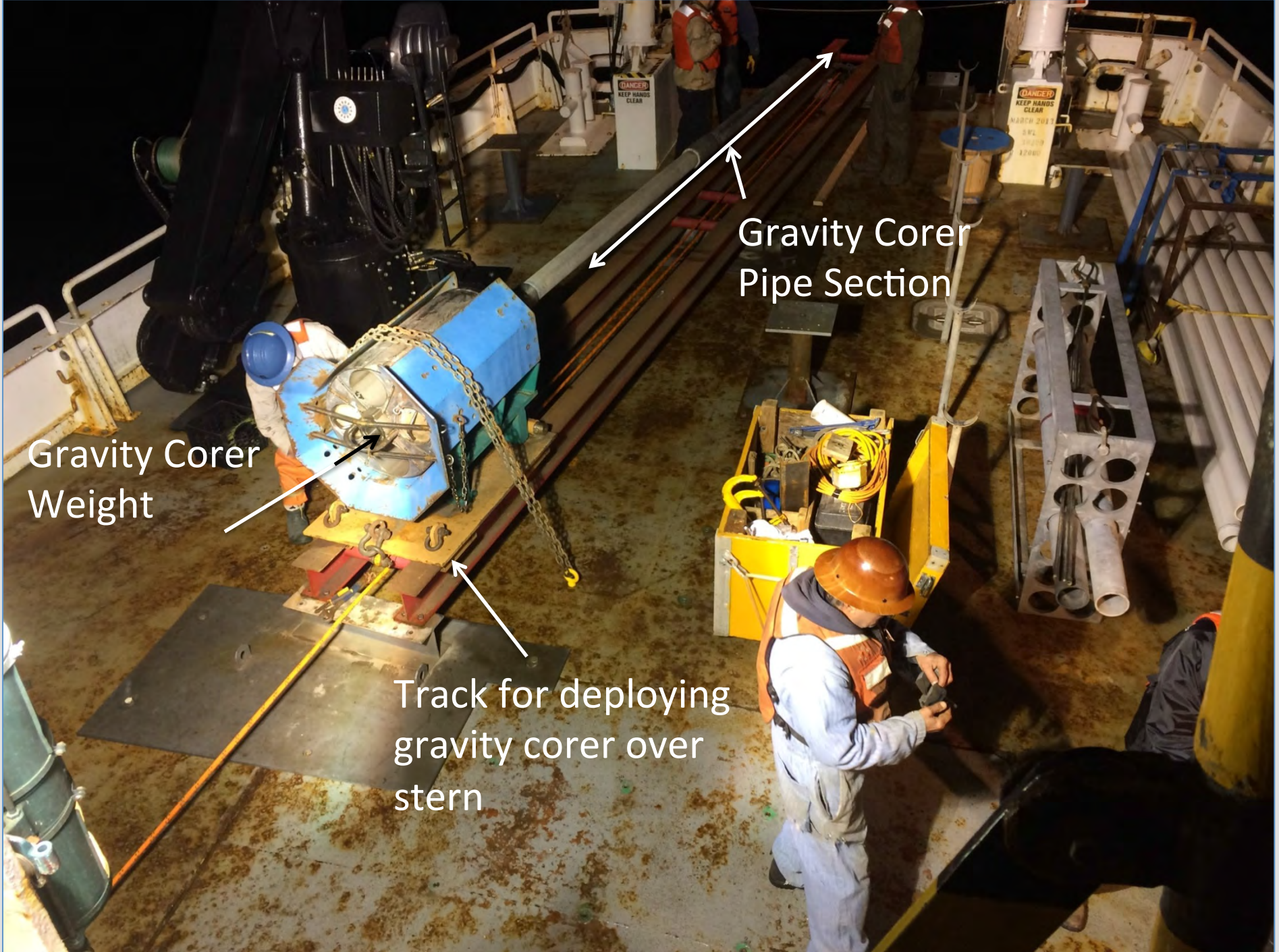
Lowered to the seafloor as fast as the winch would payout

The gravity corer is driven into the seafloor by the weight at the top of the core tube.

The hollow steel tube with a plastic inner tube. The steel tube is pushed into the seafloor and is filled with a sample down through the layers of sediment.



Gravity corer is pulled out of the bottom with sediment sample.



Gravity Corer
Weight

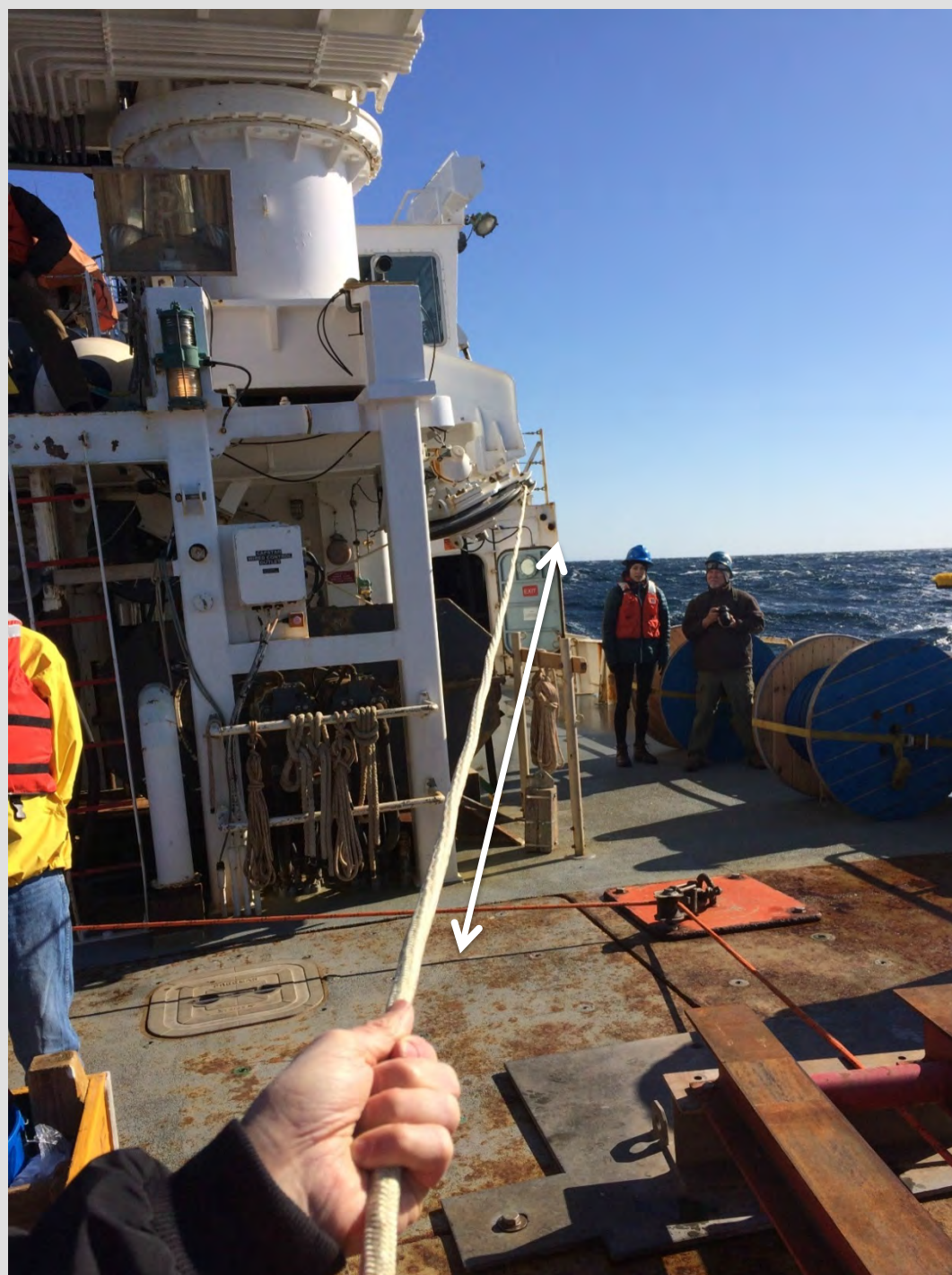
Gravity Corer
Pipe Section

Track for deploying
gravity corer over
stern

Gravity corer hauled back to the surface and is maneuvered into the bucket.







Spiral pattern evident in jacket of the Phillystran product after taking the first core.



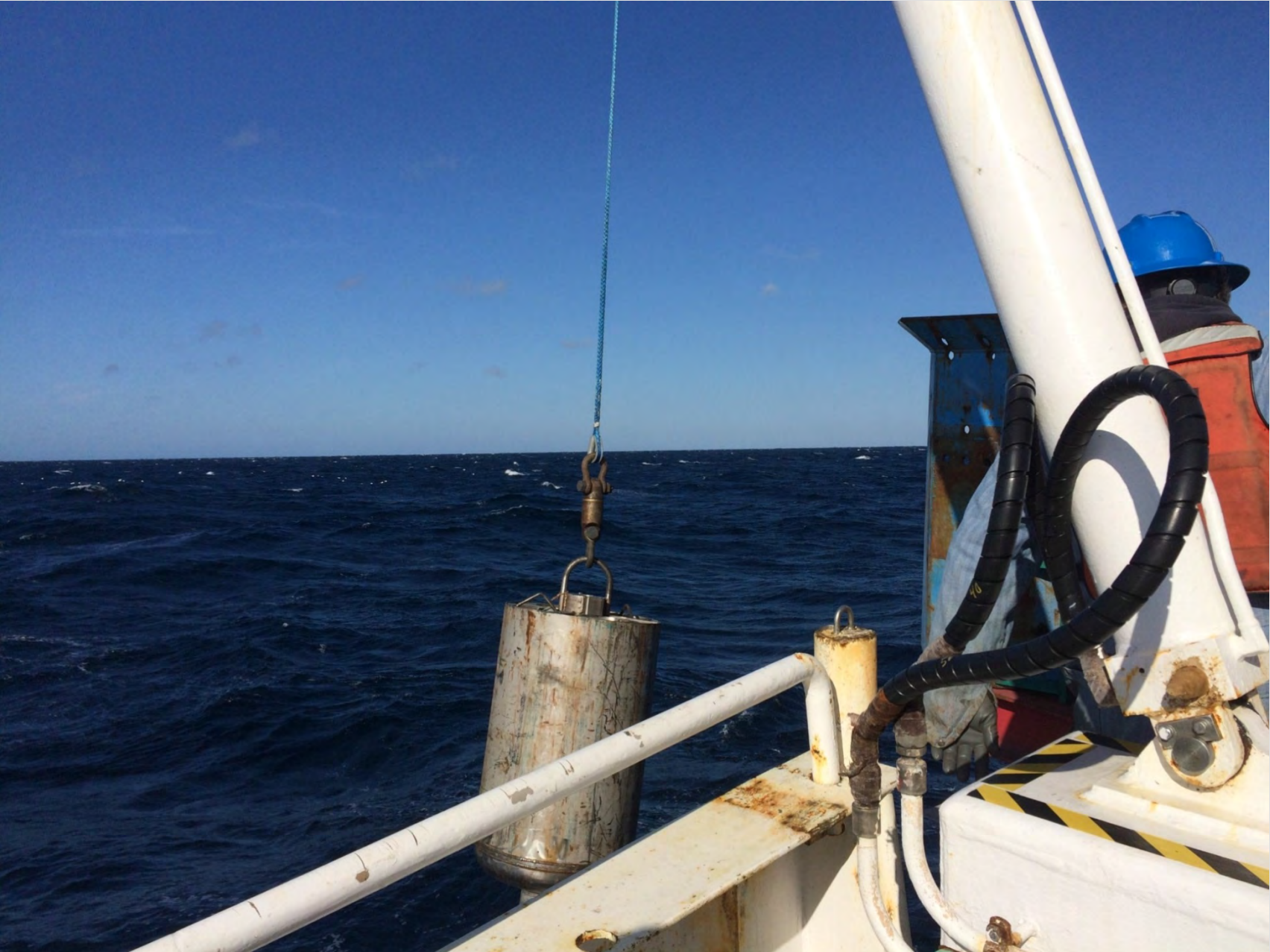
Precautions following some modifications to the rail system

Phillystran product removed and Samson product wound onto winch





Coring operations commence using the Samson product.



**SLIDE SEQUENCE IMMEDIATELY FOLLOWING
CORE PENETRATION AND DURING PULLOUT**















Coring Test Cruise Summary

- A total of 9 gravity cores taken for Science**
- Five cores in 800 meters of water**
- Four cores in 80 meters of water**
- Pullout tensions ranged from 2,359 to 4128 kg
(5200 to 9100 lbs.)**

Additional Testing of a Third Synthetic Sample

- **250 ft sample of a Cortland product called BOB for Braid Optimized for Bending.**
- **Used the Samson product as a winch leader to which the BOB was attached.**
- **BOB sample diameter = 5/8"**
- **MBS = 23314 kg (51,400 lbs.)**
- **Specific Gravity = 1.18**
- **Elongation at 30% of MBS = 1.12%**
- **Blend of fibers that improve the bend over sheave CTF**
- **Conducted dock side load tests using the BOB**

Load tests utilizing the Cortland BOB Product





**11,363 kg
(25,000 lbs.)
Load Test
with BOB**

Summary Comments

- **Successfully refurbished existing ship's equipment to be used with synthetic rope**
- **Both synthetic ropes performed satisfactorily**
- **Both were easily installed on the ship's winch**
- **No level wind problems developed with our short lengths**
- **Utilizing a traction winch with relatively low tension to the storage drum prevented any rope burying**
- **The 12 strand single braid is easier to splice than the 7 strand "wire lay" construction**
- **The Phillystran jacket protects the strength member, is therefore less susceptible to contact damage and stiffens the rope.**
- **The flexibility of the Samson product could lead to the line getting snagged if the line drops to the deck**
- **The Phillystran product developed an unexplained twist at the working end**
- **Other ropes will be evaluated such as BOB in order to select a suitable rope for specific application**

Questions?

