

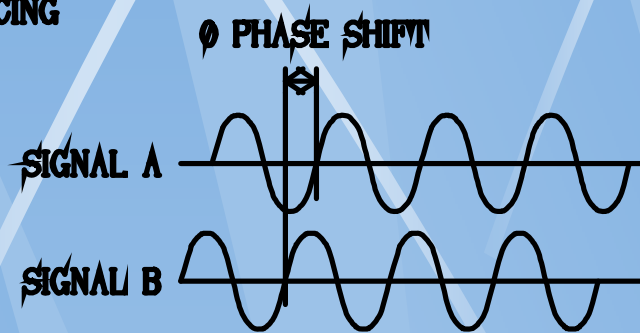
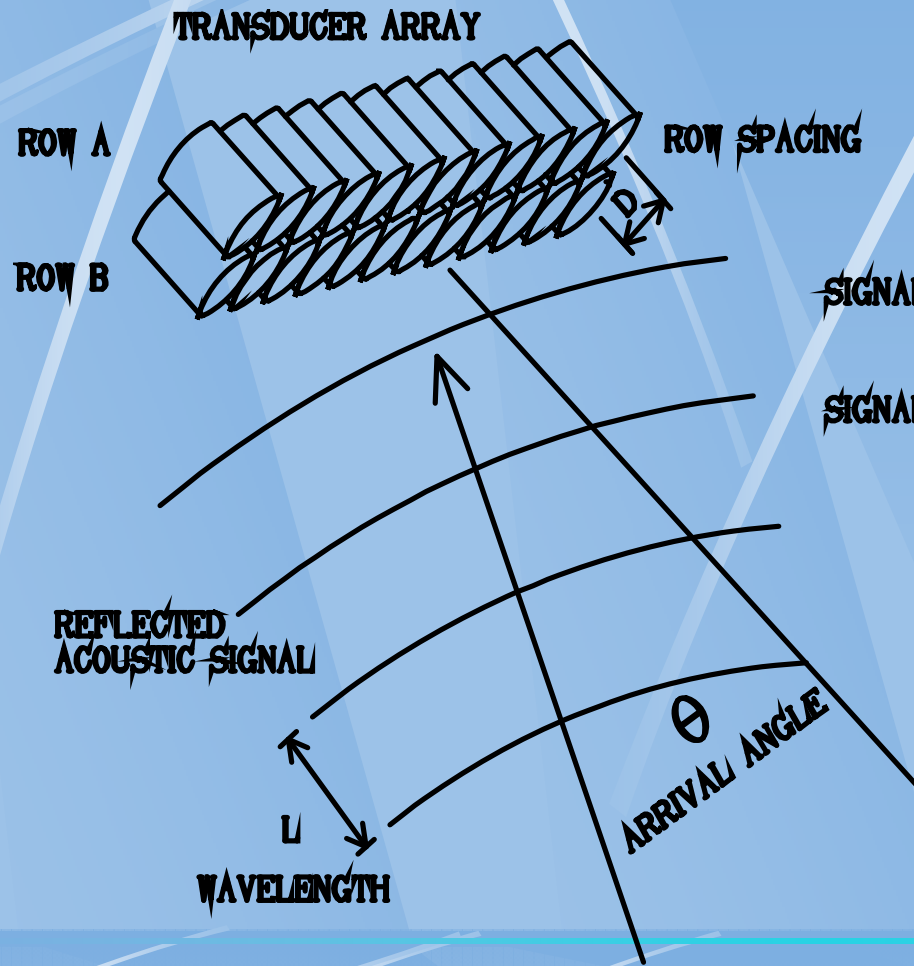
The IMI-120 Deep Tow Sonar - Searching for Lost Submarines

Mark R. Rognstad, University of Hawaii

DSL-120A/IMI-120

- Originally built by Woods Hole Oceanographic Institution & University of Hawaii - HMRG
- 120 kHz operating frequency
- Backscatter imaging sidescan
- Phase bathymetry
- Maximum depth 6000 m

Phase-Difference Bathymetry



$$\sin \theta = \frac{L}{D} \times \frac{\phi}{360^\circ}$$

Sonar Electronics

- Receiver/Processor – 2 Channel
- Master Timer
- Power Amplifier – 2 Channel
- Power Supply

Receiver/Processor

- Preamplifiers
- Acoustic A/D Converters – 16 bit, 1 Msps
- Transmitter A/D Converters – 12 bit
- DSP – 100 MHz, 24 bit fixed point
- FIFO Memory – Waveform Storage
- Flash Memory/Programmable Logic

Master Timer

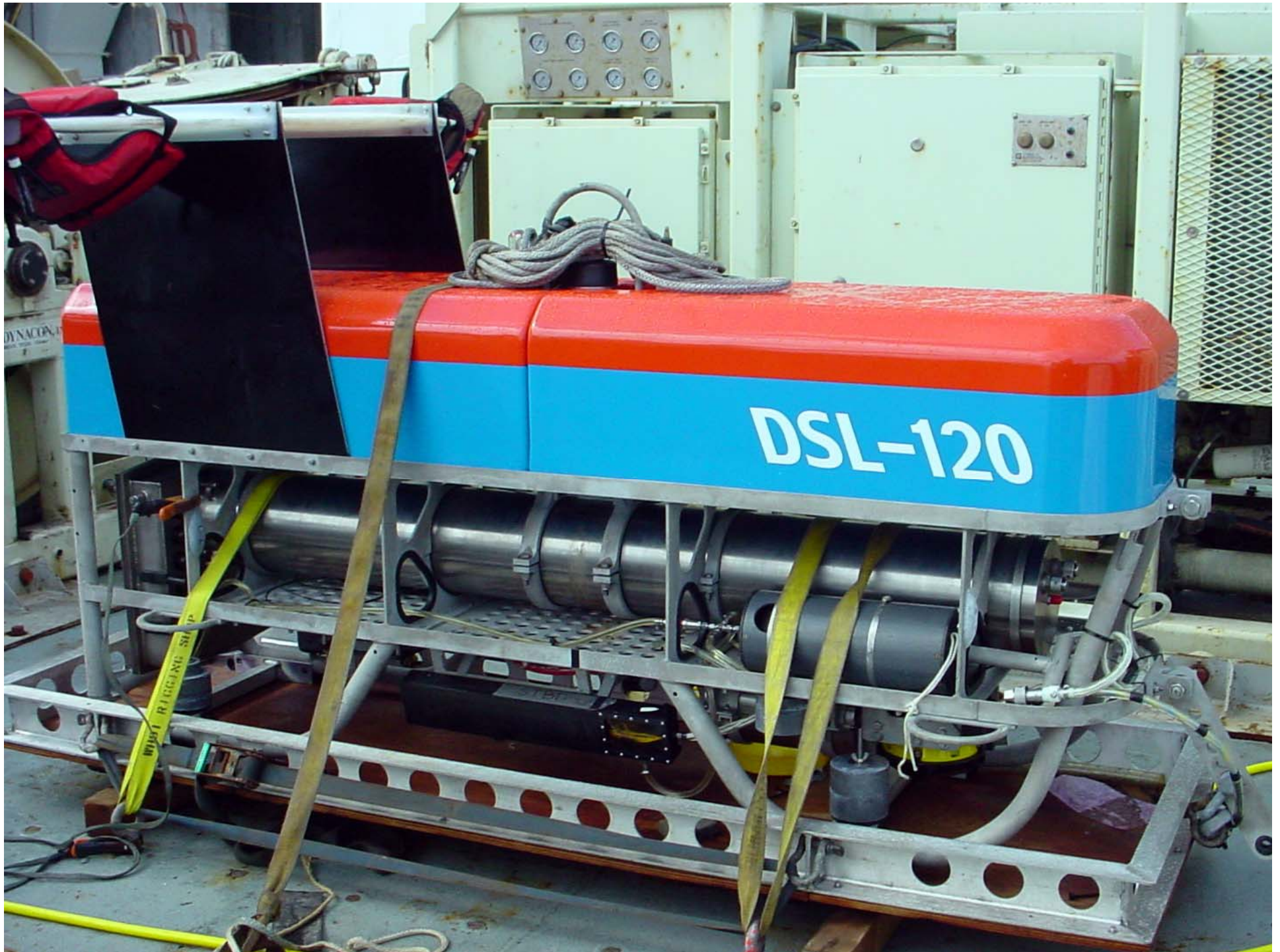
- Crystal Oscillator
- Clock/Sync for A/D Converters
- Clock/Sync for Uplink Telemetry Bus
- Transmit/Receive Timing

Power Amplifier

- Dual H-Bridge PWM
- 250 W maximum/Channel
- Energy Storage Capacitors - 2.5 J/Channel
- Capacitor Voltage Control – 10 bit resolution
- Capacitor Voltage A/D – 12 bit resolution

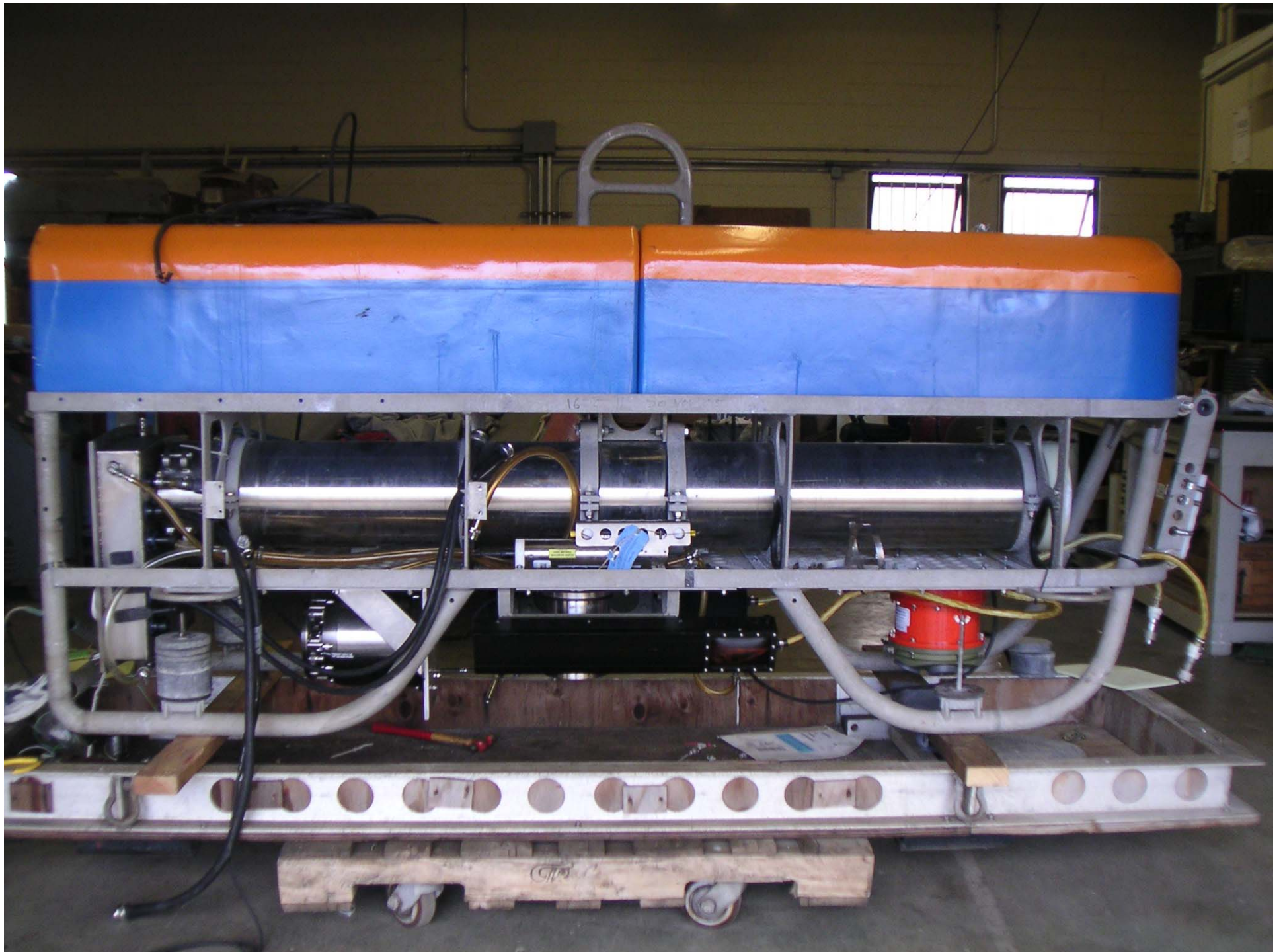
Power Supply

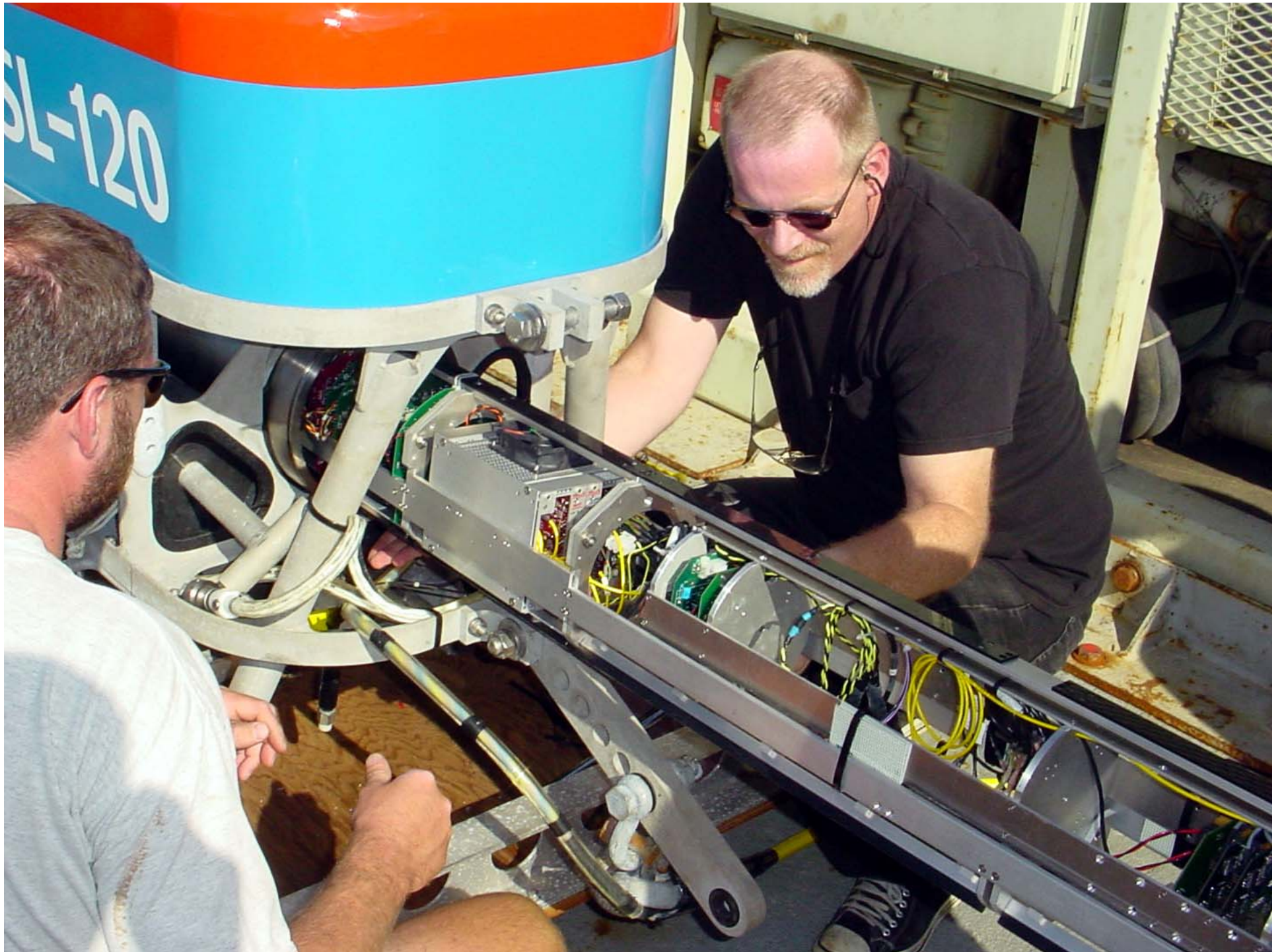
- DC-DC Converter
 - Industry Standard “Half Brick”
 - 200 to 400 V input
- Ripple Attenuator
- Passive Filter
- Synchronized converter capable

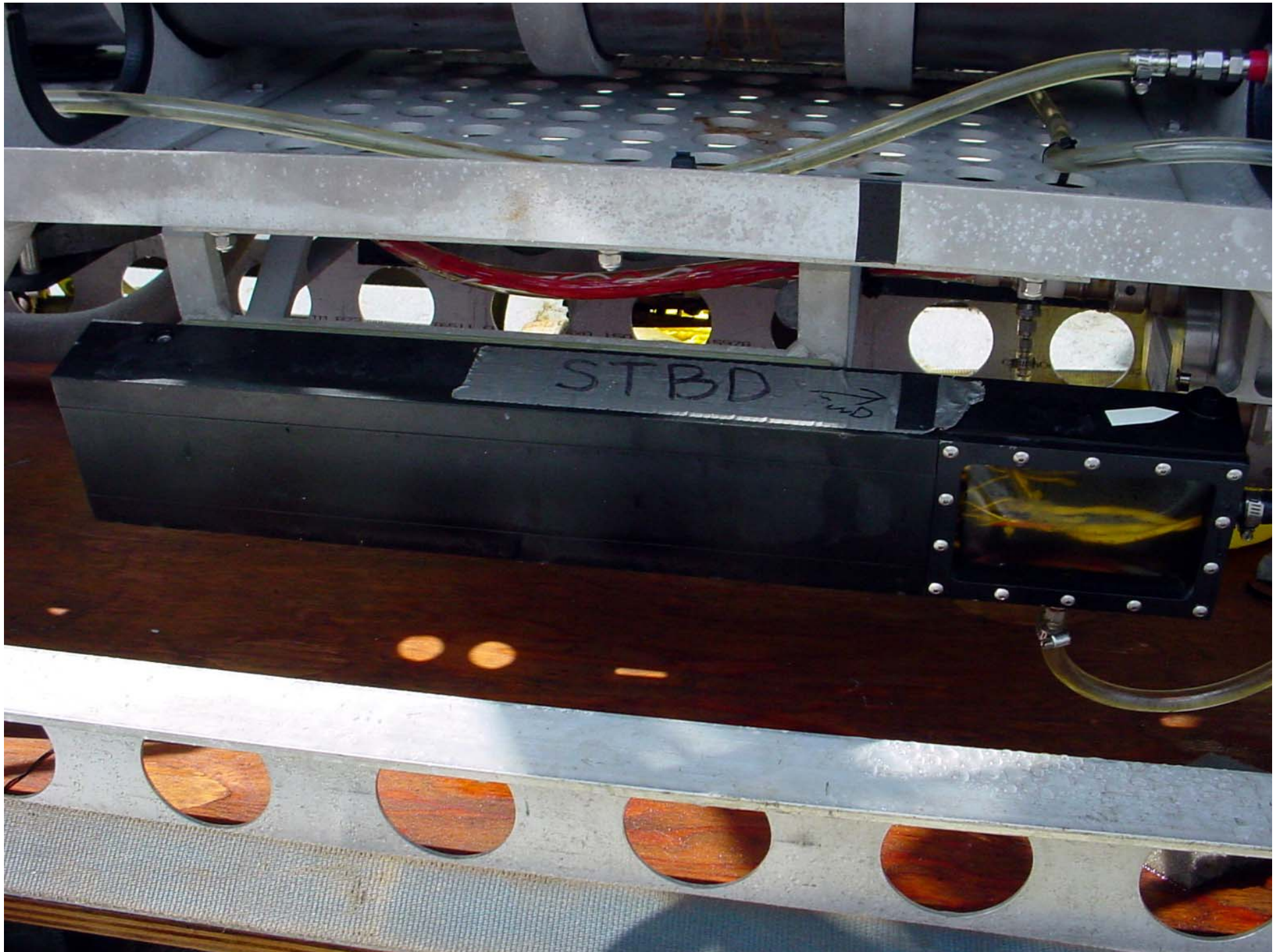


DSL-120

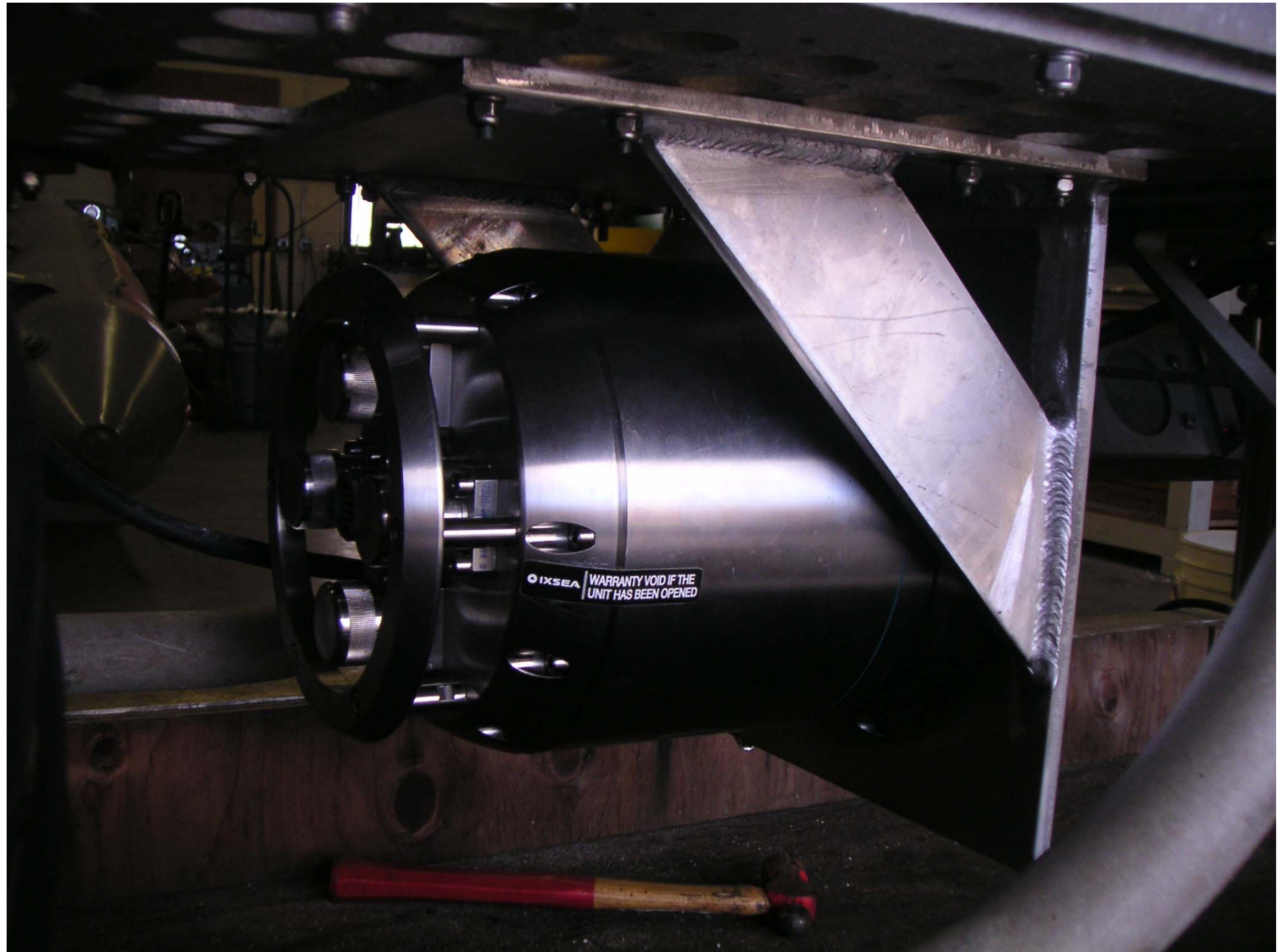
WEST RIGGING SUPPLY





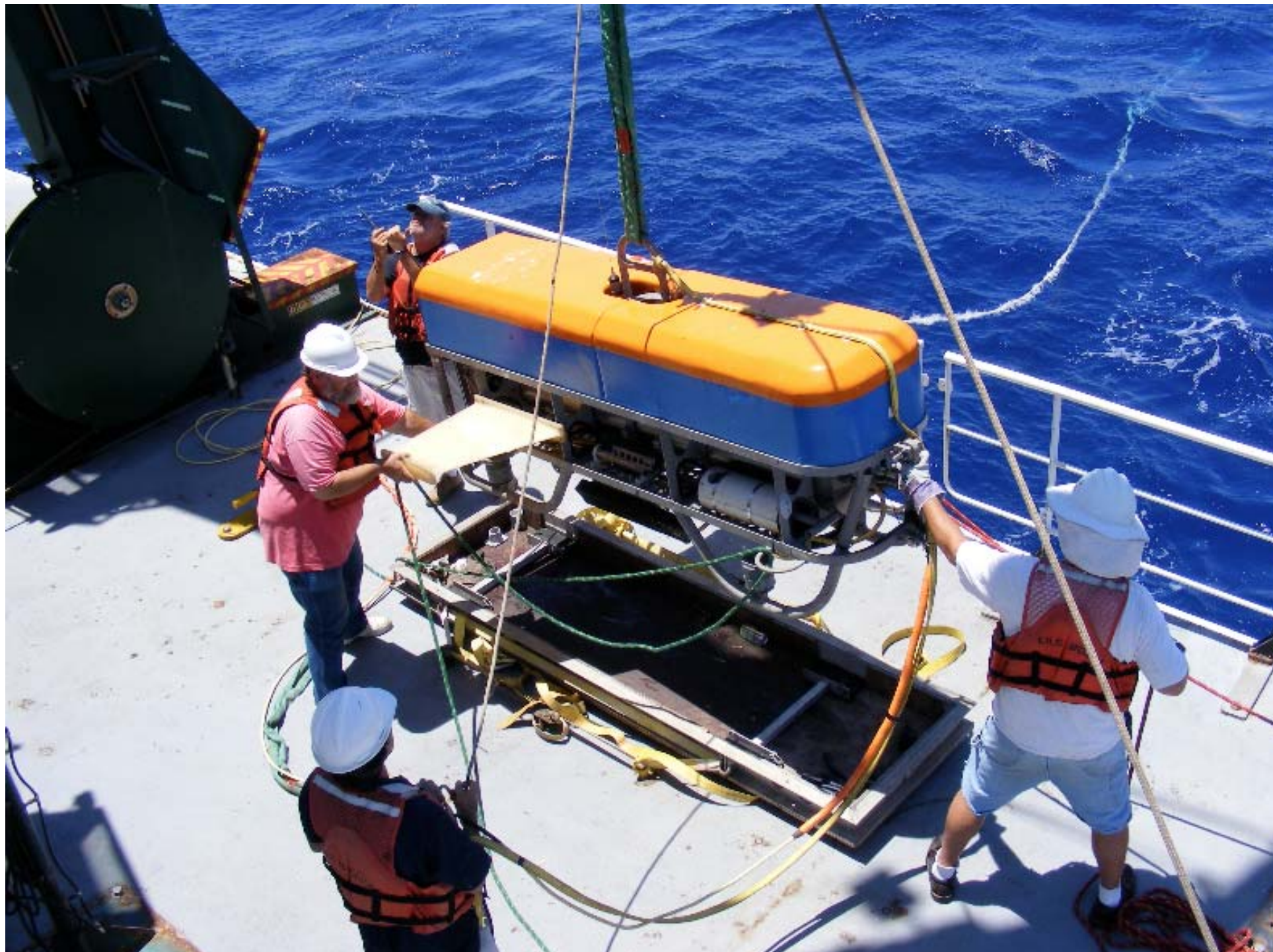




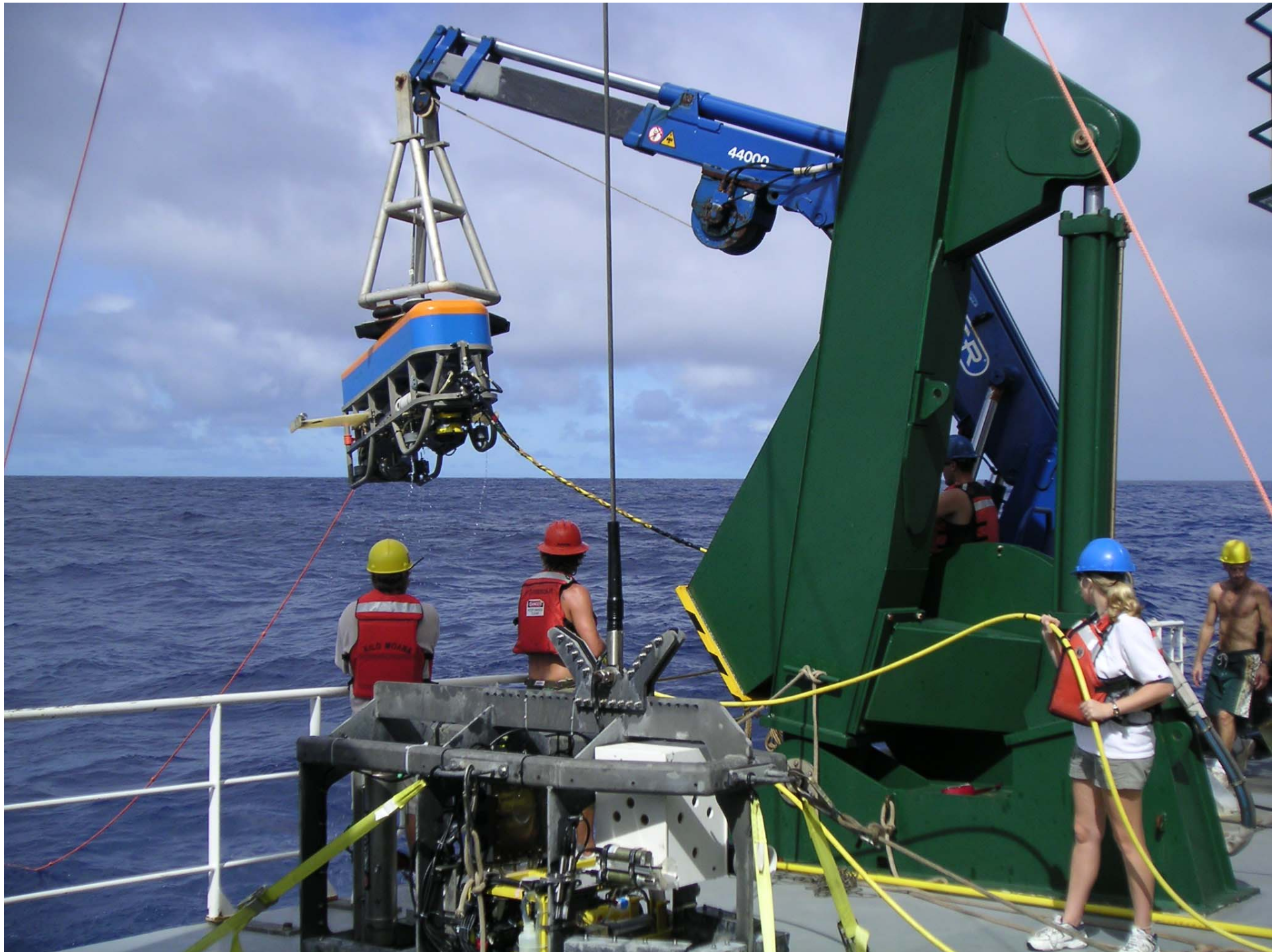






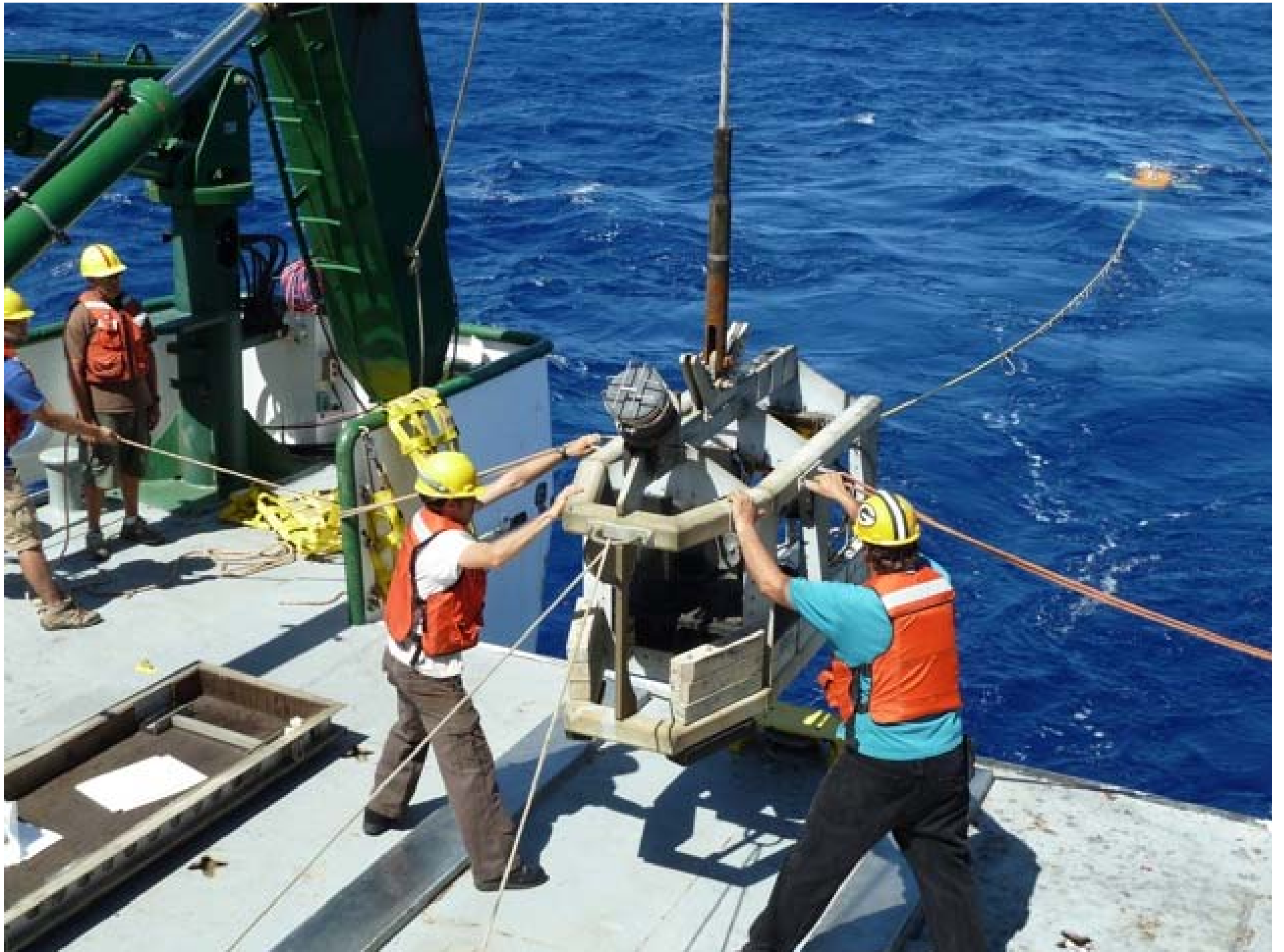






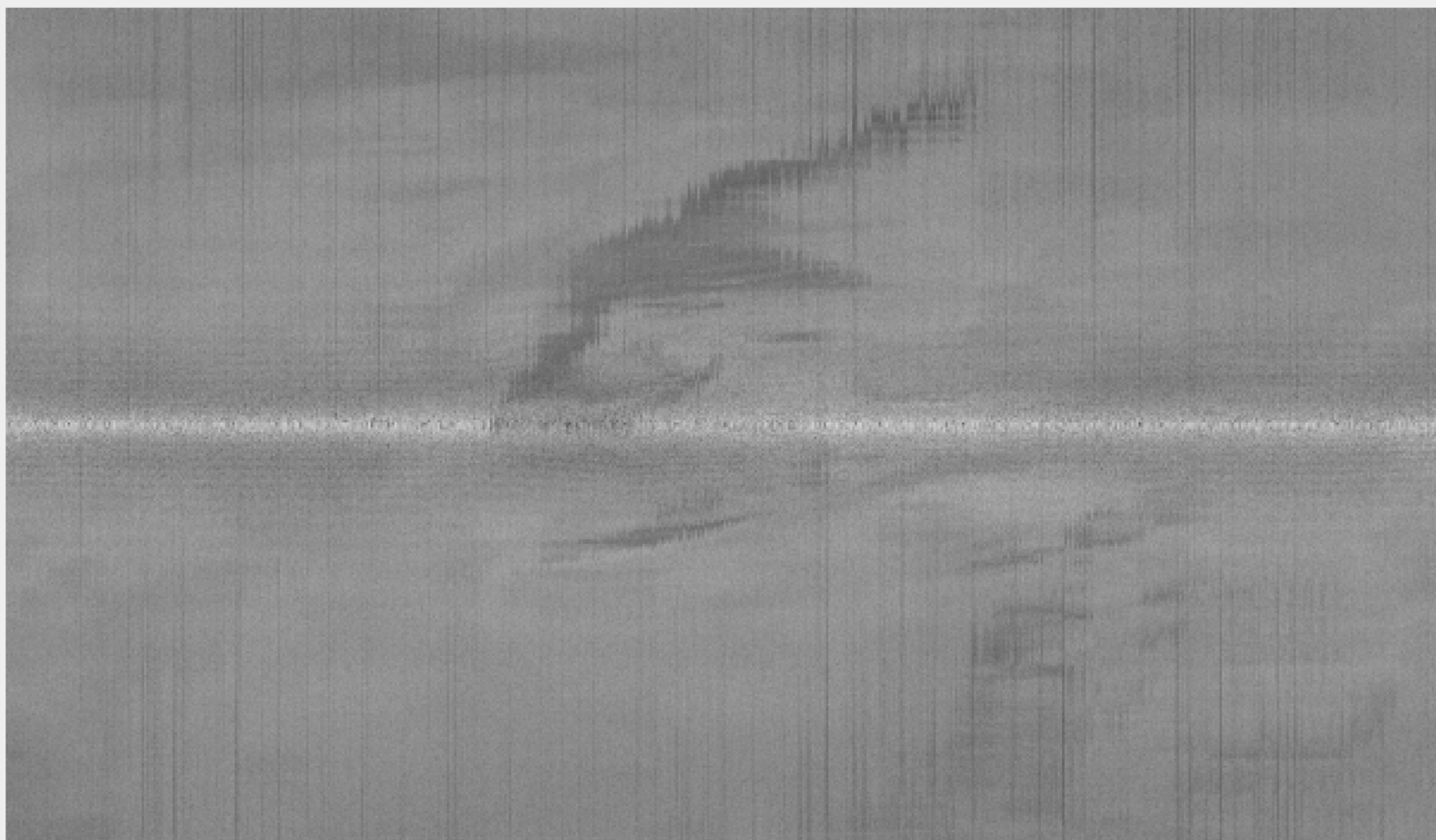


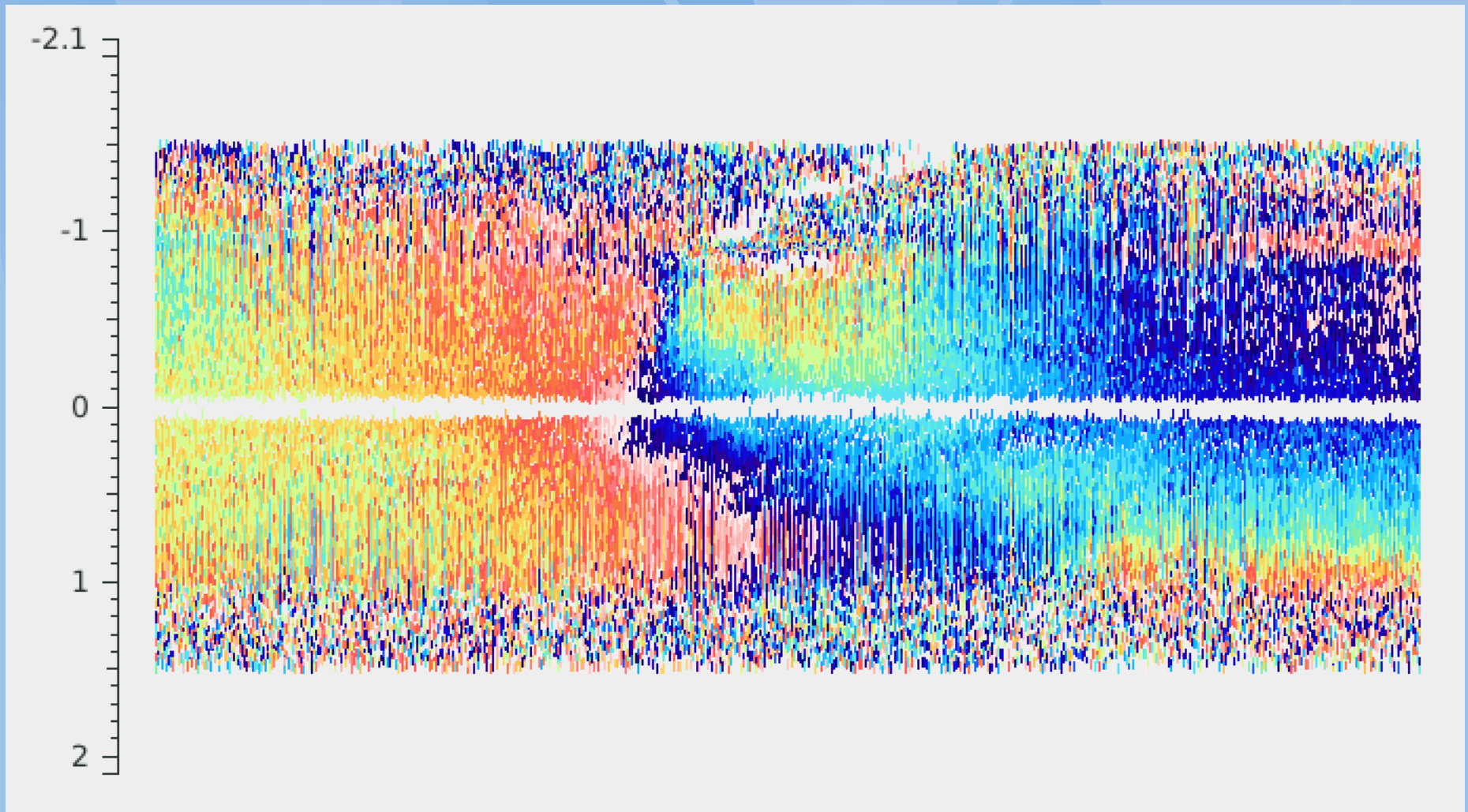





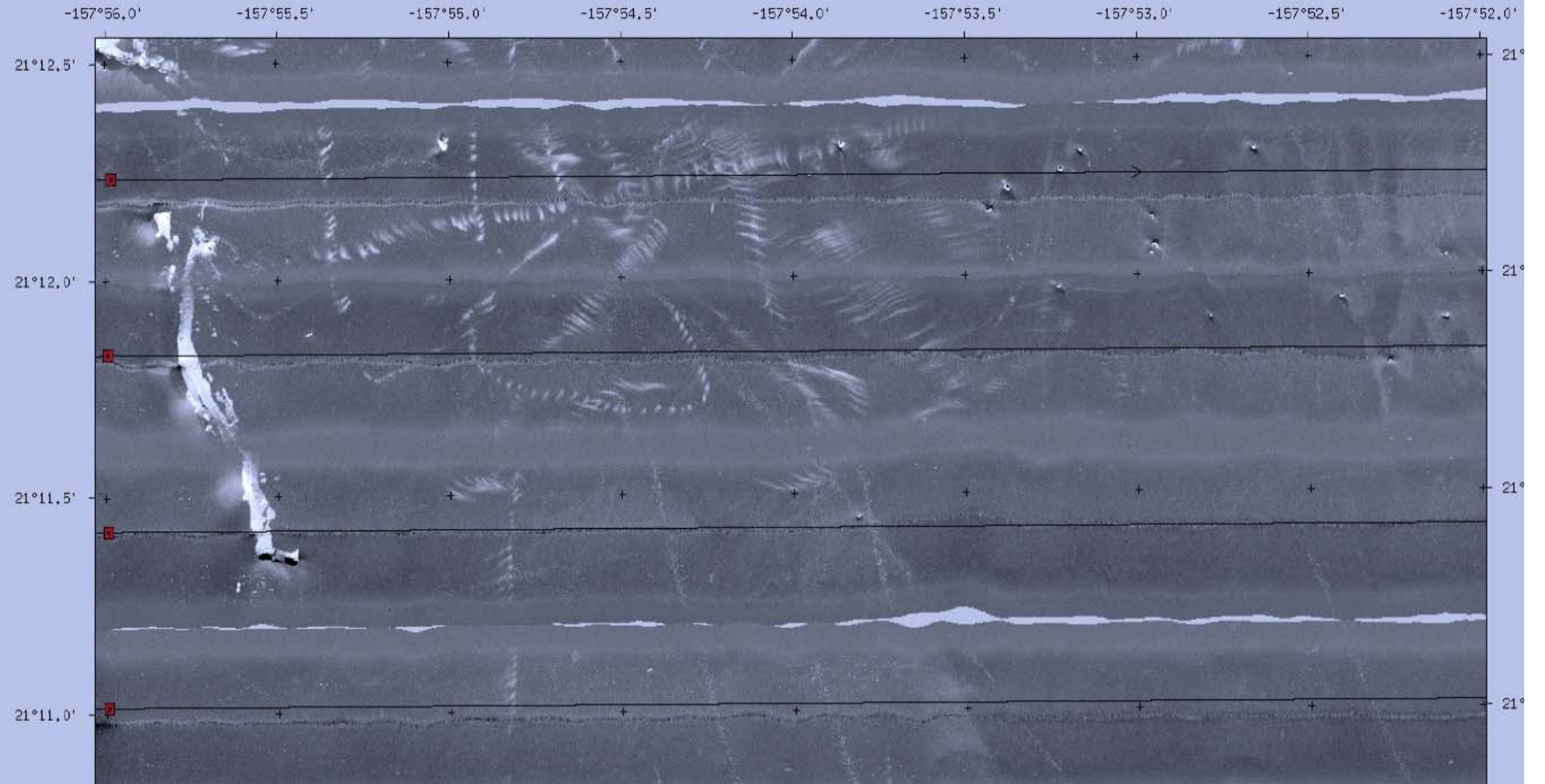


-2.1
-1
0
1
2




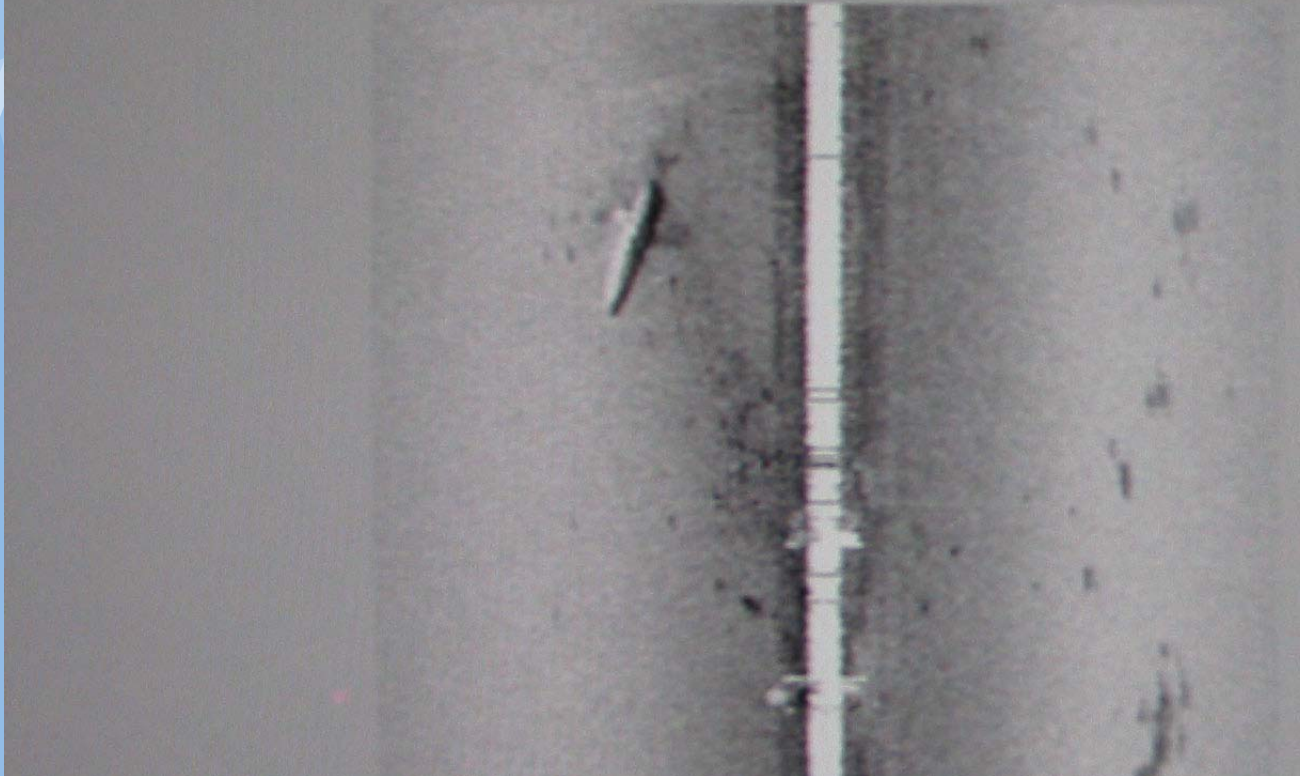


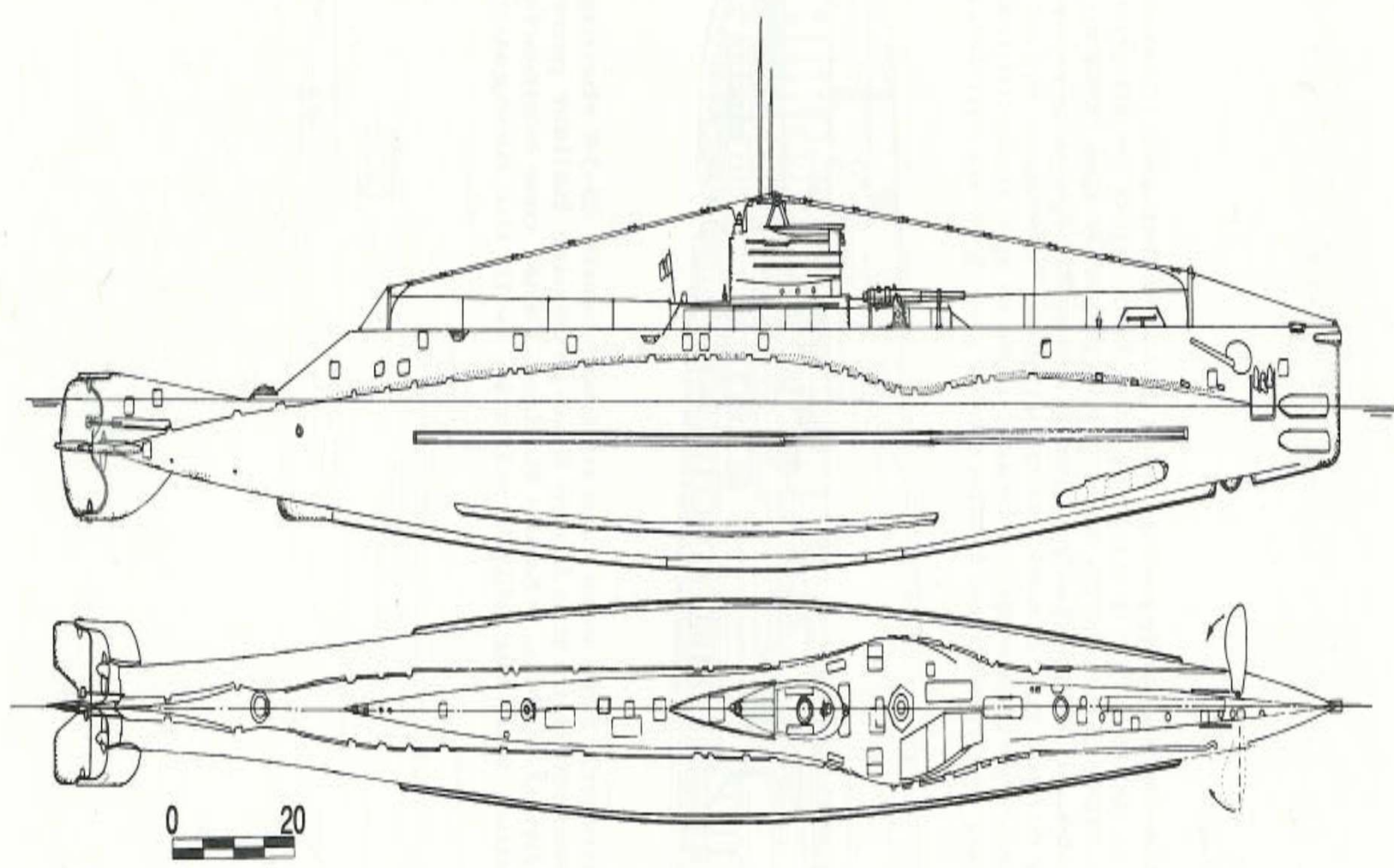
- + U M F N G S 1.25e+04  3.75e+05



16-2007241-140025 -- Ping 179 at 2007/241 14:03:25

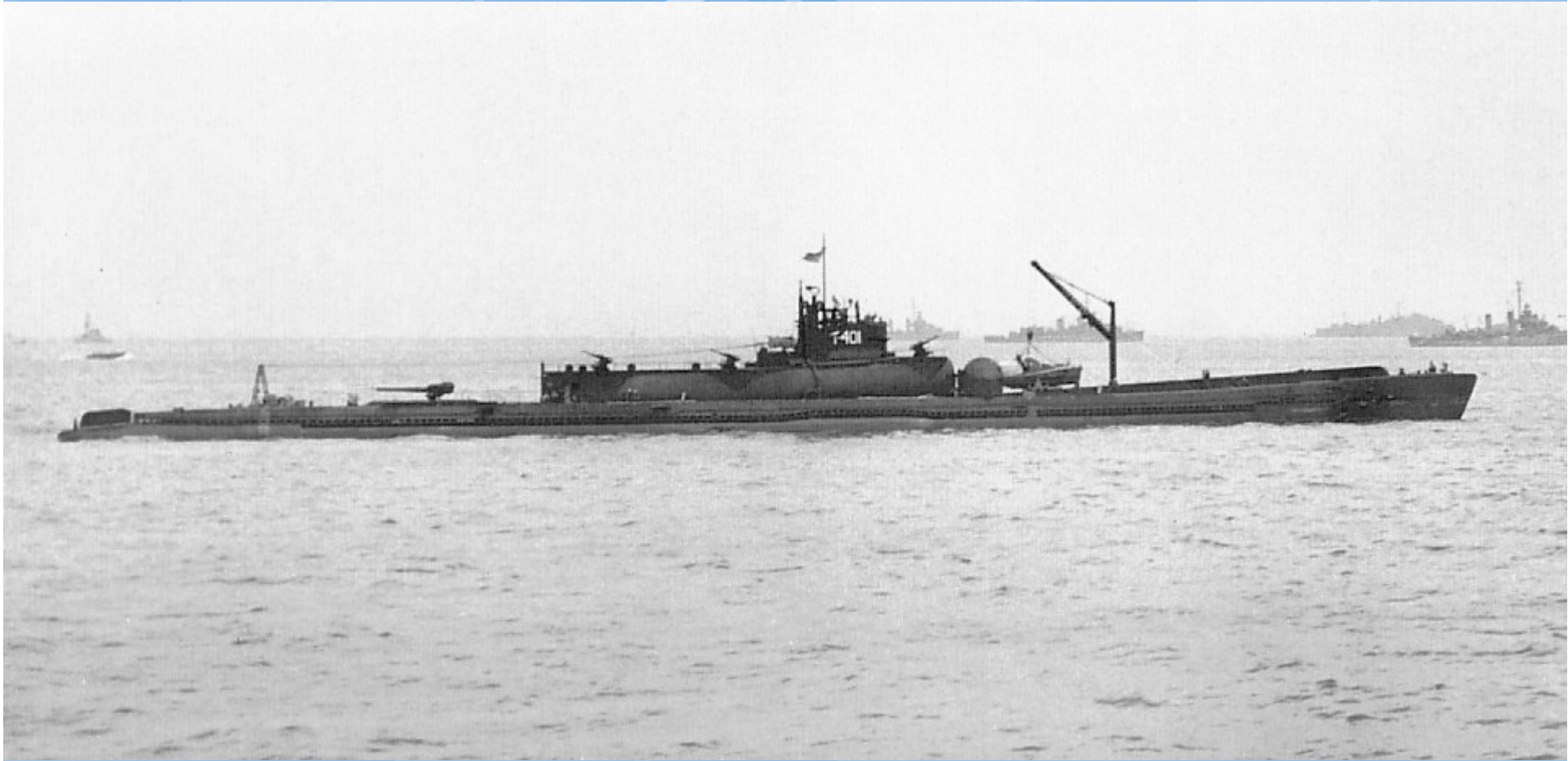
- + 1.25e+04  7.50e+05 - +
PingRep Log FlatBottom

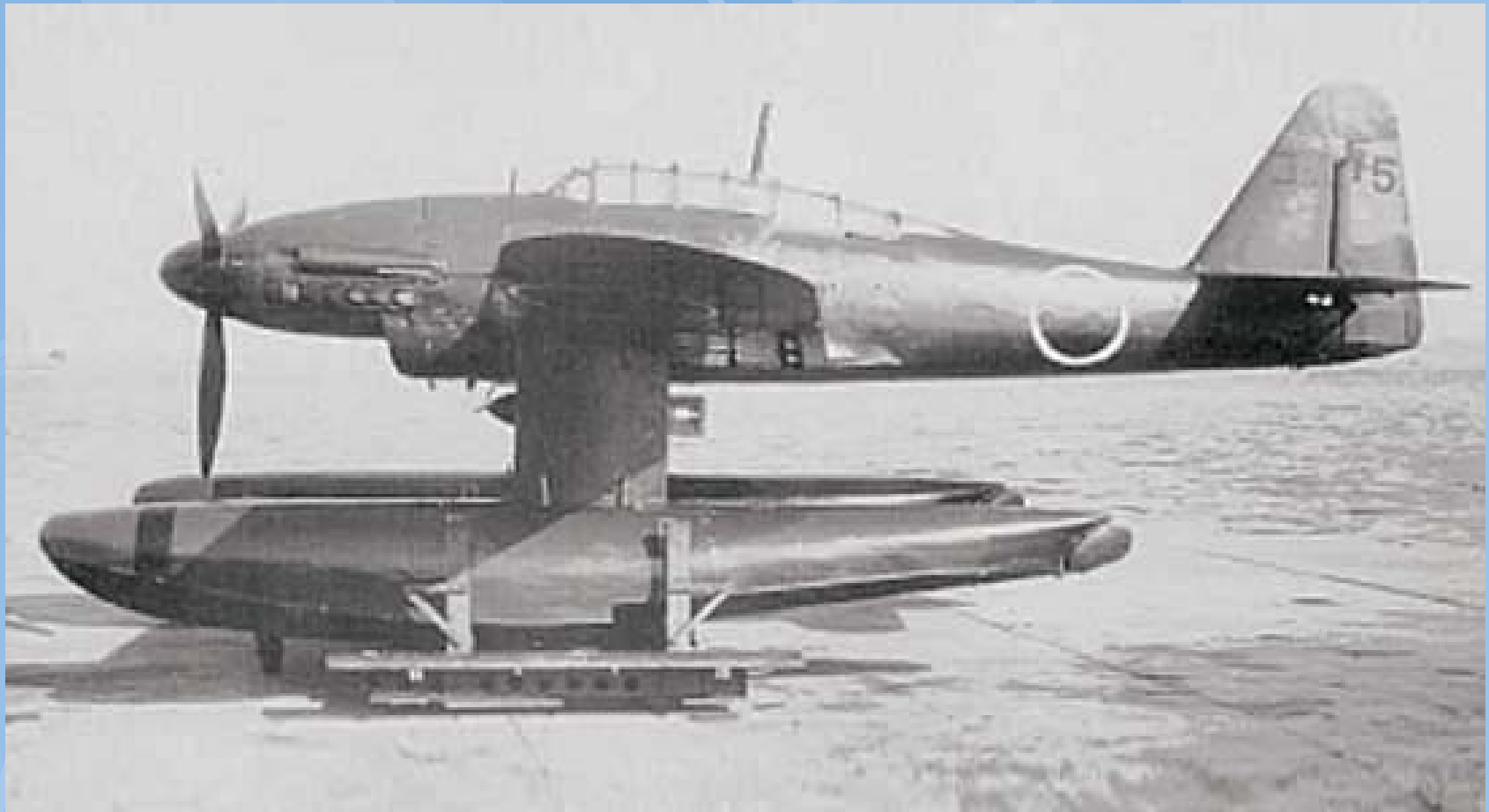






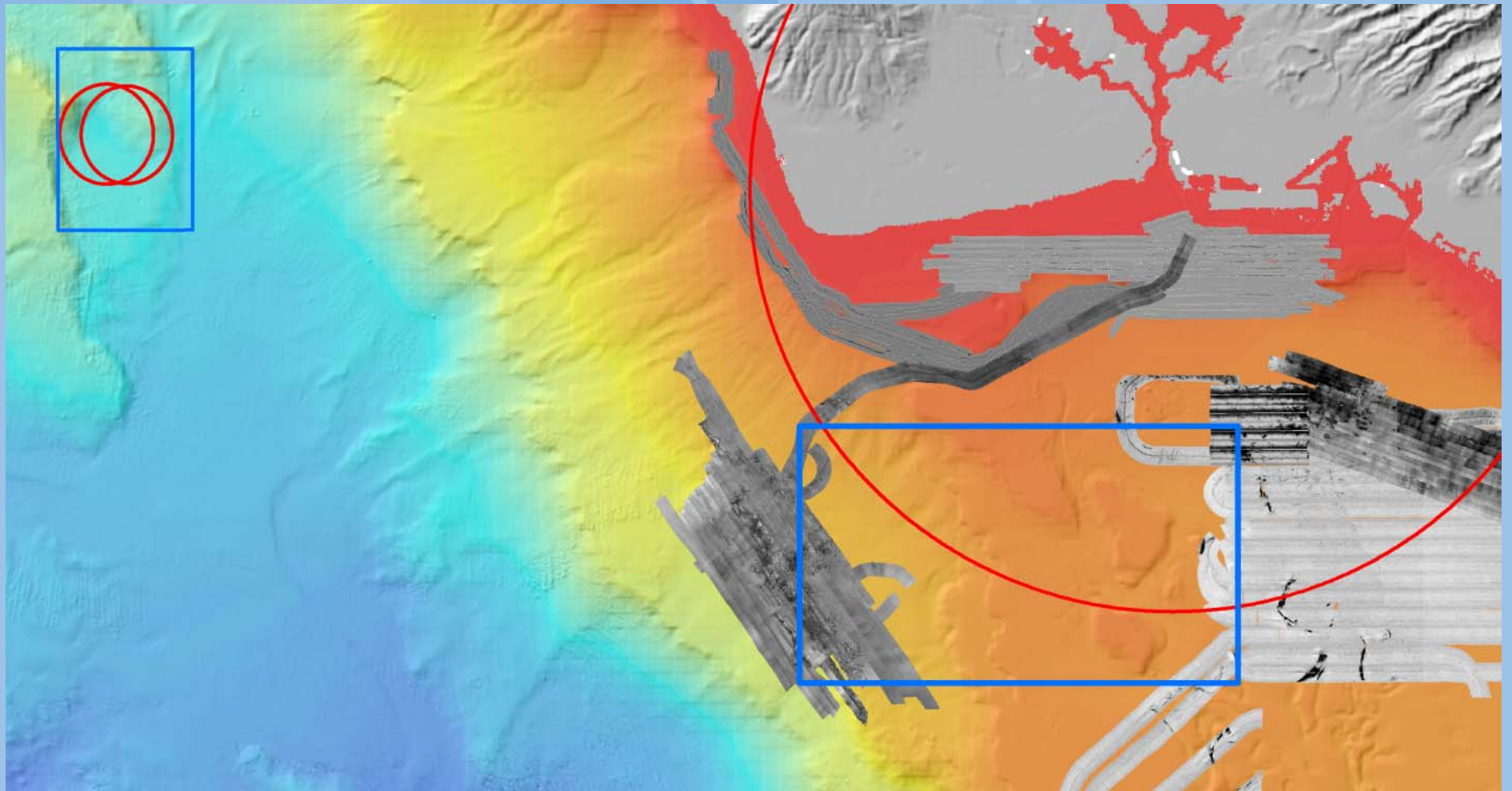
USS S-28 at Puget Sound Navy Yard, Bremerton, Washington, on 24 June 1943 after a refit.





Aichi M6A Seiran submarine-launched attack floatplane





Proposed survey areas for USN S-28 and Japanese I-23 submarines