

GEOPHYSICAL INSTRUMENTATION

Nick Benz
Shipboard Geophysical Group
Scripps Institution of Oceanography

White Island, Ross Sea

Shipboard Geophysical Group (SGG)

- Sonars
 - Multibeam: 712, 124, 129
 - ADCPs (ADCP Pool)
 - Knudsen 12kHz Echosounder
- SeaSpy Magnetometers

- Portable multi-channel seismic (MCS) system



Portable Multichannel Seismic System

Designed to be operated on UNOLS deck bolt pattern but can be installed on any ship with enough deck space.

- Acoustic Source
 - Qty 2 LMF Compressors (independent)
 - Sercel GI-210 Air Guns
- Data acquisition hardware
 - Depth controlled 120 channel streamer with instrumented tail buoy, e.g. mag, GPS
- Modular system can be deployed in various configurations

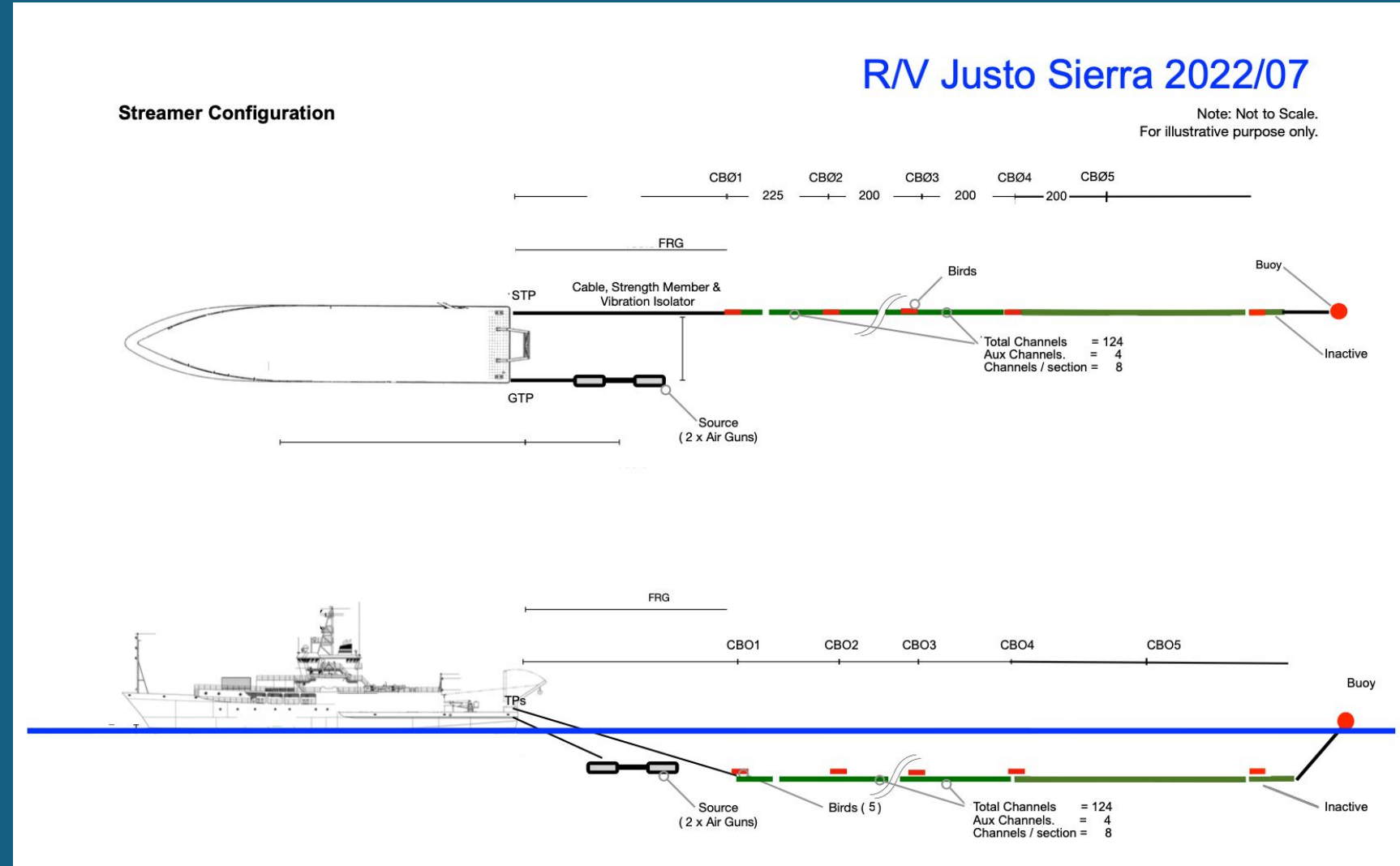


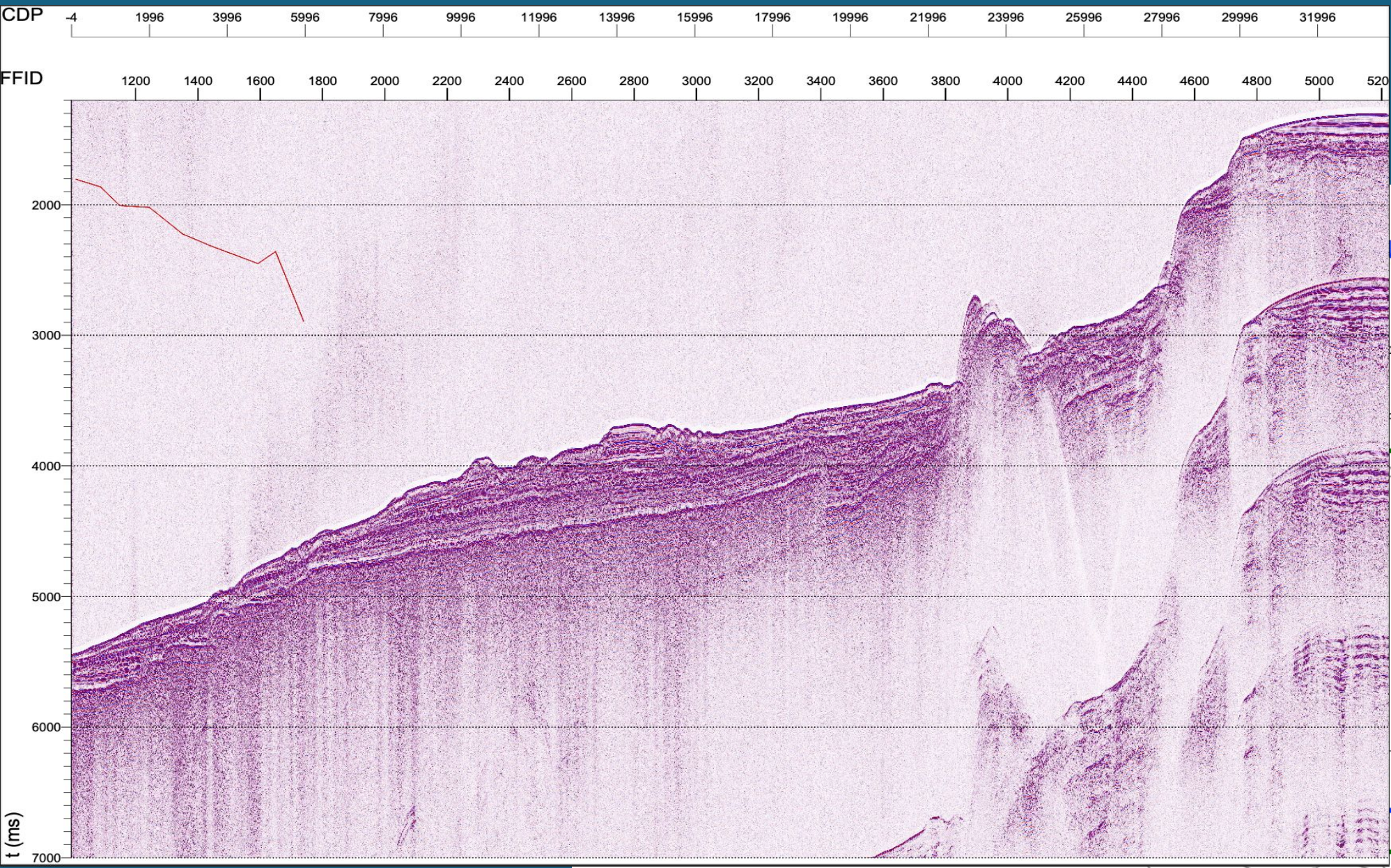
What is a seismic survey?

Acoustic source generates energy that is reflected at impedance changes below the seafloor

Repeated shots along trackline allow resolution of lateral changes in stratigraphy

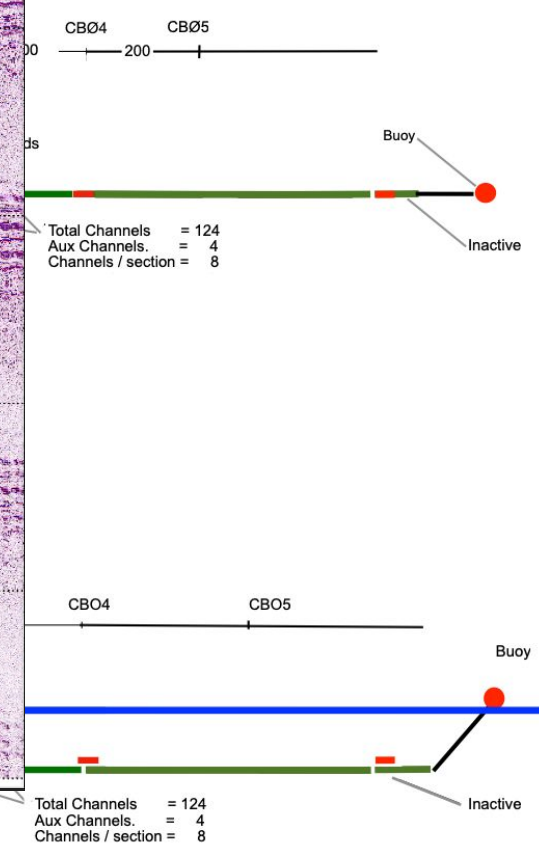
Maximum observation depths determined by record length

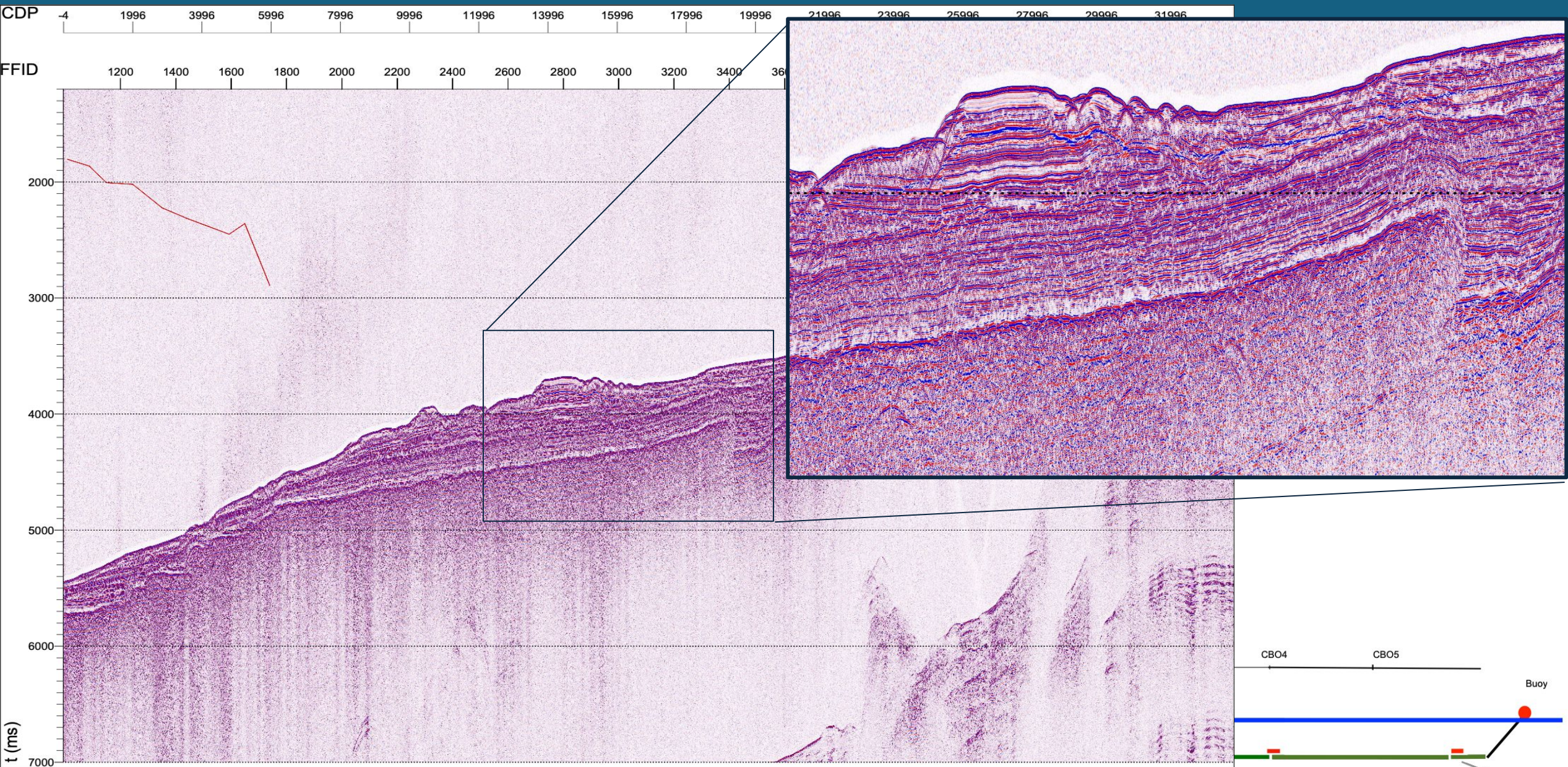




usto Sierra 2022/07

Note: Not to Scale.
For illustrative purpose only.



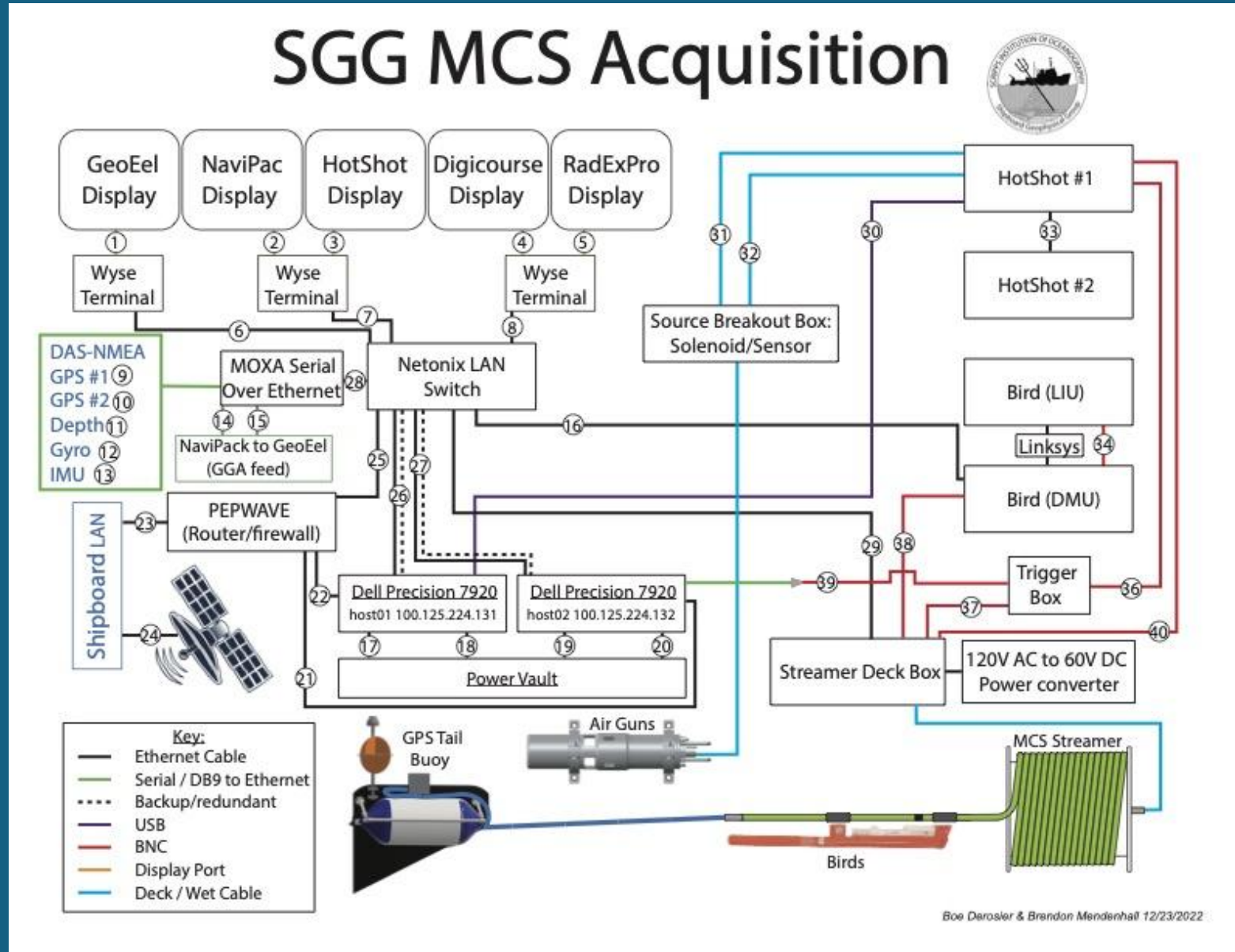


Source vs Acquisition



Acquisition Hardware

- GeoEel streamer
- Digibird "Birds"
- Tailbuoy
- Magnetometer



Geometrics GeoEel

Six hydrophones in each 50m “Active Section”

Typically towing 15 sections for ~1100m overall length (incl. vibration isolation, tow cables)

A/D conversion happens within each sections “Digitizer”

Digitizers contain A/D conversion hardware and network cards to transmit data



Digicourse DigiBird

Clamped to streamer during deployment

Remotely controlled fins provide streamer depth control

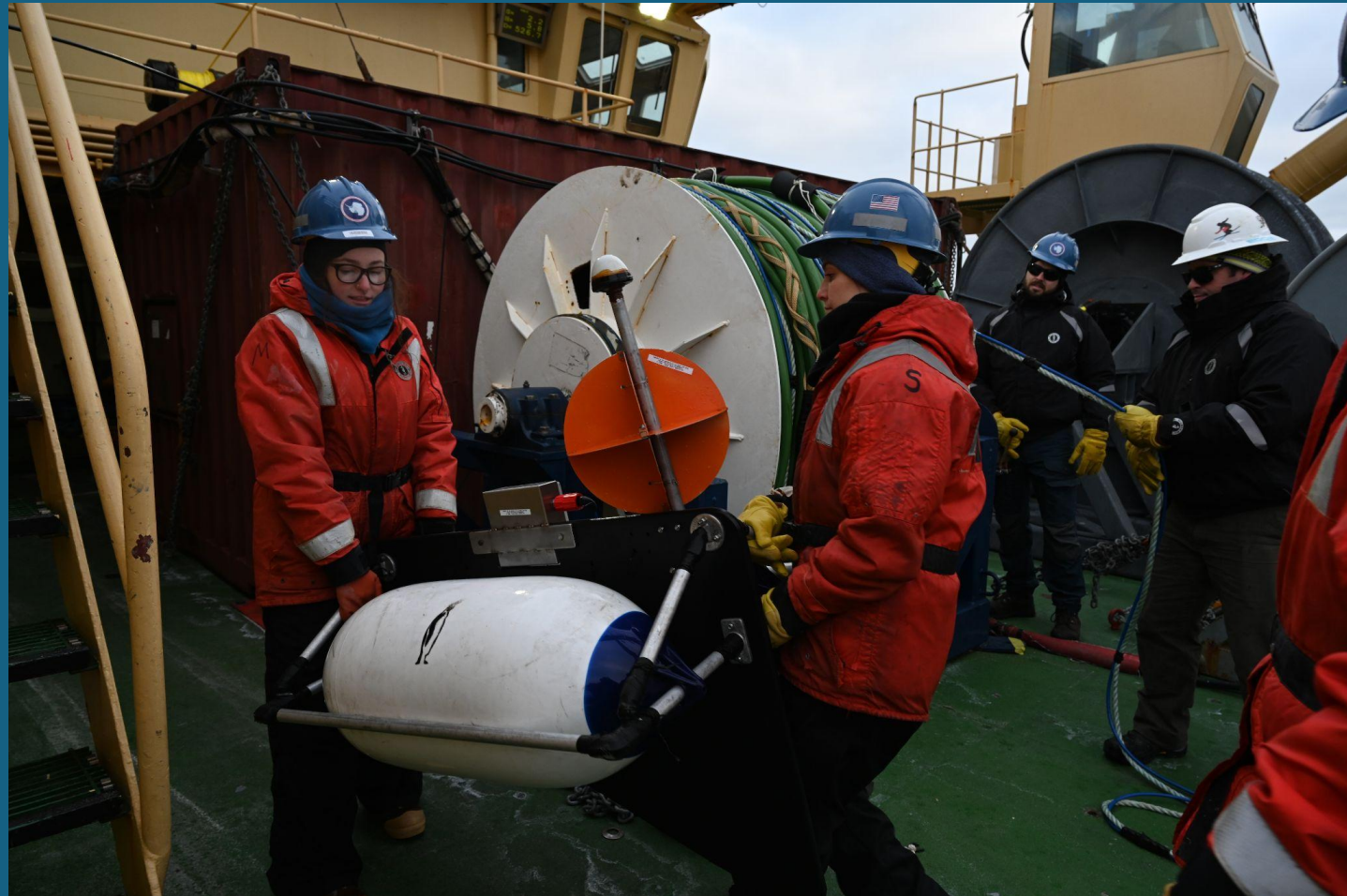
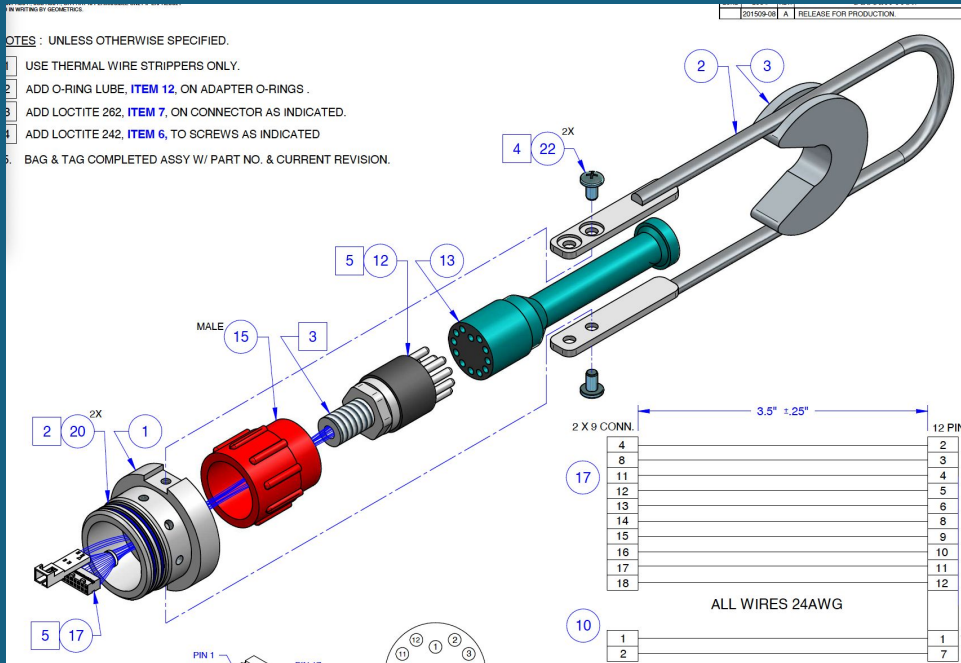
Communication over serial FSK



Tail Buoy

Leverages GeoEel's auxiliary channels

- NMEA GPS over serial or TCP/UDP
- SeaSpy2 serial enabled



Marine Magnetics SeaSpy2 Integration

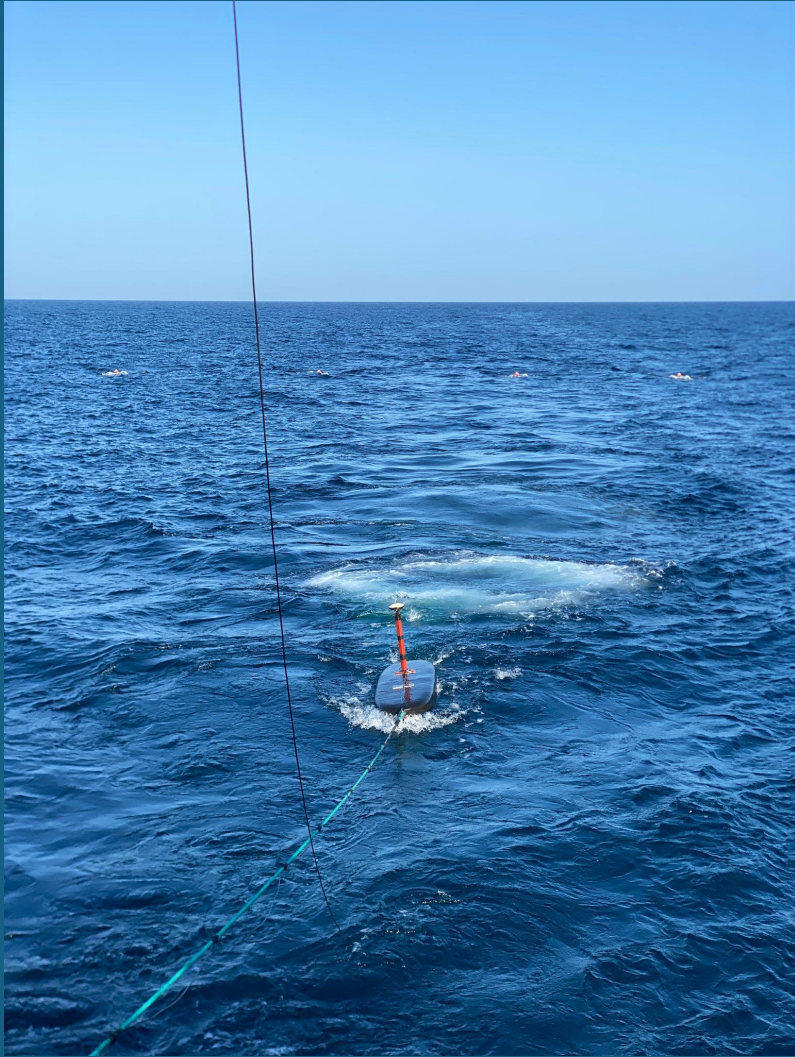
Attached 50m behind tailbuoy

Minimum magnetic interference

Communication with towfish over serial/IP
gateway



Sercel GI 210



LMF 11sL

Two newly acquired air compressors in 2023

Rental market equipment is scarce during industry booms, and available but unmaintained during busts

LMF has history of building compressors for research vessels, e.g. Thompson, Palmer, Justo Sierra

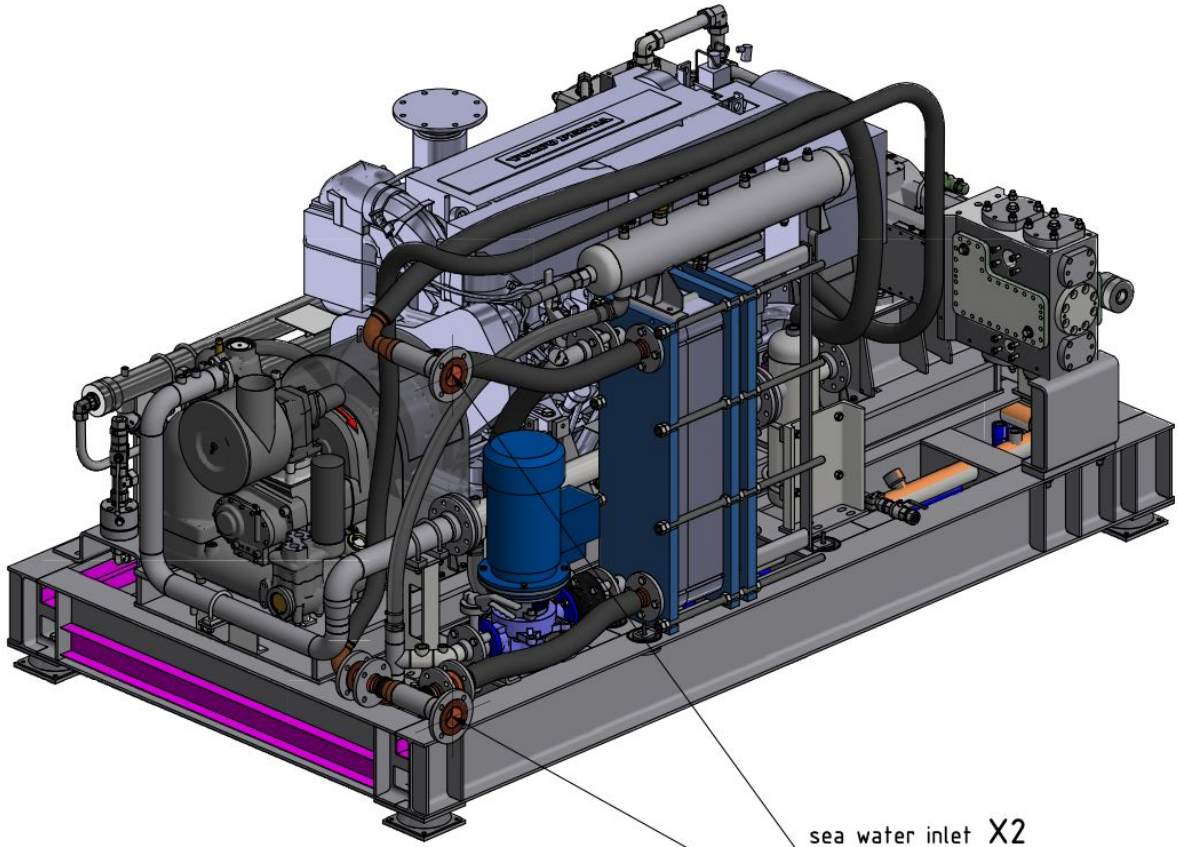
Can be deployed together or separately

Quiet: 80dB with doors closed

385 cf/m at 2500psi

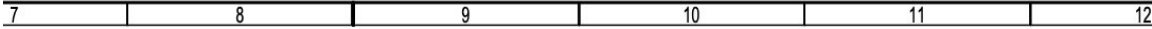
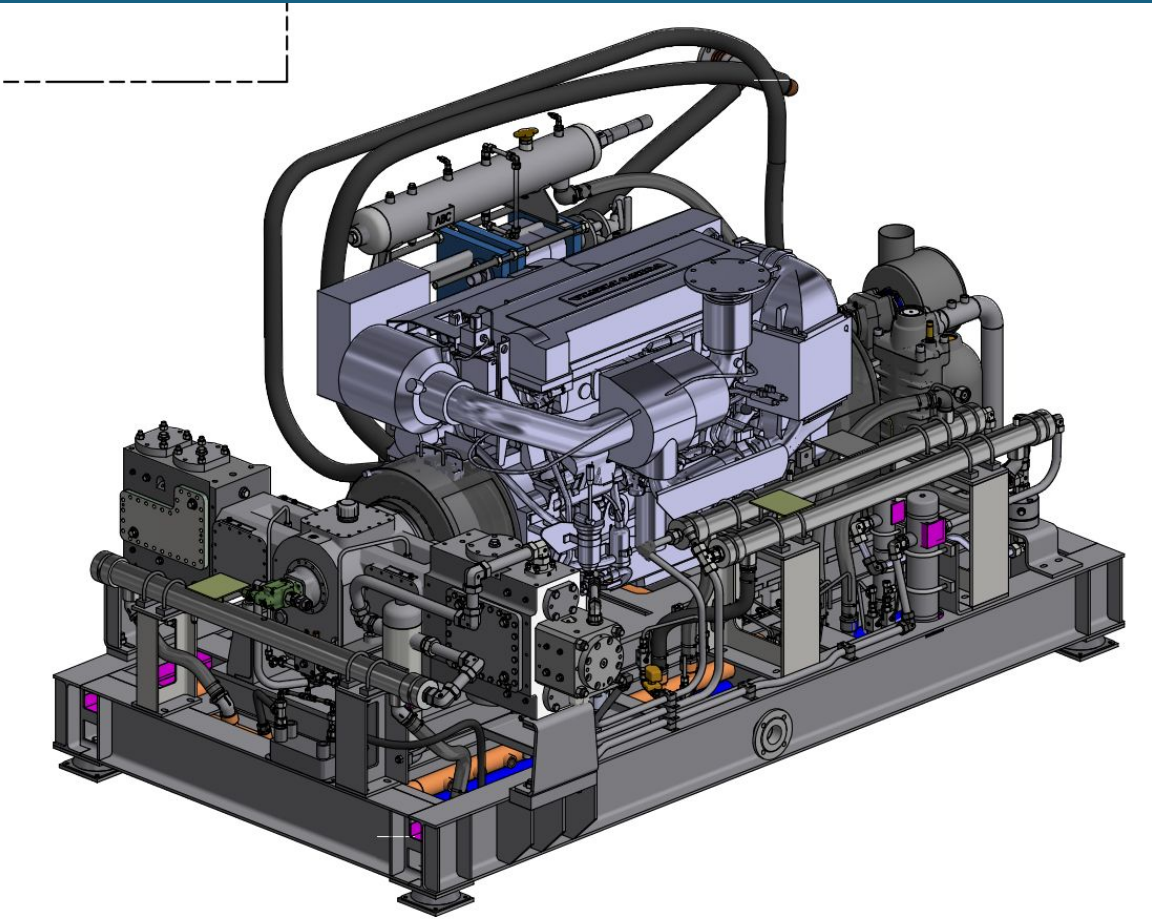


LMF 11sL



sea water inlet X2

sea water outlet X1



Questions?

