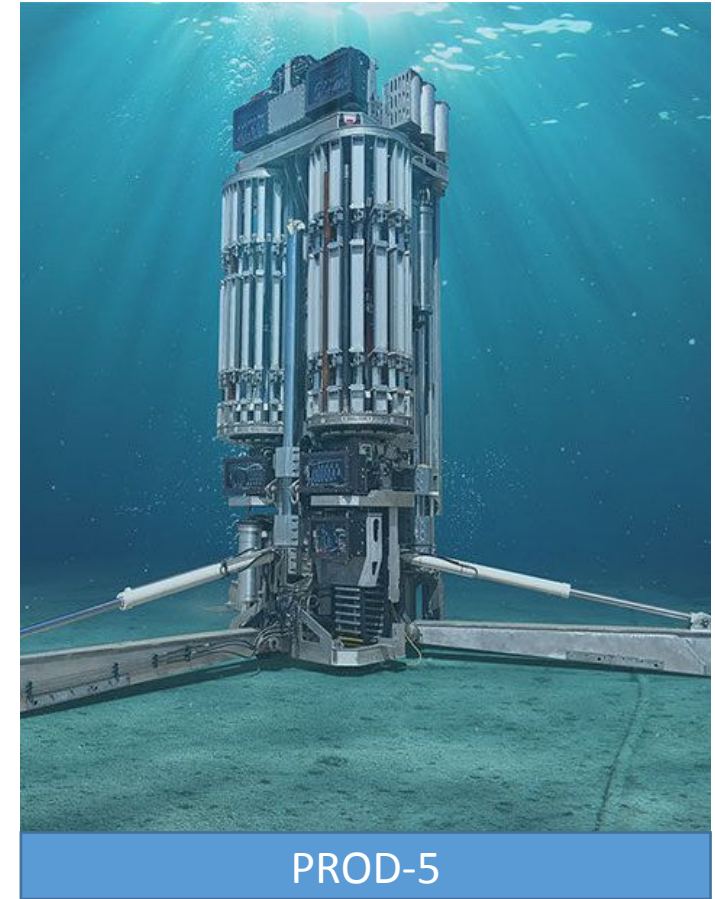
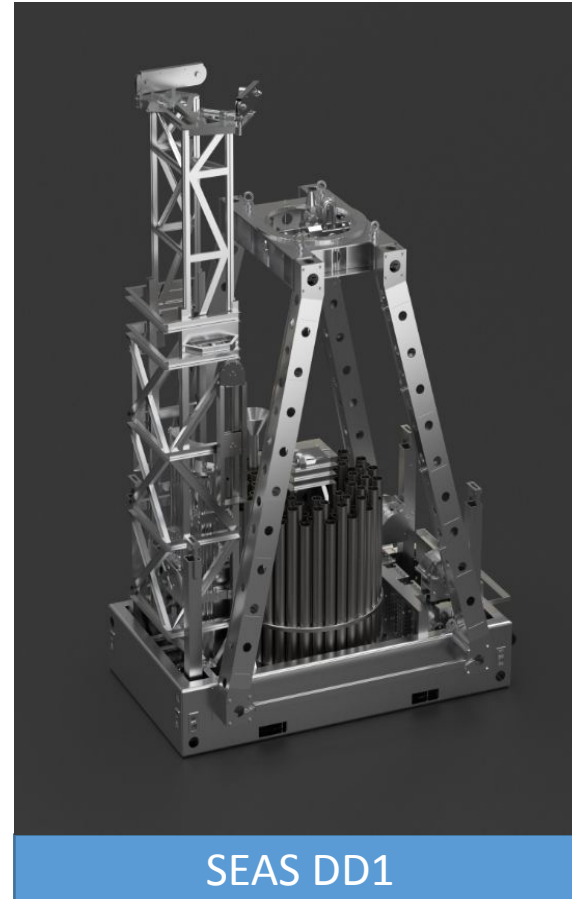


Lander Based Sea Floor Drilling

An important tool in the Geosciences sampling toolbox

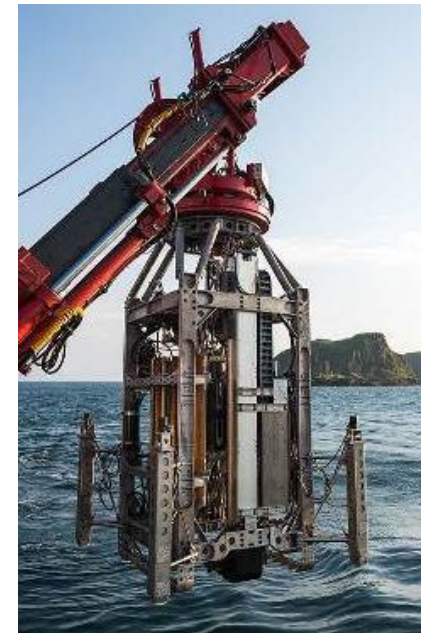


Lander Based Sea Floor Drilling

Ross Hein

ARV, Science Mission Coordinator

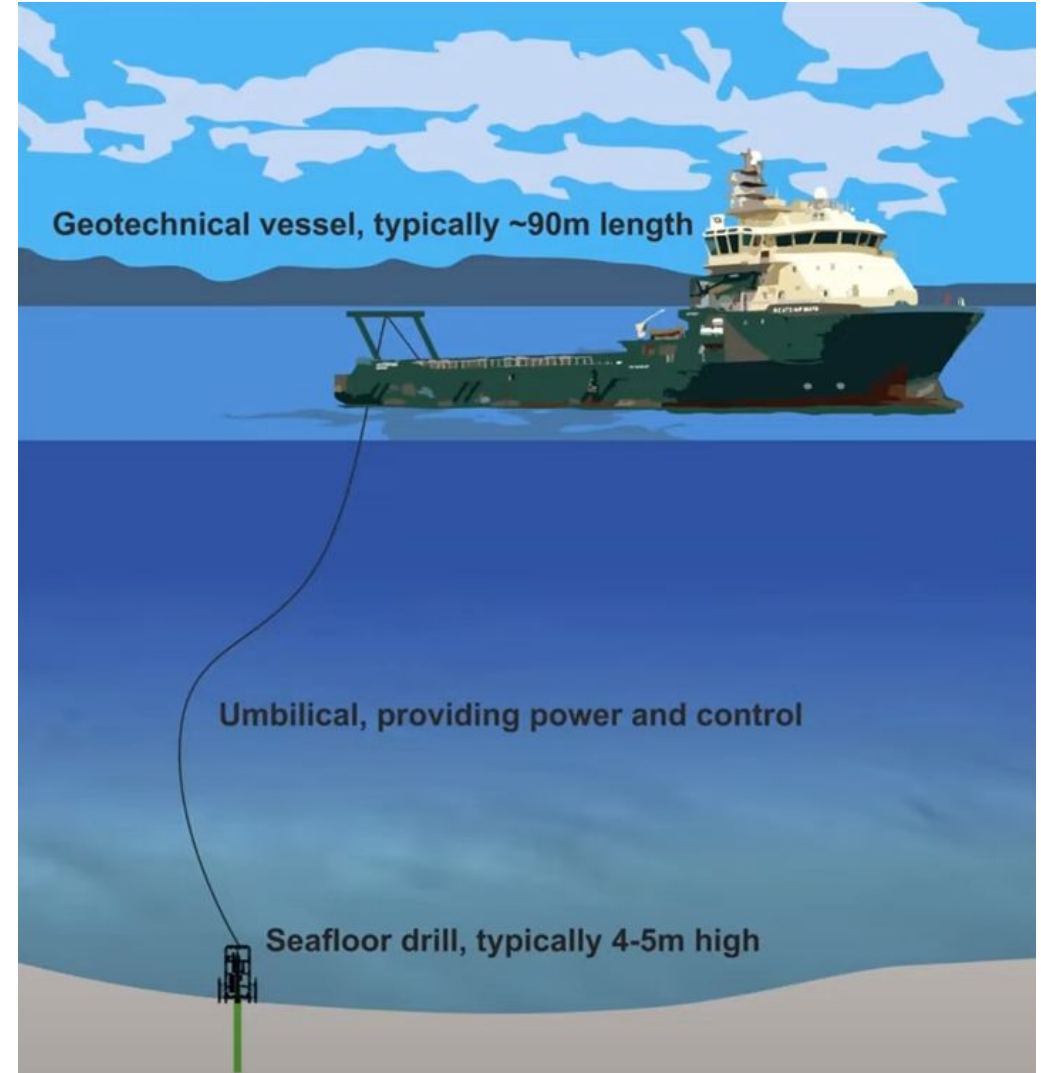
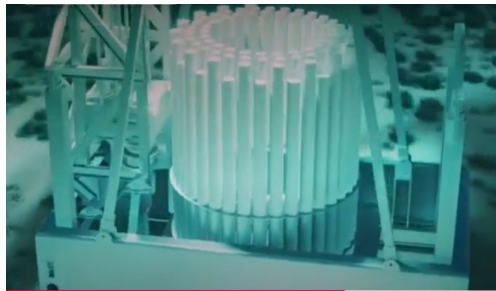
Antarctic Support Contract



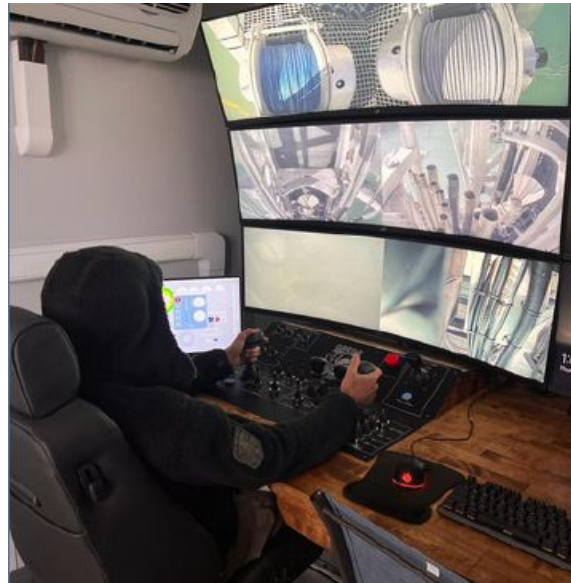
What is a Sea Floor Drill?

Working Class ROV that specializes in drilling

- Able to use thrusters to orient
- Live cameras to visualize landing and monitor drilling process
- Leveling system for sloped or uneven seafloor (20-30°)
- Monitored/Controlled from surface vessel
- Relaxed DP requirement from ship-based drilling
- Seabed Rig is unaffected by vessel movement
- Able to use vessels of opportunity

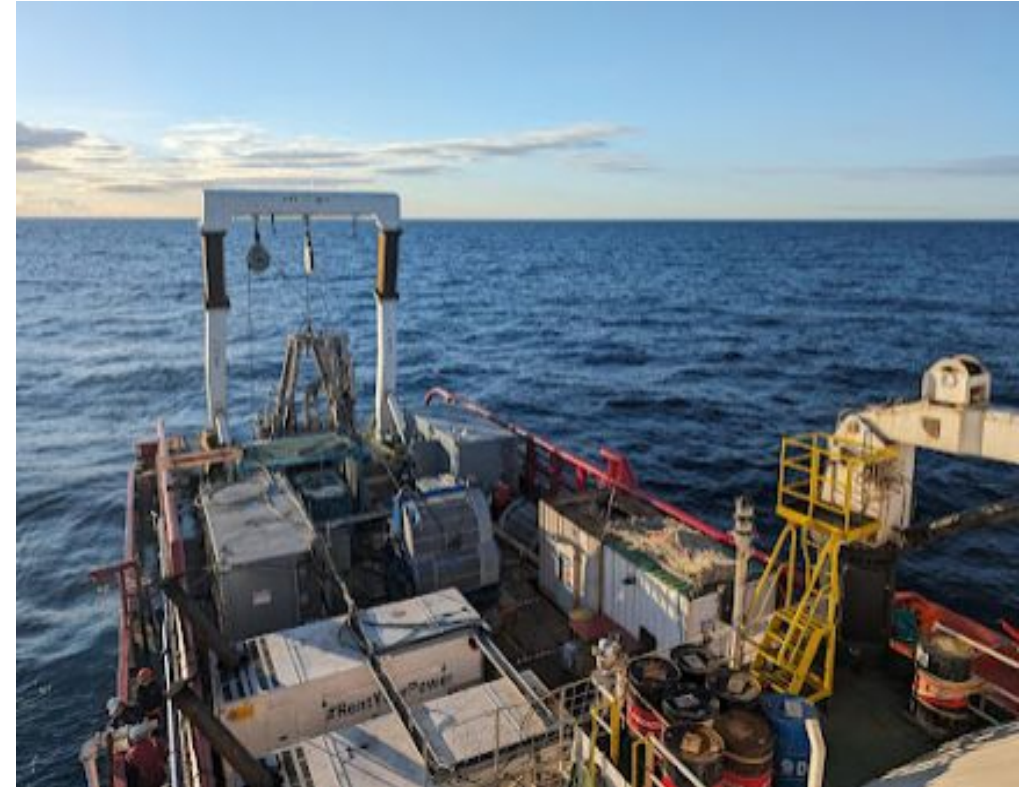
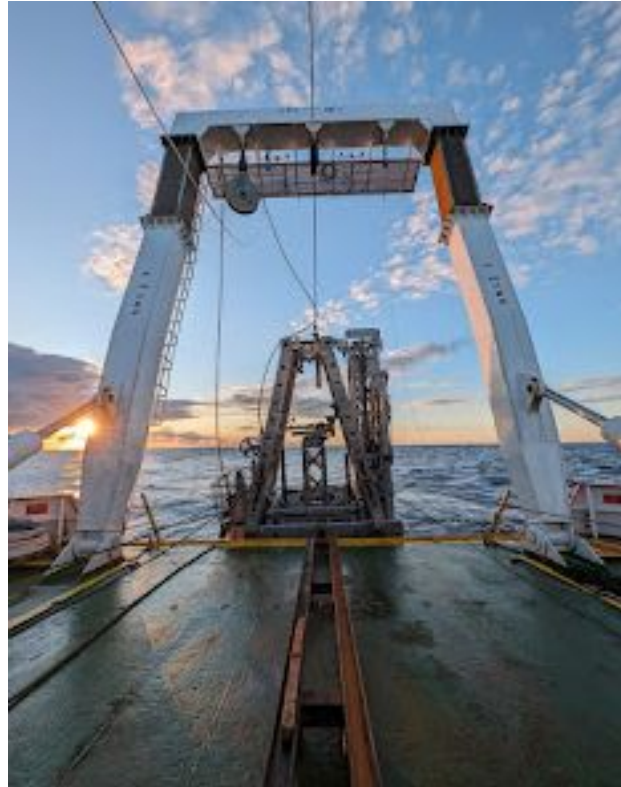


Topside Controls and Monitoring



Automated robotic drilling is monitored from a control van on the deck of the support vessel

Back Deck Operations



SEAS Geosciences Deepwater Drill 1

Sea Floor Drilling from ARV

MeBo200 Case Study

Capability

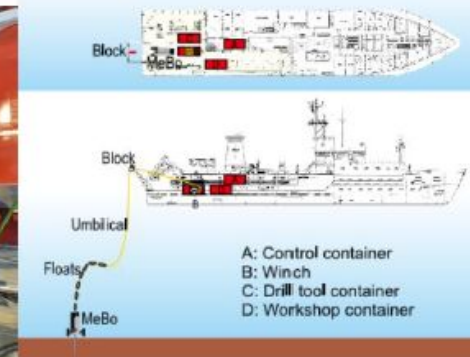
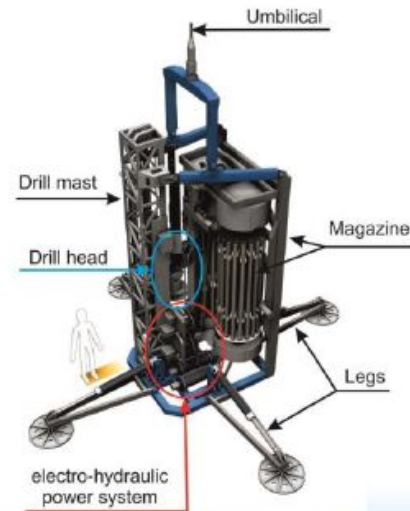
- max water depth 2,700 m
- max core length 200 m

Support Requirements

- 30 tonne A-Frame
- 400V, 50Hz, 500A Power
- 8x14 m footprint + 4ea 20' Containers

ARV support operations

- Ice Management, Vertical Casting Astern
- Station keeping ~30m watch circle

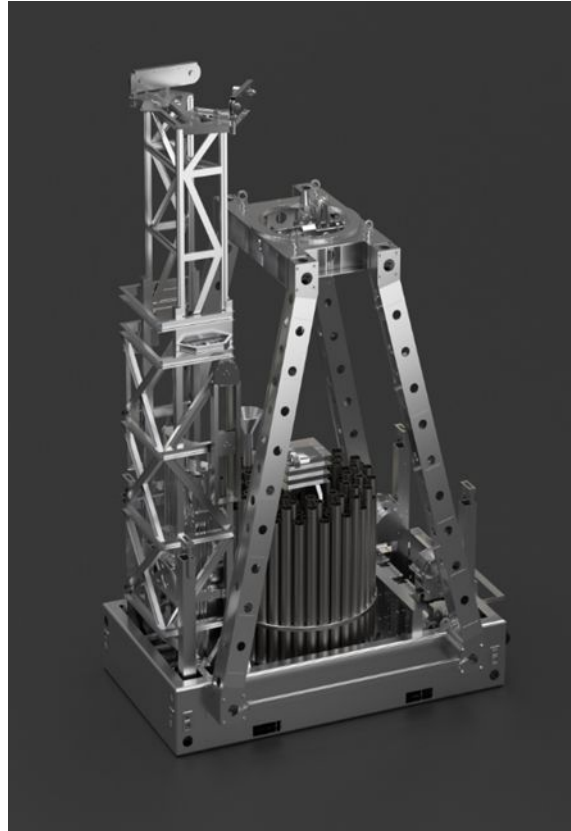


Where do I get one?

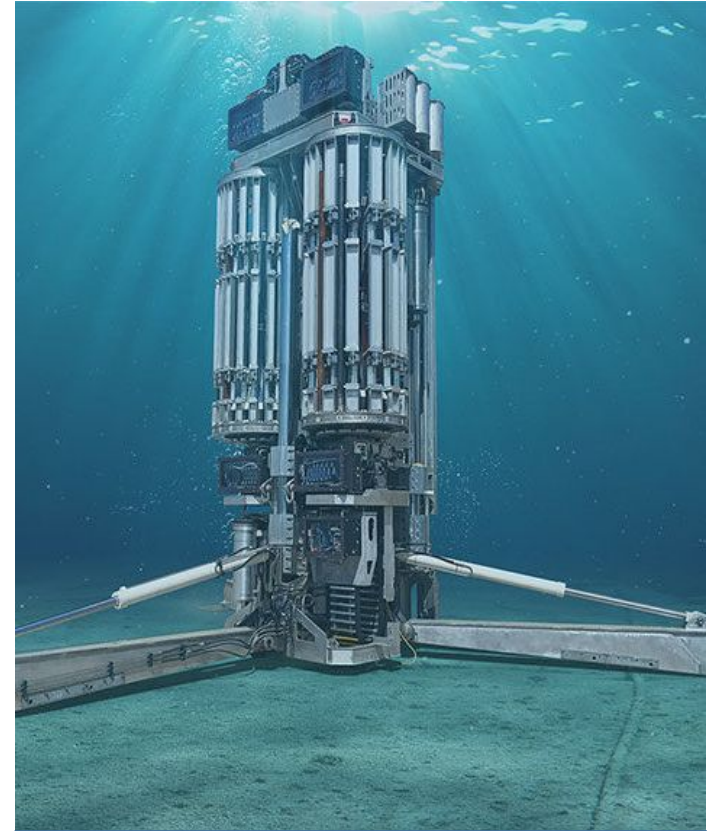
Next Generation Robotic Drill Rigs



MeBo200

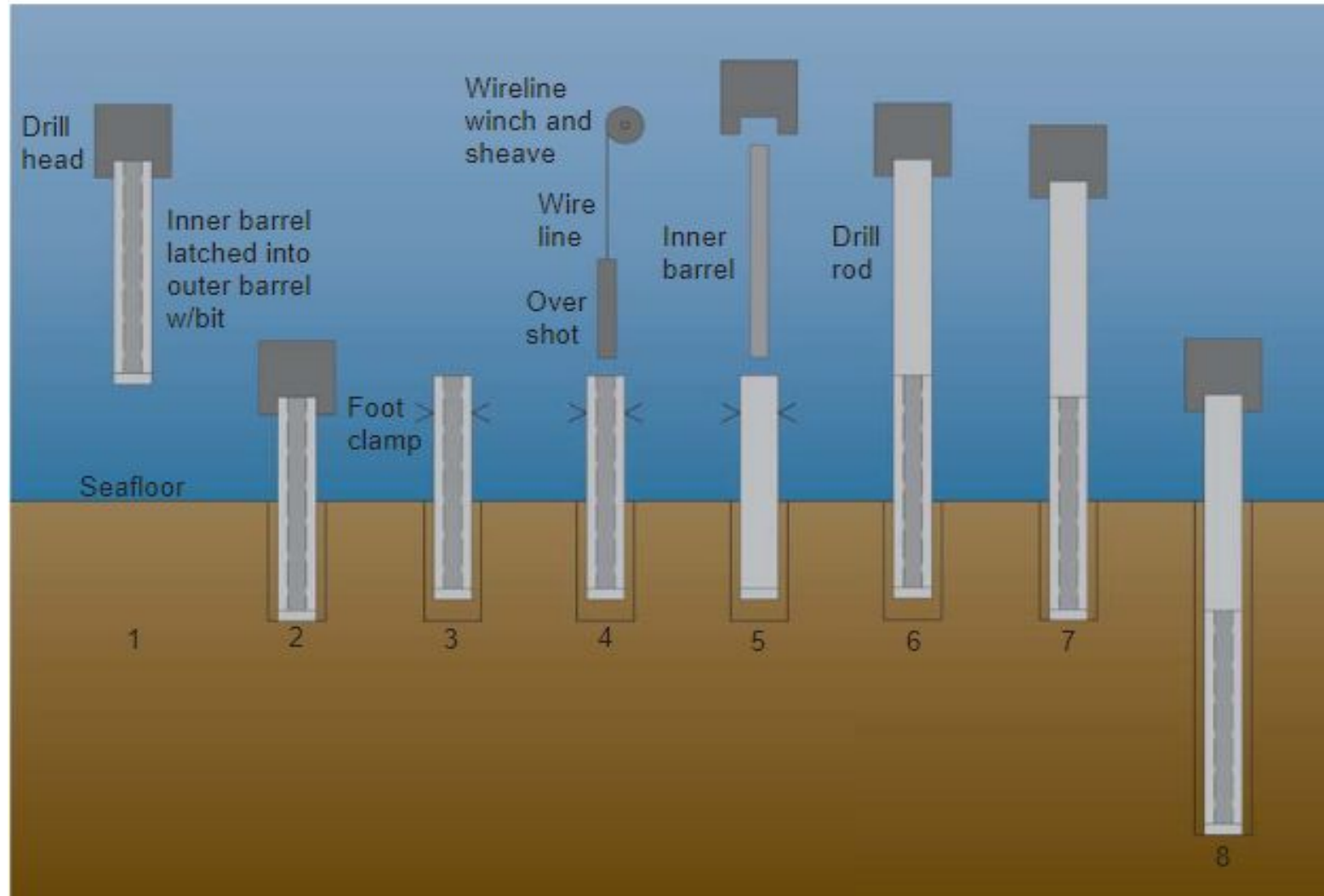


SEAS DD1



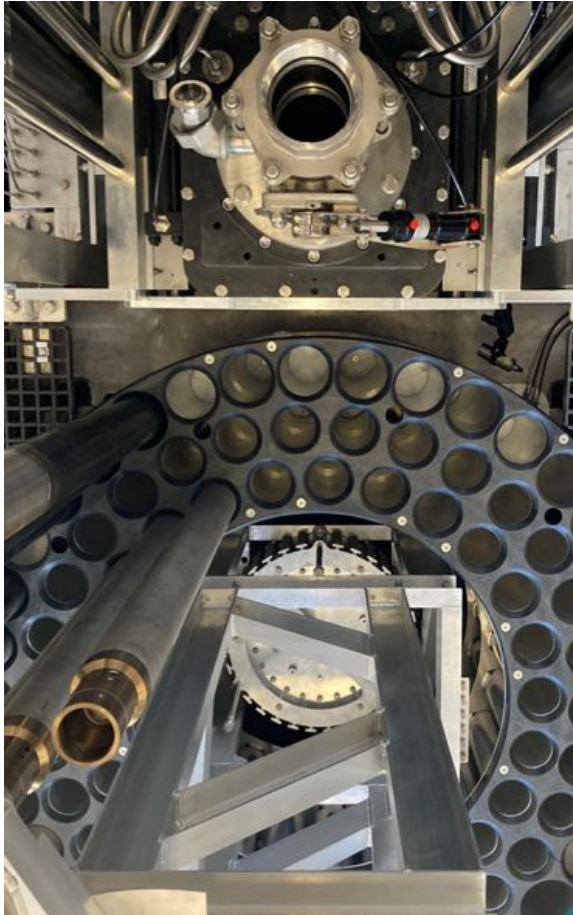
PROD-5

How Does it work?

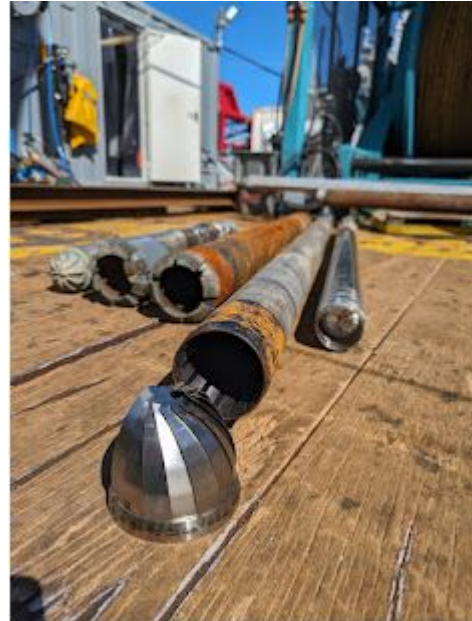


1. Grab first core barrel assembly – inner barrel latched into an outer barrel with bit
2. Drill and collect first sample
3. Lift off bottom of hole, close foot clamp, move drill head out of the way
4. Move wireline over hole, lower over shot, raise inner barrel (with sample) and store in magazine
5. Get new inner barrel, place in top of outer barrel, release and let drop
6. Attach drill rod
7. Open foot clamp, lower to bottom of hole, start drilling
8. Drill and collect second sample

Carousels carry outer and inner core barrel sections



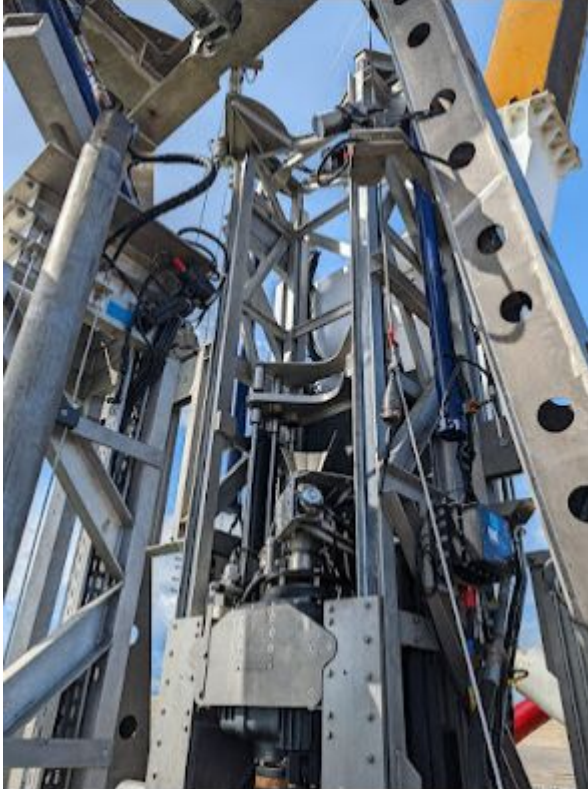
Barrels, Cutters and Catchers



Overshot detail



Drill Rig



Drill motor moves up and down on tracks



Thrusters for orientation when landing

Support Considerations & Vessel Requirements

- Over-boarding requirements/dedicated LARS?
- Power Requirements
- Deck Space for Drill and support vans
- Deck Space for Science Lab vans & core storage
- Berthing for Science and Drill Teams
- Mob/De-Mob requirements in port

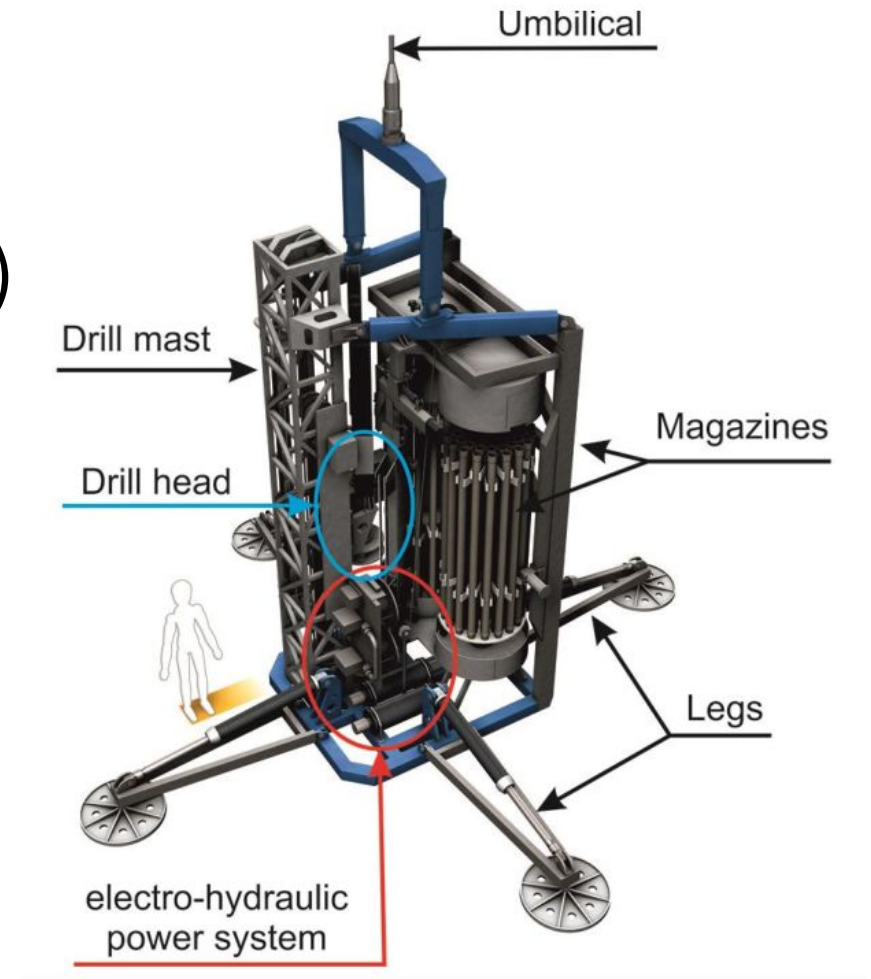


OSV MMA Valour and PROD-5 on LARS

Seafloor Drill Characteristics

- Typical sized vessel (compare 3 drills)
- Water Depth / Max Core Length
- Core Dimensions (long narrow/short wide)
- Other sampling needs (wire line)

	PROD-5	MeBo200	SEAS DD1
max water depth	4,000 msw	4,000 msw	4,000 msw
max core length	>100 m	200 m	>100 m
core diameter	72 mm	63 mm	73 mm
barrel length	2.5 m	3.5 m	2 m



Closing Discussion

- Trade off between depth and diameter
- Neither PROD-5 or MeBo200 can be supported by most UNOLS vessels. Could DD1 be deployed from the Nathaniel Palmer, or the Roger Revelle or possibly Sikuliaq? Could PROD-5?
- These are some existing systems, but there is also the ability to customize solutions aligned with science priorities and requirements.



Thank You



IODP Bremen Core Repository