

Overboard Handling Capabilities for Seafloor Core Sampling

Ethan Roth

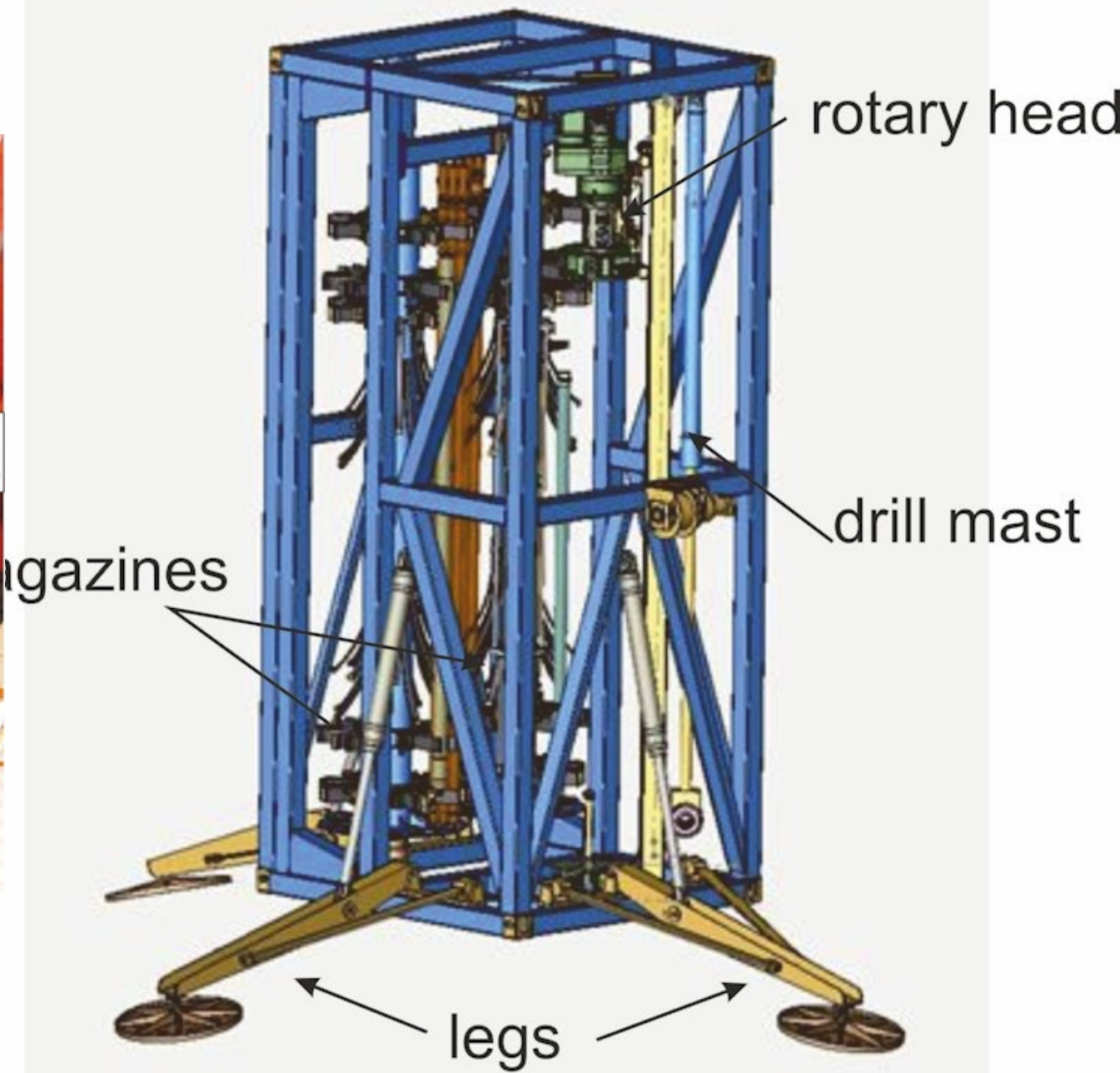
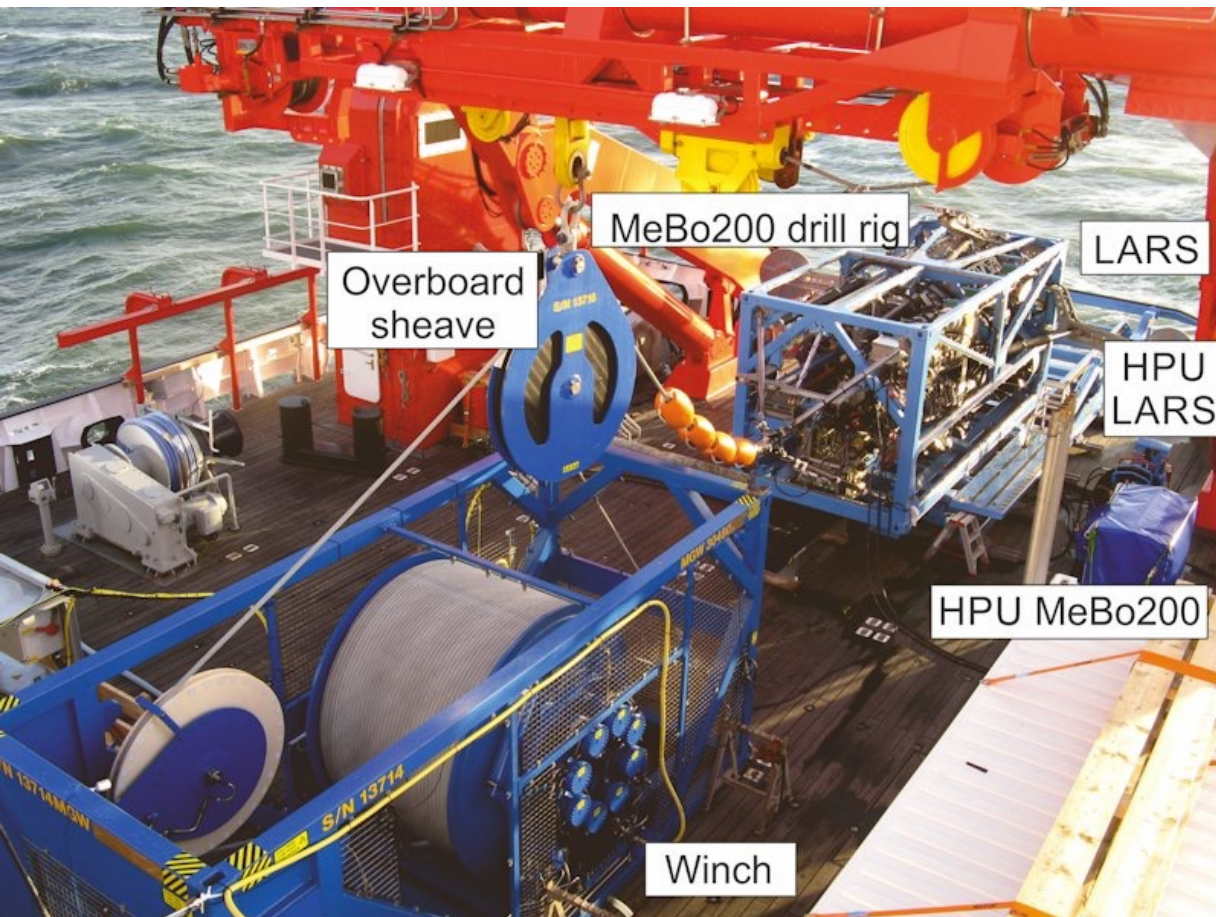
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Background & Sampling Technology

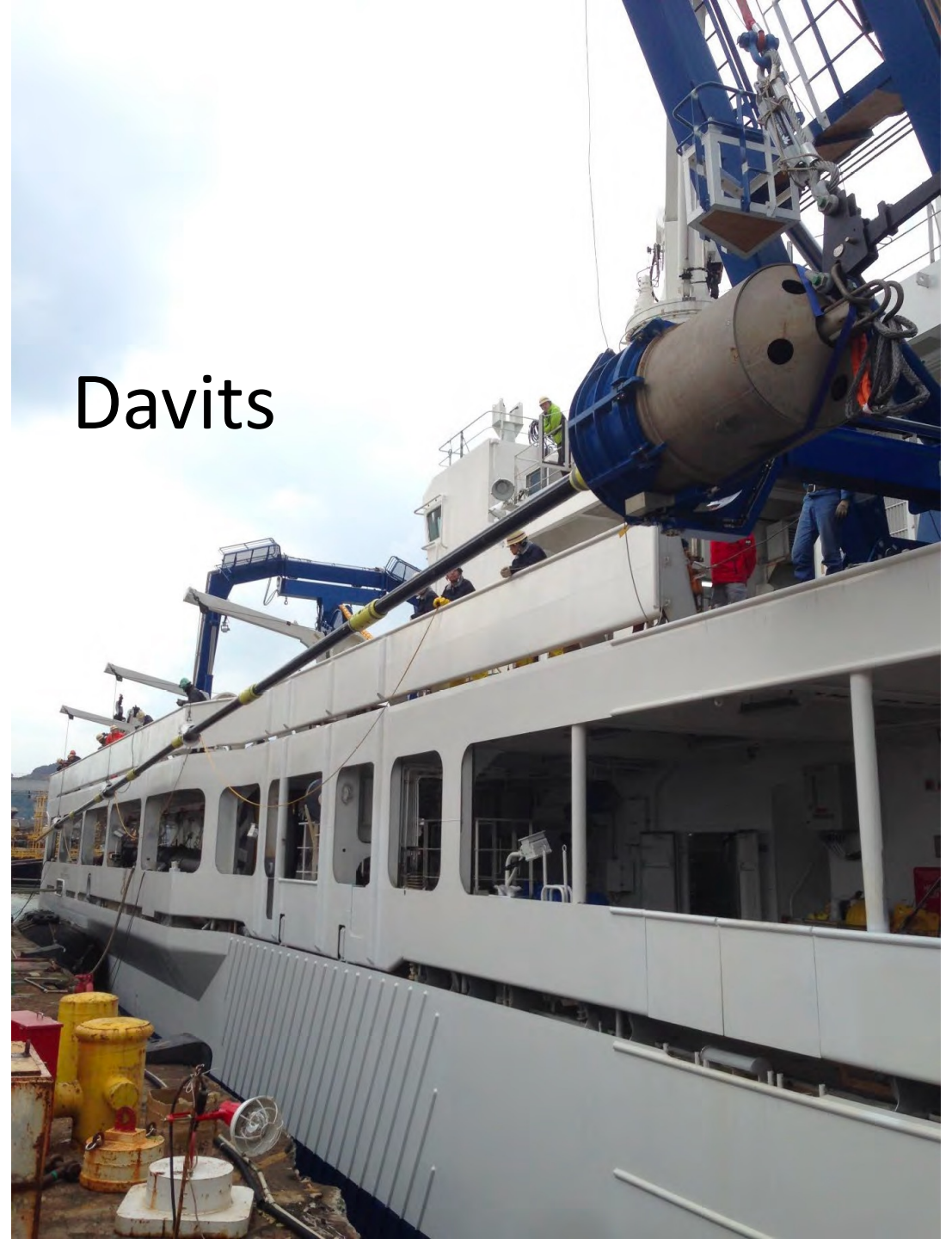
- IODP – riserless drill ship JOIDES Resolution is now retired.
- Seafloor Lander Drill Rig – MARUM MeBo200 robotic drill
 - Collects up to **200 m cores** in 2,500 m water depth. Enables borehole science.
 - Requires LARS, lift winch (umbilical $\varnothing=35.5$ mm), and stern **A-frame**.
 - Line loads of up to **30 tons**. Deployments can take more than 2 days.
- Piston Coring – OSIL Giant Piston Corer
 - Collects up to **60 m cores** in soft sediment and muds. Full ocean depth.
 - Weighs up to 10 tons. Pull out force depends on sediment type & core length.
 - 32 mm synthetic line reduces elongation & recoil effect (tensile strength = **89 tons**).



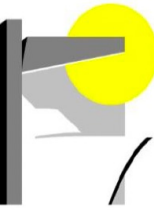




Cradle



Davits

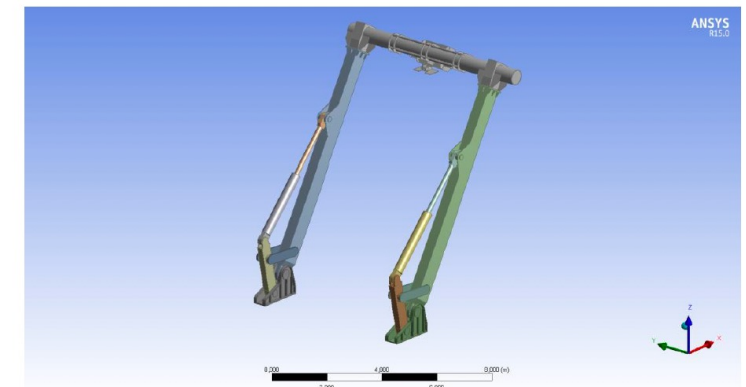


Sikuliaq A-frame Capability Review & Strengthening Feasibility Study

- Allied A-frame Critical Design Review & Analysis
 - Identify what additional analysis would be necessary to allow higher working loads in the outboard deployment position.
 - Develop a simplified surface model of the A-frame and perform first-order Finite Element Analysis (FEA) for four load cases to identify limiting factors of the current design.
- A-frame Strengthening Feasibility Study
 - Develop concepts for how weak areas of the A-frame structure could be strengthened to increase capacity.
 - Re-run and update FEA models. Run limit case FEA.

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Structural Analysis of the A-Frame



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