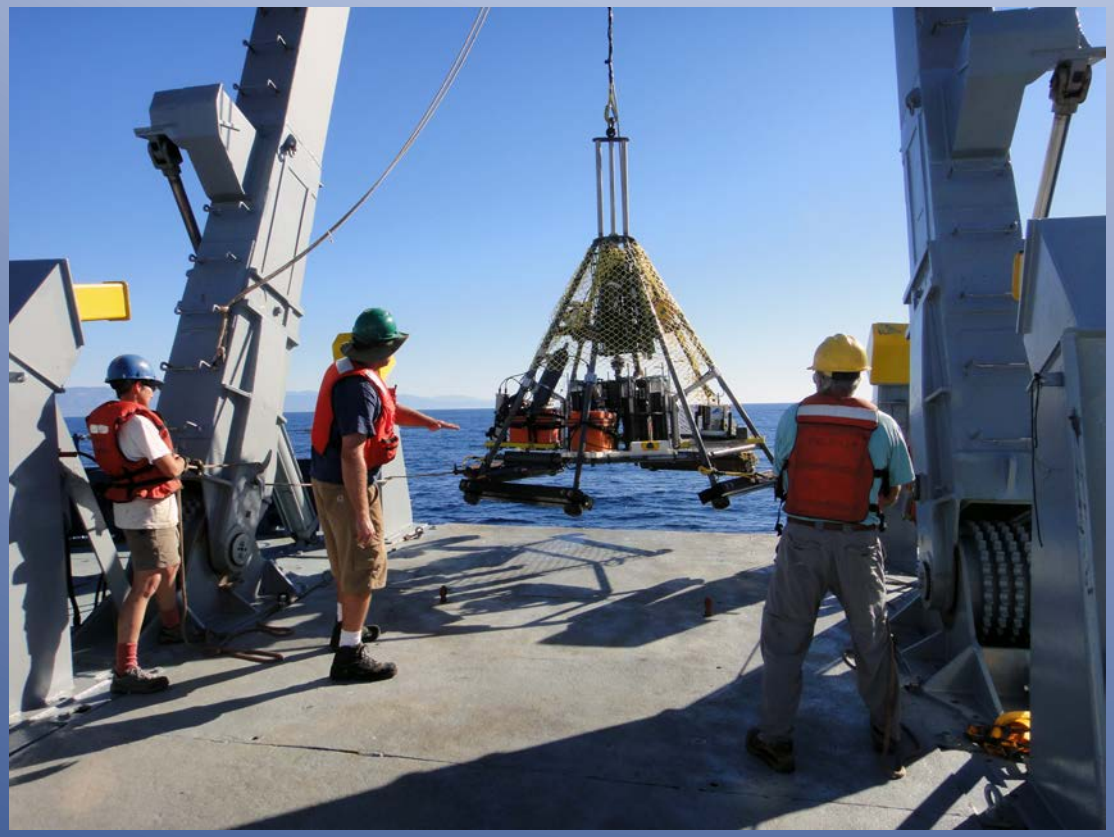
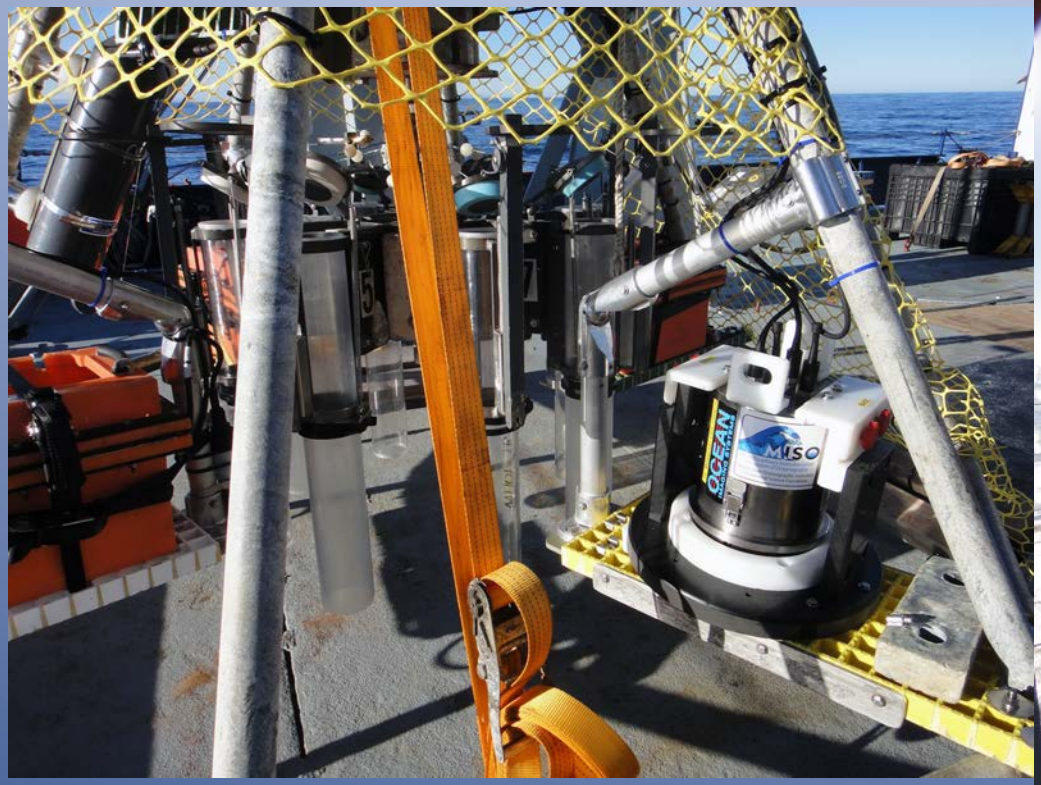
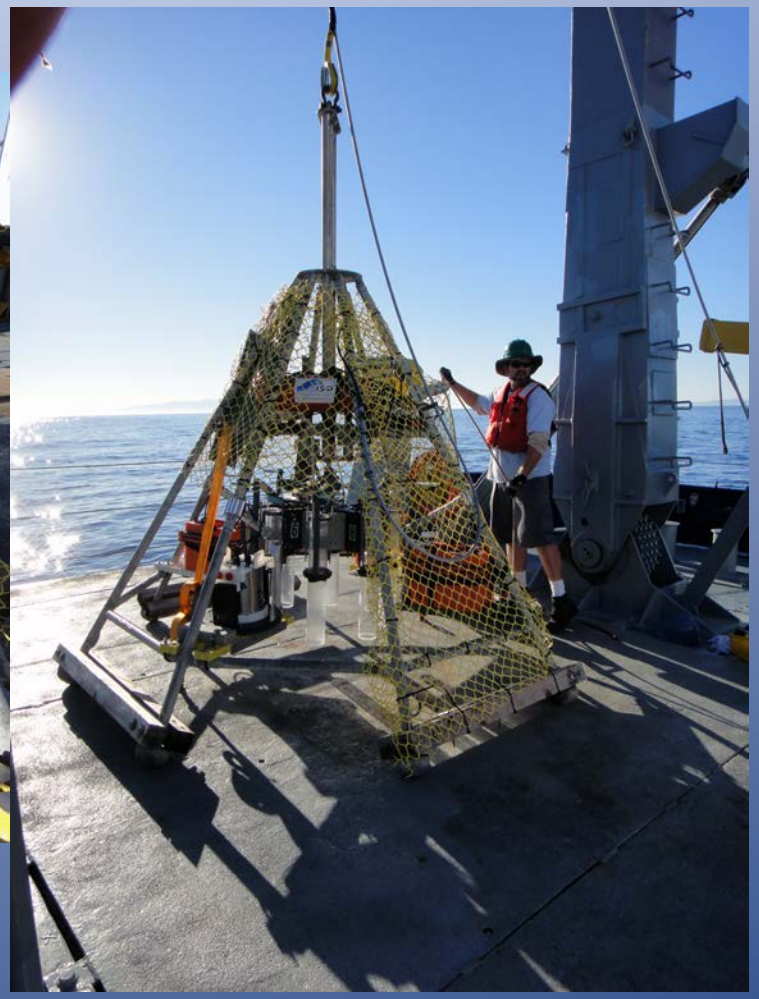


MC-800 Muticorer with Real-Time Camera, CTD and Water Sampling Capability for the UNOLS Community

Dan Fornari
Joan Bernhard
Ginny Edgcomb
WHOI

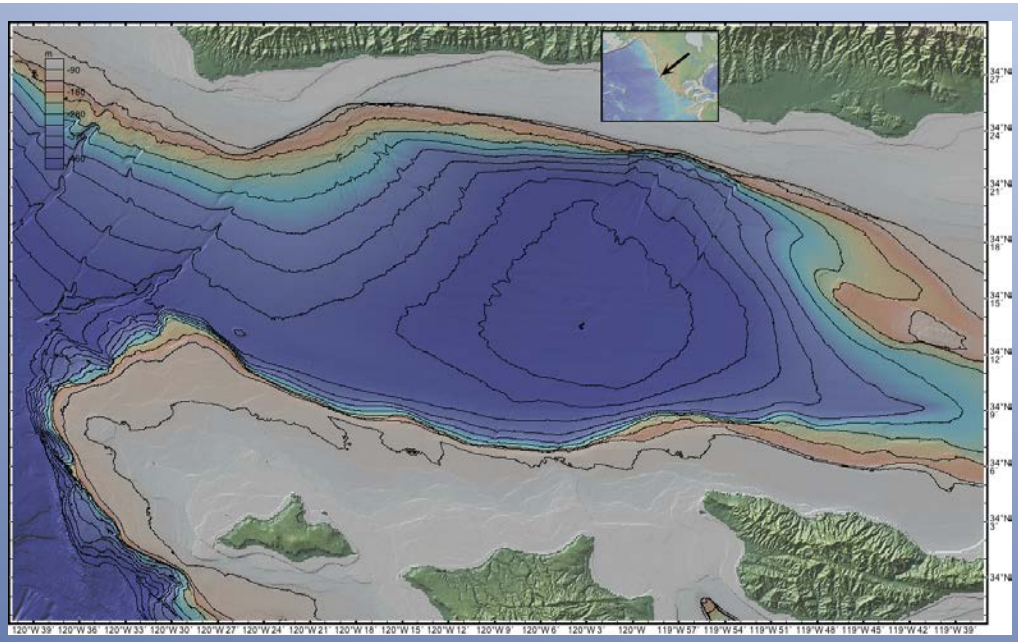
A real-time, camera-operated multicorer system can be used in a variety of sedimentary settings where spatially restricted habitats occur. Examples of these habitats include hydrocarbon seeps, mud volcanoes, sediment-covered hydrothermal vents such as Guaymas Basin, the zone where the chemocline impinges the seafloor in silled basins such as the Cariaco Basin, Black Sea, Deep Hypersaline Anoxic Basins (DHABs) and fjords such as Saanich Inlet.

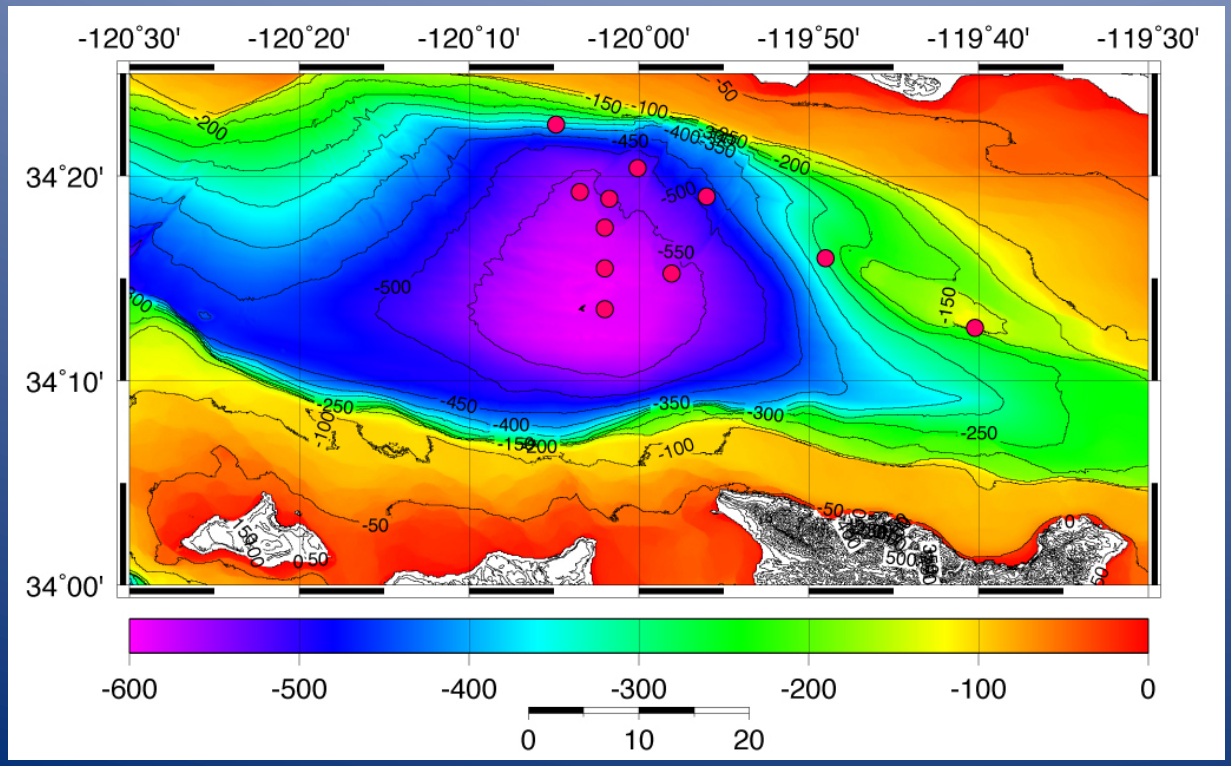




Key Objectives of NSF-Funded Multicorer Project:

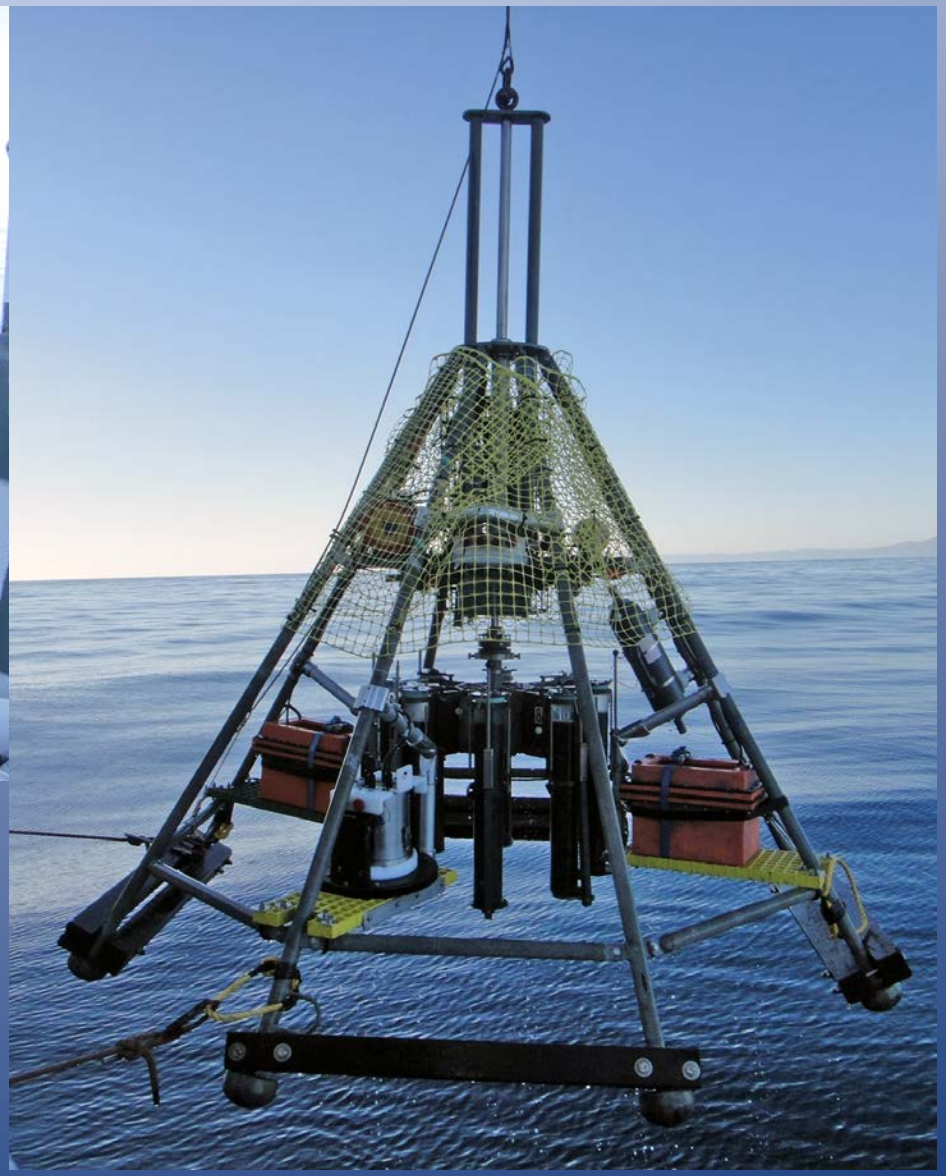
- Provide modular attachment fixtures for MISO camera, CTD, batteries, strobes, & water sampling bottle that would work for any MC-800 multicorer in the UNOLS system
- Ensure functionality of imaging and water sensing/sampling components without compromising functionality of the multicorer
- Carry out field testing to quantitatively assess working loads/tensions on both 0.680” coax and 0.322” CTD standard UNOLS cables, improve core recovery and quality of cores.



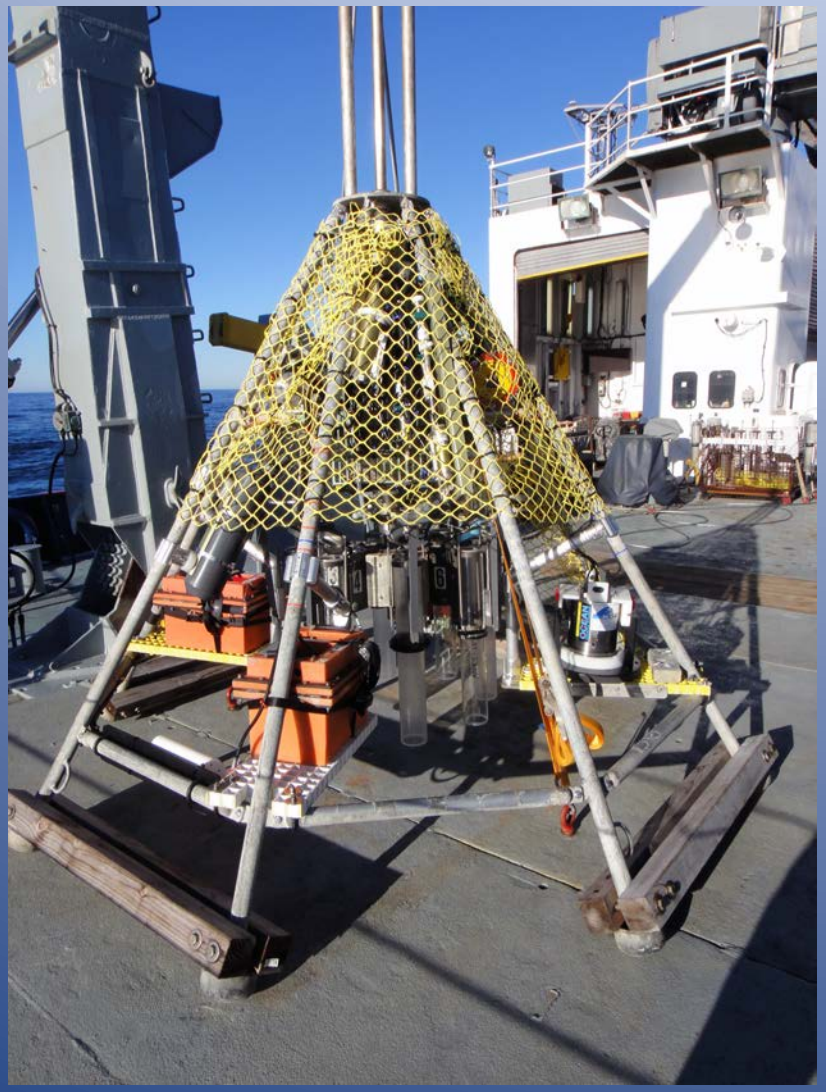


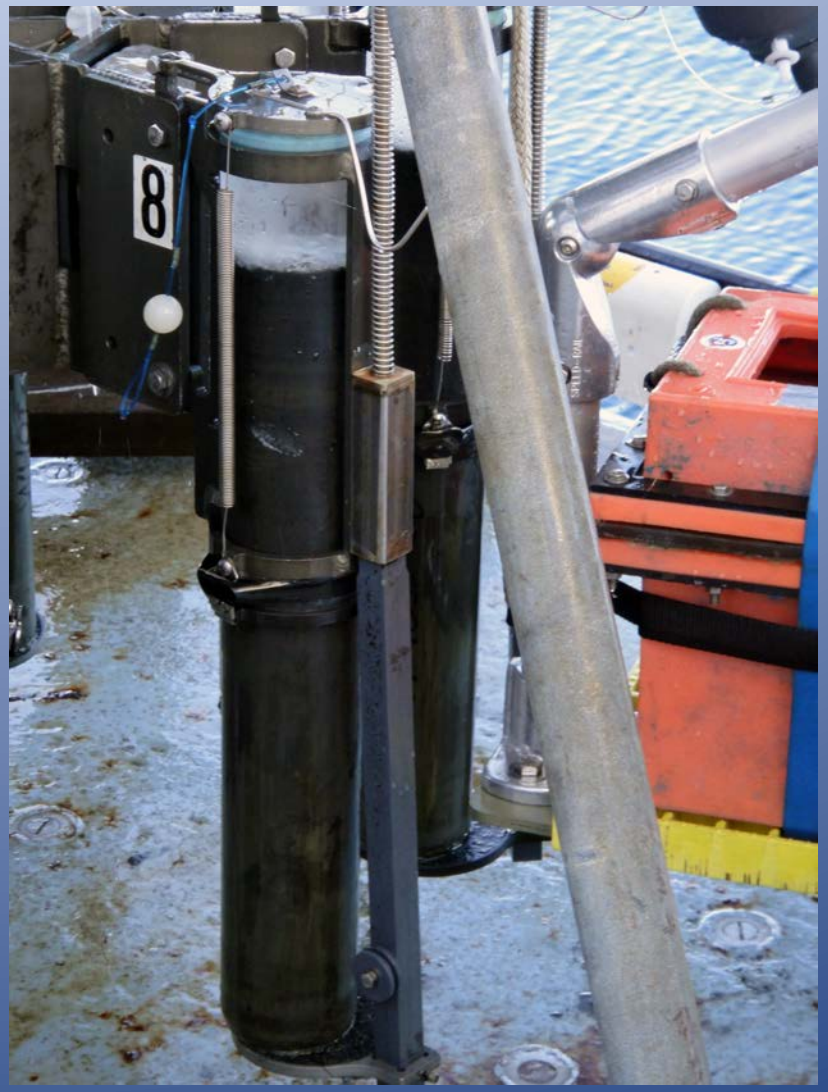
Field area for testing multicorer with camera & CTD was the Santa Barbara Basin – 17 lowerings were carried out, 15 successful lowerings in terms of good core top recovery.

Water depths from ~150 m to ~600 m.



- MC-800 rigged on *R/V Melville's* CTD cable and deployed over the starboard A-frame.
- We used the WHOI-MISO DataLink network extender electronics (Marshall Swartz) to transmit images up the CTD cable and the 0.680 coax cable.
- Altitude and depth data were viewed at 1 Hz and provided by the SBE-25 CTD as well as serially through the DataLink for a SBE-50 depth sensor and a PSA-916 altimeter.





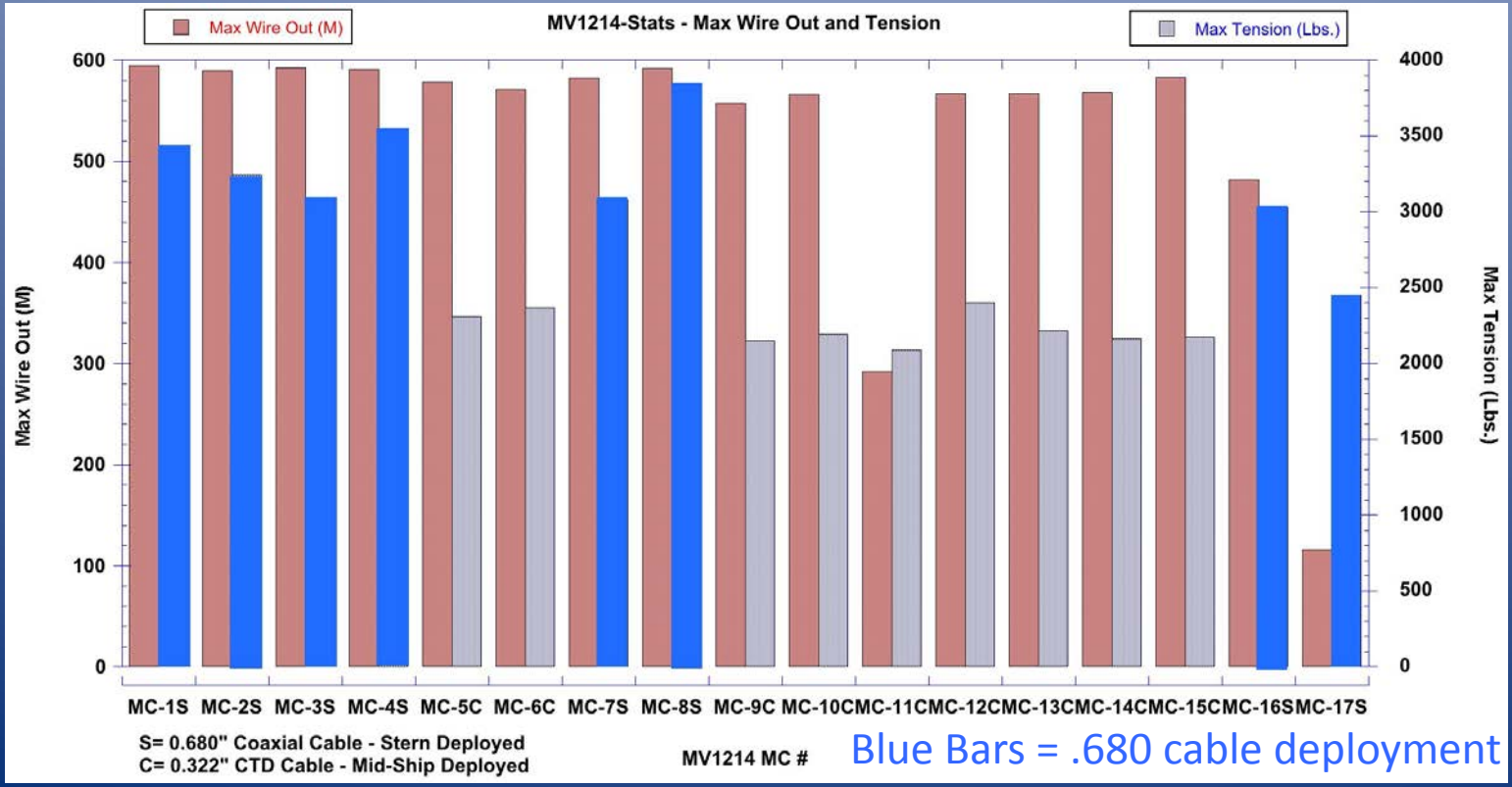
17 multicorer stations conducted during 4 days on station in the Santa Barbara Basin using *R/V Melville* (MV1214) in late Oct. 2012.

MV1214 MC #	Max Wire Out (M)	Max Tension (Lbs.)
MC-1S	595	3432
MC-2S	590	3242
MC-3S	593	3077
MC-4S	591	3541
MC-5C	579	2311
MC-6C	571	2368
MC-7S	582	3083
MC-8S	592	3848
MC-9C	558	2151
MC-10C	566	2191
MC-11C	292	2093
MC-12C	567	2400
MC-13C	567	2214
MC-14C	568	2163
MC-15C	583	2176
MC-16S	482	3031
MC-17S	116	2452

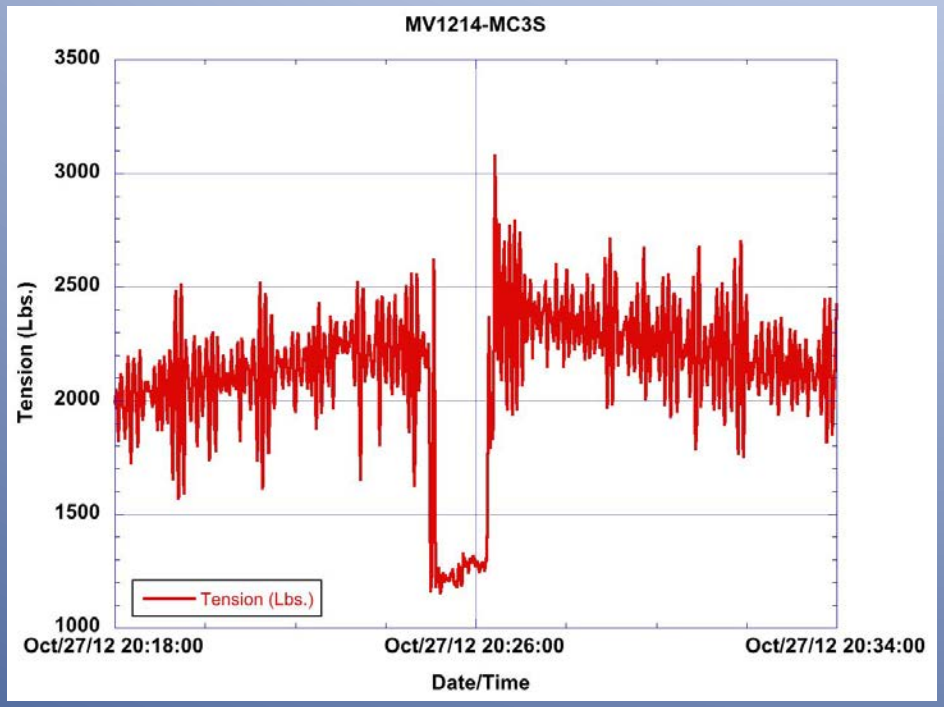
S= 0.680" Coax Wire
C= 0.322" CTD Wire

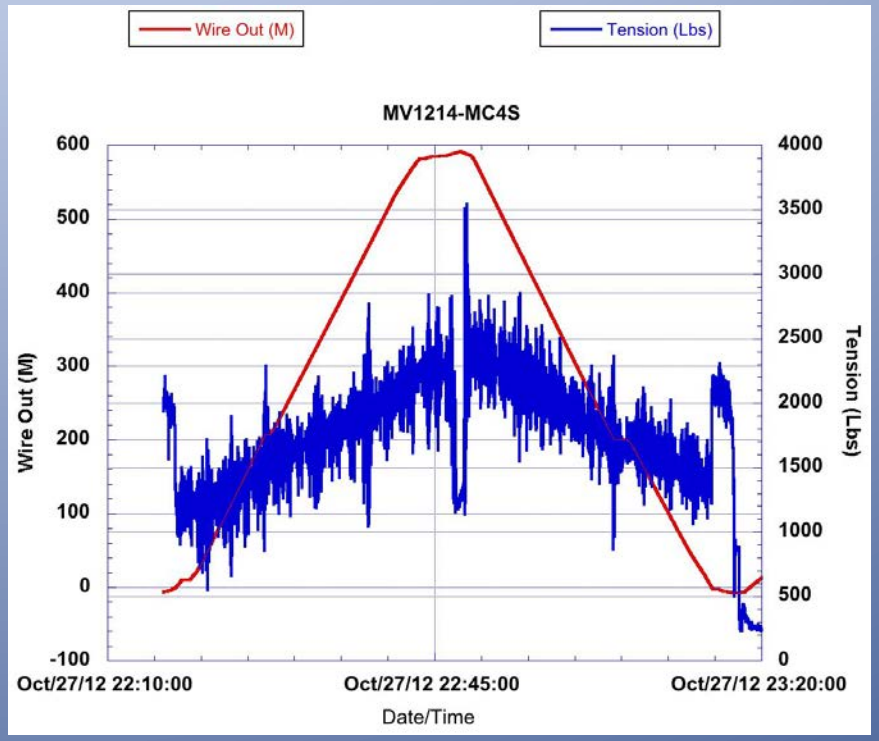
Pull-out tensions at ~<600 m depth for SB Basin sediments averaged between 1600-2000 lbs.

MC-800 system on CTD wire at depth = ~1300 lbs
MC-800 system on coax 680 wire at depth = ~2200 lbs

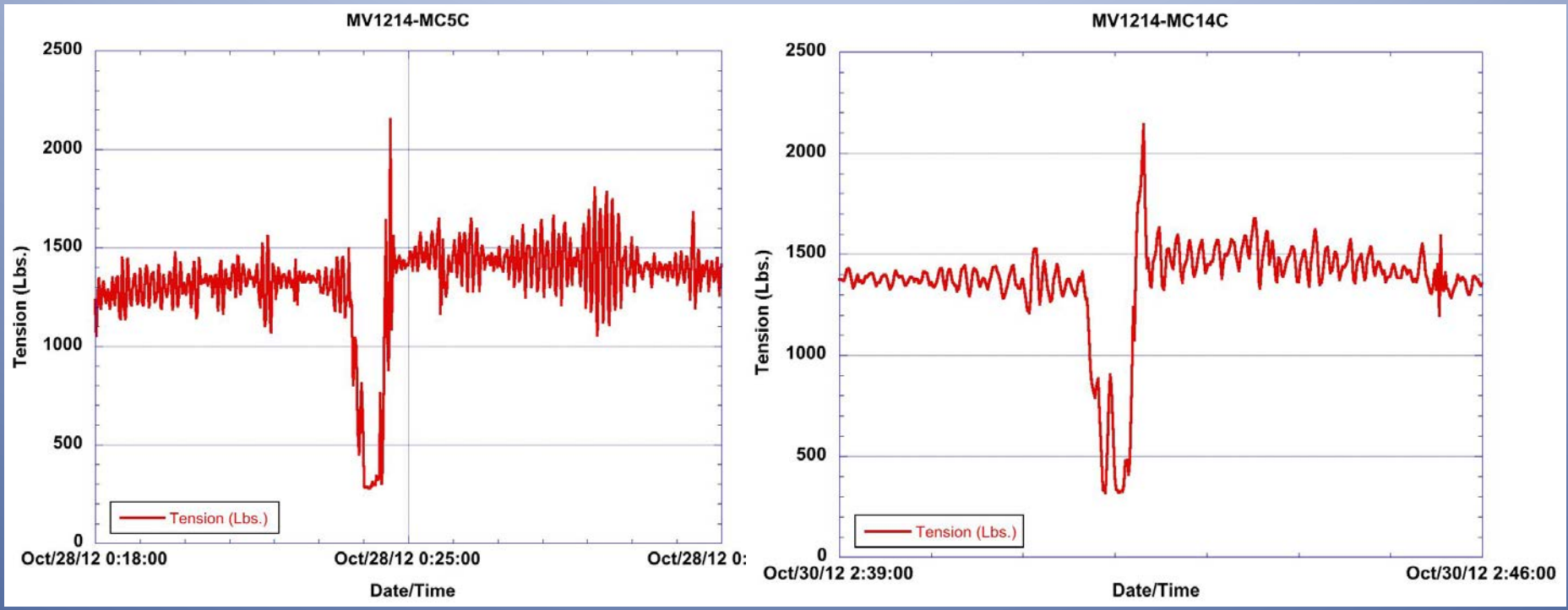


Blue Bars = .680 cable deployment





Examples of time-series plots of wire out & tension using 0.680” coax cable.



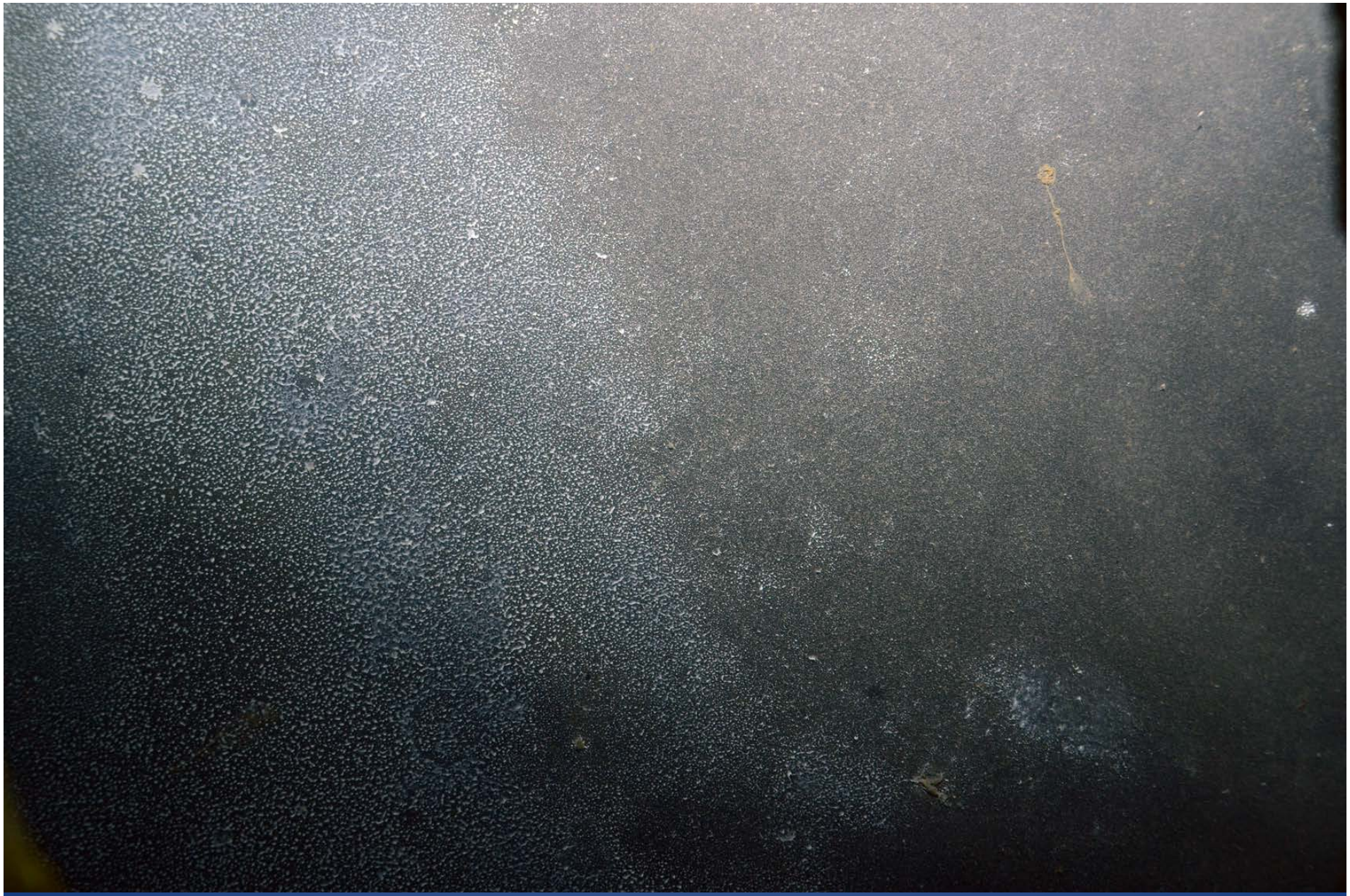
Examples of time-series plots of tension using 0.322” CTD cable.

Seafloor photo on bottom approach 16:40:04Z MC-7S ~3 m altitude 571 m depth
(OIS 16 megapixel domed camera - 4928 x 3264 pixels 57° H/40°V) UNOLS – RVTech Feb. 2013

Seafloor photo on bottom approach 16:40:44Z MC-7S ~1.7 m altitude

Seafloor photo on bottom approach 16:41:24Z MC-7S ~0.8 m altitude

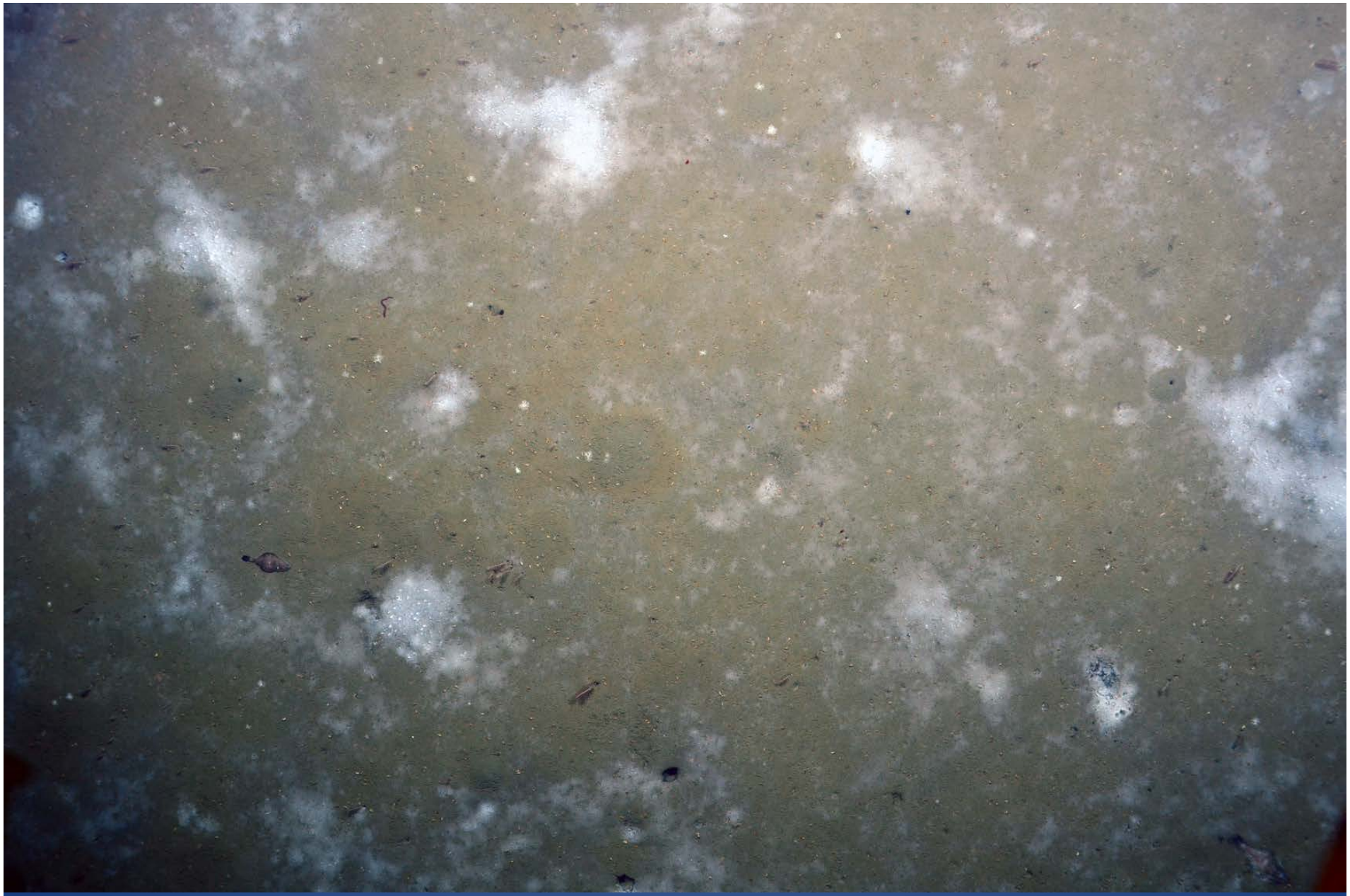
Seafloor photo on bottom approach 23:39:52Z MC-13C ~4.7 m altitude 559 m depth



Seafloor photo on bottom approach 23:40:42Z MC-13C ~1.4 m altitude

Seafloor photo on bottom approach 23:40:52Z MC-13C ~2 m altitude

Seafloor photo on bottom approach 23:41:02Z MC-13C ~1.4 m altitude



Seafloor photo on bottom approach 19:25:00Z MC-16S ~3 m altitude 470 m depth
Splotchy seeps, note fish and small orange gastropods – above anoxic zone

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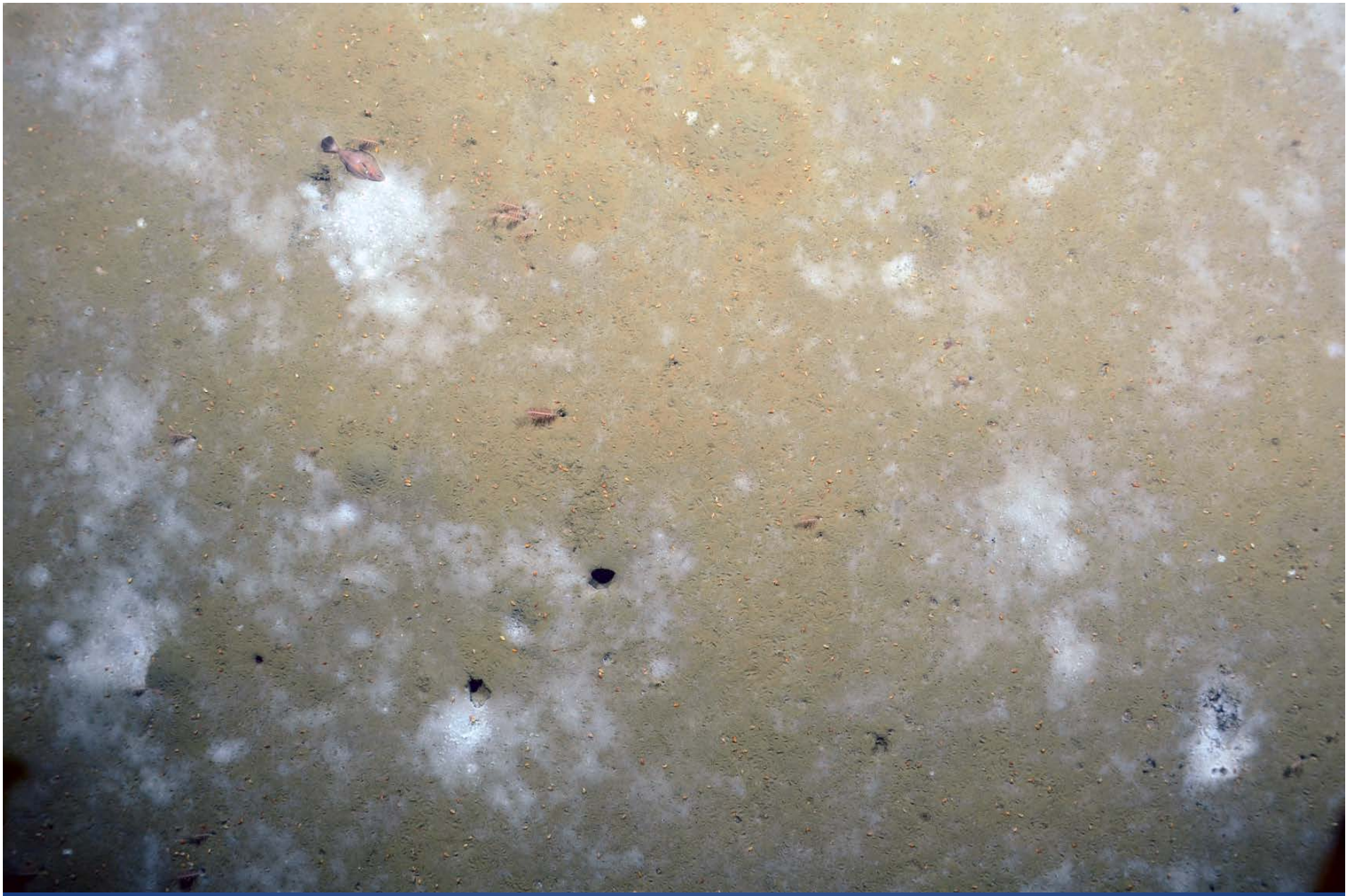
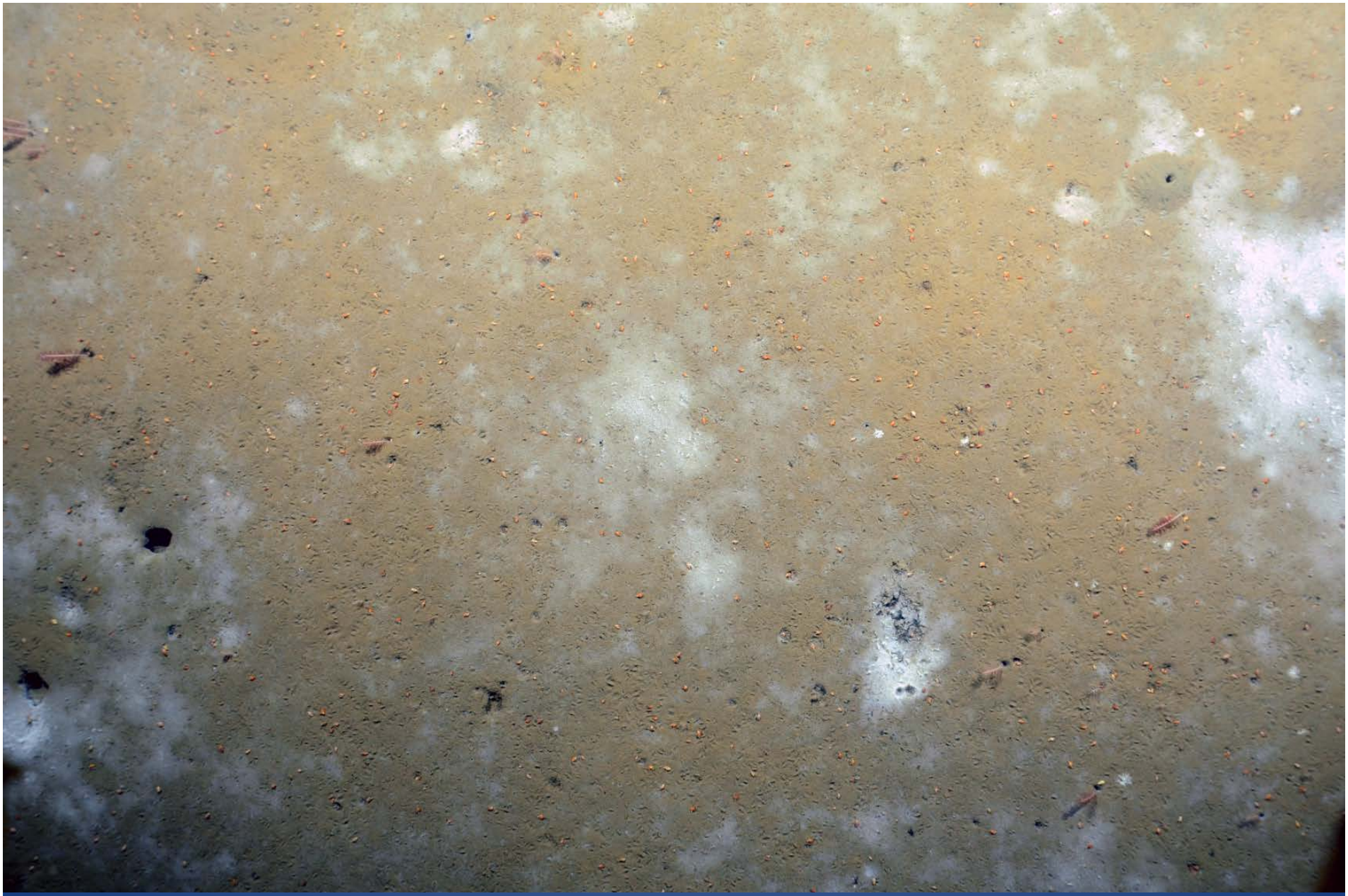
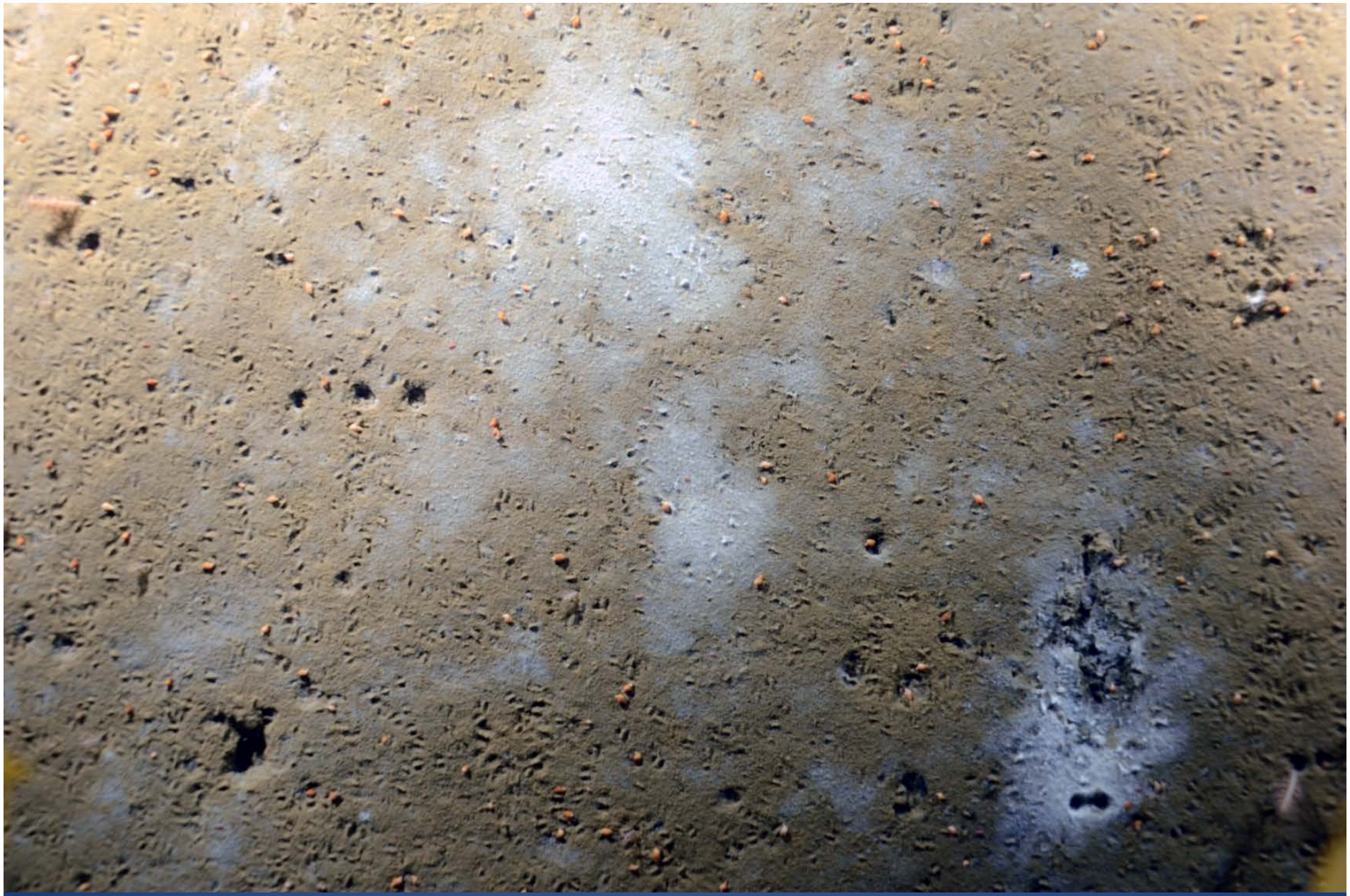


Seafloor photo on bottom approach 19:26:00Z MC-16S ~2.4 m altitude



Seafloor photo on bottom approach 19:27:00Z MC-16S ~1.3 m altitude



Seafloor photo on bottom approach 19:27:20Z MC-16S ~0.8 m altitude

Seafloor photo on bottom approach 19:27:30Z MC-16S ~0.5 m altitude

Shallow mobile fauna above anoxic boundary MC11C site ~ 3.6 m altitude 285 m depth

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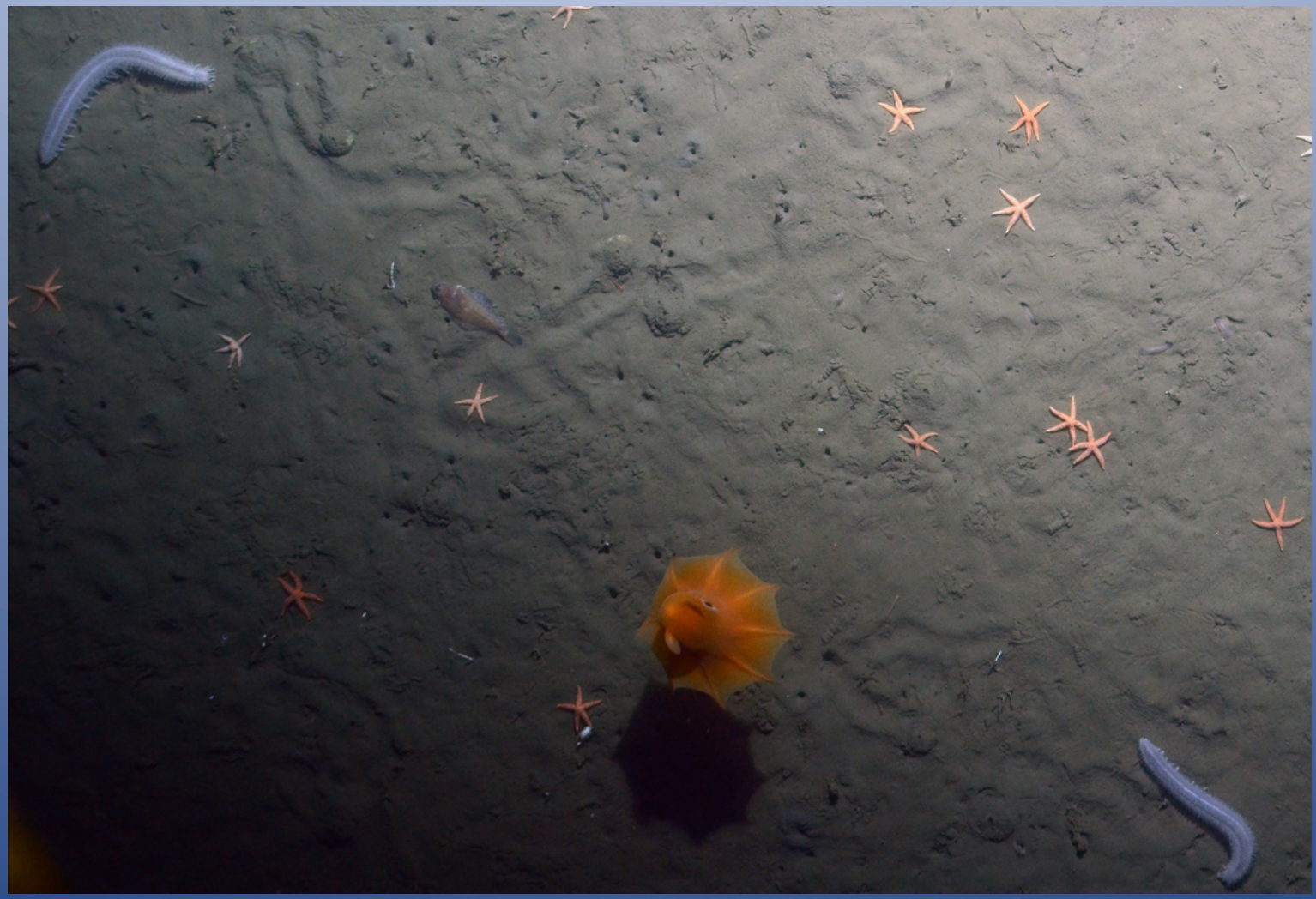
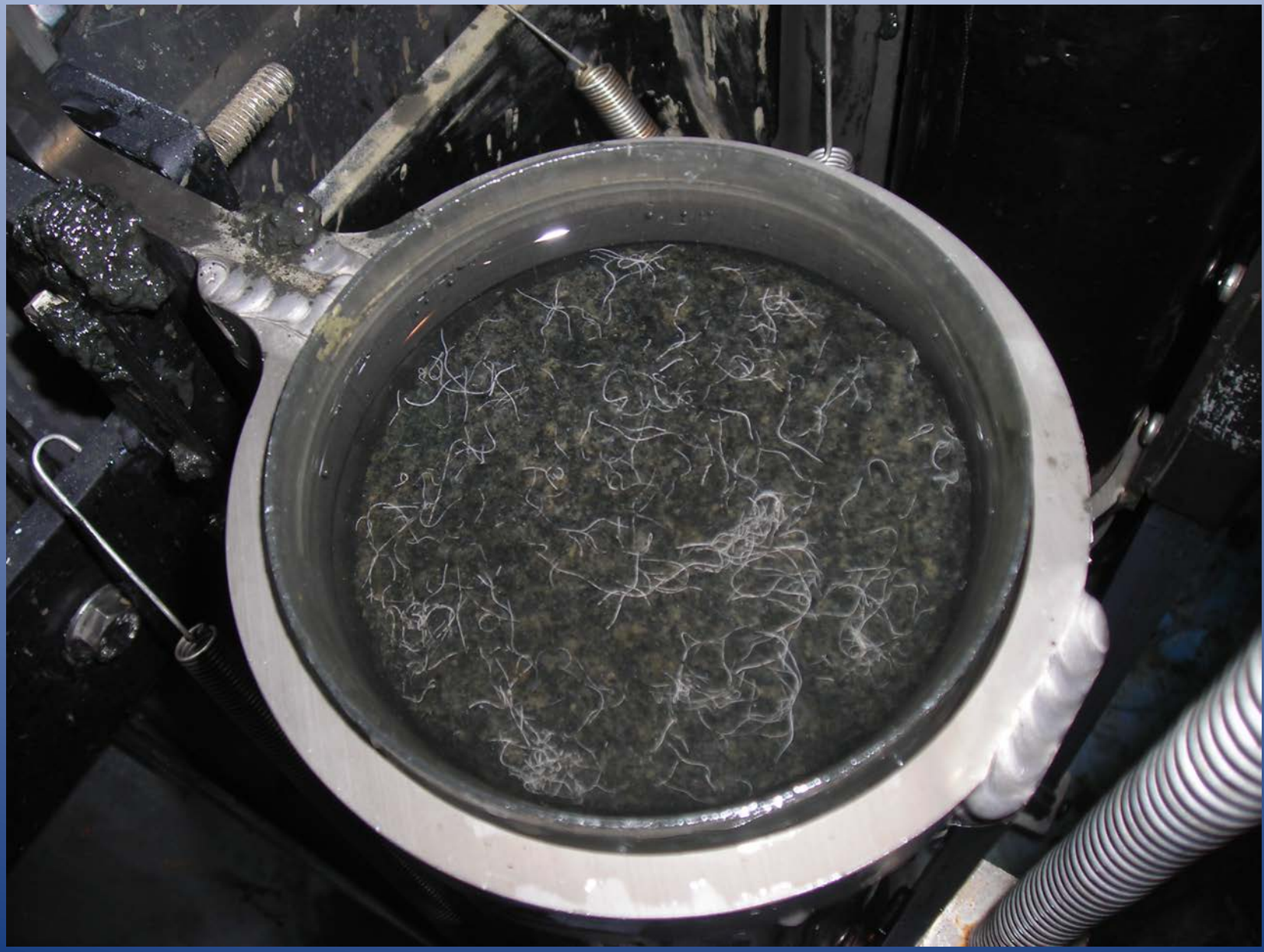
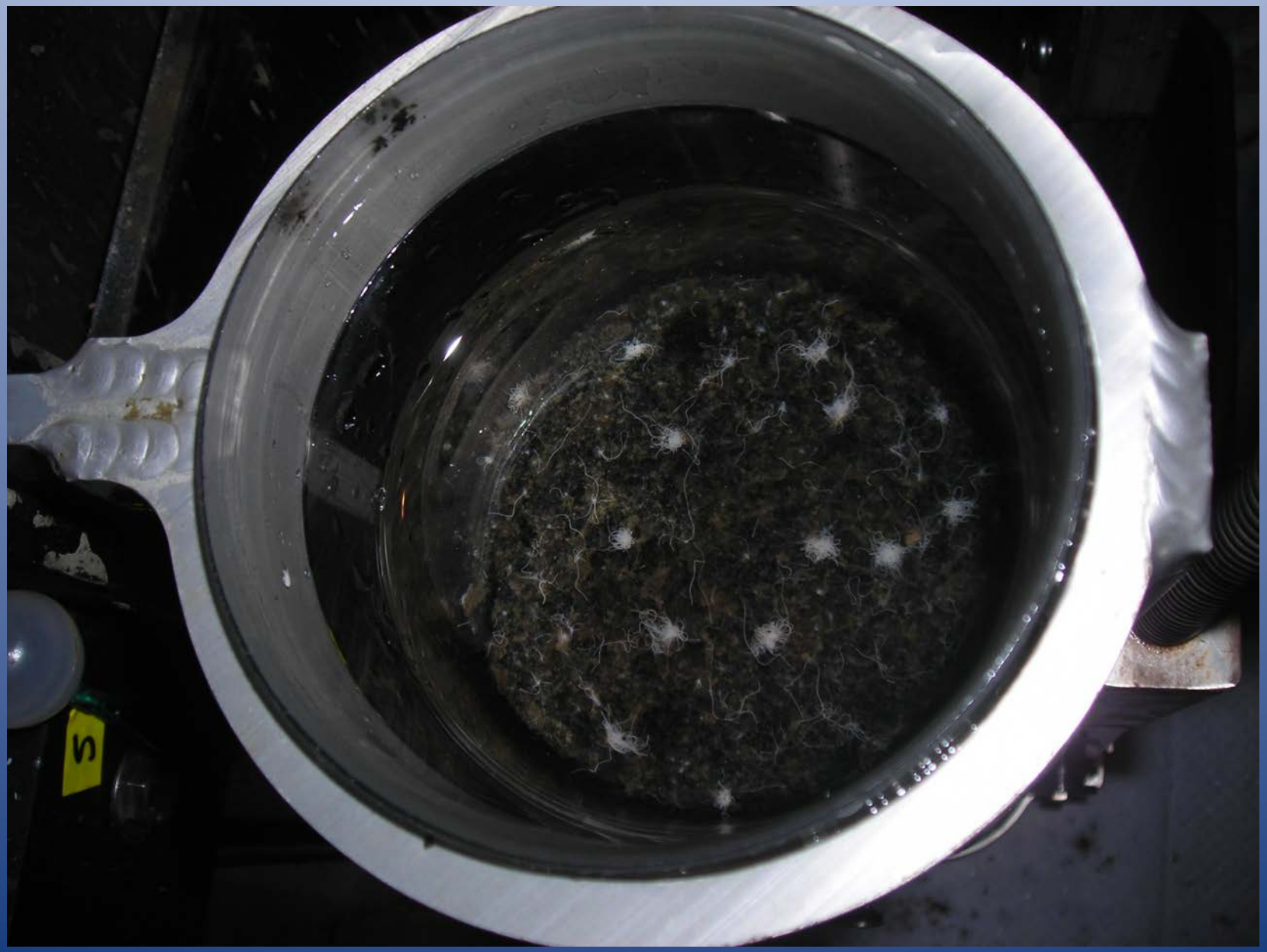


Shallow mobile fauna above anoxic boundary MC11C site ~2.5 m altitude



Core top photo MC-12C showing filamentous sulfur-oxidizing bacteria

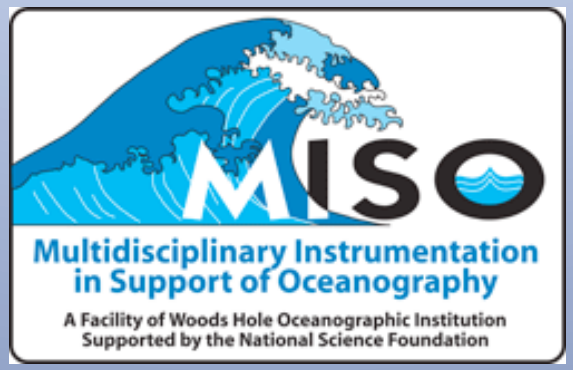
Core top photo MC-13C showing filamentous sulfur-oxidizing bacteria



Core top photo MC-14C showing filamentous sulfur-oxidizing bacteria

Core top photos MC-16S

Note gastropods also seen in bottom photos



Implementing routine science operations with the multicorer with camera & CTD system via the MISO Facility

- Planned Eos article on results from multicorer w/camera & CTD test cruise
- Contact PIs who have used multicorer systems in the past 5 years to inform them of this new capability
- Add multicorer system information to MISO website: http://www.whoi.edu/page.do?pid=13575
- Costs for supporting multicorer system equivalent to TowCam lowering costs primarily at-sea engineering support for camera/CTD systems ~$2400/day with 5 day minimum, plus travel and shipping costs.