



Methane Clathrate Hydrate Research at MBARI

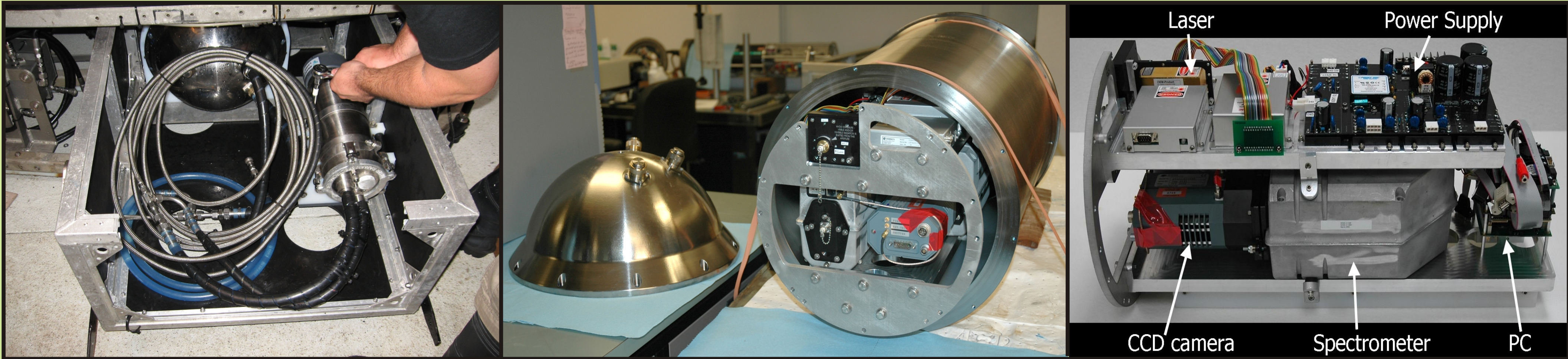
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Peter Brewer, Edward Peltzer, Peter Walz, William Kirkwood, Alana Sherman, Cheri Everlove
Jim Scholfield, Johnathan Scholl, Dave Caress, Hans Thomas, Keith Hester, Dendy Sloan

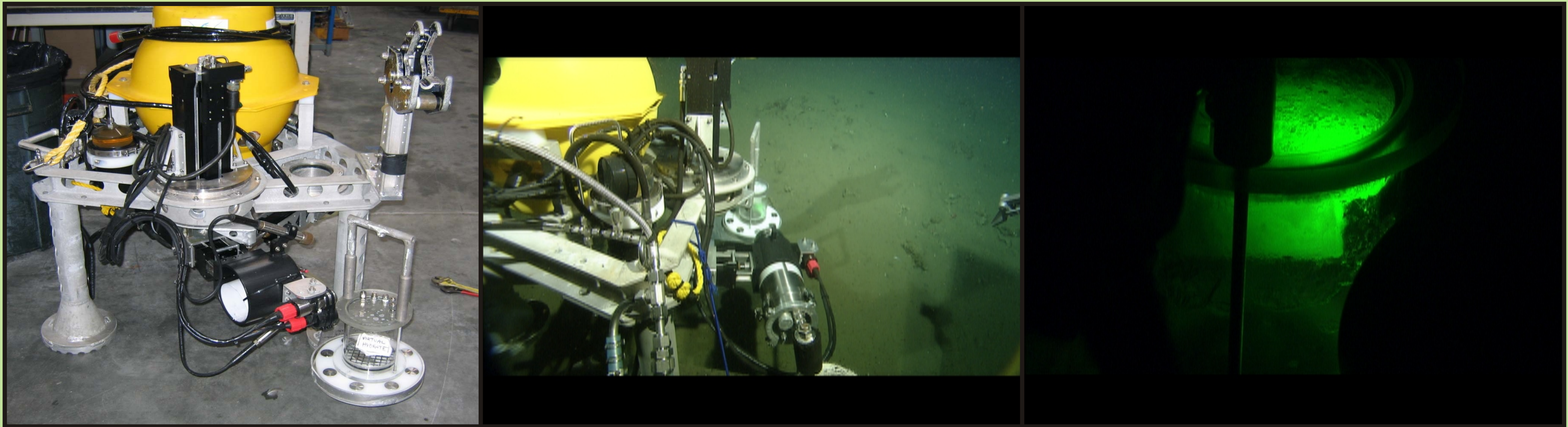


MBARI Oceanographic Research Assets

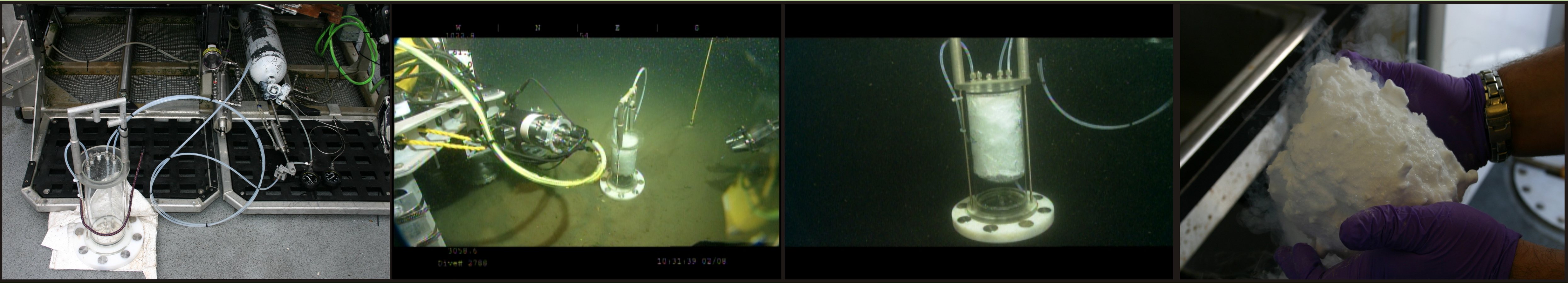
Upper left: Mapping AUV containing multi-beam, sidescan, and sub-bottom profiling systems. Provides target identification and resolution to less than one meter grids.
Upper center and right: ROV Tiburon (4000 meter rated) and associated Research Vessel Western Flyer, suitable for multi-week expeditions.
Lower left and center: Research Vessel Point Lobos and ROV Ventana (1800 meter rated).
Lower right: Science participants during the August 2006 Barkely Canyon Expedition.
Back row: Dendy Sloan, Keith Hester, Peter Walz, Bill Kirkwood, Hans Thomas, Dave Caress.
Front Row: Ed Peltzer, Adien Aggenbach, Rachel Dunk, Peter Brewer, Johnathan Scholl.



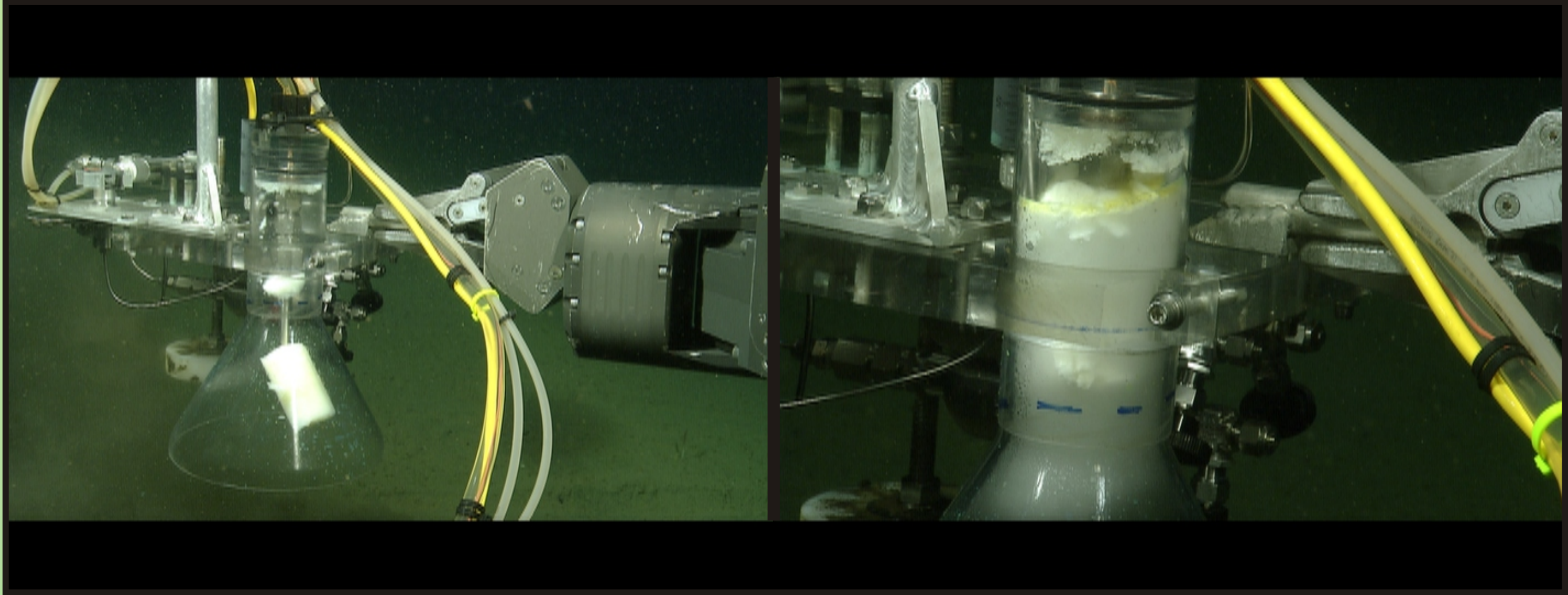
DORISS 2: Deep Ocean Raman In-Situ Spectrometer. This second generation MBARI engineered instrument is rated for use to 4000 meters and permits real time identification and measurement of hydrate targets in the deep sea. Kaiser Optical spectrometer and Andor Scientific CCD camera.



PUP: Precision Underwater Positioner. This unit can carry the DORISS 2 probe head for precision positioning of the laser. Movement of the laser focal point in four dimensions at 0.1 mm increments is possible. Typically carried on the ROV and placed on the seafloor at targets of interest.



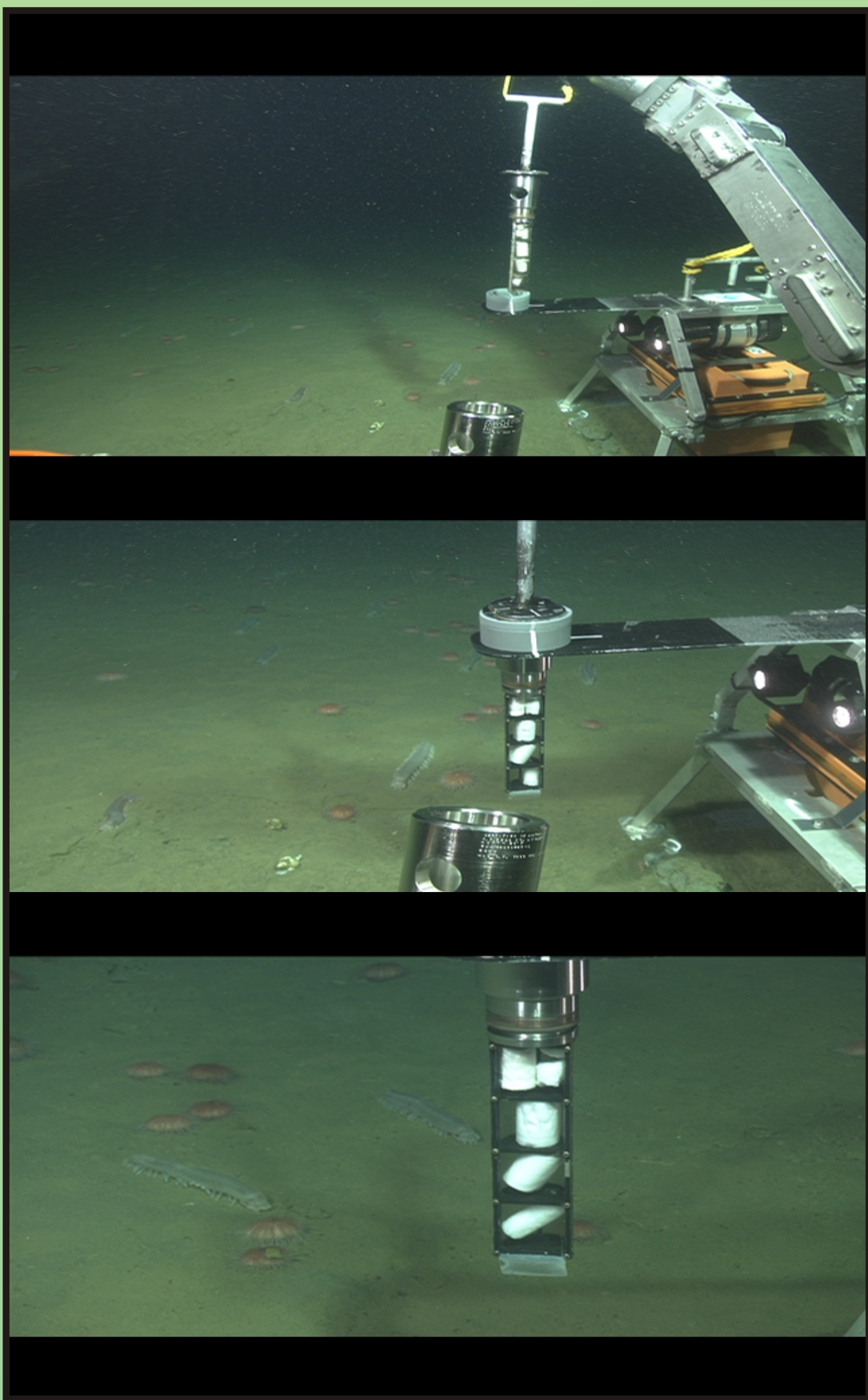
In-Situ Hydrate Synthesis: MBARI has developed methods of mixing, transporting, and dispensing complex gas samples (methane, ethane, carbon dioxide, hydrogen sulfide etc. . .) to form hydrates in-situ. Samples can then be left on the sea floor and examined over time using DORISS2 and PUP to identify development of Structure 1 and Structure 2 hydrate composition. We can also recover samples to the surface for additional laboratory experiments and examination.



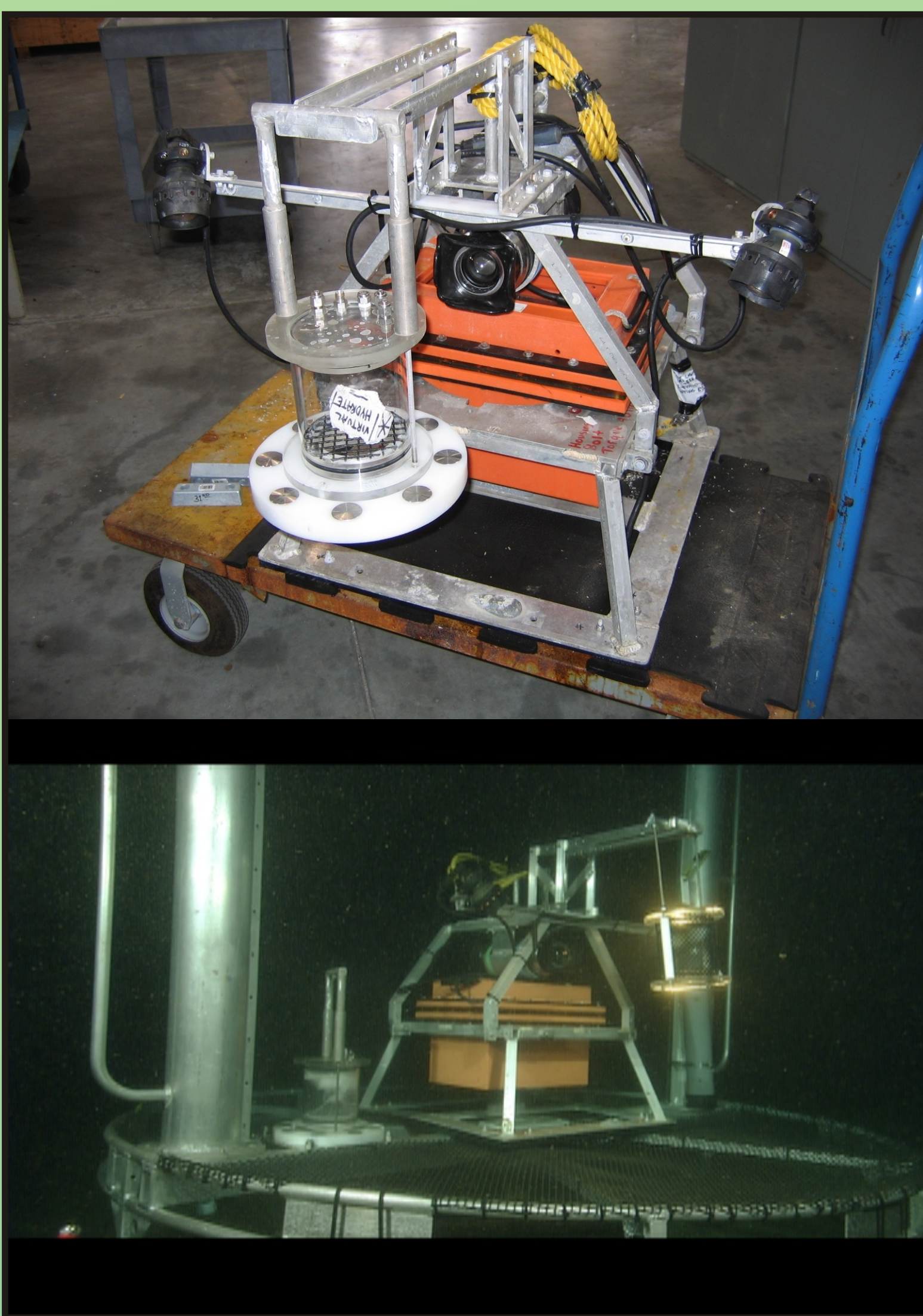
Heated Funnel/Gas Sampler: Uses a 240 VDC, 400 watt cartridge heater for dissociating solid hydrate samples to gas in-situ. Three 150 ml sample cylinders are used for discrete gas collection.



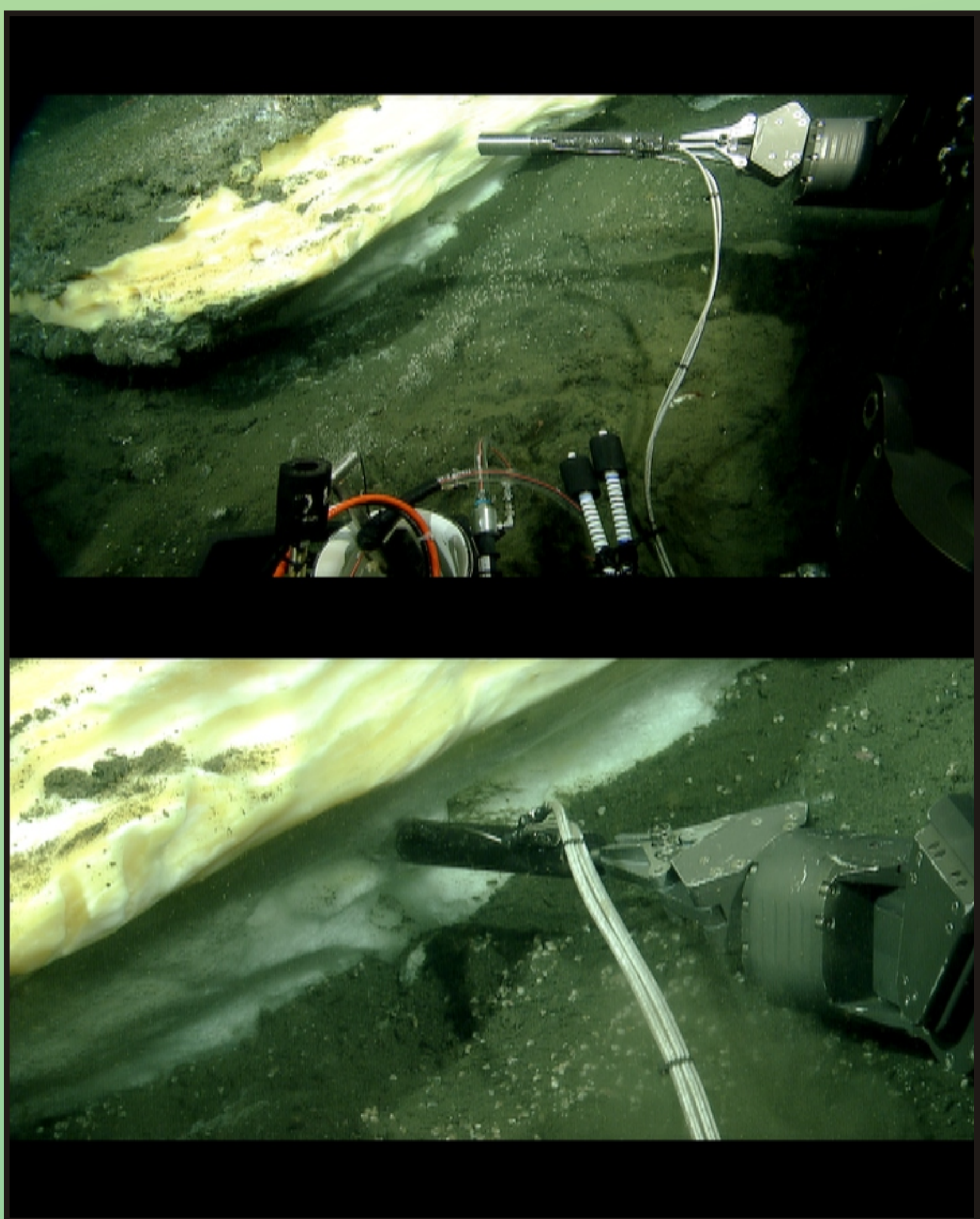
Clathrate Bucket: ROV mounted system for collection of intact hydrate specimens and recovery to the surface under pressure. Once on deck, the bucket can be quickly opened and the sample extracted for preservation in liquid nitrogen.



Hydrate Hotel: Four chambers for observation of laboratory formed (synthetic) hydrate samples. Can be opened and closed on the seafloor. Shown positioned in front of time lapse camera.



Time Lapse Camera: Programmable digital still camera (Nikon Coolpix) for time series measurements of hydrate samples.



Hydrate Coring Tool: Stainless steel cylinder with cutting edge. Bimba hydraulic ram inside cylinder for ejecting/extracting core. Sample core dimensions: 4 cm diameter x 9 cm long.