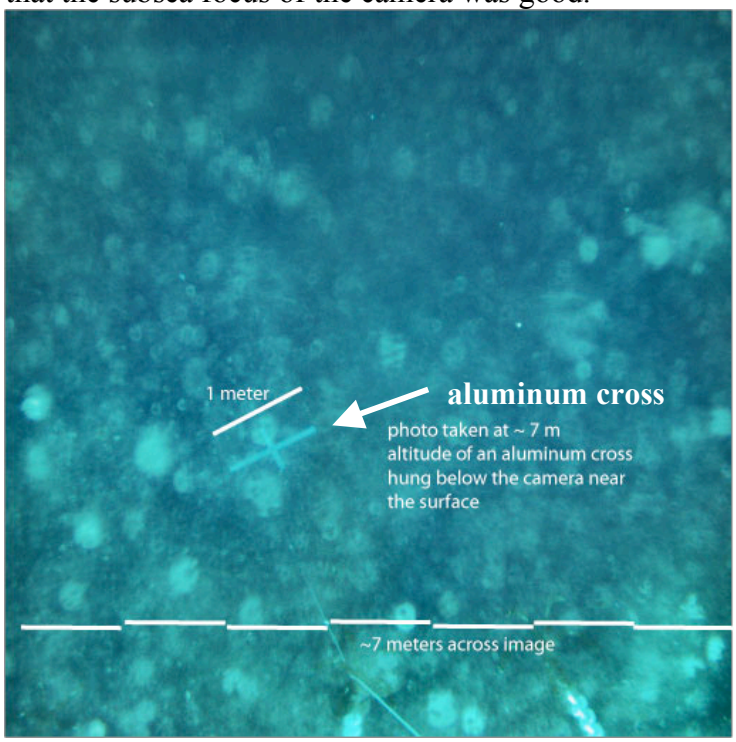
Operations Summary - WHOI-MISO TowCam (Fiber optic)

The WHOI-MISO TowCam was mobilized for the AT15-6 cruise to have capability for near-real time image acquisition (i.e., one image every 10 sec.) and storage using the capabilities of the UNOLS 0.680" fiber optic cable and traction winch system on board R/V Atlantis. This capability allowed for efficient search operations for 'stuck' ocean bottom seismometers (OBSs) as well as geological observations at night during Alvin battery charging time to further map the extent of the new lava flow(s). Engineers at WHOI's Deep Submergence Lab. (DSL) (J. Howland, A. Bowen et al.) and the NDSF participated in this effort and contributed to its success.

The system was mobilized during the Galveston, TX port stop and the various subsea and topside components tested on deck. The fiber optic cable was terminated to the TowCam system and the equipment installed on the frame. The basic operation of the system primarily relied on the standard CTD (SBE25) capabilities of the WHOI TowCam [Fornari, 2003]. This entailed the power system junction box/cabling interfaced to the new DSL digital still camera and fiber to serial hardware installed in two subsea housings that supplied the proper telemetry and power links for the camera and CTD to operate over the fiber optic cable.

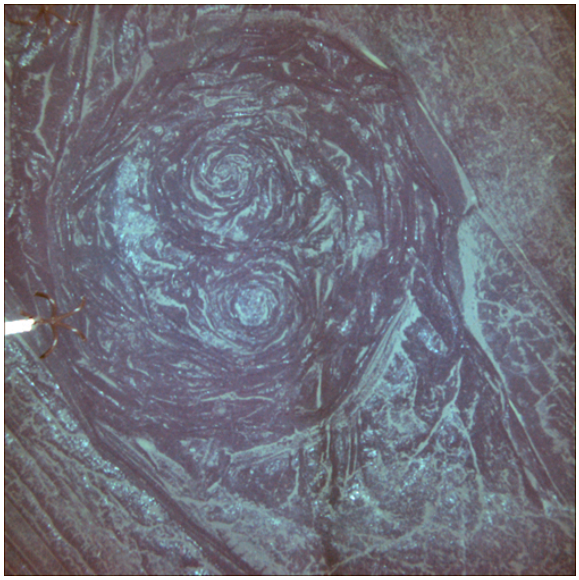
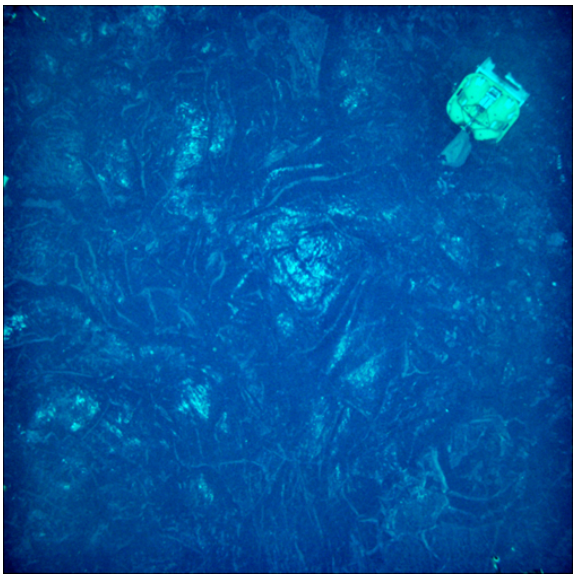
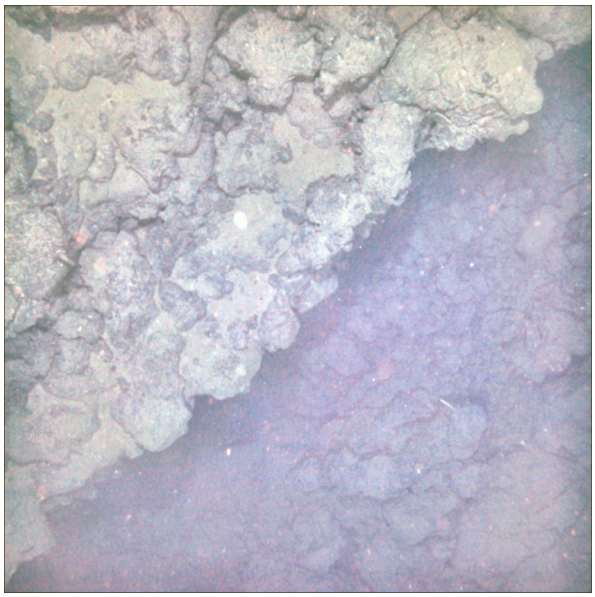
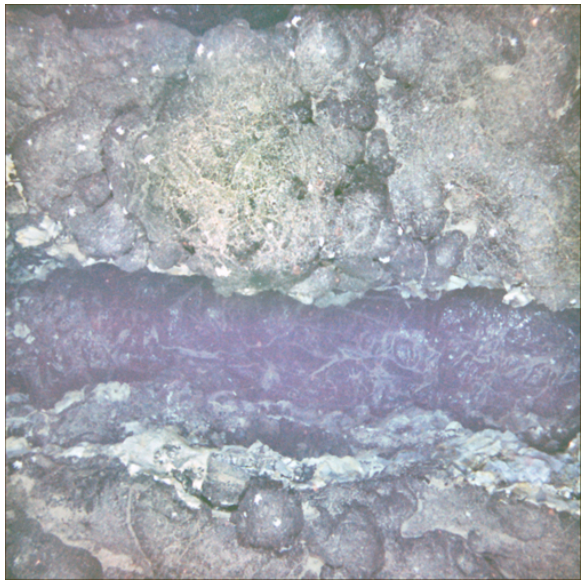
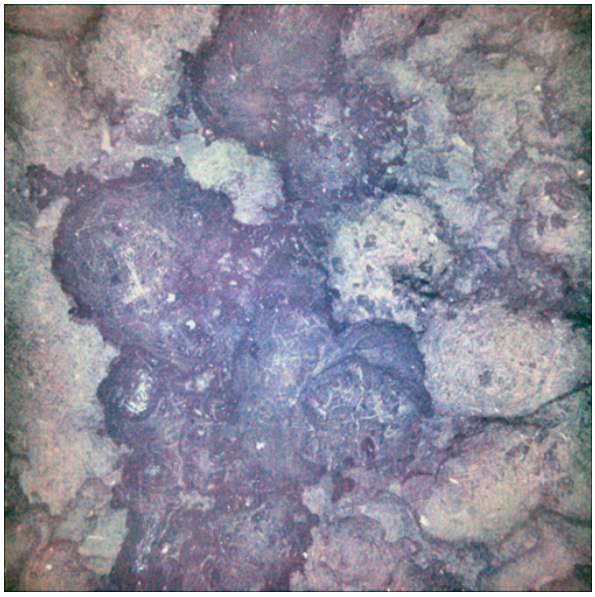
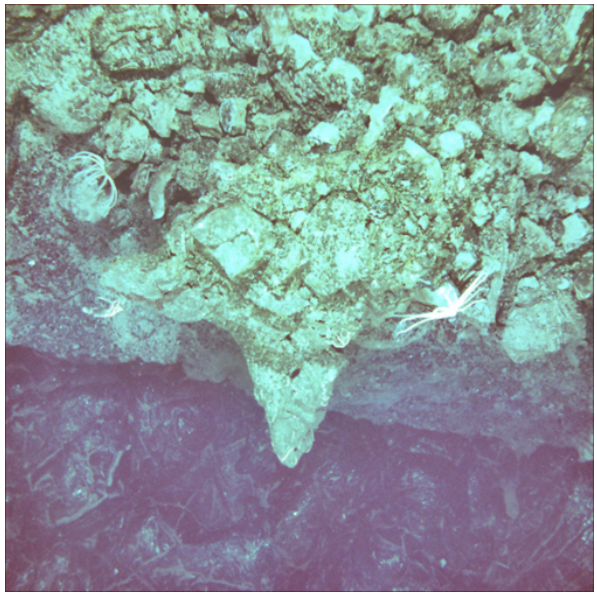
At sea, the system was tested on CT#1 over the OBS206 site at the EPR axis. The camera was also calibrated in water at the surface using an aluminum cross hung below the camera with 1 meter and crossing ½ meter legs imaged at ~7 m altitude. The results show that the subsea image area is approximately scaled to the altitude (which is supplied by the SBE25 CTD) and that the subsea focus of the camera was good.



Subsea image showing aluminum scale 1 m long with 0.5 m cross hanging below the camera at 7 m altitude.

The system operated successfully for the first two lowerings providing good seafloor imagery at altitudes up to 12 m from the seafloor with the available 600 watt/sec of strobe

lighting provided by the TowCam system. CT#2 was 9.5 hrs long on the bottom taking photos every 10 seconds before the strobe power fell below what was required to sufficiently recharge the strobe capacitors. During CT#3 the camera stopped functioning after ~2 hrs. on the bottom and telemetry to the camera and CTD could not be reestablished. Once on deck the system was restarted and telemetry reestablished, however, a problem was suspected in the fiber optic to ethernet telemetry link so discussions with DSL engineers took place to try to isolate the problem. After deployment on CT#4 and similary telemetry failure at 100 m depth, the subsea housing containing the fiber optic to ethernet telemetry converter was inspected and found to be not the right match for the topside converter. A spare was installed and the system was put back together and successfully tested. This proved to be the problem and after that repair, subsea operations of the fiber optic TowCam were rountine. The only other problem with telemetry occurred during recovery on CT#6 and CT#7 where at ~ 500 m from the surface the telemetry ceased. It is not clear if there is a problem in the wire at this point or not but DSL and WHOI engineers have been alerted to the occurrence.

The fiber optic TowCam was used for seven tows during the AT15-6 cruise. Navigation of the system was by LBL transponder network for CT#1, 2, 5 and 6, and layback and ADCP for CT#3, 4 and 7. The TowCam on AT15-6 was configured with a self recording 3-axis magnetometer for near bottom magnetometer data acquisition (M. Tivey-WHOI), and an ADCP mounted on the front of the frame pointing downward configured for bottom-lock relative movement detection to assist in computing vehicle layback position and speed. During three tows (CT#1, CT#2 and CT#5) TowCam was used to search for and attempt to recover two OBSs (206 and 210) close to the EPR axis. Both OBSs were located and imaged showing they are partly buried in the new lava flow. Recovery attempts with grapple hooks configured below the TowCam bottom rail were unsuccessful despite repeated attempts to both hook the OBSs and to land near them and 'nudge' them. In one case for OBS206 it is believe the TowCam may have bumped the instrument. Total use time of the fiber optic TowCam (surface to surface) was approximately 40 hours and time on the total bottom for all tows was approximately 23 hours.

Example Images from Fiber Optic TowCam on AT15-6