O-buoy 2 Deployment

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Pre-deployment Assembly and Testing 9/15-10/6

Soon after arrival on-board, the deck crew moved the various buoy pieces into the hanger so assembly and testing could begin.

The instrument tray was then pulled out of the buoy casing and the standards for the CO_2 sensor were set. An inspection was also made of the instrumentation for any damage during shipping. The tray was then slid back into casing.

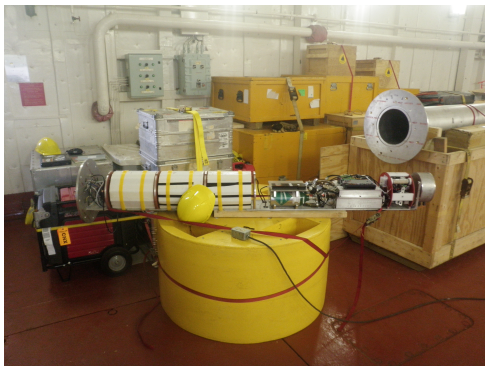

Figure 1: The instrumentation for the O-buoy. Starting from the left of the picture the tray holds: 3 Li battery packs for power during winter months when the solar array does not work, CO_2 tanks used as standards for the CO_2 sensor, the ozone detector and supervisory computer which controls buoy operations, the CO_2 sensor, and finally the spectrometer for the differential optical absorption spectroscopy done by the buoy to detect BrO

The next step was the assembly of the mast with two gas inlets, the scanhead for the spectrometer, communication components and meteorological sensors shown in Figure 2.

After assembly the buoy was hoisted up to the top of the hanger deck using the ships crane and oriented at a thirty degree angle with the deck to facilitate iridium data transmission. The buoy was switched into deployment mode while project members back on land examined the transmitted data to ensure the buoy was working properly. A problem was found with the CO_2 inlet tube, so the buoy was moved back into the hanger for troubleshooting. The length of the CO_2 tubing was examined and a kink was found in a section of tubing on the mast designed to dry the incoming sample. This was corrected and the CO_2 readings indicated the instrument had returned to normal function. During this time a horizon alignment was performed on the scan head to verify the instrument could properly detecting the horizon for data collection. The flotation collar was attached to the buoy and the Li batteries were changed out in preparation for deployment. The deck gang hoisted it back onto the top of the hanger so it could send data back to others to verify proper function of the CO_2 instrument. This was the conclusion of pre-deployment testing. The day prior to deployment the buoy was hoisted down and the mast removed in preparation for being transported via chopper to the deployment site. Temporary covers were made for all connections while transport was taking place.

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Figure 2: Assembled mast minus the scan head for the UV/Vis spectrometer and wind sensor.

Deployment

Date: 7 October 2010
Location: 76 42.950N 135 11.702 W The site was a multi-year ice floe roughly 25m across. The buoy was deployed in a thin section adjacent to a ridge to avoid having to melt a hole. A picture of the site can be seen in Figure 3.

Figure 3: Completed ice buoy observation(IBO) site. Photo by Rick Krishfield

Weather: Clear skies, sunny, Occasional wind gusts, and temps ranging from -10 to -20 C.

11:00am (ship time): Scouting for floes begins, with Kris Newhall and and Rick Krishfield(WHOI) going in the helicopter to pick out a site. This is day three of looking for suitable locations so they settle for a smaller floe, but one that is still substantially bigger than anything around so it can be made to work for this four buoy IBO given the cruise time constraints.

12:30pm: The helicopter started shuttling people and gear to the chosen site. The WHOI team preps the site for deployment of the O-buoy by chainsawing a 30 cm deep hole in the ice. This is less ice then ideal for deployment but with the loss of daylight and late start to the day, there is no time to melt an ideal hole. The buoy is then slung out to the floe via chopper and guided into position by the WHOI team.

1:30pm: The deployers and various buoy pieces make it onto the ice. The mast is slung out attached to another crate going out minus the windbird and DOAS scanhead. The solar panels, lead acid batteries, windbird, scanhead, and charge controller are put in the back of the chopper along with our tools. We wait for a break in flight ops and then get to work making the mast connections, attaching the DOAS scanhead, and bolting the mast to the buoy body with the assistance of Miranda Corkum from IOS.

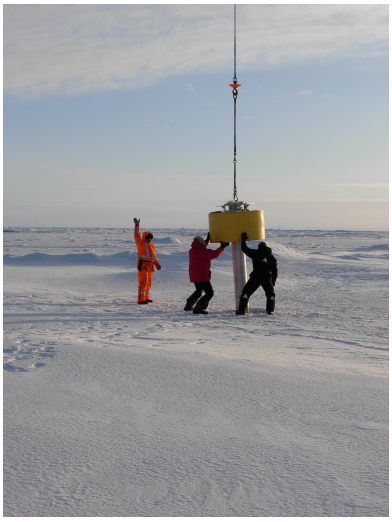

Figure 4: Kris Newhall(R) and Jim Dunn(L) guide the buoy into position. Photo by Rick Krishfield

Next the solar panels were installed and wired to the charge controller which lit up to indicate the panels were connected properly. The rechargeable batteries were placed in the flotation collar and hooked up to the solar array.

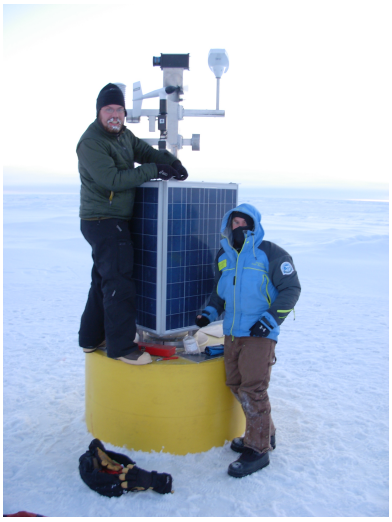

Figure 5: Peter(L) and Carlton(R) pause for a photo-op during assembly. Photo by Rick Krishfield

5:30pm: Pictures were taken for later determination of the buoy azimuth and direction of the scanhead. GPS marks were also taken for this purpose, but may not work well due to the small size of the floe. Visibility was dropping so the chopper started bringing people home. With the assistance of Jeffery Charters(IOS) we finished bolting down the solar array and turned the buoy on. Due to time constraints there was no time to connect to the buoy via RS-232, so we waited for the sounds of scanhead operation to verify that the buoy had in fact come on.

6:15pm: Boarded the helicopter and returned to the ship. The buoy made its first transmission home soon after and other members of the O-buoy team looked at the data set and verified a successful deployment.

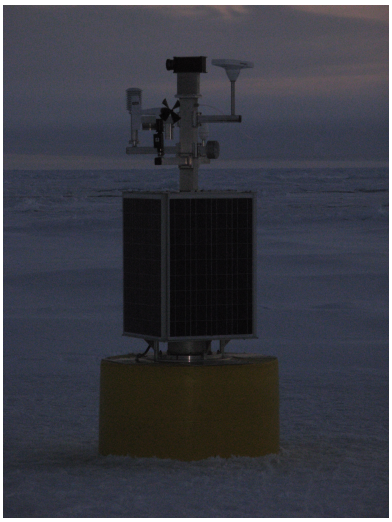

Figure 6: Completed O-Buoy. Photo by Rick Krishfield