

The incredible adventure of the University of North Carolina Wilmington lander

Summary: A benthic lander deployed at 450m depth off Cape Lookout, NC, USA was intended to collect valuable information on the deep sea ecosystem. It was unfortunately not retrieved at the end of the deployment and was considered lost until recently found by a fisherman. The lander was equipped with a SeaGuard RCM and the recovered data revealed what happened to the lander. It had been drifting for 4 years performing an incredible journey around the Atlantic Ocean.

The goal of this research program was to provide information on the deep sea ecosystem to facilitate management and protection of productive and vulnerable habitats.

On June 6th, 2010, a team of scientists coordinated by Dr. Steve W. Ross, University of North Carolina at Wilmington (UNCW), deployed a benthic lander at about 450m depth off Cape Lookout, NC, USA.

This lander was intended to stay on the bottom for a nine to twelve-month period recording oceanographic data related to deep-water coral reefs, ocean currents, salinity, temperature, tides, oxygen and turbidity using a Aanderaa SeaGuard RCM equipped with a suite of smart sensors. Twelve bottle sediment traps, acoustic release and glass floats were also incorporated to the lander.

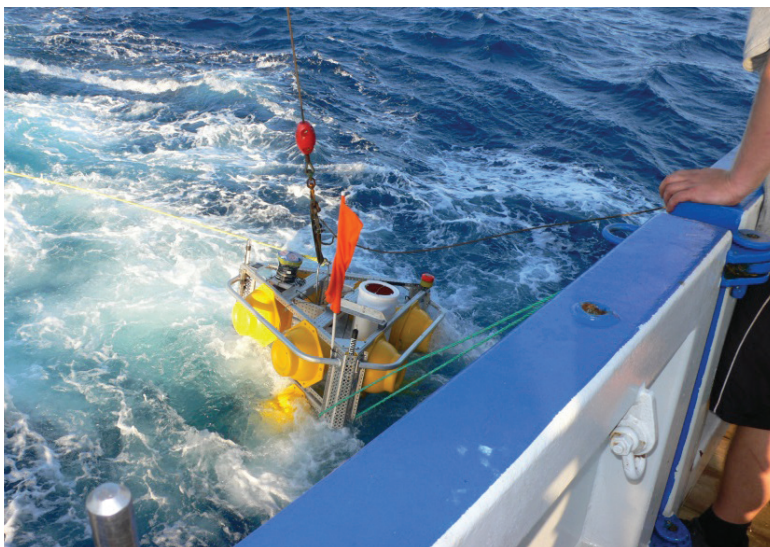


Figure 1: UNCW lander on surface off Cape Lookout just before sinking, June 2010
Photo: Patrick Gibson

The lander equipped with a SeaGuard RCM had been drifting for 4 years performing an incredible journey around the Atlantic Ocean.

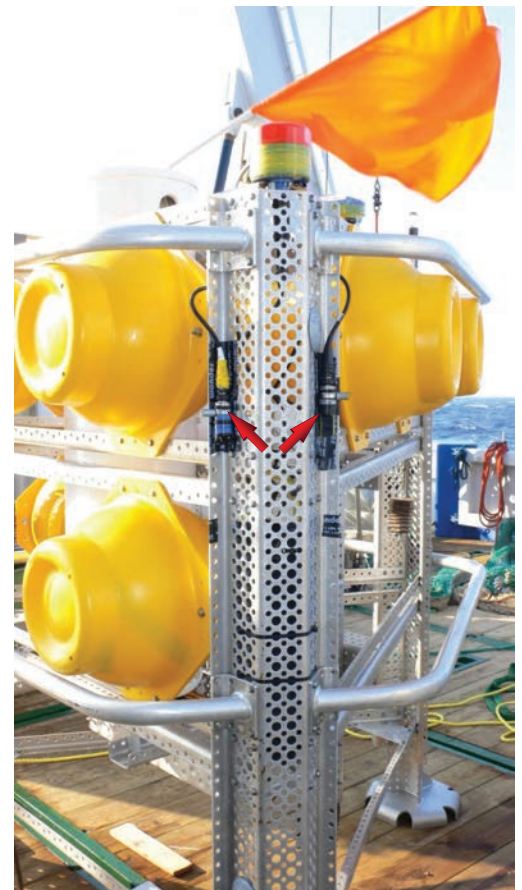


Figure 2: UNCW lander showing Aanderaa sensors
Photo: UNCW and Patrick Gibson UNC-Chapel Hill

Unsuccessful recovery of the lander

On April 15th, 2011, UNCW scientist Mike Rhode made a short cruise to the Cape Lookout site to retrieve the lander; however, he was unable to make an acoustic connection to bring the lander up. Dr. Ross made another unsuccessful attempt to retrieve this lander on June 5th, 2011.

The lander's journey

Even though Dr. Ross's team had made several attempts to rescue the lander, they had to accept the fact that it was lost. However on June 26th, 2014, Dr. Ross received an email from Royden Goode, a fisherman off the Abaco Islands in the Bahamas. He wrote that he had found a floating object with Dr. Ross's contact information on it. A photo attached (Figure 3) to the email proved this to be the missing lander.

Dr. Ross explained the importance of the lander, and Mr. Goode agreed to go back the next day to try to locate and salvage it.

Due to the surface currents (Figure 4), the only way for the lander to arrive in the Bahamas was to ride the Gulf Stream across the North Atlantic. It continued riding the currents (possibly the Canary Current) south along the coast of Africa, and then took the North Equatorial Current across to the Western Atlantic. We can only imagine the forces of nature the lander underwent during its 4-year journey in the Atlantic Ocean.

M. Goode located the lander on June 27th and salvaged the SeaGuard but unfortunately the lander was too far offshore to be retrieved and was left at sea.

What did the SeaGuard data reveal?

The SeaGuard was in good shape, the interior was dry and the SD data card containing the data was intact (Figure 5 and Figure 6). Hopes were high that valuable close-to-bottom data (original purpose) would have been collected. SeaGuard data stored on the SD card, however, revealed that the lander had come up to the surface only about 4 days after the deployment in June 2010 (Figure7).



Figure 3: UNCW lander off the Bahamas, June 2014

Photo: R. Goode



Figure 4: In green the assumed travel of the drifting lander



Figure 5: The SeaGuard after recovery



Figure 6: Interior of the recovered SeaGuard

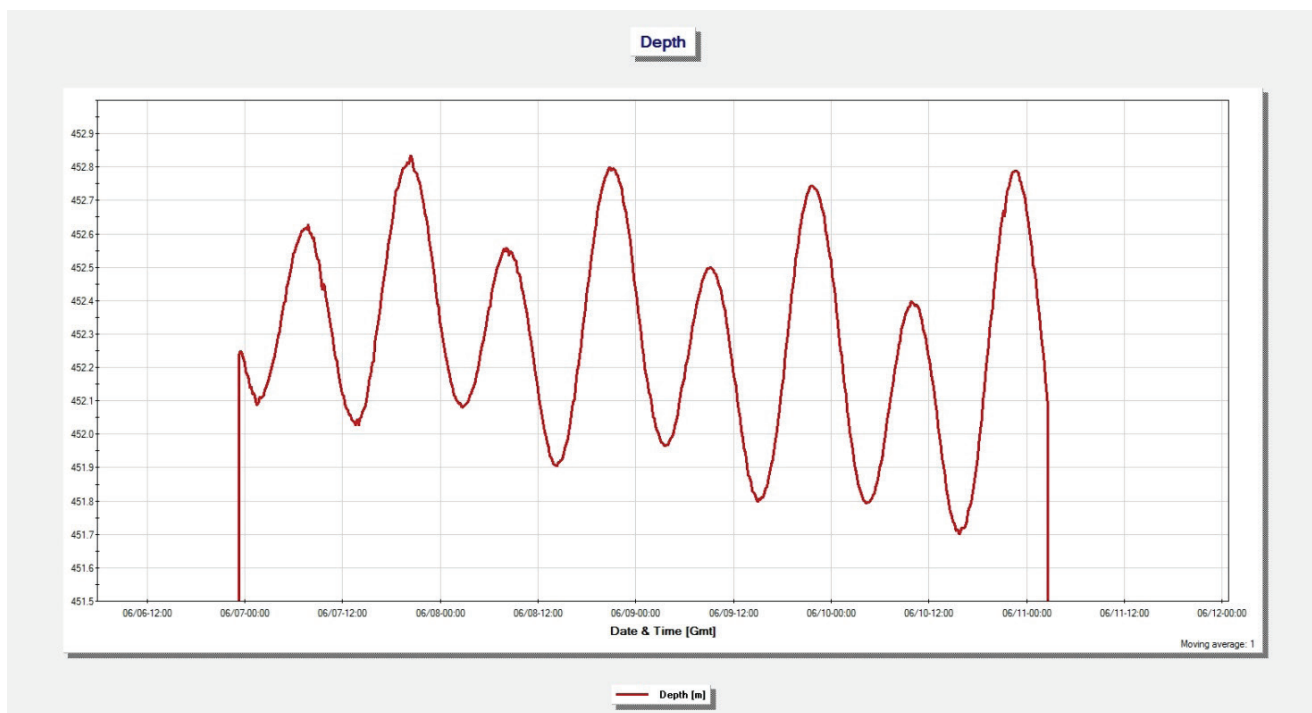


Figure 7: Pressure data showing the 4 days at the deployed location

During the first 14 months of surface drift, data was recorded at 10 minutes intervals. Then the SeaGuard ran out of power. Since the lander was moving in the waves and there were wires and chains hanging from it, some of the sensors were eventually damaged. Figure 8 shows 3.5 months of oxygen recordings reflecting various level of primary production.

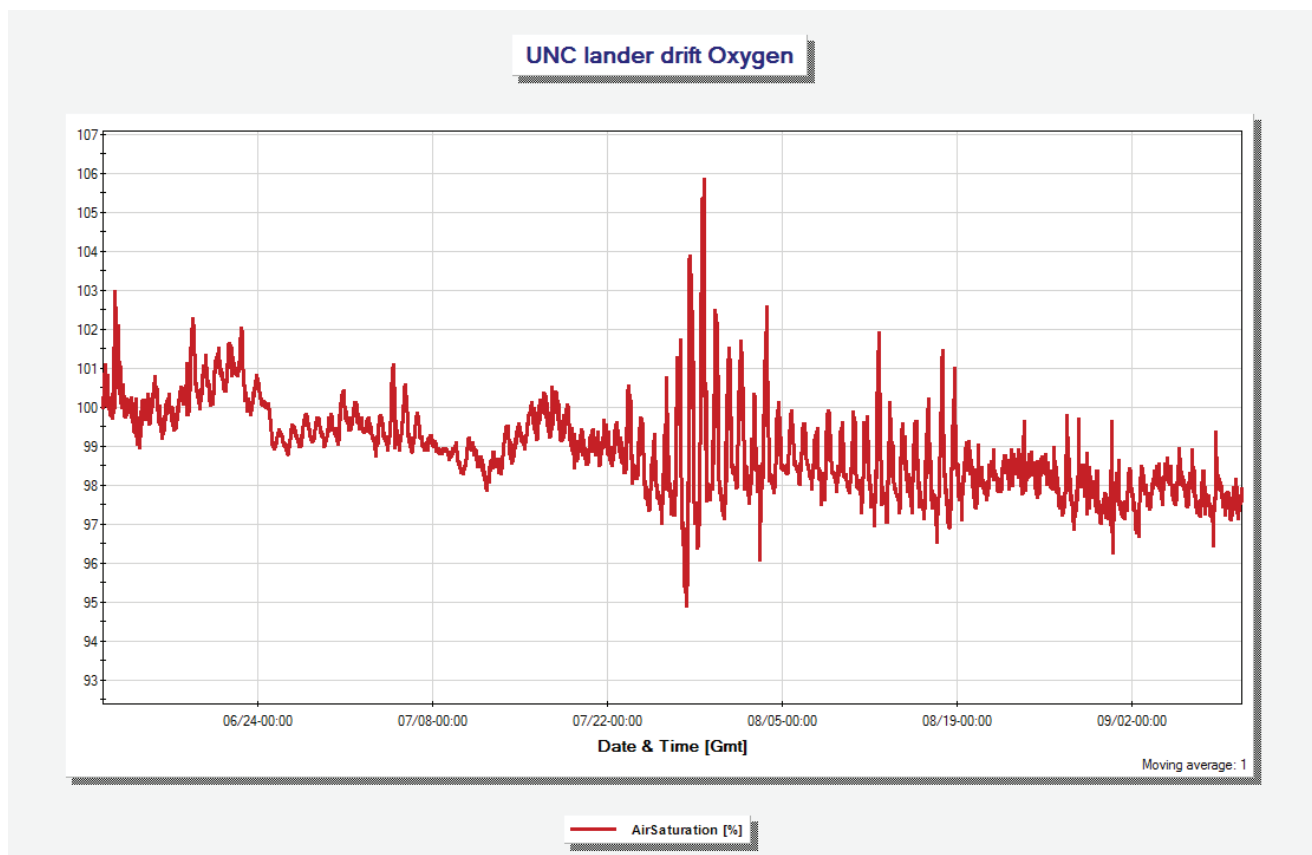


Figure 8: Oxygen saturation measurements during the first 3.5 months of the lander drift. Daily oscillations are most likely related to primary production. Higher oscillations for about 2 weeks in the beginning of August indicate the onset of a bloom.

Increasing pressure (figure 9) and decreasing temperature recordings demonstrate how the lander drifts to the NE across the Atlantic. The lowest winter temperatures reached was about 18°C indicating that the lander drifted south of the Azores islands.

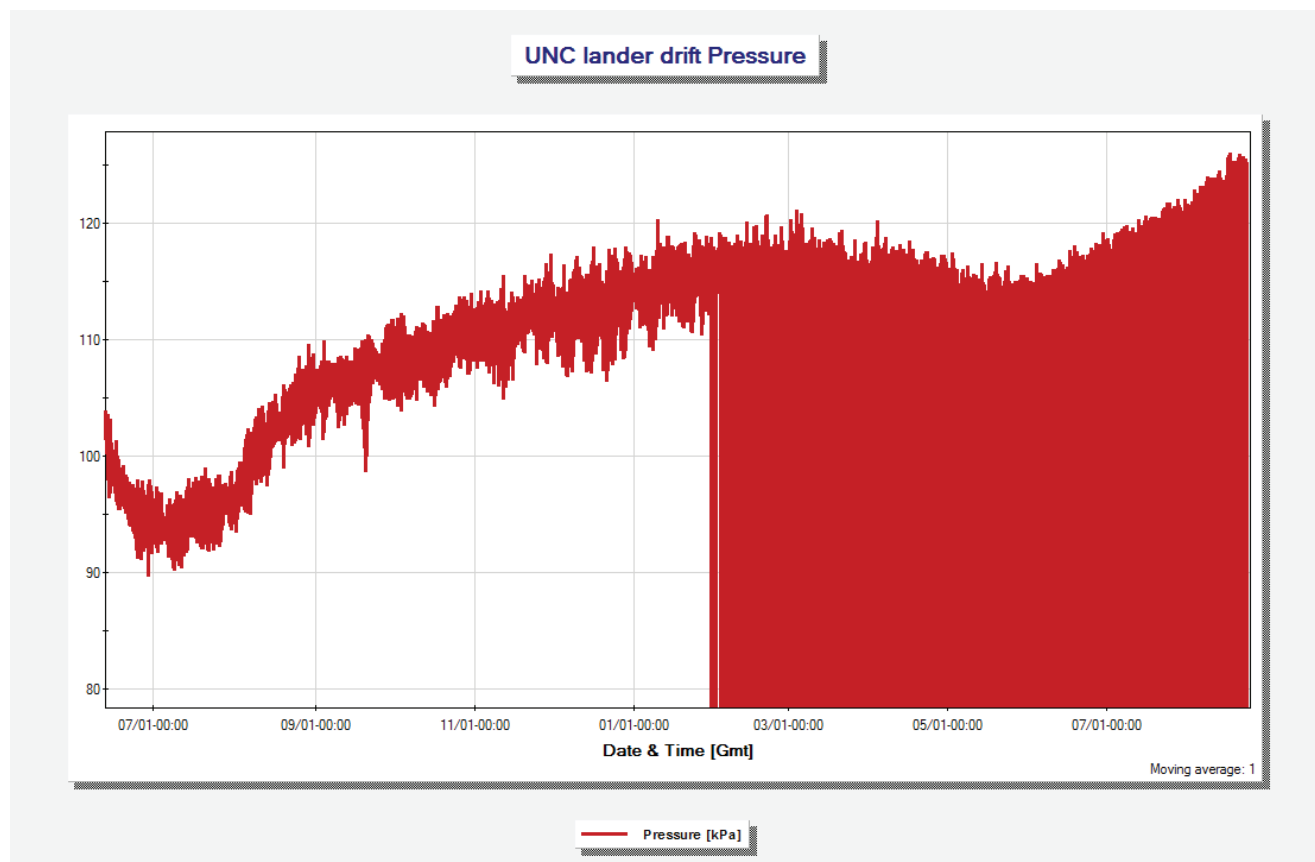


Figure 9: Pressure measurements during the drift. The pressure sensor is located close to the surface. Short-term oscillations are related to wave activity while long-term changes are related to air-pressure variations. The destruction of the Doppler Current Sensor introduces noise, negative spikes, on the pressure sensor readings. High-end values should still be ok. It should be possible to use variations in air-pressure and temperature as an indication of where the lander is located during the first year.

We can only hope that the lander will show up again somewhere in the Atlantic Ocean. All we know for certain is that it is no longer monitoring the deep sea coral reef off Cape Lookout, NC, USA.

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