

V. Deployment Cruise Report

OPPEX-I Deployment Cruise: Chief Scientist Report Chief Scientist: Eric Grabowski

OPPEX-I Deployment Cruise

Vessel: R/V Kilo Moana, University of Hawaii

Cruise ID: KM 08-07

May 30 – June 1, 2008

Master of the Vessel: Captain Richard L Meyer

OTG Marine Technicians: Dan Fitzgerald and Elly Speicher

Loaded: May 30, 2008 @ 1100

Departed: May 30, 2008 @ 1800

Arrived: June 1, 2008 @ 1800

1.0 Cruise Objectives

The objective of the cruise was to deploy three wave-powered pumps, one single pump and two tethered pumps. Hydrographic and biogeochemical data was to be collected to characterize the upper water column. Three Seagliders were to be deployed during the cruise. The stations that were to be occupied during the cruise:

- 1) Station 1, the site of CTD operations, small boat operations and Seaglider deployments, located northeast of Oahu at a position that was to be determined by the mesoscale ocean altimetry data. The approximate location, 22° 13.4'N, 157° 23.5'W. This station was to be occupied on May 31 between 0200 and 0900.
- 2) Station 2, the site of the single pump deployment, small boat operations and optic casts, located 1 nm away from Station 1. This station was to be occupied on May 31 between 0930 and 1330.
- 3) Station 3, the tethered pumps deployment site and small boat operations, located northeast of Oahu at a position that was to be determined by the mesoscale ocean altimetry data. The pumps were to be deployed within 2 nm of the single pump array. This station was to be occupied on May 31 between 1400 and 1730.
- 4) Station 4, the site of the third Seaglider deployment, small boat operations and net tows, located 1nm away from the tethered pumps deployment site. This station was to be occupied between May 31, 1800 and June 1, 0130.
- 5) Station 5, the location of the single pump array after drifting for approximately 20hr. A small boat was to be deployed at this site. A hand held CTD unit was to be deployed and two tidbit sensors were to be recovered from the small boat. This station was to be occupied on June 1 between 0600 and 0900.

2.0 Description of Planned Operations: *Refer to Deployment Cruise Schedule*

Upon arrival to Station 1, CTD operations were to commence. Three CTD casts were scheduled at this location. Following the third CTD cast, at sunrise, the small boat was to be deployed. The small boat was to be used as the filming and/or diving platform for the filming crew. The small boat was to be used for this purpose throughout the cruise. After the deployment of the small boat, two Seagliders were to be deployed consecutively. After the successful deployment of both Seagliders the KM was to move 1 nm away to Station 2.

Upon arrival to Station 2, the small boat was to be deployed with the filming crew aboard. The single pump was to be deployed in this location. Following the completion of the single pump deployment the KM was to move a safe distance away for the PRR cast and the cyanocage cast. After the optics casts the KM was to transit 2 nm to Station 3.

The small boat was to be launched prior to the tethered pumps deployment. The two pumps were to be deployed at this location. Following the dual pumps deployment the KM was to move 1 nm away to Station 4, for the third Seaglider deployment. Following this deployment the small boat was to be recovered. Several net tows were to be completed at this location. Then the KM was to transit to Station 5, the single pump.

At sunrise, on June 1 the small boat was to be deployed next to the single pump. Hand-lowered CTD casts and the recovery of the tidbit temperature sensor were to be completed from the small boat. After, the small boat was to be recovered. The KM was scheduled to depart Station 5 at 1000 for the KM's return to Snug Harbor at 1800 on June 1.

3.0 PERSONNEL:

<u>Participant</u>	<u>Title</u>	<u>Affiliation</u>
Eric Grabowski	Chief Scientist	UH
Angelique White	Lead Scientist	OSU
Brian Von Herzen	Broader Impacts Scientist	Climate Foundation
Philip Kithil	Pump Inventor	Atmocean
Blake Watkins	Marine Engineer	UH
Steve Poulos	Technology/Seaglider	UH
Karin Björkman	Support Scientist	UH
Sam Wilson	Support Scientist	UH
Tara Clemente	Support Scientist	UH
Iain Riddick	Series Producer	IP
Geraldine Hawkins	Line Producer	IP
Matthew Wortman	Director	IP
Ruth Roberts	Producer	IP
Sarah Newman	Production Co-Ordinator	IP
Mike Timney	Cameraman	IP
Simon De Glanville	Cameraman	IP
Mark Hatch	Sound Recordist	IP
Mike May	Local Camera Assistant	IP
Jennifer Languell	Presenter	IP
Basil Singer	Presenter	IP
William Branlund	Discovery Photog	IP
Dan Fitzgerald	Marine Technician	OTG
Elly Speicher	Marine Technician	OTG
Kevin Flanagan	UH Dive Safety Officer	UH
Tom Swenarton	Dive Support	UHMC
Tim McGovern	Dive Support	OTG

4.0 Summary of Operations:

The KM departed on the OPPEX-I deployment cruise at 1800 on May 30. At 0125 the KM arrived at Station 1. Upon arrival, three CTD casts were completed consecutively. The third CTD cast was aborted because of instrumentation problems and a fourth CTD cast was added to the schedule for 2000 on May 31. At 0635 the small boat was deployed with divers and film crew aboard. The small boat was used as the film and dive platform. Following the small boat deployment a Seaglider was deployed at 0700. The second Seaglider was deployed successfully at 0845. The KM then steamed 5 nm away from the Seaglidars to Station 2.

Upon arrival to Station 2, the small boat was launched with film and dive crew aboard. The single pump buoy was deployed at 1053 followed by the whole pump system which was released from the ship at 1109 on May 31. The single pump was deployed successfully and without incident. The KM then moved a safe distance away from the pump for a cyanocage cast. The KM then steamed 2 nm away from the single pump to Station 3, the two tethered pumps deployment location.

At 1640 the valve of the first pump was deployed followed by the buoy at 1646. The second buoy was deployed at 1701 and the entire tethered pumps system was deployed and released from the ship at 1715. The two pumps were deployed successfully and without incident. Following the deployment, the small boat was recovered. The KM moved safely away from the dual pumps for a cyanocage cast. Because the set-up of the dual pumps took longer than expected the third Seaglider deployment was postponed until 0800 on June 1. After the optics cast, a CTD cast was conducted at 2012 to finish the biogeochemical sampling. Two net tows were completed at 2135 and 2250. Following the net tows the KM transited to Station 5, the single pump.

The single pump was located at 0340. At 0536 the KM was in position for the small boat deployment. Overnight, the winds and sea state increased so the Captain cancelled the hand-lowered CTD casts from the small boat. The small boat was still deployed at 0602 with the mission of recovering the tidbit temperature sensor in the top coupler of the pump tube that was rigged to break free. The temperature sensor was successfully recovered at 0630 and the small boat was safely brought back aboard the KM at 0645. The third Seaglider was then deployed at 0710 in the vicinity of the single pump. While the tidbit sensor was being removed from its protective case the sensor was damaged and the data could not be downloaded onboard the KM. The KM got underway to Snug Harbor at 0825 and returned on time at 1745.

On June 2 the tidbit sensor was sent back to the manufacturer to retrieve the data.

5.0 Detailed Summary of Operations:

May 30, 2008

The OPPEX team loaded all of the gear and supplies aboard the KM at 1100.

Departed Snug Harbor at 1800.

Safety and Science meeting held in the conference room at 1900.

May 31, 2008

Arrived Station 1 at 0125, location of 22° 13.4'N, 157° 23.4'W.

CTD cast 1 was deployed at 0204 and recovered at 0251. CTD cast 2 was deployed at 0323 and recovered at 0403. CTD cast 3 was deployed at 0542 and recovered at 0617.

Following CTD operations, the small boat was deployed at 0635 with divers aboard to film the deployment of the Seagliders.

At 0700 the first Seaglider was deployed at the location of 22° 13.4'N, 157° 23.5'W.

At 0837 the divers entered the water. The second Seaglider was deployed at 0845. The divers were back aboard the KM at 0900.

The KM steamed 5 nm away from the Seagliders to Station 2, location of 22° 13.4'N 157° 22.5'W for the single pump deployment. At 1053 the single pump buoy was deployed. The single pump was successfully deployed at 1109. The deployment was completed safely and without incident.

The KM moved a safe distance away from the pump and the cyanocage was deployed 1146 and recovered at 1223.

Conducted abandon ship drill at 1230. All personnel mustered in the staging bay. All new personnel were instructed to put on their survival suits. C/M instructed crew on the life raft launching protocol.

The KM then moved to Station 3, 2 nm away from the single pump at the location of 22° 13.5'N, 157° 18.6'W. At 1640 the valve of the first of the dual pumps was lowered into the ocean. At 1646 the first buoy of the tethered pumps were deployed followed by the second buoy at 1701. The dual pumps were successfully deployed at 1715. Both pumps were deployed safely and without incident. The small boat was recovered at 1812.

The KM moved safely away from the tethered pumps and the cyanocage was deployed at 1832 and recovered at 1906.

A CTD cast was conducted at 2012 at the location of 22° 13.7'N, 157° 16.8'W.

A net tow was performed at 2135 followed by a second tow at 2250.

June 1, 2008

The KM transited to the single pump at 0255. The ship was within 3 nm of the pump at 0340. At 0445 the KM maneuvered for the single pump. The ship was in position by 0536 at the location of 22° 14.8'N, 157° 18.1'W. Because the wind and wave heights increased overnight the hand lowered CTD operations were canceled. The small boat was still launched at 0602 with the mission of recovering the rigged tidbit sensor. The sensor was successfully recovered at 0630. The small boat was safely recovered at 0645.

The third Seaglider was deployed at 0710 at the location of 22° 14.76'N, 157° 18.1'W. .

The KM got underway to Snug Harbor at 0825.

The KM arrived at Snug Harbor on time at 1745.

DEPLOYMENT CRUISE SCHEDULE:

TIME	Fri. May 30	Sat. May 31	Sun. June 1	Mon June 2	
0000			Open/Close Net Tow		0000
0100			Net Tow		0100
0200		CTD 1			0200
0300			Transit Single Pump		0300
0400		CTD 2			0400
0500					0500
0600		CTD 3 Deploy Small Boat	Deploy Small Boat		0600
0700		Deploy Seaglider 1	Hand-Lowered CTD		0700
0800		Deploy Seaglider 2	Recover Tidbit		0800
0900		Move off 1nm glider Deploy Single Pump	Recover Small Boat		0900
1000			Transit Snug		1000
1100					1100
1200		PRR Cyanocage			1200
1300		Move off 2nm pump			1300
1400		Deploy Dual Pump			1400
1500					1500
1600					1600
1700		Move off 1nm pump			1700
1800	Depart Snug	Deploy Seaglider 3	Arrive Snug		1800
1900		Recover Small Boat			1900
2000					2000
2100					2100
2200					2200
2300					2300

June 1: Sunrise 0549

Sunset 1910