

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM
FINAL CRUISE REPORT
KA-10-06

Area: Equatorial Pacific between 8°N and 8°S latitude along 165°E Longitude and 8°S to 8°N Latitude along 180° Longitude.

Itinerary:

KA-10-06 DEP *October 5, 2010, Kwajalein, RMI*
ARR *November 3, 2010, Honolulu, HI*

CRUISE DESCRIPTION

The Tropical Atmosphere Ocean (TAO) array consists of 70 buoys utilizing a taut line mooring configuration used to mount data collection sensors for climate research purposes. Fifteen buoys are serviced by JAMSTEC and the remaining 55 buoys from 95°W longitude to 165°E longitude are serviced by National Data Buoy Center (NDBC). Repair and maintenance of the buoys is performed by NDBC contracted personnel on an annual basis utilizing the NOAA Ship *Ka'imimoana* and other ships. The buoys' deployment lifecycles are up to 18 months to ensure at least one year of data collection can be completed.

TAO Project Points of Contact:

TAO Program Manager

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TAO Operations Manager

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TAO Cruise Objective and Plan:

The objective of this cruise was the maintenance of the TAO Array along the 165°E and 180° meridians.

The scientific complement for the cruise embarked at *Kwajalein, RMI* on **October 4, 2010**. The ship departed on **October 5, 2010** and conducted operations as listed in Section 2.1. The ship arrived in *Honolulu, HI* on **November 3, 2010**.

1.0 PERSONNEL

1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: Aaron Boutwell

Participating Scientists:

Name	Gender	Nationality	Affiliation
Aaron Boutwell	M	US	NOAA/NDBC
James Haden	M	US	NOAA/NDBC
Casey Burge	M	US	NOAA/NDBC

2.0 OPERATIONS

2.1 TAO Data Recovery Summary

Mooring Operations conducted are shown in the tables below. The following provides details on the data recovery efforts for the buoys serviced. All noted times in this summary report are Coordinated Universal Time (UTC):

Cruise Summary

Buoy Site: 8N 165E	Mooring Depth: 5218m
Mooring Operation: Recovery	Mooring ID#: PM873A
Deployed Location: 08 2.98N, 165 8.82E	Deployed Date: 2/15/2010
Recovered Location: 08 02.7N, 165 07.7E	Recovered Date: 10/6/2010
Previous Repair Date: None	
Sensors/Equipment Lost at Sea: Tube SN# 653, AT/RH SN# 118829, Anemometer SN# 80505, Rain Gauge SN# 743	
Sensors Damaged/Fouled: None that were recovered.	
Fishing/Vandalism: Tower had been removed from buoy.	

Sensors/Tubes Downloaded: All sub surface sensors were downloaded successfully.			
General Comments: Batteries in release were almost dead.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 8N 165E	Mooring Depth: 5218m
Mooring Operation: Deployment	Mooring ID#: PM935A
Deployed Location: 08 03.44N, 165 07.704E	Deployed Date: 10/7/2010
Pre-Deployment On Deck Instrument Failures: 125m temperature sensor SN#14543 failed on deck.	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: Anemometer	
General Comments: Anemometer was damaged during deployment. This sensor was not replaced due to the ship's policy of not launching small boats at night.	

Buoy Site: 5N 165E Refresh	Mooring Depth: 4773m		
Mooring Operation: Recovery	Mooring ID#: DM003B		
Deployed Location: 05 02.2N, 165 03.1E	Deployed Date: 06/16/2009		
Recovered Location: 05 02.753N, 165 03.026E	Recovered Date: 10/6/2010		
Previous Repair Date: 02/20/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully.			
General Comments: When the tube was opened up it was noticed that the rack was loose and the hardware that held it together was in the bottom of the tube.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 5N 165E Refresh	Mooring Depth: 4770m
Mooring Operation: Deployment	Mooring ID#: DM013A
Deployed Location: 04 58.229N, 165 02.808E	Deployed Date: 10/9/2010
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Routine deployment.	

Buoy Site: 5N 165E		Mooring Depth: 4782m	
Mooring Operation: Repair		Mooring ID#: PM874B	
Deployed Location: 05 02.07N, 165 00.71E		Deployed Date: 2/21/2010	
Repair Location: 05 02.503N, 165 00.250E		Repaired Date: 10/09/2010	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except Tube SN# 615 (no comms.).			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 2N 165E		Mooring Depth: 4175m	
Mooring Operation: Recovery		Mooring ID#: PM821B	
Deployed Location: 01 59.9N, 165 009E		Deployed Date: 6/18/2009	
Recovered Location: 02 00.5N, 165 00.7E		Recovered Date: 9/7/2010	
Previous Repair Date: 2/22/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: T5 SN#14365 module mount was broken			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except T7 SN#14368 (no comms.).			
General Comments:			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 2N 165E		Mooring Depth: 4653m	
Mooring Operation: Deployment		Mooring ID#: PM936A	
Deployed Location: 01 59.102N, 154 56.567W		Deployed Date: 9/8/2010	
Pre-Deployment On Deck Instrument Failures: T1 SN#14467			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 0 165E		Mooring Depth: 4404m	
Mooring Operation: Repair		Mooring ID#: PM875B	
Deployed Location: 00 00.3N, 164 59.6E		Deployed Date: 2/23/2010	

Repair Location: 00 00.420N, 164 59.490E		Repaired Date: 10/10/2010	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except Tube SN#625 which had no data to be downloaded.			
General Comments: Replaced TC10 with a dive op. and attempted to download tube.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 0 165E ADCP		Mooring Depth: 4393m	
Mooring Operation: Deployment		Mooring ID#: WA011	
Deployed Location: 00 00.420N, 165 12.368E		Deployed Date: 10/11/2010	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 2S 165E		Mooring Depth: 4468m	
Mooring Operation: Recovery		Mooring ID#: PM823A	
Deployed Location: 02 00.267S, 165 00.730E		Deployed Date: 6/20/2009	
Recovered Location: 02 00.56S, 164 59.19E		Recovered Date: 10/12/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: T4 SN#13974, 100m module			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Hawser line attached to buoy			
Sensors/Tubes Downloaded: All sensors were downloaded successfully except: T3 SN#13973, T5 SN#13975 (no comms.) and Tube SN# 720 had 0 bytes to transfer.			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 2S 165E		Mooring Depth: 4468m	
Mooring Operation: Deployment		Mooring ID#: PM939A	
Deployed Location: 02 00.56S, 164 59.19E		Deployed Date: 10/12/2010	
Pre-Deployment On Deck Instrument Failures: Tube# 741 would not report AT/RH			
Sensors/Equipment Lost at Sea: None			

Sensors Damaged During Deployment: None
General Comments: Deployed spare Tube# 740 as Tube# 741 failed on deck.

Buoy Site: 8S 165E Refresh		Mooring Depth: 3895m	
Mooring Operation: Recovery		Mooring ID#: DM004B	
Deployed Location: 08 02.496S, 164 44.5E		Deployed Date: 6/21/2009	
Recovered Location: 08 02.9S. 164 44.0E		Recovered Date: 10/18/2010	
Previous Repair Date: 02/26/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: T4, T6, T7, TP8, were all fouled with fishing gear. T1 had slipped down to the 75m sensor.			
Fishing/Vandalism: Lots of fishing gear.			
Sensors/Tubes Downloaded: All sensors were downloaded successfully except T1 (no comms.)			
General Comments: None.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 8S 165E Refresh		Mooring Depth: 3894m	
Mooring Operation: Deployment		Mooring ID#: DM014A	
Deployed Location: 08 02.360S, 164 48.818E		Deployed Date: 10/19/2010	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 8S 165E		Mooring Depth: 3895m	
Mooring Operation: Recovery		Mooring ID#: PM824A	
Deployed Location: 08 02.653S, 164 46.709E		Deployed Date: 6/22/2009	
Recovered Location: 08 02.417S, 164 47.321E		Recovered Date: 10/18/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: T7 SN#14120 and T8 SN#14211 had lots of fishing gear			
Fishing/Vandalism: Large amount of fishing line recovered throughout the mooring.			
Sensors/Tubes Downloaded: All sensors downloaded successfully except T8 SN#14211 (no comms.)			
General Comments: None.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service

			Observations

Buoy Site: 8S 165E	Mooring Depth: 3896m
Mooring Operation: Deployment	Mooring ID#: PM938A
Deployed Location: 07 59.85S, 164 51.27E	Deployed Date: 10/19/2010
Pre-Deployment On Deck Instrument Failures: T8 SN#12008	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Routine deployment.	

Buoy Site: 2S 180	Mooring Depth: 5367m		
Mooring Operation: Recovery	Mooring ID#: PM865B		
Deployed Location: 02 00.1S, 179 55.0W	Deployed Date: 11/19/2009		
Recovered Location: 01 59.463S, 179 53.352W	Recovered Date: 10/24/2010		
Previous Repair Date: 03/05/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC SN#12447 had broken mount. TP10 SN#14847 module mount was missing and sensor had slid down to end of nilspin being held on nilspin with tie wraps only.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except: Tube SN#637 had 0 bytes to transfer and T6 SN#14713 (no comms.).			
General Comments:			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 2S 180	Mooring Depth: 5342m
Mooring Operation: Deployment	Mooring ID#: PM939A
Deployed Location: 01 59.909S, 179 52.207W	Deployed Date: 10/24/2010
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Routine deployment.	

Buoy Site: 0 180	Mooring Depth: 5393m
Mooring Operation: Recovery	Mooring ID#: PM864BA

Deployed Location: 00 01.375N, 179.54.41W		Deployed Date: 11/18/2009	
Recovered Location: 00 01.6N, 179 53.04W		Recovered Date: 10/24/2010	
Previous Repair Date: 03/06/2010			
Sensors/Equipment Lost at Sea: Anemometer SN#88450 was lost during recovery.			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: None			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 0 180		Mooring Depth: 5393m	
Mooring Operation: Deployment		Mooring ID#: PM940A	
Deployed Location: 00 02.42N, 179 53.56W		Deployed Date: 9/20/2010	
Pre-Deployment On Deck Instrument Failures: T1 SN#15098			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 2N 180		Mooring Depth: 5485m	
Mooring Operation: Repair		Mooring ID#: PM879B	
Deployed Location: 02 00.6N, 179 48.9W		Deployed Date: 03/08/2010	
Repair Location: 02 00.96W, 179 50.86W		Repaired Date: 10/26/2010	
Sensors/Equipment Lost at Sea: Diver dropped T1 SN#12930 attempting to attach to Nilspin.			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
Sensors/Tubes Downloaded: T1 SN#13036 was not downloaded (no comms.).			
General Comments:			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 5N 180		Mooring Depth: 5547m	
Mooring Operation: Repair		Mooring ID#: PM880B	
Deployed Location: 04 59.2N, 179 53.5W		Deployed Date: 03/10/2010	
Repair Location: 04 59.7N, 179 55.0W		Repaired Date: 10/26/2010	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: Replaced anemometer and SSC.			

Fishing Vandalism: None			
Sensors/Tubes Downloaded: Tube successfully downloaded.			
General Comments: None.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 8N 180		Mooring Depth: 5950m	
Mooring Operation: Recovery		Mooring ID#: PM819A	
Deployed Location: 07 59.6N, 179 52.0W		Deployed Date: 6/8/2009	
Recovered Location: 07 59.57N, 179 53.4W		Recovered Date: 10/27/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: T1 SN#13935, T5 SN#13939, T6 SN#13940 all had broken mounts. T10 SN#13388 was flooded.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors were downloaded successfully except T10 SN#13388 (flooded).			
General Comments: None.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

Buoy Site: 8N 180		Mooring Depth: 5950m	
Mooring Operation: Deployment		Mooring ID#: PM941A	
Deployed Location: 08 00.61N, 179 47.07W		Deployed Date: 10/28/2010	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

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Buoy Site: 8N 180 Refresh		Mooring Depth: 5929m	
Mooring Operation: Recovery		Mooring ID#: DM002A	
Deployed Location: 07 58.3N, 179 53.1W		Deployed Date: 6/9/2009	
Recovered Location: 07 58.4N, 179 55.8W		Recovered Date: 10/27/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors were downloaded successfully except: T1			

PN#25350 SN#3161, T4 PN#25328 SN#3148 would not download. T5 PN#25430 SN#3198, T7 PN#25330 SN#3159 had no comms.			
General Comments: None.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

2.2 *CTD Casts Completed*

A Sea-Bird 911plus CTD with dual temperature and conductivity sensors was provided by the NMAO. Temperature and conductivity sensors are calibrated yearly at Sea-Bird and sent in for diagnostics as necessary. A Sea-Bird 12-position carousel and twelve 5-liter Niskin bottles were used to collect water samples for the analysis of salinity.

The following outlines the CTD casts completed during the cruise:

CTD Operations			
Coordinates	Date	Cast #	Comments
0805.613N 16508.264E	10/6/2010	KA60011	3000 m
0700.274N 16506.705E	10/7/2010	KA60021	1000 m
0600.749N 16506.117E	10/7/2010	KA60031	1000 m
0505.082N 16500.217E	10/8/2010	KA60041	1000 m
0400.460N 16500.052E	10/9/2010	KA60051	1000 m
0300.687N 16500.179E	10/9/2010	KA60061	1000 m
0159.983N 16458.984E	10/10/2010	KA60071	1000 m
0100.500N 16500.234E	10/10/2010	KA60081	1000 m
0001.761S 16502.986E	10/11/2010	KA60091	3000 m
0100.091S 16459.275E	10/11/2010	KA60101	1000 m
0158.656S 16459.179E	10/12/2010	KA60111	1000 m
0802.492S 16449.872E	10/19/2010	KA60121	3000 m
0201.104S 17954.749W	10/24/2010	KA60131	1000 m
0005.535N 17953.588W	10/25/2010	KA60141	3000 m
0200.835N 17952.139W	10/25/2010	KA60151	1000 m
0459.341N 17956.624W	10/26/2010	KA60161	1000 m
0800.040N 17957.618W	10/27/2010	KA60171	3000 m

2.3 *Ancillary Science Projects Completed on the Cruise*

The following outlines the ancillary science work performed in conjunction with the TAO operations on

the cruise:

Pacific Marine Environmental Laboratory (PMEL) Argo Profiling CTD Floats

Four (4) Argo float was scheduled for deployment on this cruise. The chief scientist verified and briefed the Operations Officer on the deployment positions prior to the start of the cruise. All Argo Float deployments were completed as scheduled.

Questions concerning ARGO Floats should be directed to:

Gregory Johnson, NOAA/PMEL
Tel: (206) 526-6806
E-mail: pmel_floats@noaa.gov

or

Elizabeth Steffen, NOAA/PMEL
Tel: (206) 526-6747
E-mail: pmel_floats@noaa.gov

The following outlines the Argo floats deployed during the cruise:

ARGO Floats			
Coordinates	Date	SN#	Comments
0001.595S 16502.771E	10/11/2010	4677	
0359.988S 16409.753E	10/17/2010	4670	
0710.302S 16659.784E	10/20/2010	4668	
0006.940N 17953.444W	10/25/2010	4676	

Atlantic Oceanographic and Meteorological Laboratory (AMOL) Surface Drifting Floats

Ten (10) AOML Surface Drifters were scheduled for deployment on this cruise. The chief scientist verified and briefed the Operations Officer on the deployment positions prior to the start of the cruise. All AOML Surface Drifter deployments were completed as scheduled.

Questions concerning AOML Surface Drifters should be directed to:

Shaun Dolk, NOAA/AOML
Global Drifter Center,
Tel: (305) 361-4546
Fax: (305) 361-4436
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The following outlines the AOML Drifting floats deployed during this cruise:

AOML Floats			
Coordinates	Date	SN#	Comments
0457.998N 16502.711E	10/9/2010	90559	

0301.088N 16500.102E	10/9/2010	90561	
0001.553S 16502.659E	10/11/2010	90535	
0258.420S 16401.314E	10/17/2010	90538	
0500.019S 16418.221E	10/18/2010	90556	
0201.112S 17954.396W	10/24/2010	90542	
0201.044S 17954.300W	10/24/2010	90543	
0007.119N 17953.442W	10/25/2010	90540	
0300.048N 17950.733W	10/26/2010	90541	
0459.687N 17954.951W	10/26/2010	90544	