

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM
FINAL CRUISE REPORT
KA-10-07

Area: Equatorial Pacific between 9°N and 5°S latitude along 140°W longitude and 8°S to 8°N latitude along 125°W longitude.

Itinerary:

KA-10-07 DEP *November 16, 2010, Ford Island, HI*
ARR *December 19, 2010, Ford Island, 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 lifecycle 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 125°W and 140°W meridians.

The scientific complement for the cruise embarked at Ford Island, *HI* on *November 15, 2010*. The ship

departed on *November 16, 2010* and conducted operations as listed in Section 2.1. The ship arrived in Ford Island, *HI* on *December 19, 2010*.

1.0 PERSONNEL

1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: Leonard Quigley

Participating Scientists:

Name	Gender	Nationality	Affiliation
Leonard Quigley	M	US	NOAA/NDBC
Robert Koller	M	US	NOAA/NDBC
James Houston	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 time in the summary reports is Coordinated Universal Time (UTC):

Cruise Summary

Buoy Site: 9N 140W			
Mooring Operation: Recovery		Mooring ID#: PM838B	
Deployed Location: 8 59.4N 140 15.4W		Deployed Date: 8/30/2009	
Recovered Location: 9 00.4N 140 15.2W		Recovered Date: 11/22/2010	
Previous Repair Date: 4/5/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Fishing line at 20 meters			
Sensors/Tubes Downloaded: All sensors downloaded successfully.			
General Comments: Routine recovery.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
Winds	6/22/10	Wind vane stuck on 0	None

Buoy Site: 9N 140W	Mooring Depth: 4834m
Mooring Operation: Deployment	Mooring ID#: PM942A
Deployed Location: 09 00.382N 140 14.791W	Deployed Date: 11/23/2010
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 140W	Mooring Depth: 4475m		
Mooring Operation: Repair	Mooring ID#: PM891B		
Deployed Location: 04 57.8N 139 57.2W	Deployed Date: 4/8/2010		
Repair Location: 04 59.01N 139 58.31W	Repaired Date: 11/24/2010		
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
Sensors/Tubes Not Downloaded: Unable to download payload, seas too rough.			
General Comments: Replaced SSC sensor.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
Salinity	9/23/10	Data too high	None

Buoy Site: 2N 140W	Mooring Depth: 4367m		
Mooring Operation: Repair	Mooring ID#: PM892B		
Deployed Location: 01 58.2N 140 00.1W	Deployed Date: 4/9/2010		
Repair Location: 01 59.5N 140 00.2W	Repaired Date: 11/25/2010		
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
Sensors/Tubes Not Downloaded: Unable to download payload, seas too rough.			
General Comments: Replaced SSC sensor.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
Salinity	8/26/10	Data too low	None

Buoy Site: 0 140W	
Mooring Operation: Recovery	Mooring ID#: PM843B

Deployed Location: 00 00.15S 139 51.39W		Deployed Date: 9/4/2009	
Recovered Location: 0 11.3N 140 8.7W		Recovered Date: 11/25/2010	
Previous Repair Date: 4/10/2010			
Sensors/Equipment Lost at Sea: TP 300 SN# 13111 & TP500 SN#13112			
Sensors Damaged/Fouled: TV13739 Flooded, Sontek 658 cable broken, Sontek 660 broken fin and missing, TC 14880 had interior damage-circuit board broken and loose.			
Fishing/Vandalism: Nilspin cut to core at 82 m, several missing sensors.			
Sensors/Tubes Downloaded: Sensors not downloaded: TP 300 SN# 13111, TP500 SN#13112, TC14878, TV13739, TV14383, Sontek 660, TC14880. All others downloaded successfully.			
General Comments: None.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
80m Salinity	5/24/10	No data	Sensor case & Interior damaged
60m Salinity	9/17/10	Data too low	None
TV120	9/4/09	No data	Sensor flooded
TV25	9/4/09	No data	None
40m Salinity	10/6/09	No data	No communication

Buoy Site: 0 140W		Mooring Depth: 4345m	
Mooring Operation: Deployment		Mooring ID#: PM943A	
Deployed Location: 0 02.21S 139 52.28W		Deployed Date: 11/26/2010	
Pre-Deployment On Deck Instrument Failures: TV12617 would not communicate, replaced with TV14916 at 13m			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 2S 140W		Mooring Depth: 4333m	
Mooring Operation: Visit		Mooring ID#: PM893A	
Deployed Location: 2 2.0S 139 59.819W		Deployed Date: 4/12/10	
Visit Location: 02 02.506S 139 59.99W		Visit Date: 11/27/2010	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
None			N/A

Buoy Site: 0 140W ADCP			
Mooring Operation: Recovery		Mooring ID#: CA015	
Deployed Location: 0 02.0073N 140 02.5546W		Deployed Date: 9/3/2009	
Recovered Location: 0 01.800N 140 01.164W		Recovered Date: 11/26/2010	
Previous Repair Date: N/A			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except CTD PN# 26493			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
None			

Buoy Site: 0 140W ADCP		Sensor Head Depth: 312.6m	
Mooring Operation: Deployment		Mooring ID#: CA016	
Deployed Location: 0 02.102282N 140 02.0362W		Deployed Date: 11/27/2010	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

Buoy Site: 5S 140W			
Mooring Operation: Recovery		Mooring ID#: PM845A	
Deployed Location: 05 00.1S 139 54.1W		Deployed Date: 9/6/2009	
Recovered Location: 04 59.84S 138 55.59W		Recovered Date: 11/28/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC 12877 housing damaged at mounting hole.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except SSC 12877.			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
SSC	11/17/10	No data	No communications

Buoy Site: 5S 140W	Mooring Depth: 4360m
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Mooring Operation: Deployment	Mooring ID#: PM944A
Deployed Location: 05 03.432S 139 54.094W	Deployed Date: 11/29/2010
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: None	

Buoy Site: 5S 140W Refresh			
Mooring Operation: Recovery		Mooring ID#: DM005B	
Deployed Location: 04 57.8S 139 54.2W		Deployed Date: 9/5/2009	
Recovered Location: 04 57.9S 139 55.8W		Recovered Date: 11/29/2010	
Previous Repair Date: 4/12/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except T20 PN#31293.			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
T20	7/11/10	No data	Dead battery

Buoy Site: 5S 140W Refresh		Mooring Depth: 4362m	
Mooring Operation: Deployment		Mooring ID#: DM015A	
Deployed Location: 05 00.1S 139 56.6W		Deployed Date: 11/30/2010	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

Buoy Site: 5S 125W			
Mooring Operation: Recovery		Mooring ID#: PM847A	
Deployed Location: 4 59.7S 124 57.5W		Deployed Date: 9/11/09	
Recovered Location: 04 59.5S 124 57.4W		Recovered Date: 12/4/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: T12548 & T12522			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Long line gear and cuts in the nilspin.			
Sensors/Tubes Downloaded: All sensors downloaded successfully except T12548 & T12522			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations

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Buoy Site: 5S 125W	Mooring Depth: 4547m
Mooring Operation: Deployment	Mooring ID#: PM945A
Deployed Location: 04 59.465S 124 56.786W	Deployed Date: 12/5/2010
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: None	

Buoy Site: 5S 125W Refresh	Mooring Depth: 4536m
Mooring Operation: Deployment	Mooring ID#: DM016A
Deployed Location: 05 02.538S 124 51.348W	Deployed Date: 12/4/2010
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: None	

Buoy Site: 2S 125W			
Mooring Operation: Recovery	Mooring ID#: PM848B		
Deployed Location: 02 02.3S 124 53.5W	Deployed Date: 9/12/2009		
Recovered Location: 02 01.43S 124 59.72W	Recovered Date: 12/5/2010		
Previous Repair Date: 4/20/2010			
Sensors/Equipment Lost at Sea: T12917			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All recovered sensors were downloaded successful except T12912 (No Comms.).			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
T60	11/12/09	No data	No communications
T180	4/11/10	No data	Lost at sea
T20	9/12/09	Not at 20m depth	Slid to 40m
Salinity	6/1/10	Data too high	None

Buoy Site: 2S 125W	Mooring Depth: 4761m
Mooring Operation: Deployment	Mooring ID#: PM946A
Deployed Location: 02 01.62S 124 53.01W	Deployed Date: 12/6/2010
Pre-Deployment On Deck Instrument Failures: None	

Sensors/Equipment Lost at Sea: None
Sensors Damaged During Deployment: None
General Comments: None

Buoy Site: 0 125W			
Mooring Operation: Recovery		Mooring ID#: PM895A	
Deployed Location: 0 11.09S 124 23.59W		Deployed Date: 4/21/2010	
Recovered Location: 0 58.68N 123 44.8W		Recovered Date: 12/7/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: TP15170 & TP15171			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Buoy had ship impact marks			
Sensors/Tubes Downloaded: All sensors downloaded successfully except TP15170 & TP15171 (Lost at Sea).			
General Comments: Buoy was adrift			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
Winds	11/13/10	WDIR off 45+ degrees	None
TP300	7/30/10	No data	Lost at sea
TP500	8/16/10	No data	Lost at sea

Buoy Site: 0 125W	Mooring Depth: 4772m
Mooring Operation: Deployment	Mooring ID#: PM947A
Deployed Location: 00 10.44S 124 22.17W	Deployed Date: 12/7/2010
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: None	

Buoy Site: 2N 125W	Mooring Depth: 4624m
Mooring Operation: Deployment	Mooring ID#: PM948A
Deployed Location: 01 57.178N 125 01.965W	Deployed Date: 12/9/2010
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: None	

Buoy Site: 5N 125W		Mooring Depth: 4410m	
Mooring Operation: Visit		Mooring ID#: PM896A	
Deployed Location: 05 04.450N 124 56.651W		Deployed Date: 4/23/2010	
Visit Location: 05 06.47N 124 57.56W		Visit Date: 12/10/10	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
None			N/A

Buoy Site: 8N 125W			
Mooring Operation: Recovery		Mooring ID#: PM854A	
Deployed Location: 08 01.31N 125 00.746W		Deployed Date: 9/17/2009	
Recovered Location: 08 01.42N 125 00.09W		Recovered Date: 12/10/2010	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: T13698			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: TUBE655, T13691 (no communications), T13698 (Lost at sea)			
General Comments: Could not communicate with release and used line cutter.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
T20	10/29/10	No data	No communications
T180	7/9/10	No data	Lost at sea

Buoy Site: 8N 125W		Mooring Depth: 4659m	
Mooring Operation: Deployment		Mooring ID#: PM949A	
Deployed Location: 08 01.457N 125 00.499W		Deployed Date: 12/11/2010	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: None			

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	
0903.710N 14015.307W	11/22/2010	KA70011	3000m	
0458.216N 13959.770W	11/24/2010	KA70021	1000m	
0400.664N 13959.437W	11/24/2010	KA70031	1000m	
0300.241N 14000.102W	11/24/2010	KA70041	1000m	
0157.407N 14000.305W	11/25/2010	KA70051	1000m	
0100.843N 14005.014W	11/25/2010	KA70061	1000m	
0001.475S 13949.566W	11/26/2010	KA70071	3000m	
0059.880S 14000.941W	11/27/2010	KA70081	1000m	
0203.540S 14001.481W	11/27/2010	KA70091	1000m	
0259.695S 13958.499W	11/28/2010	KA70101	1000m	
0359.729S 13957.427W	11/28/2010	KA70111	1000m	
0455.129S 13952.517W	11/29/2010	KA70121	3000m	
0457.487S 12458.917W	12/4/2010	KA70131	3000m	
0359.607S 12458.001W	12/5/2010	KA70141	1000m	
0259.756S 12458.785W	12/5/2010	KA70151	1000m	
0200.877S 12451.033W	12/6/2010	KA70161	1000m	
0059.482S 12436.278W	12/6/2010	KA70171	1000m	
0009.004S 12423.063W	12/6/2010	KA70181	3000m	
0100.487N 12353.455W	12/7/2010	KA70191	1000m	
0158.114N 12502.609W	12/8/2010	KA70201	1000m	
0259.991N 12501.140W	12/9/2010	KA70211	1000m	
0508.715N 12457.228W	12/10/2010	KA70221	1000m	
0559.562N 12457.514W	12/10/2010	KA70231	1000m	
0800.213N 12501.165W	12/11/2010	KA70241	3000m	

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

Five (5) Argo floats 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 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
1353.612N 14800.357W	11/19/2010	4669	
0900.667N 14015.177W	11/23/2010	6915	
0000.297S 13953.216W	11/27/2010	4605	
0010.721S 12421.670W	12/7/2010	4603	
0802.161N 12500.660W	12/11/2010	6917	

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
E-mail: shaun.dolk@noaa.gov

The following outlines the AOML Drifting floats deployed during this cruise:

AOML Floats			
Coordinates	Date	SN#	Comments
0459.024N 13959.672W	11/24/2010	90532	
0157.670N 14000.341W	11/25/2010	90534	
0000.200S 13953.255W	11/27/2010	90528	
0203.407S 14001.624W	11/27/2010	90525	
0500.002S 13954.662W	12/5/2010	90527	
0459.083S 12455.840W	12/6/2010	90531	
0200.497S 12450.686W	12/7/2010	90529	
0010.555S 12421.654W	12/9/2010	90526	

0300.523N 12501.928W	12/10/2010	90533	
0508.638N 12457.004W	12/10/2010	90530	