

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM
FINAL CRUISE REPORT
KA-11-02

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-11-02 DEP *February 23, 2011, Pohnpei, FSM*
ARR *March 25, 2011, 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.

TAO Project Points of Contact:

TAO Program 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 *Pohnpei, FSM* on *February 22, 2011*. The ship

departed on *February 23, 2011* and conducted operations as listed in Section 2.1. The ship arrived in *Honolulu, HI* on *March 25, 2011*.

1.0 PERSONNEL

1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: Robert Koller

Participating Scientists:

Name	Gender	Nationality	Affiliation
Robert Koller	M	US	NOAA/NDBC
William Thompson	M	US	NOAA/NDBC
Paul Hodnet	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 Operation: Repair		Mooring ID#: PM935B	
Deployed Location: 08 03.7N 165 06.2 E		Deployed Date: 10/07/2010	
Repair Location: 08 04.651N 165 06.245E		Repair Date: 2/25/2011	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Replaced rain gauge and winds, problem persisted. Replaced tube.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
Winds	10/7/10	Zeroed during deployment	None
Rain	10/7/10	Percent time raining	None

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Buoy Site: 5N 165E Refresh			
Mooring Operation: Repair		Mooring ID#: DM013B	
Deployed Location: 04 58.23N 165 02.808E		Deployed Date: 10/09/2010	
Repair Location: 04 57.140N 165 02.588E		Repair Date: 2/26/2011	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Installed new SSC. Old SSC was left on bridle.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
SSC	10/26/10	Data too low	None

Buoy Site: 5N 165E			
Mooring Operation: Recovery		Mooring ID#: PM874B	
Deployed Location: 5 02.07N 165 00.71E		Deployed Date: 2/21/2010	
Recovered Location: 05 0.913N 165 00.782E		Recovered Date: 2/26/2011	
Previous Repair Date: 10/9/10			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors and the tube were downloaded successfully.			
General Comments: Routine recovery.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None

Buoy Site: 5N 165E		Mooring Depth: 4787	
Mooring Operation: Deployment		Mooring ID#: PM957A	
Deployed Location: 05 05.7N 165 01.94E		Deployed Date: 2/27/2011	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 2N 165E			
Mooring Operation: Visit		Mooring ID#: PM936A	
Deployed Location: 2 01.1N 165 00.5E		Deployed Date: 10/10/2010	
Visit Location: 2 00.814N 165 00.263E		Visit Date: 2/28/2011	

Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Buoy riding well in the water.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None

Buoy Site: 0 165E			
Mooring Operation: Recovery		Mooring ID#: PM875B	
Deployed Location: 00 00.3N 164 59.6E		Deployed Date: 2/23/2010	
Recovered Location: 00 00.82N 165 00.195E		Recovered Date: 2/28/2011	
Previous Repair Date: 10/10/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: Wind sensor rotor bearing damaged. Sensors from 1 to 125m fouled. T sensor at 400m off mount.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors were downloaded successfully except TC 14612 had dead battery and the tube would not download.			
General Comments: Tube showed 2695 records, 0 bytes with 382 days stored.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
Winds	11/25/10	Zeroed out	None

Buoy Site 0 165E		Mooring Depth: 4408m	
Mooring Operation: Deployment		Mooring ID#: PM958A	
Deployed Location: 00 00.12N 164 59.92E		Deployed Date: 3/1/2011	
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 Operation: Visit		Mooring ID#: PM937A	
Deployed Location: 02 00.56S 164 59.19E		Deployed Date: 10/12/2010	
Visit Location: 02 1.3S 164 59.5E		Visit Date: 3/1/11	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Buoy riding well in the water.			

Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None

Buoy Site: 2S 165E Refresh			
Mooring Operation: Recovery		Mooring ID#: DM008A	
Deployed Location: 01 59.990S 164 57.899E		Deployed Date: 2/24/2010	
Recovered Location: 02 00.999S 164 57.178E		Recovered Date: 3/1/2011	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None.			
Sensors Damaged/Fouled: T2,3,5,6 and TP8 had slipped in the sensor mount. T2 has chafing inside the inductive mount. SSC, and top 2 sensors fouled.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All were downloaded successfully except SSC which gave transmission errors during download.			
General Comments: Nilspin damaged at 75 & 150m.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None other than noted above

Buoy Site: 2S 165E Refresh		Mooring Depth: 4468m	
Mooring Operation: Deployment		Mooring ID#: DM019A	
Deployed Location: 02 00.123S 164 58.032E		Deployed Date: 3/2/2011	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 5S 165E			
Mooring Operation: Recovery		Mooring ID#: PM876A	
Deployed Location: 05 00.405S 165 10.427E		Deployed Date: 2/25/2010	
Recovered Location: 05 00.621S 165 09.704E		Recovered Date: 3/3/2011	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Long line fishing gear wrapped around acoustic release.			
Sensors/Tubes Downloaded: All sensors downloaded successfully.			
General Comments: None			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service

			Observations
			None

Buoy Site: 5S 165E	Mooring Depth: 2492m
Mooring Operation: Deployment	Mooring ID#: PM959A
Deployed Location: 05 00.028S 165 10.070E	Deployed Date: 3/3/2011
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 Refresh			
Mooring Operation: Visit		Mooring ID#: DM014A	
Deployed Location: 08 02.360S 164 48.818E		Deployed Date: 10/19/2010	
Visit Location: 08 02.15S 164 48.40E		Visit Date: 3/4/2011	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Buoy riding well in the water.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None

Buoy Site: 8S 165E			
Mooring Operation: Repair		Mooring ID#: PM938B	
Deployed Location: 7 59.85S 164 51.27E		Deployed Date: 10/19/2010	
Repair Location: 08 00.612S 164 46.055E		Repair Date: 3/4/2011	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Replaced rain gauge. Downloaded tube.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
Rain	11/21/10	Data too high	None

Buoy Site: 8S 180	
Mooring Operation: Recovery	Mooring ID#: PM877A

Deployed Location: 07 58.8S 179 51.0W		Deployed Date: 3/3/2010	
Recovered Location: 07 59.335S 179 50.44W		Recovered Date: 3/7/2011	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: T12940 at 125m			
Sensors Damaged/Fouled: SSC and top 3 sensors fouled. 500m sensor off mount.			
Fishing/Vandalism: Several hundred meters of long line gear recovered throughout the mooring.			
Sensors/Tubes Downloaded: All sensors downloaded successfully except T13213, dead battery T12940, lost.			
General Comments: Slices in Nilspin at 150 and 50 meters.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
T50	3/4/10	Data missing	Dead batteries
T125	2/21/11	Data missing	Lost at Sea

Buoy Site: 8S 180		Mooring Depth: 5538m	
Mooring Operation: Deployment		Mooring ID#: PM960A	
Deployed Location: 07 58.848S 179 50.815W		Deployed Date: 3/9/2011	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Routine deployment.			

Buoy Site: 5S 180			
Mooring Operation: Recovery		Mooring ID#: PM878A	
Deployed Location: 04 58.119S 179 54.507W		Deployed Date: 3/4/2010	
Recovered Location: 04 58.845S 179 54.640W		Recovered Date: 3/9/2011	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: 200m sensor had broken mount. SSC and top 3 sensors fouled.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully.			
General Comments: Nilspin sliced at 150m			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None

Buoy Site: 5S 180		Mooring Depth: 5660m	
Mooring Operation: Deployment		Mooring ID#: PM961A	
Deployed Location: 04 57.717S 179 52.831W		Deployed Date: 3/10/2011	

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 180 Refresh	Mooring Depth: 5361m
Mooring Operation: Deployment	Mooring ID#: DM020A
Deployed Location: 01 59.6S 179 50.1W	Deployed Date: 3/11/2011
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 180			
Mooring Operation: Recovery		Mooring ID#: PM939A	
Deployed Location: 01 59.909S 179 52.207W		Deployed Date: 10/24/2010	
Recovered Location: 01 59.89S 179 52.181W		Recovered Date: 3/11/2011	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC and top 3 T sensors were fouled.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully.			
General Comments: There were cuts in the Nilspin at 100 and 150m.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None

Buoy Site: 2S 180	Mooring Depth: 5339m
Mooring Operation: Deployment	Mooring ID#: PM962A
Deployed Location: 01 58.6S 179 53.4W	Deployed Date: 3/12/2011
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 Operation: Visit	Mooring ID#: PM940A
Deployed Location: 00 02.42N 179 53.56W	Deployed Date: 10/25/2010

Visit Location: 00 01.6N 179 53.5W		Visit Date: 3/12/2011	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Buoy riding well in the water.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			None

Buoy Site: 2N 180			
Mooring Operation: Recovery		Mooring ID#: PM879B	
Deployed Location: 02 00.6N 179 48.9W		Deployed Date: 3/8/2010	
Recovered Location: 02 01.0N 179 50.3W		Recovered Date: 3/13/2011	
Previous Repair Date: 10/26/2010			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC & top 3 sensors fouled.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully.			
General Comments: Broken mount at 500m			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
TP500	11/16/10	Data missing	Broken Mount, Lost at Sea

Buoy Site: 2N 180		Mooring Depth: 5485m	
Mooring Operation: Deployment		Mooring ID#: PM963A	
Deployed Location: 02 0.593N 179 48.47W		Deployed Date: 3/14/2011	
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 180			
Mooring Operation: Recovery		Mooring ID#: PM880B	
Deployed Location: 04 59.2N 179 53.5W		Deployed Date: 3/10/2010	
Recovered Location: 04 58.680N 179 53.542W		Recovered Date: 3/15/2011	
Previous Repair Date: 10/26/2010			
Sensors/Equipment Lost at Sea: T3-75m lost.			
Sensors Damaged/Fouled: SSC, 25 and 50m sensors fouled. Connector on SSC pulled loose.			
Fishing/Vandalism: Fishing gear tangled on 75m mount.			

Sensors/Tubes Downloaded: All sensors downloaded successfully except T75 lost at sea.			
General Comments: ID and SN tags missing from TP300.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
T75	7/23/10	Data missing	Lost at Sea

Buoy Site: 5N 180	Mooring Depth: 5697m
Mooring Operation: Deployment	Mooring ID#: PM964A
Deployed Location: 05 00.042N 179 53.991W	Deployed Date: 3/15/2011
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Complete IM failure on deployment. No replacement Nilspin available. Station was left with subsurface sensors recording internally only.	

Buoy Site: 8N 180			
Mooring Operation: Repair	Mooring ID#: PM941B		
Deployed Location: 8 00.61N 179 47.07W	Deployed Date: 10/28/2010		
Repair Location: 07 58.899N 179 53.456W	Repaired Date: 3/17/2011		
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
Sensors/Tubes Not Downloaded: Tube downloaded successfully.			
General Comments: Tube swap.			
Site Sensor Failures	Date Sensors Failed	Why Sensors Failed	Field Service Observations
			N/A

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
0806.333N	16505.769E	2/25/2011	KA20011	3000 m
0700.298N	16506.160E	2/26/2011	KA20021	1000 m
0559.785N	16504.355E	2/26/2011	KA20031	1000 m
0505.364N	16459.203E	2/27/2011	KA20041	1000 m
0400.309N	16500.321E	2/27/2011	KA20051	1000 m
0300.310N	16500.771E	2/27/2011	KA20061	1000 m
0158.191N	16500.073E	2/28/2011	KA20071	1000 m
0100.271N	16459.286E	2/28/2011	KA20081	1000 m
0000.044N	16456.861E	2/28/2011	KA20091	3000 m
0059.943S	16458.928E	3/1/2011	KA20101	1000 m
0200.031S	16455.790E	3/1/2011	KA20111	1000 m
0300.387S	16501.438E	3/2/2011	KA20121	1000 m
0359.926S	16505.286E	3/2/2011	KA20131	1000 m
0459.949S	16509.208E	3/3/2011	KA20141	1000 m
0600.018S	16502.046E	3/3/2011	KA20151	1000 m
0659.644S	16454.959E	3/3/2011	KA20161	Aborted
0759.904S	16450.664E	3/4/2011	KA20171	3000 m
0758.220S	17950.869W	3/8/2011	KA20181	3000 m
0659.955S	17952.368W	3/9/2011	KA20191	1000 m
0600.175S	17953.206W	3/9/2011	KA20201	1000 m
0457.839S	17955.084W	3/10/2011	KA20211	1000 m
0359.792S	17953.538W	3/10/2011	KA20221	1054 m
0259.769S	17952.724W	3/10/2011	KA20231	1000 m
0157.306S	17951.503W	3/11/2011	KA20241	1000 m
0059.859S	17953.209W	3/12/2011	KA20251	1000 m
0004.635N	17953.584W	3/12/2011	KA20261	3000 m
0100.129N	17952.700W	3/13/2011	KA20271	1000 m
0200.616N	17948.268W	3/13/2011	KA20281	1000 m
0300.039N	17951.953W	3/14/2011	KA20291	1000 m
0400.405N	17952.706W	3/14/2011	KA20301	1000 m
0459.530N	17952.711W	3/15/2011	KA20311	1000 m
0559.959N	17953.475W	3/16/2011	KA20321	1000 m
0700.020N	17952.708W	3/16/2011	KA20331	1000 m
0800.948N	17953.448W	3/17/2011	KA 20341	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

Two (2) 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:

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or

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The following outlines the Argo floats deployed during the cruise:

Argo Floats				
Coordinates		Date	SN#	Comments
0000.466S	16500.524E	3/1/2011	4449	EQ 165E R/D
0008.716N	17953.622W	3/12/2011	4655	Argo