

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM
FINAL CRUISE REPORT
KA-12-01

Area: Equatorial Pacific between 8°N and 8°S latitude along 110°W Longitude and 8°S to 8°N Latitude along 95°W Longitude.

Itinerary:

KA-12-01 DEP *January 16, 2012, Honolulu, HI*
ARR *February 29, 2012, Puntarenas, CR*

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.

NDBC Points of Contact:

NDBC 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 110°W and 95°W meridians.

The scientific complement for the cruise embarked at *Honolulu, HI* on *January 15, 2012*. The ship departed on *January 16, 2012* and conducted operations as listed in Section 2.1. The ship arrived in *Puntarenas, CR* on *February 29, 2012*.

1.0 PERSONNEL

1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: James Haden.

Participating Scientists:

Name	Gender	Nationality	Affiliation
James Haden	M	US	NOAA/NDBC
Alan Lossett	M	US	NOAA/NDBC
James Coleman	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: 5N 110W	
Mooring Operation: Recovery	Mooring ID#: PM977A
Deployed Location: 4 59.60N 110 03.50W	Deployed Date: 7/30/2011
Recovered Location: 4 59.90N 110 00.50W	Recovered Date: 2/8/2012
Previous Repair Date: N/A	
Sensors/Equipment Lost at Sea: Tower, Bird Cage, Tube, ATRH, anemometer, and TP300	
Sensors Damaged/Fouled: TP300 broken module mount	
Fishing/Vandalism: Yes	

Sensors/Tubes Downloaded: All recovered sensors downloaded successfully.			
General Comments: Tower was removed from buoy, no instruments above surface			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
All (Tube)	12/19/11	Data missing	Tower and Tube were removed, lost at sea
TP300	12/19/11	Data missing	Lost at sea, broken module mount

Buoy Site: 5N 110W	Mooring Depth: 4251 m
Mooring Operation: Deployment	Mooring ID#: PM997A
Deployed Location: 4 59.62N 110 04.56W	Deployed Date: 2/8/2012
Pre-Deployment On Deck Instrument Failures: T140 failed on deck and was replaced.	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Routine deployment.	

Buoy Site: 2N 110W			
Mooring Operation: Repair	Mooring ID#: PM978B		
Deployed Location: 2 02.06N 110 02.15W	Deployed Date: 8/1/2011		
Repair Location: 2 02.079N 110 02.376W	Repair Date: 2/9/2012		
Sensors/Equipment Lost at Sea: T20			
Sensors Damaged/Fouled: None			
Fishing Vandalism: None			
General Comments: Divers dropped T20 sensor during the repair.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
T20	8/5/11	Data missing	T20 not reporting

Buoy Site: 0 110W	
Mooring Operation: Repair	Mooring ID#: PM979B
Deployed Location: 00 01.81N 109 55.61W	Deployed Date: 8/2/2011
Repair Location: 00 01.818N 109 55.623W	Repair Date: 2/10/2012
Sensors/Equipment Lost at Sea: None	
Sensors Damaged/Fouled: None	
Fishing Vandalism: None	
General Comments: Rain gauge for repair failed on deck, Rain gauge and cable replaced.	

Team also swapped out CO2 system.

Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
Rain,	8/3/11	Data erratic	None
AT/RH	10/31/11	Data too high	None

Buoy Site: 2S 110W			
Mooring Operation: Recovery		Mooring ID#: PM980A	
Deployed Location: 02 01.90S 109 58.16W		Deployed Date: 8/3/2011	
Recovered Location: 01 18.2S 108 44.9W		Recovered Date: 2/11/2012	
Previous Repair Date: N/A			
Sensors/Equipment Lost at Sea: T180, Release, Anemometer			
Sensors Damaged/Fouled: T80, T140, TP300 broken mounts.			
Fishing/Vandalism: Anemometer wire cut above the connector.			
Sensors/Tubes Downloaded: All sensors downloaded successfully except T180			
General Comments: Buoy was adrift			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
T180	2/8/12	Data missing	Lost at sea, broken module mount
Wind	9/12/11	WDIR 180 degrees off	Wire cut above the connector

Buoy Site: 2S 110W		Mooring Depth: 3914 m	
Mooring Operation: Deployment		Mooring ID#: PM980A	
Deployed Location: 02 01.45S 109 58.14W		Deployed Date: 2/11/12	
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 110W			
Mooring Operation: Repair		Mooring ID#: PM981B	
Deployed Location: 04 59.45S 109 59.33W		Deployed Date: 8/4/2011	
Repair Location: 04 59.19S 110 00.1W		Repair Date: 2/12/2012	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: T20			

Fishing Vandalism: None			
General Comments: Exchange T20, No Communications with T20 when downloading was attempted.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
T20	9/6/11	Data missing	No communications

Buoy Site: 8S 95W			
Mooring Operation: Recovery		Mooring ID#: PM915B	
Deployed Location: 08 01.874S 95 14.967W		Deployed Date: 7/29/2010	
Recovered Location: 08 01.40S 95 14.50W		Recovered Date: 2/16/2012	
Previous Repair Date: 5/8/2011			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: T100, T120 and TP300 had broken module mounts. Anemometer connector broken during recovery.			
Fishing/Vandalism: None			
Sensors/Tubes Downloaded: All sensors downloaded successfully except the Tube, T140, and T180.			
General Comments: The tube was not transmitting upon arrival.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
All (Tube)	11/20/11	Data missing	No transmits
T140	8/4/11	Data missing	No communications
T180	8/25/11	Data missing	Would not transfer

Buoy Site: 8S 95W		Mooring Depth: 3976 m	
Mooring Operation: Deployment		Mooring ID#: DM032A	
Deployed Location: 08 01.42S 95 14.99W		Deployed Date: 2/16/2012	
Pre-Deployment On Deck Instrument Failures: Tube			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Tube failed on deck. It was replaced.			

Buoy Site: 5S 95W			
Mooring Operation: Recovery		Mooring ID#: PM917A	
Deployed Location: 05 04.9S 95 03.4W		Deployed Date: 7/30/2010	

Recovered Location: 05 04.06S 95 03.3W		Recovered Date: 2/18/2012	
Previous Repair Date: N/A			
Sensors/Equipment Lost at Sea: TP300, Release			
Sensors Damaged/Fouled: Anemometer bent over, T120 mount and coil ear broken. Rain gauge missing some bird spikes.			
Fishing/Vandalism: Yes, anemometer bent over, rain gauge missing bird spikes.			
Sensors/Tubes Downloaded: All sensors downloaded successfully except TP300			
General Comments: Had no communications with release had to send down line cutter			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
TP300	11/20/11	Data missing	Lost at sea

Buoy Site: 5S 95W		Mooring Depth: 3830 m	
Mooring Operation: Deployment		Mooring ID#: PM999A	
Deployed Location: 05 04.6S 95 03.07W		Deployed Date: 2/19/2012	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: T100, T120, and T140 were not reporting after anchor drop.			
General Comments: Routine deployment.			

Buoy Site: 2S 95W			
Mooring Operation: Recovery		Mooring ID#: PM918B	
Deployed Location: 01 59.4S 95 10.5W		Deployed Date: 8/1/2010	
Recovered Location: 01 10.08S 95 35.52W		Recovered Date: 2/20/2012	
Previous Repair Date: 5/10/2011			
Sensors/Equipment Lost at Sea: Tower, Tube, anemometer, rain gauge, bird cage, ATRH, T60 T80 all lost at sea.			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Yes			
Sensors/Tubes Downloaded: All sensors downloaded successfully except Tube, T60, and T80.			
General Comments: Buoy was vandalized had 200yds of fishing gear trailing, also a raft and a transmitter recovered. Tower was unbolted from buoy.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
All (Tube)	7/29/11	Data missing	Tower & Tube missing, lost at sea
T60	7/29/11	Data missing	Lost at sea

T80	7/29/11	Data missing	Lost at sea, module mount broken
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Buoy Site: 2S 95W	Mooring Depth: 3433 m
Mooring Operation: Deployment	Mooring ID#: QM001A
Deployed Location: 01 59.07S 95 10.98W	Deployed Date: 2/20/2012
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 95W			
Mooring Operation: Recovery		Mooring ID#: PM972A	
Deployed Location: 00 12.637N 95 17.437W		Deployed Date: 5/11/2011	
Recovered Location: N/A		Recovered Date: N/A	
Previous Repair Date: N/A			
Sensors/Equipment Lost at Sea: All equipment lost at sea			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Yes			
Sensors/Tubes Downloaded: None			
General Comments: Indication that buoy had been pulled on prior to arrival			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
All (Tube)	1/17/12	Data missing	Lost at sea

Buoy Site: 0 95W	Mooring Depth: 3312 m
Mooring Operation: Deployment	Mooring ID#: QM002A
Deployed Location: 00 00.611S 94 58.378W	Deployed Date: 2/21/2012
Pre-Deployment On Deck Instrument Failures: Rain gauge failed on deck and was replaced.	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Deployed buoy was a standard toroid, there was no solid core or inserts aboard.	

Buoy Site: 2N 95W	
Mooring Operation: Recovery	Mooring ID#: PM973A

Deployed Location: 02 06.45N 95 24.90W		Deployed Date: 5/12/2011	
Recovered Location: 02 08.24N 95 26.74W		Recovered Date: 2/22/2012	
Previous Repair Date: N/A			
Sensors/Equipment Lost at Sea: T20, T40, T180 lost at sea.			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Yes			
Sensors/Tubes Downloaded: All sensors but T20,T40, and T180			
General Comments: Buoy had a hawser line attached to leg of tower.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
SST,SSC	2/14/12	Data missing	Data missing
T20	5/28/11	Data missing	Lost at sea
T40	11/13/11	Data missing	Lost at sea
T180	10/24/11	Data missing	Lost at sea

Buoy Site: 2N 95W		Mooring Depth: 3119 m	
Mooring Operation: Deployment		Mooring ID#: QM003A	
Deployed Location: 01 58.50N 95 18.46W		Deployed Date: 2/22/2012	
Pre-Deployment On Deck Instrument Failures: None			
Sensors/Equipment Lost at Sea: None			
Sensors Damaged During Deployment: None			
General Comments: Recovered buoy was turned around and deployed due to it having inserts.			

Buoy Site: 5N 95W		Mooring ID#: PM974A	
Mooring Operation: Recovery		Mooring ID#: PM974A	
Deployed Location: 04 57.019N 95 00.682W		Deployed Date: 5/14/2011	
Recovered Location: 04 57.10N 95 00.20W		Recovered Date: 2/23/2012	
Previous Repair Date: N/A			
Sensors/Equipment Lost at Sea: TP500 Lost at sea			
Sensors Damaged/Fouled: Rain gauge cup was broke off sensor, T20 fouled from fishing gear			
Fishing/Vandalism: Yes			
Sensors/Tubes Downloaded: All downloaded successfully except TP500 and T20.			
General Comments: There was a small amount of fishing gear throughout mooring. The nilspin was tied in a knot around the TP500 module mount.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
T20	10/22/11	Data missing	Fouled, fishing line, No communications
TP500	5/14/11	Data missing	Lost at sea, knot in nilspin

Buoy Site: 5N 95W	Mooring Depth: 3500 m
Mooring Operation: Deployment	Mooring ID#: QM004A
Deployed Location: 04 57.20N 95 00.50W	Deployed Date: 2/24/2012
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: T40	
General Comments: T40 was not reporting after anchor drop.	

Buoy Site: 8N 95W			
Mooring Operation: Recovery		Mooring ID#: PM975A	
Deployed Location: 07 58.83N 94 53.33W		Deployed Date: 5/18/2011	
Recovered Location: 07 59.60N 94 53.50N		Recovered Date: 2/25/2012	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: Tube, ATRH, Wind, Rain gauge, and T140			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: Yes			
Sensors/Tubes Downloaded: All subsurface sensors except T140, Tube was not downloaded.			
General Comments: Buoy had no tower on it. Net was covering the buoy hull and trailing off of buoy about 200 yards.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
All (Tube)	11/4/11	Data missing	Tower and Tube missing, lost at sea
T140	11/4/11	Data missing	Lost at sea

Buoy Site: 8N 95W	Mooring Depth: 3684 m
Mooring Operation: Deployment	Mooring ID#: QM005A
Deployed Location: 08 01.03N 94 57.32W	Deployed Date: 2/25/2012
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Fishing vessel Mrs. Jacky was spotted three miles from buoy location.	

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
0457.779N 10959.407W	2/8/2012	KA10011	1038m wire out
0400.045N 11001.148W	2/9/2012	KA10021	1044m wire out
0259.331N 11002.679W	2/9/2012	KA10031	1077m wire out
0457.882N 10959.407W	2/9/2012	KA10041	1063m wire out
0100.032N 10959.135W	2/10/2012	KA10051	1044M wire out
0012.834N 10955.196W	2/10/2012	KA10061	3210m wire out
0117.444S 10844.879W	2/11/2012	KA10071	1049m wire out
0202.782S 10956.883W	2/11/2012	KA10081	1042m wire out
0259.931S 10959.157W	2/12/2012	KA10091	1056m wire out
0400.090S 10959.416W	2/12/2012	KA10101	1041m wire out
0457.906S 11000.948W	2/12/2012	KA10111	1065m wire out
0800.552S 9516.797W	2/16/2012	KA10121	3110m wire out
0659.834S 9346.433W	2/18/2012	KA10131	1044 m wire out.
0600.122S 9426.836W	2/18/2012	KA10141	1040m wire out
0503.984S 9501.730W	2/18/2012	KA10151	1058m wire out
0359.582S 9506.389W	2/19/2012	KA10161	1047m wire out
0300.026S 9507.999W	2/20/2012	KA10171	1077m wire out
0159.133S 9510.268W	2/20/2012	KA10181	1043m wire out
0100.185S 9531.403W	2/21/2012	KA10191	1053m wire out
0001.143S 9457.853W	2/21/2012	KA10201	3185m wire out
0059.707N 9511.729W	2/22/2012	KA10211	1062m wire out
0157.456N 9519.102W	2/22/2012	KA10221	1050m wire out
0300.361N 9512.205W	2/23/2013	KA10231	1044m wire out
0400.061N 9506.291W	2/23/2012	KA10241	1042m wire out
0459.439N 9500.808W	2/24/2012	KA10251	1043m wire out
0600.171N 9457.731W	2/24/2012	KA10261	1043m wire out
0700.043N 9455.569W	2/24/2012	KA10271	1041m wire out
0800.380N 9458.136W	2/25/2012	KA10281	3112m wire out

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

Seven (7) Argo floats 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
0100.044N	10959.377W	2/10/2012	3901115	
0002.569N	10956.382W	2/10/2012	3901035	
001.552S	09457.690W	2/21/2012	5328	
0157.458N	09519.272W	2/23/2012	5421	
0459.439N	09500.808W	2/24/2012	5310	
0800.254N	09458.265W	2/25/2012	5313	
0551.511N	09159.875W	2/26/2012	5840	

Atlantic Oceanographic and Meteorological Laboratory (AMOL) Surface Drifting Floats

Ten (11) 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
0400.136N	11001.208W	2/9/2012	36480	

0200.159N	11003.230W	2/9/2012	34869	
0001.198N	10955.012W	2/10/2012	36481	
0202.781S	10956.715W	2/11/2012	36477	
0400.028S	10959.517W	2/12/2012	36478	
0503.613S	09501.531W	2/18/2012	36491	
0300.197S	09507.532W	2/20/2012	36483	
0100.194S	09531.415W	2/21/2012	35488	
0059.637N	09511.461W	2/22/2012	36505	
0300.558N	09512.124W	2/22/2012	35892	
0459.439N	09500.811W	2/24/2012	36479	