

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM  
FINAL CRUISE REPORT  
RB-14-06

Area: Equatorial Pacific: 8°S 155°W to 8°N 155°W

Itinerary:

RB-14-06            DEP    *November 5, Kwajalein Atoll, RMI*  
                          ARR    *November 24, 2014, 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 Ships and other contract vessels. 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 Operations Branch Chief	NDBC Operations Manager
Steve Cucullu	Jeff Jenner
National Data Buoy Center	National Data Buoy Center
Building 3205	Building 3205
Stennis Space Center, MS 39529	Stennis Space Center, MS 39529
228-688-3804	228-688-2784
Email: <a href="mailto:stephen.cucullu@noaa.gov">stephen.cucullu@noaa.gov</a>	Email: <a href="mailto:jeff.jenner@noaa.gov">jeff.jenner@noaa.gov</a>

TAO Cruise Objective and Plan:

The objective of this cruise was the maintenance of the TAO Array along the 155°W meridian.

The scientific complement for the cruise embarked at Kwajalein, Atoll, RMI on November 4, 2014. The

ship departed on November 5, 2014 and conducted operations as listed in Section 2.1. The ship arrived at Honolulu, HI on November 24, 2014.

## 1.0 PERSONNEL

### 1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: James Rauch.

Participating Scientists:

Name	Gender	Nationality	Affiliation
James Rauch	M	US	NOAA/NDBC
James Haden	M	US	NOAA/NDBC
Stephan Becerra	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

<b>Buoy Site:</b> 0 180	
<b>Mooring Operation:</b> Visit	<b>Mooring ID#:</b> DM079A
<b>Deployed Location:</b> 00 01.785N 179 55.191W	<b>Deployed Date:</b> 07/27/14
<b>Current Location:</b> 00 01.847N 179 53.548W	<b>Visit Date:</b> 11/08/14
<b>Sensors/Equipment Lost at Sea:</b> None	
<b>Sensors Damaged/Fouled:</b> None	
<b>Fishing/Vandalism:</b> None	
<b>Sensors/Tubes Downloaded:</b> None	
<b>General Comments:</b> Unplanned visit conducted due to buoy proximity to the track line.	

<b>Buoy Site:</b> 8S 170W	
<b>Mooring Operation:</b> Recovery	<b>Mooring ID#:</b> DM043A
<b>Deployed Location:</b> 08 00.53S 170 02.3W	<b>Deployed Date:</b> 06/05/12

<b>Recovered Location:</b> 08 06.5S 170 08.6W		<b>Recovered Date:</b> 11/10/14	
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged/Fouled:</b> SSC Fouled; Anemometer stanchion failed and was laid over on the tower ring; T25 all clamp screws were stripped and the sensor was damaged while removing the clamps.			
<b>Fishing/Vandalism:</b> Fishing line was on bridle down to the first sensor. Rope was tied off to bridle as well. Buoy off station.			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Recovery added to mission after the previous cruise had a ship casualty preventing the recovery. Mooring broke from anchor, directly under the release. The acoustic release had no comms and appeared to have been dragged in the mud on the ocean floor. The release link was still attached to the release but no shackles nor chain.			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
Buoy	7/12/14	No transmits	None
ATMP	7/10/14	Data missing	None
T25	4/20/14	Data missing	Damaged, fishing gear
T50-T125	4/20/14	Data missing	None
T150	4/20/14	Data missing	No comms, mount slid
T200	4/20/14	Data missing	Mount slid
T250-T500	4/20/14	Data missing	None
RH	6/11/13	Data too high	None
Wind	8/23/12	WDIR erratic	Upper stanchion failure, hanging my cable
SSC	6/22/12	Data too low	Fouled, fishing gear

<b>Buoy Site:</b> 8S 155W			
<b>Mooring Operation:</b> Recovery		<b>Mooring ID#:</b> DM059A	
<b>Deployed Location:</b> 08 15.32S 155 01.11W		<b>Deployed Date:</b> 10/03/13	
<b>Recovered Location:</b> 10 23.58S 160 41.03W		<b>Recovered Date:</b> 11/12/14	
<b>Sensors/Equipment Lost at Sea:</b> Acoustic Release			
<b>Sensors Damaged/Fouled:</b> SSC, T25 Fouled			
<b>Fishing/Vandalism:</b> None			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Buoy adrift.			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
Buoy	12/15/13	Adrift	Outside data grid

<b>Buoy Site:</b> 8S 155W		<b>Mooring Depth:</b> 5345m	
<b>Mooring Operation:</b> Deployment		<b>Mooring ID#:</b> DM107A	
<b>Deployed Location:</b> 08 17.42S 155 02.41W		<b>Deployed Date:</b> 11/14/2014	
<b>Pre-Deployment On Deck Instrument Failures:</b> None			
<b>Sensors/Equipment Lost at Sea:</b> None			

<b>Sensors Damaged During Deployment:</b> None
<b>General Comments:</b> None

<b>Buoy Site:</b> 5S 155W			
<b>Mooring Operation:</b> Recovery		<b>Mooring ID#:</b> DM060A	
<b>Deployed Location:</b> 04 58.66S 154 59.55W		<b>Deployed Date:</b> 10/04/13	
<b>Recovered Location:</b> 04 58.76S 154 59.22W		<b>Recovered Date:</b> 11/15/14	
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged/Fouled:</b> SSC Fouled			
<b>Fishing/Vandalism:</b> Long line gear on T250, TP300			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Standard recovery			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
ATMP	12/16/13	Data too low	None
RH	11/21/13	Data stuck	None

<b>Buoy Site:</b> 5S 155W		<b>Mooring Depth:</b> 5023m	
<b>Mooring Operation:</b> Deployment		<b>Mooring ID#:</b> DM108A	
<b>Deployed Location:</b> 05 00.02S 154 59.07W		<b>Deployed Date:</b> 11/16/2014	
<b>Pre-Deployment On Deck Instrument Failures:</b> None			
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged During Deployment:</b> None			
<b>General Comments:</b> Standard deployment			

<b>Buoy Site:</b> 2S 155W			
<b>Mooring Operation:</b> Recovery		<b>Mooring ID#:</b> DM058A	
<b>Deployed Location:</b> 01 59.15S 154 59.63W		<b>Deployed Date:</b> 10/01/13	
<b>Recovered Location:</b> 01 58.9S 154 58.6W		<b>Recovered Date:</b> 11/16/14	
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged/Fouled:</b> T150-TP500 fouled with fishing gear			
<b>Fishing/Vandalism:</b> Excessive long line gear on mooring			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Recovery of low profile buoy			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
Buoy	5/1/14	Transmit failure	None
T250	3/8/14	Data missing	No comms
SST/SSS	1/27/14	Data missing	None

<b>Buoy Site:</b> 2S 155W	<b>Mooring Depth:</b> 4987m
<b>Mooring Operation:</b> Deployment	<b>Mooring ID#:</b> DM109A
<b>Deployed Location:</b> 01 58.4S 155 00.9W	<b>Deployed Date:</b> 11/17/2014
<b>Pre-Deployment On Deck Instrument Failures:</b> None	
<b>Sensors/Equipment Lost at Sea:</b> None	
<b>Sensors Damaged During Deployment:</b> None	
<b>General Comments:</b> Standard deployment	

<b>Buoy Site:</b> 0 155W			
<b>Mooring Operation:</b> Recovery		<b>Mooring ID#:</b> DM061A	
<b>Deployed Location:</b> 00 00.05N 154 56.90W		<b>Deployed Date:</b> 10/05/13	
<b>Recovered Location:</b> 00 00.02N 154 54.78W		<b>Recovered Date:</b> 11/17/14	
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged/Fouled:</b> SSC unplugged, TP500 slid to end of Nilspin (700m)			
<b>Fishing/Vandalism:</b> None			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Standard CO2 recovery. CO2 equilibrator bent			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
T25-T250	10/30/14	Data missing	None
TP300	10/10/14	Data missing	None
Wind	4/17/14	WSPD = 0	None
SST/SSS	4/15/14	Data missing	No comms/unplugged
TP500	4/10/14	Data failed	Mount slid
RH	12/18/13	Data too high	None

<b>Buoy Site:</b> 0 155W/CO2	<b>Mooring Depth:</b> 4627m
<b>Mooring Operation:</b> Deployment	<b>Mooring ID#:</b> DM110A
<b>Deployed Location:</b> 00 00.20N 154 55.16W	<b>Deployed Date:</b> 11/18/2014
<b>Pre-Deployment On Deck Instrument Failures:</b> None	
<b>Sensors/Equipment Lost at Sea:</b> None	
<b>Sensors Damaged During Deployment:</b> None	
<b>General Comments:</b> Standard CO2 deployment.	

<b>Buoy Site:</b> 2N 155W	
<b>Mooring Operation:</b> Recovery	<b>Mooring ID#:</b> DM057A
<b>Deployed Location:</b> 01 59.25N 154 57.83W	<b>Deployed Date:</b> 09/29/13
<b>Recovered Location:</b> 01 59.0N 154 55.8W	<b>Recovered Date:</b> 11/18/14
<b>Sensors/Equipment Lost at Sea:</b> None	
<b>Sensors Damaged/Fouled:</b> T25 slid to 50m, T50 slid to 75m; Anemometer stanchion bent 45°	

<b>Fishing/Vandalism:</b> None			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Standard deployment			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
T50	8/23/14	Data failed	Mount slid
Wind	7/25/14	WSPD too low	Stanchion bent
T25	3/2/14	Data failed	Mount slid
ATMP/RH	10/7/13	High/erratic	None

<b>Buoy Site:</b> 2N 155W		<b>Mooring Depth:</b> 4662m	
<b>Mooring Operation:</b> Deployment		<b>Mooring ID#:</b> DM111A	
<b>Deployed Location:</b> 01 59.08N 154 58.38W		<b>Deployed Date:</b> 11/19/2014	
<b>Pre-Deployment On Deck Instrument Failures:</b> None			
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged During Deployment:</b> None			
<b>General Comments:</b> Standard deployment with fairings			

<b>Buoy Site:</b> 5N 155W			
<b>Mooring Operation:</b> Recovery		<b>Mooring ID#:</b> DM062A	
<b>Deployed Location:</b> 05 00.3N 154 57.0W		<b>Deployed Date:</b> 10/08/13	
<b>Recovered Location:</b> 04 59.2N 154 57.2W		<b>Recovered Date:</b> 11/19/14	
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged/Fouled:</b> SSC unplugged, T25 slid to 50m, T200 slid to 250m			
<b>Fishing/Vandalism:</b> None			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Standard recovery			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
SST/SSS	2/8/14	Data missing	Fouled/Damaged, cable unplugged, 2 pins missing
RH	1/2/14	Data too high	None
T50	10/15/13	Data missing	No comms

<b>Buoy Site:</b> 5N 155W		<b>Mooring Depth:</b> 4582m	
<b>Mooring Operation:</b> Deployment		<b>Mooring ID#:</b> DM112A	
<b>Deployed Location:</b> 05 00.1N 154 57.1W		<b>Deployed Date:</b> 11/20/2014	
<b>Pre-Deployment On Deck Instrument Failures:</b> None			
<b>Sensors/Equipment Lost at Sea:</b> None			

<b>Sensors Damaged During Deployment:</b> None
<b>General Comments:</b> Standard deployment

<b>Buoy Site:</b> 8N 155W			
<b>Mooring Operation:</b> Recovery		<b>Mooring ID#:</b> DM056A	
<b>Deployed Location:</b> 08 00.5N 154 57.0W		<b>Deployed Date:</b> 09/26/13	
<b>Recovered Location:</b> 07 59.17N 154 59.35W		<b>Recovered Date:</b> 11/20/14	
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged/Fouled:</b> None			
<b>Fishing/Vandalism:</b> None			
<b>Sensors/Tubes Downloaded:</b> None			
<b>General Comments:</b> Standard deployment			
<b>Site Sensor Failures</b>	<b>Date Data Flagged</b>	<b>Why Data Flagged</b>	<b>Field Service Observations</b>
RH	6/29/14	Data too high	None
T25-TP500	6/16/14	Data missing	None

<b>Buoy Site:</b> 8N 155W		<b>Mooring Depth:</b> 5225m	
<b>Mooring Operation:</b> Deployment		<b>Mooring ID#:</b> DM113A	
<b>Deployed Location:</b> 07 57.04N 154 59.37W		<b>Deployed Date:</b> 11/21/2014	
<b>Pre-Deployment On Deck Instrument Failures:</b> None			
<b>Sensors/Equipment Lost at Sea:</b> None			
<b>Sensors Damaged During Deployment:</b> None			
<b>General Comments:</b> Standard deployment			

## 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.

The following outlines the CTD casts completed during the cruise:

<b>CTD Operations</b>			
<b>Coordinates</b>	<b>Date</b>	<b>Cast #</b>	<b>Comments</b>
08 17.2395S 155 01.2592W	11/14/14	RB060011	
06 59.8702S 155 00.4577W	11/14/14	RB060021	
05 59.9478S 154 59.7893W	11/14/14	RB060031	
04 59.5392S 155 00.0361W	11/16/14	RB060041	

03 59.9665S 155 20.2773W	11/16/14	RB060051	
03 00.0353S 155 09.7883W	11/16/14	RB060061	
01 59.0702S 154 59.7188W	11/17/14	RB060071	
00 59.8602S 154 57.4334W	11/17/14	RB060081	
00 01.2003S 154 54.8633W	11/18/14	RB060091	
00 59.9621N 154 57.0388W	11/18/14	RB060101	
01 58.6459N 154 57.3745W	11/19/14	RB060111	
03 00.0332N 154 57.2382W	11/19/14	RB060121	
04 00.0421N 154 56.5554W	11/19/14	RB060131	
04 59.6454N 154 56.3555W	11/20/14	RB060141	
06 00.1572N 154 58.7889W	11/20/14	RB060151	
07 00.1415N 155 00.1003W	11/20/14	RB060161	
07 56.6156N 154 57.9214W	11/21/14	RB060171	

### 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 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](mailto:pmel_floats@noaa.gov)

or

Elizabeth Steffen, NOAA/PMEL  
 Tel: (206) 526-6747  
 E-mail: [pmel\\_floats@noaa.gov](mailto:pmel_floats@noaa.gov)

The following outlines the Argo floats deployed during the cruise:

<b>ARGO Floats</b>			
<b>Coordinates</b>	<b>Date</b>	<b>SN#</b>	<b>Comments</b>
01 03.8720N 178 59.1121E	11/7/2014	214	
00 56.3185S 178 45.0768W	11/8/2014	405	
04 57.7544S 155 00.2650W	11/16/2014	224	
01 57.7547S 155 00.4270W	11/17/2014	404	
00 00.3949N 154 55.4660W	11/18/2014	406	
01 59.1667N 154 58.7319W	11/19/2014	407	
05 00.4669N 154 57.7729W	11/20/2014	408	

#### 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](mailto:shaun.dolk@noaa.gov)

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

<b>AOML Floats</b>			
<b>Coordinates</b>	<b>Date</b>	<b>SN#</b>	<b>Comments</b>
04 57.6802S 155 00.2729W	11/16/2014	127114	
04 57.6802S 155 00.2729W	11/16/2014	127115	
04 57.6802S 155 00.2729W	11/16/2014	127107	
04 57.6802S 155 00.2729W	11/16/2014	127106	
01 57.7427S 155 00.4258W	11/17/2014	127103	
01 57.7427S 155 00.4258W	11/17/2014	127105	
00 00.4011N 154 55.4662W	11/18/2014	116437	
00 00.4011N 154 55.4662W	11/18/2014	127104	
01 59.1642N 154 58.7314W	11/19/2014	116435	
05 00.4794N 154 57.7668W	11/20/2014	116436	