

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM
FINAL CRUISE REPORT
RB-15-07

Area: Equatorial Pacific: 8°N 170°W to 8°S 170°W and 8°S 155°W to 8°N 155°W

Itinerary:

RB-15-07 DEP *November 10, 2015, Seattle, WA*
 ARR *December 17, 2015, 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.

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: stephen.cucullu@noaa.gov	Email: jeff.jenner@noaa.gov

TAO Cruise Objective and Plan:

The objective of this cruise was the maintenance of the TAO Array along the 170°W and 155°W meridians. Drifting DART Station 46407 was recovered during this cruise. A PMEL Prowler mooring at 2°N 155°W was also recovered.

The scientific complement for the cruise embarked at Seattle, WA on November 9, 2015. The ship departed on November 10, 2015 and conducted operations as listed in Section 2.1. The ship arrived at Honolulu, HI on December 17, 2015.

1.0 PERSONNEL

1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: Brian Lake

Participating Scientists:

Name	Gender	Nationality	Affiliation
Brian Lake	M	US	NOAA/NDBC
James Coleman	M	US	NOAA/NDBC
Rodney Watkins	M	US	NOAA/NDBC
David Ball	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: DART Drifter 46D07	
Mooring Operation: Recovery	Mooring ID#: 46407
Deployed Location: 42-39.4N/128-48.6W	Deployed Date: 3/7/14
Recovered Location: 30-31.68N/150-17.4W	Recovered Date: 11/18/15
Sensors/Equipment Lost at Sea: None	
Sensors Damaged/Fouled: None	
Fishing/Vandalism: Buoy was adrift	
General Comments: Mooring failed at the fishbite eyesplice below chain.	

Buoy Site: 8N 170W	
Mooring Operation: Recovery	Mooring ID#: DM095
Deployed Location: 08-01.48N/170-03.16W	Deployed Date: 10/11/14
Recovered Location: 08-00.30N/170-03.30W	Recovered Date: 11/25/15
Sensors/Equipment Lost at Sea: NA	

Sensors Damaged/Fouled: SSC, T25-T50 fouled. Several sensors out of their mount.			
Fishing/Vandalism:			
General Comments: Routine recovery			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
SST/SSC	11/17/14	SST too high	None
RH	4/29/15	Saturated	None
AT	4/4/15	Too low	None

Buoy Site: 8N 170W	Mooring Depth: 5522 m
Mooring Operation: Deployment	Mooring ID#: DM149
Deployed Location: 07-59.51N/170-06.06W	Deployed Date: 11/26/15
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 170W			
Mooring Operation: Recovery		Mooring ID#: DM096	
Deployed Location: 05-00.96N/169-59.51W		Deployed Date: 10/12/14	
Recovered Location: 05-00.4N/169-59.2W		Recovered Date: 11/26/15	
Sensors/Equipment Lost at Sea: Tube, ATRH, Anemometer missing.			
Sensors Damaged/Fouled: SSC fouled			
Fishing/Vandalism: Topside instruments were removed.			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
T100	12/31/14	Missing	None
Tube	1/15/15	No transmits	Vandalism, Lost at Sea

Buoy Site: 5N 170W		Mooring Depth: 5752 m	
Mooring Operation: Deployment		Mooring ID#: DM150	
Deployed Location: 05-01.4N/169-59.4W		Deployed Date: 11/27/15	
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 170W	
Mooring Operation: Recovery	Mooring ID#: DM097
Deployed Location: 02-02.08N/169-59.04W	Deployed Date: 10/13/14
Recovered Location: 02-02.3N/169-59.82W	Recovered Date: 11/28/15
Sensors/Equipment Lost at Sea: NA	
Sensors Damaged/Fouled: SSC, T25 fouled.	
Fishing/Vandalism: T100-T200, TP500 all fouled with longline	
General Comments: None	

Buoy Site: 2N 170W	Mooring Depth: 5388 m
Mooring Operation: Deployment	Mooring ID#: DM151
Deployed Location: 02-01.78N/170-00.23W	Deployed Date: 11/28/15
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 170W Flux/CO2			
Mooring Operation: Recovery		Mooring ID#: DM098	
Deployed Location: 00-01.36S/170-01.43W		Deployed Date: 10/15/14	
Recovered Location: 00-00.85S/169-59.52W		Recovered Date: 11/29/15	
Sensors/Equipment Lost at Sea: NA			
Sensors Damaged/Fouled: SWR, LWR fouled. SSC-T25 fouled.			
Fishing/Vandalism: None			
General Comments: Routine Recovery			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
V10	12/31/14	Missing	None
C10	8/31/15	Conductivity too low	Sensor fouled
WDIR	10/2/15	Erratic	None
All Inductive	10/19/14	Significant data losses	None

Buoy Site: 0 170W Flux/CO2	Mooring Depth: 5602 m
Mooring Operation: Deployment	Mooring ID#: DM152
Deployed Location: 00-01.14S/170-01.77W	Deployed Date: 11/30/15
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	

General Comments: CT75 sensor's temperature reading is only correct at minute 10, 30 and 50 in the hourly data.

Buoy Site: 0 170W ADCP			
Mooring Operation: Recovery		Mooring ID#: KA018	
Deployed Location: 00-00.19N/169-43.84W		Deployed Date: 10/13/14	
Recovered Location: 00-00.192N/169-43.84W		Recovered Date: 11/30/15	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations

Buoy Site: 0 170W ADCP		Mooring Depth: 5448 m	
Mooring Operation: Deployment		Mooring ID#: KA019	
Deployed Location: 00-00.082S/169-43.68W		Deployed Date: 12/01/15	
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 170W			
Mooring Operation: Recovery		Mooring ID#: DM099	
Deployed Location: 02-10.04S/170-00.801W		Deployed Date: 10/16/14	
Recovered Location: 02-09.25S/169-59.7W		Recovered Date: 12/01/15	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC fouled			
Fishing/Vandalism: None			
General Comments: Several sensors out of their mount.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
T25	3/11/15	Missing	Low Battery

Buoy Site: 2S 170W		Mooring Depth: 4690 m	
Mooring Operation: Deployment		Mooring ID#: DM153	
Deployed Location: 02-09.42S/170-00.09W		Deployed Date: 12/01/15	
Pre-Deployment On Deck Instrument Failures: None			

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

Buoy Site: 5S 170W			
Mooring Operation: Recovery		Mooring ID#: DM100	
Deployed Location: 04-59.96S/170-00.81W		Deployed Date: 10/17/14	
Recovered Location: 04-58.41S/169-59.46W		Recovered Date: 12/02/15	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC-T50 fouled.			
Fishing/Vandalism: None			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
SSC	7/16/15	Conductivity too low	Sensor fouled
T25	9/21/15	Missing	No communication

Buoy Site: 5S 170W		Mooring Depth: 5419 m	
Mooring Operation: Deployment		Mooring ID#: DM154	
Deployed Location: 04-59.19S/169-59.04W		Deployed Date: 12/03/15	
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 170W			
Mooring Operation: Recovery		Mooring ID#: DM101	
Deployed Location: 07-59.43S/170-01.30W		Deployed Date: 10/17/14	
Recovered Location: 07-58.08S/170-01.20W		Recovered Date: 12/03/15	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
General Comments: Knot in Nilspin at ~225 m.			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
AT	8/27/15	Erratic	None
All Inductive Data	4/10/15	Intermittent	None

Buoy Site: 8S 170W	Mooring Depth: 5375 m
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Mooring Operation: Deployment	Mooring ID#: DM155
Deployed Location: 07-57.8S/170-01.6W	Deployed Date: 12/04/15
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Original Payload tube was replaced early in the cruise due to wireless comms. issues.	

Buoy Site: 8S 155W			
Mooring Operation: Recovery		Mooring ID#: DM107	
Deployed Location: 08-17.41S/155-03.41W		Deployed Date: 11/14/14	
Recovered Location: 08-16.97S/155-03.18W		Recovered Date: 12/09/15	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC-T50 fouled. Several sensors out of mount			
Fishing/Vandalism: None			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
WDIR	5/3/15	Offset > 40°	None

Buoy Site: 8S 155W		Mooring Depth: 5339 m	
Mooring Operation: Deployment		Mooring ID#: DM156	
Deployed Location: 08-16.74S/155-02.67W		Deployed Date: 12/10/15	
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 155W			
Mooring Operation: Recovery		Mooring ID#: DM108	
Deployed Location: 05-00.018S/154-59.07W		Deployed Date: 11/15/14	
Recovered Location: 04-59.67S/154-58.2W		Recovered Date: 12/10/15	
Sensors/Equipment Lost at Sea: ATRH lost at sea			
Sensors Damaged/Fouled: SSC-T50 fouled			
Fishing/Vandalism: Possible vandalism, ATRH seems to have been removed.			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
AT/RH	9/15/15	Excessive values	Vandalism,

			Sensor lost at sea
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Buoy Site: 5S 155W	Mooring Depth: 5038 m
Mooring Operation: Deployment	Mooring ID#: DM157
Deployed Location: 04-58.96S/154-57.023W	Deployed Date: 12/10/15
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 155W			
Mooring Operation: Recovery		Mooring ID#: DM109	
Deployed Location: 01-58.4S/155-00.9W		Deployed Date: 11/17/14	
Recovered Location: 01-57.88S/155-00.07W		Recovered Date: 12/11/15	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC fouled.			
Fishing/Vandalism: Hawser tied to tower, longline throughout the mooring.			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
All Inductive Data	10/23/15	Missing	Vandalism, Long line gear entanglement
AT/RH	11/30/15	Excessive values	Vandalism
Tube	12/5/15	No transmits	Vandalism

Buoy Site: 2S 155W	Mooring Depth: 4989 m
Mooring Operation: Deployment	Mooring ID#: DM158
Deployed Location: 01-58.020S/154-59.43W	Deployed Date: 12/11/15
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: TP300 stopped transmitting upon deployment.	

Buoy Site: 0 155W	
Mooring Operation: Recovery	Mooring ID#: DM110W
Deployed Location: 00-00.2N/154-55.16W	Deployed Date: 11/17/15
Recovered Location: 00-00.1N/154-54.66W	Recovered Date: 12/12/15
Sensors/Equipment Lost at Sea: None	

Sensors Damaged/Fouled: SSC-T50 fouled
Fishing/Vandalism: Longline entangled in mooring from 500 – 550 m.
General Comments: None

Buoy Site: 0 155W	Mooring Depth: 4640 m
Mooring Operation: Deployment	Mooring ID#: DM159
Deployed Location: 00-00.01S/154-55.43W	Deployed Date: 12/12/15
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 155W			
Mooring Operation: Recovery		Mooring ID#: DM111	
Deployed Location: 01-59.08N/154-58.38W		Deployed Date: 11/18/14	
Recovered Location: 01-58.88N/154-58.55W		Recovered Date: 12/13/15	
Sensors/Equipment Lost at Sea: None			
Sensors Damaged/Fouled: SSC fouled			
Fishing/Vandalism: Longline throughout the entire mooring.			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why data failed	Field Service Observations
RH	3/22/15	Too low	Vandalism
SST	3/29/15	Erratic	Sensor damaged

Buoy Site: 2N 155W	Mooring Depth: 46571 m
Mooring Operation: Deployment	Mooring ID#: DM160
Deployed Location: 01-59.53N/154-58.133W	Deployed Date: 12/14/15
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 155W	
Mooring Operation: Recovery	Mooring ID#: DM112
Deployed Location: 05-00.1N/154-57.1W	Deployed Date: 11/20/14
Recovered Location: 04-59.617N/154-56.7W	Recovered Date: 12/14/15
Sensors/Equipment Lost at Sea: None	

Sensors Damaged/Fouled: None			
Fishing/Vandalism: None			
General Comments: None			
Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
SST	3/29/15	Too low	None

Buoy Site: 5N 155W	Mooring Depth: 4588 m
Mooring Operation: Deployment	Mooring ID#: DM161
Deployed Location: 04-59.84N/154-56.96W	Deployed Date: 12/15/15
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: Wind speed out on deployment, wind direction good	
General Comments: Too rough to launch the small boat for anemometer replacement.	

2.2 CTD Casts Completed

A Sea-Bird 911plus CTD with dual temperature and conductivity sensors was provided by the OMAO. 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:

CTDs			
Coordinates	Date	Cast #	Comments
8N 170W	11/25/15	RB15078N170W	3000 m
7N 170W	11/26/15	RB15077N170W	1000 m
6N 170W	11/26/15	RB15076N170W	1000 m
5N 170W	11/27/15	RB15075N170W	1000 m
4N 170W	11/27/15	RB15074N170W	1000 m
3N 170W	11/28/15	RB15073N170W	3000 m
2N 170W	11/28/15	RB15072N170W	1000 m
1N 170W	11/29/15	RB15071N170W	1000 m
0N 170W	11/29/15	RB15070N170W	3000 m
1S 170W	12/1/15	RB15071S170W	1000 m
2S 170W	12/1/15	RB15072S170W	1000 m
3S 170W	12/2/15	RB15073S170W	1000 m
4S 170W	12/2/15	RB15074S170W	1000 m
5S 170W	12/3/15	RB15075S170W	1000 m
6S 170W	12/3/15	RB15076S170W	1000 m
7S 170W	12/3/15	RB15077S170W	1000 m

8S 170W	12/4/15	RB15078S170W	3000 m
8S 155W	12/9/15	RB15078S155W	3000 m
5S 155W	12/11/15	RB15075S155W	1000 m
2S 155W	12/12/15	RB15072S155W	1000 m
1S 155W	12/12/15	RB15071S155W	1000 m
0 155W	12/12/15	RB15070S155W	3000 m
1N 155W	12/13/15	RB15071N155W	1000 m
2N 155W	12/13/15	RB15072N155W	1000 m
5N 155W	12/15/15	RB15075N155W	1000 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

Fifteen (11) Argo floats were scheduled for deployment on this 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
37-40.89N/136-43.13W	11/15/15	590	
11-00.50N/167-22.52W	11/24/15	501	
09-30.44N/168-42.57W	11/25/15	487	
07-59.65N/170-05.81W	11/26/15	486	
05-00.72N/169-59.13W	11/27/15	485	
02-01.80N/169-59.95W	11/28/15	484	
00-00.75S/170-00.64W	11/30/15	479	
01-57.43S/154-59.12W	12/12/15	475	
00-00.54N/154-55.26W	12/13/15	474	
01-59.06N/154-57.08W	12/14/15	473	
05-00.11N/154-56.99W	12/15/15	472	

Atlantic Oceanographic and Meteorological Laboratory (AMOL) Surface Drifting Floats

Twenty six (18) 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 Drifters			
Coordinates	Date	SN#	Comments
04-59.97N/170-00.52W	11/27/15	139626	
05-59.96N/170-00.52W	11/27/15	139722	
02-59.84N/169-59.38W	11/27/15	139620	
02-59.80N/169-59.38W	11/27/15	139624	
00-00.74S/170-00.66W	11/30/15	139628	
00-00.74S/170-00.66W	11/30/15	139623	
03-00.10S/170-00.37W	12/02/15	139621	
03-00.10S/170-00.37W	12/02/15	139622	
04-59.21S/169-58.54W	12/03/15	139934	
04-59.21S/169-58.54W	12/03/15	139936	
04-58.97S/154-56.95W	12/11/15	139933	
04-58.97S/154-56.95W	12/11/15	139935	
02-59.86S/155-02.66W	12/11/15	139932	
02-59.86S/155-02.66W	12/11/15	139931	
00-00.54N/154-55.26W	12/13/15	139928	
02-59.51N/155-00.73W	12/14/15	139930	
04-59.95N/154-57.04W	12/15/15	139927	
04-59.95N/154-57.04W	12/15/15	139929	