

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM
FINAL CRUISE REPORT
TA-19-02-DISC

Area: Equatorial Pacific: 8°S 125°W to 8°N 125°W and 8°S 140°W to 8°N 140°W

Itinerary:

TA-19-02-DISC DEP *September 27, 2019, Honolulu, HI*
 ARR *November 6, 2019*

CRUISE DESCRIPTION

The Tropical Atmosphere Ocean (TAO) array consists of 55 buoys utilizing a taut line mooring configuration used to mount data collection sensors for climate research purposes. 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.

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 Honolulu, HI on September 27, 2019 and the ship departed the same day. All operation listed in Section 2.1 were conducted prior to arrival in San Diego, CA on November 6, 2019.

1.0 PERSONNEL

1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: James Coleman

Participating Scientists:

Name	Gender	Nationality	Affiliation
James Coleman	M	US	NOAA/NDBC
Jim Turner	M	US	NOAA/NDBC
Casey Burge	M	US	NOAA/NDBC
Cole Stewart	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):

TAO Cruise Summary

Buoy Site: 9N 140W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM313A
Deployed Location: 09 00.036N 140 14.730W	Deployed Date: 9/15/2018
Recovered Location: 09 00.072N 140 14.309W	Recovered Date: 10/4/2019
Sensors/Equipment Lost at Sea: None	
Sensors Damaged/Fouled: T20-sea growth	
Fishing/Vandalism: None	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: T80 had no comms. Tube had no comms, fuses were blown in the battery box.	

Buoy Site: 9N 140W Refresh	Mooring Depth: 4818M
Mooring Operation: Deployment	Mooring ID#: DM340A
Deployed Location: 09 00.142N 140 14.970W	Deployed Date: 10/5/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments:	

Buoy Site: 5N 140W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM314A
Deployed Location: 05 00.528N 139 59.549W	Deployed Date: 9/17/2018
Recovered Location: 05 00.012N 139 56.647W	Recovered Date: 10/6/2019
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: T20, T40- loose mount around sensors	
Fishing/Vandalism: YES, long line gear tangled at the end of #3 spool, T13024	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: Tube had an iridium modem failure.	

Buoy Site: 5N 140W Refresh	Mooring Depth: 4480M
Mooring Operation: Deployment	Mooring ID#: DM341A
Deployed Location: 04 59.200N 139 57.068W	Deployed Date: 10/7/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 2N 140W Refresh

Mooring Operation: Recovery	Mooring ID#: DM315A
Deployed Location: 01 57.770N 140 01.406W	Deployed Date: 9/19/2018
Recovered Location: 01 59.068N 140 04.960W	Recovered Date: 10/8/2019
Sensors/Equipment Lost at Sea: SSC	
Sensors Damaged/Fouled: SSC, T20	
Fishing/Vandalism: NONE	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: NONE	

Buoy Site: 2N 140W Refresh	Mooring Depth: 4375M
Mooring Operation: Deployment	Mooring ID#: DM342A
Deployed Location: 01 58.419N 140 03.625W	Deployed Date: 10/9/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 0 140W Refresh Flux	
Mooring Operation: Recovery	Mooring ID#: DM316A
Deployed Location: 00 01.847N 139 56.310W	Deployed Date: 9/20/2018
Recovered Location: 00 00.834N 139 55.585W	Recovered Date: 10/9/2019
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: Rain Gauge	
Fishing/Vandalism: NONE	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: The entire nylon mooring was retired due to wear.	

Buoy Site: 0 140W Refresh Flux	Mooring Depth: 4358M
Mooring Operation: Deployment	Mooring ID#: DM343A
Deployed Location: 00 00.241N 139 53.922W	Deployed Date: 10/10/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: Wind- lost at sea after ship collided with buoy during fly-by.	
Sensors Damaged During Deployment: NONE	
General Comments: Buoy was hit by ship during fly-by. The wind, rain gauge, and SWR/LWR was replaced.	

Buoy Site: 0 140W ADCP	
Mooring Operation: Recovery	Mooring ID#: CA022
Deployed Location: 00 01.35N 140 01.97W	Deployed Date: 9/20/2018
Recovered Location: 00 01.35N 140 01.97W	Recovered Date: 10/11/2019
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: NONE	
Fishing/Vandalism: NONE	
Sensors/Tubes Downloaded: Sent to lab for download	
General Comments: NONE	

Buoy Site: 0 140W ADCP	Mooring Depth: 4328M
Mooring Operation: Deployment	Mooring ID#: CA023
Deployed Location: 00 01.595N 140 03.506W	Deployed Date: 10/11/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	

General Comments: NONE

Buoy Site: 2S 140W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM317A
Deployed Location: 02 01.771S 140 00.867W	Deployed Date: 9/22/2018
Recovered Location: 02 02.616S 139 59.034W	Recovered Date: 10/12/2019
Sensors/Equipment Lost at Sea: T180	
Sensors Damaged/Fouled: SSC, T20, T40, T60- Sea growth	
Fishing/Vandalism: NONE	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: Two uniform rings cut into nilspin near missing T180; TP500-no comms.	

Buoy Site: 2S 140W Refresh	Mooring Depth: 4273M
Mooring Operation: Deployment	Mooring ID#: DM344A
Deployed Location: 02 04.920S 139 59.100W	Deployed Date: 10/12/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 8S 125W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM319A
Deployed Location: 07 59.043S 124 58.588W	Deployed Date: 9/27/2018
Recovered Location: 07 59.142S 124 58.800W	Recovered Date: 10/18/2019
Sensors/Equipment Lost at Sea: Acoustic release	
Sensors Damaged/Fouled: SSC, T20-T140-Sea growth	
Fishing/Vandalism: YES, long line gear above T40	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: Nilspin insulation frayed and missing for 12 inches at 10m. No comms with acoustic release, line cutter deployed and activated at spool #4, spool T15010.	

Buoy Site: 8S 125W Refresh	Mooring Depth: 4510M
Mooring Operation: Deployment	Mooring ID#: DM345A
Deployed Location: 07 58.920S 124 58.680W	Deployed Date: 10/19/2019
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 Operation: Recovery	Mooring ID#: DM320A
Deployed Location: 04 59.549S 124 56.250W	Deployed Date: 9/29/2018
Recovered Location: 04 59.220S 124 56.064W	Recovered Date: 10/20/2019
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: SSC, T20-T120- Sea growth	
Fishing/Vandalism: NONE	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: T100-sensor slid within mount. Acoustic release indicated horizontal upon interrogation but was released and recovered.	
Buoy Site: 5S 125W Refresh	Mooring Depth: 4550M
Mooring Operation: Deployment	Mooring ID#: DM346A

Deployed Location: 05 01.132S 124 53.153W	Deployed Date: 10/20/2019
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 Refresh	
Mooring Operation: Recovery	Mooring ID#: DM321A
Deployed Location: 02 04.819S 124 54.076W	Deployed Date: 9/30/2018
Recovered Location: 02 05.334S 124 54.758W	Recovered Date: 10/21/2019
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: SSC. T20-T100-Sea growth	
Fishing/Vandalism: NONE	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: T20- no comms	

Buoy Site: 2S 125W Refresh	Mooring Depth: 4769M
Mooring Operation: Deployment	Mooring ID#: DM347A
Deployed Location: 02 04.800S 124 54.240W	Deployed Date: 10/22/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: Acoustic release-after mooring broke	
Sensors Damaged During Deployment: NONE	
General Comments: Buoy went adrift after deployment.	

Buoy Site: 2S 125W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM347A
Deployed Location: 02 04.800S 124 54.240W	Deployed Date: 10/22/2019
Recovered Location: 02 12.834S 124 54.948W	Recovered Date: 10/23/2019
Sensors/Equipment Lost at Sea: Acoustic Release	
Sensors Damaged/Fouled: NONE	
Fishing/Vandalism: NONE	
Sensors/Tubes Downloaded: All sensors redeployed on DM347B	
General Comments: Line parted about 1,300-1,400m on spool T17131.	

Buoy Site: 2S 125W Refresh	Mooring Depth: 3574M
Mooring Operation: Deployment	Mooring ID#: DM347B
Deployed Location: 02 06.007S 124 52.012W	Deployed Date: 10/24/2019
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 Refresh	
Mooring Operation: Recovery	Mooring ID#: DM322A
Deployed Location: 00 10.598S 124 23.635W	Deployed Date: 9/30/2018
Recovered Location: 00 12.174S 124 23.166W	Recovered Date: 10/24/2019
Sensors/Equipment Lost at Sea: WIND	
Sensors Damaged/Fouled: Wind-vandalism; SSC, T20-T60-Sea growth	
Fishing/Vandalism: YES. Wind stanchion was broken and sensor missing. Long line gear on 30m and 50m Chipods.	

Sensors/Tubes Downloaded: Sent to Lab for download
General Comments: Acoustic release did not indicate it was released, but line tension indicated a successful release once recovery was initiated. T120 and T180-No comms.

Buoy Site: 0 125W Refresh TPOS	Mooring Depth: 4787M
Mooring Operation: Deployment	Mooring ID#: DM348A
Deployed Location: 00 10.884S 124 23.092W	Deployed Date: 10/25/2019
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 Refresh TPOS	
Mooring Operation: Recovery	Mooring ID#: DM323A
Deployed Location: 01 58.011N 125 03.428W	Deployed Date: 10/2/2018
Recovered Location: 01 58.374N 125 02.370W	Recovered Date: 10/26/2019
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: SSC, TC05-AQP68- Sea growth; 23.5M Nortek ALD slid to T25	
Fishing/Vandalism: YES, Long line gear tangled on T40.	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: T35, T140, TP300, and TP500- No comms. Knot in nilspin around inductive coil mount in T500.	

Buoy Site: 2N 125W Refresh	Mooring Depth: 4710M
Mooring Operation: Deployment	Mooring ID#: DM349A
Deployed Location: 01 58.261N 125 03.812W	Deployed Date: 10/26/2019
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 Refresh	
Mooring Operation: Recovery	Mooring ID#: DM324A
Deployed Location: 05 04.428N 124 56.647W	Deployed Date: 10/3/2018
Recovered Location: 05 05.412N 124 56.406W	Recovered Date: 10/27/2019
Sensors/Equipment Lost at Sea: ALL MET, TOWER MISSING	
Sensors Damaged/Fouled: SSC, T20, T40- Sea growth; T20-Long line gear	
Fishing/Vandalism: YES, Long line gear on T20	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: T100-no comms	

Buoy Site: 5N 125W Refresh	Mooring Depth: 4408M
Mooring Operation: Deployment	Mooring ID#: DM350A
Deployed Location: 05 05.064N 124 56.184W	Deployed Date: 10/27/2019
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 8N 125W Refresh

Mooring Operation: Recovery	Mooring ID#: DM325A
Deployed Location: 08 02.175N 124 59.228W	Deployed Date: 10/4/2018
Recovered Location: 08 02.254N 124 59.824W	Recovered Date: 10/28/2019
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: SSC-Sea growth	
Fishing/Vandalism: YES, Mast and all top side sensors were missing. Part of the buoy hull was cut off due to being hit by a ship.	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: Top section hose was severed at the coupling near the Nilspin head. No comms with tube, battery box had blown fuses. SSC- No comms.	

Buoy Site: 8N 125W Refresh	Mooring Depth: 4536M
Mooring Operation: Deployment	Mooring ID#: DM351A
Deployed Location: 07 59.927N 125 05.387W	Deployed Date: 10/28/2019
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

No CTD casts were taken on this cruise

2.3 Ancillary Science Projects Supported by the Cruise

The following outlines the ancillary science work performed in conjunction with the TAO operations on this cruise:

Atlantic Oceanographic and Meteorological Laboratory (AOML) Surface Drifting Floats

Sixteen (16) 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 LAT/LONG		Date	SN#	Comments
03 00.12' N	140 00.11' W	10/07/2019	66817240	3N 140W
03 00.12' N	140 00.11' W	10/07/2019	66818180	3N 140W
00 02.20' S	140 02.35' W	10/11/2019	66816280	0 140W
00 02.20' S	140 02.35' W	10/11/2019	66816330	0 140W
03 00.00' S	140 00.00' W	10/12/2019	66816220	3S 140W

03 00.00' S	140 00.00' W	10/12/2019	66816350	3S 140W
5 00.00' S	140 54.11' W	10/13/2019	66816210	5S 140W
5 00.00' S	140 54.11' W	10/13/2019	66816200	5S 140W
05 00.00' S	124 53.82' W	10/20/2019	66910780	5S 125W
05 00.00' S	124 53.82' W	10/20/2019	66910790	5S 125W
03 00.12' S	124 59.88' W	10/21/2019	66819360	3S 125W
03 00.12' S	124 59.88' W	10/21/2019	66819370	3S 125W
00 11.91' S	124 23.80' W	10/25/2019	66819340	0 125W
00 11.91' S	124 23.80' W	10/25/2019	66819330	0 125W
03 00.002' N	125 00.113' W	10/26/2019	66818370	3N 125W
03 00.002' N	125 00.113' W	10/26/2019	66818190	3N 125W

Pacific Marine Environmental Laboratory (PMEL) Argo Profiling CTD Floats

Four (4) 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

Elizabeth Steffen NOAA/PMEL
 Tel: (206) 526-6747
 E-mail: pmel_floats@noaa.gov

ARGO Floats					
Coordinates LAT/LONG		Date	Time	SN#	Comments
10 14.214N	141 50.832W	10/4/2019	03:05	F1133	NONE
08 59.865N	140 16.337 W	10/5/2019	11:55	F1110	NONE
00 11.856S	124 23.754W	10/25/2019	08:04	F1129	NONE
15 00.003N	122 49.422W	10/30/2019	18:08	F0995	NONE

University of Washington APEX Floats

Eight (8) APEX floats were scheduled for deployment on this cruise. All APEX Float deployments were completed as scheduled.

University of Washington APEX Floats					
Coordinates LAT/LONG		Date	Time	SN#	Comments
05 00.000N	139 57.068W	10/7/2019	04:45	17534	NONE
04 00.510S	125 00.078W	10/21/2019	05:56	18608	NONE
02 04.650S	124 55.116W	10/22/2019	10:49	17929	NONE
01 59.562N	125 04.230W	10/26/2019	09:58	18930	NONE
04 00.002N	125 00.114W	10/26/2019	23:01	17862	NONE
05 05.394N	124 56.214W	10/27/2019	15:34	17350	NONE
18 00.000N	122 12.564W	10/31/2019	15:33	18850	NONE
24 00.000N	120 23.862W	11/2/2019	08:53	18780	NONE