

TROPICAL ATMOSPHERE-OCEAN (TAO)
PROGRAM FINAL CRUISE REPORT
TA-18-01-BLFN

Area: Equatorial Pacific: 8°S 95°W to 8°N 95°W and 8°S 110°W to 8°N 110°W

Itinerary:

TA-18-01 DEP April 2, 2018, Colon, Panama

ARR May 15, 2018, San Diego, CA

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; this cruise utilized the commercial vessel *M/V Bluefin*. 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 95°W and 110°W meridians.

The scientific complement for the cruise embarked at Colon, Panama, on April 1, 2018. The ship departed on April 2, 2018 and conducted operations as listed in Section 2.1. The ship arrived at San Diego, CA, on May 15, 2018.

1.0 PERSONNEL

1.1 CRUISE LEAD AND PARTICIPATING SCIENTISTS:

Cruise Lead: Adam Herrin.

Participating Scientists:

Name	Gender	Nationality	Affiliation
Adam Herrin	M	US	NOAA/NDBC
Josh Lee	M	US	NOAA/NDBC
Eddie Kendrick	M	US	NOAA/NDBC
Daniel Rutledge	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: 8N 95W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM238A
Deployed Location: 8° 1' 8" N 94° 58' 1" W	Deployed Date: 6/17/2017
Recovered Location: 08 00.5N 094 58.4W	Recovered Date: 4/15/2018
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: NONE	
Fishing/Vandalism: YES, Line wrapped around bridle where a ship had tied off to the buoy.	
Sensors/Tubes Downloaded: Sent to Lab for download.	
General Comments: NONE	

Buoy Site: 8N 95W Refresh	Mooring Depth: 3640M
Mooring Operation: Deployment	Mooring ID#: DM271A
Deployed Location: 08 01.6N 094 58.4W	Deployed Date: 4/16/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 5N 95W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM239A
Deployed Location: 05 05.21N 94 57.08W	Deployed Date: 6/18/2017
Recovered Location: 05 5.1N 094 57.18W	Recovered Date: 4/17/2018
Sensors/Equipment Lost at Sea: Tower missing, all top side sensors	
Sensors Damaged/Fouled: CT01	
Fishing/Vandalism: YES, Tower was missing, line tied around the hull, and CT01 was disconnected.	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: NONE	

Buoy Site: 5N 95W Refresh	Mooring Depth: 3520M
Mooring Operation: Deployment	Mooring ID#: DM272A
Deployed Location: 04 59.72N 094 57.36W	Deployed Date: 4/17/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 2N 95W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM240A
Deployed Location: 01 56.124N 95 19.667W	Deployed Date: 6/19/2017
Recovered Location: 01 55.69N 095 21.33W	Recovered Date: 4/18/2018
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: CT01, AT/RH	
Fishing/Vandalism: YES, Long line tied to tower and bags were tied around the top of the tube, and over the AT/RH and battery box.	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: NONE	

Buoy Site: 2N 95W Refresh	Mooring Depth: 5393M
Mooring Operation: Deployment	Mooring ID#: DM273A
Deployed Location: 01 56.6N 095 18.3W	Deployed Date: 4/18/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 0 95W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM241A
Deployed Location: 00 05.704N 95 26.567W	Deployed Date: 6/20/2017
Recovered Location: 00 05.89N 095 28.66W	Recovered Date: 4/19/2018
Sensors/Equipment Lost at Sea: T20	
Sensors Damaged/Fouled: CT01, 9M CHIPOD, 29M CHIPOD, AT/RH	
Fishing/Vandalism: Yes. Multiple lines and long line tied off to buoy. Bags tied over the top of the tube, over the AT/RH and battery box. Long line wrapped around sensors and the 20m sensor was missing.	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: NONE	

Buoy Site: 0 95W Refresh	Mooring Depth: 3204M
Mooring Operation: Deployment	Mooring ID#: DM274A
Deployed Location: 00 05.989N 095 28.259W	Deployed Date: 4/19/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 2S 95W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM242A
Deployed Location: 01 58.521S 95 08.829W	Deployed Date: 6/21/2017
Recovered Location: 01 58.84S 095 07.66W	Recovered Date: 4/20/2018
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: CAMERA, AT/RH	
Fishing/Vandalism: YES, Line tied to tower and bags tied over camera, top of tube, AT/RH, and battery boxes.	
Sensors/Tubes Downloaded: Sent to Lab for download	

General Comments: NONE.

Buoy Site: 2S 95W Refresh	Mooring Depth: 3371M
Mooring Operation: Deployment	Mooring ID#: DM275A
Deployed Location: 01 59.063S 095 08.35W	Deployed Date: 4/20/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 5S 95W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM154A
Deployed Location: 04 58.352S 94 59.803W	Deployed Date: 6/22/2017
Recovered Location: 05 58.36S 094 59.74W	Recovered Date: 4/21/2018
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: 5S 95W Refresh	Mooring Depth: 3859M
Mooring Operation: Deployment	Mooring ID#: DM276A
Deployed Location: 04 58.32S 094 59.54W	Deployed Date: 4/21/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE.	

Buoy Site: 8S 95W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM244A
Deployed Location: 07 59.385S 95 15.257W	Deployed Date: 6/23/2017
Recovered Location: 07 59.19S 095 15.01W	Recovered Date: 4/23/2018
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: 8S 95W Refresh	Mooring Depth: 3906M
Mooring Operation: Deployment	Mooring ID#: DM277A
Deployed Location: 07 59.196S 095 15.196W	Deployed Date: 4/23/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 8S 110W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM231A

Deployed Location: 7 57.38S 110 04.66W	Deployed Date: 6/6/2017
Recovered Location: 07 57.43S 110 04.14W	Recovered Date: 4/27/2018
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: 8S 110W Refresh	Mooring Depth: 3446M
Mooring Operation: Deployment	Mooring ID#: DM278A
Deployed Location: 07 57.29S 110 04.0W	Deployed Date: 4/27/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 5S 110W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM232A
Deployed Location: 04 57.485S 109 58.246W	Deployed Date: 6/7/2017
Recovered Location: 04 57.006S 109 58.2W	Recovered Date: 4/29/2018
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: 5S 110W Refresh	Mooring Depth: 3668M
Mooring Operation: Deployment	Mooring ID#: DM279A
Deployed Location: 04 57.0S 109 57.3W	Deployed Date: 4/29/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 2S 110W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM233A
Deployed Location: 01 58.572S 109 58.149W	Deployed Date: 6/8/2017
Recovered Location: 01 58.14S 109 58.24W	Recovered Date: 4/30/2018
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: NONE	
Fishing/Vandalism: YES, Buoy had bags tied over the camera and hanging off tower. Anemometer stanchion was broken off and hanging.	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: NONE	

Buoy Site: 2S 110W Refresh	Mooring Depth: 3878M
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Mooring Operation: Deployment	Mooring ID#: DM280A
Deployed Location: 01 58.388S 109 57.831W	Deployed Date: 4/30/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 0 110W Refresh Flux	
Mooring Operation: Recovery	Mooring ID#: DM234A
Deployed Location: 00 03.5N 109 53.9W	Deployed Date: 6/9/2017
Recovered Location: 00 03.04N 109 53.29W	Recovered Date: 5/1/2018
Sensors/Equipment Lost at Sea: SHORT WAVE AND LONG WAVE RADIATION	
Sensors Damaged/Fouled: NONE	
Fishing/Vandalism: YES, Buoy had bags tied over all the sensors.	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: NONE	

Buoy Site: 0 110W Refresh Flux	Mooring Depth: 3741M
Mooring Operation: Deployment	Mooring ID#: DM281A
Deployed Location: 00 03.02N 109 54.03W	Deployed Date: 5/2/2018
Pre-Deployment On Deck Instrument Failures: T25,T45,T100,T140,T180,TP300,TP500, 10M CURRENT	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: On deployment 9 sensors never came in. Recovered buoy and resolved the problem then deployed again. All sensors with the exception of the 10m current sensor came back in.	

Buoy Site: 0 110W ADCP	
Mooring Operation: Recovery	Mooring ID#: EA024
Deployed Location: 00 00.5328N 109 55.2714W	Deployed Date: 6/9/2017
Recovered Location: 00 00.5328N 109 55.2714W	Recovered Date: 5/1/2018
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 110W ADCP	Mooring Depth: 3498M
Mooring Operation: Deployment	Mooring ID#: EA025
Deployed Location: 00 00.440N 109 55.191W	Deployed Date: 5/1/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: Added Deep Ocean CT Sensor: 116516	

Buoy Site: 2N 110W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM235A
Deployed Location: 2° 1' 43" N 110° 2' 20" W	Deployed Date: 6/10/2017
Recovered Location: 02 01.12N 110 02.34W	Recovered Date: 5/3/2018
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: 2N 110W Refresh	Mooring Depth: 3662M
Mooring Operation: Deployment	Mooring ID#: DM282A
Deployed Location: 02 01.2N 110 02.27W	Deployed Date: 5/3/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 5N 110W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM244A
Deployed Location: 05 00.348N 110 04.086W	Deployed Date: 6/12/2017
Recovered Location: 04 59.3N 110 03.48W	Recovered Date: 5/4/2018
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged/Fouled: T60,T80,T100,TP500	
Fishing/Vandalism: YES, Long line gear wrapped around sensors at 60m, 80m, and 100m	
Sensors/Tubes Downloaded: Sent to Lab for download	
General Comments: Nilspin at 500m was wrapped in a knot around the sensor. Sensor was missing part of mount.	

Buoy Site: 5N 110W Refresh	Mooring Depth: 4174M
Mooring Operation: Deployment	Mooring ID#: DM283A
Deployed Location: 04 58.79N 110 03.95W	Deployed Date: 5/4/2018
Pre-Deployment On Deck Instrument Failures: NONE	
Sensors/Equipment Lost at Sea: NONE	
Sensors Damaged During Deployment: NONE	
General Comments: NONE	

Buoy Site: 8N 110W Refresh	
Mooring Operation: Recovery	Mooring ID#: DM237A
Deployed Location: 08 02.30N 110 08.46W	Deployed Date: 6/13/2017
Recovered Location: 08 01.93N 110 09.18W	Recovered Date: 5/5/2018
Sensors/Equipment Lost at Sea: Anemometer	
Sensors Damaged/Fouled: NONE	
Fishing/Vandalism: YES, Anemometer stanchion was broke off and the Top Section was severed.	

Sensors/Tubes Downloaded: Sent to Lab for download
General Comments: NONE

Buoy Site: 8N 110W Refresh	Mooring Depth: 4154M
Mooring Operation: Deployment	Mooring ID#: DM284A
Deployed Location: 08 02.37N 110 09.79W	Deployed Date: 5/5/2018
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 (AMOL) Surface Drifting Floats

Twenty (20) 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/Time	SN#	Comments
07 35.91N	090 00.0W	14 APR 18 12:11	64826430	
07 35.92N	090 00.1W	14 APR 18 12:12	64826500	
07 35.92N	090 00.1W	14 APR 18 12:12	64826560	
03 00.576N	095 00.91W	17 APR 18 20:24	64879070	
03 00.476N	095 00.9W	17 APR 18 20:25	64879090	

01 00.995N	095 00.960W	18 APR 18 16:54	64879100	
01 00.876N	095 00.948W	18 APR 18 16:55	64879060	
01 00.095S	095 11.912W	19 APR 18 17:02	64878540	
01 00.199S	095 11.903W	19 APR 18 17:03	64879050	
03 00.2S	095 01.1W	20 APR 18 15:22	64878570	
03 00.2S	095 01.1W	20 APR 18 15:22	64878570	
03 00.2S	109 58.4W	29 APR 18 18:22	64878500	
03 00.2S	109 58.4W	29 APR 18 18:22	64878130	
01 00.1S	109 59.9W	30 APR 18 14:56	64878150	
01 00.1S	109 59.9W	30 APR 18 14:56	64878120	
01 00.1N	109 57.4W	02 MAY 18 02:50	64878060	
01 00.1N	109 57.4W	02 MAY 18 02:50	64878100	
03 00.1N	110 01.6W	03 MAY 18 02:35	64887110	
03 00.1N	110 01.6W	03 MAY 18 02:35	64887070	