TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM

FINAL CRUISE REPORT

RB-14-02

Area: Equatorial Pacific: 8°S 95°W to 2°S 95°W and 2°S 110°W to 5°S 110°W

Itinerary:

RB-14-02 DEP *March 21, 2014, Arica, Chile*

ARR *April 12, 2014, San Diego, CA*

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
Steve Cucullu
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Stennis Space Center, MS 39529
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NDBC Operations Manager
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TAO Cruise Objective and Plan:

The objective of this cruise was the maintenance of the TAO Array along the 95°W (8°S to 2°S),

110°W(2°S to 8°S) and 125°W (8°S to 8°N) meridians. Due to mechanical problems, the ship was diverted and did not complete 8°S 110°W or any of the 125°W stations.

The scientific complement for the cruise embarked at Arica, Chile on March 20, 2014. The ship departed on March 21, 2014 and conducted operations as listed in Section 2.1. The ship arrived in San Diego, CA on April 12, 2014.

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
William Thompson	M	US	NOAA/NDBC
James Rauch	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 32413 BPR	
Mooring Operation: Recovery	**Mooring ID#:** 32413
Deployed Location: 7 23’ 48” S / 93 30’ 0” W	**Deployed Date:** 2/17/12
Recovered Location: 7 23’ 48” S / 93 30’ 0” W	**Recovered Date:** 3/26/14 (BPR)
Sensors/Equipment Lost at Sea: Surface Buoy adrift (previously recovered, 9/9/13)	
Sensors Damaged/Fouled: None	
Fishing/Vandalism: None	
Sensors/Tubes Downloaded: None	
General Comments: None	

Buoy Site: DART 32413	**Mooring Depth:** 3890 m
Mooring Operation: Deployment	**Mooring ID#:** 32413
Deployed Location: 07 23.97S 093 30.24W	**Deployed Date:** 3/26/14
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Routine BPR and buoy deployment.	

Buoy Site: 8S 95W Refresh	
Mooring Operation: Recovery	**Mooring ID#:** DM032a
Deployed Location: 8 01.42S 95 14.99W	**Deployed Date:** 2/16/12
Recovered Location: NA	**Recovered Date:** NA
Sensors/Equipment Lost at Sea: NA	
Sensors Damaged/Fouled: NA	
Fishing/Vandalism: NA	
Sensors/Tubes Downloaded: None	
General Comments: Buoy not recovered, still adrift and transmitting.	

Buoy Site: 8S 95W	**Mooring Depth:** 3955 m
Mooring Operation: Deployment	**Mooring ID#:** DM063b
Deployed Location: 08 00.74S 095 16.47W	**Deployed Date:** 3/27/2014
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 95W ATLAS	
Mooring Operation: Recovery	**Mooring ID#:** PM999a
Deployed Location: 05 04.6S 095 03.07W	**Deployed Date:** 2/19/2012
Recovered Location: 05 07.8S 095 05.09W	**Recovered Date:** 3/28/2014
Sensors/Equipment Lost at Sea: Tube 722, ATRH 133395, Wind 80499, Rain 1336, T60 13947, T100 14171, T120 14173, T140 14198, T180 14201, TP300 12271	

Sensors Damaged/Fouled: SSC, T20, T40, T80 fouled			
Fishing/Vandalism: Buoy off site, tower ripped off, fishing boat 2 nm from recovery site.			
Sensors/Tubes Downloaded: All recovered sensors downloaded successfully.			
General Comments:			
Site Sensor Failures	**Date Data Flagged**	**Why Data Flagged**	**Field Service Observations**
Wind	5/11/12	All zeros	Tower removed
Rain	5/12/12	Data missing	Tower removed
Tube (all Met)	5/29/12	Data missing, transmits ceased	Tower removed
T60	5/23/12	Data missing	Lost at sea
T100	2/19/12	Data missing	Lost at sea
T120	5/23/12	Data missing	Lost at sea
T140	2/19/12	Data missing	Lost at sea
T180	5/23/12	Data missing	Lost at sea
TP300	5/23/12	Data missing	Lost at sea
TP500	5/23/12	Data missing	Pressurized water
SSC	5/25/12	Data missing	Dead battery

Buoy Site: 5S 95W REFRESH	**Mooring Depth:** 3940 m
Mooring Operation: Deployment	**Mooring ID#:** DM064a
Deployed Location: 05 00.06S 094 59.99W	**Deployed Date:** 3/28/2014
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: The anchor was deployed away from the target site in deeper water than anticipated.	

Buoy Site: 2S 95W ATLAS			
Mooring Operation: Recovery		**Mooring ID#:** QM016a	
Deployed Location: 01 59.00S 095 11.06W		**Deployed Date:** 4/2/2013	
Recovered Location: 01 59.9S 095 10.8W		**Recovered Date:** 3/29/2014	
Previous Repair Date: NA			
Sensors/Equipment Lost at Sea: T180 12787, TP300 13299			
Sensors Damaged/Fouled: SSC, T20, T40 fouled			
Fishing/Vandalism: Fishing line found on mooring			
Sensors/Tubes Downloaded: All recovered sensors were successfully downloaded.			
General Comments: None			
Site Sensor Failures	**Date Data Flagged**	**Why Data Flagged**	**Field Service**

			Observations
T180	5/11/13	Data missing	Lost at sea
TP300	9/16/13	Data missing	Lost at sea
Wind	3/21/14	Data missing	None
Rain	2/15/14	Data too high	none

Buoy Site: 2S 95W REFRESH	**Mooring Depth:** 3460 m
Mooring Operation: Deployment	**Mooring ID#:** DM065a
Deployed Location: 01 59.16S 095 10.43W	**Deployed Date:** 3/29/2014
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 110W ATLAS	
Mooring Operation: Recovery	**Mooring ID#:** PM998a
Deployed Location: 02 01.45S 109 58.14W	**Deployed Date:** 2/11/2012
Recovered Location: NA	**Recovered Date:** NA
Previous Repair Date: None	
Sensors/Equipment Lost at Sea: Entire mooring lost at sea	
Sensors Damaged/Fouled: NA	
Fishing/Vandalism: Mooring lost at sea	
Sensors/Tubes Downloaded: No sensors downloaded.	
General Comments: Entire mooring lost at sea.	

Site Sensor Failures	Date Data Flagged	Why Data Flagged	Field Service Observations
All (Tube)	5/23/12	No transmissions	Lost at sea

Buoy Site: 2S 110W REFRESH	**Mooring Depth:** 3918 m
Mooring Operation: Deployment	**Mooring ID#:** DM066a
Deployed Location: 02 01.377S 109 58.72W	**Deployed Date:** 4/2/2014
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 ATLAS			
Mooring Operation: Recovery		**Mooring ID#:** PM981b	
Deployed Location: 04 59.459S 109 59.336W		**Deployed Date:** 8/4/2011	
Recovered Location: NA		**Recovered Date:** NA	
Previous Repair Date: None			
Sensors/Equipment Lost at Sea: All sensors lost at sea, buoy is adrift.			
Sensors Damaged/Fouled:			
Fishing/Vandalism: Buoy is adrift			
Sensors/Tubes Downloaded: No sensors were downloaded.			
General Comments: Release horizontal on sea floor.			
Site Sensor Failures	**Date Data Flagged**	**Why Data Flagged**	**Field Service Observations**
All	8/26/12	Adrift outside its data grid	Adrift and not transmitting, lost at sea

Buoy Site: 5S 110W	**Mooring Depth:** 3613 m
Mooring Operation: Deployment	**Mooring ID#:** DM067a
Deployed Location: 04 59.405S 109 59.6W	**Deployed Date:** 4/3/2014
Pre-Deployment On Deck Instrument Failures: None	
Sensors/Equipment Lost at Sea: None	
Sensors Damaged During Deployment: None	
General Comments: Routine 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:

CTD Operations			
Coordinates	**Date**	**Cast #**	**Comments**
8 01.73S 95 16.28W	3/27/14	RB8S95W	
4 09.4S 95 00.13W	3/28/14	RB5S95W	
1 58.87S 95 09.86W	3/29/14	RB2S95W	
1 58.70S 109 59.73W	4/1/14	RB2S110W	

4 59.08S 110 00.54W	4/3/14	RB5S110W	

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

Twenty (20) 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

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**
13 11.24S 081 59.86W	3/23/14	F0298	
12 42.42S 83 52.59W	3/24/14	F0296	
11 18.15S 085 46.27W	3/24/14	F0288	
10 06.76S 088 07.89W	3/24/14	F0287	
9 24.44S 089 31.56W	3/25/14	F0293	
8 33.46S 091 12.66W	3/26/14	F0300	
7 33.6S 093 10.74W	3/26/14	F0297	
8 0.79S 095 16.24W	3/27/14	F0301	
4 59.76S 094 59.67W	3/28/14	F0299	
1 59.36S 095 10.69W	3/29/14	F0289	
2 0.39S 103 58.54W	3/31/14	F0286	
2 0.88S 106 58.07W	4/1/14	F0295	
2 01.89S 109 59.0W	4/2/14	F0291	
4 59.59S 109 59.69W	4/3/14	F0292	
1 03.94S 111 0.41W	4/4/14	F0284	
0 0.53N 111 13.98W	4/5/14	F0283	
1 01.93N 111 26.88W	4/5/14	F0294	
3 01.40N 111 52.53W	4/6/14	F0290	
3 58.77N 112 04.206W	4/5/14	F0162	
5 32.88N 112 23.95W	4/6/14	F0282	

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

AOML Floats			
Coordinates	**Date**	**SN#**	**Comments**
4 59.72N 110 4.25W	3/26/13	118579	
2 2.30N 110 3.585W	3/28/13	118580	
0 2.95N 109 54.32W	3/29/13	118581	
1 58.5S 95 11.0W	4/3/13	118577	
0 05.2S 95 27.4W	4/4/13	118570	
1 55.22N 95 20.34W	4/4/13	118572	
4 57.97N 94 39.89W	4/6/13	118578	