

TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM  
FINAL CRUISE REPORT  
RB-08-07

Area: Equatorial Pacific between 8°N and 8°S latitude along 95°W Longitude and 8°S to 8°N Latitude along 1110° Longitude.

Itinerary:

RB-08-07     *Arica, Chile*             DEP   *December 10, 2008*  
                  *Rodman, Panama*         ARR   *January 11, 2008*

**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 a semiannual basis utilizing the NOAA Ship KA'IMIMOANA and NOAA Ship RONALD H. BROWN. The buoy deployment lifecycle are up to 18 months to ensure at least one year of data collection can be completed.

TAO Project Points of Contact:

TAO Program 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 and 110°W meridians. The scientific complement for the cruise embarked at *Arica, Chile* on **December 9, 2008**. The ship departed on **December 10, 2008** and conducted operations on the 165°E and 180° lines as listed in Section 2.1. The ship arrived in Rodman, Panama on **January 11, 2009**.

## 1.0 PERSONNEL

### 1.1 CHIEF SCIENTIST AND PARTICIPATING SCIENTISTS:

Chief Scientist: LTJG William Wells

#### Participating Scientists:

Name	Gender	Nationality	Affiliation
William Wells	M	US	NOAA/NDBC
William Thompson	M	US	NOAA/NDBC
Casey Burge	M	US	NOAA/NDBC

## 2.0 OPERATIONS

### 2.1 TAO Data Recovery Summary

Mooring Operations conducted are shown in the table below. The following provides details on the data recovery efforts for the buoys serviced. All noted time in the summary reports is Coordinated Universal Time (UTC):

#### 8S 95W

<b>Buoy ID:</b> PM752		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3963 m	
<b>Deployed Location:</b> 8-01.79S 95-14.71W		<b>Recovery Location:</b> 8-01.52S 95-15.60W	
<b>Buoy Start Date:</b> 6/16/08		<b>Repair Date:</b> 12/16/08	
<b>Service Description:</b> Repair. Datalogger tube and anemometer replaced.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**5S 95W**

<b>Buoy ID:</b> PM711B		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3840 m	
<b>Deployed Location:</b> 5-04.79S 95-03.99W		<b>Recovery Location:</b> 05-02.0S 95-18.7W	
<b>Buoy Start Date:</b> 11/14/07		<b>Buoy End Date:</b> 12/17/08	
<b>Service Description:</b> Recovery/Deployment. SSC, T20, T40, T60 fouled. All sensors download successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**2S 95W**

<b>Buoy ID:</b> PM712B		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3440 m	
<b>Deployed Location:</b> 1-59.4S 95-9.6W		<b>Recovery Location:</b> 1-54.6S 95-09.4W	
<b>Buoy Start Date:</b> 11/15/07		<b>Buoy End Date:</b> 12/18/08	
<b>Service Description:</b> Recovery/Deployment. Tower and associated meteorological instruments lost at sea (vandalism). SSC, T20, T40, T60 fouled. All subsurface instruments downloaded successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**0 95W**

<b>Buoy ID:</b> PM751		<b>Buoy Configuration:</b> Flux	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3324 m	
<b>Deployed Location:</b> 00-0.3N 94-59.3W		<b>Recovery Location:</b> 00-0.4N 95-22.1W	
<b>Buoy Start Date:</b> 6/13/08		<b>Buoy End Date:</b> 12/19/07	
<b>Service Description:</b> Recovery/Deployment. Buoy damaged. Evidence of fishing activity. Anemometer and Rain Gauge missing. TP500 flooded. All other subsurface instruments downloaded successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**8S 110W**

<b>Buoy ID:</b> PM720		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3423 m	
<b>Deployed Location:</b> 7-59.99S 11-03.89W		<b>Recovery Location:</b> 7-59.9S 110-03.91W	
<b>Buoy Start Date:</b> 1/3/08		<b>Buoy End Date:</b> 12/23/08	
<b>Service Description:</b> Recovery/Deployment. SSC, T20 – T140 fouled. All sensors downloaded successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were failed</b>	<b>Field Service Observations</b>

**5S 110W**

<b>Buoy ID:</b> PM719		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3608 m	
<b>Deployed Location:</b> 4-59.05S 109-59.17W		<b>Recovery Location:</b> 4-59.22S 109-59.36W	
<b>Buoy Start Date:</b> 1/2/08		<b>Buoy End Date:</b> 12/25/08	
<b>Service Description:</b> SSC, T20, T40 fouled. All sensors downloaded successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were failed</b>	<b>Field Service Observations</b>

**2S 110W**

<b>Buoy ID:</b> PM753		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3928 m	
<b>Deployed Location:</b> 2-02.16S 109-57.99W		<b>Recovery Location:</b> None, buoy adrift	
<b>Buoy Start Date:</b> 6/30/08		<b>Buoy End Date:</b> None, buoy adrift.	
<b>Service Description:</b> Deployment only. Buoy adrift.			

**0 110W ADCP**

<b>Buoy ID:</b> EA015		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ADCP		<b>Water Depth:</b> 3752 m	
<b>Deployed Location:</b> 00-0.904N 110-04.61W		<b>Repair Location:</b> 00-0.904N 110-04.61W	
<b>Buoy Start Date:</b> 12/30/07		<b>Buoy End Date:</b> 12/27/08	
<b>Service Description:</b> ADCP and instruments not downloaded at sea.			

**0 110W**

<b>Buoy ID:</b> PM754		<b>Buoy Configuration:</b> Flux	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3814 m	
<b>Deployed Location:</b> 00-02.03N 109-54.5W		<b>Repair Location:</b> 00-0.80N 109-57.69	
<b>Buoy Start Date:</b> 7/1/08		<b>Repair Date:</b> 12/28/08	
<b>Service Description:</b> Repair. Replaced barometer and ATRH sensors. Tube downloaded.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**2N 110W**

<b>Buoy ID:</b> PM718		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3765 m	
<b>Deployed Location:</b> 02-2.5N 110-1.8W		<b>Recovered Location:</b> Not recovered, buoy adrift	
<b>Buoy Start Date:</b> 12/28/08		<b>Buoy End Date:</b> Not recovered, buoy adrift	
<b>Service Description:</b> Deployment only. Buoy not recovered, buoy adrift			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were failed</b>	<b>Field Service Observations</b>

**5N 110W**

<b>Buoy ID:</b> PM665		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 4240 m	
<b>Deployed Location:</b> 04-59.6N 110-04.16W		<b>Recovery Location:</b> 05-06.4N 110-00.61	
<b>Buoy Start Date:</b> 4/9/07		<b>Buoy End Date:</b> 12/30/08	
<b>Service Description:</b> Recovery/Deployment. SSC, T20, T40, T60 fouled. SSC not downloaded, dead battery. All other subsurface sensors were downloaded successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**8N 110W**

<b>Buoy ID:</b> PM664B		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 4179 m	
<b>Deployed Location:</b> 08-03.24N 110-08.92W		<b>Recovery Location:</b> 08-03.75N 110-08.35W	
<b>Buoy Start Date:</b> 4/8/07		<b>Buoy End Date:</b> 12/31/08	
<b>Service Description:</b> Recovery/Deployment. Extensively vandalized. Anemometer gone. SSC, T20, T40, T60, T80 fouled. Datalogger tube could not be downloaded at sea.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**8N 95W**

<b>Buoy ID:</b> PM750		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3650 m	
<b>Deployed Location:</b> 08-03.04N 94-57.06W		<b>Visit Location:</b> 08-03.02N 94-56.93W	
<b>Buoy Start Date:</b> 6/10/08		<b>Visit Date:</b> 1/4/09	
<b>Service Description:</b> Visit. Buoy riding well. Instruments all working.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

**5N 95W**

<b>Buoy ID:</b> PM717B		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3512 m	
<b>Deployed Location:</b> 04-56.4N 95-0.4W		<b>Recovery Location:</b> 04-58.92N 94-57.31W	
<b>Buoy Start Date:</b> 11/18/07		<b>Buoy End Date:</b> 1/5/09	
<b>Service Description:</b> Recovery/Deployment. Buoy vandalized. Anemometer and Rain Gauge missing. SSC, T20, T40 fouled. T140 could not be downloaded at sea. T180 flooded. All other subsurface instruments were downloaded successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

## 2N 95W

<b>Buoy ID:</b> PM716		<b>Buoy Configuration:</b> Standard	
<b>Buoy Type:</b> ATLAS		<b>Water Depth:</b> 3107 m	
<b>Deployed Location:</b> 01-58.64N 95-17.60W		<b>Recovery Location:</b> 01-59.87N 95-22.44W	
<b>Buoy Start Date:</b> 11/17/07		<b>Buoy End Date:</b> 1/6/09	
<b>Service Description:</b> Recovery/Deployment. Longline fishing gear balled up in spots. SSC, T20, T40, T60, T80 fouled. All sensors downloaded successfully.			
<b>Site Sensor Failures</b>	<b>Date Sensors Failed</b>	<b>Why sensors were Failed</b>	<b>Field Service Observations</b>

### 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. A Sea-Bird 12-position carousel and twelve 5-liter Niskin bottles were used to collect water samples for the analysis of salinity.

The following outlines the CTD casts completed during the cruise:

<b>CTD Operations</b>		
<b>Site</b>	<b>Date</b>	<b>Comments</b>
8S 95W	12/16/08	3000 m
7S 95W	12/16/08	1000 m
6S 95W	12/17/08	1000 m
5S 95W	12/17/08	1000 m
2S 95W	12/18/08	1000 m
0 95W	12/20/08	3000 m
8S 110W	12/24/08	3000 m
7S 110W	12/24/08	1000 m
6S 110W	12/25/08	1000 m
5S 110W	12/25/08	1000 m
2S 110W	12/26/08	1000 m
0 110W	12/28/08	3000 m
1N 110W	12/28/08	1000 m
2N 110W	12/29/08	1000 m
5N 110W	12/30/08	1000 m
6N 110W	12/30/08	1000 m

7N 110W	12/31/08	1000 m
8N 110W	1/1/09	3000 m
8N 95W	1/4/09	3000 m
7N 95W	1/5/09	1000 m
5N 95W	1/5/08	1000 m
2N 95W	1/6/09	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) Haruphone recovery

Four of five Haruphone subsurface moorings were recovered along the 95W and 110W meridians.

Questions concerning Haruphone moorings should be directed to:

Robert Dziak, NOAA/PMEL

Tel: (541) 867-0175

E-mail: [Robert.P.Dziak@noaa.gov](mailto:Robert.P.Dziak@noaa.gov)

The following outlines the Haruphone recoveries during the cruise:

<b>ARGO Floats</b>		
<b>Site</b>	<b>Date</b>	<b>Comments</b>
8S 110W	12/23/08	
0 110W	12/28/08	
8N 110W	12/31/08	
8N 95W	1/4/09	
0 95W		Not recovered

University of Colorado MAX-DOAS (Multi Axis Differential Optical Absorption Spectroscopy) Sampling.

MAX-DOAS atmospheric sampling occurred throughout this cruise.

Questions concerning MAX-DOAS sampling should be directed to:

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