TROPICAL ATMOSPHERE-OCEAN (TAO) PROGRAM

FINAL CRUISE REPORT

KA-07-04

Area: Equatorial Pacific between 8°N and 8°S latitude along 165°E Longitude and 8°S to 8°N Latitude along 180° Longitude.

Itinerary:

KA-08-04	*Kwajalein, RMI*	DEP	*August 13, 2007*
	Honolulu, Hawaii	ARR	*September 5, 2007*

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 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:

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TAO Cruise Objective and Plan:

The objective of this cruise was the maintenance of the TAO Array along the 165°E and 180° meridians. The scientific complement for the cruise embarked at ***Kwajalein, RMI*** on ***August 12, 2007***. The ship departed on ***August 13, 2007*** and conducted operations on the 165°E and 180° lines as listed in Section 2.1. The ship arrived in Honolulu Hawaii on ***September 5, 2007***.

1.0 PERSONNEL

1.1 *CHIEF SCIENTIST AND PARTICIPATING SCIENTISTS*:

Chief Scientist: William Wells

Participating Scientists:

Name	Gender	Nationality	Affiliation
William Wells	M	US	NOAA/NDBC
Robert Harris	M	US	NOAA/NDBC
James Haden	M	US	NOAA/NDBC

2.0 OPERATIONS

2.1 *TAO Data Recovery Summary*

Mooring Operations conducted are shown in the table below. Operations were conducted from *8N 165E* to *8S 165E* and *8S 180* to *8N 180*). 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):

8N 165E

Buoy ID: PM607B		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 5224 m	
Deployed Location: 8-02.01N 165-03.8E		**Recovery Location:** 8-02.2N 165-04.8E	
Buoy Start Date: 7/8/06		**Buoy End Date:** 8/14/07	
Service Description: Recovery/Deployment. Recovery/Deployment. Routine recovery. All sensors downloaded successfully.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**

Rain	3/7/07	Data erratic.	

5N 165E

Buoy ID: PM640		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 4779 m	
Deployed Location: 05 01.8N 165 00.9E		**Repair Location:** 05 01.8N 165 00.9E	
Buoy Start Date: 3/14/08		**Buoy End Date:** Still deployed	
Service Description: Visit. Buoy riding well and is in good condition.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
None			

2N 165E

Buoy ID: PM608B		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 4171 m	
Deployed Location: 1-59.8N 165-00.92E		**Recovery Location:** 1 59.9N 165 0.2E	
Buoy Start Date: 7/10/06		**Recovery Date:** 8/16/07	
Service Description: Recovery/Deployment. Anemometer and Rain gauge gone. All subsurface sensors except SSC were lost when the Nilspin fell into the sea.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
None			

0 165E

Buoy ID: PM609B		**Buoy Configuration:** Flux	
Buoy Type: ATLAS		**Water Depth:** 4411 m	
Deployed Location: 0-01.6N 165-02.51E		**Recovery Location:** 0-01.6N 165-02.51E	
Buoy Start Date: 7/11/06		**Buoy End Date:** 8/17/07	
Service Description: Recovery/Deployment. Temperature sensor T5 and Temperature/velocity sensor TV13 were missing. All other sensors were downloaded successfully.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
None			

2S 165E

Buoy ID: PM645A	**Buoy Configuration:** Standard
Buoy Type: ATLAS	**Water Depth:** 4460 m
Deployed Location: 1-58.97S 156-59.9E	**Visit Location:** 1-58.6S 164-59.7E
Buoy Start Date: 11/10/06	**Visit Date:** 8/18/07
Service Description: Visit. Buoy riding well. Small line attached to the buoy but everything appears to be functioning.	

Site Sensor Failures	Date Sensors Failed	Why sensors were failed	Field Service Observations
None			

5S 165E

Buoy ID: PM610	**Buoy Configuration:** Standard
Buoy Type: ATLAS	**Water Depth:** 2511 m
Deployed Location: 4 -9.36S 165-11.78E	**Recovery Location:** 5-01.1S 165-10.25E
Buoy Start Date: 7/14/06	**Recovery Date:** 8/19/07
Service Description: Recovery/Deployment. SSC wire severed just above sensor. T125 slid down wire to 150 m. All sensors downloaded successfully.	

Site Sensor Failures	Date Sensors Failed	Why sensors were failed	Field Service Observations
None			

8S 165E

Buoy ID: PM647B	**Buoy Configuration:** Standard
Buoy Type: ATLAS	**Water Depth:** 3900 m
Deployed Location: 8-01.59S 164-47.0E	**Repair Location:** 8-02.2S 164 52.6E
Buoy Start Date: 11/12/06	**Repair Date:** 8/20/07
Service Description: Repair. Replaced T25 sensor with divers. All operations conducted successfully.	

Site Sensor Failures	Date Sensors Failed	Why sensors were Failed	Field Service Observations
None			

8S 180

Buoy ID: PM652		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 5537 m	
Deployed Location: 7 58.6S 179 50.9W		**Visit Location:** 7 58.73S 179 51.0W	
Buoy Start Date: 11/16/06		**Visit Date:** 8/24/07	
Service Description: Visit. Buoy riding well. All instruments appear to be functioning properly.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
None			

5S 180

Buoy ID: PM613B		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 5666 m	
Deployed Location: 4-58.0S 179 53.89W		**Recovery Location:** 4-59.2S 179 55.1W	
Buoy Start Date: 7/21/06		**Buoy End Date:** 8/25/07	
Service Description: Recovery/Deployment. T250 missing. All other sensors downloaded successfully.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
None			

2S 180

Buoy ID: PM653		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 5331 m	
Deployed Location: 2-00.075S 179-53.12W		**Repair Location:** 1-59.7S 179 53.08W	
Buoy Start Date: 11/19.06		**Repair Date:** 8/27/07	
Service Description: Repair. Anemometer swapped. Buoy in good condition.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were failed**	**Field Service Observations**
Wind	7/15/07	Wind direction off.	

0 180

Buoy ID: PM614		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 5393 m	
Deployed Location: 0-1.5N 179 54.03W		**Recovery Location:** None	
Buoy Start Date: 7/23/06		**Recovery Date:** None	
Service Description: Recovery/Deployment. No recovery. Buoy lost at sea.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
Buoy	7/21/07	Buoy flagged as moved.	
Buoy	7/28/07	Transmission failure.	

2N 180

Buoy ID: PM615		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 5475 m	
Deployed Location: 2-1.1N 179 47.6W		**Recovery Location:** None	
Buoy Start Date: 7/24/06		**Buoy End Date:** None	
Service Description: Recovery/Deployment. No recovery, buoy lost at sea.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
Wind	6/12/07	Wind direction off.	
Buoy	6/15/07	Transmission failure.	

5N 180

Buoy ID: PM568B		**Buoy Configuration:** Standard	
Buoy Type: ATLAS		**Water Depth:** 5674 m	
Deployed Location: 4-59.6N 179-54.41W		**Recovery Location:** 4-59.6N 179-54.41W	
Buoy Start Date: 11/23/05		**Recovery Date:** 8/29/07	
Service Description: Recovery/ Deployment. Longline gear on Nilspin. T100 and T125 missing, all other sensors downloaded successfully.			
Site Sensor Failures	**Date Sensors Failed**	**Why sensors were Failed**	**Field Service Observations**
Buoy	8/4/07	Transmission failure.	

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:

CTD Operations		
Site	**Date**	**Comments**
8N 165E	8/14/07	1000 m
7N 165E	-	1000 m
6N 165E	-	1000 m
5N 165E	8/16/07	1000 m
4N 165E	-	1000 m
3N 165E	-	1000 m
2.5N 165E	-	1000 m
2N 165E	8/16/07	1000 m
1.5N 165E	-	1000 m
1N 165E	-	1000 m
0.5N 165E	-	1000 m
0 165E	8/18/07	1000 m
0.5S 165E	-	1000 m
1S 165E	8/18/07	1000 m
1.5S 165E	-	1000 m
2S 165E	8/18/07	1000 m
2.5S 165E	-	1000 m
3S 165E	8/19/07	1000 m
4S 165E	-	1000 m
5S 165E	8/20/07	1000 m
6S 165E	-	1000 m
7S 165E	-	1000 m
8S 165E	8/20/07	1000 m
8S 180	8/24/07	3000 m
7S 180	8/24/07	1000 m
6S 180	8/25/07	1000 m
5S 180	8/25/07	1000 m
4S 180	-	1000 m
3S 180	8/26/07	1000 m
2.5S 180	-	1000 m
2S 180	8/27/07	1000 m
1.5S 180	-	1000 m
1S 180	8/27/07	1000 m

0.5S 180	-	1000 m
0N 180	8/28/07	1000 m
0.5N 180	-	1000 m
1N 180	8/28/07	1000 m
1.5N 180	-	1000 m
2N 180	8/29/07	1000 m
2.5N 180	-	1000 m
3N 180	8/29/07	1000 m
4N 180	-	1000 m
5N 180	8/30/07	3000 m
6N 178W	8/30/07	1000 m
7N 177W	8/31/07	1000 m
8N 180	-	3000 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

Eight 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
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or

Elizabeth Steffen, NOAA/PMEL
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E-mail: pmel_floats@noaa.gov

The following outlines the Argo floats deployed during the cruise:

ARGO Floats		
Site	**Date**	**Comments**
08-02.33N 165-04.6E	8/15/07	
00-02.34N 165-01.24E	8/18/07	
08-14.63S 178-00.51E	8/23/07	
00-01.58N 179-54.33W	8/28/07	

Atlantic Oceanographic and Meteorological Laboratory (AMOL) Surface Drifting Floats

Ten 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,
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Fax: (305) 361-4436
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The following outlines the AOML Drifting floats deployed during this cruise:

AOML Floats		
Site	**Date**	**Comments**
5N 165E	8/16/07	
3N 165E	8/16/07	
2N 165E	8/18/07	
3S 165E	8/19/07	
5S 165E	8/20/07	
5S 180	8/26/07	
2S 180	8/26/07	
2N 180	8/28/07	
3N 180	8/29/07	
5N 180	8/30/07	

PCO2 and Nitrate Mapping System and Nutrient Samples

Twenty-seven 30ml water samples were collected on this cruise. The chief scientist verified and briefed the Operations Officer on the specifications of the water samples to be collected during CTD casts prior to the start of the cruise. All water samples were collected as scheduled.

Questions concerning Nutrient Samples should be directed to:

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