

# R/V Kilo Moana Cruise Report

**KM 1208**

## **MIXET: Mixing in the Equatorial Pacific**

April 20 to May 14, 2012

Pohnpei – Pohnpei

Chief Scientist: Kelvin J. Richards, University of Hawai`i

### **1. Prime Objectives:**

- Deploy 5 moorings with McLane moored profilers along 156°E
- Take upper ocean measurements of velocity, T & S and microstructure

### **2. Participants**

#### **Science Party:**

Kelvin J. Richards	University of Hawai`i
Eric Firing	University of Hawai`i
Glenn S. Carter	University of Hawai`i
Miho Ishizu	University of Hawai`i
Saulo Muller Soares	University of Hawai`i
Scott E. WorriLOW	WHOI
Andrew C. Davies	WHOI
Andrew C. Cookson	University of Washington
Kyung-Il Chang	Seoul National University
Jae Am Shin	Seoul National University
Sang Chul Hwang	KORDI
Martin M.B. Puy	Université Joseph Fourier, Grenoble
Ismael Hernandez-Carrasco	Universitat Illes Balears, Palma

#### **Technical Support:**

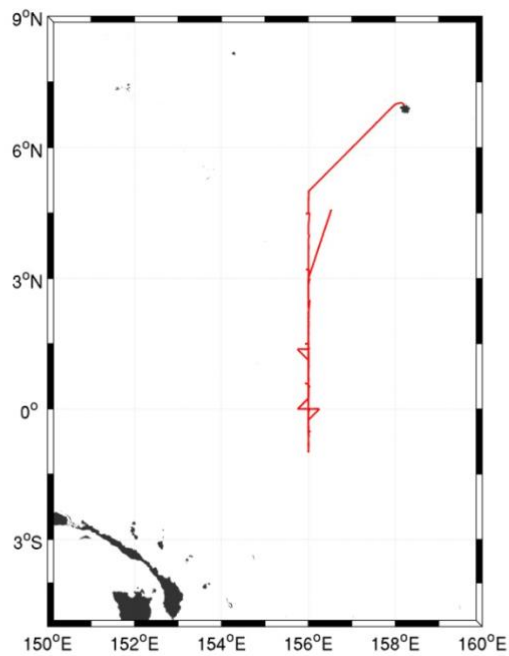
Vic Polidoro	OTG
Ben Colello	OTG
Ashley Stinson	MATE intern

#### **Ship's Crew:**

Gray Drewry	Master
Eric Schoenberg	Ch. Mate

Kim Krueger	2 <sup>nd</sup> Mate
Richard Wisner	3 <sup>rd</sup> Mate
Thomas Perry	AB
Craig Harvey	AB
Frank Zellin	AB
Roger Rios	AB
Ryan Duncan	AB
Jeff Artingstall	AB
Joe Heise	Ch Eng
Hank Hazen	1 <sup>st</sup> A/E
Travis Souza	2 <sup>nd</sup> A/E
John Nordberg	3 <sup>rd</sup> A/E
Richie Velasquez	QMED
Deren Atienza	QMED
Robert McDonough	QMED
Debra Gall	CH. Steward
Manuel Camacho	Cook
Andrew Middleton	Stew. Asst.

**3. Cruise track:**



#### 4. Overview of Operations:

##### Year Day Time

110	23:10z	Departed pier, Pohnpei. Steam to 5N, 156E
111	14:55z	Deploy CTD to 500db (S01C001: 5N 156E)
111	21:00z	Start mooring deployment (4.5N 156E)
112	01:00z	Drop mooring anchor
112	02:00z	Deployed CTD to 500db. (S02C001: 4.5N 156E)
112	03:30z	Deployed vertical microstructure profiler (VMP)
112	08:55z	Deployed CTD to 500db (S03C001: 4N 156E)
112	10:00z	Deployed VMP
112	15:30z	Deploy CTD to 500db. (S04C001: 3.5N 156E)
112	16:20z	Deploy VMP for 2 yo-yos.
112	22:30z	Start mooring deployment (3N 156E)
113	02:00z	Dropped mooring anchor
113	04:30z	Deploy CTD to 500db (S05C001: 3N 156E)
113	05:30z	Deploy VMP for 2 yo-yos
113	10:15z	Deploy CTD to 500db (S06C001: 2.5N 156E)
113	11:30z	Deploy VMP for 2 yo-yos
113	16:30z	Deploy CTD to 500db (S07C001: 2N 156E)
113	17:45z	Deploy VMP for 2 yo-yo casts
114	00:00z	Start mooring deployment. (1.5N 156E)
114	03:20z	Dropped mooring anchor.
114	04:00z	Deploy CTD to 500db. (S08C001: 1.5N 156E)
114	05:00z	Deploy VMP for 2 yo-yos.
114	09:45z	Deploy CTD to 500db. (S09C001: 1N 156E)
114	11:00z	Deploy VMP for 2 yo-yos.
114	17:30z	Deploy VMP, for 2 yo-yos (0.5N 156E)
114	19:30	Deploy CTD had to recover before CTD got in the water due to a crane part needing replacement. (S10C001: 0.5N 156E)
114	20:00z	Re-launch CTD to 500db. (S10C002: 0.5N 156E)
114	21:30z	Begin mooring deployment. (0.5N 156E)
115	01:15z	Drop mooring anchor
115	02:30z	Deploy CTD to 500db. (S11C001: Eq 156E)
115	07:00z	Deploy CTD to 500db. (S12C001: 0.5S 156E)
115	08:10z	Deploy VMP.
115	16:00z	Begin mooring deployment. (0.5S 156E)
115	19:30z	Drop mooring anchor, underway to next station.
115	22:45z	Deploy CTD to 500db. (S13C001: 1S 156E)
115	23:45z	Deploy VMP for 2 yo-yos.
116	08:00z	Start Butterfly pattern. CTD/LADCP stations every 7.5nm (S14C001-S43C001). VMP casts (in free fall mode) at equator.
119	06:30z	Start time series at equator. CTD/LADCP stations every 3 hrs (S44C001-S44C060).

3 to 4 VMP free fall casts every day.

124 12:00z Finish time series. Steam to 2N.

125 01:30z Deploy freefall VMP to 2000m at 1.75N 156E.

125 01:45z Deploy CTD to 500db at 1.75N. Start of "Butterfly" survey (S45C001-S52C001)

125 18:10z Start CTD/LADCP/VMP time series at 1.374N 156E (S53C001-S53C081)

132 12:00z End time series.  
Start northward transect along 156E. CTD/LADCP every 7.5 nm (S54C001-S67C001).

133 12:10z Recover last CTD at 2.625N 156E (S67C001).  
END OF SCIENCE. Headed for Pohnpei.

134 20:15z Arrived at pilot station.

134 21:40z All fast at pier. End KM1208.

## 5. Observations

### 5.1 Underway

Underway observations were taken using two hull-mounted Acoustic Doppler Current Profiler to measure ocean currents, a thermosalinograph, fluorometers attached to the uncontaminated sea water system and a suite of meteorological instrumentation

#### ADCP - Acoustic Doppler Current Profiler

RD Instruments Workhorse 300kHz  
Operational

RD Instruments Ocean Surveyor 38kHz  
Operational

#### MET Sensor Suite

Suite located 68 feet above sea surface

Biospherical PAR - QSR-2200,	s/n:	20238
(cal date: 2-March-11)		
Eppley Labs PSP Precision Spectral Pyranometer	s/n:	31246F3
(cal date: 22-June-11)		
Eppley Labs PIR Precision Infrared Radiometer	s/n:	31226F3
(cal date: 23-June-11)		
RM Young RTD Model 41342VC platenized temp	s/n:	1951
(cal date: 06-July-11)		
RM Young Aspirated Radiation shield model 43408F (2)		
RM Young Precipitation Gauge model 50203	s/n:	00604
(cal date: n/a)		
Rotronic Hygromers (Humidity) MP101A-C5	s/n:	41992
(cal date: 13-July-11)		
RM Young Wind Anemometer - 0deg forward	STBD-s/n:	44604
(cal date: 15-Sept-10)		
RM Young Wind Anemometer - 0deg forward	PORT-s/n:	43393
(cal date: 15-Sept-10)		
Vaisala Humidity & Temp Transmitter	s/n:	H0940016
(cal date: 02-Mar-12)		

\*NOTE- not yet integrated to the system

Vaisala PTB220 Class A digital Barometer s/n: Y062001  
(cal date: 14-Oct-11)  
Test Procedure doc210434A  
Optical Scientific Optical Rain Gauge ORG-815-Dr s/n: 09010291  
(cal date: 29-Apr-11)  
Campbell MicroLogger (s/n 2056) with Ethernet/Compact Flash Module  
(s/n 1815)  
- installed March 2008  
Note: Ultraviolet 0.20 - 0.39um  
Visible: 0.39 - 0.78um  
Near-Infared:0.78 - 4.0um  
Infared:4.0 - 100.0um  
PSP short wave (most significant source of heat flux for  
ocean) PIR long wave  
PSP .285um-----2.8 3.5-----50um

### **Thermosalinograph, Fluorometers & Uncontaminated Sea Water System (USSW)**

Seabird SBE45 Micro-Thermosalinograph, s/n: 4552988-0267 (cal date: 06  
March 2012; install date: 28 Mar 2012)  
Operational  
Seabird SBE38 Digital Remote Temperature Probe, s/n: 0396 (cal date:  
18 Oct 2011 install date: 28 Mar 2012)  
Operational  
Turner Fluorometer (Installed Jan 3 2011)  
Operational

## **5.2 Station data**

### **CTD and LADCP data collection**

A Seabird CTD and frame were provided by OTG. The CTD was equipped with dual temperature, conductivity, and oxygen sensors. A combined fluorometer and turbidity sensor (WET Labs ECO) was also installed, along with a Biospherical/Licor PAR/irradiance sensor. No water samples were taken.

An RDI 600-kHz Workhorse was mounted in the center of the frame, looking down, to provide a high resolution lowered ADCP (LADCP). It was configured with 25 2-m depth cells, and a ping interval of 0.25 seconds. The ambiguity interval command was WV250 through station 21, after which WV200 was used.

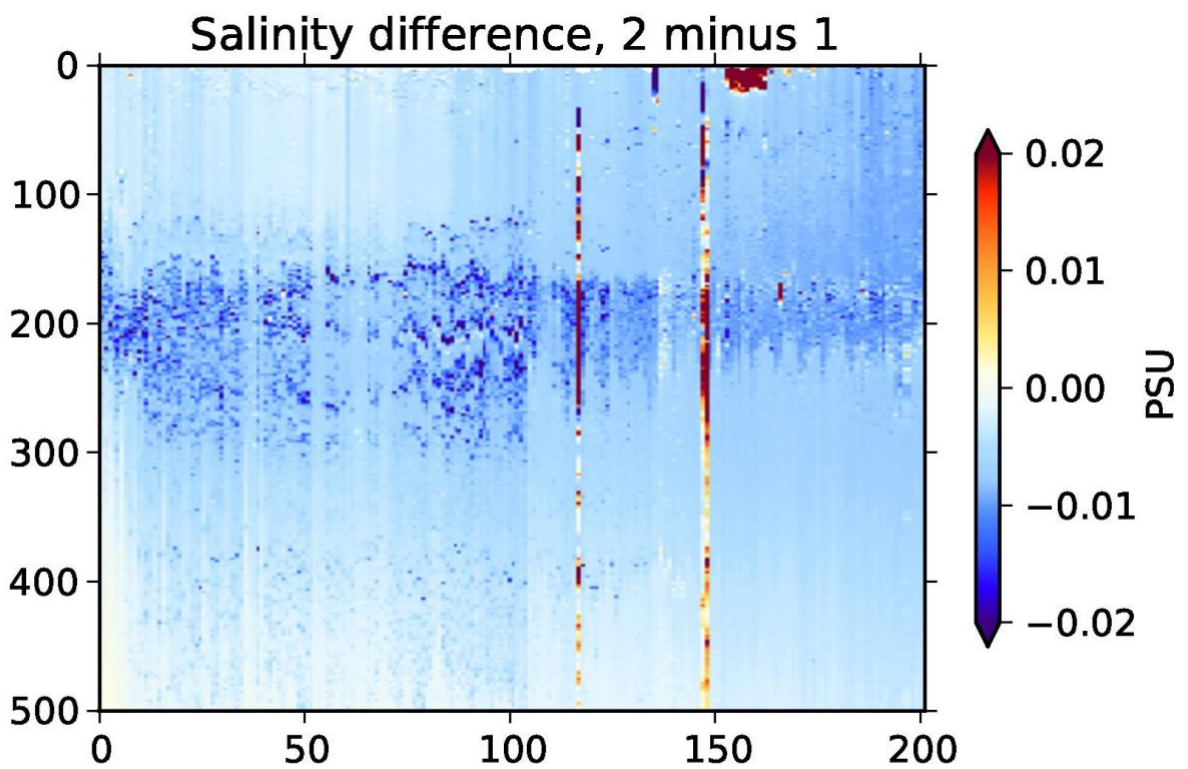
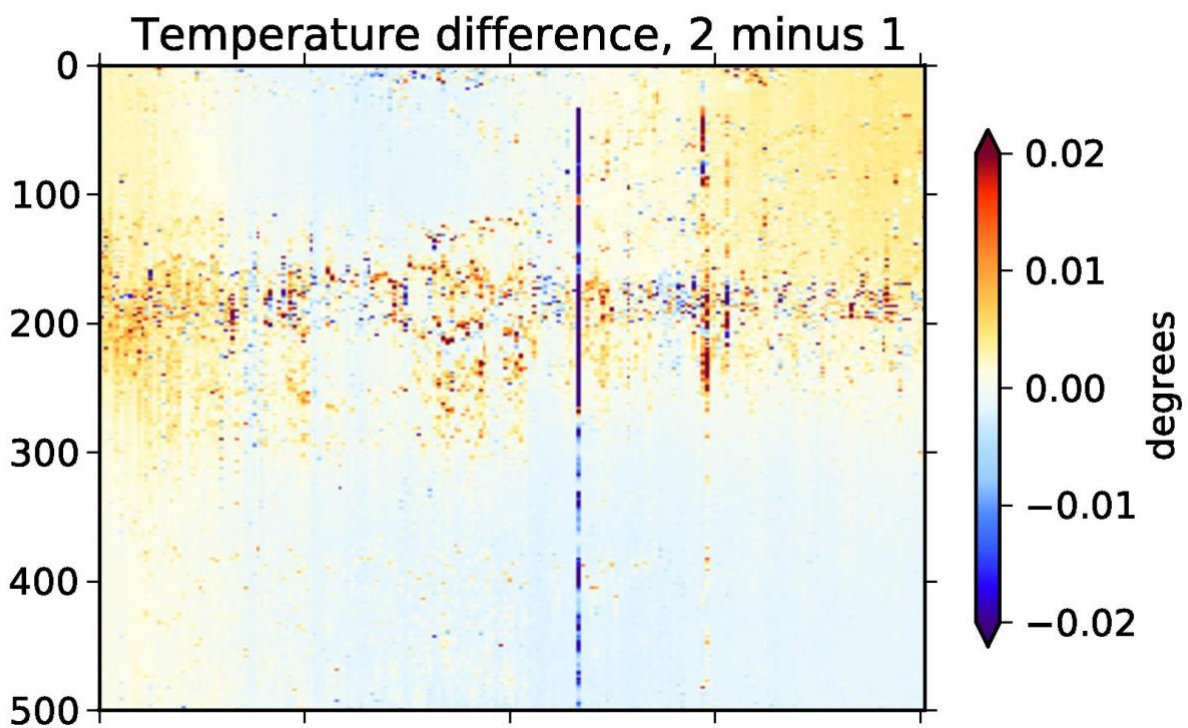
The CTD was deployed with the Caley crane and winch system. Heave compensation was used for depths below about 30 m, resulting in a clean CTD time series without the “loops” that would otherwise need to be edited out. All casts reached 500 decibars; one (cast 35 on station 44) was accidentally extended to 600 decibars.

CTD data were processed immediately after each cast using a batch script to produce two files: one gridded at 1 decibar intervals, the second a time series at 1 Hz for use in LADCP processing.

A total of 207 CTD/LADCP casts were made, of which 205 have complete CTD and LADCP records. The first cast at station 10 was aborted owing to an electrical problem in the wire termination. A second cast was then made successfully. On station 44 cast 40, it was found that the LADCP had been turned off immediately after startup, so no LADCP data are available.

Problems with one of the two sensor pairs caused larger-than-normal sensor differences on several casts at station 53. On cast 5, data from the primary sensor pair is degraded. Plumbing problems were suspected but not positively identified; after adjustment and refastening, however, the problem was absent on subsequent casts. On casts 35 and 36, the secondary sensor pair shows some anomalies, of unknown cause. On casts 23 and 24 there was a problem with flushing of sensor two, visible only at the start of the cast, and solved after a couple of pump swaps. On casts 41 through 50 there was a similar problem with the primary sensors, again at the start of the cast. This was initially mitigated with a deeper soak (20 m) before starting the profile, but turned out to have been caused by blockage of the air vent between the salinity and temperature sensors and the oxygen sensor. Clearing the vent solved the problem. On cast 54, there is a prominent conductivity spike (visible in salinity) at about 170 decibars in sensor 2; presumably this needs to be edited out.

In addition to the few obvious problems noted above, there were small and slowly-varying offsets between the sensor pairs. Both types of behavior are visible in the following figure:



**Station List**

Sta	Cast	Start date and time	Longitude	Latitude	Max pres.
1	1	2012/04/20 15:03:29	156.001	4.999	500
2	1	2012/04/21 02:26:01	156.012	4.486	500
3	1	2012/04/21 09:03:40	156.000	4.000	500
4	1	2012/04/21 15:15:31	155.999	3.500	500
5	1	2012/04/22 04:36:28	156.000	3.000	501
6	1	2012/04/22 10:19:57	156.000	2.500	500
7	1	2012/04/22 16:43:34	156.000	2.000	500
8	1	2012/04/23 04:12:05	156.000	1.484	500
9	1	2012/04/23 10:08:11	156.000	1.000	500
10	2	2012/04/24 02:33:04	156.000	0.500	500
11	1	2012/04/24 07:00:18	156.000	-0.003	501
12	1	2012/04/24 15:20:46	156.002	-0.500	501
13	1	2012/04/24 22:48:01	156.000	-1.000	500
14	1	2012/04/25 08:19:51	156.000	0.000	500
15	1	2012/04/25 11:53:43	156.125	0.000	500
16	1	2012/04/25 13:45:39	156.250	0.000	500
17	1	2012/04/25 17:02:53	156.000	-0.250	501
18	1	2012/04/25 18:46:39	156.001	-0.125	500
19	1	2012/04/25 20:26:35	156.000	0.000	500
20	1	2012/04/25 22:01:04	156.000	0.125	500
21	1	2012/04/25 23:41:41	156.000	0.251	501
22	1	2012/04/26 02:52:35	155.750	0.000	500
23	1	2012/04/26 04:40:01	155.875	0.000	501
24	1	2012/04/26 06:24:41	156.000	0.000	500
25	1	2012/04/26 12:04:30	156.125	0.000	501
26	1	2012/04/26 14:02:30	156.250	0.000	500
27	1	2012/04/26 17:16:23	155.999	-0.250	500



Sta	Cast	Start date and time	Longitude	Latitude	Max pres.
28	1	2012/04/26 19:01:33	156.000	-0.124	501
29	1	2012/04/26 20:44:49	156.000	0.001	500
30	1	2012/04/26 22:25:24	156.000	0.124	500
31	1	2012/04/27 00:14:47	155.999	0.250	500
32	1	2012/04/27 03:23:57	155.749	0.000	500
33	1	2012/04/27 05:11:00	155.876	0.001	500
34	1	2012/04/27 06:53:50	156.000	0.001	500
35	1	2012/04/27 12:19:06	156.125	-0.000	500
36	1	2012/04/27 14:11:50	156.250	-0.000	500
37	1	2012/04/27 17:33:26	156.001	-0.250	501
38	1	2012/04/27 19:12:29	156.001	-0.124	500
39	1	2012/04/27 20:49:42	156.000	0.000	500
40	1	2012/04/27 22:32:11	156.001	0.125	508
41	1	2012/04/28 00:06:02	156.001	0.251	500
42	1	2012/04/28 03:09:02	155.749	0.000	500
43	1	2012/04/28 04:52:46	155.875	0.000	500
44	1	2012/04/28 06:39:46	156.001	0.002	502
44	2	2012/04/28 11:26:38	156.000	0.000	500
44	3	2012/04/28 13:30:51	156.000	0.000	500
44	4	2012/04/28 15:32:52	156.000	0.000	500
44	5	2012/04/28 17:25:08	156.000	-0.000	501
44	6	2012/04/28 19:23:27	156.000	0.000	500
44	7	2012/04/28 21:29:05	156.000	-0.000	500
44	8	2012/04/28 23:28:05	156.000	0.000	500
44	9	2012/04/29 06:12:10	156.000	0.000	500
44	10	2012/04/29 07:37:40	156.000	0.000	501
44	11	2012/04/29 09:32:20	156.000	0.000	500
44	12	2012/04/29 11:33:46	156.000	0.000	500
44	13	2012/04/29 13:33:34	156.000	0.001	500
44	14	2012/04/29 15:28:46	156.000	0.000	500
44	15	2012/04/29 17:46:17	156.000	0.000	501
44	16	2012/04/29 19:45:54	156.000	0.000	502

Sta	Cast	Start date and time	Longitude	Latitude	Max pres.
44	17	2012/04/29 21:30:13	155.998	-0.001	500
44	18	2012/04/29 23:26:37	156.000	0.000	500
44	19	2012/04/30 01:34:26	156.000	0.000	500
44	20	2012/04/30 03:31:17	156.000	0.000	500
44	21	2012/04/30 05:29:57	156.000	0.000	501
44	22	2012/04/30 07:28:38	156.000	-0.000	502
44	23	2012/04/30 09:27:19	156.006	-0.001	501
44	24	2012/04/30 11:32:46	155.998	0.000	500
44	25	2012/04/30 13:31:58	156.000	0.000	501
44	26	2012/04/30 15:29:31	155.999	-0.000	500
44	27	2012/04/30 17:29:53	156.000	-0.000	500
44	28	2012/04/30 19:30:11	156.000	-0.000	501
44	29	2012/04/30 21:30:10	156.001	-0.000	500
44	30	2012/04/30 23:29:59	156.000	-0.000	500
44	31	2012/05/01 01:28:24	156.000	0.001	500
44	32	2012/05/01 03:31:29	156.000	-0.000	500
44	33	2012/05/01 05:32:01	156.000	0.000	501
44	34	2012/05/01 07:28:43	156.000	0.000	501
44	35	2012/05/01 09:24:57	156.005	-0.001	607
44	36	2012/05/01 11:28:39	156.000	-0.000	501
44	37	2012/05/01 13:30:42	155.999	0.000	500
44	38	2012/05/01 15:29:48	156.000	-0.000	500
44	39	2012/05/01 17:29:25	156.000	-0.000	500
44	40	2012/05/01 19:39:06	156.000	-0.000	501
44	41	2012/05/01 21:28:08	155.998	-0.001	501
44	42	2012/05/01 23:26:58	156.000	0.000	501
44	43	2012/05/02 01:32:24	156.000	-0.000	500
44	44	2012/05/02 03:29:06	156.000	0.000	501
44	45	2012/05/02 05:36:15	156.000	-0.000	501
44	46	2012/05/02 07:29:19	155.999	-0.000	500
44	47	2012/05/02 09:29:03	156.004	-0.000	503
44	48	2012/05/02 11:27:58	156.000	0.001	500

Sta	Cast	Start date and time	Longitude	Latitude	Max pres.
44	49	2012/05/02 13:33:03	155.999	0.000	500
44	50	2012/05/02 15:29:28	155.999	-0.001	501
44	51	2012/05/02 17:29:01	156.000	0.000	501
44	52	2012/05/02 19:28:50	156.000	-0.000	501
44	53	2012/05/02 21:28:17	156.000	0.000	500
44	54	2012/05/02 23:30:07	155.999	0.000	500
44	55	2012/05/03 01:40:52	156.000	0.000	500
44	56	2012/05/03 03:32:21	156.000	0.000	500
44	57	2012/05/03 05:31:18	156.000	0.000	500
44	58	2012/05/03 07:29:03	156.000	0.000	500
44	59	2012/05/03 09:29:22	156.005	0.004	502
44	60	2012/05/03 11:29:40	155.999	0.002	500
45	1	2012/05/04 01:50:44	156.000	1.750	500
46	1	2012/05/04 04:43:19	156.000	1.625	500
47	1	2012/05/04 06:28:44	156.000	1.500	501
48	1	2012/05/04 08:13:33	155.999	1.375	501
49	1	2012/05/04 09:53:46	156.000	1.250	500
50	1	2012/05/04 11:26:13	156.001	1.125	500
51	1	2012/05/04 14:37:30	155.750	1.375	500
52	1	2012/05/04 16:27:16	155.874	1.375	502
53	1	2012/05/04 18:04:04	155.999	1.375	500
53	2	2012/05/04 19:28:39	156.000	1.375	500
53	3	2012/05/04 21:31:27	156.000	1.376	500
53	4	2012/05/04 23:31:21	156.000	1.375	501
53	5	2012/05/05 01:31:38	155.999	1.375	500
53	6	2012/05/05 03:41:29	156.006	1.372	500
53	7	2012/05/05 05:30:29	156.000	1.375	503
53	8	2012/05/05 07:28:50	156.002	1.375	500
53	9	2012/05/05 09:30:16	155.994	1.373	500
53	10	2012/05/05 11:29:37	156.000	1.375	501
53	11	2012/05/05 13:32:44	156.000	1.375	500
53	12	2012/05/05 15:27:18	156.000	1.375	500

Sta	Cast	Start date and time	Longitude	Latitude	Max pres.
53	13	2012/05/05 17:28:40	156.001	1.375	501
53	14	2012/05/05 19:30:34	156.000	1.375	500
53	15	2012/05/05 21:28:46	156.000	1.375	500
53	16	2012/05/05 23:28:55	156.000	1.376	500
53	17	2012/05/06 01:26:14	156.000	1.375	501
53	18	2012/05/06 03:28:11	155.999	1.375	500
53	19	2012/05/06 05:30:36	156.000	1.375	500
53	20	2012/05/06 07:29:54	156.000	1.375	499
53	21	2012/05/06 09:28:38	155.995	1.372	501
53	22	2012/05/06 11:26:35	156.002	1.381	500
53	23	2012/05/06 13:29:17	156.000	1.375	501
53	24	2012/05/06 15:34:05	156.000	1.375	500
53	25	2012/05/06 17:54:50	156.000	1.375	501
53	26	2012/05/06 19:25:24	156.000	1.375	500
53	27	2012/05/06 21:40:35	156.000	1.375	500
53	28	2012/05/06 23:32:29	156.000	1.375	500
53	29	2012/05/07 01:30:04	156.000	1.375	500
53	30	2012/05/07 03:30:45	156.005	1.378	500
53	31	2012/05/07 05:41:02	156.020	1.397	500
53	32	2012/05/07 07:30:34	156.017	1.393	500
53	33	2012/05/07 09:28:10	155.995	1.371	501
53	34	2012/05/07 11:43:04	156.000	1.375	501
53	35	2012/05/07 13:31:02	156.000	1.375	500
53	36	2012/05/07 15:26:22	156.000	1.375	500
53	37	2012/05/07 17:27:18	156.000	1.375	500
53	38	2012/05/07 19:23:37	156.000	1.375	500
53	39	2012/05/07 21:23:15	156.000	1.376	501
53	40	2012/05/07 23:28:25	156.000	1.375	500
53	41	2012/05/08 01:33:15	156.000	1.375	500
53	42	2012/05/08 03:29:59	156.000	1.374	501
53	43	2012/05/08 05:38:58	156.010	1.377	500
53	44	2012/05/08 07:27:35	156.011	1.377	501

Sta	Cast	Start date and time	Longitude	Latitude	Max pres.
53	45	2012/05/08 09:27:02	155.997	1.374	501
53	46	2012/05/08 11:29:50	156.000	1.376	501
53	47	2012/05/08 13:29:12	156.000	1.375	500
53	48	2012/05/08 15:28:47	156.000	1.375	500
53	49	2012/05/08 17:27:29	156.000	1.375	501
53	50	2012/05/08 19:34:13	156.000	1.375	501
53	51	2012/05/08 21:26:54	156.000	1.375	500
53	52	2012/05/08 23:29:31	156.000	1.375	501
53	53	2012/05/09 01:27:43	156.000	1.370	501
53	54	2012/05/09 03:28:36	156.010	1.385	501
53	55	2012/05/09 05:42:02	156.000	1.375	500
53	56	2012/05/09 07:29:07	156.002	1.373	502
53	57	2012/05/09 09:28:46	156.000	1.375	500
53	58	2012/05/09 11:25:43	156.000	1.375	501
53	59	2012/05/09 13:29:40	156.000	1.375	501
53	60	2012/05/09 15:27:37	156.000	1.375	500
53	61	2012/05/09 17:26:56	156.001	1.375	500
53	62	2012/05/09 19:26:37	156.000	1.375	501
53	63	2012/05/09 21:31:55	156.000	1.375	501
53	64	2012/05/09 23:27:30	156.000	1.375	500
53	65	2012/05/10 01:22:36	156.000	1.371	500
53	66	2012/05/10 03:30:31	156.004	1.374	501
53	67	2012/05/10 05:31:22	156.000	1.374	502
53	68	2012/05/10 07:26:21	155.999	1.373	501
53	69	2012/05/10 09:26:52	156.004	1.377	500
53	70	2012/05/10 11:26:20	156.000	1.375	501
53	71	2012/05/10 13:31:02	156.000	1.375	500
53	72	2012/05/10 17:27:38	156.000	1.375	500
53	73	2012/05/10 19:36:47	156.000	1.375	502
53	74	2012/05/10 21:40:48	156.000	1.375	500
53	75	2012/05/10 23:30:57	156.000	1.375	500
53	76	2012/05/11 01:34:19	155.997	1.372	501

Sta	Cast	Start date and time	Longitude	Latitude	Max pres.
53	77	2012/05/11 03:27:37	156.007	1.376	500
53	78	2012/05/11 05:30:49	155.999	1.376	500
53	79	2012/05/11 07:25:52	155.999	1.371	500
53	80	2012/05/11 09:28:21	156.004	1.377	500
53	81	2012/05/11 11:25:27	156.001	1.374	500
54	1	2012/05/11 14:15:58	156.001	1.000	500
55	1	2012/05/11 15:54:13	156.001	1.125	501
56	1	2012/05/11 17:28:26	156.000	1.250	500
57	1	2012/05/11 19:01:27	156.000	1.377	501
58	1	2012/05/11 20:37:55	156.000	1.501	500
59	1	2012/05/11 22:24:50	156.000	1.625	500
60	1	2012/05/11 23:56:32	155.999	1.750	500
61	1	2012/05/12 01:29:31	156.000	1.875	500
62	1	2012/05/12 03:11:15	156.000	2.000	500
63	1	2012/05/12 04:50:11	156.001	2.125	501
64	1	2012/05/12 06:33:06	156.000	2.250	500
65	1	2012/05/12 08:15:39	156.000	2.375	500
66	1	2012/05/12 09:58:01	156.000	2.499	500

### Microstructure

At a number of stations, the CTD cast was followed by the deployment of a microstructure probe, a Rockland VMP 6000. Instrumentation included two shear probes, and a rapid temperature probe (FP07). Initially, on the southward section (Stations 1-13) the instrument was deployed on a tether. Excessive noise makes the data unusable. Good data were collected with the instrument deployed untethered on a number of the stations taken at the timeseries at the equator (CTD Station 44: a total of 24 profiles), and 1.375N (CTD Station 53: total 25 profiles).

Data are available at the ocean microstructure database <https://microstructure.ucsd.edu> under the program name MIXET 1.

The table gives details of each cast:

	Station	Cast	Start	Finish	Position	Max Pressure
1	Butterfly N0 (MXT1 014)	00	25-Apr-2012 09:13:58	25-Apr-2012 09:29:15	0° 0.070' N 155° 59.946' E	513
2	Butterfly N0 (MXT1 015)	01	25-Apr-2012 10:13:26	25-Apr-2012 10:29:01	0° 0.061' S 156° 0.435' E	513
3	Butterfly N0 (MXT1 016)	02	26-Apr-2012 07:14:36	26-Apr-2012 07:45:29	0° 0.002' N 156° 0.011' E	1014
4	Butterfly N0 (MXT1 017)	03	26-Apr-2012 08:37:57	26-Apr-2012 09:08:35	0° 0.111' N 156° 0.275' E	1014
5	Butterfly N0 (MXT1 018)	04	26-Apr-2012 09:52:33	26-Apr-2012 10:22:53	0° 0.071' N 156° 0.179' E	1014
6	Butterfly N0 (MXT1 019)	05	27-Apr-2012 07:45:45	27-Apr-2012 08:16:32	0° 0.038' N 155° 59.978' E	1014
7	Butterfly N0 (MXT1 020)	06	27-Apr-2012 09:04:16	27-Apr-2012 09:34:29	0° 0.018' S 156° 0.014' E	1013
8	Butterfly N0 (MXT1 021)	07	27-Apr-2012 10:16:24	27-Apr-2012 10:47:23	0° 0.013' N 155° 59.968' E	1014

	Station	Cast	Start	Finish	Position	Max Pressure
9	Equator timeseries (MXT1_022)	00	28-Apr-2012 07:26:28	28-Apr-2012 07:56:42	0° 0.166' N 156° 0.112' E	1014
10	Equator timeseries (MXT1_024)	01	29-Apr-2012 01:52:41	29-Apr-2012 02:13:59	0° 0.015' N 156° 0.016' E	714
11	Equator timeseries (MXT1_025)	02	29-Apr-2012 02:51:13	29-Apr-2012 03:12:29	0° 0.031' N 156° 0.425' E	714
12	Equator timeseries (MXT1_026)	03	29-Apr-2012 03:51:35	29-Apr-2012 04:51:03	0° 0.054' N 156° 0.832' E	1950
13	Equator timeseries (MXT1_027)	04	30-Apr-2012 06:56:59	30-Apr-2012 07:52:39	0° 0.009' S 156° 0.018' E	1962
14	Equator timeseries (MXT1_028)	05	30-Apr-2012 09:04:04	30-Apr-2012 10:03:41	0° 0.089' S 156° 0.435' E	1961
15	Equator timeseries (MXT1_029)	06	01-May-2012 02:51:00	01-May-2012 03:46:56	0° 0.013' S 155° 55.961' E	1966
16	Equator timeseries (MXT1_030)	07	01-May-2012 06:49:25	01-May-2012 07:48:48	0° 0.005' S 155° 55.993' E	1964
17	Equator timeseries (MXT1_031)	08	01-May-2012 08:55:11	01-May-2012 09:53:58	0° 0.067' S 156° 0.542' E	1965
18	Equator timeseries (MXT1_032)	09	02-May-2012 02:52:34	02-May-2012 03:51:39	0° 0.024' N 156° 0.002' E	1965
19	Equator timeseries (MXT1_033)	10	02-May-2012 06:49:04	02-May-2012 07:48:21	0° 0.020' N 155° 59.966' E	1964
20	Equator timeseries (MXT1_034)	11	02-May-2012 08:51:13	02-May-2012 09:50:25	0° 0.016' N 156° 0.214' E	1964
21	Equator timeseries (MXT1_035)	12	03-May-2012 02:55:07	03-May-2012 03:53:56	0° 0.054' N 156° 0.105' E	1965
22	Equator timeseries (MXT1_036)	13	03-May-2012 04:48:37	03-May-2012 05:47:28	0° 0.101' N 156° 0.216' E	1965
23	Equator timeseries (MXT1_037)	14	03-May-2012 06:53:47	03-May-2012 07:52:22	0° 0.176' N 156° 0.277' E	1964
24	Equator timeseries (MXT1_038)	15	03-May-2012 08:57:40	03-May-2012 09:55:44	0° 0.121' N 156° 0.456' E	1965
25	N0pt75 E156 (MXT1_039)	00	04-May-2012 01:28:12	04-May-2012 02:29:29	1° 45.011' N 156° 0.023' E	2020



	Station	Cast	Start	Finish	Position	Max Pressure
26	N1pt375 timeseries (MXT1_040)	00	05-May-2012 00:14:42	05-May-2012 01:28:03	1° 22.509' N 155° 59.976' E	2397
27	N1pt375 timeseries (MXT1_041)	01	05-May-2012 02:37:27	05-May-2012 03:49:31	1° 22.609' N 156° 0.469' E	2398
28	N1pt375 timeseries (MXT1_042)	02	05-May-2012 06:10:07	05-May-2012 07:23:29	1° 22.507' N 156° 0.135' E	2418
29	N1pt375 timeseries (MXT1_043)	03	05-May-2012 08:24:25	05-May-2012 09:37:05	1° 22.608' N 156° 0.287' E	2417
30	N1pt375 timeseries (MXT1_044)	04	06-May-2012 02:51:15	06-May-2012 04:05:28	1° 22.540' N 155° 59.929' E	2432
31	N1pt375 timeseries (MXT1_045)	05	06-May-2012 06:19:57	06-May-2012 07:34:34	1° 22.540' N 156° 0.000' E	2433
32	N1pt375 timeseries (MXT1_046)	06	06-May-2012 08:42:54	06-May-2012 09:55:41	1° 22.779' N 155° 59.987' E	2433
33	N1pt375 timeseries (MXT1_047)	07	07-May-2012 00:14:10	07-May-2012 01:28:10	1° 22.735' N 156° 0.146' E	2428
34	N1pt375 timeseries (MXT1_048)	08	07-May-2012 02:53:38	07-May-2012 04:07:48	1° 23.249' N 156° 0.766' E	2428
35	N1pt375 timeseries (MXT1_049)	09	07-May-2012 06:21:38	07-May-2012 07:35:55	1° 23.837' N 156° 1.280' E	2428
36	N1pt375 timeseries (MXT1_050)	10	07-May-2012 09:05:33	07-May-2012 10:18:57	1° 22.499' N 155° 59.905' E	2428
37	N1pt375 timeseries (MXT1_051)	11	08-May-2012 02:55:21	08-May-2012 04:06:18	1° 22.493' N 156° 0.041' E	2429
38	N1pt375 timeseries (MXT1_052)	12	08-May-2012 06:17:23	08-May-2012 07:27:10	1° 22.690' N 156° 0.748' E	2428
39	N1pt375 timeseries (MXT1_053)	13	08-May-2012 08:57:51	08-May-2012 10:07:52	1° 22.515' N 155° 59.910' E	2427
40	N1pt375 timeseries (MXT1_054)	14	09-May-2012 00:10:28	09-May-2012 01:22:39	1° 22.495' N 156° 0.004' E	2428
41	N1pt375 timeseries (MXT1_055)	15	09-May-2012 02:50:43	09-May-2012 04:02:53	1° 23.237' N 156° 0.678' E	2428
42	N1pt375 timeseries (MXT1_056)	16	09-May-2012 06:25:47	09-May-2012 07:38:13	1° 22.497' N 156° 0.024' E	2428
43	N1pt375 timeseries (MXT1_057)	17	09-May-2012 08:45:48	09-May-2012 09:56:53	1° 22.760' N 156° 0.267' E	2428

	Station	Cast	Start	Finish	Position	Max Pressure
44	N1pt375 timeseries (MXT1 058)	18	10-May-2012 00:11:26	10-May-2012 01:24:05	1° 22.464' N 155° 59.990' E	2427
45	N1pt375 timeseries (MXT1 059)	19	10-May-2012 02:41:46	10-May-2012 03:52:53	1° 22.873' N 156° 0.485' E	2427
46	N1pt375 timeseries (MXT1 060)	20	10-May-2012 06:19:33	10-May-2012 07:32:03	1° 22.439' N 155° 59.969' E	2428
47	N1pt375 timeseries (MXT1 061)	21	10-May-2012 08:44:19	10-May-2012 09:56:19	1° 22.705' N 156° 0.317' E	2428
48	N1pt375 timeseries (MXT1 062)	22	11-May-2012 00:14:10	11-May-2012 01:26:28	1° 22.468' N 155° 59.999' E	2428
49	N1pt375 timeseries (MXT1 063)	23	11-May-2012 02:43:29	11-May-2012 03:54:54	1° 22.873' N 156° 0.337' E	2428
50	N1pt375 timeseries (MXT1 064)	24	11-May-2012 06:14:53	11-May-2012 07:26:44	1° 22.420' N 155° 59.988' E	2428
51	N1pt375 timeseries (MXT1 065)	25	11-May-2012 08:39:22	11-May-2012 09:52:13	1° 22.726' N 156° 0.324' E	2427

### 5.3 Mooring operations

The 5 mooring array in support of MIXET (Mixing in the Equatorial Thermocline) was conducted aboard R/V Kilo Moana cruise, 20 April – 15 May 2012. Overall mooring operations were conducted very smoothly with no problems, issues or concerns. Standard anchor last deployment practices were used and the moorings were deployed within acceptable distance and depth from planned site. The planned duration of this array is nominally about 6 months, with planned recovery to occur in early November 2012.

All moorings were designed basically the same, adjusting for water depth, utilizing a McLane Research Moored profiler (MMP) as the primary data collecting instrument. MMP's were configured using Falmouth Scientific 3D Acoustic Current Meters and CTD sensors. Nortek Aquadopp current meters are added in the mooring at either end of the MMP wire for data enhancement and redundancy. It was planned to have RDI ADCP's included in the top flotation spheres, however 1 of these instruments failed during pre-cruise prep and was unable to be deployed. The decision was made to have these remaining ADCP's on 4 of the 5 moorings, omitting the ADCP from the 0.5S mooring in the array

The profilers were programmed utilizing the McLane Pattern Mission program and were set up to sample the upper 400 m or between 50m and 450m once every four hours with a full profile to 1500m once every three days. The upward looking ADCP's are used to obtain the upper water column from the sphere ~50m to the surface. All moorings use dual release systems to help secure successful recovery and also have ARGOS transmitters attached to the top sphere as a backup in the event of a mooring failure and allow tracking of the mooring to help with location and recovery.

The instrumentation was supplied by the Sub-Surface Mooring Operations Group, WHOI, with the exception of the ADCP's that were supplied by U of Hawaii and KORDI. The WHOI Rigging Shop was responsible the actual fabrication of the mooring components, wire, flotation, anchors and hardware.

Mooring planning, logistics and deployments was overseen by Scott WorriLOW, Group Operations Leader, Sub-Surface Mooring Operations Group, WHOI, and assisted by Andrew Davies, WHOI. U of Hawaii OTG group, ship's crew and science personnel assisted as required during the mooring operations.

### MIXET Mooring Location

All Top floats ~ 50m depth

WHOI Mooring #	Water Depth	Latitude	Longitude	Date deployed
1251 (4.5N)	3560m	04° 30.09 N	156° 00.700 E	21 Apr 12 00:50 GMT
1252 (3N)	2998m	03° 13.08 N	155° 59.956 E	22 Apr 12 01:57 GMT
1253 (1.5N)	2381m	01° 30.128 N	156° 00.424 E	23 Apr 12 03:17 GMT
1254 (.5N)	2182m	00° 33.847 N	156° 00.009 E	24 Apr 12 01:11 GMT
1255 (.5S)	1996m	00° 34.495 S	156° 00.060 E	24 Apr 12 19:31 GMT

All profiler missions begin 27 Apr 2012 @ 0000 GMT

Typical mooring:

