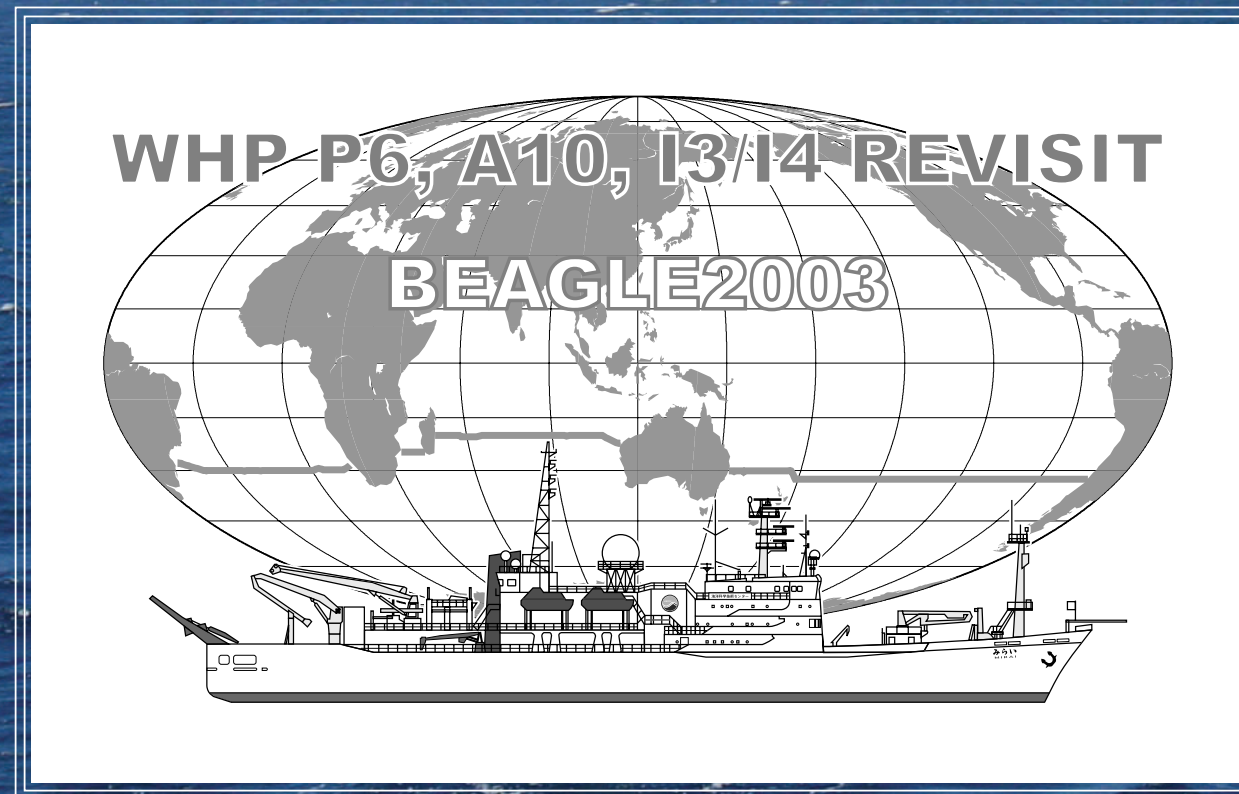


# WHP P6, A10, I3/I4 REVISIT DATA BOOK

Blue Earth Global Expedition 2003 (BEAGLE2003)

Volume 1





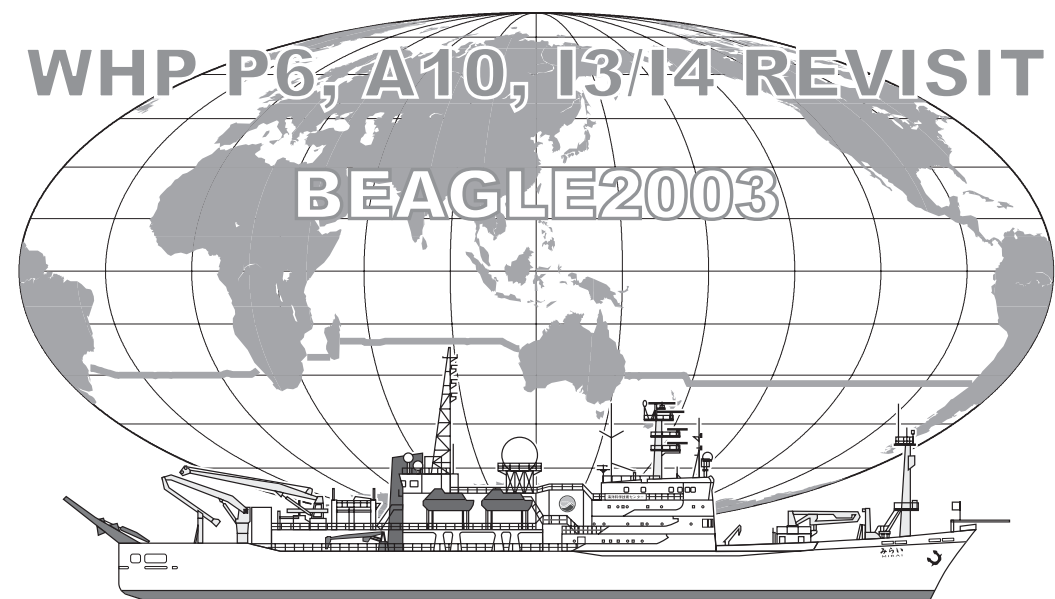
# WHP P6, A10, I3/I4 REVISIT DATA BOOK

Blue Earth Global Expedition 2003 (BEAGLE2003)

Volume 1



*Edited by*  
*Hiroshi Uchida (JAMSTEC),*  
*Masao Fukasawa (JAMSTEC)*



WHP P6, A10, I3/I4 REVISIT DATA BOOK

Blue Earth Global Expedition 2003 (BEAGLE2003)

Volume 1

10, March, 2005 Published

Edited by Hiroshi Uchida (JAMSTEC) and Masao Fukasawa (JAMSTEC)

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*Y. Sonoyama (MWJ), S. Tanaka (Hokkaido Univ.)*

*and S. Watanabe (JAMSTEC)*

#### *$\delta^{13}\text{C}$ and $\Delta^{14}\text{C}$ of Dissolved Inorganic Carbon*

*Y. Kumamoto (JAMSTEC)*

#### *Total Organic Carbon*

*M. Wakita, A. Murata (JAMSTEC) and H. Ogawa (ORI, Univ. of Tokyo)*

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*Figure caption*

*Observation lines*

*Station locations*

*Cross-sections*

*CFC-11*

*CFC-12*

*CFC113*

*$\Delta^{14}\text{C}$*

*$\delta^{13}\text{C}$*

*Total organic carbon*

Updated .sea files

*CD-ROM on the back cover*

(Volume 3 will be published in 2007.)



# Preface

*Dedicated to late Professor Yasunobu Matsuura from Sao Paulo University.*

Zonal WOCE Hydrographic Program lines (WHP lines) of P06, A10, and I05 are located in the southern hemisphere and well known that they compose the Scorpio line in the southern hemisphere. Ocean Observation Research Department of Japan Marine Science and Technology Center, which was reformed as Institute of Observational Research for Global Change of Japan Agency for Marine-Earth Science and Technology (JAMSTEC) in 2004, planned an ambitious scientific cruise to occupy all of these lines at a time in order to investigate the possible decadal changes in the Antarctic Overturn System. They had reached a puzzling observational fact that the bottom water temperature increased along P01 and P17N, which were located at the terminal regions of the global overturn system in the northern-end of the North Pacific, through collaborative WHP revisits with IOS, Canada. Same warming of the bottom water as this one was also found at each WHP cross-point between P03 (23.5N) and several meridional WHP lines. The warming rate was so large that the increase in the temperature of bottom water corresponded to 0.5 degree Celsius warming for one century of duration. It was natural, at least for us, to suspect some non-linear and abrupt changes was taking place in the Antarctic Overturn System in the southern hemisphere which could have propagated in the bottom water at much faster phase speed than the advection of water itself.

This plan of the hydrographic observation around the southern hemisphere, which might compare with the global cruise of Magellan, was named as Blue Earth Global Expedition 2003 (BEAGLE2003) and promoted by JAMSTEC as a commemorative action of 30's anniversary of its establishment and also supported by the Partnership for Observation of the Global Ocean (POGO) as a following-up of the Sao Paulo Declaration in POGO2001 that recommended the enhancement of the ocean observation and the capacity building in the southern hemisphere. Although, during the preparation for the cruise, the Indian sector I05 in the original plan was substituted to I4 and I3 in order to make the international collaboration of global hydrography more effective, JAMSTEC could invite more than 30 scientists and students from countries in the southern hemisphere as participants of BEAGLE2003 on the board of R/V Mirai. Also International Ocean Color Coordinating Group (IOCCG) dispatched eight trainees from various countries through POGO. The cruise was started on 3 August 2003 from Brisbane, Australia and finished 19 February 2004 at Fremantle, Australia. During BEAGLE2003, four

hundreds and ninety three (493) WOCE hydrographic stations were re-occupied, sixty Argo floats were launched and bottom cores were sampled at six stations.

This data book contains CTD data, bottle data and data from underway observations with their documentations along the circum southern hemispheric cruise track of BEAGLE2003. Also the bottom topography data measured by the multi narrow beam on R/V Mirai are included. At this stage, unfortunately, analyses of some radioactive carbon samples are not completed yet and they will be supplemented to this data book later. I heartily hope that BEAGLE2003 cruise will inspire young scientists with deep interests in the ocean science and that data from BEAGLE2003 will help ocean scientists to have better understanding of the ocean through this data book.

Finally, it should be noted here that BEAGLE2003 was supported by many people in the world. Without their supports, we could not work out this ambitious cruise. I would like to express my heartfelt thanks to all people who supported BEAGLE2003 though I do not name all of them here because they are so many. However, special thanks should be extended to Capt. Akamine from R/V Mirai with all crew members, Dr. Sathyendranath from POGO, Dr. Church from CSIRO, Dr. Stuardo from University of Concepcion, Dr. Weber from Sao Paulo University and Dr. Field from University of Cape Town because they were the first colleagues when we set sail into "the ocean of BEAGLE2003".

at Mutsu Institute of Oceanography, 2005 Spring

*BEAGLE2003 Chief Scientist*

*Masao Fukasawa*

*Ocean General Circulation Observational Research Program*

*Institute of Observational Research for Global Change*

*Japan Agency for Marine-Earth Science and Technology*

# 1 Cruise Narrative

## 1.1 Highlight

**WOCE Line Designation:** P6W, P6C, P6E, A10, I3 and I4

**Expedition Designation:** MR03-K04 Leg 1, Leg 2, Leg 4 and Leg 5

### Chief Scientists and Affiliation:

#### Masao Fukasawa (Leg 1 and 5)

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)  
2-15, Natsushima, Yokosuka, 237-0061, Japan  
Tel: +81-46-867-9470 Fax: +81-46-867-9455  
E-mail: fksw@jamstec.go.jp

#### Shuichi Watanabe (Leg 2)

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)  
690 Kitasekine, Sekine, Mutsu City, Aomori, 035-0022, Japan  
Tel: +81-175-45-1033 Fax: +81-175-45-1079  
E-mail: swata@jamstec.go.jp

#### Yasushi Yoshikawa (Leg 4)

Japan Agency for Marine-Earth Science and Technology (JAMSTEC)  
2-15, Natsushima, Yokosuka, 237-0061, Japan  
Tel: +81-46-867-9473 Fax: +81-46-867-9455  
E-mail: yoshikaway@jamstec.go.jp

**Ship:** R/V MIRAI

**Ports of Call:**

Leg 1	Brisbane, Australia – Papeete, Tahiti
Leg 2	Papeete, Tahiti – Valparaiso, Chile
Leg 4	Santos, Brazil – Cape Town, South Africa
Leg 5	Cape Town, South Africa – Tamatave, Madagascar – Port Louis, Mauritius – Fremantle, Australia

**Cruise Dates:**

Leg 1	August 3, 2003 – September 5, 2003
Leg 2	September 9, 2003 – October 16, 2003
Leg 4	November 6, 2003 – December 5, 2003
Leg 5	December 9, 2003 – January 24, 2004

**Number of Stations:**

Leg 1	121 CTD/Carousel Water Sampler
Leg 2	116 CTD/Carousel Water Sampler
Leg 4	111 CTD/Carousel Water Sampler
Leg 5	145 CTD/Carousel Water Sampler

**Geographic boundaries:**

Leg 1	153° 29.00' E - 144° 49.87' W 29° 59.72' S - 32° 31.77' S
Leg 2	149° 49.49' W to 71° 29.94' W 32° 10.17' S to 32° 40.43' S
Leg 4	47° 23.27' W to 15° 00.15' E 27° 43.90' S to 30° 13.21' S
Leg 5	35° 21.94' E to 113° 45.52' E 19° 58.06' S to 24° 40.29' S



**Floats and drifters deployed:**

Leg 1	10 Argo Floats
Leg 2	18 Argo Floats
Leg 4	21 Argo Floats
Leg 5	13 Argo Floats

**Mooring deployed or recovered mooring:** NONE

## 1.2 Cruise Summary

### (1) Geographic boundaries

MR03-K04 leg 1 occupied stations along 32°30' S from 153°29' E to 144°50' W. MR03-K04 leg 2 occupied stations along 32°30' S from 149°50' W to 71°30' W. Two stations, No. 125 and 127, were revisited to be compared with leg 1. MR03-K04 leg 4 occupied stations along 30° S from 47°23' W to 15°E. MR03-K04 leg 5a (Cape Town to Tamatave) occupied stations along 24°40' S from 35°22' E to 43°52' E. MR03-K04 leg 5b (Tamatave to Fremantle via Port Louise) occupied stations along 20°S from 48°55' E to 113°46' E.

### (2) Station occupied

A total of 493 stations were occupied using a Sea-Bird Electronics 36 bottle Carousel equipped with 36 12 liter Niskin X water sample bottles, a SBE911plus equipped with SBE35 deep ocean standards thermometer, SBE43 oxygen sensor, Seapoint sensors Inc. Chlorophyll Fluorometer (except for Leg.2) and Benthos Inc. Altimeter and RDI Workhorse Monitor ADCP. Cruise track and station location are shown in Fig. 1.2.1 to Fig. 1.2.5.

### (3) Sampling and measurements

Water samples were analyzed for salinity, oxygen, nutrients, CFC11,12, 113, total alkalinity, DIC and pH. The sampling layers in dbar were 10, 50, 100, 150, 200, 250, 300, 400, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3250, 3500, 3750, 4000, 4250, 4500, 4750, 5000, 5250, 5500, 5750 and bottom (minus 10 m). Sample for Ar, <sup>14</sup>C, <sup>13</sup>C, <sup>3</sup>He/<sup>4</sup>He, <sup>137</sup>Cs, Plutonium and <sup>3</sup>H, TOC were also collected. The bottle depth diagram is shown in Fig. 1.2.6. Measurements of autotrophic biomass (epifluorescence and chlorophyll a) by surface LV and bio-optical measurement (scatter and transfer) were made in the day time. Underway measurements of pCO<sub>2</sub>, temperature, salinity, oxygen, surface current, bathymetry and meteorological parameters were made along the cruise track.

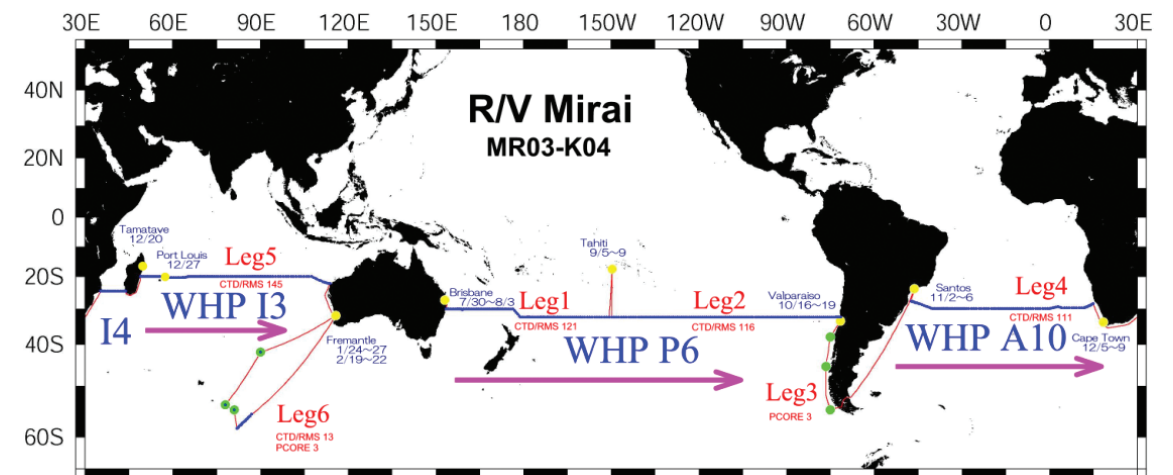


Figure 1.2.1. Cruise track.

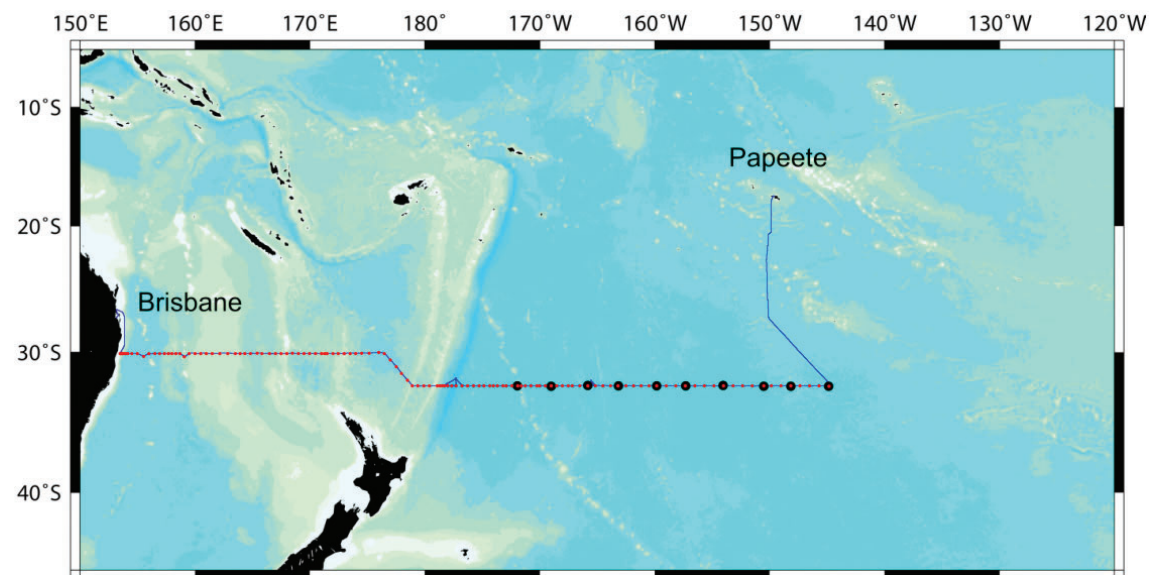


Figure 1.2.2. Station location of leg 1. Red dot and closed circle indicate CTD station and Argo float deployment position, respectively.

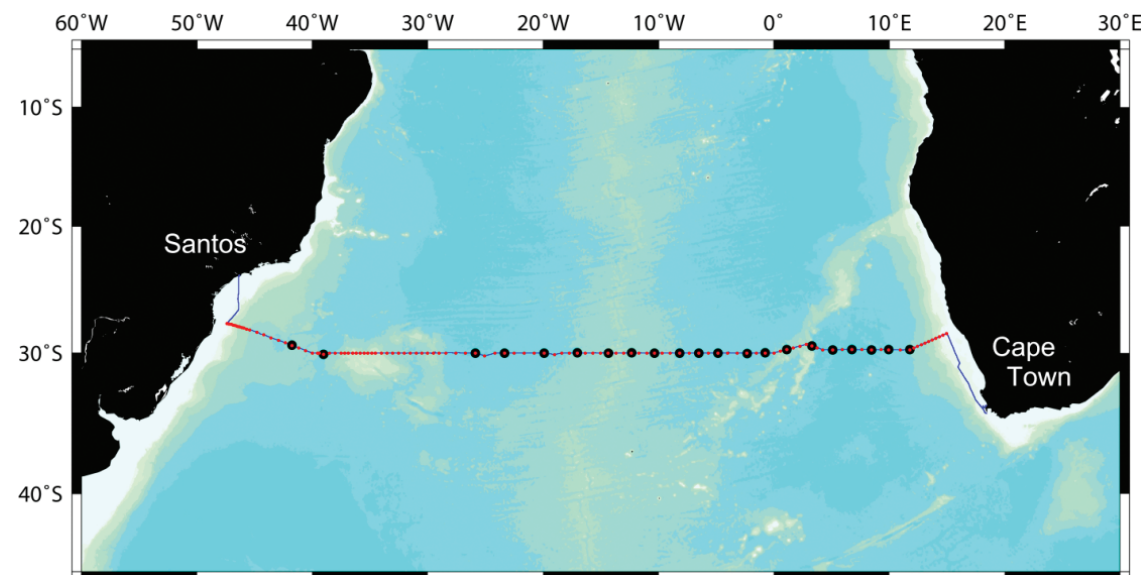


Figure 1.2.4. Same as Figure 1.2.2, but for leg 4.

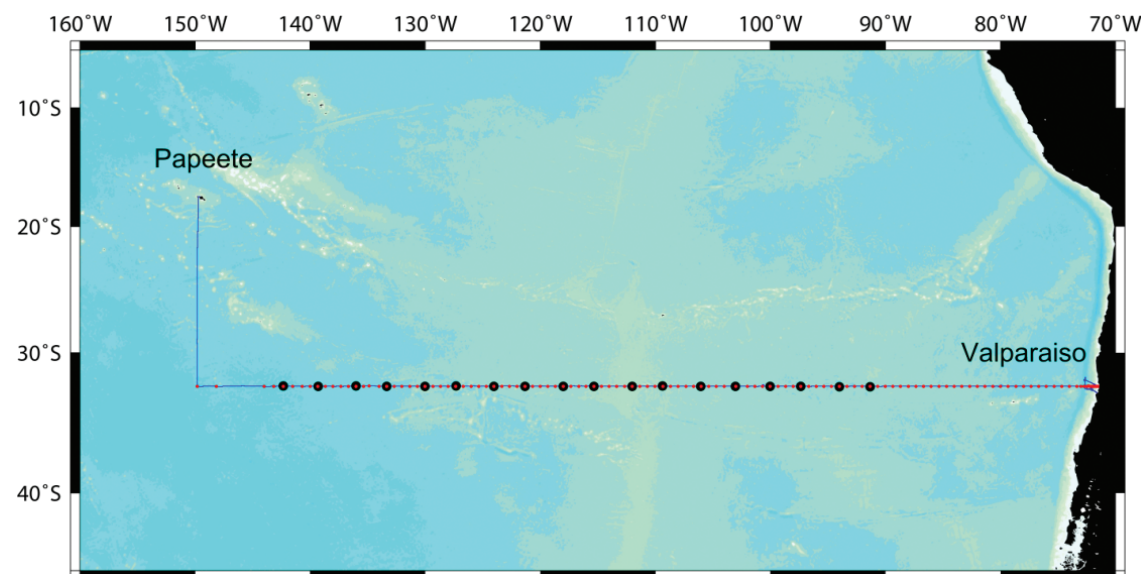


Figure 1.2.3. Same as Figure 1.2.2, but for leg 2.

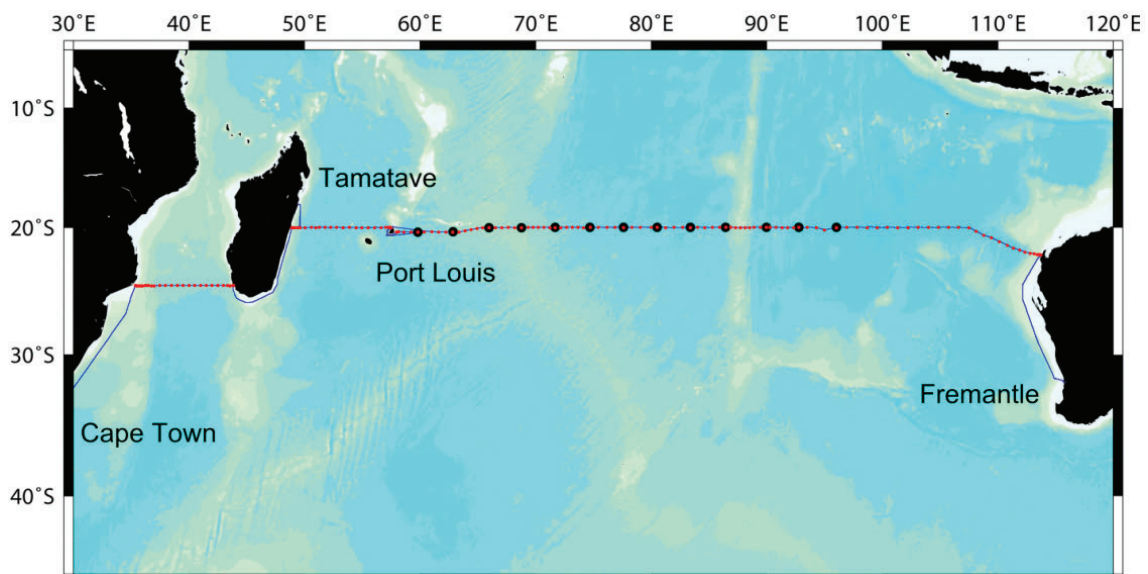


Figure 1.2.5. Same as Figure 1.2.2, but for leg 5.



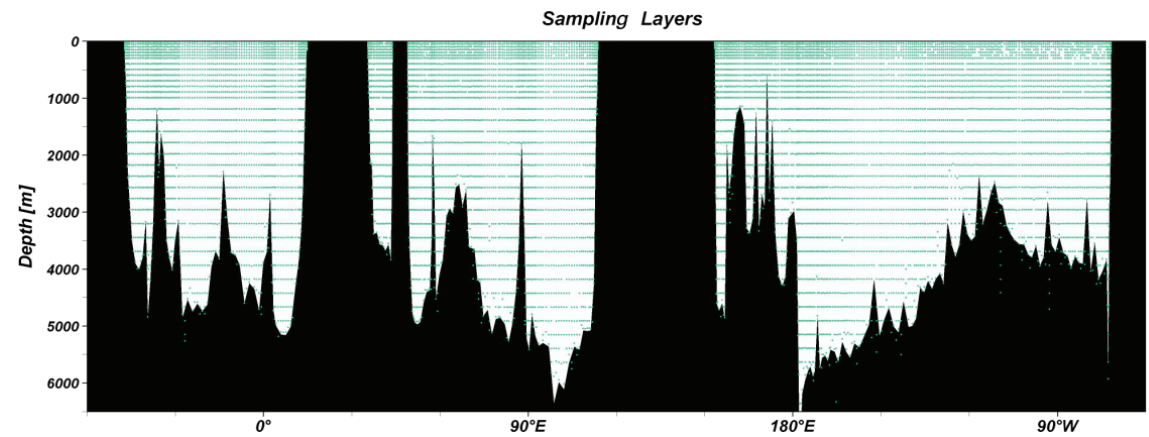


Figure 1.2.6. Bottle depth diagram.

#### (4) Floats and Drifters deployed

62 ARGO floats were launched along the cruise track as a joint research program among JAMSTEC (FORGC), Scripps Institute of Oceanography (SIO), Atlantic Oceanographic and Meteorological Laboratory (AOML) and the Southampton Oceanography Centre (SOC). The Launched positions of the ARGO floats are listed in Table.1.2.1.

Table 1.2.1. Launched positions of the ARGO floats.

Owner	Type	S/N	ARGOS PTT ID	Date and Time of Reset (UTC)	Date and Time of Launch (UTC)	Location of Launch
FORSGC	APEX	927	25184	19:36, Aug. 21	20:42, Aug. 21	32-30.74 S, 171-55.13 W
SIO	SOLO	2185	unknown	00:08, Jul. 31	09:56, Aug. 23	32-31.01 S, 168-59.49 W
FORSGC	APEX	928	25185	00:08, Jul. 31	18:24, Aug. 24	32-28.23 S, 165-48.00 W
SIO	SOLO	2199	unknown	00:08, Jul. 31	03:42, Aug. 27	32-29.45 S, 163-08.99 W
FORSGC	APEX	929	25186	07:22, Aug. 28	09:13, Aug. 28	32-30.21 S, 159-48.14 W

FORSGC	APEX	930	25187	03:21, Aug. 29	04:21, Aug. 29	32-30.38 S, 157-17.91 W
FORSGC	APEX	931	25263	02:58, Aug. 30	05:19, Aug. 30	32-28.46 S, 154-01.00 W
SIO	SOLO	2202	unknown	08:35, Jul. 31	09:02, Aug. 31	32-30.95 S, 150-30.71 W
FORSGC	APEX	932	25280	01:55, Sep. 01	03:25, Sep. 01	32-31.12 S, 148-08.70 W
SIO	SOLO	2203	unknown	00:11, Jul. 31	07:25, Sep. 02	32-31.12 S, 144-50.01 W
FORSGC	APEX	933	25284	06:45, Sep. 14	08:05, Sep. 14	32-28.94 S, 142-20.93 W
SIO	SOLO	2204	unknown	22:52, Jul. 30	09:18, Sep. 15	32-30.46 S, 139-17.46 W
FORSGC	APEX	934	25287	12:11, Sep. 16	13:25, Sep. 16	32-28.94 S, 136-00.61 W
SIO	SOLO	2205	unknown	22:55, Jul. 30	15:43, Sep. 17	32-29.30 S, 133-19.78 W
FORSGC	APEX	935	25288	19:40, Sep. 18	20:41, Sep. 18	32-29.19 S, 129-59.26 W
SIO	SOLO	2206	unknown	22:57, Jul. 30	18:32, Sep. 19	32-28.75 S, 127-19.00 W
FORSGC	APEX	936	25293	13:41, Sep. 21	14:53, Sep. 21	32-29.58 S, 124-00.23 W
SIO	SOLO	2207	unknown	22:59, Jul. 30	11:53, Sep. 22	32-29.87 S, 121-18.95 W
FORSGC	APEX	660	11478	14:10, Sep. 23	15:27, Sep. 23	32-30.42 S, 117-59.04 W
SIO	SOLO	2208	unknown	23:00, Jul. 30	13:18, Sep. 24	32-29.33 S, 115-19.56 W
FORSGC	APEX	938	25594	12:40, Sep. 25	14:00, Sep. 25	32-29.97 S, 111-59.55 W
SIO	SOLO	2209	unknown	23:02, Jul. 30	11:03, Sep. 26	32-28.79 S, 109-20.87 W
FORSGC	APEX	940	25596	16:57, Sep. 27	17:30, Sep. 27	32-29.46 S, 106-01.87 W
SIO	SOLO	2210	unknown	23:59, Jul. 30	16:20, Sep. 28	32-30.13 S, 103-00.53 W
FORSGC	APEX	939	25595	18:20, Sep. 30	20:06, Sep. 30	32-30.80 S, 100-00.49 W
SIO	SOLO	2211	unknown	00:02, Jul. 31	17:08, Oct. 01	32-30.67 S, 097-20.23 W
FORSGC	APEX	941	25597	18:27, Oct. 02	19:50, Oct. 02	32-30.93 S, 093-59.28 W
SIO	SOLO	2212	unknown	00:04, Jul. 31	16:50, Oct. 03	32-31.49 S, 091-18.75 W
AOML	SOLO	262	unknown	04:47, Nov. 10	06:24, Nov. 10	29-23.73 S, 041-44.59 W

AOML	SOLO	260	unknown	11:15, Nov. 11	12:32, Nov. 11	30-05.90 S, 039-01.21 W
AOML	SOLO	264	unknown	12:15, Nov. 17	13:46, Nov. 17	29-59.34 S, 025-51.76 W
AOML	SOLO	261	unknown	08:15, Nov. 18	09:44, Nov. 18	30-00.19 S, 023-18.64 W
AOML	SOLO	263	unknown	10:50, Nov. 19	12:03, Nov. 19	29-59.69 S, 019-53.28 W
AOML	SOLO	265	unknown	09:55, Nov. 20	11:22, Nov. 20	29-59.02 S, 017-01.38 W
SOC	APEX	865	unknown	06:35, Nov. 21	08:32, Nov. 21	29-59.55 S, 014-19.74 W
SOC	APEX	1190	unknown	21:48, Nov. 21	23:10, Nov. 21	29-58.61 S, 012-18.93 W
SOC	APEX	1191	unknown	13:26, Nov. 22	15:17, Nov. 22	29-59.65 S, 010-19.76 W
SOC	APEX	1192	unknown	07:02, Nov. 23	08:54, Nov. 23	29-59.62 S, 008-09.22 W
SOC	APEX	886	unknown	20:44, Nov. 23	21:52, Nov. 23	30-00.33 S, 006-28.91 W
SOC	APEX	1193	unknown	09:07, Nov. 24	10:27, Nov. 24	29-59.70 S, 004-48.50 W
SOC	APEX	1194	unknown	01:17, Nov. 26	02:39, Nov. 26	30-01.98 S, 002-18.17 W
SOC	APEX	1195	unknown	14:10, Nov. 26	15:13, Nov. 26	29-58.98 S, 000-43.56 W
SOC	APEX	1196	unknown	05:05, Nov. 27	06:51, Nov. 27	29-43.13 S, 001-08.20 E
SOC	APEX	887	unknown	01:47, Nov. 28	02:53, Nov.28	29-27.83 S, 003-19.07 E
SOC	APEX	1197	unknown	18:58, Nov. 28	20:17, Nov. 28	29-44.82 S, 005-07.75 E
SOC	APEX	1198	unknown	08:07, Nov. 29	09:30, Nov. 29	29-43.79 S, 006-47.35 E
SOC	APEX	1199	unknown	22:12, Nov. 29	23:30, Nov. 29	29-44.65 S, 008-29.14 E
SOC	APEX	1200	unknown	10:39, Nov. 30	12:42, Nov. 30	29-43.97 S, 009-58.78 E
SOC	APEX	1201	unknown	06:25, Dec. 01	07:46, Nov. 01	29-44.47 S, 011-47.97 E
FORSGC	APEX	1077	20647	00:21, Dec. 26	01:49, Dec. 26	20-22.87 S, 059-49.40 E
FORSGC	APEX	1078	20724	16:45, Dec. 28	17:47, Dec. 28	20-21.16 S, 062-51.36 E
FORSGC	APEX	1080	20773	18:42, Dec. 29	20:24, Dec. 29	19-59.85 S, 065-58.88 E
FORSGC	APEX	1079	20725	17:37, Dec. 30	18:48, Dec. 30	19-59.81 S, 068-47.65 E

FORSGC	APEX	1097	21997	20:16, Jan. 01	21:50, Jan. 01	19-58.97 S, 071-41.65 E
FORSGC	APEX	1098	22083	05:47, Jan. 03	06:15, Jan. 03	19-59.11 S, 074-43.92 E
FORSGC	APEX	1075	20590	07:39, Jan. 04	09:05, Jan. 04	19-59.74 S, 077-37.42 E
FORSGC	APEX	1076	20644	09:53, Jan. 05	11:18, Jan. 05	19-58.41 S, 080-32.71 E
FORSGC	APEX	1094	21341	12:04, Jan. 06	13:28, Jan. 06	19-59.53 S, 083-24.76 E
FORSGC	APEX	1073	20572	18:39, Jan. 07	20:00, Jan. 07	19-58.51 S, 086-28.15 E
FORSGC	APEX	947	26426	04:45, Jan. 10	06:20, Jan. 10	19-59.53 S, 089-59.70 E
FORSGC	APEX	946	26080	14:05, Jan. 11	15:58, Jan. 11	19-58.80 S, 092-48.40 E
FORSGC	APEX	1096	21561	18:35, Jan. 12	20:10, Jan. 12	19-59.36 S, 096-04.02 E

**(5) Moorings deployed or recovered**

No mooring was deployed nor recovered during the cruise.



### 1.3 List of Principal Investigator and Person in Charge on the Ship

The principal investigator (PI) and the person in charge responsible for the major parameters measured on the cruise are listed in Table 1.3.1.

Table 1.3.1. List of PI and person in charge.

Item	Principal Investigator(s)	Person in Charge
<b>Hydrography</b>		
CTDO	Hiroshi Uchida (JAMSTEC) <sup>1,5</sup> <i>huchida@jamstec.go.jp</i>	Mark Rosenberg (ACE CRC) <sup>1,4</sup> <i>mark.rosenberg@utas.edu.au</i>
	Masao Fukasawa (JAMSTEC) <sup>1,5</sup> <i>fksw@jamstec.go.jp</i>	Satoshi Ozawa (MWJ) <sup>1,4,5</sup> <i>satoshi@mwj.co.jp</i>
	Wolfgang Schneider (Univ. of Concepcion) <sup>4,5</sup> <i>wschneid@udec.cl</i>	Hiroshi Matsunaga (MWJ) <sup>2,5</sup> <i>matsunaga@mwj.co.jp</i>
LADCP	Yasushi Yoshikawa (JAMSTEC) <sup>1,5</sup> <i>yoshikaway@jamstec.go.jp</i>	Satoshi Ozawa (MWJ) <sup>1</sup> <i>satoshi@mwj.co.jp</i>
		Hiroshi Matsunaga (MWJ) <sup>2</sup> <i>matsunaga@mwj.co.jp</i>
		On Sugimoto (JAMSTEC) <sup>4</sup> Luiz Vianna Nonnato (Univ. of Sao Paulo) <sup>4</sup> <i>luiz@ceres.io.usp.br</i>
	Masao Fukasawa (JAMSTEC) <sup>5</sup> <i>fksw@jamstec.go.jp</i>	

XCTD

Tamaryn Morris (MCM)<sup>5</sup>  
*tmorris@mcm.wcape.gov.za*  
Masao Fukasawa (JAMSTEC)<sup>5</sup>  
*fksw@jamstec.go.jp*

Yasutaka Imai (GODI)<sup>5</sup>  
*imai@godi.co.jp*

Salinity

Takeshi Kawano (JAMSTEC)<sup>1,5</sup>  
*kawanot@jamstec.go.jp*

Naoko Takahashi (MWJ)<sup>1,4</sup>  
*takahashi@mwj.co.jp*  
Takeo Matsumoto (MWJ)<sup>2</sup>  
*takem@mwj.co.jp*

Ken-ichi Katayama (MWJ)<sup>5</sup>  
*katayama@mwj.co.jp*

Oxygen

Shuichi Watanabe (JAMSTEC)<sup>1,4</sup>  
*swata@jamstec.go.jp*  
Ayako Nishina (Kagoshima Univ.)<sup>5</sup>  
*nishina@fish.kagoshima-u.ac.jp*

Takayoshi Seike (MWJ)<sup>1,4,5</sup>  
*seike@mwj.co.jp*  
Tomoko Miyashita (MWJ)<sup>2,5</sup>  
*miyashita@mwj.co.jp*

Nutrients

Michio Aoyama (MRI/JMA)<sup>1,5</sup>  
*maoyama@mri-jma.go.jp*

Junko Hamanaka (MWJ)<sup>1,4</sup>  
*hamanaka@mwj.co.jp*  
Ken-ichiro Sato (MWJ)<sup>2,5</sup>  
*satok@mwj.co.jp*

TCO<sub>2</sub>

Akihiko Murata (JAMSTEC)<sup>1,5</sup>  
*akihiko.murata@jamstec.go.jp*

Minoru Kamata (MWJ)<sup>1,4</sup>  
*kamata@mwj.co.jp*  
Mikio Kitada (MWJ)<sup>2,5</sup>  
*kitada@mwj.co.jp*

Alkalinity

Akihiko Murata (JAMSTEC)<sup>1,5</sup>  
*akihiko.murata@jamstec.go.jp*

Fuyuki Shibata (MWJ)<sup>1,4</sup>  
*shibataf@mwj.co.jp*

		Taeko Ohama (MWJ) <sup>2,5</sup> <i>ohama@mwj.co.jp</i>			Mikio Kitada (MWJ) <sup>5</sup> <i>kitada@mwj.co.jp</i>
pH	Akihiko Murata (JAMSTEC) <sup>1-5</sup> <i>akihiko.murata@jamstec.go.jp</i>	Toru Fujiki (MWJ) <sup>1,4</sup> <i>fujiki@mwj.co.jp</i>	<sup>3</sup> He/ <sup>4</sup> He	Shuichi Watanabe (JAMSTEC) <sup>1,2,5</sup> <i>swata@jamstec.go.jp</i>	Yuichiro Kumamoto (JAMSTEC) <sup>1</sup> <i>kumamoto@jamstec.go.jp</i>
		Masaki Moro (MWJ) <sup>2</sup> <i>moro@mwj.co.jp</i>			Shuichi Watanabe (JAMSTEC) <sup>2</sup> <i>swata@jamstec.go.jp</i>
		Taeko Ohama (MWJ) <sup>5</sup> <i>ohama@mwj.co.jp</i>			Masahide Wakita (JAMSTEC) <sup>5</sup> <i>mwakita@jamstec.go.jp</i>
CFCs	Yutaka Watanabe (Hokkaido Univ.) <sup>1-5</sup> <i>yywata@ees.hokudai.ac.jp</i>	Ken-ichi Sasaki (JAMSTEC) <sup>1,4,5</sup> <i>ksasaki@jamstec.go.jp</i>	Cs,Pu, <sup>3</sup> H,Sr	Michio Aoyama (MRI/JMA) <sup>1-5</sup> <i>maoyama@mri-jma.go.jp</i>	Akira Takeuchi (KANSO) <sup>1,2</sup> <i>takeuti_akira@kanso.co.jp</i>
		Masahide Wakita (JAMSTEC) <sup>2</sup> <i>mwakita@jamstec.go.jp</i>			Sang-Han Lee (IAEA) <sup>4</sup> <i>S.Lee@iaea.org</i>
		Katsuhiko Sagishima (MWJ) <sup>4</sup> <i>ksagi@mwj.co.jp</i>			Beniamino Oregioni (IAEA) <sup>5</sup> <i>B.Oregioni@iaea.org</i>
		Yuichi Sonoyama (MWJ) <sup>5</sup> <i>sonoyama@mwj.co.jp</i>	Ar/N <sub>2</sub>	Yutaka Watanabe (Hokkaido Univ.) <sup>1-5</sup> <i>yywata@ees.hokudai.ac.jp</i>	Shin-ichi Tanaka (Hokkaido Univ.) <sup>1-5</sup> <i>shinichi@ees.hokudai.ac.jp</i>
Δ <sup>14</sup> C	Yuichiro Kumamoto (JAMSTEC) <sup>1-5</sup> <i>kumamoto@jamstec.go.jp</i>	Yuichiro Kumamoto (JAMSTEC) <sup>1,2</sup> <i>kumamoto@jamstec.go.jp</i>	N <sub>2</sub> O	Laura Farias (RP POC) <sup>2</sup> <i>lfarias@profc.udec.cl</i>	Mauricio Gallegos (RP POC) <sup>2</sup> <i>mauricio@profc.udec.cl</i>
		Akihiko Murata (JAMSTEC) <sup>4,5</sup> <i>akihiko.murata@jamstec.go.jp</i>	Primary	Brian Irwin (BIO) <sup>1</sup> <i>brian.Irwin@ns.sympatico.ca</i>	Brian Irwin (BIO) <sup>1</sup> <i>brian.Irwin@ns.sympatico.ca</i>
			Productivity		
TOC	Akihiko Murata (JAMSTEC) <sup>1-5</sup> <i>akihiko.murata@jamstec.go.jp</i>	Akihiko Murata (JAMSTEC) <sup>1,2</sup> <i>akihiko.murata@jamstec.go.jp</i>		Gadiel Alarcon (Univ. of Concepcion) <sup>2</sup> <i>gadiel@profc.udec.cl</i>	Gadiel Alarcon (Univ. of Concepcion) <sup>2</sup> <i>gadiel@profc.udec.cl</i>
		Minoru Kamata (MWJ) <sup>4</sup> <i>kamata@mwj.co.jp</i>		Vivian Lutz (INIDEP) <sup>4</sup> <i>vlutz@inidep.edu.ar</i>	Vivian Lutz (INIDEP) <sup>4</sup> <i>vlutz@inidep.edu.ar</i>

Chlorophyll-a	Prudence Bonham (CSIRO) <sup>5</sup> <i>Pru.Bonham@csiro.au</i>	Prudence Bonham (CSIRO) <sup>5</sup> <i>Pru.Bonham@csiro.au</i>	Meteorology	Kunio Yoneyama (JAMSTEC) <sup>1-5</sup> <i>yoneyamak@jamstec.go.jp</i>	Sou-ichiro Sueyoshi (GODI) <sup>1,4</sup> <i>sueyoshi@godi.co.jp</i>	
	Brian Irwin (BIO) <sup>1</sup> <i>brian.Irwin@ns.sympatico.ca</i>	Brian Irwin (BIO) <sup>1</sup> <i>brian.Irwin@ns.sympatico.ca</i>		Satoshi Okumura (GODI) <sup>2</sup> <i>okumura@godi.co.jp</i>		
	Gadiel Alarcon (Univ. of Concepcion) <sup>2</sup> <i>gadiel@prof.c.udec.cl</i>	Gadiel Alarcon (Univ. of Concepcion) <sup>2</sup> <i>gadiel@prof.c.udec.cl</i>		Yasutaka Imai (GODI) <sup>5</sup> <i>imai@godi.co.jp</i>		
	Vivian Lutz (INIDEP) <sup>4</sup> <i>vlutz@inidep.edu.ar</i>	Vivian Lutz (INIDEP) <sup>4</sup> <i>vlutz@inidep.edu.ar</i>		Thermosalinograph	Takeshi Kawano (JAMSTEC) <sup>1</sup> <i>kawanot@jamstec.go.jp</i>	Takayoshi Seike (MWJ) <sup>1,4</sup> <i>seike@mwj.co.jp</i>
	Prudence Bonham (CSIRO) <sup>5</sup> <i>Pru.Bonham@csiro.au</i>	Prudence Bonham (CSIRO) <sup>5</sup> <i>Pru.Bonham@csiro.au</i>		Masao Fukasawa (JAMSTEC) <sup>2,4,5</sup> <i>fksw@jamstec.go.jp</i>	Tomoko Miyashita (MWJ) <sup>2,5</sup> <i>miyashita@mwj.co.jp</i>	
<b>Underway</b>			pCO <sub>2</sub>	Akihiko Murata (JAMSTEC) <sup>1-5</sup> <i>akihiko.murata@jamstec.go.jp</i>	Minoru Kamata (MWJ) <sup>1,4</sup> <i>kamata@mwj.co.jp</i>	
	ADCP	Yasushi Yoshikawa (JAMSTEC) <sup>1-5</sup> <i>yoshikaway@jamstec.go.jp</i>	Sou-ichiro Sueyoshi (GODI) <sup>1,4</sup> <i>sueyoshi@godi.co.jp</i>		Mikio Kitada (MWJ) <sup>2,5</sup> <i>kitada@mwj.co.jp</i>	
		Satoshi Okumura (GODI) <sup>2</sup> <i>okumura@godi.co.jp</i>	Fluorescence	Brian Irwin (BIO) <sup>1</sup> <i>brian.Irwin@ns.sympatico.ca</i>	Takayoshi Seike (MWJ) <sup>1</sup> <i>seike@mwj.co.jp</i>	
Bathymetry		Yasutaka Imai (GODI) <sup>5</sup> <i>imai@godi.co.jp</i>		Gadiel Alarcon (Univ. of Concepcion) <sup>2</sup> <i>gadiel@prof.c.udec.cl</i>	Tomoko Miyashita (MWJ) <sup>2</sup> <i>miyashita@mwj.co.jp</i>	
		Toshiya Fujiwara (JAMSTEC) <sup>1-5</sup> <i>toshi@jamstec.go.jp</i>	Sou-ichiro Sueyoshi (GODI) <sup>1,4</sup> <i>sueyoshi@godi.co.jp</i>	pN <sub>2</sub> O	Laura Farias (RP POC) <sup>2</sup> <i>lfarias@prof.c.udec.cl</i>	Mauricio Gallegos (RP POC) <sup>2</sup> <i>mauricio@prof.c.udec.cl</i>
		Satoshi Okumura (GODI) <sup>2</sup> <i>okumura@godi.co.jp</i>				
		Yasutaka Imai (GODI) <sup>5</sup> <i>imai@godi.co.jp</i>	<b>Floats, Drifters</b>			
			Argo float	Kensuke Takeuchi (JAMSTEC) <sup>1-5</sup> <i>takeuchi@fish-u.ac.jp</i>	Tomoyuki Takamori (MWJ) <sup>1,5</sup> <i>takamori@mwj.co.jp</i>	

Dean Roemmich (SIO) <sup>1-5</sup>

*droemmich@ucsd.edu*

Masao Fukasawa (JAMSTEC) <sup>1,2,5</sup>

*fksw@jamstec.go.jp*

Takeo Matsumoto (MWJ) <sup>2</sup>

*takem@mwj.co.jp*

Miki Yoshiike (MWJ) <sup>4</sup>

Yasushi Yoshikawa (JAMSTEC) <sup>4</sup>

*yoshikaway@jamstec.go.jp*

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ACE CRC: Antarctic Climate and Ecosystems Cooperative Research Centre, Australia

BIO: Bedford Institute of Oceanography, Canada

CSIRO: Commonwealth Scientific and Industrial Research Organisation, Australia

GODI: Global Ocean Development Inc.

IAEA: International Atomic Energy Agency

INIDEP: Instituto Nacional de Investigacion y Desarrollo Pesquero, Argentina

JAMSTEC: Japan Marine Science and Technology Center

KANSO: Kansai Environmental Engineering Center Co., Ltd.

MCM: Marine and Coastal Management, South Africa

MRI/JMA: Meteorological Research Institute, Japan Meteorological Agency

MWJ: Marine Works Japan, Ltd.

RP POC: Regional Program of Physical Oceanographic and Climate,

University of Concepcion, Chile

SIO: Scripps Institution of Oceanography, U.S.A.



## 1.4 Scientific Program and Methods

### (1) Nature and objectives of MR03-K04 cruise project

It has been a decade since WOCE (World Ocean Circulation Experiment under WCRP) Hydrographic Program (WHP) was carried out in the world ocean. Not only accurate hydrographic sections but also mass transports and their divergence/convergence have been clarified on a basin scale. On the other hand, skills of measurements, especially those for carbon and CFC parameters, have been developed remarkably since the WOCE period. Thus, repeated land-to-land hydrography is recommended by CLIVAR and JGOFS strongly. At the same time, the repeated hydrography or WHP revisit is desirable to investigate long term changes in inventories of heat, water mass, materials and their transports; in fact, revisit of a WHP line in the North Pacific found a bottom water warming, which can be attributed to changes in the water column in the southern ocean. The magnitude of the warming was significant along its path way although very small.

Ocean Observation and Research Department of JAMSTEC plans to revisit WHP lines in the Southern Hemisphere as one of research actions of their project TAV-PI (Transport And Variability in the Pacific and the Indian) to detect long term changes in the hydrographic structure and the Antarctic overturn by surveying WHP lines in the Pacific, the Atlantic and the Indian at one cruise. This southern hemispheric circum navigation was highlighted at POGO-3 (December, 2001) as a following-up of the Sao Paulo Declaration of POGO-2 (January, 2001) that encourages and promotes both oceanographic studies and scientific capacity building in the southern hemisphere.

The main purpose of this research cruise is to detect and quantify temporal changes in the Antarctic overturn System corresponding to the global ocean and the Southern Ocean warming during the last decade through high quality and spatially dense observation along old WHP (WOCE Hydrographic Program: 1991-2002) lines. Scientific priorities, which lead to the above interest, are (1) changes in inventories of heat and freshwater, (2) changes in production rate, mass and pathway, (3) carbon and nutrients transport, (4) data base for model validation, and (5) ARGO sensor calibration.

The other purposes of this cruise are (1) to observe surface meteorological and hydrological parameters as a basic dataset of the meteorology and oceanography, (2) to launch ARGO floats in order to monitor the changes of sub-surface temperature and salinity, (3) to observe global warming gas distribution, (4) to observe sea bottom topography, gravity and magnetic fields along the cruise track in order to understand the dynamics of ocean plate and the accompanying geophysical activities, (5) to obtain data on global distribution and optical characteristics of aerosols and clouds for the climatology and for study of the feasibility of the satellite observations, (6) to construct a model to predict a primary production from satellite observation and (7) to observe concentration of cloud droplets for verification of satellite observation.

### (2) Cruise overview

MR03-K04 cruise was carried out during the period from August 3, 2003 to February 19, 2004. The cruise was realized by the cooperation of Australia (CSIRO,ACE-CRC), Chile, Brazil, South Africa, IOCCG, Argo Science Team (Scripps, AOML, SOC) and IAEA. The cruise contained six legs. Legs 1, 2, 4 and 5 were revisit of WOCE Hydrographic Program sections P6W, P6C, P6E, A10, I4 and I3. A total of 493 stations were set to agree with the 1990s WOCE hydrographic observation stations. At each station, full-depth CTD profile and up to 36 water samples were taken and analyzed. Water samples were obtained from fixed layers with 12-liter Niskin bottles attached to 36-position SBE carousel water sampler. The layers were 10, 50, 100, 150, 200, 150, 200, 250, 300, 400, 500, 600, 700, 800, 900, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000, 3250, 3500, 3750, 4000, 4250, 4500, 4750, 5000, 5250, 5500, 5750 dbar and about 10 dbar above the bottom. Scientists from various institutions and technicians from Marine Works Japan Ltd. (MWJ) were responsible for analyzing water sample for salinity, dissolved oxygen, nutrients, CFCs, total carbon contents, alkalinity and pH. They also contributed sampling for total organic carbon, radiocarbon and He. A student of Hokkaido University joined CFCs measurement. We accepted 18 POGO trainees from Indonesia, Sri Lanka, Argentina, Chile, Turkey, Peru, Colombia, Uruguay, Brazil, Namibia, Tanzania and South Africa. POGO group mainly analyzed Chlorophyll-a contents and bioactivity in seawater. Twelve scientists from Chile, Brazil, Namibia, South Africa,

Kenya, Mozambique, Madagascar and Mauritius were invited to the cruise. A part of Chilean group brought pN<sub>2</sub>O system and collected seawater samples for N<sub>2</sub>O analysis. Technicians from Global Ocean Development Inc. (GODI) have responsibility on a part of underway measurements such as current velocity by Acoustic Doppler Current Profiler (ADCP), geological parameters (topography, geo-magnetic field and gravity), and meteorological parameters. Sixty-two ARGO floats prepared by JAMSTEC, Scripps Institute of Oceanography (SIO), Atlantic Oceanographic and Meteorological Laboratory (AOML) and the Southampton Oceanography Centre (SOC) were launched by MWJ technicians and ship crew.

### **(3) Cruise narrative**

R/V Mirai departed Brisbane, (Australia) on August 3, 2003. She arrived at the first station on the same day and made a cast for 93m. Although the depth was so shallow to trip only three bottles for analysis, we tripped additional 33 bottles to drill the method of sample drawing into all watchstanders. We made a cast at station P06-121 on September 2, 2003 and then went to Papeete, Tahiti. We observed 121 stations during leg 1 along approximately 32°30'S, which is WHP P06E and a half of P06C. She arrived at Papeete on September 5 and left on September 9, 2003 for the hydrographic section. She arrived at the first station, P06-127, on September 12, 2003. Although the station was observed once during leg 1, we observed the station again to confirm the continuity. P06-125 was also observed again for the same purpose. We made a cast at station P06-4 on 12 October, 2003 and then headed to Valparaiso, Chile. We observed 116 stations (excluding two doubled stations) along approximately 32°30'S, which corresponds to the rest half of P06C and P06W. R/V Mirai left Valparaiso on October 19, 2003 for Santos, Brazil. She went through Magellan Strait and arrived at Santos on November 2, 2003. She left Santos on November 6, 2003 for Cape Town, South Africa. The first station of the leg 4 was A10-622 and observed on November 7, 2003. We observed 111 stations along approximately 32°S, which corresponds to WHP A10. We observed the last station of leg 4, A10-100 on December 2, 2003 and arrived at Cape Town on December 5, 2003. She left Cape Town on December 9, 2003 and called at Tamatave, Madagascar on December 20 and Port Louise, Mauritius on December 27 on her way to Fremantle, Australia. The navigation

along approximately 24°40' S from Cape Town to Tamatave is called leg 5a and corresponds to WHP I4. The navigation along approximately 20°S from Tamatave to Fremantle is called leg 5b and corresponds to WHP I3. We observed 145 stations during leg 5 and arrived at Fremantle, Australia on January 24, 2004.

## **1.5 Major Problems and Goals not Achieved**

Fluorometer attached to CTD was broken at Station P06-166. We replaced it with new one from leg 4. So fluorescence was not measured after P06-166 and during leg 2.

Since an instrument for CFCs did not work during leg 1 and a half of leg 2, CFCs were measured at selected layers during this period.

## 1.6 List of Participants

The members of the scientific party are listed in Table 1.6.1 to 1.6.5 along with their main tasks undertaken on the cruise.

Table 1.6.1. List of cruise participants in leg 1.

Name	Main tasks	Affiliation
A. Albertino	Sampling	Bogor Agricultural University
E. Barberi	Sampling	Estacion de Fotobiologia Playa Union
T. Fujiki	TCO <sub>2</sub>	MWJ
M. Fujisaki	CTD	MWJ
M. Fukasawa	LADCP, Thermosalinograph, ARGO	JAMSTEC
J. Hamanaka	Nutrients	MWJ
Y. Iribe	Sampling	MWJ
B. Irwin	Bio-Optics	BIO
M. Kamata	TCO <sub>2</sub>	MWJ
T. Kawano	Salinity	JAMSTEC
A. Kubo	Nutrients	MWJ
Y. Kumamoto	Oxygen, <sup>14</sup> C	JAMSTEC
K. Maeno	ADCP, Bathymetry, Meteorology	GODI
A. Murata	pH, Alkalinity, TCO <sub>2</sub> , pCO <sub>2</sub> , TOC	JAMSTEC
T. Nishihashi	Sampling	MWJ
S. Okumura	ADCP, Bathymetry, Meteorology	GODI
Y. Oyama	Sampling	MWJ
S. Ozawa	CTD	MWJ
M. Rosenberg	CTD Data Processing	ACE CRC
K. Sagishima	CFC	MWJ

K. Sasaki	CFC	JAMSTEC
T. Seike	Oxygen	MWJ
F. Shibata	pH, Alkalinity	MWJ
A. Shioya	Sampling	MWJ
S. Sueyoshi	ADCP, Bathymetry, Meteorology	GODI
N. Takahashi	Salinity	MWJ
T. Takamori	CTD Operation	MWJ
A. Takeuchi	Radio Nuclides	KANSO
S. Tanaka	Ar, N <sub>2</sub> , CFC	Hokkaido University
T. Tanaka	Sampling, Salinity	MWJ
A. Wada	Sampling, CFC	MWJ
M. Wakita	CFC	JAMSTEC
K. Wataki	CFC	MWJ
H. Yamazaki	Sampling	MWJ
I. Yamazaki	Oxygen	MWJ
K. Yapa	Sampling	Univ. of Ruhuna, Matara, Sri Lanka
S. Yokogawa	Nutrients	MWJ
M. Yokota	Sampling, CFC	MWJ
Y. Yoshikawa	ADCP, LADCP	JAMSTEC

ACE CRC: Antarctic Climate and Ecosystems Cooperative Research Centre, Australia

BIO: Bedford Institute of Oceanography, Canada

GODI: Global Ocean Development Inc.

JAMSTEC: Japan Marine Science and Technology Center

KANSO: Kansai Environmental Engineering Center Co., Ltd.

MWJ: Marine Works Japan, Ltd.

Table 1.6.2. List of cruise participants in leg 2.

Name	Main tasks	Affiliation
G. Alarcon	Bio-Optics	Univ. of Concepcion
T. Chihara	Sampling	MWJ
R. Fuenzalida	Sampling	Univ. of Concepcion
M. Fukasawa	Data Management, LADCP	JAMSTEC
K. Katayama	ARGO, Salinity	MWJ
R. Kimura	ADCP, Bathymetry, Meteorology	GODI
M. Kitada	DIC, pCO <sub>2</sub>	MWJ
N. Komai	Oxygen	MWJ
Y. Kumamoto	Oxygen, <sup>14</sup> C, Sampling	JAMSTEC
D.B. Matellini	Bio-Optics	Peruvian Marine Research Institute
K. Matsumoto	Sampling	MWJ
T. Matsumoto	Salinity	MWJ
H. Matsunaga	CTD	MWJ
A.G. Mejia	Bio-Optics	Univ. of Concepcion
T. Miyashita	Thermosalinograph, Oxygen	MWJ
M. Moro	TCO <sub>2</sub>	MWJ
S.G. Munoz	Observer (Chile)	Armada de Chile
A. Murata	Alkalinity, pH	JAMSTEC
S. Okumura	ADCP, Bathymetry, Meteorology	GODI
Y. Otsubo	Nutrients	MWJ
S. Sancak	Bio-Optics	Middle East Technical University
W. Schneider	CTD	Univ. of Concepcion
T. Ohama	Alkalinity, pH	MWJ
K. Sato	Nutrients	MWJ
Y. Sonoyama	CFC	MWJ
O. Sugimoto	Sampling	JAMSTEC

M. Gallegos	Nitrous Oxide	RP POC
A. Takeuchi	Radio Nuclides	KANSO
S. Tanaka	CFC, Ar, N <sub>2</sub>	Hokkaido University
W. Tokunaga	ADCP, Bathymetry, Meteorology	GODI
H. Uchida	CTD	JAMSTEC
V. Villagran	Elec. Engineer	Univ. of Concepcion
M. Wakita	CFC	JAMSTEC
S. Watanabe	CFC, <sup>3</sup> He/ <sup>4</sup> He	JAMSTEC
T. Watanabe	Sampling	MWJ
Hideki Yamamoto	Data Management, LADCP, CFC	MWJ
Hirofumi Yamamoto	Sampling	JAMSTEC
A. Yasuda	Nutrients	MWJ
M. Yoshiike	ARGO, CTD	MWJ

Armada de Chile: Servicio Hidrografico y Oceanografico de la Armada de Chile

GODI: Global Ocean Development Inc.

JAMSTEC: Japan Marine Science and Technology Center

KANSO: Kansai Environmental Engineering Center Co., Ltd.

MWJ: Marine Works Japan, Ltd.

RP POC: Regional Program of Physical Oceanographic and Climate



Table 1.6.3. List of cruise participants in leg 4.

Name	Main tasks	Affiliation
E. Braga	Oxygen	Univ. of Sao Paulo
A. Claudia	Sampling, Bio-Optics	Univ. of Sao Paulo
B. Currie	Sampling	MFMR
T. Fujiki	TCO <sub>2</sub>	MWJ
J. Hamanaka	Nutrients	MWJ
J. Hashimoto	CTD Operation	MWJ
S. Ikeda	Sampling	MWJ
M. Kamata	TCO <sub>2</sub>	MWJ
T. Kawano	Salinity	JAMSTEC
A. Kubo	Nutrients	MWJ
S. Lee	Radio Nuclides	IAEA
V. Lutz	Bio-Optics	INIDEP
J. Madruga	Sampling, Bio-Optics	Univ. of Sao Paulo
K. Maeno	ADCP, Bathymetry, Meteorology	GODI
K. Matsumoto	Oxygen, Sampling	JAMSTEC
A. Murata	pH, Alkalinity, TOC, <sup>14</sup> C	JAMSTEC
L. Nonnato	LADCP, Sampling	Univ. of Sao Paulo
S. Okumura	ADCP, Bathymetry, Meteorology	GODI
S. Ozawa	CTD	MWJ
K. Peard	Sampling	LMR
M. Rosenberg	CTD, Data Processing	ACE CRC
K. Sagishima	CFC	MWJ
K. Sasaki	CFC	JAMSTEC
S. Sasaki	Sampling	MWJ
V. Segura	Sampling, Bio-Optics	INIDEP
T. Seike	Oxygen	MWJ

W. Schneider	CTD	Univ. of Concepcion
F. Shibata	pH, Alkalinity	MWJ
N. Silulwane	Sampling	MCM
S. Sueyoshi	ADCP, Bathymetry, Meteorology	GODI
O. Sugimoto	Sampling	JAMSTEC
N. Takahashi	Salinity	MWJ
S. Tanaka	CFC, Ar, N <sub>2</sub>	Hokkaido Univ.
H. Uchida	LADCP	JAMSTEC
K. Wataki	CFC	MWJ
S. Watanabe	CFC, <sup>3</sup> He/ <sup>4</sup> He	JAMSTEC
S. Yokogawa	Nutrients	MWJ
I. Yamazaki	Oxygen	MWJ
M. Yokota	Sampling	MWJ
M. Yoshiike	CTD Operation, ARGO	MWJ
Y. Yoshikawa	LADCP	JAMSTEC

ACE CRC:	Antarctic Climate and Ecosystems Cooperative Research Centre, Australia
GODI:	Global Ocean Development Inc.
IAEA:	International Atomic Energy Agency
INIDEP:	Instituto Nacional de Investigacion y Desarrollo Pesquero, Argentina
JAMSTEC:	Japan Marine Science and Technology Center
LMR:	Luederitz Marine Research, Namibia
MCM:	Marine and Coastal Management, South Africa
MFMR:	Ministry of Fisheries and Marine Resources, Namibia
MWJ:	Marine Works Japan, Ltd.

Table 1.6.4. List of cruise participants in leg 5a.

Name	Main tasks	Affiliation
J. Bemiasa	Sampling	IHSM
P. Bonham	Bio-Optics	CSIRO
L. Bravo	Sampling	Univ. of Concepcion
A. Forbes	LADCP	CSIRO
T. Fujiki	TCO <sub>2</sub>	MWJ
M. Fukasawa	LADCP, ARGO, Thermosalinograph	JAMSTEC
J. Githaiga-Mwicigi	Sampling	MCM
A. Hogue	Sampling	Univ. of Eduardo Mondlane
Y. Imai	ADCP, Bathymetry, Meteorology, XCTD	GODI
K. Katayama	Salinity	MWJ
T. Kawano	Salinity	JAMSTEC
M. Kawazoe	Sampling	MWJ
M. Kitada	TCO <sub>2</sub> , TOC	MWJ
T. Kurokawa	Sampling	MWJ
M. Kyewalyanga	Sampling, Bio-Optics	Univ. of Dar es Salaam
K. Matsumoto	Sampling	MWJ
H. Matsunaga	CTD	MWJ
T. Miyashita	Oxygen, Thermosalinograph	MWJ
T. Morris	Sampling	MCM
A. Murata	pH, Alkalinity, pCO <sub>2</sub> , TOC, <sup>14</sup> C	JAMSTEC
Y. Naito	Sampling	MWJ
A. Nishina	CTD, Oxygen	Kagoshima University
T. Ohama	pH, Alkalinity	MWJ
S. Okumura	ADCP, Bathymetry, Meteorology, XCTD	GODI
B. Oregioni	Radio Nuclides	IAEA
S. Ozawa	CTD	MWJ
S. Persand	Sampling	Mauritius Oceanography Institute
T. Sagara	Sampling	MWJ
K. Sasaki	CFC	JAMSTEC
K. Sato	Nutrients	MWJ
W. Schneider	CTD	Univ. of Concepcion
T. Seike	Oxygen, Thermosalinograph	MWJ
Y. Sonoyama	CFC	MWJ
T. Takamori	CTD Operation, ARGO	MWJ
S. Tanaka	CFC, Ar, N <sub>2</sub>	Hokkaido University
W. Tokunaga	ADCP, Bathymetry, Meteorology, XCTD	GODI
M. Wakita	CFC, <sup>3</sup> He/ <sup>4</sup> He	JAMSTEC
T. Watanabe	Salinity	MWJ
B. Wigly	Sampling, Bio-Optics	Univ. of Cape Town
Hideki Yamamoto	LADCP	MWJ
Hirofumi Yamamoto	Sampling	JAMSTEC
A. Yasuda	Nutrients	MWJ
S. Yokogawa	Nutrients	MWJ

CSIRO:	Commonwealth Scientific and Industrial Research Organisation
GODI:	Global Ocean Development Inc.
IAEA:	International Atomic Energy Agency
IHSM:	Institut Halieutique et des Sciences Marines
JAMSTEC:	Japan Marine Science and Technology Center
MCM:	Marine and Coastal Management, South Africa
MWJ:	Marine Works Japan, Ltd.

Table 1.6.5. List of cruise participants in leg 5b.

Name	Main tasks	Affiliation			
P. Bonham	Bio-Optics	CSIRO	K. Sato	Nutrients	MWJ
L. Bravo	Sampling	Univ. of Concepcion	W. Schneider	CTD	Univ. of Concepcion
A. Forbes	Bio-Optics	CSIRO	A. Shioya	Sampling	MWJ
M. Fukasawa	LADCP, ARGO, Thermosalinograph	JAMSTEC	Y. Sonoyama	CFC	MWJ
J. Gasutaud	Radio Nuclides	IAEA	T. Takamori	CTD Operation, ARGO	MWJ
Y. Imai	ADCP, Bathymetry, Meteorology, XCTD	GODI	S. Tanaka	CFC, Ar, N <sub>2</sub>	Hokkaido University
K. Katayama	Salinity	MWJ	W. Tokunaga	ADCP, Bathymetry, Meteorology, XCTD	GODI
T. Kawano	Salinity	JAMSTEC	H. Uno	CTD	MWJ
M. Kawazoe	Sampling	MWJ	A. Wada	Sampling	MWJ
R. Kimura	ADCP, Bathymetry, Meteorology, XCTD	GODI	M. Wakita	CFC, <sup>3</sup> He/ <sup>4</sup> He	JAMSTEC
M. Kitada	TCO <sub>2</sub> , TOC	MWJ	T. Watanabe	Salinity	MWJ
N. Komai	Oxygen, Thermosalinograph	MWJ	Hideki Yamamoto	LADCP	MWJ
A. Kubo	Nutrients	MWJ	Hirofumi Yamamoto	Sampling	JAMSTEC
T. Kurokawa	Sampling	MWJ	A. Yasuda	Nutrients	MWJ
M. Kyewalyanga	Sampling, Bio-Optics	Univ. of Dar es Salaam	A. Yenluk	Sampling	Mauritius Oceanography Institute
K. Matsumoto	Sampling	MWJ			
H. Matsunaga	CTD	MWJ	CSIRO:	Commonwealth Scientific and Industrial Research Organisation	
T. Miyashita	Oxygen, Thermosalinograph	MWJ	GODI:	Global Ocean Development Inc.	
M. Moro	TCO <sub>2</sub> , TOC	MWJ	IAEA:	International Atomic Energy Agency	
A. Murata	pH, Alkalinity, pCO <sub>2</sub> , TOC, <sup>14</sup> C	JAMSTEC	JAMSTEC:	Japan Marine Science and Technology Center	
Y. Naito	Sampling	MWJ	MWJ:	Marine Works Japan, Ltd.	
A. Nishina	CTD, Oxygen	Kagoshima University			
T. Ohama	pH, Alkalinity	MWJ			
Y. Okamoto	Sampling	MWJ			
T. Sagara	Sampling	MWJ			
K. Sasaki	CFC	JAMSTEC			

## 2 Underway Measurements

### 2.1 Navigation and Bathymetry

28 February 2005

#### (1) Personnel

Souichiro Sueyoshi (GODI)

Satoshi Okumura (GODI)

Yasutaka Imai (GODI)

Katsuhisa Maeno (GODI)

Shinya Okumura (GODI)

Wataru Tokunaga (GODI)

Ryo Kimura (GODI)

Toshiya Fujiwara (JAMSTEC)

#### (2) Navigation

##### (2.1) Overview of the equipment

Ship's position was measured by navigation system, made by Sena Co. Ltd, Japan. The system has two 12-channel GPS receivers (Leica MX9400N). GPS antennas located at Navigation deck, offset to starboard and portside, respectively. We switched them to choose better state of receiving when the number of GPS satellites decreased or HDOP increased. But the system sometimes lost the position while the receiving status became worse. The system also integrates gyro heading (Tokimec TG-6000), log speed (Furuno DS-30) and other navigation devices data on HP workstation. The workstation keeps accurate time using GPS Time server (Datum Tymserv2100) via NTP (Network Time Protocol). Navigation data was recorded as "SOJ" data every 60 seconds.

The differential GPS (DGPS) system, *THALES Geosolutions* SkyFix, has also installed, but we had few chances to use this system because it needs reference stations within 2,000 km from the ship, so that differential

corrections became available just before the end of this cruise. Two antennas for Leica GPS receiver located on the navigation deck, offset to starboard and portside, respectively. We switched them to choose better state of receiving when the number of satellites decreased or HDOP increased. But the system sometimes lost the position while the receiving status became worse.

##### (2.2) Data period

Leg 1: 01:00, 3 Aug. 2003 to 22:00, 5 Sep. 2003

Leg 2: 18:30, 9 Sep. 2003 to 12:08, 16 Oct. 2003

Leg 4: 11:20, 6 Nov. 2003 to 07:10, 5 Dec. 2003

Leg 5: 04:22, 9 Dec. 2003 to 00:52, 24 Jan. 2004

##### (2.3) Remarks

###### Leg 1

None

###### Leg 2

26 Sep. 2003 11:27 – 11:29 (GPS positioning error)

27 Sep. 2003 07:10 – 07:22 (GPS positioning error)

\* GPS system was changed at 07:22, 27 Sep. 2003, from GPS1 to GPS2.

28 Sep. 2003 11:25 – 11:30 (GPS positioning error)

03 Oct. 2003 08:09 – 08:13 (GPS positioning error)

03 Oct. 2003 09:22 – 09:27 (GPS positioning error)

03 Oct. 2003 13:03 – 13:18 (GPS positioning error)

04 Oct. 2003 12:16 – 12:21 (GPS positioning error)

09 Oct. 2003 12:01 – 12:04 (GPS positioning error)

11 Oct. 2003 11:56 – 11:58 (GPS positioning error)



\* GPS system was changed at 15:50, 11 Oct. 2003, from GPS2 to DGPS1

\* GPS system was changed at 17:58, 11 Oct. 2003, from DGPS1 to GPS2.

#### Leg 4

\* GPS system was changed at 10:24, 06 Nov. 2003, from GPS1 to DGPS2

\* GPS system was changed at 19:36, 06 Nov. 2003, from DGPS2 to GPS1

\* GPS system was changed at 16:17, 07 Nov. 2003, from GPS1 to DGPS2

\* GPS system was changed at 16:29, 08 Nov. 2003, from DGPS2 to GPS1

09 Nov. 2003 13:15 – 13:27 (SOJ logging program trouble)

10 Nov. 2003 10:35 – 10:37 (SOJ logging program trouble)

11 Nov. 2003 10:11 – 12:41 (GPS positioning error)

\* GPS system was changed at 12:42, 11 Nov. 2003, from GPS1 to GPS2

\* GPS system was changed at 14:59, 23 Nov. 2003, from GPS2 to GPS1

23 Nov. 2003 22:29 – 22:40 (GPS positioning error)

\* GPS system was changed at 22:51, 23 Nov. 2003, from GPS1 to GPS2

24 Nov. 2003 15:34 – 16:13 (Power failure)

\* GPS system was changed at 17:25, 24 Nov. 2003, from GPS2 to GPSN

26 Nov. 2003 15:05 (GPS positioning error)

\* GPS system was changed at 14:29, 27 Nov. 2003, from GPS2 to DGPS1

\* GPS system was changed at 15:23, 27 Nov. 2003, DGPS1 to GPS2

#### Leg 5

21 Dec. 2003 13:16 – 13:46 (Network server trouble)

01 Jan. 2004 21:15 – 21:19 (GPS positioning error)

### (3) Bathymetry

#### (3.1) Overview of the equipment

R/V MIRAI equipped a Multi Narrow Beam Echo Sounding system (MNBES), SEABEAM 2112.004 (SeaBeam Instruments Inc.). The main objective of MNBES survey is collecting continuous bathymetry data along ship's track to make a contribution to geological and geophysical investigations and global datasets. Data interval along ship's track was max. 16 seconds at 6,000 m. To get accurate sound velocity of water column for ray-path correction of acoustic multibeam, we used Surface Sound Velocimeter (SSV) data at the surface (6.2m), and sound velocity profiles calculated from temperature and salinity data obtained from the nearest CTD cast by the equation of Mackenzie (1981).

#### (3.2) System configuration and performance

System:	SEABEAM2112.004
Frequency:	12 kHz
Transmit beam width:	2 degree
Transmit power:	20 kW
Transmit pulse length:	3 to 20 msec.
Depth range:	100 to 11,000 m
Beam spacing:	1 degree athwart ship
Swath width:	150 degree (max.)
	120 degree to 4,500 m
	100 degree to 6,000 m
	90 degree to 11,000 m
Depth accuracy:	Within < 0.5% of depth or +/-1m, whichever is greater, over the entire swath.

(Nadir beam has greater accuracy; typically within  $< 0.2\%$   
of depth or  $\pm 1\text{m}$ , whichever is greater)

### (3.3) Data period

We carried out bathymetric survey on the CTD observation lines during each leg.

Leg 1: 3 Aug. 2003 (P06\_246) to 2 Sep. 2003 (P06\_121)

Leg 2: 12 Sep. 2003 (P06\_127) to 12 Oct. 2003 (P06\_004)

Leg 4: 7 Nov. 2003 (A10\_622) to 2 Dec. 2003 (A10\_100)

Leg 5: 13 Dec. 2003 (I04\_610) to 17 Dec. 2003 (I04\_585)

19 Dec. 2003 (I03\_562) to 20 Jan. 2004 (I03\_444)

### (3.4) Data processing

#### (3.4.1) Checking the navigation data

Navigation data is checked and removed outliers identified. Then the removed position data is interpolated.

#### (3.4.2) Sound velocity correction

The continuous bathymetry data is split into small area at the center of the adjoining CTD stations. For each small area, the bathymetry data is corrected using sound velocity profile calculated by the CTD data in the area. The equation of Mackenzie (1981) is used for the calculation of sound velocity in sea water. These data processing are carried out using “mbbath” module of the mbsystem.

#### (3.4.3) Gridding

The data editing and gridding are carried out using the HIPS software version 5.4 (CARIS, Canada). Firstly, low quality data during the CTD cast and the drift of the ship are removed. Secondly, the data is despiked by the function “Surface Cleaning” of the software using following parameters.

Tiling: by size (Minimum size of tile: 163.84 [m])

Degree of polynomial: 1 (tiled plane)

Cleaning

Shallow threshold: 3.000, sigma = 99.74 [%]

Deep threshold: 3.000, sigma = 99.74 [%]

Minimum residual required for rejection: 1.000 [m]

Thirdly, remaining error data are removed manually and normal data, which removed by the function “Surface Cleaning” are returned manually by the function “Swath Editor” and “Subset Editor” of the software. Finally, the data is gridded by the function “Interpolate” of the software using following parameters.

Matrix size: 5 x 5

Number of nearneighbors: 10

### Reference

Mackenzie, K.V. (1981): Nine-term equation for the sound speed in the oceans, J. Acoust. Soc. Am., 70 (3), pp 807-812.

## 2.2 Surface Meteorological Observation

1 February 2005

### (1) Personnel

Kunio Yoneyama (JAMSTEC)

Satoshi Okumura (GODI)

Souichiro Sueyoshi (GODI)

Yasutaka Imai (GODI)

Shinya Okumura (GODI)

Katsuhisa Maeno (GODI)

Wataru Tokunaga (GODI)

Norio Nagahama (GODI)

Ryo Kimura (GODI)

### (2) Objective

As a basic dataset that describes weather conditions during the cruise, surface meteorological observation had been continuously conducted.

### (3) Methods

There are two different surface meteorological observation systems on the R/V MIRAI. One is the MIRAI surface meteorological measurement station (SMET), and the other is the Shipboard Oceanographic and Atmospheric Radiation (SOAR) system.

Instruments of SMET whose data are used here are listed in Table 2.2.1. All SMET data were collected and processed by KOAC-7800 weather data processor made by Koshin Denki, Japan. Note that although SMET contains rain gauge, anemometer and radiometers in their system, we adopted those data from not SMET but

SOAR due to the following reasons. Namely, 1) since SMET rain gauge is located near the base of the mast, there is a possibility that its capture rate might be affected, 2) SOAR's anemometer has better starting threshold wind speed (1 m/sec) comparing to SMET's anemometer (2 m/sec), and 3) SMET's radiometers record data with 10 W/m<sup>2</sup> unit, while SOAR takes 1 W/m<sup>2</sup> unit.

SOAR system was designed and constructed by the Brookhaven National Laboratory (BNL), USA for an accurate measurement of solar radiation on the ship. Details of SOAR can be found at <http://www.gim.bnl.gov/soar/>. SOAR consists of 1) Portable Radiation Package (PRP) that measures short and long wave downwelling radiation, 2) Zeno meteorological system that measures pressure, air temperature, relative humidity, wind speed/direction, and rainfall, and 3) Scientific Computer System (SCS), that is developed by the National Oceanic and Atmospheric Administration (NOAA) of USA for data collection, management, real-time monitoring, and so on. Information on sensors used here are listed in Table 2.2.2.

Table 2.2.1. Instruments and locations of SMET.

Sensor	Parameter	Manufacturer / type	Location / height from sea level
Thermometer <sup>*1</sup>	air temperature relative humidity	Vaisala, Finland / HMP45A	compass deck <sup>*2</sup> / 21 m
Thermometer	sea temperature	Koshin Denki, Japan / RFN1-0	4th deck / -5 m
Barometer	pressure	Yokogawa, Japan / F-451	captain deck / 13 m

<sup>\*1</sup> Gill aspirated radiation shield 43408 made by R. M. Young, USA is attached.

<sup>\*2</sup> There are two thermometers at starboard and port sides.

Table 2.2.2. Instruments and locations of SOAR.

Sensor	Parameter	Manufacturer / type	Location / height from sea level
Anemometer	wind speed/direction	R. M. Young, USA / 05106	foremast / 25 m
Rain gauge	rainfall accumulation	R. M. Young, USA / 50202	foremast / 24 m
Radiometer	short wave radiation	Eppley, USA / PSP	foremast / 25 m
	long wave radiation	Eppley, USA / PIR	foremast / 25 m

#### (4) Data processing and data format

All raw data were recorded every 6 seconds. Datasets produced here are 1-minute mean values (time stamp at the beginning of the average). They are simple mean of 8 samples (10 samples minus maximum/minimum values) to exclude singular values. Linear interpolation onto missing values was applied only when their interval is less than 4 minutes.

Since the thermometers are equipped on both starboard/port sides on the deck, we used air temperature/relative humidity (and dew point temperature) data taken at upwind side. Dew point temperature was produced from relative humidity and air temperature data.

No adjustment to sea level values is applied except pressure data.

Data are stored as ASCII format and contain the following parameters.

Time in UTC expressed as YYYYMMDDHHMM, time in Julian day (1.0000 = January 1, 0000Z), longitude (°E), latitude (°N), pressure (hPa), air temperature (°C), dew point temperature (°C), relative humidity (%), sea surface temperature (°C), zonal wind component (m/sec), meridional wind component (m/sec), precipitation (mm/hr), downwelling shortwave radiation ( $W/m^2$ ), and downwelling longwave radiation ( $W/m^2$ ).

Missing values are expressed as “9999”.

#### (5) Data Quality

To ensure the data quality, each sensor was calibrated as follows. It is remarked, however, since there is a possibility that fine time resolution data sets may have some noises caused by turbulence, it is recommended to create smoothed data sets (e.g., 1-hour mean) from this 1-minute mean data sets depending on the scientific purpose.

T/RH sensor:

Temperature and humidity probes were calibrated before/after the cruise by the manufacturer. Certificated accuracy for T/RH sensors are better than  $\pm 0.2$  °C and  $\pm 2$  %, respectively. In addition, their time drifts between the leg 1 and the leg 5 were 0.0 °C for T sensor and -1.3 % for RH sensor.

We also checked T/RH values using another calibrated portable T/RH sensor (Vaisala, HMP45A) before each cruise. The results are listed below.

Check date	Jul.31	Sep.06	Oct.17	Nov.03	Dec.05	Jan.24
Temperature (°C)						
SMET	12.1	28.2	19.2	21.9	28.3	22.6
portable	12.4	28.3	19.4	21.8	28.8	22.3
Relative Humidity (%)						
SMET	42	66	52	57	41	65
portable	38	65	51	56	41	66

Pressure sensor:

Using calibrated portable barometer (Vaisala, Finland / PTB220, certificated accuracy is better than  $\pm 0.1$  hPa, and it was calibrated at the manufacturer on Feb. 6, 2003), pressure sensor was checked before/after the each cruise. From the result listed below, pressure accuracy is better than  $\pm 1$  hPa.



Check date	Aug.02	Sep.02	Oct.17	Nov.03	Dec.05	Jan.24
SMET	1023.3	1014.1	1015.3	1017.0	1009.4	1008.1
reference	1022.6	1013.6	1014.6	1016.4	1008.8	1007.5
difference	0.7	0.5	0.7	0.6	0.6	0.6

Anemometer:

Using digital tester (Hioki, Japan / 3805), pre-/post calibration were conducted by the GODI technical staff.

Pre-calibration date:	Apr. 09, 2003											
Starting threshold wind speed:	0.2 m/sec for clockwise 0.4 m/sec for counter-clockwise											
Wind direction check	better than $\pm 3^\circ$											
Set value	0	30	60	90	120	150	180	210	240	270	300	330
Measured value	1	32	63	93	122	153	180	210	240	270	300	331
Difference	-1	-2	-3	-3	-2	-3	0	0	0	0	0	-1

Post-calibration date:	Sep. 10, 2004											
Starting threshold wind speed:	0.9 m/sec for clockwise 0.9 m/sec for counter-clockwise											
Wind direction check:	better than $\pm 4^\circ$											
Set value	0	30	60	90	120	150	180	210	240	270	300	330
Measured value	0	30	61	92	122	153	182	212	242	273	304	334
Difference	0	0	-1	-2	-2	-2	-2	-2	-2	-3	-4	-4

Precipitation:

Before each cruise, we put the water into the rain gauge to check their linearity between the indicated

values and water amount input. Expected accuracy is better than  $\pm 1$  mm that corresponds to sensor's specification.

Calibration date	Jul. 30	Sep. 05	Oct. 16	Nov. 04	Dec. 05	Jan. 24
minimum input water volume (cc)	0.0	0.0	0.0	0.0	0.0	0.0
minimum measured value (mm)	1.0	0.9	0.8	0.9	0.9	0.1
maximum input water volume (cc)	513.7	511.0	512.3	511.7	513.0	511.7
maximum measured value (mm)	51.7	51.2	51.7	51.4	51.2	50.7

Radiation sensors:

Short wave and long wave radiometers were calibrated at the Brookhaven National Laboratory prior to the cruise. Sensors used here were calibrated in September 2002. Some results are shown below.

For PSP:  $y = 3.875x + 0.2$

For PIR:  $y = 1.228x + 5.7$ , where  $y = \text{insolation (W/m}^2\text{)}$ , and  $x = \text{ADC value (mV)}$ .

$1 / (T + T_0) = p_1 a^3 + p_2 a^2 + p_3 a + p_4$ , where  $a = \ln(\text{ADC mV})$ , and  $T_0 = 273.15 \text{ K}$

Case temperature fit: max error = 0.004 °C

$p_1 = 3.0922\text{e-}6, p_2 = -3.7240\text{e-}5, p_3 = 4.3175\text{e-}4, p_4 = 1.7014\text{e-}3$

Dome temperature fit: max error = 0.004 °C

$p_1 = 2.9703\text{e-}6, p_2 = -3.6790\text{e-}5, p_3 = 4.3686\text{e-}4, p_4 = 1.6788\text{e-}3$

(6) Data periods

Leg 1 (Brisbane - Papeete): 2100Z, Aug.03, 2003 - 0700Z, Sep.02, 2003

Periods of missing values:

wind speed / direction 0002Z, Aug.16, 2003 - 0010Z, Aug.16, 2003

precipitation 0002Z, Aug.16, 2003 - 0010Z, Aug.16, 2003

short/long wave radiation	0002Z, Aug.16, 2003 - 0010Z, Aug.16, 2003 2152Z, Aug.20, 2003 - 0020Z, Aug.21, 2003
Leg 2 (Papeete - Valparaiso):	0600Z, Sep.12, 2003 - 1100Z, Oct.16, 2003
Periods of missing values:	
wind speed / direction	0001Z, Sep.23, 2003 - 0012Z, Sep.23, 2003 0816Z, Oct.12, 2003 - 0821Z, Oct.12, 2003
precipitation	0001Z, Sep.23, 2003 - 0012Z, Sep.23, 2003 0816Z, Oct.12, 2003 - 0821Z, Oct.12, 2003
short / long wave radiation	0001Z, Sep.23, 2003 - 0011Z, Sep.23, 2003 0816Z, Oct.12, 2003 - 0825Z, Oct.12, 2003
Leg 4 (Santos - Cape Town):	0000Z, Nov.09, 2003 - 0000Z, Dec.05, 2003
Periods of missing values:	
wind speed / direction	1534Z, Nov.24, 2003 - 1538Z, Nov.24, 2003 1544Z, Nov.24, 2003 - 1558Z, Nov.24, 2003
short wave radiation	1548Z, Nov.09, 2003 - 1552Z, Nov.09, 2003 1411Z, Nov.19, 2003 - 1417Z, Nov.19, 2003 1427Z, Nov.19, 2003 - 1431Z, Nov.19, 2003
Leg 5 (Cape Town - Tamatave - Fremantle):	0600Z, Dec.09, 2003 - 2100Z, Jan.23, 2004
Periods of missing values:	
sea surface temperature	0601Z, Jan.21, 2004 - 2100Z, Jan.23, 2004
wind	0008Z, Dec.24, 2003 - 0013Z, Dec.24, 2003
precipitation	0008Z, Dec.24, 2003 - 0013Z, Dec.24, 2003

short wave radiation	1201Z, Dec.09, 2003 - 1214Z, Dec.09, 2003 1029Z, Dec.15, 2003 - 1048Z, Dec.15, 2003 1022Z, Dec.17, 2003 - 1030Z, Dec.17, 2003 0953Z, Dec.22, 2003 - 0957Z, Dec.22, 2003 0933Z, Dec.23, 2003 - 0941Z, Dec.23, 2003 0008Z, Dec.24, 2003 - 0013Z, Dec.24, 2003 0804Z, Jan.03, 2004 - 0822Z, Jan.03, 2004 0726Z, Jan.06, 2004 - 0734Z, Jan.06, 2004 0743Z, Jan.06, 2004 - 0751Z, Jan.06, 2004 0720Z, Jan.07, 2004 - 0725Z, Jan.07, 2004 0741Z, Jan.07, 2004 - 0746Z, Jan.07, 2004 0419Z, Jan.15, 2004 - 0419Z, Jan.15, 2004
long wave radiation	0008Z, Dec.24, 2003 - 0013Z, Dec.24, 2003

#### (7) Preliminary results

Figures 2.2.1, 2.2.2, 2.2.3, and 2.2.4 show the time series of surface meteorological observation for each cruise. One hour mean values (time stamp at the medium of the average) instead of 1 minute mean are used to depict these figures.

#### (8) Point of contact

Kunio Yoneyama (yoneyamak@jamstec.go.jp)

JAMSTEC / IORGC, 2-15, Natsushima, Yokosuka 237-0061, Japan

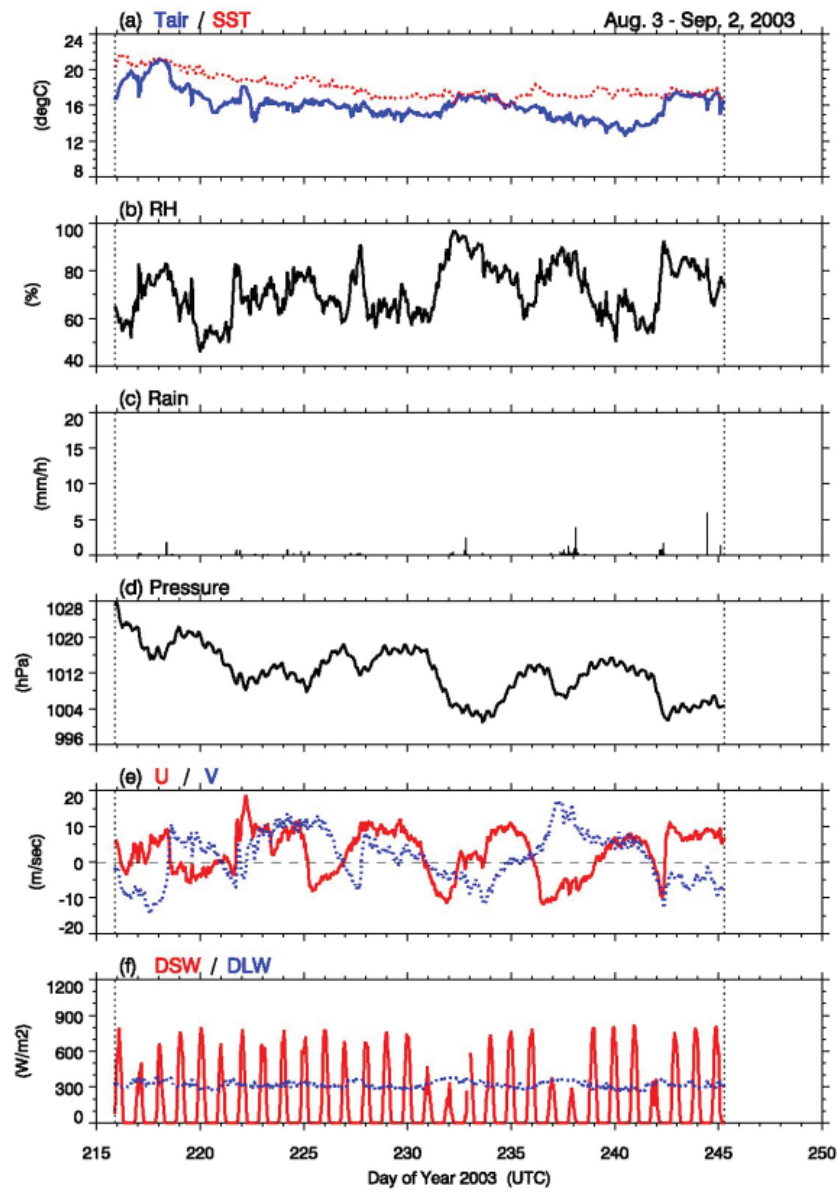


Figure 2.2.1. Time series of (a) air and sea surface temperature, (b) relative humidity, (c) precipitation, (d) pressure, (e) zonal and meridional wind components, and (e) short and long wave radiation for the leg 1 cruise. Day216 corresponds to Aug. 3, 2003.

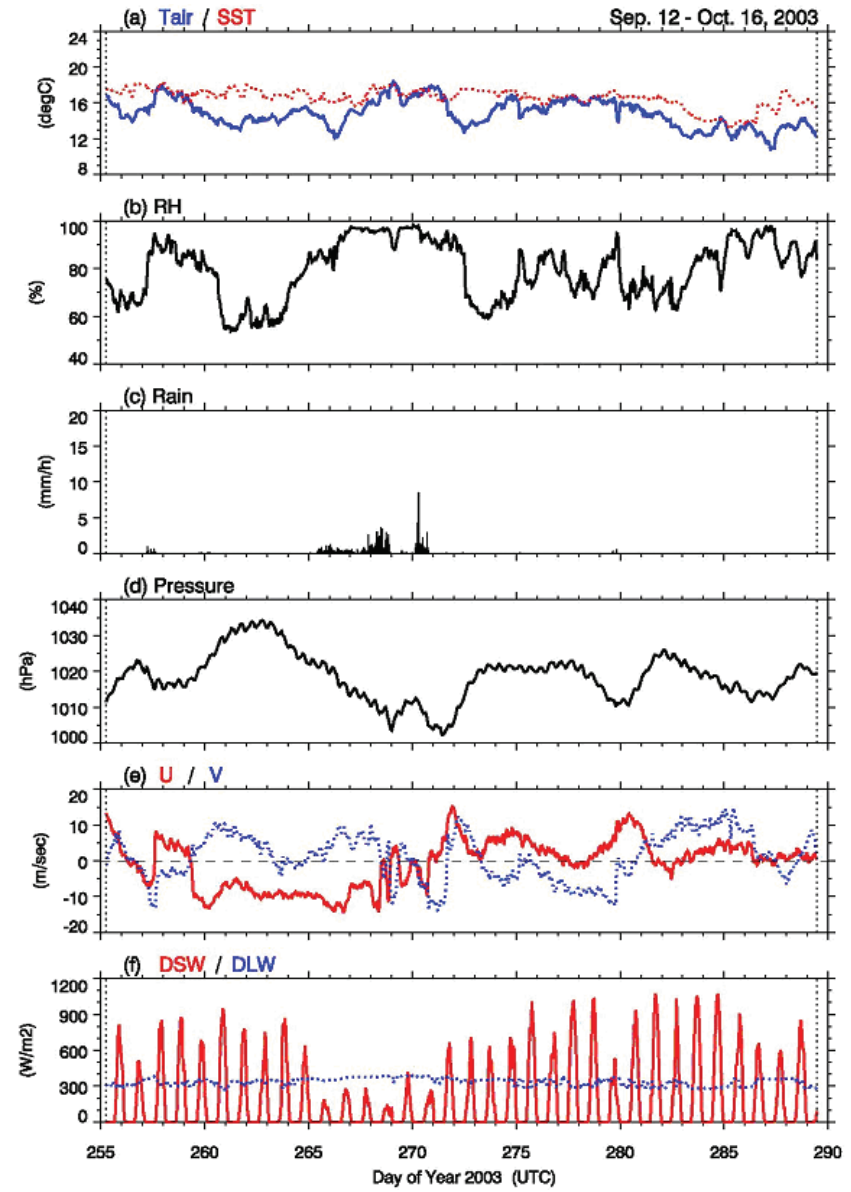


Figure 2.2.2. Same as Figure 2.2.1, but for the leg 2 cruise. Day255 corresponds to Sep. 12, 2003.

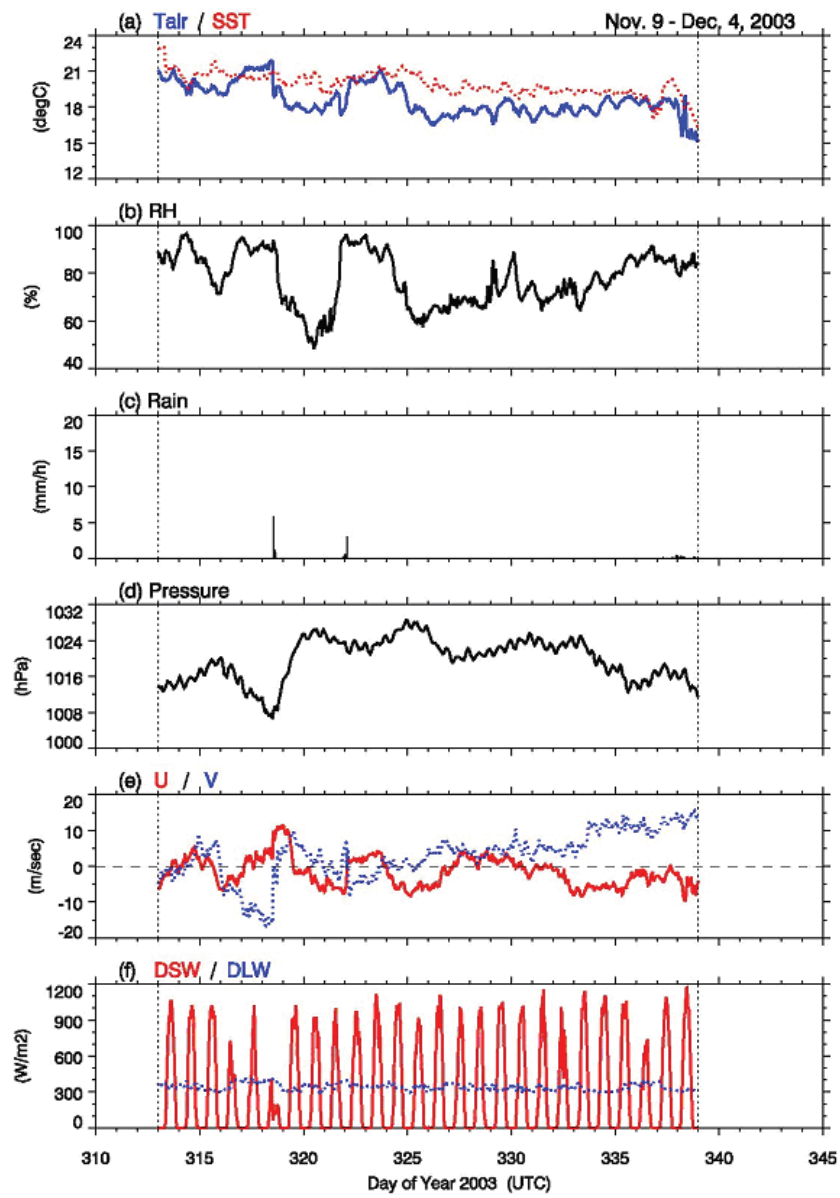


Figure 2.2.3. Same as Figure 2.2.1, but for the leg 4 cruise. Day313 corresponds to Nov. 9, 2003.

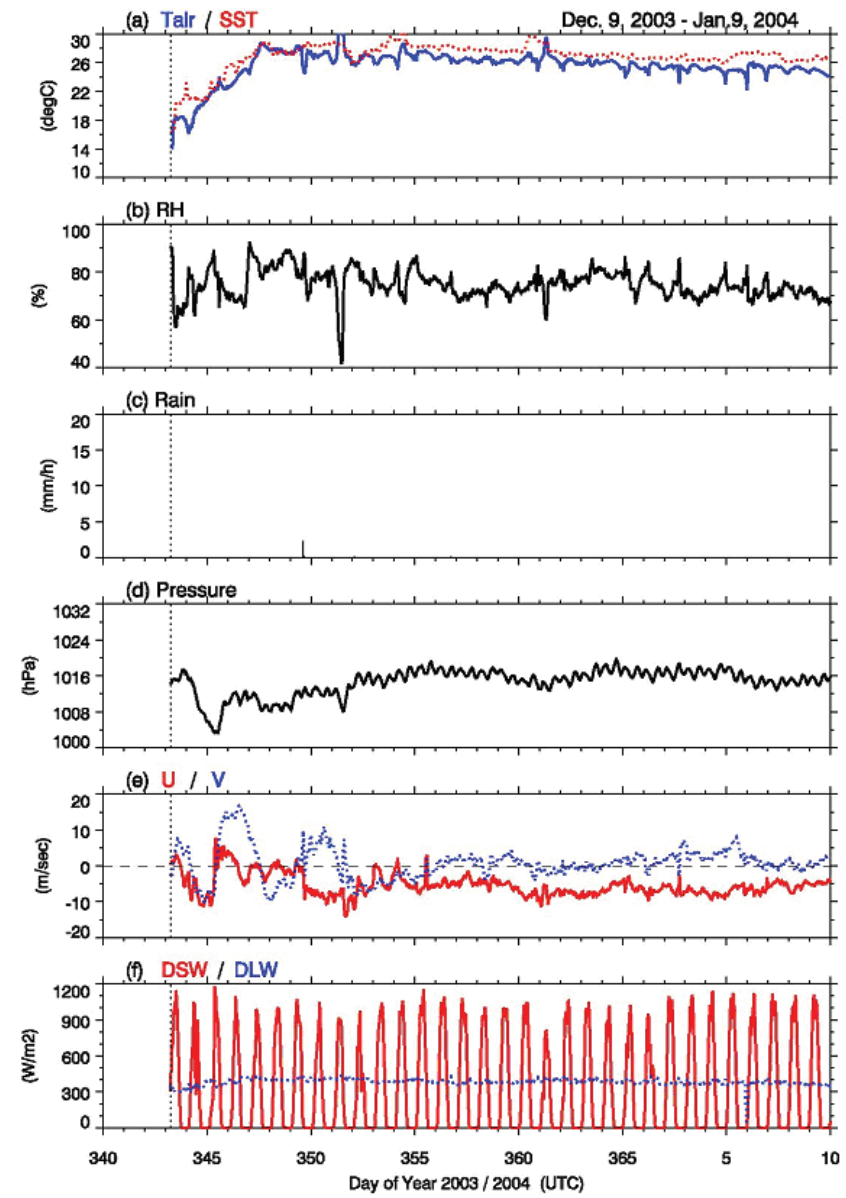


Figure 2.2.4. Same as Figure 2.2.1, but for the leg 5 cruise. Day343 corresponds to Dec. 9, 2003.



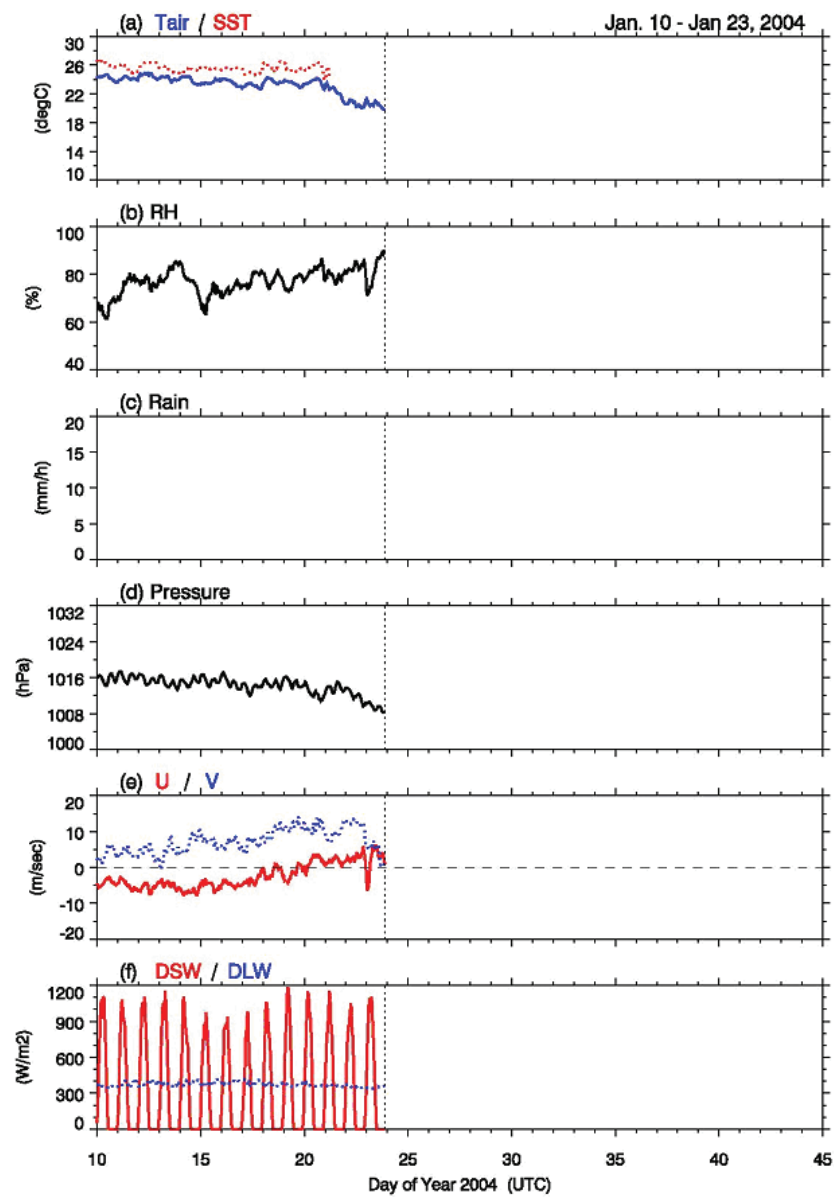


Figure 2.2.4. (continued) Day10 corresponds to Jan. 10, 2004.

## 2.3 Thermosalinograph and related measurements

22 January 2004

### (1) Personnel

Masao Fukasawa (JAMSTEC)

Takeshi Kawano (JAMSTEC)

Takayoshi Seike (MWJ)

Tomoko Miyashita (MWJ)

Nobuharu Komai (MWJ)

### (2) Objective

To measure salinity, temperature, dissolved oxygen, and fluorescence of near-sea surface water.

### (3) Methods

The *Continuous Sea Surface Water Monitoring System* (Nippon Kaiyo Co., Ltd.) has six kind of sensors and can automatically measure salinity, temperature, dissolved oxygen, fluorescence and particle size of plankton in near-sea surface water, continuously every 1-minute. This system is located in the “*sea surface monitoring laboratory*” on R/V Mirai. This system is connected to shipboard LAN-system. Measured data is stored in a hard disk of PC every 1-minute together with time and position of ship, and displayed in the data management PC machine.

Near-surface water was continuously pumped up to the laboratory and flowed into the *Continuous Sea Surface Water Monitoring System* through a vinyl-chloride pipe. The flow rate for the system is controlled by several valves and was 12 L/min except with fluorometer (about 0.3 L/min). The flow rate is measured with two flow meters and each value was checked every day.

Specification of the each sensor in this system of listed below.

#### a) Temperature and Salinity sensors

##### SEACAT THERMOSALINOGRAPH

Model: SBE-21, Sea-Bird Electronics, Inc.

Serial number: 2118859-2641 (for leg 1 and 2)

2118859-3126 (for leg 4 and 5)

Measurement range: Temperature -5 to +35 °C

Salinity 0 to 6.5 S m<sup>-1</sup>

Accuracy: Temperature 0.01 °C 6 month<sup>-1</sup>

Salinity 0.001 S m<sup>-1</sup> month<sup>-1</sup>

Resolution: Temperatures 0.001 °C

Salinity 0.0001 S m<sup>-1</sup>

#### b) Bottom of ship thermometer

Model: SBE 3S, Sea-Bird Electronics, Inc.

Serial number: 032175 (for leg 1 and 2)

032607 (for leg 4 and 5)

Measurement range: -5 to +35 °C

Resolution: ± 0.001 °C

Stability: 0.002 °C year<sup>-1</sup>

#### c) Dissolved oxygen sensor

Model: 2127A, Oubisufair Laboratories Japan Inc.

Serial number: 44733

Measurement range: 0 to 14 ppm

Accuracy: ± 1 % at 5 °C of correction range

Stability: 1 % month<sup>-1</sup>

d) Fluorometer

Model: 10-AU-005, Turner Designs  
 Serial number: 5562 FRXX  
 Detection limit: 5 ppt or less for chlorophyll-a  
 Stability: 0.5 % month<sup>-1</sup> of full scale

e) Particle Size sensor

Model: P-05, Nippon Kaiyo Co., Ltd.  
 Serial number: P5024  
 Measurement range: 0.02681 mmt to 6.666 mm  
 Accuracy: ± 10 % of range  
 Reproducibility: ± 5 %  
 Stability: 5 % week<sup>-1</sup>

f) Flow meter

Model: EMARG2W, Aichi Watch Electronics Ltd.  
 Serial number: 8672  
 Measurement range: 0 to 30 l min<sup>-1</sup>  
 Accuracy: ± 1 %  
 Stability: ± 1 % day<sup>-1</sup>

The monitoring periods (UTC) are listed below.

- Leg 1: 3 Aug. 2003, 11:00 to 3 Sep. 2003, 2:00
- Leg 2: 11 Sep. 2003, 23:30 to 13 Oct. 2003, 14:00
- Leg 4: 7 Nov. 2003, 11:07 to 2 Dec. 2003, 17:05
- Leg 5: 9 Dec. 2003, 14:02 to 21 Jan. 2004, 01:16

(4) Comparison of salinity data with sampled salinity

We sampled about three times every day for salinity sensor calibration. All salinity samples were collected from the course of the system while on station or from regions with weak horizontal gradients. All samples were analyzed on the Guildline 8400B. The results were shown in Table 2.3.1 to 2.3.4.

Table 2.3.1. Comparison between salinity obtained from *Continuous Sea Surface Water Monitoring System* and sampled salinity for leg 1.

Date [UTC]	Time [UTC]	Salinity data	Sampled Salinity [PSS-78]
2003/08/03	18:54	35.5879	35.5776
2003/08/04	2:25	35.6021	35.5977
2003/08/04	9:59	35.6077	35.6023
2003/08/04	18:01	35.6732	35.7100
2003/08/05	1:54	35.6752	35.7049
2003/08/05	9:50	35.6532	35.6842
2003/08/05	18:01	35.6003	35.6289
2003/08/06	1:51	35.5960	35.6247
2003/08/06	10:27	35.6214	35.6512
2003/08/06	20:40	35.6474	35.6757
2003/08/06	21:50	35.6564	35.6859
2003/08/07	6:14	35.6663	35.6854
2003/08/07	15:20	35.6338	35.6642
2003/08/07	22:00	35.6880	35.7229
2003/08/08	6:01	35.6572	35.6895
2003/08/08	21:10	35.6394	35.6733
2003/08/09	5:05	35.7028	35.7333

2003/08/09	12:57	35.6875	35.7201
2003/08/09	20:58	35.6833	35.7181
2003/08/10	5:00	35.6743	35.7086
2003/08/10	21:54	35.6847	35.7183
2003/08/11	4:50	35.6789	35.7130
2003/08/11	17:09	35.6461	35.6810
2003/08/11	20:55	35.6490	35.6857
2003/08/12	5:03	35.6290	35.6705
2003/08/12	12:55	35.6526	35.6881
2003/08/12	20:54	35.6345	35.6703
2003/08/13	5:04	35.6611	35.6964
2003/08/13	11:57	35.6644	35.7019
2003/08/13	20:58	35.6236	35.6593
2003/08/14	4:11	35.6377	35.6739
2003/08/14	12:04	35.6180	35.6571
2003/08/14	20:08	35.6064	35.6447
2003/08/15	3:57	35.6112	35.6496
2003/08/15	12:15	35.5664	35.6030
2003/08/15	20:18	35.5552	35.5950
2003/08/16	7:48	35.4951	35.5322
2003/08/16	16:16	35.4935	35.5294
2003/08/16	23:56	35.4875	35.5251
2003/08/17	7:55	35.4698	35.5070
2003/08/17	15:40	35.5015	35.5427
2003/08/18	0:33	35.4962	35.5350

2003/08/18	8:14	35.4878	35.5273
2003/08/18	16:05	35.4888	35.5312
2003/08/19	0:05	35.5214	35.5527
2003/08/19	7:54	35.5274	35.5679
2003/08/19	16:00	35.5244	35.5650
2003/08/19	23:56	35.5482	35.5841
2003/08/20	8:08	35.4433	35.4880
2003/08/20	16:08	35.5156	35.5571
2003/08/20	19:58	35.4993	35.5407
2003/08/21	3:58	35.5171	35.5598
2003/08/21	11:33	35.5097	35.5511
2003/08/21	18:55	35.4674	35.5105
2003/08/22	2:57	35.3707	35.4655
2003/08/22	10:50	35.3744	35.4391
2003/08/22	18:56	35.2718	35.3405
2003/08/23	2:48	35.3186	35.3660
2003/08/23	10:51	35.4549	35.5079
2003/08/23	18:44	35.4632	35.5062
2003/08/24	3:01	35.4781	35.5308
2003/08/24	10:57	35.4741	35.5188
2003/08/24	18:58	35.4474	35.4910
2003/08/25	3:05	35.4212	35.4646
2003/08/25	11:09	35.4394	35.4823
2003/08/25	18:54	35.4106	35.4549
2003/08/26	2:54	35.3799	35.4229

2003/08/26	11:31	35.4319	35.4754
2003/08/27	7:00	35.4600	35.5030
2003/08/27	14:57	35.4578	35.5008
2003/08/27	23:07	35.3555	35.4095
2003/08/28	6:58	35.4548	35.4993
2003/08/28	15:09	35.4504	35.4941
2003/08/28	23:00	35.3639	35.4040
2003/08/29	6:54	35.3661	35.4016
2003/08/29	15:27	35.4121	35.4533
2003/08/29	23:05	35.3417	35.3944
2003/08/30	11:23	35.2927	35.3342
2003/08/30	15:00	35.2908	35.3325
2003/08/30	22:58	35.4069	35.4482
2003/08/31	6:58	35.3776	35.4200
2003/08/31	23:04	35.2608	35.3023
2003/09/01	7:00	35.3240	35.3648
2003/09/01	14:55	35.3516	35.3940
2003/09/01	22:57	35.3651	35.4015
2003/09/02	6:56	35.0834	35.1256
2003/09/02	21:59	35.3719	35.4129

Table 2.3.2. Comparison between salinity obtained from *Continuous Sea Surface Water Monitoring* and sampled salinity for leg 2.

Date [UTC]	Time [UTC]	Salinity data	Sampled Salinity [PSS-78]
2003/09/12	0:04	35.4439	35.4388
2003/09/12	4:50	35.3963	35.3872
2003/09/12	13:57	35.4003	35.3969
2003/09/12	21:53	35.3118	35.3038
2003/09/13	5:50	35.4051	35.3944
2003/09/13	14:12	35.3712	35.3756
2003/09/13	21:49	35.3911	35.3844
2003/09/14	5:55	35.3108	35.3050
2003/09/14	13:57	35.3014	35.2981
2003/09/14	21:54	35.3744	35.3707
2003/09/15	6:06	35.2835	35.2799
2003/09/15	13:58	35.1876	35.1810
2003/09/15	21:51	35.1790	35.1674
2003/09/16	6:14	34.9382	34.9259
2003/09/16	12:41	35.0919	35.0850
2003/09/16	20:51	35.1629	35.1564
2003/09/17	4:51	35.0098	35.0148
2003/09/17	13:00	35.0033	34.9987
2003/09/17	20:51	35.0895	35.0844
2003/09/18	5:08	35.1236	35.0788
2003/09/18	13:04	35.1737	35.1689
2003/09/18	20:57	34.9896	34.9934



2003/09/19	5:05	35.1949	35.1894
2003/09/19	13:45	35.1500	35.1461
2003/09/19	20:49	34.9999	34.9976
2003/09/20	4:54	34.8266	34.8203
2003/09/20	12:04	35.0261	35.0190
2003/09/20	19:50	34.9281	34.9238
2003/09/21	15:52	35.1231	35.1174
2003/09/21	20:12	35.1562	35.1505
2003/09/22	12:01	34.7262	34.7236
2003/09/22	19:47	34.6572	34.6524
2003/09/23	3:54	34.5923	34.5870
2003/09/23	11:54	34.6121	34.6025
2003/09/23	19:44	34.7548	34.7495
2003/09/24	3:28	34.6148	34.5793
2003/09/24	11:52	34.6804	34.6772
2003/09/24	19:56	34.6641	34.7457
2003/09/25	3:24	35.1447	35.1417
2003/09/25	11:54	34.9619	34.9601
2003/09/25	19:53	34.7201	34.7183
2003/09/26	3:47	34.8324	34.8302
2003/09/26	11:52	34.5981	34.5895
2003/09/26	19:51	34.6506	34.6458
2003/09/27	3:29	34.7590	34.7481
2003/09/27	10:46	34.5932	34.5780
2003/09/27	18:53	34.7409	34.7540

2003/09/28	2:42	34.5840	34.5791
2003/09/28	10:54	34.2848	34.2899
2003/09/28	18:54	34.3686	34.3644
2003/09/29	3:09	34.4975	34.4959
2003/09/29	10:58	34.8530	34.8501
2003/09/29	18:57	34.8608	34.8580
2003/09/30	14:52	34.8546	34.8509
2003/09/30	18:50	34.7904	34.7903
2003/10/01	2:39	34.6251	34.6164
2003/10/01	10:54	34.8408	34.8399
2003/10/01	18:53	34.8261	34.8265
2003/10/02	2:10	34.6571	34.6547
2003/10/02	10:53	34.9884	34.9745
2003/10/02	18:54	34.4697	34.4692
2003/10/03	2:50	34.2944	34.2984
2003/10/03	10:00	34.2395	34.2355
2003/10/03	17:48	34.2884	34.2893
2003/10/04	1:11	34.3806	34.3789
2003/10/04	9:55	34.4391	34.4373
2003/10/04	17:50	34.4851	34.4850
2003/10/05	2:00	34.2875	34.2835
2003/10/05	10:01	34.3031	34.3025
2003/10/05	17:50	34.4102	34.4096
2003/10/06	1:27	34.4638	34.4738
2003/10/06	9:56	34.5224	34.5197

2003/10/06	17:49	34.5731	34.5723
2003/10/07	0:34	34.4679	34.4655
2003/10/07	10:11	34.4325	34.4312
2003/10/07	17:50	34.4260	34.4274
2003/10/08	12:54	34.4017	34.4126
2003/10/08	17:06	34.4433	34.4455
2003/10/09	0:04	34.2978	34.3073
2003/10/09	8:49	34.3004	34.2992
2003/10/09	16:55	34.2764	34.2782
2003/10/10	0:27	34.1796	34.1775
2003/10/10	8:56	34.1458	34.1464
2003/10/10	16:50	34.2664	34.2686
2003/10/11	0:11	34.2401	34.2395
2003/10/11	8:58	34.2382	34.2358
2003/10/11	16:49	34.2659	34.2650
2003/10/11	23:26	34.6082	34.6093

Table 2.3.3. Comparison between salinity obtained from *Continuous Sea Surface Water Monitoring* and sampled salinity for leg 4.

Date [UTC]	Time [UTC]	Salinity data	Sampled Salinity [PSS-78]
2003/11/07	17:55	36.1938	36.1807
2003/11/08	1:58	36.2261	36.2155
2003/11/08	9:59	36.5223	36.5107
2003/11/08	18:02	37.1111	37.1012
2003/11/09	2:10	36.9197	36.9104
2003/11/09	9:51	36.1602	36.1485
2003/11/09	17:53	35.9997	35.9989
2003/11/10	1:59	36.0251	36.0113
2003/11/10	9:49	35.7294	35.7069
2003/11/10	17:57	35.7728	35.7581
2003/11/11	1:58	36.0776	36.0665
2003/11/11	9:56	36.0963	36.0859
2003/11/11	17:58	36.4694	36.4562
2003/11/12	1:54	36.1788	36.1679
2003/11/12	9:56	36.0033	35.9918
2003/11/12	18:02	36.0591	36.0479
2003/11/13	1:57	36.0285	36.0178
2003/11/13	10:02	36.0261	36.0285
2003/11/13	17:53	35.8561	35.8478
2003/11/14	2:04	35.9495	35.9412
2003/11/14	9:58	35.9992	35.9889
2003/11/14	18:01	36.0190	36.0086

2003/11/15	1:57	35.9047	35.8949
2003/11/15	9:57	35.9049	35.8949
2003/11/15	17:58	35.9818	35.9718
2003/11/16	1:54	36.0762	36.0671
2003/11/16	10:01	36.1472	36.1375
2003/11/16	18:00	36.0770	36.0673
2003/11/17	2:08	35.4934	35.4839
2003/11/17	9:53	35.8994	35.8891
2003/11/17	17:57	35.7057	35.6967
2003/11/18	1:58	36.0270	36.0165
2003/11/18	10:06	35.9530	35.9444
2003/11/18	18:02	35.8323	35.8216
2003/11/19	2:01	36.0499	36.0429
2003/11/19	9:59	35.9020	35.8931
2003/11/19	18:01	36.0589	36.0523
2003/11/20	0:56	35.9941	35.9846
2003/11/20	8:50	36.0124	36.0030
2003/11/20	17:03	36.1284	36.1210
2003/11/21	1:00	36.1766	36.1659
2003/11/21	8:49	36.0655	36.0578
2003/11/21	16:56	36.0378	36.0288
2003/11/22	0:56	35.8476	35.8372
2003/11/22	8:48	35.9853	35.9764
2003/11/22	17:03	35.8738	35.8642
2003/11/23	0:55	35.8052	35.7957

2003/11/23	8:47	35.7842	35.7746
2003/11/23	16:59	36.1174	36.1141
2003/11/24	0:59	36.0071	35.9972
2003/11/24	8:45	35.9418	35.9332
2003/11/24	17:05	35.9580	35.9500
2003/11/24	23:56	36.0008	35.9927
2003/11/25	7:57	35.9606	35.9538
2003/11/25	16:00	36.0141	36.0069
2003/11/25	23:58	35.8938	35.8864
2003/11/26	8:09	35.8466	35.8371
2003/11/26	15:59	35.8641	35.8579
2003/11/26	23:59	35.7779	35.7695
2003/11/27	7:52	35.9645	35.9598
2003/11/27	16:08	35.8023	35.7946
2003/11/27	23:57	35.7883	35.7797
2003/11/28	8:01	35.7803	35.7724
2003/11/28	15:57	35.6961	35.6885
2003/11/29	0:01	35.7615	35.7524
2003/11/29	7:53	35.8114	35.8036
2003/11/29	16:02	35.6035	35.5984
2003/11/29	23:56	35.3958	35.3908
2003/11/30	7:54	35.6416	35.6358
2003/11/30	15:57	35.5562	35.5515
2003/12/01	6:45	35.5899	35.6257
2003/12/01	14:54	35.4484	35.4906

2003/12/01	21:55	35.4547	35.4953
2003/12/02	5:43	35.3556	35.3501
2003/12/02	13:59	35.2902	35.2840

Table 2.3.4. Comparison between salinity obtained from *Continuous Sea Surface Water Monitoring* and sampled salinity for leg 5.

Date [UTC]	Time [UTC]	Salinity data	Sampled Salinity [PSS-78]
2003/12/09	14:31	35.5513	35.5438
2003/12/10	7:03	35.6051	35.5966
2003/12/10	15:21	35.6132	35.6084
2003/12/10	23:10	35.6429	35.6401
2003/12/11	7:06	35.5615	35.5515
2003/12/11	16:43	35.4587	35.4493
2003/12/11	22:11	35.3541	35.3453
2003/12/12	5:49	35.3233	35.3163
2003/12/12	14:09	35.3667	35.3576
2003/12/13	6:05	35.1934	35.1889
2003/12/13	17:25	35.2872	35.2744
2003/12/13	21:55	35.3049	35.2942
2003/12/14	6:05	35.3170	35.3018
2003/12/14	14:29	35.3484	35.3395
2003/12/14	22:17	35.2367	35.2346
2003/12/15	6:10	35.3267	35.3150
2003/12/15	22:02	35.1947	35.1857
2003/12/16	6:03	35.2692	35.2608
2003/12/16	22:14	35.2649	35.2563
2003/12/17	6:10	35.1445	35.1364
2003/12/17	14:02	35.1797	35.1685
2003/12/17	22:09	35.2711	35.2556

2003/12/18	6:05	35.1811	35.1779
2003/12/18	14:04	34.5516	34.5406
2003/12/18	22:00	34.7189	34.7142
2003/12/19	5:42	33.9081	33.9088
2003/12/19	14:33	34.8810	34.8727
2003/12/21	5:36	35.0581	35.0529
2003/12/21	21:15	35.0091	35.0119
2003/12/22	5:24	35.0580	35.0516
2003/12/22	13:01	34.9832	34.9781
2003/12/22	21:07	35.0369	35.0310
2003/12/23	4:52	34.9513	34.9449
2003/12/23	12:59	34.9354	34.9188
2003/12/23	21:23	34.9353	34.9256
2003/12/24	5:18	34.9253	34.9196
2003/12/24	12:53	34.9528	34.9435
2003/12/24	21:06	35.0308	35.0188
2003/12/25	5:44	35.0635	35.0560
2003/12/25	13:11	35.1809	35.1728
2003/12/25	21:28	34.9931	34.9905
2003/12/26	5:00	35.0093	35.0030
2003/12/28	2:55	35.0815	35.0731
2003/12/28	11:16	34.9481	34.9407
2003/12/29	3:13	35.0996	35.0946
2003/12/29	11:13	35.1619	35.1544
2003/12/29	17:58	35.0522	35.0443

2003/12/30	3:13	35.0370	35.0297
2003/12/30	10:51	34.9865	34.9810
2003/12/30	18:54	34.8960	34.8873
2003/12/31	3:05	35.0512	35.0462
2003/12/31	10:51	34.9369	34.9289
2004/01/01	2:19	35.0381	35.0326
2004/01/01	10:01	35.0385	35.0325
2004/01/01	17:45	35.0455	35.0376
2004/01/02	2:04	35.0559	35.0509
2004/01/02	9:52	35.0417	35.0360
2004/01/02	17:53	35.1282	35.1227
2004/01/03	1:59	35.0194	35.0694
2004/01/03	9:49	35.1302	35.1237
2004/01/03	17:54	35.0556	35.0494
2004/01/04	3:54	35.2286	35.2220
2004/01/04	9:50	35.0483	35.0443
2004/01/04	17:22	35.2565	35.2510
2004/01/05	2:08	35.1113	35.1068
2004/01/05	9:49	34.8085	34.8027
2004/01/05	17:32	34.5824	34.5768
2004/01/06	2:06	34.5421	34.5342
2004/01/06	9:48	34.5069	34.5013
2004/01/06	17:08	34.5338	34.5289
2004/01/07	1:56	34.6087	34.6038
2004/01/07	9:53	34.5409	34.5364



2004/01/07	17:41	34.9639	34.9567
2004/01/08	2:08	34.9691	34.9635
2004/01/08	8:52	34.9903	34.9846
2004/01/08	16:41	34.9707	34.9652
2004/01/09	0:53	34.9801	34.9741
2004/01/09	13:03	35.0055	35.0031
2004/01/09	16:37	34.9339	34.9278
2004/01/10	0:58	34.7494	34.7441
2004/01/10	8:56	35.1022	35.0979
2004/01/10	16:46	35.0116	35.0046
2004/01/11	0:57	34.9449	34.9392
2004/01/11	8:56	35.0376	35.0314
2004/01/11	16:04	35.2834	35.2772
2004/01/12	0:59	35.1986	35.1942
2004/01/12	9:00	34.9156	34.9097
2004/01/12	16:27	34.6938	34.6848
2004/01/13	1:07	34.8813	34.8761
2004/01/13	8:50	35.0236	35.0229
2004/01/13	16:57	35.1179	35.1127
2004/01/14	0:59	35.1151	35.1101
2004/01/14	8:48	35.0928	35.0882
2004/01/14	16:36	35.0652	35.0609
2004/01/15	0:59	34.9545	34.9496
2004/01/15	8:44	34.9191	34.9075
2004/01/15	15:55	35.0167	35.0112

2004/01/16	0:10	34.9761	34.9714
2004/01/16	8:15	34.9115	34.9055
2004/01/16	16:05	34.9545	34.9495
2004/01/16	23:55	34.8065	34.7996
2004/01/17	7:42	35.0691	35.0653
2004/01/17	15:50	35.2378	35.2319
2004/01/18	0:03	34.9854	34.9813
2004/01/18	7:53	35.1433	35.1390
2004/01/18	16:05	35.2309	35.2260
2004/01/19	0:01	35.0320	35.0272
2004/01/19	7:49	35.1260	35.1202
2004/01/19	15:46	35.3380	35.3321
2004/01/19	23:58	35.3243	35.3150
2004/01/20	7:55	35.2197	35.2148
2004/01/20	15:24	35.1860	35.1802
2004/01/21	0:04	35.0948	35.0942

## 2.4 Underway pCO<sub>2</sub>

3 February 2005

### (1) Personnel

Akihiko Murata (IORGC, JAMSTEC)

Mikio Kitada (MWJ)

Minoru Kamata (MWJ)

### (2) Introduction

Concentrations of CO<sub>2</sub> in the atmosphere are now increasing at a rate of 1.5 ppmv y<sup>-1</sup> due to human activities such as burning of fossil fuels, deforestation, cement production, etc. It is an urgent task to estimate as accurately as possible the absorption capacity of the ocean against the increased atmospheric CO<sub>2</sub>, and to clarify the mechanism of the CO<sub>2</sub> absorption, because the magnitude of the predicted global warming depends on the levels of CO<sub>2</sub> in the atmosphere, and because the ocean currently absorbs 1/3 of the 6 Gt of carbon emitted into the atmosphere each year by human activities.

In the BEAGLE, we were aimed at quantifying how much anthropogenic CO<sub>2</sub> absorbed in the Southern Ocean, where intermediate and deep waters are formed, are transported and redistributed in the southern hemisphere subtropical oceans. For the purpose, we measured CO<sub>2</sub>-system properties such as dissolved inorganic carbon (C<sub>T</sub>), total alkalinity (A<sub>T</sub>), pH and underway pCO<sub>2</sub>.

In this section, we describe data on pCO<sub>2</sub> in the atmosphere and surface seawater obtained in the BEAGLE in detail.

### (3) Apparatus and shipboard measurement

Continuous underway measurements of atmospheric and surface seawater pCO<sub>2</sub> were made with the CO<sub>2</sub> measuring system (Nippon ANS, Ltd) installed in the R/V *Mirai* of JAMSTEC. The system comprises of a

non-dispersive infrared gas analyzer (NDIR; BINOS<sup>®</sup> model 4.1, Fisher-Rosemount), an air-circulation module and a showerhead-type equilibrator. To measure concentrations (mole fraction) of CO<sub>2</sub> in dry air (xCO<sub>2a</sub>), air sampled from the bow of the ship (approx. 30 m above the sea level) was introduced into the NDIR through a dehydrating route with an electric dehumidifier (kept at ~2 °C), a Perma Pure dryer (GL Sciences Inc.), and a chemical desiccant (Mg(ClO<sub>4</sub>)<sub>2</sub>). The flow rate of the air was 500 ml min<sup>-1</sup>. To measure surface seawater concentrations of CO<sub>2</sub> in dry air (xCO<sub>2s</sub>), the air equilibrated with seawater within the equilibrator was introduced into the NDIR through the same flow route as the dehydrated air used in measuring xCO<sub>2a</sub>. The flow rate of the equilibrated air was 600 – 800 ml min<sup>-1</sup>. The seawater was taken by a pump from the intake placed at the approx. 4.5 m below the sea surface. The flow rate of seawater in the equilibrator was 500 – 800 ml min<sup>-1</sup>.

The CO<sub>2</sub> measuring system was set to repeat the measurement cycle such as 4 kinds of CO<sub>2</sub> standard gases (Table 2.4.1), xCO<sub>2a</sub> (twice), xCO<sub>2s</sub> (7 times). This measuring system was run automatically throughout the cruise by a PC control.

### (4) Quality control

Concentrations of CO<sub>2</sub> of the standard gases are listed in Table 2.4.1, which were calibrated by the JAMSTEC primary standard gases. The CO<sub>2</sub> concentrations of the primary standard gases were calibrated by C.D. Keeling of the Scripps Institution of Oceanography, La Jolla, CA, U.S.A.

Since differences of concentrations of the standard gases between before and after the cruise were allowable (< 0.1 ppmv), the averaged concentrations (Table 2.4.1) were adopted for the subsequent calculations.

In actual shipboard observations, the signals of NDIR usually reveal a trend. The trends were adjusted linearly using the signals of the standard gases analyzed before and after the sample measurements.

Effects of water temperature increased between the inlet of surface seawater and the equilibrator on xCO<sub>2s</sub> were adjusted based on Gordon and Jones (1973), although the temperature increases were slight, being ~ 0.1 °C.

We checked values of xCO<sub>2a</sub> and xCO<sub>2s</sub> by examining signals of the NDIR on recorder charts, and by plotting

the  $x\text{CO}_2\text{a}$  and  $x\text{CO}_2\text{s}$  as a function of sequential day, longitude, sea surface temperature and sea surface salinity.

Table 2.4.1. Concentrations of  $\text{CO}_2$  standard gases used in the BEAGLE.

Cylinder no.	Concentrations (ppmv)	Leg no.
CQB15429	270.08	1, 2, 4
CQB15808	268.84	5
CQB15428	328.87	1, 2, 4
CQB15809	330.16	5
CQB15434	359.10	1, 2, 4
CQB15810	369.37	5
CQB15426	409.23	1, 2, 4
CQB15811	414.39	5

#### Reference

Gordon, L. I. and L. B. Jones (1973): The effect of temperature on carbon dioxide partial pressure in seawater.  
Mar. Chem., 1, 317-322.

## 2.5 Acoustic Doppler Current Profiler

28 February 2005

### (1) Personnel

Yasushi Yoshikawa (JAMSTEC)

Souichiro Sueyoshi (GODI)

### (2) Instrument and method

The instrument used was the RDI broadband 76.8 kHz unit, hull-mounted on the centerline and approximately 23 m aft of the bow at the water line. The firmware version was 5.59 and the data acquisition software was the VMDAS Ver. 1.3. Operation was made from the first CTD station to the last CTD station in each leg. The instrument was used in the water-tracking mode during the most of operations, recording each ping raw data in 100 x 8 m bins from 18.5 m to 818.5 m in deep. Sampling interval was 9.01 seconds. The bottom-tracking mode was added in the westernmost shallow water region, giving the data to evaluate the misalignment of the transducer on the hull. In the course the scale factor of the ADCP was also evaluated. GPS gave the navigation data. A compass we used was the INU (Inertial Navigation Unit) instead of the ship's gyrocompass. Its accuracy was 1.0 mil (about 0.056 degree) and had already set on zero bias before the beginning of the cruise. An electronic trouble occurred at 15:33 on 24 November, between A10\_67 and A10\_68 in the Atlantic sector. Though it recovered at 16:06, the INU compass had to be initialized. The initialization on the sea brought the bias error as 2.0 mil (about 0.112 degree) after the trouble. The bias value was evaluated again at port of Cape Town again, and fortunately, we found these values are same each other. Therefore the accuracy of the heading was same value of 0.056 degree during the cruise.

The performance of the ADCP instrument was almost good throughout the cruise: on streaming, profiles usually reached to about 600 m, except in heaviest weather and except in whilst streaming. Profiles were rather bad on CTD stations. It is probably due to the babbles originated from the bow-thruster. The profiles on the

stations did not reach so far, from 200 m to 500 m and the ADCP signal was weak typically at about 350 m in deep. Echo intensity was relatively weak in the sea east of 160 W in the Pacific sector and Atlantic sector.

### (3) Data processing

The first processing was the evaluation both of the ADCP scale factor and the misalignment by using the bottom-tracking mode data between P6\_246 and P6\_244 in the westernmost Pacific sector. The error velocity was less than 2.0 cm/s, and ratio ADCP/Navigation was 1.0259. Therefore the scale factor  $1 / 1.0259 = 0.9748$  was adopted to measured velocity magnitude of each ping. The misalignment angle was calculated as -0.17 degree between the ADCP and the INU. The values are almost same to the values those were obtained near the African coast: the difference of misalignments is less than 0.02 degree. The error of the heading, 0.056 degree, would give an estimation of the velocity error as 0.8 cm/s for the maximum ship speed 16 knots, and it would affect to the meridional velocity because the ship had almost zonal course.

The second processing is applying misalignment correction to raw data, and then calculating flow field on time series as a preliminary result that would make us an overview. Every ping data those error velocity, the difference between two vertical velocities, less than 20 cm/s and correlation value higher than 64 in the four beam solutions are used to the calculation. Median filter is used to make the 5 minutes mean field. The grids are put at the interval of 20 m. The roll and pitch data of the INU are not used to compensate the tilt motion because the INU was not put near the ADCP transducer. Therefore it would give a mismatch of the tilt motion. Depth correction is also made using the CTD data. The calculation is carried using less than about 100 independent data, 33 profiles x 3 bins. The error roughly estimated by the difference of the vertical velocities in each composite field is reduced to less than 2.0 cm/s.

We made the ADCP data set giving two types of profiles: one is at each CTD station and another is a mean profile on streaming between CTD stations. The mean velocities and their standard deviation are calculated using the 5 minutes composite velocity field. About 25 data on average are used in the calculation, which would reduce the error 0.4 cm/s, one fifth of the velocity error in each composite field. Then the final estimation of

the error should be 0.9 cm/s, which is given by square root of  $[0.8^2 + 0.4^2]$ . The velocity in the data set has both of the temporal and spatial variations. Its standard deviation is 7.6 cm/s on average. It shows no significant difference between the standard deviations in each leg. However, the standard deviation at streaming is about 9.1 cm/s, and it is somewhat greater than that at the CTD station, 6.2 cm/s.



# BEAGLE2003 .sum files

P06 REV R/V MIRAI CRUISE MR03K04 LEG1

SHIP/CRS	WOCE	CAST	UTC	EVENT	POSITION	UNC	COR	HT ABOVE	WIRE	MAX	NO. OF											COMMENTS		
EXPCODE	SECT	STNNBR	CASTNO	TYPE	DATE	TIME	CODE	LATITUDE	LONGITUDE	NAV	DEPTH	DEPTH	BOTTOM	OUT	PRESS	BOTTLES	PARAMETERS							
49MR03K04_1	P06	246	1	ROS	080303	1957	BE 30	5.59 S	153 29.04 E	GPS	93	93											33 BTLS FOR DRILL OF WATER SMPL COLLECTION	
49MR03K04_1	P06	246	1	ROS	080303	2003	BO 30	5.67 S	153 29.00 E	GPS	92	92	4	82	87									
49MR03K04_1	P06	246	1	ROS	080303	2021	EN 30	5.73 S	153 28.96 E	GPS	92	92												
49MR03K04_1	P06	246	1	BUC	080303	2031	UN 30	5.77 S	153 28.91 E	GPS	92	91												19.6C
49MR03K04_1	P06	246	1	BIO	080303	2050	UN 30	5.87 S	153 28.84 E	GPS	92	91												34, 35, 48
49MR03K04_1	P06	245	1	ROS	080303	2327	BE 30	5.09 S	153 31.42 E	GPS	134	134												4 1-6
49MR03K04_1	P06	245	1	BUC	080303	2331	UN 30	5.13 S	153 31.39 E	GPS	134	133												1
49MR03K04_1	P06	245	1	ROS	080303	2333	BO 30	5.15 S	153 31.38 E	GPS	133	134	2	125	129									20.3C
49MR03K04_1	P06	245	1	ROS	080303	2349	EN 30	5.27 S	153 31.25 E	GPS	131	130												
49MR03K04_1		401	1	XBT	080403	0027	DE 30	5.09 S	153 34.81 E	GPS	824	837												
49MR03K04_1	P06	244	1	ROS	080403	0053	BE 30	5.11 S	153 35.88 E	GPS	1126	1127												17 1-6, 7, 8, 23, 24, 26, 27, 34, 35, 48
49MR03K04_1	P06	244	1	BUC	080403	0056	UN 30	5.15 S	153 35.86 E	GPS	1131	1133												2 BTLS FOR BIO (5DB)
49MR03K04_1	P06	244	1	ROS	080403	0124	BO 30	5.43 S	153 35.67 E	GPS	1130	1136	9	1133	1132									1
49MR03K04_1	P06	244	1	UNK	080403	0148	BE 30	5.66 S	153 35.50 E	GPS	1140	1141												20.8C
49MR03K04_1	P06	244	1	UNK	080403	0155	EN 30	5.73 S	153 35.45 E	GPS	1151	1147												
49MR03K04_1	P06	244	1	ROS	080403	0211	EN 30	5.94 S	153 35.33 E	GPS	1163	1162												
49MR03K04_1	P06	243	1	ROS	080403	0336	BE 30	4.60 S	153 41.10 E	GPS	2557	2547												21 1-6, 23, 24, 26
49MR03K04_1	P06	243	1	BUC	080403	0343	UN 30	4.64 S	153 41.01 E	GPS	2574	2590												1
49MR03K04_1	P06	243	1	ROS	080403	0422	BO 30	4.80 S	153 40.78 E	GPS	2666	2620	6	2681	2702									21.0C
49MR03K04_1	P06	243	1	ROS	080403	0536	EN 30	5.19 S	153 40.28 E	GPS	2556	2567												
49MR03K04_1	P06	242	1	ROS	080403	0655	BE 30	4.65 S	153 45.27 E	GPS	1982	1982												19 1-6
49MR03K04_1	P06	242	1	BUC	080403	0658	UN 30	4.67 S	153 45.25 E	GPS	1976	1980												1
49MR03K04_1	P06	242	1	ROS	080403	0734	BO 30	4.84 S	153 45.07 E	GPS	1948	1946	22	1930	1945									20.4C
49MR03K04_1	P06	242	1	ROS	080403	0836	EN 30	5.15 S	153 44.81 E	GPS	2024	2041												
49MR03K04_1	P06	241	1	ROS	080403	0955	BE 30	5.34 S	153 55.53 E	GPS	3389	3357												24 1-8, 23, 24, 26, 27
49MR03K04_1	P06	241	1	BUC	080403	1000	UN 30	5.32 S	153 55.45 E	GPS	3240	3240												1
49MR03K04_1	P06	241	1	ROS	080403	1041	BO 30	5.47 S	153 54.94 E	GPS	2742	2749	140	2748	2763									20.5C
49MR03K04_1	P06	241	1	ROS	080403	1158	EN 30	5.51 S	153 54.22 E	GPS	2425	2423												
49MR03K04_1	P06	240	1	ROS	080403	1336	BE 30	5.07 S	153 59.94 E	GPS	4453	4454												30 1-6
49MR03K04_1	P06	240	1	ROS	080403	1444	BO 30	5.40 S	153 59.43 E	GPS	4438	4435	4	4464	4516									
49MR03K04_1	P06	240	1	BUC	080403	1602	UN 30	5.78 S	153 58.97 E	GPS	4411	4415												1
49MR03K04_1	P06	240	1	ROS	080403	1657	EN 30	6.26 S	153 58.61 E	GPS	4418	4420												
49MR03K04_1	P06	239	1	ROS	080403	1813	BE 30	5.20 S	154 9.89 E	GPS	4610	4608												31 1-6, 12, 13, 23, 24, 26
49MR03K04_1	P06	239	1	ROS	080403	1928	BO 30	5.66 S	154 9.19 E	GPS	4608	4609	4	4640	4682									
49MR03K04_1	P06	239	1	BUC	080403	2049	UN 30	5.96 S	154 8.60 E	GPS	4608	4609												1
49MR03K04_1	P06	239	1	ROS	080403	2144	EN 30	6.14 S	154 8.14 E	GPS	4609	4609												
49MR03K04_1	P06	238	1	ROS	080403	2336	BE 30	5.09 S	154 29.98 E	GPS	4594	4596												30 1-6, 9, 22, 47
49MR03K04_1	P06	238	1	UNK	080403	2338	BE 30	5.10 S	154 29.98 E	GPS	4593	4594												
49MR03K04_1	P06	238	1	UNK	080503	0028	EN 30	5.26 S	154 29.75 E	GPS	4595	4595												
49MR03K04_1	P06	238	1	BUC	080503	0049	UN 30	5.39 S	154 29.57 E	GPS	4598	4594												1
49MR03K04_1	P06	238	1	ROS	080503	0053	BO 30	5.40 S	154 29.52 E	GPS	4594	4595	4	4612	4665									
49MR03K04_1	P06	238	1	BIO	080503	0100	UN 30	5.43 S	154 29.43 E	GPS	4594	4595												34, 35, 48

49MR03K04_1	P06	238	1	ROS	080503	0250	EN	30	6.16	S	154	28.48	E	GPS	4702	4704				
49MR03K04_1	P06	237	1	ROS	080503	0455	BE	30	4.95	S	154	59.91	E	GPS	4722	4723		31	1-6	
49MR03K04_1	P06	237	1	ROS	080503	0616	BO	30	5.17	S	154	59.22	E	GPS	4719	4722	10	4777	4795	NOISE FROM RETURN VALVE (CTD WINCH)
49MR03K04_1	P06	237	1	BUC	080503	0723	UN	30	5.33	S	154	58.90	E	GPS	4721	4721			1	19.9C
49MR03K04_1	P06	237	1	ROS	080503	0819	EN	30	5.53	S	154	58.54	E	GPS	4722	4723				
49MR03K04_1	P06	X11	1	ROS	080503	1043	BE	30	17.11	S	155	33.12	E	GPS	4858	4860			33	1-6,23,24,26
49MR03K04_1	P06	X11	1	ROS	080503	1157	BO	30	17.73	S	155	32.59	E	GPS	4857	4860	3	4887	4929	#1=#18 DUPLICATE SMPLS (2000DB) A SMALL FISH IN TC DUCT CONTAMINATED PRIMARY SENSORS
49MR03K04_1	P06	X11	1	BUC	080503	1303	UN	30	18.17	S	155	32.18	E	GPS	4859	4863			1	20.2C
49MR03K04_1	P06	X11	1	ROS	080503	1402	EN	30	19.03	S	155	31.53	E	GPS	4865	4865				
49MR03K04_1	P06	235	1	ROS	080503	1620	BE	30	4.48	S	155	59.80	E	GPS	4591	4587			31	1-6
49MR03K04_1	P06	235	1	ROS	080503	1733	BO	30	5.07	S	155	58.85	E	GPS	4605	4600	1	4635	4629	START FROM 10DB
49MR03K04_1	P06	235	1	BUC	080503	1844	UN	30	5.61	S	155	58.18	E	GPS	4556	4564			1	20.6C
49MR03K04_1	P06	235	1	ROS	080503	1945	EN	30	6.20	S	155	57.27	E	GPS	4653	4650				
49MR03K04_1	P06	234	1	ROS	080503	2206	BE	30	4.84	S	156	31.94	E	GPS	4824	4830			34	1-6,7,8,12,13,15,23,24,26,27,34,35,45,48
49MR03K04_1	P06	234	1	UNK	080503	2306	BE	30	5.04	S	156	31.58	E	GPS	4824	4825				WIPED BTLS WITH ACETON SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	234	1	ROS	080503	2322	BO	30	5.06	S	156	31.48	E	GPS	4828	4829	5	4838	4899	2 BTLS FOR BIO (5DB)
49MR03K04_1	P06	234	1	BUC	080603	0039	UN	30	5.36	S	156	31.37	E	GPS	4829	4828			1	20.8C
49MR03K04_1	P06	234	1	UNK	080603	0044	EN	30	5.39	S	156	31.38	E	GPS	4824	4830				
49MR03K04_1	P06	234	1	ROS	080603	0144	EN	30	5.59	S	156	31.14	E	GPS	4825	4826				
49MR03K04_1	P06	232	1	ROS	080603	0344	BE	30	4.80	S	156	55.34	E	GPS	4882	4879			34	1-6,23,24,26,34,35,46,48
49MR03K04_1	P06	232	1	ROS	080603	0502	BO	30	5.03	S	156	55.14	E	GPS	4865	4873	5	4875	4946	2 BTLS FOR BIO (10DB)
49MR03K04_1	P06	232	1	BUC	080603	0610	UN	30	5.31	S	156	54.84	E	GPS	4870	4873			1	20.6C
49MR03K04_1	P06	232	1	ROS	080603	0710	EN	30	5.45	S	156	54.58	E	GPS	4868	4877				
49MR03K04_1	P06	231	1	ROS	080603	0854	BE	30	5.13	S	157	19.86	E	GPS	3222	3223			26	1-6,23,24,26
49MR03K04_1	P06	231	1	ROS	080603	0949	BO	30	5.29	S	157	20.01	E	GPS	3213	3214	5	3217	3252	#1=#24 DUPLICATE SMPLS (900DB)
49MR03K04_1	P06	231	1	BUC	080603	1020	UN	30	5.39	S	157	20.06	E	GPS	3201	3208			1	20.6C
49MR03K04_1	P06	231	1	ROS	080603	1117	EN	30	5.58	S	157	20.43	E	GPS	3173	3173				
49MR03K04_1	P06	230	1	ROS	080603	1241	BE	30	5.23	S	157	40.04	E	GPS	1860	1854			19	1-6
49MR03K04_1	P06	230	1	BUC	080603	1249	UN	30	5.24	S	157	40.24	E	GPS	1840	1839			1	20.3C
49MR03K04_1	P06	230	1	ROS	080603	1315	BO	30	5.23	S	157	40.67	E	GPS	1852	1851	6	1868	1856	
49MR03K04_1	P06	230	1	ROS	080603	1414	EN	30	5.12	S	157	41.67	E	GPS	1799	1798				
49MR03K04_1	P06	229	1	ROS	080603	1538	BE	30	5.08	S	158	0.03	E	GPS	2015	2018			20	1-6,23,24,26
49MR03K04_1	P06	229	1	BUC	080603	1543	UN	30	5.03	S	158	0.11	E	GPS	2047	2029			1	#1=#27 DUPLICATE SMPLS (1000DB) 20.2C
49MR03K04_1	P06	229	1	ROS	080603	1617	BO	30	4.87	S	158	0.40	E	GPS	2026	2023	7	1999	2016	
49MR03K04_1	P06	229	1	ROS	080603	1717	EN	30	4.62	S	158	1.25	E	GPS	2093	2092				
49MR03K04_1	P06	228	1	ROS	080603	1846	BE	30	4.95	S	158	20.12	E	GPS	2656	2655			29	1-6,9,15,22,45,47
49MR03K04_1	P06	228	1	BUC	080603	1849	UN	30	4.91	S	158	20.15	E	GPS	2657	2655			1	6 BTLS FOR R.N. 19.7C
49MR03K04_1	P06	228	1	ROS	080603	1931	BO	30	4.64	S	158	20.57	E	GPS	2704	2702	9	2668	2687	
49MR03K04_1	P06	228	1	ROS	080603	2058	EN	30	4.25	S	158	21.33	E	GPS	2717	2713				
49MR03K04_1	P06	227	1	ROS	080603	2222	BE	30	4.76	S	158	40.98	E	GPS	3194	3197			28	1-6,12,13,22,23,24,26,34,35,46,48
49MR03K04_1	P06	227	1	UNK	080603	2232	BE	30	4.67	S	158	41.14	E	GPS	3201	3198				2 BTLS FOR BIO (5DB) SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	227	1	ROS	080603	2316	BO	30	4.59	S	158	41.59	E	GPS	3202	3199	6	3205	3236	
49MR03K04_1	P06	227	1	BUC	080603	2346	UN	30	4.61	S	158	41.82	E	GPS	3201	3196			1	19.7C
49MR03K04_1	P06	227	1	UNK	080603	2358	EN	30	4.65	S	158	41.93	E	GPS	3201	3197				
49MR03K04_1	P06	227	1	ROS	080703	0049	EN	30	4.58	S	158	42.68	E	GPS	3212	3208				
49MR03K04_1	P06	226	1	ROS	080703	0235	BE	30	19.90	S	159	4.79	E	GPS	2346	2346			23	1-6,34,35,48
49MR03K04_1	P06	226	1	BUC	080703	0239	UN	30	19.95	S	159	4.88	E	GPS	2355	2354			1	2 BTLS FOR BIO (5DB) 19.6C
49MR03K04_1	P06	226	1	UNK	080703	0258	BE	30	20.04	S	159	5.22	E	GPS	2355	2351				SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	226	1	ROS	080703	0318	BO	30	20.13	S	159	5.44	E	GPS	2351	2347	6	2382	2368	

49MR03K04_1	P06	226	1	UNK	080703	0359	EN	30	20.46	S	159	5.72	E	GPS	2342	2335						
49MR03K04_1	P06	226	1	ROS	080703	0432	EN	30	20.63	S	159	6.50	E	GPS	2301	2299						
49MR03K04_1	P06	225	1	ROS	080703	0624	BE	30	5.06	S	159	29.86	E	GPS	2692	2690	23	1-6,23,24,26		#1=#27 DUPLICATE SMPLS (600DB)		
49MR03K04_1	P06	225	1	BUC	080703	0630	UN	30	4.98	S	159	29.95	E	GPS	2689	2691						
49MR03K04_1	P06	225	1	ROS	080703	0713	BO	30	4.99	S	159	30.37	E	GPS	2687	2689	3	2711	2720	1	19.3C	
49MR03K04_1	P06	225	1	ROS	080703	0830	EN	30	4.49	S	159	31.50	E	GPS	2663	2665						
49MR03K04_1	P06	224	1	ROS	080703	1023	BE	30	5.07	S	160	0.26	E	GPS	1656	1659			17	1-6		
49MR03K04_1	P06	224	1	BUC	080703	1031	UN	30	5.09	S	160	0.47	E	GPS	1660	1655				1	19.4C	
49MR03K04_1	P06	224	1	ROS	080703	1055	BO	30	5.04	S	160	0.78	E	GPS	1630	1633	3	1634	1651			
49MR03K04_1	P06	224	1	ROS	080703	1156	EN	30	4.92	S	160	1.71	E	GPS	1601	1602						
49MR03K04_1	P06	223	1	ROS	080703	1347	BE	30	4.96	S	160	29.96	E	GPS	1518	1521			18	1-6,9,22,23,24,26,46,47		
49MR03K04_1	P06	223	1	BUC	080703	1354	UN	30	4.89	S	160	29.98	E	GPS	1528	1521				1	19.3C	
49MR03K04_1	P06	223	1	ROS	080703	1409	BO	30	4.77	S	160	30.06	E	GPS	1521	1520	7	1514	1527			
49MR03K04_1	P06	223	1	ROS	080703	1514	EN	30	4.45	S	160	30.26	E	GPS	1524	1523						
49MR03K04_1	P06	222	1	ROS	080703	1715	BE	30	5.08	S	160	59.87	E	GPS	1275	1275			16	1-6		
49MR03K04_1	P06	222	1	BUC	080703	1717	UN	30	5.07	S	160	59.86	E	GPS	1274	1275				1	18.7C	
49MR03K04_1	P06	222	1	ROS	080703	1743	BO	30	4.97	S	160	59.76	E	GPS	1272	1272	5	1268	1278			
49MR03K04_1	P06	222	1	ROS	080703	1838	EN	30	4.72	S	160	59.57	E	GPS	1266	1266						
49MR03K04_1	P06	221	1	ROS	080703	2047	BE	30	5.15	S	161	30.01	E	GPS	1181	1182			18	1-6,12,13,1523,24,26,34,35,45,48	2 BTLS FOR BIO (5DB)	
49MR03K04_1	P06	221	1	BUC	080703	2051	UN	30	5.15	S	161	29.99	E	GPS	1181	1182				1	19.7C	
49MR03K04_1	P06	221	1	ROS	080703	2112	BO	30	5.11	S	161	29.91	E	GPS	1181	1181	4	1176	1186			
49MR03K04_1	P06	221	1	ROS	080703	2201	EN	30	5.02	S	161	29.83	E	GPS	1182	1182					IRREGULAR OSCILLATION WITH SHIFTER OF THE WINCH	
49MR03K04_1	P06	220	1	ROS	080803	0032	BE	30	4.95	S	162	10.10	E	GPS	1151	1151			17	1-6,34,35,48	2 BTLS FOR BIO (5DB)	
49MR03K04_1	P06	220	1	UNK	080803	0038	BE	30	4.91	S	162	10.12	E	GPS	1152	1152					SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	220	1	BUC	080803	0041	UN	30	4.88	S	162	10.12	E	GPS	1151	1152				1	18.7C	
49MR03K04_1	P06	220	1	ROS	080803	0101	BO	30	4.73	S	162	10.24	E	GPS	1152	1152	8	1135	1154			
49MR03K04_1	P06	220	1	UNK	080803	0128	EN	30	4.53	S	162	10.40	E	GPS	1151	1152						
49MR03K04_1	P06	220	1	ROS	080803	0202	EN	30	4.20	S	162	10.60	E	GPS	1150	1151						
49MR03K04_1	P06	219	1	UNK	080803	0456	BE	30	4.94	S	162	49.95	E	GPS	1150	1149					SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	219	1	UNK	080803	0524	EN	30	5.00	S	162	49.86	E	GPS	1149	1149						
49MR03K04_1	P06	219	1	ROS	080803	0639	BE	30	4.97	S	162	50.00	E	GPS	1150	1150			16	1-6,7,8,23,24,26,27		
49MR03K04_1	P06	219	1	BUC	080803	0648	UN	30	4.93	S	162	50.01	E	GPS	1150	1149				1	18.6C	
49MR03K04_1	P06	219	1	ROS	080803	0707	BO	30	4.79	S	162	50.07	E	GPS	1150	1150	4	1148	1155			
49MR03K04_1	P06	219	1	ROS	080803	0753	EN	30	4.53	S	162	50.32	E	GPS	1150	1150						
49MR03K04_1	P06	218	1	ROS	080803	1029	BE	30	4.92	S	163	30.26	E	GPS	1445	1443			16	1-6		
49MR03K04_1	P06	218	1	BUC	080803	1036	UN	30	4.87	S	163	30.32	E	GPS	1445	1443				1	18.4C	
49MR03K04_1	P06	218	1	ROS	080803	1100	BO	30	4.81	S	163	30.45	E	GPS	1443	1440	6	1435	1448			
49MR03K04_1	P06	218	1	ROS	080803	1150	EN	30	4.52	S	163	30.87	E	GPS	1452	1451						
49MR03K04_1	P06	217	1	ROS	080803	1332	BE	30	4.93	S	163	55.04	E	GPS	1954	1951			20	1-6,23,24,26		
49MR03K04_1	P06	217	1	BUC	080803	1336	UN	30	4.90	S	163	55.02	E	GPS	1953	1952				1	19.1C	
49MR03K04_1	P06	217	1	ROS	080803	1406	BO	30	4.76	S	163	54.93	E	GPS	1962	1960	5	1957	1972			
49MR03K04_1	P06	217	1	ROS	080803	1506	EN	30	4.51	S	163	54.64	E	GPS	1977	1970						
49MR03K04_1	P06	216	1	ROS	080803	1655	BE	30	4.86	S	164	20.01	E	GPS	3291	3292			26	1-6		
49MR03K04_1	P06	216	1	ROS	080803	1752	BO	30	4.97	S	164	19.68	E	GPS	3290	3292	6	3295	3330			
49MR03K04_1	P06	216	1	BUC	080803	1835	UN	30	5.05	S	164	19.39	E	GPS	3288	3290				1	18.8C	
49MR03K04_1	P06	216	1	ROS	080803	1922	EN	30	5.15	S	164	19.01	E	GPS	3281	3284						
49MR03K04_1	P06	215	1	ROS	080803	2121	BE	30	5.20	S	164	50.06	E	GPS	3375	3380			29	1-6,12,13,23,24,26,34,35,48	2 BTLS FOR BIO (5DB)	
49MR03K04_1	P06	215	1	UNK	080803	2127	BE	30	5.16	S	164	50.04	E	GPS	3379	3380					SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	215	1	ROS	080803	2217	BO	30	4.88	S	164	50.04	E	GPS	3376	3381	5	3391	3421			#3=#20 DUPLICATE SMPLS (1600DB)

49MR03K04_1	P06	215	1	UNK	080803	2250	EN	30	4.63	S	164	50.27	E	GPS	3375	3379		
49MR03K04_1	P06	215	1	BUC	080803	2252	UN	30	4.62	S	164	50.27	E	GPS	3378	3381	1	18.7C
49MR03K04_1	P06	215	1	ROS	080803	2349	EN	30	4.18	S	164	50.47	E	GPS	3377	3380		
49MR03K04_1	P06	214	1	ROS	080903	0203	BE	30	4.51	S	165	24.39	E	GPS	3374	3375	36	1-6,9,22,34,35,47,48
49MR03K04_1	P06	214	1	UNK	080903	0220	BE	30	4.32	S	165	24.40	E	GPS	3375	3374		2 BTLS FOR BIO (4DB), 7 BTLS FOR R.N.
49MR03K04_1	P06	214	1	ROS	080903	0258	BO	30	4.14	S	165	24.63	E	GPS	3374	3376	6	3391 3415
49MR03K04_1	P06	214	1	UNK	080903	0300	EN	30	4.12	S	165	24.63	E	GPS	3376	3378		SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	214	1	BUC	080903	0325	UN	30	3.96	S	165	24.71	E	GPS	3376	3377	1	18.7C
49MR03K04_1	P06	214	1	ROS	080903	0422	EN	30	3.68	S	165	25.02	E	GPS	3375	3376		
49MR03K04_1	P06	213	1	ROS	080903	0615	BE	30	5.10	S	165	49.97	E	GPS	2421	2420	22	1-8,15,23,24,26,27,45
49MR03K04_1	P06	213	1	BUC	080903	0620	UN	30	5.05	S	165	50.02	E	GPS	2415	2419	1	18.6C
49MR03K04_1	P06	213	1	ROS	080903	0656	BO	30	4.97	S	165	50.15	E	GPS	2411	2412	3	2413 2437
49MR03K04_1	P06	213	1	ROS	080903	0806	EN	30	4.88	S	165	50.40	E	GPS	2423	2423		
49MR03K04_1		402	1	UNK	080903	2059	BE	30	4.66	S	166	29.84	E	GPS	3118	3115		MAGNETOMETER CALIBRATION
49MR03K04_1		402	1	UNK	080903	2122	EN	30	4.66	S	166	29.84	E	GPS	3116	3115		
49MR03K04_1		403	1	UNK	080903	2314	BE	30	5.75	S	166	32.50	E	GPS	3120	3122		SOLAR LIGHT MEASUREMENT
49MR03K04_1		403	1	UNK	080903	2350	EN	30	5.96	S	166	33.48	E	GPS	3120	3119		
49MR03K04_1		403	1	BIO	081003	0004	UN	30	6.03	S	166	33.86	E	GPS	3116	3116	4	34,35,48
49MR03K04_1	P06	212	1	ROS	081003	1317	BE	30	4.56	S	166	29.72	E	GPS	3115	3117	25	1-6
49MR03K04_1	P06	212	1	ROS	081003	1407	BO	30	4.84	S	166	30.07	E	GPS	3110	3115	7	3134 3148
49MR03K04_1	P06	212	1	BUC	081003	1437	UN	30	5.00	S	166	30.21	E	GPS	3114	3114	1	#18 LEAK, #22 NO SMPL
49MR03K04_1	P06	212	1	ROS	081003	1534	EN	30	5.39	S	166	30.47	E	GPS	3113	3112		18.1C
49MR03K04_1	P06	211	1	ROS	081003	1734	BE	30	5.08	S	166	59.97	E	GPS	2841	2840	24	1-6,12,13,23,24,26,46
49MR03K04_1	P06	211	1	BUC	081003	1740	UN	30	5.12	S	166	59.96	E	GPS	2844	2840	1	START FROM 10DB
49MR03K04_1	P06	211	1	ROS	081003	1820	BO	30	5.24	S	167	0.25	E	GPS	2843	2845	6	2861 2874
49MR03K04_1	P06	211	1	ROS	081003	1940	EN	30	5.63	S	167	0.56	E	GPS	2871	2876		17.8C
49MR03K04_1	P06	210	1	ROS	081103	0047	BE	30	4.84	S	167	29.95	E	GPS	1245	1247	17	1-6,34,35,48
49MR03K04_1	P06	210	1	UNK	081103	0049	BE	30	4.85	S	167	29.95	E	GPS	1251	1247		START FROM 15DB, 2 BTLS FOR BIO (10DB)
49MR03K04_1	P06	210	1	BUC	081103	0051	UN	30	4.87	S	167	29.96	E	GPS	1231	1247	1	SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	210	1	UNK	081103	0112	EN	30	5.00	S	167	30.07	E	GPS	1200	1192		18.2C
49MR03K04_1	P06	210	1	ROS	081103	0113	BO	30	5.00	S	167	30.08	E	GPS	1180	1187	32	1188 1189
49MR03K04_1	P06	210	1	ROS	081103	0201	EN	30	5.35	S	167	30.50	E	GPS	1047	1050		
49MR03K04_1	P06	209	1	ROS	081103	0403	BE	30	4.94	S	167	59.69	E	GPS	1199	1194	18	1-6,7,8,23,24,26,27,34,35,48
49MR03K04_1	P06	209	1	UNK	081103	0405	BE	30	4.92	S	167	59.76	E	GPS	1194	1197		#3=#25 DUPLICATE SMPLS (800DB),
49MR03K04_1	P06	209	1	BUC	081103	0407	UN	30	4.91	S	167	59.77	E	GPS	1191	1194		2 BTLS FOR BIO (10DB)
49MR03K04_1	P06	209	1	ROS	081103	0426	BO	30	4.89	S	167	59.93	E	GPS	1201	1207	7	1193 1192
49MR03K04_1	P06	209	1	UNK	081103	0440	EN	30	4.91	S	168	0.03	E	GPS	1221	1222		SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	209	1	ROS	081103	0516	EN	30	5.03	S	168	0.29	E	GPS	1250	1249		
49MR03K04_1	P06	208	1	ROS	081103	0719	BE	30	4.18	S	168	29.74	E	GPS	3339	3341	26	1-6
49MR03K04_1	P06	208	1	ROS	081103	0812	BO	30	4.30	S	168	29.92	E	GPS	3338	3338	6	3352 3381
49MR03K04_1	P06	208	1	BUC	081103	0846	UN	30	4.38	S	168	30.01	E	GPS	3334	3341	1	17.8C
49MR03K04_1	P06	208	1	ROS	081103	0943	EN	30	4.46	S	168	30.14	E	GPS	3339	3340		
49MR03K04_1	P06	207	1	ROS	081103	1147	BE	30	5.04	S	168	59.96	E	GPS	3165	3166	26	1-6,12,13,23,24,26,46
49MR03K04_1	P06	207	1	ROS	081103	1241	BO	30	5.22	S	169	0.30	E	GPS	3124	3126	27	3135 3153
49MR03K04_1	P06	207	1	BUC	081103	1308	UN	30	5.20	S	169	0.49	E	GPS	3135	3127	1	START FROM 15DB
49MR03K04_1	P06	207	1	ROS	081103	1412	EN	30	5.07	S	169	0.94	E	GPS	3114	3120		#11=#14 DUPLICATE SMPLS (2800DB)
49MR03K04_1	P06	206	1	ROS	081103	1615	BE	30	5.07	S	169	29.66	E	GPS	2702	2704	29	1-6,9,22,47
49MR03K04_1	P06	206	1	BUC	081103	1629	UN	30	4.95	S	169	29.91	E	GPS	2708	2707	1	6 BTLS FOR R.N.
49MR03K04_1	P06	206	1	ROS	081103	1709	BO	30	4.88	S	169	30.16	E	GPS	2720	2720	4	2723 2743

49MR03K04_1	P06	206	1	ROS	081103	1829	EN	30	4.78	S	169	30.66	E	GPS	2740	2744				
49MR03K04_1	P06	205	1	ROS	081103	2047	BE	30	4.81	S	169	59.86	E	GPS	2945	2944			25	1-6,7,8,23,24,26,27,34,35,48
49MR03K04_1	P06	205	1	BUC	081103	2056	UN	30	4.86	S	169	59.80	E	GPS	2943	2940				
49MR03K04_1	P06	205	1	ROS	081103	2141	BO	30	4.78	S	169	59.97	E	GPS	2945	2943		5	2951	2975
49MR03K04_1	P06	205	1	UNK	081103	2152	BE	30	4.78	S	170	0.03	E	GPS	2947	2944				
49MR03K04_1	P06	205	1	UNK	081103	2237	EN	30	4.69	S	170	0.22	E	GPS	2945	2946				
49MR03K04_1	P06	205	1	ROS	081103	2309	EN	30	4.62	S	170	0.49	E	GPS	2951	2951				
49MR03K04_1	P06	204	1	ROS	081203	0113	BE	30	5.01	S	170	29.97	E	GPS	2931	2929			25	1-6,34,35,48
49MR03K04_1	P06	204	1	BUC	081203	0125	UN	30	4.86	S	170	30.06	E	GPS	2903	2900				
49MR03K04_1	P06	204	1	UNK	081203	0145	BE	30	4.76	S	170	30.33	E	GPS	2767	2753				
49MR03K04_1	P06	204	1	UNK	081203	0207	EN	30	4.77	S	170	30.55	E	GPS	2700	2707				
49MR03K04_1	P06	204	1	ROS	081203	0209	BO	30	4.76	S	170	30.57	E	GPS	2704	2699		38	2717	2712
49MR03K04_1	P06	204	1	ROS	081203	0333	EN	30	4.65	S	170	31.17	E	GPS	2577	2575				
49MR03K04_1	P06	203	1	ROS	081203	0640	BE	30	5.07	S	171	0.24	E	GPS	2136	2141			20	1-6,23,24,26
49MR03K04_1	P06	203	1	BUC	081203	0645	UN	30	5.09	S	171	0.27	E	GPS	2140	2140				
49MR03K04_1	P06	203	1	ROS	081203	0726	BO	30	5.18	S	171	1.02	E	GPS	2130	2131		5	2241	2154
49MR03K04_1	P06	203	1	ROS	081203	0837	EN	30	5.50	S	171	1.83	E	GPS	2112	2111				
49MR03K04_1	P06	202	1	ROS	081203	0953	BE	30	4.89	S	171	16.68	E	GPS	585	583			11	1-6
49MR03K04_1	P06	202	1	BUC	081203	0957	UN	30	4.89	S	171	16.77	E	GPS	589	587				
49MR03K04_1	P06	202	1	ROS	081203	1019	BO	30	4.92	S	171	17.14	E	GPS	603	604		7	611	599
49MR03K04_1	P06	202	1	ROS	081203	1051	EN	30	5.03	S	171	17.68	E	GPS	648	669				
49MR03K04_1	P06	201	1	ROS	081203	1200	BE	30	5.28	S	171	30.06	E	GPS	2238	2238			21	1-6,7,8,12,13,15,23,24,26,27,45
49MR03K04_1	P06	201	1	BUC	081203	1205	UN	30	5.34	S	171	30.18	E	GPS	2239	2246				
49MR03K04_1	P06	201	1	ROS	081203	1249	BO	30	5.74	S	171	30.96	E	GPS	2257	2254		6	2357	2266
49MR03K04_1	P06	201	1	ROS	081203	1408	EN	30	6.25	S	171	32.27	E	GPS	2268	2271				
49MR03K04_1	P06	200	1	ROS	081203	1612	BE	30	5.19	S	172	0.17	E	GPS	2787	2783			31	1-6,9,22,47
49MR03K04_1	P06	200	1	BUC	081203	1615	UN	30	5.24	S	172	0.21	E	GPS	2789	2794				
49MR03K04_1	P06	200	1	ROS	081203	1713	BO	30	5.69	S	172	0.89	E	GPS	2771	2775		3	2883	2837
49MR03K04_1	P06	200	1	ROS	081203	1840	EN	30	6.23	S	172	1.80	E	GPS	2743	2743				
49MR03K04_1	P06	199	1	ROS	081203	2048	BE	30	5.10	S	172	29.77	E	GPS	2135	2136			23	1-6,23,24,26,34,35,46,48
49MR03K04_1	P06	199	1	BUC	081203	2055	UN	30	5.15	S	172	29.77	E	GPS	2136	2135				
49MR03K04_1	P06	199	1	UNK	081203	2125	BE	30	5.40	S	172	29.74	E	GPS	2141	2141				
49MR03K04_1	P06	199	1	ROS	081203	2132	BO	30	5.41	S	172	29.75	E	GPS	2135	2139		7	2141	2156
49MR03K04_1	P06	199	1	UNK	081203	2146	EN	30	5.49	S	172	29.77	E	GPS	2129	2128				
49MR03K04_1	P06	199	1	ROS	081203	2238	EN	30	5.89	S	172	30.08	E	GPS	2127	2127				
49MR03K04_1	P06	198	1	ROS	081303	0040	BE	30	5.04	S	172	59.87	E	GPS	1383	1380			19	1-6,34,35,48
49MR03K04_1	P06	198	1	BUC	081303	0052	UN	30	5.00	S	173	0.07	E	GPS	1403	1403				
49MR03K04_1	P06	198	1	ROS	081303	0117	BO	30	4.97	S	173	0.47	E	GPS	1413	1417		8	1430	1423
49MR03K04_1	P06	198	1	UNK	081303	0132	BE	30	4.95	S	173	0.68	E	GPS	1401	1416				
49MR03K04_1	P06	198	1	UNK	081303	0202	EN	30	4.93	S	173	1.15	E	GPS	1412	1417				
49MR03K04_1	P06	198	1	ROS	081303	0210	EN	30	4.89	S	173	1.29	E	GPS	1433	1432				
49MR03K04_1	P06	197	1	ROS	081303	0401	BE	30	5.15	S	173	29.70	E	GPS	2458	2459			23	1-6,23,24,26
49MR03K04_1	P06	197	1	BUC	081303	0403	UN	30	5.12	S	173	29.75	E	GPS	2459	2458				
49MR03K04_1	P06	197	1	ROS	081303	0451	BO	30	4.98	S	173	30.50	E	GPS	2608	2604		7	2636	2615
49MR03K04_1	P06	197	1	ROS	081303	0604	EN	30	4.48	S	173	31.53	E	GPS	2781	2780				
49MR03K04_1	P06	196	1	ROS	081303	0802	BE	30	5.07	S	173	59.91	E	GPS	3368	3364			26	1-6
49MR03K04_1	P06	196	1	ROS	081303	0858	BO	30	4.74	S	174	0.37	E	GPS	3357	3354		5	3402	3401
49MR03K04_1	P06	196	1	BUC	081303	0930	UN	30	4.53	S	174	0.64	E	GPS	3347	3343				
49MR03K04_1	P06	196	1	ROS	081303	1028	EN	30	4.04	S	174	1.28	E	GPS	3344	3343				18.1C
49MR03K04_1	P06	195	1	ROS	081303	1241	BE	30	4.96	S	174	29.82	E	GPS	3636	3592			28	1-6,12,13,23,24,26



49MR03K04_1	P06	195	1	ROS	081303	1347	BO	30	4.32	S	174	30.68	E	GPS	3732	3739	7	3728	3692							
49MR03K04_1	P06	195	1	BUC	081303	1432	UN	30	3.93	S	174	31.10	E	GPS	3782	3781				1	18.5C					
49MR03K04_1	P06	195	1	ROS	081303	1533	EN	30	3.39	S	174	31.93	E	GPS	3865	3866										
49MR03K04_1	P06	194	1	ROS	081303	1821	BE	30	4.80	S	175	10.02	E	GPS	4129	4124				36	1-6,9,22,47	START FROM 15DB				
49MR03K04_1	P06	194	1	ROS	081303	1934	BO	30	4.25	S	175	10.67	E	GPS	4149	4149	4	4203	4203			7	BTLS FOR R.N.			
49MR03K04_1	P06	194	1	BUC	081303	2026	UN	30	4.04	S	175	11.01	E	GPS	4153	4150				1		17.5C				
49MR03K04_1	P06	194	1	BIO	081303	2038	UN	30	4.01	S	175	11.07	E	GPS	4153	4153					34,35,48	BIO-OPTICAL SAMPLING (NISKIN AND BUCKET)				
49MR03K04_1	P06	194	1	ROS	081303	2122	EN	30	3.85	S	175	11.53	E	GPS	4154	4155										
49MR03K04_1	P06	X14	1	ROS	081403	0052	BE	30	0.63	S	176	0.81	E	GPS	4272	4275				33	1-6,7,8,15,23,24,26,27,34,35,45,48	2	BTLS FOR BIO (10DB), #4	BACKUP OF #22		
49MR03K04_1	P06	X14	1	UNK	081403	0126	BE	30	0.44	S	176	1.07	E	GPS	4272	4271							SOLAR LIGHT MEASUREMENT			
49MR03K04_1	P06	X14	1	ROS	081403	0210	BO	30	0.34	S	176	1.48	E	GPS	4276	4276	6	4319	4332							
49MR03K04_1	P06	X14	1	UNK	081403	0231	EN	30	0.21	S	176	1.60	E	GPS	4271	4272										
49MR03K04_1	P06	X14	1	BUC	081403	0325	UN	29	59.98	S	176	1.95	E	GPS	4272	4274				1			17.7C			
49MR03K04_1	P06	X14	1	ROS	081403	0424	EN	29	59.72	S	176	2.48	E	GPS	4272	4271										
49MR03K04_1	P06	192	1	ROS	081403	0626	BE	30	4.95	S	176	29.98	E	GPS	4292	4294				30	1-6					
49MR03K04_1	P06	192	1	ROS	081403	0738	BO	30	4.77	S	176	30.68	E	GPS	4294	4292	4	4328	4352							
49MR03K04_1	P06	192	1	BUC	081403	0831	UN	30	4.59	S	176	30.98	E	GPS	4294	4292				1			18.1C			
49MR03K04_1	P06	192	1	ROS	081403	0934	EN	30	4.35	S	176	31.61	E	GPS	4292	4291										
49MR03K04_1	P06	191	1	ROS	081403	1253	BE	30	34.92	S	177	0.00	E	GPS	4297	4299				31	1-6,12,13,23,24,26					
49MR03K04_1	P06	191	1	ROS	081403	1400	BO	30	34.48	S	177	0.31	E	GPS	4296	4297	7	4335	4354							
49MR03K04_1	P06	191	1	BUC	081403	1529	UN	30	34.00	S	177	0.67	E	GPS	4289	4289				1			17.5C			
49MR03K04_1	P06	191	1	ROS	081403	1629	EN	30	33.71	S	177	0.63	E	GPS	4286	4285										
49MR03K04_1	P06	190	1	ROS	081403	1942	BE	31	4.98	S	177	32.36	E	GPS	4136	4132				31	1-6,34,35,48		2	BTLS FOR BIO (5DB)		
49MR03K04_1	P06	190	1	ROS	081403	2047	BO	31	4.76	S	177	32.17	E	GPS	4137	4136	7	4135	4189							
49MR03K04_1	P06	190	1	UNK	081403	2121	BE	31	4.77	S	177	31.84	E	GPS	4138	4143								SOLAR LIGHT MEASUREMENT		
49MR03K04_1	P06	190	1	BUC	081403	2146	UN	31	4.64	S	177	31.71	E	GPS	4144	4143				1				17.4C		
49MR03K04_1	P06	190	1	UNK	081403	2205	EN	31	4.54	S	177	31.60	E	GPS	4142	4140										
49MR03K04_1	P06	190	1	ROS	081403	2242	EN	31	4.42	S	177	31.55	E	GPS	4140	4140										
49MR03K04_1	P06	186	1	ROS	081503	0131	BE	31	35.00	S	178	0.08	E	GPS	3817	3818				31	1-6,23,24,26,34,35,48		#3=#13	DUPLICATE SMPLS (3500DB),		
																								2	BTLS FOR BIO (10DB)	
																									SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	186	1	UNK	081503	0146	BE	31	34.91	S	178	0.06	E	GPS	3820	3820										
49MR03K04_1	P06	186	1	UNK	081503	0203	EN	31	34.86	S	178	0.11	E	GPS	3824	3825										
49MR03K04_1	P06	186	1	ROS	081503	0233	BO	31	34.88	S	178	0.19	E	GPS	3824	3824	6	3816	3869							
49MR03K04_1	P06	186	1	BUC	081503	0308	UN	31	35.03	S	178	0.32	E	GPS	3816	3817				1					17.2C	
49MR03K04_1	P06	186	1	ROS	081503	0415	EN	31	35.62	S	178	0.76	E	GPS	3811	3812										
49MR03K04_1	P06	185	1	ROS	081503	0706	BE	32	5.06	S	178	30.21	E	GPS	3112	3117				26	1-6					
49MR03K04_1	P06	185	1	ROS	081503	0759	BO	32	5.12	S	178	30.87	E	GPS	3161	3158	8	3183	3161							
49MR03K04_1	P06	185	1	BUC	081503	0828	UN	32	5.20	S	178	30.91	E	GPS	3152	3148				1					17.3C	
49MR03K04_1	P06	185	1	ROS	081503	0929	EN	32	5.35	S	178	31.55	E	GPS	3134	3132										
49MR03K04_1	P06	184	1	ROS	081503	1155	BE	32	30.04	S	178	54.92	E	GPS	1544	1543				18	1-6,23,24,26					
49MR03K04_1	P06	184	1	BUC	081503	1200	UN	32	30.07	S	178	54.95	E	GPS	1545	1548				1					16.7C	
49MR03K04_1	P06	184	1	ROS	081503	1224	BO	32	30.15	S	178	54.78	E	GPS	1527	1530	4	1560	1556						#19=#21	DUPLICATE SMPLS (1400DB)
49MR03K04_1	P06	184	1	ROS	081503	1318	EN	32	30.42	S	178	54.53	E	GPS	1536	1538										
49MR03K04_1	P06	183	1	ROS	081503	1519	BE	32	30.03	S	179	25.14	E	GPS	3063	3062				24	1-6					
49MR03K04_1	P06	183	1	ROS	081503	1608	BO	32	30.46	S	179	25.13	E	GPS	3079	3077	6	3034	3057							
49MR03K04_1	P06	183	1	BUC	081503	1634	UN	32	30.60	S	179	25.12	E	GPS	3049	3059				1					17.0C	
49MR03K04_1	P06	183	1	ROS	081503	1733	EN	32	31.34	S	179	25.10	E	GPS	2931	2900										
49MR03K04_1	P06	182	1	ROS	081503	1931	BE	32	30.05	S	179	55.02	E	GPS	2797	2790				27	1-6,12,13,23,24,26,34,35,46,48		#3=#18	DUPLICATE SMPLS (2000DB),		
																								2	BTLS FOR BIO (5DB)	
49MR03K04_1	P06	182	1	BUC	081503	1936	UN	32	30.14	S	179	55.11	E	GPS	2806	2797				1					16.9C	

49MR03K04_1	P06	182	1	ROS	081503	2018	BO	32	30.55	S	179	55.36	E	GPS	2979	2978	6	2888	2874				
49MR03K04_1	P06	182	1	ROS	081503	2139	EN	32	31.06	S	179	55.93	E	GPS	3001	3023							
49MR03K04_1	P06	181	1	ROS	081503	2328	BE	32	30.25	S	179	35.05	W	GPS	2990	2990				26	1-6,34,35,48	2 BTLS FOR BIO (10DB) SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	181	1	UNK	081503	2330	BE	32	30.27	S	179	35.03	W	GPS	2985	2985							
49MR03K04_1	P06	181	1	BUC	081503	2336	UN	32	30.29	S	179	34.81	W	GPS	2966	2979					1	17.1C	
49MR03K04_1	P06	181	1	UNK	081603	0001	EN	32	30.34	S	179	34.61	W	GPS	2946	2952							
49MR03K04_1	P06	181	1	ROS	081603	0025	BO	32	30.47	S	179	34.51	W	GPS	2933	2934	8	2986	2995				
49MR03K04_1	P06	181	1	ROS	081603	0147	EN	32	30.99	S	179	33.71	W	GPS	2824	2827							
49MR03K04_1	P06	180	1	ROS	081603	0413	BE	32	29.95	S	178	54.77	W	GPS	1999	2001				21	1-6,23,24,26	#1=#33 DUPLICATE SMPLS (150DB), #2 BACKUP OF #22 16.3C	
49MR03K04_1	P06	180	1	BUC	081603	0415	UN	32	29.92	S	178	54.75	W	GPS	2000	2001					1		
49MR03K04_1	P06	180	1	ROS	081603	0452	BO	32	29.89	S	178	54.32	W	GPS	2010	2010	4	2014	2015				
49MR03K04_1	P06	180	1	ROS	081603	0552	EN	32	29.90	S	178	53.77	W	GPS	2071	2070							
49MR03K04_1	P06	179	1	ROS	081603	0727	BE	32	30.05	S	178	38.70	W	GPS	3488	3487				27	1-6	#1 BACKUP OF #22	
49MR03K04_1	P06	179	1	ROS	081603	0826	BO	32	30.23	S	178	38.20	W	GPS	3572	3570	8	3550	3568				
49MR03K04_1	P06	179	1	BUC	081603	0904	UN	32	30.35	S	178	37.92	W	GPS	3608	3607					1	16.0C	
49MR03K04_1	P06	179	1	ROS	081603	0959	EN	32	30.43	S	178	37.36	W	GPS	3601	3599							
49MR03K04_1	P06	178	1	ROS	081603	1054	BE	32	30.04	S	178	27.92	W	GPS	4465	4459				31	1-6,23,24,26,46		
49MR03K04_1	P06	178	1	ROS	081603	1208	BO	32	30.36	S	178	27.42	W	GPS	4522	4519	7	4499	4527				
49MR03K04_1	P06	178	1	BUC	081603	1312	UN	32	30.62	S	178	27.13	W	GPS	4532	4541					1	16.3C	
49MR03K04_1	P06	178	1	ROS	081603	1404	EN	32	30.92	S	178	26.70	W	GPS	4546	4541							
49MR03K04_1		404	1	UNK	081603	1907	BE	31	55.43	S	177	19.84	W	GPS	9833	9833						CTD CABLE RESPOOLING (WO 7800M)	
49MR03K04_1		404	2	UNK	081603	2254	BE	31	56.65	S	177	18.29	W	GPS	9997	9997						SOLAR LIGHT MEASUREMENT	
49MR03K04_1		404	1	BIO	081603	2300	UN	31	56.70	S	177	18.24	W	GPS	9999	9999		7934		34	35,48	BIO-OPTICAL SAMPLING (BUCKET)	
49MR03K04_1		404	2	UNK	081603	2323	EN	31	56.91	S	177	17.89	W	GPS	9997	9996							
49MR03K04_1		404	1	UNK	081703	0050	EN	31	57.59	S	177	17.05	W	GPS	9904	9905							
49MR03K04_1	P06	177	1	ROS	081703	1759	BE	32	30.05	S	178	16.99	W	GPS	5104	5111				35	1-6,34,35,48	2 BTLS FOR BIO (5DB)	
49MR03K04_1	P06	177	1	ROS	081703	1921	BO	32	30.33	S	178	16.98	W	GPS	5198	5197	9	5189	5272				
49MR03K04_1	P06	177	1	BUC	081703	2035	UN	32	30.77	S	178	16.72	W	GPS	5140	5134					1	16.3C	
49MR03K04_1	P06	177	1	UNK	081703	2041	BE	32	30.81	S	178	16.66	W	GPS	5076	5074						SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	177	1	UNK	081703	2118	EN	32	31.12	S	178	16.47	W	GPS	5035	5033						SPOOL ADJUSTMENTS 4250, 3550M	
49MR03K04_1	P06	177	1	ROS	081703	2127	EN	32	31.24	S	178	16.41	W	GPS	5027	5027							
49MR03K04_1	P06	176	1	ROS	081703	2241	BE	32	30.21	S	178	0.14	W	GPS	5876	5874				36	1-6,23,24,26		
49MR03K04_1	P06	176	1	ROS	081803	0015	BO	32	30.85	S	177	59.62	W	GPS	5888	5889	6	5943	5975				SPOOL ADJUSTMENTS 5299M SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	176	1	UNK	081803	0030	BE	32	30.88	S	177	59.61	W	GPS	5889	5900							
49MR03K04_1	P06	176	1	UNK	081803	0123	EN	32	31.11	S	177	59.37	W	GPS	5916	5916							
49MR03K04_1	P06	176	1	BUC	081803	0141	UN	32	31.20	S	177	59.28	W	GPS	5916	5917					1,34,35,48	16.8C, 20L FOR BIO	
49MR03K04_1	P06	176	1	ROS	081803	0236	EN	32	31.52	S	177	58.97	W	GPS	5946	5946							
49MR03K04_1	P06	175	1	ROS	081803	0413	BE	32	30.06	S	177	39.95	W	GPS	7458	7452				36	1-6,9,22,47	REMOVE LADCP, ALTIMETER, FLUOROMETER	
49MR03K04_1	P06	175	1	ROS	081803	0543	BO	32	30.21	S	177	39.68	W	GPS	7510	7509	-9	6380	6502				
49MR03K04_1	P06	175	1	BUC	081803	0730	UN	32	30.70	S	177	39.48	W	GPS	7551	7549					1	16.5C	
49MR03K04_1	P06	175	1	ROS	081803	0818	EN	32	30.91	S	177	39.35	W	GPS	7602	7597							
49MR03K04_1	P06	174	1	ROS	081803	1000	BE	32	30.07	S	177	15.18	W	GPS	7421	7414				36	1-6,12,13,15,23,24,26,45,46	REMOVE LADCP, ALTIMETER, FLUOROMETER	
49MR03K04_1	P06	174	1	ROS	081803	1132	BO	32	29.75	S	177	15.51	W	GPS	7182	7166	-9	6391	6500				
49MR03K04_1	P06	174	1	BUC	081803	1326	UN	32	29.59	S	177	15.82	W	GPS	7180	7179					1	16.8C	
49MR03K04_1	P06	174	1	ROS	081803	1422	EN	32	29.37	S	177	15.90	W	GPS	7192	7195							
49MR03K04_1		405	1	UNK	081803	1722	BE	31	59.52	S	177	20.01	W	GPS	9962	9965						CTD CABLE RESPOOLING (WO 8054M)	
49MR03K04_1		405	1	BIO	081803	2058	UN	31	59.73	S	177	18.61	W	GPS	9839	9838				34	35,48	BIO-OPTICAL SAMPLING (BUCKET)	
49MR03K04_1		405	2	UNK	081803	2115	BE	31	59.73	S	177	18.46	W	GPS	9833	9831						SOLAR LIGHT MEASUREMENT	
49MR03K04_1		405	2	UNK	081803	2125	EN	31	59.72	S	177	18.34	W	GPS	9814	9833							

49MR03K04_1		405	1	UNK	081803	2141	EN	31	59.75	S	177	18.04	W	GPS	9876	9876			
49MR03K04_1	P06	173	1	ROS	081903	0034	BE	32	29.91	S	176	45.13	W	GPS	6135	6136	36	1-6	
49MR03K04_1	P06	173	1	UNK	081903	0056	BE	32	29.72	S	176	45.02	W	GPS	6136	6137			SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	173	1	UNK	081903	0125	EN	32	29.55	S	176	44.85	W	GPS	6136	6136			
49MR03K04_1	P06	173	1	ROS	081903	0207	BO	32	29.38	S	176	44.67	W	GPS	6139	6140	7	6166	6253
49MR03K04_1	P06	173	1	BUC	081903	0340	UN	32	29.11	S	176	44.37	W	GPS	6134	6135			1, 34, 35, 48
49MR03K04_1	P06	173	1	ROS	081903	0441	EN	32	28.87	S	176	44.48	W	GPS	6139	6139			16.6C, 20L FOR BIO
49MR03K04_1	P06	172	1	ROS	081903	0636	BE	32	30.14	S	176	14.98	W	GPS	5711	5711			
49MR03K04_1	P06	172	1	ROS	081903	0802	BO	32	29.78	S	176	15.11	W	GPS	5820	5826	7	5754	5862
49MR03K04_1	P06	172	1	BUC	081903	0933	UN	32	29.41	S	176	15.38	W	GPS	5843	5839			36 1-6,23,24,26
49MR03K04_1	P06	172	1	ROS	081903	1024	EN	32	29.19	S	176	15.56	W	GPS	5867	5846			#1=#5 DUPLICATE SMPLS (5000DB)
49MR03K04_1	P06	171	1	ROS	081903	1225	BE	32	30.06	S	175	44.93	W	GPS	5886	5884			1
49MR03K04_1	P06	171	1	ROS	081903	1355	BO	32	29.72	S	175	45.19	W	GPS	5878	5879	7	5891	5986
49MR03K04_1	P06	171	1	BUC	081903	1518	UN	32	29.57	S	175	45.50	W	GPS	5871	5872			16.8C
49MR03K04_1	P06	171	1	ROS	081903	1621	EN	32	29.69	S	175	45.92	W	GPS	5863	5863			1
49MR03K04_1	P06	170	1	ROS	081903	1826	BE	32	29.96	S	175	15.18	W	GPS	5732	5734			16.6C
49MR03K04_1	P06	170	1	ROS	081903	1950	BO	32	29.80	S	175	15.31	W	GPS	5735	5736	4	5726	5835
49MR03K04_1	P06	170	1	BIO	081903	2110	UN	32	29.58	S	175	15.43	W	GPS	5751	5746			36 1-6,7,8,23,24,26,27,46
49MR03K04_1	P06	170	1	ROS	081903	2205	EN	32	29.34	S	175	15.75	W	GPS	5743	5741			#1=#3 DUPLICATE SMPLS (5500DB)
49MR03K04_1	P06	169	1	ROS	081903	2356	BE	32	30.18	S	174	50.01	W	GPS	5752	5752			1, 34, 35, 48
49MR03K04_1	P06	169	1	UNK	082003	0101	BE	32	29.94	S	174	50.21	W	GPS	5757	5757			17.0C, 20L FOR BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_1	P06	169	1	UNK	082003	0118	EN	32	29.93	S	174	50.25	W	GPS	5760	5761			
49MR03K04_1	P06	169	1	ROS	082003	0125	BO	32	29.91	S	174	50.29	W	GPS	5756	5758	5	5775	5863
49MR03K04_1	P06	169	1	BIO	082003	0156	UN	32	29.77	S	174	50.36	W	GPS	5761	5762			35 1-6
49MR03K04_1	P06	169	1	ROS	082003	0338	EN	32	29.28	S	174	50.70	W	GPS	5761	5763			SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	168	1	ROS	082003	0543	BE	32	29.83	S	174	19.75	W	GPS	5862	5862			
49MR03K04_1	P06	168	1	ROS	082003	0712	BO	32	29.58	S	174	19.96	W	GPS	5832	5832	6	5854	5959
49MR03K04_1	P06	168	1	BUC	082003	0825	UN	32	29.24	S	174	19.94	W	GPS	5852	5847			1, 34, 35, 48
49MR03K04_1	P06	168	1	ROS	082003	0932	EN	32	29.03	S	174	20.34	W	GPS	5781	5782			17.0C, 20L FOR BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_1	P06	167	1	ROS	082003	1100	BE	32	30.10	S	173	59.84	W	GPS	5677	5675			
49MR03K04_1	P06	167	1	ROS	082003	1226	BO	32	30.37	S	174	0.12	W	GPS	5676	5673	6	5665	5761
49MR03K04_1	P06	167	1	BUC	082003	1401	UN	32	30.60	S	174	0.44	W	GPS	5672	5672			36 1-6,9,22,47
49MR03K04_1	P06	167	1	ROS	082003	1442	EN	32	30.74	S	174	0.55	W	GPS	5672	5671			#1=#4 DUPLICATE SMPLS (5250DB)
49MR03K04_1	P06	166	1	ROS	082003	1610	BE	32	30.25	S	173	39.89	W	GPS	5675	5677			1
49MR03K04_1	P06	166	1	ROS	082003	1734	BO	32	30.51	S	173	40.25	W	GPS	5703	5699	7	5712	5802
49MR03K04_1	P06	166	1	BIO	082003	1830	UN	32	30.48	S	173	40.64	W	GPS	5689	5689			19 1-6,23,24,26
49MR03K04_1	P06	166	1	ROS	082003	1931	EN	32	30.53	S	173	41.13	W	GPS	5696	5696			1, 34, 35, 48
49MR03K04_1	P06	166	2	ROS	082003	2119	BE	32	30.17	S	173	40.00	W	GPS	5672	5672			16.9C, 20L FOR BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_1	P06	166	1	BUC	082003	2124	UN	32	30.20	S	173	40.04	W	GPS	5676	5670			UPCAST INTERRUPTED AT 1750DB
49MR03K04_1	P06	166	2	ROS	082003	2202	BO	32	30.36	S	173	40.40	W	GPS	5660	5661	-9	2602	2601
49MR03K04_1	P06	166	1	UNK	082003	2238	BE	32	30.60	S	173	40.64	W	GPS	5705	5706			REMOVE FLUOROMETER
49MR03K04_1	P06	166	1	UNK	082003	2300	EN	32	30.64	S	173	40.86	W	GPS	5706	5705			16.1C
49MR03K04_1	P06	166	2	ROS	082003	2314	EN	32	30.64	S	173	40.99	W	GPS	5701	5700			
49MR03K04_1	P06	165	1	ROS	082103	0110	BE	32	29.96	S	173	10.41	W	GPS	5859	5855			SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	165	1	BUC	082103	0200	UN	32	29.77	S	173	10.65	W	GPS	5837	5839			
49MR03K04_1	P06	165	1	ROS	082103	0239	BO	32	29.76	S	173	10.75	W	GPS	5863	5863	4	5845	5967
49MR03K04_1	P06	165	1	UNK	082103	0252	BE	32	29.71	S	173	10.80	W	GPS	5842	5843			36 1-6,34,35
49MR03K04_1	P06	165	1	UNK	082103	0312	EN	32	29.65	S	173	10.84	W	GPS	5848	5848			1, 34, 35, 48
49MR03K04_1	P06	165	1	ROS	082103	0459	EN	32	29.66	S	173	11.07	W	GPS	5866	5865			16.8C, 20L FOR BIO
49MR03K04_1	P06	164	1	ROS	082103	0606	BE	32	29.91	S	172	54.86	W	GPS	5978	5973			SOLAR LIGHT MEASUREMENT
																			36 1-6,7,8,23,24,26,27

49MR03K04_1	P06	164	1	ROS	082103	0732	BO	32	30.17	S	172	55.04	W	GPS	5978	5975	6	5970	6087				
49MR03K04_1	P06	164	1	BUC	082103	0855	UN	32	30.16	S	172	55.26	W	GPS	5980	5980				1	16.9C		
49MR03K04_1	P06	164	1	ROS	082103	0956	EN	32	30.38	S	172	55.30	W	GPS	5979	5979							
49MR03K04_1	P06	163	1	ROS	082103	1153	BE	32	30.04	S	172	25.01	W	GPS	5747	5745				35	1-6		
49MR03K04_1	P06	163	1	ROS	082103	1321	BO	32	30.30	S	172	25.28	W	GPS	5750	5748	6	5752	5849				
49MR03K04_1	P06	163	1	BUC	082103	1429	UN	32	30.56	S	172	25.69	W	GPS	5757	5757				1	17.1C		
49MR03K04_1	P06	163	1	ROS	082103	1540	EN	32	30.56	S	172	26.02	W	GPS	5758	5762							
49MR03K04_1	P06	162	1	ROS	082103	1743	BE	32	29.98	S	171	54.56	W	GPS	4142	4147				32	1-6,12,13,23,24,26,34,35,48		
																					#3=#12 DUPLICATE SMPLS (3250DB), 2 BTLS FOR BIO (5DB)		
49MR03K04_1	P06	162	1	ROS	082103	1850	BO	32	30.18	S	171	54.80	W	GPS	4146	4133	7	4153	4201				
49MR03K04_1	P06	162	1	BUC	082103	1929	UN	32	30.41	S	171	55.00	W	GPS	4194	4182				1	17.0C		
49MR03K04_1	P06	162	1	ROS	082103	2033	EN	32	30.68	S	171	55.31	W	GPS	4265	4266							
49MR03K04_1	P06	162	1	FLT	082103	2042	DE	32	30.74	S	171	55.12	W	GPS	4153	4153						ARGO/APEX#927	
49MR03K04_1	P06	161	1	ROS	082103	2202	BE	32	30.09	S	171	35.06	W	GPS	4844	4848				34	1-6,34,35,48	2 BTLS FOR BIO (5DB)	
49MR03K04_1	P06	161	1	UNK	082103	2241	BE	32	30.33	S	171	35.26	W	GPS	4826	4844						SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	161	1	ROS	082103	2317	BO	32	30.56	S	171	35.37	W	GPS	4828	4827	6	4870	4910				
49MR03K04_1	P06	161	1	UNK	082103	2330	EN	32	30.66	S	171	35.39	W	GPS	4816	4818							
49MR03K04_1	P06	161	1	BUC	082203	0037	UN	32	31.08	S	171	35.61	W	GPS	4783	4783				1	16.4C		
49MR03K04_1	P06	161	1	ROS	082203	0107	EN	32	31.39	S	171	35.70	W	GPS	4757	4746							
49MR03K04_1	P06	160	1	ROS	082203	0231	BE	32	29.90	S	171	15.07	W	GPS	5466	5465				35	1-6,7,8,23,24,26,27	#1=#9 DUPLICATE SMPLS (4000DB)	
49MR03K04_1	P06	160	1	ROS	082203	0354	BO	32	30.25	S	171	14.98	W	GPS	5468	5471	3	5474	5561				
49MR03K04_1	P06	160	1	BUC	082203	0455	UN	32	30.53	S	171	15.09	W	GPS	5460	5462				1	16.4C		
49MR03K04_1	P06	160	1	ROS	082203	0616	EN	32	30.78	S	171	15.18	W	GPS	5451	5444							
49MR03K04_1	P06	159	1	ROS	082203	0816	BE	32	29.89	S	170	45.03	W	GPS	5722	5723				35	1-6,11		
49MR03K04_1	P06	159	1	ROS	082203	0944	BO	32	30.24	S	170	44.98	W	GPS	5735	5735	6	5728	5837				
49MR03K04_1	P06	159	1	BUC	082203	1100	UN	32	30.62	S	170	45.16	W	GPS	5732	5732				1	16.2C		
49MR03K04_1	P06	159	1	ROS	082203	1158	EN	32	30.90	S	170	45.03	W	GPS	5726	5725							
49MR03K04_1	P06	158	1	ROS	082203	1357	BE	32	29.95	S	170	15.12	W	GPS	5749	5748				36	1-6,23,24,26,46	#1=#3 DUPLICATE SMPLS (5500DB)	
49MR03K04_1	P06	158	1	ROS	082203	1529	BO	32	30.42	S	170	15.10	W	GPS	5747	5747	5	5777	5854				
49MR03K04_1	P06	158	1	BUC	082203	1658	UN	32	30.75	S	170	14.96	W	GPS	5747	5741				1	15.5C		
49MR03K04_1	P06	158	1	ROS	082203	1747	EN	32	31.21	S	170	14.75	W	GPS	5730	5726							
49MR03K04_1	P06	X15	1	ROS	082203	1921	BE	32	30.25	S	170	0.07	W	GPS	5526	5530				35	1-6,7,8,12,13,15,23,24,26,27,34,35,45,48		
49MR03K04_1	P06	X15	1	UNK	082203	2009	BE	32	30.64	S	169	59.93	W	GPS	5503	5500						SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	X15	1	UNK	082203	2039	EN	32	30.82	S	169	59.88	W	GPS	5506	5504							
49MR03K04_1	P06	X15	1	ROS	082203	2046	BO	32	30.86	S	169	59.87	W	GPS	5523	5502	5	5576	5611				
49MR03K04_1	P06	X15	1	BUC	082203	2058	UN	32	30.90	S	169	59.83	W	GPS	5503	5515					1,34,35,48	16.1C, 20L FOR BIO	
49MR03K04_1	P06	X15	1	ROS	082203	2252	EN	32	31.48	S	169	59.46	W	GPS	5501	5499							
49MR03K04_1	P06	156	1	ROS	082303	0043	BE	32	30.14	S	169	30.15	W	GPS	5520	5516				36	1-6,9,22,34,35,47	#2=#27 DUPLICATE SMPLS FOR R.N. (600DB)	
49MR03K04_1	P06	156	1	UNK	082303	0104	BE	32	30.34	S	169	29.95	W	GPS	5518	5515						SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	156	1	UNK	082303	0127	EN	32	30.34	S	169	30.00	W	GPS	5516	5516							
49MR03K04_1	P06	156	1	BUC	082303	0129	UN	32	30.44	S	169	30.00	W	GPS	5515	5516					1,34,35,48	16.1C, 20L FOR BIO	
49MR03K04_1	P06	156	1	ROS	082303	0206	BO	32	30.68	S	169	29.93	W	GPS	5518	5516	5	5537	5613				
49MR03K04_1	P06	156	1	ROS	082303	0420	EN	32	31.59	S	169	29.47	W	GPS	5544	5547							
49MR03K04_1	P06	155	1	ROS	082303	0614	BE	32	29.96	S	169	0.17	W	GPS	5449	5510				34	1-6		
49MR03K04_1	P06	155	1	ROS	082303	0737	BO	32	30.29	S	169	0.04	W	GPS	5553	5546	8	5539	5636				
49MR03K04_1	P06	155	1	BUC	082303	0901	UN	32	30.70	S	168	59.91	W	GPS	5527	5530				1	16.4C		
49MR03K04_1	P06	155	1	ROS	082303	0946	EN	32	30.96	S	168	59.83	W	GPS	5556	5552							
49MR03K04_1	P06	155	1	FLT	082303	0956	DE	32	31.01	S	168	59.49	W	GPS	5512	5506						ARGO/SOLO#2185	
49MR03K04_1	P06	154	1	ROS	082303	1146	BE	32	29.98	S	168	30.18	W	GPS	5487	5486				35	1-6,23,24,26,46		
49MR03K04_1	P06	154	1	ROS	082303	1307	BO	32	30.50	S	168	30.23	W	GPS	5507	5502	6	5516	5586				

49MR03K04_1	P06	154	1	BUC	082303	1429	UN	32	31.02	S	168	30.29	W	GPS	5518	5518			1	16.3C	
49MR03K04_1	P06	154	1	ROS	082303	1521	EN	32	31.48	S	168	30.48	W	GPS	5509	5508					
49MR03K04_1	P06	153	1	ROS	082303	1719	BE	32	30.20	S	168	0.86	W	GPS	5586	5587			34	1-6,34,35	
49MR03K04_1		406	1	UNK	082303	1815	BE	32	30.24	S	168	0.57	W	GPS	5584	5583				CONTINUOUS SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	153	1	ROS	082303	1843	BO	32	30.30	S	168	0.51	W	GPS	5579	5589	5	5582	5582		
49MR03K04_1	P06	153	1	UNK	082303	2000	BE	32	30.49	S	168	0.35	W	GPS	5576	5565				SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	153	1	BUC	082303	2008	UN	32	30.51	S	168	0.31	W	GPS	5562	5564				1,34,35,48	
49MR03K04_1	P06	153	1	UNK	082303	2020	EN	32	30.55	S	168	0.27	W	GPS	5559	5559				16.5C, 20L FOR BIO	
49MR03K04_1	P06	153	1	ROS	082303	2051	EN	32	30.65	S	168	0.18	W	GPS	5554	5555					
49MR03K04_1	P06	152	1	ROS	082303	2258	BE	32	30.23	S	167	30.14	W	GPS	5629	5627			36	1-6,23,24,26,34,35	
49MR03K04_1	P06	152	1	UNK	082403	0000	BE	32	30.11	S	167	29.47	W	GPS	5724	5717				#1=#13 DUPLICATE SMPLS (3000DB) SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	152	1	UNK	082403	0020	EN	32	30.05	S	167	29.32	W	GPS	5727	5731					
49MR03K04_1	P06	152	1	ROS	082403	0027	BO	32	30.01	S	167	29.29	W	GPS	5730	5726	5	5762	5807		
49MR03K04_1	P06	152	1	BUC	082403	0100	UN	32	29.98	S	167	29.18	W	GPS	5698	5729				1,34,35,48	
49MR03K04_1	P06	152	1	ROS	082403	0245	EN	32	29.32	S	167	29.06	W	GPS	5711	5712				17.1C, 20L FOR BIO	
49MR03K04_1		406	1	UNK	082403	0340	EN	32	29.72	S	167	15.49	W	GPS	5483	5478					
49MR03K04_1	P06	151	1	ROS	082403	0412	BE	32	30.07	S	167	9.77	W	GPS	5391	5396			34	1-6	
49MR03K04_1	P06	151	1	ROS	082403	0535	BO	32	30.17	S	167	9.53	W	GPS	5384	5385	8	5383	5481		
49MR03K04_1	P06	151	1	BUC	082403	0655	UN	32	30.36	S	167	9.35	W	GPS	5384	5387				1	
49MR03K04_1	P06	151	1	ROS	082403	0745	EN	32	30.47	S	167	9.24	W	GPS	5382	5387				17.6C	
49MR03K04_1	P06	150	1	ROS	082403	1012	BE	32	29.82	S	166	29.94	W	GPS	5476	5477			34	1-6,7,8,12,13,15,23,24,26,27,45	
49MR03K04_1	P06	150	1	ROS	082403	1135	BO	32	29.20	S	166	29.89	W	GPS	5235	5228	139	5297	5355		
49MR03K04_1	P06	150	1	BUC	082403	1226	UN	32	28.73	S	166	29.90	W	GPS	5218	5217				1	
49MR03K04_1	P06	150	1	ROS	082403	1335	EN	32	27.96	S	166	29.59	W	GPS	5312	5312				17.1C	
49MR03K04_1	P06	149	1	ROS	082403	1621	BE	32	29.76	S	165	49.70	W	GPS	5424	5421			36	1-6,34,35,48	
49MR03K04_1	P06	149	1	ROS	082403	1745	BO	32	29.21	S	165	49.29	W	GPS	5438	5437	5	5468	5520		2 BTLS FOR BIO (10DB)
49MR03K04_1	P06	149	1	BUC	082403	1836	UN	32	28.98	S	165	48.88	W	GPS	5439	5439				1	
49MR03K04_1	P06	149	1	ROS	082403	1957	EN	32	28.34	S	165	48.30	W	GPS	5448	5431				16.6C	
49MR03K04_1	P06	149	1	FLT	082403	2006	DE	32	28.23	S	165	48.00	W	GPS	5404	5392				ARGO/APEX#928	
49MR03K04_1		407	1	BIO	082503	2001	UN	32	27.23	S	165	12.90	W	GPS	5616	5576				34,35,48	
49MR03K04_1		408	1	BIO	082603	0157	UN	32	30.28	S	165	9.87	W	GPS	6356	6355				34,35,48	
49MR03K04_1	P06	148	1	ROS	082603	0306	BE	32	30.40	S	165	10.15	W	GPS	6355	6366			36	1-6,23,24,26,34,35,46	
49MR03K04_1	P06	148	1	ROS	082603	0455	BO	32	29.78	S	165	9.76	W	GPS	6357	6355	12	6388	6472		REMOVE LADCP
49MR03K04_1	P06	148	1	BUC	082603	0630	UN	32	29.15	S	165	9.36	W	GPS	6353	6355				1	
49MR03K04_1	P06	148	1	ROS	082603	0756	EN	32	28.63	S	165	9.09	W	GPS	6332	6335				16.1C	
49MR03K04_1	P06	147	1	ROS	082603	1104	BE	32	29.97	S	164	29.60	W	GPS	5609	5604			36	1-6	
49MR03K04_1	P06	147	1	ROS	082603	1234	BO	32	29.08	S	164	29.19	W	GPS	5648	5645	5	5655	5684		REINSTALL LADCP
49MR03K04_1	P06	147	1	BUC	082603	1333	UN	32	28.59	S	164	28.83	W	GPS	5652	5655				1	
49MR03K04_1	P06	147	1	ROS	082603	1455	EN	32	27.82	S	164	28.41	W	GPS	5647	5640				16.1C	
49MR03K04_1	P06	146	1	ROS	082603	1751	BE	32	29.90	S	163	49.89	W	GPS	5528	5533			35	1-8,12,13,23,24,26,27,34,35	
49MR03K04_1	P06	146	1	ROS	082603	1919	BO	32	29.68	S	163	49.63	W	GPS	5562	5556	5	5548	5631		#1=#5 DUPLICATE SMPLS (5000DB)
49MR03K04_1	P06	146	1	BUC	082603	1955	UN	32	29.68	S	163	49.32	W	GPS	5589	5587				1,34,35,48	
49MR03K04_1	P06	146	1	UNK	082603	2041	BE	32	29.67	S	163	48.98	W	GPS	5657	5656				SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	146	1	UNK	082603	2113	EN	32	29.67	S	163	48.73	W	GPS	5702	5704					
49MR03K04_1	P06	146	1	ROS	082603	2129	EN	32	29.66	S	163	48.58	W	GPS	5727	5727					
49MR03K04_1	P06	145	1	ROS	082703	0006	BE	32	29.88	S	163	9.86	W	GPS	5259	5259			35	1-6,9,22,34,35,47	
49MR03K04_1	P06	145	1	UNK	082703	0016	BE	32	29.90	S	163	9.82	W	GPS	5272	5272				#2=#27 DUPLICATE SMPLS (600DB) SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	145	1	UNK	082703	0043	EN	32	29.87	S	163	9.77	W	GPS	5230	5215					
49MR03K04_1	P06	145	1	BUC	082703	0056	UN	32	29.76	S	163	9.75	W	GPS	5225	5221				1,34,35,48	
49MR03K04_1	P06	145	1	ROS	082703	0129	BO	32	29.70	S	163	9.71	W	GPS	5217	5220	3	5236	5331		16.9C, 20L FOR BIO

49MR03K04_1	P06	145	1	ROS	082703	0334	EN	32	29.48	S	163	9.19	W	GPS	5229	5230				
49MR03K04_1	P06	145	1	FLT	082703	0343	DE	32	29.45	S	163	8.91	W	GPS	5182	5198			ARGO/SOLO#2199	
49MR03K04_1	P06	144	1	ROS	082703	0616	BE	32	30.15	S	162	29.99	W	GPS	5178	5189		34	1-6,23,24,26,46	#1=#19 DUPLICATE SMPLS (1800DB)
49MR03K04_1	P06	144	1	ROS	082703	0736	BO	32	30.01	S	162	29.34	W	GPS	5056	5067	5	5143	5213	
49MR03K04_1	P06	144	1	BUC	082703	0828	UN	32	29.85	S	162	29.56	W	GPS	5120	5137			1	17.4C
49MR03K04_1	P06	144	1	ROS	082703	0940	EN	32	29.51	S	162	28.13	W	GPS	5368	5356				
49MR03K04_1	P06	143	1	ROS	082703	1207	BE	32	30.00	S	161	50.00	W	GPS	5425	5423		34	1-6	
49MR03K04_1	P06	143	1	ROS	082703	1331	BO	32	29.75	S	161	49.38	W	GPS	5456	5455	5	5443	5519	
49MR03K04_1	P06	143	1	BUC	082703	1441	UN	32	29.54	S	161	48.73	W	GPS	5528	5478			1	16.5C
49MR03K04_1	P06	143	1	ROS	082703	1536	EN	32	29.44	S	161	48.28	W	GPS	5540	5536				
49MR03K04_1	P06	142	1	ROS	082703	1804	BE	32	30.00	S	161	9.80	W	GPS	5134	5132		34	1-8,12,13,15,23,24,26,27,34,35,45	#1=#9 DUPLICATE SMPLS (4000DB)
49MR03K04_1	P06	142	1	ROS	082703	1923	BO	32	29.85	S	161	9.12	W	GPS	5138	5137	5	5167	5222	
49MR03K04_1	P06	142	1	BUC	082703	2037	UN	32	29.92	S	161	8.41	W	GPS	5129	5128			1	16.2C
49MR03K04_1	P06	142	1	ROS	082703	2123	EN	32	29.88	S	161	7.87	W	GPS	5132	5130				
49MR03K04_1	P06	140	1	ROS	082703	2341	BE	32	29.90	S	160	29.55	W	GPS	5531	5533		34	1-6,34,35	
49MR03K04_1	P06	140	1	UNK	082803	0007	BE	32	30.01	S	160	29.37	W	GPS	5538	5533				SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	140	1	UNK	082803	0054	EN	32	30.18	S	160	29.08	W	GPS	5543	5544				
49MR03K04_1	P06	140	1	ROS	082803	0106	BO	32	30.18	S	160	28.96	W	GPS	5531	5524	6	5561	5628	
49MR03K04_1	P06	140	1	BUC	082803	0150	UN	32	30.21	S	160	28.72	W	GPS	5526	5525			1,34,35,48	16.8C, 20L FOR BIO
49MR03K04_1	P06	140	1	ROS	082803	0315	EN	32	30.44	S	160	27.94	W	GPS	5495	5492				
49MR03K04_1	P06	139	1	ROS	082803	0532	BE	32	30.05	S	159	50.22	W	GPS	5325	5329		34	1-6,23,24,26,46	#1=#9 DUPLICATE SMPLS (4000DB)
49MR03K04_1	P06	139	1	ROS	082803	0657	BO	32	30.20	S	159	49.68	W	GPS	5314	5312	6	5336	5410	
49MR03K04_1	P06	139	1	BUC	082803	0802	UN	32	30.20	S	159	49.10	W	GPS	5313	5313			1	16.5C
49MR03K04_1	P06	139	1	ROS	082803	0906	EN	32	30.23	S	159	48.29	W	GPS	5309	5308				
49MR03K04_1	P06	139	1	FLT	082803	0913	DE	32	30.22	S	159	48.16	W	GPS	5307	5309				ARGO/APEX#929
49MR03K04_1	P06	138	1	ROS	082803	1206	BE	32	30.14	S	158	59.82	W	GPS	5282	5281		33	1-6	
49MR03K04_1	P06	138	1	ROS	082803	1325	BO	32	30.26	S	158	59.11	W	GPS	5282	5283	6	5315	5379	
49MR03K04_1	P06	138	1	BUC	082803	1440	UN	32	30.40	S	158	58.57	W	GPS	5275	5285			1	16.9C
49MR03K04_1	P06	138	1	ROS	082803	1529	EN	32	30.46	S	158	57.92	W	GPS	5278	5277				
49MR03K04_1	P06	137	1	ROS	082803	1820	BE	32	29.98	S	158	9.99	W	GPS	5693	5686		36	1-6,7,8,12,13,23,25,26,27,34,35	
49MR03K04_1	P06	137	1	ROS	082803	1950	BO	32	29.70	S	158	9.20	W	GPS	5620	5619	2	5721	5782	
49MR03K04_1	P06	137	1	BUC	082803	2100	UN	32	29.59	S	158	8.78	W	GPS	5599	5580			1,34,35,48	16.3C, 20L FOR BIO
49MR03K04_1	P06	137	1	UNK	082803	2134	BE	32	29.51	S	158	8.36	W	GPS	5583	5592				SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	137	1	UNK	082803	2158	EN	32	29.52	S	158	8.13	W	GPS	5594	5589				
49MR03K04_1	P06	137	1	ROS	082803	2202	EN	32	29.51	S	158	8.05	W	GPS	5596	5595				
49MR03K04_1	P06	136	1	ROS	082903	0053	BE	32	29.74	S	157	19.80	W	GPS	5352	5356		36	1-6,9,22,34,35,47	#1=#3 (B-10DB), #2=#27 (600DB) DUPLICATE SMPLS FOR R.N.
49MR03K04_1	P06	136	1	UNK	082903	0103	BE	32	29.76	S	157	19.69	W	GPS	5358	5358				SOLAR LIGHT MEASUREMENT
49MR03K04_1	P06	136	1	UNK	082903	0134	EN	32	29.75	S	157	19.47	W	GPS	5374	5363				
49MR03K04_1	P06	136	1	BUC	082903	0153	UN	32	29.76	S	157	19.35	W	GPS	5384	5369			1,34,35,48	17.2C, 20L FOR BIO
49MR03K04_1	P06	136	1	ROS	082903	0213	BO	32	29.85	S	157	19.26	W	GPS	5383	5381	5	5375	5452	
49MR03K04_1	P06	136	1	ROS	082903	0417	EN	32	30.39	S	157	18.13	W	GPS	5354	5355				
49MR03K04_1	P06	136	1	FLT	082903	0424	DE	32	30.38	S	157	17.91	W	GPS	5340	5336				ARGO/APEX#930
49MR03K04_1	P06	135	1	ROS	082903	0708	BE	32	30.10	S	156	30.07	W	GPS	5310	5318		35	1-6,23,24,26,46	#1=#16 DUPLICATE SMPLS (2400DB)
49MR03K04_1	P06	135	1	ROS	082903	0829	BO	32	30.40	S	156	29.63	W	GPS	5306	5306	5	5297	5380	
49MR03K04_1	P06	135	1	BUC	082903	0953	UN	32	30.65	S	156	29.20	W	GPS	5300	5298			1	16.4C
49MR03K04_1	P06	135	1	ROS	082903	1034	EN	32	30.78	S	156	28.76	W	GPS	5294	5299				
49MR03K04_1	P06	134	1	ROS	082903	1331	BE	32	29.96	S	155	40.05	W	GPS	5159	5158		33	1-6	
49MR03K04_1	P06	134	1	BUC	082903	1402	UN	32	30.03	S	155	39.83	W	GPS	5148	5149			1	16.5C
49MR03K04_1	P06	134	1	ROS	082903	1449	BO	32	30.15	S	155	39.65	W	GPS	5133	5124	4	5165	5241	



49MR03K04_1	P06	134	1	ROS	082903	1650	EN	32	30.50	S	155	38.97	W	GPS	5110	5109					
49MR03K04_1	P06	133	1	ROS	082903	1939	BE	32	30.26	S	154	50.82	W	GPS	4985	4976	35	1-8,12,13,15,23,24,26,27,34,35,45,48	#3=#13 DUPLICATE SMPLS (3000DB), 2 BTLS FOR BIO SOLAR LIGHT MEASUREMENT		
49MR03K04_1	P06	133	1	UNK	082903	2018	BE	32	30.33	S	154	50.55	W	GPS	4992	4995					
49MR03K04_1	P06	133	1	BUC	082903	2024	UN	32	30.35	S	154	50.55	W	GPS	4989	4995		1	16.5C		
49MR03K04_1	P06	133	1	UNK	082903	2045	EN	32	30.44	S	154	50.51	W	GPS	4977	4980					
49MR03K04_1	P06	133	1	ROS	082903	2056	BO	32	30.49	S	154	50.46	W	GPS	4982	4981	4	5002	5078		
49MR03K04_1	P06	133	1	ROS	082903	2252	EN	32	30.20	S	154	49.24	W	GPS	5006	5000					
49MR03K04_1	P06	132	1	ROS	083003	0148	BE	32	29.57	S	153	59.64	W	GPS	4959	4971		32	1-6,34,35		
49MR03K04_1	P06	132	1	UNK	083003	0156	BE	32	29.51	S	153	59.75	W	GPS	4956	4961				SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	132	1	UNK	083003	0215	EN	32	29.36	S	153	59.81	W	GPS	4923	4923					
49MR03K04_1	P06	132	1	BUC	083003	0303	UN	32	29.13	S	154	0.01	W	GPS	4807	4810		1,34,35,48		16.3C, 20L FOR BIO	
49MR03K04_1	P06	132	1	ROS	083003	0312	BO	32	29.13	S	154	0.08	W	GPS	4809	4807	3	4946	4998		ALTITUDE DECREASED DOWN TO 7M
49MR03K04_1	P06	132	1	ROS	083003	0511	EN	32	28.40	S	154	1.02	W	GPS	5010	5009					
49MR03K04_1	P06	132	1	FLT	083003	0519	DE	32	28.46	S	154	1.00	W	GPS	4996	5003				ARGO/APEX#931	
49MR03K04_1	P06	131	1	ROS	083003	1022	BE	32	29.78	S	153	9.80	W	GPS	5252	5239		34	1-6,23,24,26	#1=#23 DUPLICATE SMPLS (1000DB)	
49MR03K04_1	P06	131	1	ROS	083003	1144	BO	32	30.09	S	153	10.03	W	GPS	5199	5202	7	5229	5308		
49MR03K04_1	P06	131	1	BUC	083003	1256	UN	32	30.27	S	153	10.18	W	GPS	5193	5194		1		16.8C	
49MR03K04_1	P06	131	1	ROS	083003	1342	EN	32	30.46	S	153	10.26	W	GPS	5198	5203					
49MR03K04_1	P06	130	1	ROS	083003	1643	BE	32	30.08	S	152	19.91	W	GPS	4196	4208		28	1-6,34,35		
49MR03K04_1	P06	130	1	BUC	083003	1737	UN	32	30.33	S	152	20.06	W	GPS	4293	4293		1		17.6C	
49MR03K04_1	P06	130	1	ROS	083003	1747	BO	32	30.33	S	152	20.16	W	GPS	4295	4286	5	4316	4371		
49MR03K04_1	P06	130	1	BIO	083003	1818	UN	32	30.66	S	152	20.05	W	GPS	4435	4435		34,35,48		BIO-OPTICAL SAMPLING (BUCKET)	
49MR03K04_1	P06	130	1	ROS	083003	1927	EN	32	31.40	S	152	19.73	W	GPS	4774	4773					
49MR03K04_1	P06	129	1	ROS	083003	2225	BE	32	30.11	S	151	29.83	W	GPS	5576	5560		35	1-8,23,24,26,27,34,35,46	#1=#6 DUPLICATE SMPLS (4750DB) SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	129	1	UNK	083003	2233	BE	32	30.19	S	151	29.84	W	GPS	5545	5547					
49MR03K04_1	P06	129	1	UNK	083003	2306	EN	32	30.48	S	151	29.82	W	GPS	5433	5435					
49MR03K04_1	P06	129	1	ROS	083003	2351	BO	32	30.83	S	151	29.93	W	GPS	5334	5336	3	5519	5567		
49MR03K04_1	P06	129	1	BUC	083103	0057	UN	32	31.33	S	151	29.94	W	GPS	5363	5370		1,34,35,48		17.5C, 20L FOR BIO	
49MR03K04_1	P06	129	1	ROS	083103	0156	EN	32	31.77	S	151	30.10	W	GPS	5328	5343					
49MR03K04_1	P06	X16	1	ROS	083103	0536	BE	32	29.95	S	150	29.91	W	GPS	5164	5166		34	1-8,12,13,23,24,26,27	#1=#8 DUPLICATE SMPLS (4250DB)	
49MR03K04_1	P06	X16	1	ROS	083103	0653	BO	32	30.35	S	150	30.24	W	GPS	5140	5137	6	5164	5234		
49MR03K04_1	P06	X16	1	BUC	083103	0755	UN	32	30.64	S	150	30.48	W	GPS	5101	5103		1		17.3C	
49MR03K04_1	P06	X16	1	ROS	083103	0854	EN	32	30.93	S	150	30.82	W	GPS	5133	5134					
49MR03K04_1	P06	X16	1	FLT	083103	0902	DE	32	30.95	S	150	30.69	W	GPS	5119	5121				ARGO/SOLO#2202	
49MR03K04_1	P06	127	1	ROS	083103	1128	BE	32	30.04	S	149	49.59	W	GPS	5102	5102		36	1-6,9,22,47		
49MR03K04_1	P06	127	1	ROS	083103	1244	BO	32	30.35	S	149	49.77	W	GPS	5075	5085	6	5107	5182		
49MR03K04_1	P06	127	1	BUC	083103	1325	UN	32	30.53	S	149	49.87	W	GPS	5088	5092		1		17.1C	
49MR03K04_1	P06	127	1	ROS	083103	1441	EN	32	30.89	S	149	50.19	W	GPS	5093	5101					
49MR03K04_1	P06	126	1	ROS	083103	1804	BE	32	29.93	S	149	0.55	W	GPS	4897	4909		34	1-6,34,35,48	2 BTLS FOR BIO (5DB)	
49MR03K04_1	P06	126	1	ROS	083103	1918	BO	32	30.09	S	149	0.68	W	GPS	4865	4877	4	4912	4995		INTERNAL CLOCK ERROR OF SBE35 (NO RESET)
49MR03K04_1	P06	126	1	BUC	083103	1930	UN	32	30.12	S	149	0.68	W	GPS	4864	4880		1		17.2C	
49MR03K04_1	P06	126	1	UNK	083103	1956	BE	32	30.21	S	149	0.69	W	GPS	4863	4876				SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	126	1	UNK	083103	2030	EN	32	30.42	S	149	0.63	W	GPS	4873	4873					
49MR03K04_1	P06	126	1	ROS	083103	2112	EN	32	30.66	S	149	0.67	W	GPS	4839	4830					
49MR03K04_1	P06	125	1	ROS	090103	0009	BE	32	30.25	S	148	9.60	W	GPS	4588	4586		33	1-8,12,13,15,23,24,26,27,34,35,45,46	#1=#11 DUPLICATE SMPLS (3500DB), #4 MISS FIRE	
49MR03K04_1	P06	125	1	BUC	090103	0028	UN	32	30.41	S	148	9.40	W	GPS	4553	4544		1		16.8C	
49MR03K04_1	P06	125	1	ROS	090103	0121	BO	32	30.76	S	148	9.10	W	GPS	4499	4500	3	4603	4628		
49MR03K04_1	P06	125	1	UNK	090103	0129	BE	32	30.80	S	148	9.10	W	GPS	4519	4509				SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	125	1	UNK	090103	0150	EN	32	30.88	S	148	9.09	W	GPS	4517	4517					

49MR03K04_1	P06	125	1	ROS	090103	0313	EN	32	31.21	S	148	9.08	W	GPS	4538	4511				
49MR03K04_1	P06	125	1	BIO	090103	0323	UN	32	31.11	S	148	8.82	W	GPS	4479	4482		34, 35, 48	20L FOR BIO-OPTICAL SAMPLING (BUCKET)	
49MR03K04_1	P06	125	1	FLT	090103	0325	DE	32	31.12	S	148	8.70	W	GPS	4489	4477			ARGO/APEX#932	
49MR03K04_1	P06	124	1	ROS	090103	0617	BE	32	29.93	S	147	20.61	W	GPS	4677	4676		31 1-6		
49MR03K04_1	P06	124	1	ROS	090103	0730	BO	32	30.21	S	147	20.80	W	GPS	4620	4615	7	4678	4750	
49MR03K04_1	P06	124	1	BUC	090103	0826	UN	32	30.46	S	147	20.82	W	GPS	4650	4617		1	17.1C	
49MR03K04_1	P06	124	1	ROS	090103	0922	EN	32	30.84	S	147	20.80	W	GPS	4647	4643				
49MR03K04_1	P06	123	1	ROS	090103	1222	BE	32	30.14	S	146	29.94	W	GPS	5177	5189		34 1-8,23,24,26,27	#1=#10 DUPLICATE SMPLS (3750DB)	
49MR03K04_1	P06	123	1	ROS	090103	1339	BO	32	30.47	S	146	29.85	W	GPS	5118	5119	4	5134	5213	
49MR03K04_1	P06	123	1	BUC	090103	1438	UN	32	30.83	S	146	29.86	W	GPS	5087	5087		1	17.3C	
49MR03K04_1	P06	123	1	ROS	090103	1539	EN	32	31.36	S	146	29.83	W	GPS	5070	5088				
49MR03K04_1	P06	122	1	ROS	090103	1837	BE	32	29.77	S	145	39.84	W	GPS	4999	5002		34 1-6,34,35,48	2 BTLS FOR BIO (10DB)	
49MR03K04_1	P06	122	1	ROS	090103	1953	BO	32	29.99	S	145	40.15	W	GPS	5010	5014	6	5018	5092	
49MR03K04_1	P06	122	1	UNK	090103	2045	BE	32	30.38	S	145	40.12	W	GPS	5089	5076			SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	122	1	BUC	090103	2057	UN	32	30.45	S	145	40.13	W	GPS	5115	5122		1	17.6C	
49MR03K04_1	P06	122	1	UNK	090103	2103	EN	32	30.50	S	145	40.12	W	GPS	5116	5125				
49MR03K04_1	P06	122	1	ROS	090103	2155	EN	32	30.96	S	145	40.38	W	GPS	5130	5123				
49MR03K04_1	P06	121	1	ROS	090203	0052	BE	32	30.47	S	144	49.88	W	GPS	5273	5285		34 1-8,12,13,23,24,26,27,46	#1=#12 DUPLICATE SMPLS (3250DB)	
49MR03K04_1	P06	121	1	UNK	090203	0105	BE	32	30.62	S	144	49.87	W	GPS	5276	5274			SOLAR LIGHT MEASUREMENT	
49MR03K04_1	P06	121	1	UNK	090203	0127	EN	32	30.66	S	144	49.86	W	GPS	5269	5269				
49MR03K04_1	P06	121	1	BUC	090203	0156	UN	32	30.86	S	144	49.83	W	GPS	5281	5283		1, 34, 35, 48	16.0C, 20L FOR BIO	
49MR03K04_1	P06	121	1	ROS	090203	0212	BO	32	31.00	S	144	49.83	W	GPS	5287	5279	3	5301	5354	
49MR03K04_1	P06	121	1	ROS	090203	0415	EN	32	31.46	S	144	49.97	W	GPS	5251	5244				
49MR03K04_1	P06	121	2	UNK	090203	0434	BE	32	30.45	S	144	49.79	W	GPS	5300	5305			CTD CABLE RESPOOLING (WO 5115M)	
49MR03K04_1	P06	121	2	UNK	090203	0719	EN	32	31.15	S	144	49.94	W	GPS	5291	5283				
49MR03K04_1	P06	121	1	FLT	090203	0725	DE	32	31.11	S	144	50.02	W	GPS	5259	5265			ARGO/SOLO#2203	

P06 REV R/V MIRAI CRUISE MR03K04 LEG2

SHIP/CRS EXPCODE	WOCE SECT	STNNBR	CASTNO	CAST TYPE	UTC DATE	EVENT TIME	CODE	LATITUDE	LONGITUDE	NAV	UNC DEPTH	COR DEPTH	HT ABOVE BOTTOM	WIRE OUT	MAX PRESS	NO. OF BOTTLES	PARAMETERS	COMMENTS				
49MR03K04_2	P06	127	2	ROS	091203	0616	BE 32	29.90 S	149 49.49 W	GPS	5061	5060						REDUNDANT STATION WITH LEG1				
49MR03K04_2	P06	127	2	BUC	091203	0625	UN 32	29.93 S	149 49.38 W	GPS	5061	5396						16.8C				
49MR03K04_2	P06	127	2	ROS	091203	0644	UN 32	30.09 S	149 49.36 W	GPS	5003	5024						OPERATION INTERRUPTED AT 887DB (PRIMARY T NOISE)				
49MR03K04_2	P06	127	2	ROS	091203	0700	EN 32	30.19 S	149 49.26 W	GPS	5003	4996						REPLACED PRIMARY T SENSOR AND CONNECTING CABLE				
49MR03K04_2	P06	127	3	ROS	091203	0755	BE 32	30.06 S	149 49.38 W	GPS	4995	4995						OPERATION INTERRUPTED AT 636DB (PRIMARY T NOISE)				
49MR03K04_2	P06	127	3	ROS	091203	0810	UN 32	30.13 S	149 49.39 W	GPS	4997	-9						REPLACED SBE9 AND CONNECTING CABLES				
49MR03K04_2	P06	127	3	ROS	091203	0841	EN 32	30.21 S	149 49.27 W	GPS	4983	-9						#1-3 FOR R.N.				
49MR03K04_2	P06	127	4	ROS	091203	1236	BE 32	30.09 S	149 49.58 W	GPS	5091	5093				36	1-6,9,22,47					
49MR03K04_2	P06	127	4	ROS	091203	1358	BO 32	30.66 S	149 49.17 W	GPS	5017	5025	8	5124	5150			86L THROUGH HULL PUMP FOR R.N.				
49MR03K04_2	P06	127	1	UNK	091203	1429	UN 32	30.78 S	149 48.95 W	GPS	4948	4935										
49MR03K04_2	P06	127	4	ROS	091203	1608	EN 32	31.53 S	149 48.48 W	GPS	5004	5022										
49MR03K04_2	P06	125	2	ROS	091203	2203	BE 32	30.36 S	148 9.86 W	GPS	4608	4618					36	1-8,23,24,26,27,34,35	REDUNDANT STATION WITH LEG1, #1=#6 DUPLICATE SMPLS (B-10DB), 3 BTLS FOR BIO			
49MR03K04_2	P06	125	2	BUC	091203	2208	UN 32	30.41 S	148 9.77 W	GPS	4597	4603						1,48	16.8C, 20L FOR BIO			
49MR03K04_2	P06	125	2	UNK	091203	2218	BE 32	30.01 S	148 9.65 W	GPS	4580	4589							SOLAR LIGHT MEASUREMENT			
49MR03K04_2	P06	125	2	ROS	091203	2314	BO 32	30.71 S	148 9.04 W	GPS	4459	4469	10	4635	4640				LADCP SOUNDING			
49MR03K04_2	P06	125	2	UNK	091303	0013	EN 32	30.94 S	148 8.41 W	GPS	4254	4297										
49MR03K04_2	P06	125	2	ROS	091303	0113	EN 32	31.29 S	148 7.77 W	GPS	4220	4263							#31 NO WATER, #2 MISS FIRE			
49MR03K04_2	P06	120	1	ROS	091303	1512	BE 32	30.07 S	144 0.24 W	GPS	5103	5104					36	1-6,9,22,34,35,47	#1-3 FOR R.N.			
49MR03K04_2	P06	120	1	BUC	091303	1526	UN 32	30.13 S	144 0.20 W	GPS	5096	5098						1	17.5C			
49MR03K04_2	P06	120	1	ROS	091303	1632	BO 32	30.41 S	143 59.78 W	GPS	4961	4957	7	5100	5151							
49MR03K04_2	P06	120	1	UNK	091303	1646	UN 32	30.54 S	143 59.76 W	GPS	4950	4944							9,22,47	86L THROUGH HULL PUMP FOR R.N.		
49MR03K04_2	P06	120	2	BUC	091303	1700	UN 32	30.62 S	143 59.72 W	GPS	4959	4956							34,35,48	20L FOR BIO		
49MR03K04_2	P06	120	1	ROS	091303	1854	EN 32	30.92 S	143 59.26 W	GPS	4771	4824										
49MR03K04_2	P06	119	1	ROS	091303	2205	BE 32	30.60 S	143 9.05 W	GPS	5525	5522					35	1-8,23,24,26,27,34,35	#1=#4 DUPLICATE SMPLS (5250DB)			
49MR03K04_2	P06	119	1	BUC	091303	2215	UN 32	30.58 S	143 9.11 W	GPS	5518	5520						1	17.4C			
49MR03K04_2	P06	119	1	UNK	091303	2300	BE 32	30.51 S	143 9.05 W	GPS	5508	5511								SOLAR LIGHT MEASUREMENT		
49MR03K04_2	P06	119	1	ROS	091303	2329	BO 32	30.50 S	143 9.07 W	GPS	5519	5510	10	5517	5616							
49MR03K04_2	P06	119	1	UNK	091303	2341	EN 32	30.54 S	143 9.10 W	GPS	5504	5515										
49MR03K04_2	P06	119	2	BUC	091403	0025	UN 32	30.73 S	143 9.35 W	GPS	5524	5528							34,35,48			
49MR03K04_2	P06	119	1	ROS	091403	0141	EN 32	30.99 S	143 9.56 W	GPS	5324	5339										
49MR03K04_2	P06	118	1	ROS	091403	0441	BE 32	29.74 S	142 19.68 W	GPS	4572	4573										
49MR03K04_2	P06	118	1	BUC	091403	0447	UN 32	29.68 S	142 19.72 W	GPS	4474	4510							30	1-6,11		
49MR03K04_2	P06	118	2	BUC	091403	0515	UN 32	29.51 S	142 19.90 W	GPS	4447	4428							1	16.9C		
49MR03K04_2	P06	118	1	ROS	091403	0551	BO 32	29.43 S	142 20.07 W	GPS	4438	4427	11	4451	4500					34,35	500ML FOR BIO	
49MR03K04_2	P06	118	1	ROS	091403	0756	EN 32	29.12 S	142 21.00 W	GPS	4378	4379										
49MR03K04_2	P06	118	1	FLT	091403	0804	DE 32	28.94 S	142 20.94 W	GPS	4374	4374									ARGO/APEX#933	
49MR03K04_2	P06	117	1	ROS	091403	1117	BE 32	29.86 S	141 29.58 W	GPS	4689	4692							32	1-8,12,13,15,23,24,26,27,45,46	#1=#8 DUPLICATE SMPLS (4250DB)	
49MR03K04_2	P06	117	1	BUC	091403	1124	UN 32	29.82 S	141 29.57 W	GPS	4694	4693							1	16.9C		
49MR03K04_2	P06	117	1	UNK	091403	1229	UN 32	29.82 S	141 29.66 W	GPS	4682	4690								9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	117	1	ROS	091403	1230	BO 32	29.82 S	141 29.66 W	GPS	4685	4688	11	4685	4763							
49MR03K04_2	P06	117	1	ROS	091403	1427	EN 32	29.78 S	141 30.04 W	GPS	4591	4576										
49MR03K04_2	P06	116	1	ROS	091403	1731	BE 32	29.90 S	140 40.06 W	GPS	5005	4958								32	1-6,34,35	

49MR03K04_2	P06	116	1	BUC	091403	1736	UN	32	30.03	S	140	40.05	W	GPS	4953	4950					1	17.8C		
49MR03K04_2	P06	116	2	BUC	091403	1827	UN	32	30.59	S	140	40.27	W	GPS	4915	4916					34, 35, 48	20L FOR BIO		
49MR03K04_2	P06	116	1	ROS	091403	1847	BO	32	30.76	S	140	40.39	W	GPS	4888	4893	10	4975	4977					
49MR03K04_2	P06	116	1	UNK	091403	2007	BE	32	31.22	S	140	40.87	W	GPS	4890	4890							SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	116	1	UNK	091403	2033	EN	32	31.34	S	140	40.97	W	GPS	4876	4878								
49MR03K04_2	P06	116	1	ROS	091403	2101	EN	32	31.54	S	140	41.13	W	GPS	4892	4887								
49MR03K04_2	P06	115	1	ROS	091403	2331	BE	32	29.96	S	139	59.71	W	GPS	4726	4731					32	1-8,23,24,26,27,34,35	#1=#7 DUPLICATE SMPLS (4500DB)	
49MR03K04_2	P06	115	1	BUC	091403	2336	UN	32	29.90	S	139	59.62	W	GPS	4707	4715					1	17.9C		
49MR03K04_2	P06	115	1	UNK	091503	0026	BE	32	30.06	S	139	59.25	W	GPS	4729	4734							SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	115	1	ROS	091503	0042	BO	32	30.16	S	139	59.19	W	GPS	4735	4734	20	4713	4752					
49MR03K04_2	P06	115	1	UNK	091503	0050	EN	32	30.20	S	139	59.17	W	GPS	4734	4733								
49MR03K04_2	P06	115	2	BUC	091503	0130	UN	32	30.35	S	139	59.02	W	GPS	4787	4785						34, 35, 48	20L FOR BIO	
49MR03K04_2	P06	115	1	ROS	091503	0242	EN	32	30.66	S	139	58.90	W	GPS	4790	4791								
49MR03K04_2	P06	114	1	ROS	091503	0506	BE	32	29.96	S	139	20.14	W	GPS	4985	4985					36	1-6,9,22,47	#1-4 FOR R.N.	
49MR03K04_2	P06	114	1	BUC	091503	0511	UN	32	29.99	S	139	20.10	W	GPS	4987	4986					1	17.2C		
49MR03K04_2	P06	114	1	ROS	091503	0633	BO	32	30.22	S	139	19.30	W	GPS	4831	4842	32	5027	5052					LADCP SOUNDING
49MR03K04_2	P06	114	1	UNK	091503	0641	UN	32	30.25	S	139	19.27	W	GPS	4825	4822						9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	114	1	ROS	091503	0910	EN	32	30.37	S	139	17.74	W	GPS	4791	4793							IRREGULAR SPOOL AT 1400M AND 800M	
49MR03K04_2	P06	114	1	FLT	091503	0918	DE	32	30.46	S	139	17.43	W	GPS	4799	4797							ARGO/SOLO#2204	
49MR03K04_2	P06	113	1	ROS	091503	1138	BE	32	30.05	S	138	39.91	W	GPS	4588	4588					32	1-8,12,13,23,24,26,27,46	#1=#9 DUPLICATE SMPLS (4000DB)	
49MR03K04_2	P06	113	1	BUC	091503	1145	UN	32	30.12	S	138	39.94	W	GPS	4578	4581					1	16.6C		
49MR03K04_2	P06	113	1	ROS	091503	1248	BO	32	30.51	S	138	40.22	W	GPS	4553	4552	6	4607	4640					
49MR03K04_2	P06	113	1	ROS	091503	1449	EN	32	30.92	S	138	40.66	W	GPS	4529	4526								
49MR03K04_2	P06	112	1	ROS	091503	1720	BE	32	30.18	S	137	59.78	W	GPS	4851	4852					32	1-6,34,35		
49MR03K04_2	P06	112	1	BUC	091503	1827	UN	32	30.63	S	137	59.95	W	GPS	4850	4852						1,48	17.2C, 20L FOR BIO	
49MR03K04_2	P06	112	1	ROS	091503	1835	BO	32	30.69	S	137	59.97	W	GPS	4853	4851	15	4881	4920					
49MR03K04_2	P06	112	1	UNK	091503	2000	BE	32	31.20	S	138	0.34	W	GPS	4845	4848								SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	112	1	UNK	091503	2043	EN	32	31.47	S	138	0.61	W	GPS	4829	4828								
49MR03K04_2	P06	112	1	ROS	091503	2046	EN	32	31.51	S	138	0.64	W	GPS	4828	4827								
49MR03K04_2	P06	111	1	ROS	091503	2320	BE	32	30.07	S	137	19.90	W	GPS	4319	4313					30	1-8,23,24,26,27,34,35	#1=#10 DUPLICATE SMPLS (3750DB)	
49MR03K04_2	P06	111	1	UNK	091603	0010	BE	32	30.37	S	137	19.36	W	GPS	4318	4314								SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	111	1	ROS	091603	0026	BO	32	30.54	S	137	19.32	W	GPS	4318	4311	10	4379	4367					
49MR03K04_2	P06	111	1	UNK	091603	0043	EN	32	30.71	S	137	19.28	W	GPS	4311	4309								
49MR03K04_2	P06	111	1	BUC	091603	0059	UN	32	30.86	S	137	19.26	W	GPS	4307	4306						1,34,35,48	16.1C, 20L FOR BIO	
49MR03K04_2	P06	111	1	ROS	091603	0217	EN	32	31.48	S	137	19.00	W	GPS	4308	4308								
49MR03K04_2	P06	110	1	ROS	091603	0445	BE	32	29.77	S	136	39.75	W	GPS	4333	4333					30	1-6		
49MR03K04_2	P06	110	1	BUC	091603	0450	UN	32	29.71	S	136	39.61	W	GPS	4332	4330					1	16.3C		
49MR03K04_2	P06	110	1	ROS	091603	0552	BO	32	29.62	S	136	39.22	W	GPS	4325	4325	6	4345	4391					
49MR03K04_2	P06	110	1	ROS	091603	0743	EN	32	29.41	S	136	38.81	W	GPS	4317	4320								
49MR03K04_2	P06	109	1	ROS	091603	1013	BE	32	29.94	S	136	0.15	W	GPS	4402	4396					30	1-8,12,13,15,23,24,26,27,45,46	#1=#11 DUPLICATE SMPLS (3500DB)	
49MR03K04_2	P06	109	1	BUC	091603	1019	UN	32	29.94	S	136	0.14	W	GPS	4411	4392					1	16.4C		
49MR03K04_2	P06	109	1	ROS	091603	1121	BO	32	29.63	S	136	0.33	W	GPS	4385	4390	7	4421	4455					
49MR03K04_2	P06	109	1	ROS	091603	1319	EN	32	28.90	S	136	0.69	W	GPS	4402	4401								
49MR03K04_2	P06	109	1	FLT	091603	1325	DE	32	28.94	S	136	0.61	W	GPS	4390	4377								ARGO/APEX#934
49MR03K04_2	P06	108	1	ROS	091603	1602	BE	32	30.01	S	135	19.99	W	GPS	4408	4392					36	1-6,9,22,34,35,47	#1-6 FOR R.N.	
49MR03K04_2	P06	108	1	UNK	091603	1706	UN	32	29.46	S	135	19.98	W	GPS	4390	4393						9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	108	1	ROS	091603	1711	BO	32	29.43	S	135	19.97	W	GPS	4394	4388	8	4359	4384					
49MR03K04_2	P06	108	1	BUC	091603	1728	UN	32	29.30	S	135	19.98	W	GPS	4410	4420						1,34,35,48	16.6C, 20L FOR BIO	
49MR03K04_2	P06	108	1	ROS	091603	1906	EN	32	28.36	S	135	19.97	W	GPS	4349	4310								
49MR03K04_2	P06	X17	1	ROS	091603	2114	BE	32	28.42	S	134	50.86	W	GPS	4325	4321					0			

49MR03K04_2	P06	X17	1	UNK	091603	2131	BE	32	28.28	S	134	50.97	W	GPS	4347	4347				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	X17	1	UNK	091603	2140	EN	32	28.25	S	134	50.97	W	GPS	4336	4349				
49MR03K04_2	P06	X17	2	UNK	091603	2142	BE	32	28.25	S	134	50.97	W	GPS	4336	4356				
49MR03K04_2	P06	X17	1	ROS	091603	2147	EN	32	28.23	S	134	50.98	W	GPS	4359	4353				OPERATION INTERRUPTED AT 1300DB (POWER FAILURE), NO DATA EXCEPT FOR LADCP #1=#12 DUPLICATE SMPLS (3250DB)
49MR03K04_2	P06	X17	2	ROS	091603	2245	BE	32	28.39	S	134	50.91	W	GPS	4326	4325		30	1-8,23,24,26,27	
49MR03K04_2	P06	X17	2	UNK	091603	2310	EN	32	28.33	S	134	50.95	W	GPS	4344	4337				
49MR03K04_2	P06	X17	1	BUC	091603	2328	UN	32	28.25	S	134	51.00	W	GPS	4356	4351			1,34,35,48	16.7C, 30L FOR BIO
49MR03K04_2	P06	X17	2	ROS	091603	2353	BO	32	28.02	S	134	51.08	W	GPS	4361	4365	10	4388	4389	
49MR03K04_2	P06	X17	2	ROS	091703	0148	EN	32	27.99	S	134	51.08	W	GPS	4362	4363				#18 DISCONNECTED MIDDLE AND LOWER LANYARD
49MR03K04_2	P06	106	1	ROS	091703	0549	BE	32	29.94	S	134	0.36	W	GPS	4216	4220		29	1-6,11,34,35	
49MR03K04_2	P06	106	1	BUC	091703	0601	UN	32	29.89	S	134	0.32	W	GPS	4200	4213			1,34,35	16.4C
49MR03K04_2	P06	106	1	ROS	091703	0658	BO	32	29.60	S	134	0.24	W	GPS	4169	4158	12	4173	4211	
49MR03K04_2	P06	106	1	ROS	091703	0849	EN	32	29.04	S	133	59.81	W	GPS	4143	4151				
49MR03K04_2	P06	105	1	ROS	091703	1227	BE	32	30.11	S	133	20.58	W	GPS	4302	4292		30	1-8,12,13,23,24,26,27,46	#1=#13 DUPLICATE SMPLS (3000DB)
49MR03K04_2	P06	105	1	BUC	091703	1237	UN	32	30.03	S	133	20.58	W	GPS	4282	4302			1	16.0C
49MR03K04_2	P06	105	1	ROS	091703	1335	BO	32	29.78	S	133	20.24	W	GPS	4251	4248	22	4266	4307	
49MR03K04_2	P06	105	1	ROS	091703	1535	EN	32	29.19	S	133	19.78	W	GPS	4263	4252				ARGO/SOLO#2205
49MR03K04_2	P06	105	1	FLT	091703	1543	DE	32	29.30	S	133	19.77	W	GPS	4246	4243				
49MR03K04_2	P06	104	1	ROS	091703	1845	BE	32	30.10	S	132	39.89	W	GPS	4351	4348		30	1-6,34,35	
49MR03K04_2	P06	104	1	BUC	091703	1855	UN	32	30.05	S	132	39.85	W	GPS	4349	4349			1,34,35,48	16.2C
49MR03K04_2	P06	104	1	UNK	091703	1932	BE	32	29.88	S	132	39.86	W	GPS	4352	4347				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	104	1	ROS	091703	1954	BO	32	29.87	S	132	39.91	W	GPS	4345	4347	15	4343	4405	
49MR03K04_2	P06	104	2	UNK	091703	2003	UN	32	29.88	S	132	39.93	W	GPS	4360	4347			9,22,47	86L THROUGH HULL PUMP FOR R.N.
49MR03K04_2	P06	104	1	UNK	091703	2020	EN	32	29.87	S	132	39.91	W	GPS	4345	4347				
49MR03K04_2	P06	104	1	ROS	091703	2147	EN	32	29.82	S	132	39.82	W	GPS	4349	4346				
49MR03K04_2	P06	103	1	ROS	091803	0040	BE	32	29.85	S	132	0.61	W	GPS	4262	4262		30	1-8,23,24,26,27,34,35	#1=#14 DUPLICATE SMPLS (2800DB)
49MR03K04_2	P06	103	1	BUC	091803	0046	UN	32	29.84	S	132	0.57	W	GPS	4263	4261			1,34,35,48	16.8C, 40L FOR BIO
49MR03K04_2	P06	103	1	UNK	091803	0106	BE	32	29.82	S	132	0.44	W	GPS	4262	4260				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	103	1	UNK	091803	0138	EN	32	29.84	S	132	0.40	W	GPS	4261	4260				
49MR03K04_2	P06	103	1	ROS	091803	0149	BO	32	29.86	S	132	0.31	W	GPS	4260	4259	14	4259	4315	
49MR03K04_2	P06	103	1	ROS	091803	0342	EN	32	29.52	S	132	0.05	W	GPS	4260	4261				
49MR03K04_2	P06	102	1	ROS	091803	0639	BE	32	30.08	S	131	20.09	W	GPS	4176	4167		30	1-6	BTL #12015 AND #12021 WERE EXCHANGED
49MR03K04_2	P06	102	1	BUC	091803	0645	UN	32	30.11	S	131	20.07	W	GPS	4178	4179			1	17.2C
49MR03K04_2	P06	102	1	ROS	091803	0745	BO	32	30.22	S	131	19.72	W	GPS	4183	4183	11	4191	4234	
49MR03K04_2	P06	102	1	ROS	091803	0931	EN	32	30.13	S	131	19.13	W	GPS	4162	4151				
49MR03K04_2	P06	101	1	ROS	091803	1216	BE	32	29.93	S	130	39.88	W	GPS	3599	3588		28	1-8,12,13,23,24,26,27,34,35,46	#1=#15 DUPLICATE SMPLS (2600DB), NISKIN #12021 WAS REPLACED WITH #12012
49MR03K04_2	P06	101	1	BUC	091803	1222	UN	32	29.88	S	130	39.89	W	GPS	3602	3603			1	16.6C
49MR03K04_2	P06	101	1	ROS	091803	1315	BO	32	29.66	S	130	39.59	W	GPS	3663	3681	19	3620	3648	
49MR03K04_2	P06	101	1	ROS	091803	1505	EN	32	28.97	S	130	39.02	W	GPS	3764	3757				SAMPING LAYER OF 3500DB WAS CHANGED TO 3400DB
49MR03K04_2	P06	100	1	ROS	091803	1742	BE	32	30.11	S	129	59.98	W	GPS	4052	4065		36	1-6,9,22,34,35,47	#1-8 FOR R.N.
49MR03K04_2	P06	100	1	BUC	091803	1758	UN	32	29.98	S	129	59.89	W	GPS	4086	4090			1,34,35,48	16.9C
49MR03K04_2	P06	100	1	ROS	091803	1846	BO	32	29.63	S	129	59.79	W	GPS	4084	4085	9	4133	4149	
49MR03K04_2	P06	100	1	UNK	091803	1856	UN	32	29.59	S	129	59.72	W	GPS	4061	4051			9,22,47	86L THROUGH HULL PUMP FOR R.N.
49MR03K04_2	P06	100	2	UNK	091803	1956	BE	32	29.33	S	129	59.51	W	GPS	4055	4072				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	100	2	UNK	091803	2033	EN	32	29.19	S	129	59.40	W	GPS	4146	4149				
49MR03K04_2	P06	100	1	ROS	091803	2035	EN	32	29.18	S	129	59.38	W	GPS	4135	4158				#2 DISCONNECTED MIDDLE AND LOWER LANYARD
49MR03K04_2	P06	100	1	FLT	091803	2041	DE	32	29.19	S	129	59.25	W	GPS	4147	4150				ARGO/APEX#935
49MR03K04_2	P06	99	1	ROS	091803	2316	BE	32	29.93	S	129	19.73	W	GPS	4126	4130		30	1-8,15,23,24,26,27,34,35,45	#1=#16 DUPLICATE SMPLS (2400DB)

49MR03K04_2	P06	99	1	BUC	091803	2324	UN	32	29.90	S	129	19.72	W	GPS	4127	4131					1, 34, 35, 48	16.9C, 40L FOR BIO		
49MR03K04_2	P06	99	1	UNK	091903	0004	BE	32	29.81	S	129	19.66	W	GPS	4115	4117						SOLAR LIGHT MEASUREMENT		
49MR03K04_2	P06	99	1	ROS	091903	0020	BO	32	29.76	S	129	19.60	W	GPS	4116	4116	8	4133	4183					
49MR03K04_2	P06	99	1	UNK	091903	0032	EN	32	29.72	S	129	19.52	W	GPS	4116	4111								
49MR03K04_2	P06	99	1	ROS	091903	0210	EN	32	29.28	S	129	19.47	W	GPS	4046	4036								
49MR03K04_2	P06	98	1	ROS	091903	0448	BE	32	29.70	S	128	40.37	W	GPS	4256	4265					29	1-6		
49MR03K04_2	P06	98	1	BUC	091903	0453	UN	32	29.71	S	128	40.34	W	GPS	4266	4264					1		17.0C	
49MR03K04_2	P06	98	1	ROS	091903	0555	BO	32	29.74	S	128	40.05	W	GPS	4248	4266	12	4223	4321					
49MR03K04_2	P06	98	1	ROS	091903	0745	EN	32	29.64	S	128	39.60	W	GPS	4236	4236								
49MR03K04_2	P06	97	1	ROS	091903	1026	BE	32	30.01	S	128	0.06	W	GPS	4136	4180					29	1-8,12,13,23,24,26,27,46	#1=#17 DUPLICATE SMPLS (2200DB)	
49MR03K04_2	P06	97	1	BUC	091903	1033	UN	32	30.00	S	128	0.01	W	GPS	4139	4125					1		16.6C	
49MR03K04_2	P06	97	1	ROS	091903	1129	BO	32	29.66	S	127	59.84	W	GPS	3949	3955	104	3958	3986				LADCP SOUNDING	
49MR03K04_2	P06	97	1	UNK	091903	1242	UN	32	29.27	S	127	59.73	W	GPS	3901	3899						9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	97	1	ROS	091903	1318	EN	32	29.15	S	127	59.56	W	GPS	3900	3904								
49MR03K04_2	P06	96	1	ROS	091903	1557	BE	32	29.94	S	127	19.43	W	GPS	3204	3201					25	1-6,34,35		
49MR03K04_2	P06	96	1	ROS	091903	1649	BO	32	29.54	S	127	19.38	W	GPS	3149	3145	9	3155	3182					
49MR03K04_2	P06	96	1	BUC	091903	1727	UN	32	29.28	S	127	19.31	W	GPS	3180	3185						1,48	16.9C, 20L FOR BIO	
49MR03K04_2	P06	96	1	ROS	091903	1825	EN	32	28.82	S	127	19.20	W	GPS	3217	3197								
49MR03K04_2	P06	96	1	FLT	091903	1832	DE	32	28.75	S	127	18.98	W	GPS	3131	3119							ARGO/SOLO#2206	
49MR03K04_2	P06	95	1	ROS	091903	2102	BE	32	29.95	S	126	40.14	W	GPS	2379	2375					24	1-8,23,24,26,27,34,35,48	#1=#18 DUPLICATE SMPLS (2000DB), IRREGULAR TRIP SEQUENCE	
49MR03K04_2	P06	95	1	BUC	091903	2109	UN	32	29.86	S	126	40.14	W	GPS	2356	2357					1		16.2C	
49MR03K04_2	P06	95	1	ROS	091903	2140	BO	32	29.61	S	126	40.11	W	GPS	2342	2340	10	2301	2296					SPOOLED IN 6M BEFORE BOTTOM SAMPLING
49MR03K04_2	P06	95	1	UNK	091903	2158	BE	32	29.48	S	126	40.08	W	GPS	2379	2378								SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	95	1	UNK	091903	2237	EN	32	29.15	S	126	40.06	W	GPS	2406	2404								
49MR03K04_2	P06	95	1	ROS	091903	2257	EN	32	29.03	S	126	40.04	W	GPS	2378	2374								
49MR03K04_2	P06	94	1	ROS	092003	0139	BE	32	29.72	S	125	59.44	W	GPS	3527	3524					28	1-8,23,24,26,27,46	#1=#19 DUPLICATE SMPLS (1800DB)	
49MR03K04_2	P06	94	1	BUC	092003	0146	UN	32	29.65	S	125	59.37	W	GPS	3584	3585					1		15.9C	
49MR03K04_2	P06	94	1	ROS	092003	0239	BO	32	29.26	S	125	59.29	W	GPS	3611	3611	12	3611	3631					
49MR03K04_2	P06	94	1	ROS	092003	0423	EN	32	28.56	S	125	59.17	W	GPS	3425	3442								
49MR03K04_2	P06	93	1	ROS	092103	0301	BE	32	30.57	S	125	19.96	W	GPS	2139	2133					21	1-8,12,13,23,24,26,27,34,35	#1=#20 DUPLICATE SMPLS (1600DB)	
49MR03K04_2	P06	93	1	BUC	092103	0306	UN	32	30.53	S	125	19.97	W	GPS	2159	2148						1,34,35	15.8C	
49MR03K04_2	P06	93	1	ROS	092103	0341	BO	32	30.33	S	125	20.02	W	GPS	2234	2217	12	2170	2182					
49MR03K04_2	P06	93	1	ROS	092103	0451	EN	32	30.03	S	125	20.31	W	GPS	2220	2216								
49MR03K04_2	P06	92	1	ROS	092103	0731	BE	32	30.27	S	124	39.99	W	GPS	3802	3804					36	1-6,9,22,47	#1-9 FOR R.N.	
49MR03K04_2	P06	92	1	BUC	092103	0737	UN	32	30.29	S	124	40.06	W	GPS	3779	3770					1		16.7C	
49MR03K04_2	P06	92	1	ROS	092103	0830	BO	32	30.37	S	124	40.22	W	GPS	3741	3758	24	3780	3783					
49MR03K04_2	P06	92	1	UNK	092103	0846	UN	32	30.32	S	124	40.15	W	GPS	3736	3732						9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	92	1	ROS	092103	1010	EN	32	30.17	S	124	40.09	W	GPS	3748	3745								
49MR03K04_2	P06	91	1	ROS	092103	1245	BE	32	29.86	S	123	59.98	W	GPS	2365	2359					24	1-8,23,24,26,27,34,35,46,48	#1=#21 DUPLICATE SMPLS (1400DB), 2 BTLS FOR BIO (5DB)	
49MR03K04_2	P06	91	1	BUC	092103	1251	UN	32	29.88	S	123	59.99	W	GPS	2362	2366					1		16.6C	
49MR03K04_2	P06	91	1	ROS	092103	1327	BO	32	29.82	S	124	0.12	W	GPS	2364	2382	9	2414	2432					
49MR03K04_2	P06	91	1	ROS	092103	1446	EN	32	29.55	S	124	0.43	W	GPS	2418	2426								
49MR03K04_2	P06	91	1	FLT	092103	1453	DE	32	29.58	S	124	0.24	W	GPS	2369	2364								ARGO/APEX#936
49MR03K04_2	P06	90	1	ROS	092103	1724	BE	32	29.84	S	123	19.89	W	GPS	3568	3551					29	1-6,34,35,48	#1=#2 DUPLICATE SMPLS (5DB), 2 BTLS FOR BIO (5DB)	
49MR03K04_2	P06	90	1	BUC	092103	1728	UN	32	29.79	S	123	19.92	W	GPS	3476	3497					1		16.8C	
49MR03K04_2	P06	90	1	ROS	092103	1823	BO	32	29.52	S	123	20.06	W	GPS	3596	3590	10	3595	3628					
49MR03K04_2	P06	90	1	UNK	092103	1902	BE	32	29.20	S	123	20.29	W	GPS	3530	3534								SOLAR LIGHT MEASUREMENT





49MR03K04_2	P06	79	1	ROS	092403	0519	BE	32	29.43	S	116	0.68	W	GPS	3142	3142				26	1-8,23,24,26,27,46	#1=#27 DUPLICATE SMPLS (600DB)	
49MR03K04_2	P06	79	1	BUC	092403	0523	UN	32	29.40	S	116	0.65	W	GPS	3128	3131				1		15.3C	
49MR03K04_2	P06	79	1	ROS	092403	0612	BO	32	29.12	S	116	0.49	W	GPS	3123	3122	11	3124	3153				
49MR03K04_2	P06	79	1	ROS	092403	0754	EN	32	28.37	S	116	0.29	W	GPS	2970	2990							
49MR03K04_2	P06	78	1	ROS	092403	1033	BE	32	30.01	S	115	19.90	W	GPS	3230	3230				25	1-6		
49MR03K04_2	P06	78	1	BUC	092403	1039	UN	32	29.97	S	115	19.87	W	GPS	3230	3222				1		15.8C	
49MR03K04_2	P06	78	1	ROS	092403	1127	BO	32	29.65	S	115	19.93	W	GPS	3219	3222	12	3232	3252				
49MR03K04_2	P06	78	1	ROS	092403	1310	EN	32	29.33	S	115	19.78	W	GPS	3212	3220							
49MR03K04_2	P06	78	1	FLT	092403	1318	DE	32	29.33	S	115	19.56	W	GPS	3231	3233						ARGO/SOLO#2208	
49MR03K04_2	P06	77	1	ROS	092403	1547	BE	32	30.03	S	114	40.08	W	GPS	2933	2937				27	1-8,12,13,23,24,26,27,34,35,48	#1=#28 DUPLICATE SMPLS (500DB), 2 BTLS FOR BIO (5DB)	
49MR03K04_2	P06	77	1	BUC	092403	1552	UN	32	30.00	S	114	40.04	W	GPS	2933	2938				1		16.4C	
49MR03K04_2	P06	77	1	ROS	092403	1634	BO	32	29.87	S	114	39.87	W	GPS	2965	2967	8	2947	2973				
49MR03K04_2	P06	77	1	ROS	092403	1804	EN	32	29.58	S	114	39.52	W	GPS	3045	3046							
49MR03K04_2	P06	76	1	ROS	092403	2036	BE	32	30.20	S	113	59.77	W	GPS	2979	2980				36	1-6,9,22,34,35,47,48	2 BTLS FOR BIO (5DB), #1-7,9,10 FOR R.N.	
49MR03K04_2	P06	76	1	BUC	092403	2041	UN	32	30.18	S	113	59.73	W	GPS	2955	2958				1		17.0C	
49MR03K04_2	P06	76	1	ROS	092403	2125	BO	32	30.08	S	113	59.42	W	GPS	2978	2979	7	2979	3000				
49MR03K04_2	P06	76	1	UNK	092403	2126	UN	32	30.08	S	113	59.42	W	GPS	2975	2977					9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	76	1	ROS	092403	2307	EN	32	29.68	S	113	59.11	W	GPS	2972	2976						#8 DID NOT FIRE (OPERATION MISS)	
49MR03K04_2	P06	75	1	ROS	092503	0139	BE	32	30.26	S	113	20.07	W	GPS	2837	2845				25	1-8,15,23,24,26,27,45,46	#1=#28 (500DB), #2=#15 (2600DB) DUPLICATE SMPLS	
49MR03K04_2	P06	75	1	BUC	092503	0144	UN	32	30.20	S	113	20.06	W	GPS	2860	2862				1		17.4C	
49MR03K04_2	P06	75	1	ROS	092503	0226	BO	32	29.91	S	113	19.95	W	GPS	2805	2803	12	2841	2850				
49MR03K04_2	P06	75	1	ROS	092503	0400	EN	32	29.11	S	113	19.64	W	GPS	2443	2437							
49MR03K04_2	P06	72	1	ROS	092503	0641	BE	32	29.87	S	112	40.26	W	GPS	2684	2678				22	1-6		
49MR03K04_2	P06	72	1	BUC	092503	0645	UN	32	29.77	S	112	40.29	W	GPS	2672	2675				1		16.7C	
49MR03K04_2	P06	72	1	ROS	092503	0725	BO	32	29.52	S	112	40.17	W	GPS	2668	2669	30	2647	2657				LADCP SOUNDING
49MR03K04_2	P06	72	1	ROS	092503	0853	EN	32	29.00	S	112	40.14	W	GPS	2665	2669							
49MR03K04_2	P06	71	1	ROS	092503	1139	BE	32	29.95	S	112	0.00	W	GPS	2714	2711				25	1-8,12,13,23,24,26,27	#1=#30 (300DB), #2=#23 (1000DB) DUPLICATE SMPLS	
49MR03K04_2	P06	71	1	BUC	092503	1152	UN	32	29.88	S	112	0.06	W	GPS	2714	2712				1		17.4C	
49MR03K04_2	P06	71	1	ROS	092503	1227	BO	32	29.87	S	112	0.13	W	GPS	2720	2708	9	2696	2720				
49MR03K04_2	P06	71	1	UNK	092503	1239	UN	32	29.87	S	112	0.09	W	GPS	2715	2712					9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	71	1	ROS	092503	1353	EN	32	29.93	S	111	59.82	W	GPS	2724	2725							
49MR03K04_2	P06	71	1	FLT	092503	1400	DE	32	29.97	S	111	59.56	W	GPS	2720	2720						ARGO/APEX#938	
49MR03K04_2	P06	70	1	ROS	092503	1628	BE	32	29.79	S	111	19.98	W	GPS	2499	2485				24	1-6,34,35,48	2 BTLS FOR BIO (5DB)	
49MR03K04_2	P06	70	1	BUC	092503	1632	UN	32	29.82	S	111	20.01	W	GPS	2482	2477				1		17.6C	
49MR03K04_2	P06	70	1	ROS	092503	1711	BO	32	29.88	S	111	19.99	W	GPS	2477	2476	12	2477	2500				
49MR03K04_2	P06	70	1	ROS	092503	1829	EN	32	29.72	S	111	19.94	W	GPS	2517	2512						17.4C	
49MR03K04_2	P06	69	1	ROS	092503	2106	BE	32	29.87	S	110	40.08	W	GPS	3004	3003				28	1-8,23,24,26,27,34,35,46,48	#1=#29 (400DB), #2=#14 (2800DB) DUPLICATE SMPLS, 2 BTLS FOR BIO (10DB)	
49MR03K04_2	P06	69	1	BUC	092503	2118	UN	32	29.73	S	110	40.11	W	GPS	3012	3011				1		17.5C	
49MR03K04_2	P06	69	1	ROS	092503	2200	BO	32	29.31	S	110	40.07	W	GPS	3025	3026	8	3055	3051				
49MR03K04_2	P06	69	1	ROS	092503	2341	EN	32	28.93	S	110	40.75	W	GPS	3058	3058							
49MR03K04_2	P06	68	1	ROS	092603	0221	BE	32	30.07	S	109	59.98	W	GPS	2855	2855				23	1-6,11		
49MR03K04_2	P06	68	1	BUC	092603	0231	UN	32	30.16	S	110	0.07	W	GPS	2822	2831				1		17.7C	
49MR03K04_2	P06	68	1	ROS	092603	0310	BO	32	30.39	S	110	0.38	W	GPS	2724	2740	22	2848	2813	2853			
49MR03K04_2	P06	68	1	ROS	092603	0440	EN	32	30.63	S	110	0.87	W	GPS	2669	2669							
49MR03K04_2	P06	67	1	ROS	092603	0718	BE	32	30.00	S	109	20.15	W	GPS	4479	4480				31	1-8,12,13,15,23,24,26,27,45	#1=#7 DUPLICATE SMPLS (B-10DB)	
49MR03K04_2	P06	67	1	BUC	092603	0729	UN	32	29.96	S	109	20.17	W	GPS	4470	4478				1		16.8C	

49MR03K04_2	P06	67	1	ROS	092603	0833	BO	32	29.75	S	109	20.42	W	GPS	4448	4456	9	4442	4498				
49MR03K04_2	P06	67	1	UNK	092603	0922	UN	32	29.47	S	109	20.61	W	GPS	4463	4461				9,22,47	86L THROUGH HULL PUMP FOR R.N.		
49MR03K04_2	P06	67	1	ROS	092603	1054	EN	32	28.82	S	109	20.97	W	GPS	4480	4508							
49MR03K04_2	P06	67	1	FLT	092603	1103	DE	32	28.79	S	109	20.87	W	GPS	4496	4456					ARGO/SOLO#2209		
49MR03K04_2	P06	66	1	ROS	092603	1801	BE	32	30.30	S	108	40.02	W	GPS	2906	2927				24	1-6		
49MR03K04_2	P06	66	1	BUC	092603	1819	UN	32	30.26	S	108	40.19	W	GPS	2867	2866					1,34,35,48	16.8C, 30L FOR BIO	
49MR03K04_2	P06	66	1	UNK	092603	1856	BE	32	30.35	S	108	40.72	W	GPS	2850	2844						SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	66	1	ROS	092603	1904	BO	32	30.29	S	108	40.74	W	GPS	2848	2848	10	2829	2823				
49MR03K04_2	P06	66	1	UNK	092603	1927	EN	32	30.10	S	108	40.88	W	GPS	2868	2879							
49MR03K04_2	P06	66	1	ROS	092603	2030	EN	32	29.81	S	108	41.32	W	GPS	2964	2983							
49MR03K04_2	P06	65	1	ROS	092603	2308	BE	32	29.99	S	108	0.15	W	GPS	3238	3221				26	1-8,23,24,26,27,34,35,46	#13=#36 DUPLICATE SMPLS (3000DB)	
49MR03K04_2	P06	65	1	BUC	092603	2327	UN	32	30.24	S	108	0.34	W	GPS	3257	3255					1,34,35,48	17.1C	
49MR03K04_2	P06	65	1	ROS	092703	0003	BO	32	30.31	S	108	0.61	W	GPS	3256	3255	9	3272	3290				
49MR03K04_2	P06	65	1	ROS	092703	0139	EN	32	30.54	S	108	1.12	W	GPS	3172	3182							
49MR03K04_2	P06	64	1	ROS	092703	0434	BE	32	29.98	S	107	19.86	W	GPS	3251	3250				25	1-6		
49MR03K04_2	P06	64	1	BUC	092703	0443	UN	32	29.99	S	107	19.85	W	GPS	3249	3247					1	17.1C	
49MR03K04_2	P06	64	1	ROS	092703	0529	BO	32	30.00	S	107	19.80	W	GPS	3249	3249	13	3246	3280				
49MR03K04_2	P06	64	1	ROS	092703	0706	EN	32	29.98	S	107	19.47	W	GPS	3168	3166							
49MR03K04_2	P06	63	1	ROS	092703	0935	EN	32	30.03	S	106	39.98	W	GPS	3311	3306				27	1-8,12,13,23,24,26,27,	#12=#35 DUPLICATE SMPLS (3250DB)	
49MR03K04_2	P06	63	1	BUC	092703	0946	UN	32	29.88	S	106	39.91	W	GPS	3305	3306					1	16.6C	
49MR03K04_2	P06	63	1	ROS	092703	1033	BO	32	29.85	S	106	40.26	W	GPS	3309	3310	8	3318	3344				
49MR03K04_2	P06	63	1	ROS	092703	1211	EN	32	29.36	S	106	40.98	W	GPS	3323	3318							
49MR03K04_2	P06	62	1	ROS	092703	1449	BE	32	30.02	S	106	0.43	W	GPS	3397	3397				36	1-6,9,22,34,35,47,48	2 BTLS FOR BIO (10DB), #1-8 FOR R.N.	
49MR03K04_2	P06	62	1	BUC	092703	1459	UN	32	29.98	S	106	0.51	W	GPS	3394	3390					1	17.1C	
49MR03K04_2	P06	62	1	ROS	092703	1545	BO	32	29.96	S	106	0.99	W	GPS	3345	3345	11	3396	3402				
49MR03K04_2	P06	62	1	UNK	092703	1548	UN	32	29.96	S	106	1.02	W	GPS	3345	3344					9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	62	1	ROS	092703	1723	EN	32	29.52	S	106	1.87	W	GPS	3263	3262							
49MR03K04_2	P06	62	1	FLT	092703	1729	DE	32	29.47	S	106	1.88	W	GPS	3257	3258						ARGO/APEX#940	
49MR03K04_2	P06	61	1	ROS	092703	2014	BE	32	30.09	S	105	20.10	W	GPS	3271	3275				29	1-8,23,24,26,27,34,35,46,48	#12=#34 DUPLICATE SMPLS (3250DB), 2 BTLS FOR BIO (10DB)	
49MR03K04_2	P06	61	1	BUC	092703	2020	UN	32	30.15	S	105	20.20	W	GPS	3294	3300					1	16.6C	
49MR03K04_2	P06	61	1	ROS	092703	2109	BO	32	30.16	S	105	20.42	W	GPS	3359	3358	10	3306	3341				
49MR03K04_2	P06	61	1	ROS	092703	2255	EN	32	30.20	S	105	20.96	W	GPS	3558	3559							
49MR03K04_2	P06	60	1	ROS	092803	0203	BE	32	29.92	S	104	40.07	W	GPS	3499	3509				26	1-6	REMOVE SECONDARY DO SENSOR	
49MR03K04_2	P06	60	1	BUC	092803	0213	UN	32	29.97	S	104	40.09	W	GPS	3493	3493					1	16.6C	
49MR03K04_2	P06	60	1	ROS	092803	0302	BO	32	30.02	S	104	40.22	W	GPS	3507	3506	19	3494	3536				
49MR03K04_2	P06	60	1	ROS	092803	0445	EN	32	30.04	S	104	40.40	W	GPS	3504	3505							
49MR03K04_2	P06	59	1	ROS	092803	0713	BE	32	30.04	S	104	0.04	W	GPS	3043	3041				25	1-8,15,23,24,26,27,45	#33=#14 DUPLICATE SMPLS (2800DB)	
49MR03K04_2	P06	59	1	BUC	092803	0725	UN	32	30.00	S	103	59.96	W	GPS	3044	3043					1	15.9C	
49MR03K04_2	P06	59	1	ROS	092803	0801	BO	32	30.02	S	104	0.10	W	GPS	3018	3004	84	2986	3013				LADCP SOUNDING
49MR03K04_2	P06	59	1	ROS	092803	0948	EN	32	30.07	S	104	0.53	W	GPS	2950	2920							
49MR03K04_2	P06	X18	1	ROS	092803	1326	BE	32	29.93	S	102	59.82	W	GPS	3556	3557				30	1-8,12,13,23,24,26,27,34,35,46,48	#32=#11 DUPLICATE SMPLS (3500DB), 2 BTLS FOR BIO (10DB)	
49MR03K04_2	P06	X18	1	BUC	092803	1338	UN	32	29.92	S	102	59.89	W	GPS	3566	3560					1	16.2C	
49MR03K04_2	P06	X18	1	ROS	092803	1428	BO	32	29.93	S	103	0.26	W	GPS	3585	3590	13	3595	3618				
49MR03K04_2	P06	X18	1	UNK	092803	1433	UN	32	29.95	S	103	0.29	W	GPS	3589	3592					9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	X18	1	ROS	092803	1613	EN	32	30.42	S	103	0.67	W	GPS	3622	3632							
49MR03K04_2	P06	X18	1	FLT	092803	1620	DE	32	30.14	S	103	0.54	W	GPS	3661	3633						ARGO/SOLO#2210	
49MR03K04_2	P06	56	1	ROS	092803	1950	BE	32	30.14	S	101	59.97	W	GPS	3865	3865				30	1-6,34,35,48	2 BTLS FOR BIO (10DB)	
49MR03K04_2	P06	56	1	BUC	092803	2001	UN	32	30.30	S	101	59.80	W	GPS	3857	3868					1	16.0C	



49MR03K04_2	P06	46	1	ROS	100203	0619	BE	32	30.05	S	95	20.08	W	GPS	3777	3775			36	1-6,9,22,47	#1-8,10 FOR R.N.	
49MR03K04_2	P06	46	1	BUC	100203	0624	UN	32	30.07	S	95	20.06	W	GPS	3771	3775				1,33	16.2C	
49MR03K04_2	P06	46	1	ROS	100203	0719	BO	32	30.44	S	95	19.89	W	GPS	3777	3778	12	3793	3820			
49MR03K04_2	P06	46	1	UNK	100203	0735	UN	32	30.50	S	95	19.84	W	GPS	3774	3774				9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	46	1	ROS	100203	0912	EN	32	30.96	S	95	19.48	W	GPS	3750	3753						
49MR03K04_2	P06	45	1	ROS	100203	1135	BE	32	29.86	S	94	39.96	W	GPS	3810	3813			30	1-8,23,24,26,27,34,35,46,48	#11=#26 DUPLICATE SMPLS (3500DB), 2 BTLS FOR BIO	
49MR03K04_2	P06	45	1	BUC	100203	1141	UN	32	29.87	S	94	39.91	W	GPS	3818	3814				1	16.1C	
49MR03K04_2	P06	45	1	ROS	100203	1233	BO	32	29.93	S	94	39.70	W	GPS	3797	3786	8	3815	3858			
49MR03K04_2	P06	45	1	ROS	100203	1423	EN	32	29.99	S	94	39.15	W	GPS	3837	3839						
49MR03K04_2	P06	44	1	ROS	100203	1648	BE	32	30.22	S	93	59.90	W	GPS	3930	3933			31	1-6,34,35,48	3 BTLS FOR BIO (10DB)	
49MR03K04_2	P06	44	1	BUC	100203	1657	UN	32	30.25	S	93	59.80	W	GPS	3935	3933				1	16.4C	
49MR03K04_2	P06	44	1	ROS	100203	1754	BO	32	30.47	S	93	59.59	W	GPS	3933	3930	11	3939	3980			
49MR03K04_2	P06	44	1	UNK	100203	1817	BE	32	30.52	S	93	59.48	W	GPS	3934	3931					SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	44	1	UNK	100203	1848	EN	32	30.62	S	93	59.42	W	GPS	3932	3932						
49MR03K04_2	P06	44	1	ROS	100203	1943	EN	32	30.84	S	93	59.24	W	GPS	3932	3931						
49MR03K04_2	P06	44	1	FLT	100203	1949	DE	32	30.94	S	93	59.28	W	GPS	3930	3932					ARGO/APEX#941	
49MR03K04_2	P06	43	1	ROS	100203	2211	BE	32	30.15	S	93	20.23	W	GPS	2840	2837			24	1-8,12,13,23,24,26,27	#15=#25 DUPLICATE SMPLS (2600DB)	
49MR03K04_2	P06	43	1	BUC	100203	2216	UN	32	30.21	S	93	20.18	W	GPS	2779	2793				1	16.6C	
49MR03K04_2	P06	43	1	ROS	100203	2257	BO	32	30.44	S	93	19.89	W	GPS	2728	2714	7	2689	2690			
49MR03K04_2	P06	43	1	UNK	100203	2259	UN	32	30.46	S	93	19.88	W	GPS	2719	2728				9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	43	2	UNK	100203	2336	BE	32	30.68	S	93	19.59	W	GPS	2813	2836					SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	43	2	UNK	100203	2358	EN	32	30.83	S	93	19.40	W	GPS	2902	2896						
49MR03K04_2	P06	43	1	ROS	100303	0025	EN	32	31.07	S	93	19.16	W	GPS	2954	2954						
49MR03K04_2	P06	42	1	ROS	100303	0250	BE	32	30.26	S	92	40.11	W	GPS	4665	4668			32	1-8,15,23,24,26,27,33,45	#7=#24 DUPLICATE SMPLS (4500DB)	
49MR03K04_2	P06	42	1	BUC	100303	0255	UN	32	30.27	S	92	40.03	W	GPS	4684	4673				1	15.8C	
49MR03K04_2	P06	42	1	ROS	100303	0405	BO	32	30.60	S	92	39.84	W	GPS	4726	4732	11	4729	4788			
49MR03K04_2	P06	42	1	ROS	100303	0622	EN	32	30.89	S	92	39.56	W	GPS	4721	4696						
49MR03K04_2	P06	41	1	ROS	100303	0853	BE	32	30.00	S	91	59.81	W	GPS	3593	3590			27	1-8,23,24,26,27,46	#12=#23 DUPLICATE SMPLS (3250DB)	
49MR03K04_2	P06	41	1	BUC	100303	0858	UN	32	30.00	S	91	59.74	W	GPS	3594	3587				1	15.5C	
49MR03K04_2	P06	41	1	ROS	100303	0950	BO	32	30.21	S	91	59.52	W	GPS	3560	3559	10	3547	3585			
49MR03K04_2	P06	41	1	ROS	100303	1142	EN	32	30.62	S	91	59.54	W	GPS	3526	3528						
49MR03K04_2	P06	40	1	ROS	100303	1405	BE	32	30.08	S	91	19.78	W	GPS	3543	3544			26	1-6,11,34,35	#24 DID NOT TRIP	
49MR03K04_2	P06	40	1	BUC	100303	1458	UN	32	30.58	S	91	19.48	W	GPS	3483	3489				1,34,35,48	16.0C, 20L FOR BIO	
49MR03K04_2	P06	40	1	ROS	100303	1502	BO	32	30.62	S	91	19.47	W	GPS	3532	3531	10	3482	3476			
49MR03K04_2	P06	40	1	UNK	100303	1551	BE	32	30.98	S	91	19.07	W	GPS	3512	3524					SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	40	1	UNK	100303	1625	EN	32	31.24	S	91	18.91	W	GPS	3484	3503						
49MR03K04_2	P06	40	1	ROS	100303	1645	EN	32	31.34	S	91	18.78	W	GPS	3504	3494						
49MR03K04_2	P06	40	1	FLT	100303	1650	DE	32	31.49	S	91	18.75	W	GPS	3477	3478					ARGO/SOLO#2212	
49MR03K04_2	P06	39	1	ROS	100303	1909	BE	32	29.93	S	90	40.06	W	GPS	3713	3715			28	1-8,12,13,23,24,26,27	#11=#22 DUPLICATE SMPLS (3500DB)	
49MR03K04_2	P06	39	1	UNK	100303	1923	BE	32	30.04	S	90	40.06	W	GPS	3703	3701					SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	39	1	UNK	100303	1945	EN	32	30.21	S	90	39.97	W	GPS	3705	3698						
49MR03K04_2	P06	39	2	UNK	100303	1954	BE	32	30.29	S	90	40.00	W	GPS	3702	3703					SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	39	2	UNK	100303	1957	EN	32	30.32	S	90	40.02	W	GPS	3702	3704						
49MR03K04_2	P06	39	1	ROS	100303	2009	BO	32	30.43	S	90	40.12	W	GPS	3700	3699	9	3733	3742			
49MR03K04_2	P06	39	3	UNK	100303	2015	UN	32	30.47	S	90	40.13	W	GPS	3693	3692				9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	39	1	BUC	100303	2026	UN	32	30.55	S	90	40.18	W	GPS	3689	3690				1,34,35,48	16.7C	
49MR03K04_2	P06	39	4	UNK	100303	2103	BE	32	30.84	S	90	40.21	W	GPS	3697	3691					SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	39	4	UNK	100303	2111	EN	32	30.90	S	90	40.23	W	GPS	3689	3690						
49MR03K04_2	P06	39	5	UNK	100303	2116	BE	32	30.95	S	90	40.23	W	GPS	3693	3692						

49MR03K04_2	P06	39	5	UNK	100303	2142	EN	32	31.16	S	90	40.31	W	GPS	3677	3680				
49MR03K04_2	P06	39	1	ROS	100303	2214	EN	32	31.42	S	90	40.39	W	GPS	3676	3679				
49MR03K04_2	P06	38	1	ROS	100403	0042	BE	32	30.20	S	90	0.01	W	GPS	3687	3687			27 1-6	
49MR03K04_2	P06	38	1	BUC	100403	0049	UN	32	30.21	S	89	59.90	W	GPS	3685	3681			1	16.1C
49MR03K04_2	P06	38	1	ROS	100403	0140	BO	32	30.05	S	89	59.40	W	GPS	3682	3682	12	3685	3707	
49MR03K04_2	P06	38	1	ROS	100403	0341	EN	32	29.85	S	89	58.71	W	GPS	3734	3734				
49MR03K04_2	P06	37	1	ROS	100403	0603	BE	32	29.93	S	89	20.02	W	GPS	3464	3463			27 1-8,23,24,26,27,46	#12=#21 DUPLICATE SMPLS (3250DB)
49MR03K04_2	P06	37	1	BUC	100403	0613	UN	32	29.87	S	89	20.08	W	GPS	3472	3473			1	16.3C
49MR03K04_2	P06	37	1	ROS	100403	0702	BO	32	29.99	S	89	20.42	W	GPS	3409	3407	18	3432	3450	
49MR03K04_2	P06	37	1	ROS	100403	0911	EN	32	30.71	S	89	21.02	W	GPS	3237	3231				
49MR03K04_2	P06	36	1	ROS	100403	1139	BE	32	29.92	S	88	39.95	W	GPS	3879	3883			31 1-6,34,35,48	3 BTLS FOR BIO (5DB)
49MR03K04_2	P06	36	1	BUC	100403	1144	UN	32	29.93	S	88	39.97	W	GPS	3886	3877			1	16.3C
49MR03K04_2	P06	36	1	ROS	100403	1240	BO	32	30.16	S	88	40.10	W	GPS	3943	3942	10	3937	3979	
49MR03K04_2	P06	36	1	ROS	100403	1436	EN	32	30.46	S	88	40.39	W	GPS	3916	3916				
49MR03K04_2	P06	X19	1	ROS	100403	1704	BE	32	30.07	S	87	59.46	W	GPS	3730	3730			31 1-8,12,13,15,23,24,26,27,34,35,45,48	#11=#20 DUPLICATE SMPLS (3500DB), 2 BTLS FOR BIO (5DB)
49MR03K04_2	P06	X19	1	BUC	100403	1708	UN	32	30.07	S	87	59.46	W	GPS	3733	3732			1	16.5C
49MR03K04_2	P06	X19	1	UNK	100403	1751	BE	32	30.09	S	87	59.65	W	GPS	3741	3732				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	X19	1	ROS	100403	1804	BO	32	30.06	S	87	59.71	W	GPS	3731	3734	10	3728	3774	
49MR03K04_2	P06	X19	1	UNK	100403	1816	EN	32	30.04	S	87	59.78	W	GPS	3734	3730				
49MR03K04_2	P06	X19	1	ROS	100403	1951	EN	32	29.97	S	88	0.29	W	GPS	3719	3718				
49MR03K04_2	P06	34	1	ROS	100403	2213	BE	32	30.18	S	87	19.84	W	GPS	3833	3836			36 1-6,9,22,47	#1-8 FOR R.N.
49MR03K04_2	P06	34	1	BUC	100403	2218	UN	32	30.16	S	87	19.84	W	GPS	3827	3826			1	15.8C
49MR03K04_2	P06	34	1	ROS	100403	2313	BO	32	30.12	S	87	20.14	W	GPS	3819	3819	19	3817	3859	
49MR03K04_2	P06	34	1	UNK	100403	2321	UN	32	30.13	S	87	20.17	W	GPS	3823	3824			9,22,47	86L THROUGH HULL PUMP FOR R.N.
49MR03K04_2	P06	34	1	ROS	100503	0113	EN	32	30.27	S	87	20.78	W	GPS	3853	3851				
49MR03K04_2	P06	33	1	ROS	100503	0341	BE	32	29.84	S	86	39.94	W	GPS	3782	3777			28 1-8,23,24,26,27,33,46	#11=#19 DUPLICATE SMPLS (3500DB)
49MR03K04_2	P06	33	1	BUC	100503	0346	UN	32	29.83	S	86	39.97	W	GPS	3787	3782			1	15.7C
49MR03K04_2	P06	33	1	ROS	100503	0442	BO	32	29.82	S	86	40.34	W	GPS	3726	3727	10	3795	3827	
49MR03K04_2	P06	33	1	ROS	100503	0658	EN	32	30.01	S	86	41.28	W	GPS	3809	3806				
49MR03K04_2	P06	32	1	ROS	100503	0928	BE	32	29.81	S	86	0.11	W	GPS	3933	3935			28 1-6	
49MR03K04_2	P06	32	1	BUC	100503	0933	UN	32	29.87	S	86	0.13	W	GPS	3936	3936			1	15.8C
49MR03K04_2	P06	32	1	ROS	100503	1029	BO	32	29.93	S	86	0.40	W	GPS	3954	3969	11	3933	3979	
49MR03K04_2	P06	32	1	ROS	100503	1224	EN	32	29.98	S	86	0.89	W	GPS	3996	3994				
49MR03K04_2	P06	31	1	ROS	100503	1453	BE	32	29.83	S	85	19.99	W	GPS	3993	3999			29 1-8,12,13,23,24,26,27,34,35	#10=#18 DUPLICATE SMPLS (3750DB)
49MR03K04_2	P06	31	1	BUC	100503	1531	UN	32	29.93	S	85	20.20	W	GPS	4004	4005			1,34,35,48	16.4C
49MR03K04_2	P06	31	1	ROS	100503	1557	BO	32	29.98	S	85	20.34	W	GPS	4024	4010	12	4009	4053	
49MR03K04_2	P06	31	1	UNK	100503	1602	UN	32	29.99	S	85	20.36	W	GPS	4016	4016			9,22,47	86L THROUGH HULL PUMP FOR R.N.
49MR03K04_2	P06	31	2	UNK	100503	1700	BE	32	30.00	S	85	20.57	W	GPS	4025	4019				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	31	2	UNK	100503	1724	EN	32	30.04	S	85	20.67	W	GPS	4026	4027				
49MR03K04_2	P06	31	1	ROS	100503	1751	EN	32	30.03	S	85	20.77	W	GPS	4023	4027				
49MR03K04_2	P06	30	1	ROS	100503	2014	BE	32	29.82	S	84	40.12	W	GPS	3893	3892			28 1-6,34,35	
49MR03K04_2	P06	30	1	UNK	100503	2037	BE	32	29.92	S	84	40.21	W	GPS	3872	3871				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	30	1	UNK	100503	2103	EN	32	29.88	S	84	40.32	W	GPS	3879	3874				
49MR03K04_2	P06	30	1	ROS	100503	2113	BO	32	29.90	S	84	40.34	W	GPS	3863	3871	8	3872	3923	
49MR03K04_2	P06	30	1	BUC	100503	2128	UN	32	29.90	S	84	40.36	W	GPS	3868	3864			1,34,35,48	16.4C
49MR03K04_2	P06	30	1	ROS	100503	2306	EN	32	29.97	S	84	40.54	W	GPS	3812	3812				
49MR03K04_2	P06	29	1	ROS	100603	0134	BE	32	29.84	S	84	0.28	W	GPS	3796	3796			29 1-8,15,23,24,26,27,45,46	#10=#17 DUPLICATE SMPLS (3840DB)
49MR03K04_2	P06	29	1	BUC	100603	0140	UN	32	29.82	S	84	0.29	W	GPS	3794	3793			1	16.5C
49MR03K04_2	P06	29	1	ROS	100603	0235	BO	32	29.97	S	84	0.50	W	GPS	3793	3793	10	3801	3840	



49MR03K04_2	P06	29	1	ROS	100603	0428	EN	32	30.39	S	84	1.23	W	GPS	3803	3798			
49MR03K04_2	P06	28	1	ROS	100603	0702	BE	32	29.97	S	83	20.09	W	GPS	3816	3812		27	1-6
49MR03K04_2	P06	28	1	BUC	100603	0707	UN	32	29.95	S	83	20.11	W	GPS	3814	3814		1	16.5C
49MR03K04_2	P06	28	1	ROS	100603	0802	BO	32	30.14	S	83	20.48	W	GPS	3824	3802	11	3844	3872
49MR03K04_2	P06	28	1	ROS	100603	0947	EN	32	30.44	S	83	21.12	W	GPS	3698	3698			
49MR03K04_2	P06	27	1	ROS	100603	1217	BE	32	30.00	S	82	39.72	W	GPS	3903	3898		32	1-8,12,13,23,24,26,27,34,35,48
49MR03K04_2	P06	27	1	BUC	100603	1223	UN	32	30.03	S	82	39.72	W	GPS	3877	3881		1	#10=#16 DUPLICATE SMPLS (3750DB), 2 BTLS FOR BIO
49MR03K04_2	P06	27	1	ROS	100603	1317	BO	32	30.27	S	82	40.03	W	GPS	3921	3922	10	3901	3934
49MR03K04_2	P06	27	1	ROS	100603	1510	EN	32	30.80	S	82	40.42	W	GPS	3982	3982			
49MR03K04_2	P06	26	1	ROS	100603	1734	BE	32	29.57	S	81	59.82	W	GPS	4010	4010		36	1-6,9,22,34,35,47
49MR03K04_2	P06	26	1	ROS	100603	1837	BO	32	29.84	S	81	59.94	W	GPS	3994	3994	8	4024	4057
49MR03K04_2	P06	26	1	UNK	100603	1843	UN	32	29.86	S	81	59.96	W	GPS	4000	3995			9,22,47
49MR03K04_2	P06	26	1	BUC	100603	1957	UN	32	30.33	S	81	59.91	W	GPS	3982	3983			1,34,35,48
49MR03K04_2	P06	26	1	ROS	100603	2025	EN	32	30.56	S	81	59.80	W	GPS	3984	3995			
49MR03K04_2	P06	25	1	ROS	100603	2245	BE	32	29.92	S	81	19.56	W	GPS	3922	3922		29	1-8,23,24,26,27,33,46
49MR03K04_2	P06	25	1	BUC	100603	2251	UN	32	29.97	S	81	19.43	W	GPS	3934	3907		1	#10=#15 DUPLICATE SMPLS (3750DB) 16.2C
49MR03K04_2	P06	25	1	ROS	100603	2348	BO	32	30.13	S	81	19.46	W	GPS	3918	3913	13	3904	3956
49MR03K04_2	P06	25	1	ROS	100703	0148	EN	32	30.33	S	81	19.37	W	GPS	3933	3925			
49MR03K04_2	P06	24	1	ROS	100703	0412	BE	32	30.08	S	80	39.87	W	GPS	3939	3941		29	1-6
49MR03K04_2	P06	24	1	BUC	100703	0416	UN	32	30.09	S	80	39.83	W	GPS	3941	3939		1	#7 FOR SAL (2000DB)
49MR03K04_2	P06	24	1	ROS	100703	0516	BO	32	30.43	S	80	39.84	W	GPS	3948	3945	12	3963	3985
49MR03K04_2	P06	24	1	ROS	100703	0709	EN	32	30.92	S	80	39.93	W	GPS	3949	3952			
49MR03K04_2	P06	23	1	ROS	100803	1000	BE	32	30.14	S	79	59.72	W	GPS	2808	2804		27	1-8,12,13,23,24,26,27,34,35,48
49MR03K04_2	P06	23	1	BUC	100803	1013	UN	32	30.25	S	79	59.69	W	GPS	2821	2823		1	#1=#14 DUPLICATE SMPLS (B-10DB), 3 BTLS FOR BIO
49MR03K04_2	P06	23	1	ROS	100803	1053	BO	32	30.46	S	79	59.59	W	GPS	2728	2732	9	2788	2811
49MR03K04_2	P06	23	1	UNK	100803	1054	UN	32	30.46	S	79	59.59	W	GPS	2765	2765			9,22,47
49MR03K04_2	P06	23	1	ROS	100803	1221	EN	32	30.83	S	79	59.13	W	GPS	2481	2491			
49MR03K04_2	P06	22	1	ROS	100803	1454	BE	32	29.86	S	79	19.93	W	GPS	3769	3771		31	1-6,34,35,48
49MR03K04_2	P06	22	1	BUC	100803	1503	UN	32	29.87	S	79	19.82	W	GPS	3769	3767			
49MR03K04_2	P06	22	1	ROS	100803	1556	BO	32	30.02	S	79	19.42	W	GPS	3762	3762	10	3786	3807
49MR03K04_2	P06	22	1	UNK	100803	1618	BE	32	30.07	S	79	19.24	W	GPS	3760	3760			SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	22	1	UNK	100803	1649	EN	32	30.17	S	79	19.01	W	GPS	3741	3743			
49MR03K04_2	P06	22	1	ROS	100803	1744	EN	32	30.39	S	79	18.67	W	GPS	3772	3773			
49MR03K04_2	P06	21	1	UNK	100803	2006	BE	32	30.49	S	78	39.43	W	GPS	4054	4054			SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	21	1	ROS	100803	2008	BE	32	30.50	S	78	39.41	W	GPS	4053	4057		29	1-8,15,23,24,26,27,33,45
49MR03K04_2	P06	21	1	BUC	100803	2013	UN	32	30.47	S	78	39.33	W	GPS	4057	4057		1	#10=#13 DUPLICATE SMPLS (3750DB) 16.2C
49MR03K04_2	P06	21	1	UNK	100803	2039	EN	32	30.47	S	78	39.18	W	GPS	4059	4059			
49MR03K04_2	P06	21	1	ROS	100803	2112	BO	32	30.59	S	78	39.10	W	GPS	4070	4066	10	4061	4106
49MR03K04_2	P06	21	1	ROS	100803	2313	EN	32	30.79	S	78	38.86	W	GPS	4073	4077			
49MR03K04_2	P06	20	1	ROS	100903	0134	BE	32	30.15	S	78	0.18	W	GPS	4006	4006		29	1-6
49MR03K04_2	P06	20	1	BUC	100903	0140	UN	32	30.11	S	78	0.10	W	GPS	4009	4008		1	#7 FOR SAL (2000DB) 15.9C
49MR03K04_2	P06	20	1	ROS	100903	0241	BO	32	30.06	S	77	59.51	W	GPS	4062	4062	12	4073	4090
49MR03K04_2	P06	20	1	ROS	100903	0439	EN	32	29.92	S	77	59.00	W	GPS	4062	4062			
49MR03K04_2	P06	19	1	ROS	100903	0713	BE	32	29.82	S	77	19.49	W	GPS	3567	3570		27	1-8,12,13,23,24,26,27
49MR03K04_2	P06	19	1	BUC	100903	0719	UN	32	29.84	S	77	19.46	W	GPS	3567	3566		1	#1=#12 DUPLICATE SMPLS (3250DB) 15.6C
49MR03K04_2	P06	19	1	ROS	100903	0811	BO	32	29.85	S	77	19.28	W	GPS	3579	3580	11	3567	3608
49MR03K04_2	P06	19	1	ROS	100903	1001	EN	32	29.43	S	77	18.80	W	GPS	3633	3633			

49MR03K04_2	P06	18	1	ROS	100903	1225	BE	32	30.12	S	76	39.94	W	GPS	4280	4284				36	1-6,9,22,34,35,47	#1-7 FOR R.N.	
49MR03K04_2	P06	18	1	ROS	100903	1333	BO	32	29.88	S	76	39.23	W	GPS	4265	4266	10	4328	4333				
49MR03K04_2	P06	18	1	UNK	100903	1335	UN	32	29.89	S	76	39.20	W	GPS	4263	4263					9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	18	1	BUC	100903	1356	UN	32	29.89	S	76	39.19	W	GPS	4260	4266					1,34,35,48	15.6C	
49MR03K04_2	P06	18	2	UNK	100903	1453	BE	32	29.89	S	76	38.46	W	GPS	4130	4104						SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	18	2	UNK	100903	1519	EN	32	29.99	S	76	38.23	W	GPS	4114	4115							
49MR03K04_2	P06	18	1	ROS	100903	1541	EN	32	29.91	S	76	37.93	W	GPS	3997	3978							
49MR03K04_2	P06	17	1	ROS	100903	1802	BE	32	29.98	S	76	0.05	W	GPS	4193	4193				30	1-8,23,24,26,27,33-35,46	#9=#11 DUPLICATE SMPLS (4000DB)	
49MR03K04_2	P06	17	1	UNK	100903	1821	BE	32	29.98	S	75	59.80	W	GPS	4201	4201						SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	17	1	UNK	100903	1852	EN	32	29.93	S	75	59.61	W	GPS	4216	4213							
49MR03K04_2	P06	17	1	ROS	100903	1906	BO	32	29.88	S	75	59.54	W	GPS	4219	4221	10	4208	4252				
49MR03K04_2	P06	17	1	BUC	100903	1928	UN	32	29.82	S	75	59.43	W	GPS	4226	4229					1,34,35,48	15.6C, 30L FOR BIO	
49MR03K04_2	P06	17	1	ROS	100903	2122	EN	32	29.52	S	75	58.08	W	GPS	4265	4273							
49MR03K04_2	P06	16	1	ROS	100903	2343	BE	32	29.84	S	75	19.93	W	GPS	4246	4253				30	1-6	#7 FOR SAL (2000DB)	
49MR03K04_2	P06	16	1	BUC	100903	2350	UN	32	29.76	S	75	19.88	W	GPS	4257	4269					1	14.9C	
49MR03K04_2	P06	16	1	ROS	101003	0052	BO	32	29.58	S	75	19.42	W	GPS	4265	4261	11	4296	4325				
49MR03K04_2	P06	16	1	ROS	101003	0301	EN	32	29.47	S	75	18.23	W	GPS	4221	4222							
49MR03K04_2	P06	15	1	ROS	101003	0527	BE	32	29.90	S	74	40.34	W	GPS	4048	4055				29	1-8,12,13,15,23,24,26,27,45	#1=#10 DUPLICATE SMPLS (3750DB)	
49MR03K04_2	P06	15	1	BUC	101003	0533	UN	32	29.92	S	74	40.33	W	GPS	4030	4033					1	14.4C	
49MR03K04_2	P06	15	1	ROS	101003	0629	BO	32	30.00	S	74	39.86	W	GPS	3838	3840	144	3857	3885				LADCP SOUNDING
49MR03K04_2	P06	15	1	UNK	101003	0645	UN	32	30.01	S	74	39.74	W	GPS	3759	3779					9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	15	1	ROS	101003	0833	EN	32	29.96	S	74	38.90	W	GPS	3568	3588							
49MR03K04_2	P06	14	1	ROS	101003	1101	BE	32	29.75	S	73	59.93	W	GPS	4100	4101				33	1-6,34,35,48	#7=#18 DUPLICATE SMPLS (2000DB) FOR SAL AND OXY, 3 BTLS FOR BIO (10DB)	
49MR03K04_2	P06	14	1	BUC	101003	1107	UN	32	29.73	S	73	59.90	W	GPS	4105	4103					1	14.0C	
49MR03K04_2	P06	14	1	ROS	101003	1204	BO	32	29.73	S	73	59.74	W	GPS	4106	4103	10	4101	4150				
49MR03K04_2	P06	14	1	ROS	101003	1404	EN	32	29.75	S	73	59.02	W	GPS	4107	4103							
49MR03K04_2	P06	13	1	ROS	101003	1628	BE	32	29.96	S	73	20.09	W	GPS	3858	3860				32	1-8,12,13,23,24,26,27,33-35,46,48	3 BTLS FOR BIO (10DB)	
49MR03K04_2	P06	13	1	BUC	101003	1633	UN	32	29.99	S	73	20.04	W	GPS	3864	3859					1	13.8C	
49MR03K04_2	P06	13	1	ROS	101003	1728	BO	32	30.29	S	73	19.72	W	GPS	3839	3837	7	3871	3887				SOLAR LIGHT MEASUREMENT
49MR03K04_2	P06	13	1	UNK	101003	1814	BE	32	30.42	S	73	19.42	W	GPS	3772	3769							
49MR03K04_2	P06	13	1	UNK	101003	1843	EN	32	30.41	S	73	19.30	W	GPS	3770	3773							
49MR03K04_2	P06	13	1	ROS	101003	1924	EN	32	30.50	S	73	19.11	W	GPS	3881	3892							
49MR03K04_2	P06	12	1	ROS	101003	2127	BE	32	30.19	S	72	59.76	W	GPS	4658	4655				32	1-6	#5 FOR SAL (2000DB)	
49MR03K04_2	P06	12	1	BUC	101003	2130	UN	32	30.21	S	72	59.75	W	GPS	4655	4658					1	14.0C	
49MR03K04_2	P06	12	1	UNK	101003	2156	BE	32	30.29	S	72	59.78	W	GPS	4656	4659						SOLAR LIGHT MEASUREMENT	
49MR03K04_2	P06	12	1	UNK	101003	2203	EN	32	30.28	S	72	59.77	W	GPS	4657	4659							
49MR03K04_2	P06	12	1	ROS	101003	2238	BO	32	30.35	S	72	59.69	W	GPS	4658	4658	11	4654	4717				
49MR03K04_2	P06	12	1	ROS	101103	0057	EN	32	30.55	S	73	0.10	W	GPS	4645	4640							
49MR03K04_2	P06	11	1	ROS	101103	0303	BE	32	29.68	S	72	42.92	W	GPS	5946	5949				36	1-8,12,13,15,23,24,26,27,45,46		
49MR03K04_2	P06	11	1	BUC	101103	0308	UN	32	29.66	S	72	42.89	W	GPS	5948	5951					1	13.5C	
49MR03K04_2	P06	11	1	ROS	101103	0435	BO	32	29.65	S	72	42.63	W	GPS	5952	5952	12	5956	6054				
49MR03K04_2	P06	11	1	ROS	101103	0727	EN	32	29.47	S	72	42.16	W	GPS	5961	5961							
49MR03K04_2	P06	10	1	ROS	101103	0930	BE	32	29.83	S	72	29.57	W	GPS	4666	4666				36	1-6,9,22,47	#1-5 FOR R.N.	
49MR03K04_2	P06	10	1	BUC	101103	0935	UN	32	29.83	S	72	29.55	W	GPS	4666	4664					1	13.5C	
49MR03K04_2	P06	10	1	ROS	101103	1039	BO	32	29.79	S	72	29.25	W	GPS	4622	4617	10	4669	4721				
49MR03K04_2	P06	10	1	UNK	101103	1043	UN	32	29.79	S	72	29.23	W	GPS	4619	4621					9,22,47	86L THROUGH HULL PUMP FOR R.N.	
49MR03K04_2	P06	10	1	ROS	101103	1302	EN	32	29.74	S	72	27.98	W	GPS	4161	4165							
49MR03K04_2	P06	9	1	ROS	101103	1459	BE	32	28.77	S	72	19.78	W	GPS	2970	2964				26	1-8,23,24,26,27,34,35	#7=#14 DUPLICATE SMPLS (2800DB)	
49MR03K04_2	P06	9	1	BUC	101103	1504	UN	32	28.77	S	72	19.73	W	GPS	2947	2938					1,34,35,48	13.8C, 30L FOR BIO	



A10 REV R/V MIRAI CRUISE MR03K04 LEG4

SHIP/CRS EXPCODE	WOCE SECT	STNNBR	CASTNO	CAST TYPE	UTC DATE	EVENT TIME	POSITION CODE	LATITUDE	LONGITUDE	NAV	UNC DEPTH	COR DEPTH	HT ABOVE BOTTOM	WIRE OUT	MAX PRESS	NO. OF BOTTLES	PARAMETERS	COMMENTS
49MR03K04_4	A10	622	1	ROS	110703	1055	BE 27	43.90 S	47 23.27 W	GPS	182	181				5	1-6	
49MR03K04_4	A10	622	1	BUC	110703	1055	UN 27	43.90 S	47 23.27 W	GPS	182	181					1	21.9C
49MR03K04_4	A10	622	1	ROS	110703	1102	BO 27	43.91 S	47 23.39 W	GPS	182	181	11	166	168			
49MR03K04_4	A10	622	1	ROS	110703	1121	EN 27	43.97 S	47 23.68 W	GPS	179	179						
49MR03K04_4	A10	623	1	ROS	110703	1256	BE 27	46.11 S	47 12.20 W	GPS	334	334				9	1-6,34,35,48	#18 FOR BIO (5DB)
49MR03K04_4	A10	623	1	BUC	110703	1257	UN 27	46.11 S	47 12.20 W	GPS	334	334					1,34,35,48	21.8C, 18L FOR BIO
49MR03K04_4	A10	623	1	ROS	110703	1306	BO 27	46.11 S	47 12.23 W	GPS	334	333	10	318	322			
49MR03K04_4	A10	623	1	ROS	110703	1335	EN 27	46.03 S	47 12.58 W	GPS	323	323						
49MR03K04_4	A10	624	1	ROS	110703	1458	BE 27	48.92 S	47 1.44 W	GPS	540	539				10	1-6	
49MR03K04_4	A10	624	1	BUC	110703	1504	UN 27	48.91 S	47 1.48 W	GPS	540	539					1	22.2C
49MR03K04_4	A10	624	1	ROS	110703	1512	BO 27	48.88 S	47 1.53 W	GPS	539	538	10	530	531			
49MR03K04_4	A10	624	1	ROS	110703	1542	EN 27	48.79 S	47 1.62 W	GPS	538	537						
49MR03K04_4	A10	625	1	ROS	110703	1704	BE 27	51.41 S	46 50.88 W	GPS	760	760				13	1-8,23,24,26,27	#23=#26 DUPLICATE SMPLS (700DB)
49MR03K04_4	A10	625	1	BUC	110703	1710	UN 27	51.34 S	46 50.89 W	GPS	761	760					1	22.1C
49MR03K04_4	A10	625	1	ROS	110703	1721	BO 27	51.25 S	46 50.94 W	GPS	760	761	9	752	752			
49MR03K04_4	A10	625	1	ROS	110703	1758	EN 27	50.97 S	46 51.12 W	GPS	757	757						
49MR03K04_4	A10	626	1	ROS	110703	2001	BE 27	54.45 S	46 39.94 W	GPS	1257	1257				16	1-6,34,35,48	#2 FOR BIO (75DB)
49MR03K04_4	A10	626	1	BUC	110703	2007	UN 27	54.42 S	46 39.93 W	GPS	1258	1258					1,34,35,48	22.0C, 18L FOR BIO
49MR03K04_4	A10	626	1	ROS	110703	2026	BO 27	54.35 S	46 39.96 W	GPS	1258	1257	12	1238	1251			#24 MISS FIRE
49MR03K04_4	A10	626	1	ROS	110703	2126	EN 27	53.78 S	46 40.35 W	GPS	1245	1245						
49MR03K04_4	A10	627	1	ROS	110703	2259	BE 27	57.11 S	46 29.28 W	GPS	1686	1686				19	1-8,23,24,26,27	#20=#22 DUPLICATE SMPLS (1600DB)
49MR03K04_4	A10	627	1	BUC	110703	2304	UN 27	57.10 S	46 29.28 W	GPS	1687	1687					1	22.1C
49MR03K04_4	A10	627	1	ROS	110703	2329	BO 27	57.02 S	46 29.32 W	GPS	1683	1684	11	1678	1687			
49MR03K04_4	A10	627	1	ROS	110803	0041	EN 27	56.97 S	46 29.56 W	GPS	1676	1674						
49MR03K04_4	A10	628	1	ROS	110803	0213	BE 27	59.86 S	46 18.55 W	GPS	2222	2220				20	1-6	
49MR03K04_4	A10	628	1	BUC	110803	0219	UN 27	59.85 S	46 18.57 W	GPS	2220	2221					1	22.1C
49MR03K04_4	A10	628	1	ROS	110803	0251	BO 27	59.86 S	46 18.60 W	GPS	2218	2218	12	2212	2230			
49MR03K04_4	A10	628	1	ROS	110803	0414	EN 28	0.13 S	46 18.63 W	GPS	2222	2222						
49MR03K04_4	A10	629	1	ROS	110803	0527	BE 28	2.69 S	46 7.56 W	GPS	2415	2415				22	1-8,12,13,23,24,26,27,46	#17=#21 DUPLICATE SMPLS (2200DB)
49MR03K04_4	A10	629	1	BUC	110803	0532	UN 28	2.71 S	46 7.55 W	GPS	2416	2417					1	22.0C
49MR03K04_4	A10	629	1	ROS	110803	0607	BO 28	2.85 S	46 7.60 W	GPS	2414	2415	11	2411	2430			
49MR03K04_4	A10	629	1	ROS	110803	0736	EN 28	3.01 S	46 7.86 W	GPS	2417	2415						
49MR03K04_4	A10	630	1	ROS	110803	0906	BE 28	5.46 S	45 56.67 W	GPS	2599	2599				22	1-6	
49MR03K04_4	A10	630	1	BUC	110803	0911	UN 28	5.48 S	45 56.74 W	GPS	2597	2598					1	22.1C
49MR03K04_4	A10	630	1	ROS	110803	0950	BO 28	5.62 S	45 56.93 W	GPS	2595	2596	13	2591	2613			
49MR03K04_4	A10	630	1	ROS	110803	1122	EN 28	6.06 S	45 57.39 W	GPS	2586	2586						
49MR03K04_4	A10	631	1	ROS	110803	1247	BE 28	9.56 S	45 40.66 W	GPS	2788	2790				25	1-8,23,24,26,27,34,35,48	#15=#20 DUPLICATE SMPLS (2600DB), #2 FOR BIO (70DB)
49MR03K04_4	A10	631	1	BUC	110803	1252	UN 28	9.54 S	45 40.66 W	GPS	2788	2790					1,34,35,48	22.9C, 18L FOR BIO
49MR03K04_4	A10	631	1	ROS	110803	1332	BO 28	9.59 S	45 40.90 W	GPS	2786	2787	12	2786	2809			
49MR03K04_4	A10	631	1	UNK	110803	1337	BE 28	9.59 S	45 40.91 W	GPS	2787	2787						SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	631	1	UNK	110803	1437	EN 28	9.64 S	45 41.05 W	GPS	2779	2778						
49MR03K04_4	A10	631	1	ROS	110803	1517	EN 28	9.66 S	45 41.09 W	GPS	2778	2779						
49MR03K04_4	A10	632	1	ROS	110803	1701	BE 28	13.60 S	45 24.44 W	GPS	2967	2968				27	1-6,34,35,48	#1-3 FOR BIO (5DB, 100DB)
49MR03K04_4	A10	632	1	BUC	110803	1706	UN 28	13.55 S	45 24.44 W	GPS	2966	2968					1	22.8C
49MR03K04_4	A10	632	1	UNK	110803	1706	BE 28	13.55 S	45 24.44 W	GPS	2966	2968						SOLAR LIGHT MEASUREMENT

49MR03K04_4	A10	632	1	ROS	110803	1749	BO	28	13.54	S	45	24.50	W	GPS	2966	2964	10	2964	2992				
49MR03K04_4	A10	632	1	UNK	110803	1751	EN	28	13.54	S	45	24.50	W	GPS	2965	2966							
49MR03K04_4	A10	632	1	ROS	110803	1943	EN	28	13.37	S	45	24.35	W	GPS	2975	2975							
49MR03K04_4	A10	1	1	ROS	110803	2227	BE	28	25.25	S	44	47.03	W	GPS	3525	3518				27	1-8,23,24,26,27,46	#12=#19 DUPLICATE SMPLS (3250DB)	
49MR03K04_4	A10	1	1	BUC	110803	2232	UN	28	25.24	S	44	47.09	W	GPS	3519	3516				1		22.4C	
49MR03K04_4	A10	1	1	ROS	110803	2324	BO	28	25.21	S	44	47.27	W	GPS	3509	3505	10	3495	3540				
49MR03K04_4	A10	1	1	ROS	110903	0128	EN	28	24.80	S	44	48.10	W	GPS	3488	3490							
49MR03K04_4	A10	2	1	ROS	110903	0405	BE	28	36.95	S	44	13.10	W	GPS	3702	3697				27	1-6		
49MR03K04_4	A10	2	1	BUC	110903	0411	UN	28	36.90	S	44	13.11	W	GPS	3698	3700				1		22.3C	
49MR03K04_4	A10	2	1	ROS	110903	0503	BO	28	36.64	S	44	13.37	W	GPS	3707	3706	12	3729	3738				
49MR03K04_4	A10	2	1	ROS	110903	0702	EN	28	35.85	S	44	13.59	W	GPS	3706	3706							
49MR03K04_4	A10	3	1	ROS	110903	0944	BE	28	50.10	S	43	34.91	W	GPS	3906	3904				32	1-8,12,13,23,24,26,27,34,35,48	#10=#18 DUPLICATE SMPLS (3750DB), #2-4 FOR BIO (107DB, 5DB)	
49MR03K04_4	A10	3	1	BUC	110903	0950	UN	28	50.11	S	43	34.98	W	GPS	3904	3904				1		20.7C	
49MR03K04_4	A10	3	1	ROS	110903	1043	BO	28	50.03	S	43	35.24	W	GPS	3890	3891	13	3887	3934				
49MR03K04_4	A10	3	1	UNK	110903	1155	BE	28	49.87	S	43	35.50	W	GPS	3886	3887						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	3	1	ROS	110903	1248	EN	28	49.75	S	43	35.76	W	GPS	3892	3891							
49MR03K04_4	A10	3	1	UNK	110903	1251	EN	28	49.73	S	43	35.77	W	GPS	3895	3892							
49MR03K04_4	A10	4	1	ROS	110903	1535	BE	29	2.16	S	42	54.48	W	GPS	4010	4015				31	1-6,34,35,48	#1-3 FOR BIO (130DB, 5DB)	
49MR03K04_4	A10	4	1	BUC	110903	1540	UN	29	2.16	S	42	54.52	W	GPS	4011	4016				1		20.6C	
49MR03K04_4	A10	4	1	UNK	110903	1620	BE	29	2.14	S	42	54.63	W	GPS	4015	4016						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	4	1	ROS	110903	1637	BO	29	2.08	S	42	54.59	W	GPS	4013	4014	13	4006	4059				
49MR03K04_4	A10	4	1	UNK	110903	1657	EN	29	2.06	S	42	54.67	W	GPS	4012	4014							
49MR03K04_4	A10	4	1	ROS	110903	1838	EN	29	2.06	S	42	55.07	W	GPS	4016	4015							
49MR03K04_4	A10	5	1	ROS	110903	2106	BE	29	13.91	S	42	19.52	W	GPS	4006	4007				29	1-8,23,24,26,27,46	#10=#17 DUPLICATE SMPLS (3750DB)	
49MR03K04_4	A10	5	1	BUC	110903	2112	UN	29	13.84	S	42	19.50	W	GPS	4006	4007				1		20.7C	
49MR03K04_4	A10	5	1	ROS	110903	2221	BO	29	13.69	S	42	19.45	W	GPS	4006	4006	10	4004	4053				
49MR03K04_4	A10	5	1	ROS	111003	0034	EN	29	13.23	S	42	19.54	W	GPS	4008	4008							
49MR03K04_4	A10	6	1	ROS	111003	0301	BE	29	25.34	S	41	44.38	W	GPS	3880	3874				28	1-6		
49MR03K04_4	A10	6	1	BUC	111003	0311	UN	29	25.25	S	41	44.36	W	GPS	3874	3877				1		20.0C	
49MR03K04_4	A10	6	1	ROS	111003	0401	BO	29	24.85	S	41	44.58	W	GPS	3892	3885	10	3899	3921				
49MR03K04_4	A10	6	1	ROS	111003	0615	EN	29	23.78	S	41	44.81	W	GPS	3899	3897							
49MR03K04_4	A10	6	1	FLT	111003	0624	DE	29	23.75	S	41	44.54	W	GPS	3901	3896						ARGO/SOLO#262	
49MR03K04_4	A10	7	1	ROS	111003	0847	BE	29	36.67	S	41	9.60	W	GPS	3813	3806				31	1-8,12,13,15,23,24,26,27,34,35,45,48	#15=#16 DUPLICATE SMPLS (2600DB), #2-4 FOR BIO (95DB, 5DB)	
49MR03K04_4	A10	7	1	BUC	111003	0853	UN	29	36.63	S	41	9.62	W	GPS	3809	3804				1		19.3C	
49MR03K04_4	A10	7	1	ROS	111003	0947	BO	29	36.45	S	41	9.70	W	GPS	3802	3795	12	3796	3834				
49MR03K04_4	A10	7	1	UNK	111003	1057	BE	29	36.37	S	41	9.73	W	GPS	3817	3815						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	7	1	UNK	111003	1140	EN	29	36.20	S	41	9.69	W	GPS	3814	3807							
49MR03K04_4	A10	7	1	ROS	111003	1147	EN	29	36.15	S	41	9.66	W	GPS	3814	3810							
49MR03K04_4	A10	8	1	ROS	111003	1408	BE	29	48.54	S	40	34.92	W	GPS	3778	3780				35	1-6,9,22,34,35,47,48	#9 FOR BIO (105DB), #1-7 FOR R.N.	
49MR03K04_4	A10	8	1	UNK	111003	1410	BE	29	48.54	S	40	34.90	W	GPS	3776	3783						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	8	1	ROS	111003	1506	BO	29	48.35	S	40	34.70	W	GPS	3783	3782	25	3773	3804				JELLYFISH IN #25
49MR03K04_4	A10	8	1	UNK	111003	1513	EN	29	48.41	S	40	34.75	W	GPS	3779	3776							
49MR03K04_4	A10	8	1	UNK	111003	1513	BE	29	48.41	S	40	34.75	W	GPS	3779	3776				9,22,47		80L THROUGH HULL PUMP FOR R.N.	
49MR03K04_4	A10	8	1	UNK	111003	1529	EN	29	48.48	S	40	34.84	W	GPS	3778	3775							
49MR03K04_4	A10	8	1	BUC	111003	1559	UN	29	48.47	S	40	34.82	W	GPS	3783	3775				1,34,35,48		19.6C, 18L FOR BIO	
49MR03K04_4	A10	8	1	ROS	111003	1700	EN	29	48.40	S	40	34.80	W	GPS	3783	3778							
49MR03K04_4	A10	9	1	ROS	111003	1919	BE	30	0.35	S	39	59.97	W	GPS	3186	3186				26	1-8,23,24,26,27,46	#13=#15 DUPLICATE SMPLS (3000DB)	
49MR03K04_4	A10	9	1	BUC	111003	1924	UN	30	0.40	S	39	59.95	W	GPS	3188	3188				1		20.3C	

49MR03K04_4	A10	9	1	ROS	111003	2011	BO	30	0.52	S	39	59.62	W	GPS	3185	3184	10	3200	3219				
49MR03K04_4	A10	9	1	ROS	111003	2154	EN	30	0.76	S	39	59.08	W	GPS	3182	3185							
49MR03K04_4	A10	10	1	ROS	111003	2340	BE	30	0.25	S	39	31.77	W	GPS	3975	3976				28	1-6		
49MR03K04_4	A10	10	1	BUC	111003	2344	UN	30	0.27	S	39	31.74	W	GPS	3976	3978				1		20.1C	
49MR03K04_4	A10	10	1	ROS	111103	0040	BO	30	0.40	S	39	31.38	W	GPS	3978	3986	10	4006	4042				
49MR03K04_4	A10	10	1	ROS	111103	0247	EN	30	0.56	S	39	30.87	W	GPS	3965	3969							
49MR03K04_4	A10	11	1	ROS	111103	0402	BE	29	59.98	S	39	22.82	W	GPS	4865	4865				33	1-8,23,24,26,27,46	#6=#14 DUPLICATE SMPLS (4750DB)	
49MR03K04_4	A10	11	1	BUC	111103	0407	UN	29	59.96	S	39	22.80	W	GPS	4862	4865				1		19.8C	
49MR03K04_4	A10	11	1	ROS	111103	0517	BO	29	59.89	S	39	22.54	W	GPS	4859	4857	13	4868	4927				
49MR03K04_4	A10	11	1	ROS	111103	0747	EN	29	59.84	S	39	22.20	W	GPS	4839	4839							
49MR03K04_4	A10	X17	1	ROS	111103	0924	BE	30	5.94	S	39	2.10	W	GPS	4213	4215				33	1-8,12,13,15,23,24,26,27,34,35,45,48	#9=#13 DUPLICATE SMPLS (4000DB), #2-4 FOR BIO (100DB, 5DB)	
49MR03K04_4	A10	X17	1	BUC	111103	0930	UN	30	5.93	S	39	2.04	W	GPS	4212	4213				1		20.0C	
49MR03K04_4	A10	X17	1	UNK	111103	1020	BE	30	5.95	S	39	1.60	W	GPS	4216	4213						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	X17	1	ROS	111103	1029	BO	30	5.98	S	39	1.51	W	GPS	4229	4232	17	4221	4248				
49MR03K04_4	A10	X17	1	UNK	111103	1105	EN	30	5.91	S	39	1.24	W	GPS	4229	4230							
49MR03K04_4	A10	X17	1	ROS	111103	1225	EN	30	5.90	S	39	1.21	W	GPS	4207	4204							
49MR03K04_4	A10	X17	1	FLT	111103	1232	DE	30	5.90	S	39	1.21	W	GPS	4211	4207						ARGO/SOLO#260	
49MR03K04_4	A10	13	1	ROS	111103	1424	BE	30	0.03	S	38	30.09	W	GPS	4209	4212				36	1-6,9,22,34,35,47,48	#7 FOR BIO (100DB), #1-6 FOR R.N.	
49MR03K04_4	A10	13	1	UNK	111103	1428	BE	30	0.01	S	38	30.04	W	GPS	4220	4217						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	13	1	UNK	111103	1503	BE	29	59.77	S	38	29.74	W	GPS	4208	4212				9,22,47		80L THROUGH HULL PUMP FOR R.N.	
49MR03K04_4	A10	13	1	UNK	111103	1518	EN	29	59.86	S	38	29.56	W	GPS	4228	4227						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	13	1	ROS	111103	1530	BO	29	59.91	S	38	29.43	W	GPS	4230	4232	13	4263	4266				
49MR03K04_4	A10	13	1	UNK	111103	1540	EN	29	59.91	S	38	29.34	W	GPS	4231	4232						81L THROUGH HULL PUMP FOR R.N.	
49MR03K04_4	A10	13	1	BUC	111103	1700	UN	29	59.69	S	38	28.99	W	GPS	4230	4231				1,34,35,48		21.3C, 18L FOR BIO	
49MR03K04_4	A10	13	1	ROS	111103	1729	EN	29	59.64	S	38	28.75	W	GPS	4235	4237							
49MR03K04_4	A10	14	1	ROS	111103	1921	BE	30	0.10	S	37	59.98	W	GPS	3822	3822				28	1-6		
49MR03K04_4	A10	14	1	BUC	111103	1926	UN	30	0.07	S	37	59.95	W	GPS	3822	3824				1		20.8C	
49MR03K04_4	A10	14	1	UNK	111103	1930	BE	30	0.05	S	37	59.93	W	GPS	3822	3824						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	14	1	UNK	111103	2014	EN	29	59.83	S	37	59.65	W	GPS	3840	3842							
49MR03K04_4	A10	14	1	ROS	111103	2023	BO	29	59.78	S	37	59.60	W	GPS	3844	3843	11	3862	3871				
49MR03K04_4	A10	14	1	ROS	111103	2237	EN	29	59.08	S	37	58.88	W	GPS	3852	3855							
49MR03K04_4	A10	15	1	ROS	111203	0034	BE	29	59.95	S	37	29.66	W	GPS	3167	3169				26	1-8,23,24,26,27	#12=#13 DUPLICATE SMPLS (3000DB)	
49MR03K04_4	A10	15	1	BUC	111203	0039	UN	29	59.90	S	37	29.71	W	GPS	3208	3209				1		20.2C	
49MR03K04_4	A10	15	1	ROS	111203	0124	BO	29	59.79	S	37	29.75	W	GPS	3192	3188	10	3208	3197				
49MR03K04_4	A10	15	1	ROS	111203	0328	EN	29	59.29	S	37	30.26	W	GPS	3159	3161							
49MR03K04_4	A10	16	1	ROS	111203	0453	BE	30	0.09	S	37	10.16	W	GPS	2324	2326				21	1-6		
49MR03K04_4	A10	16	1	BUC	111203	0458	UN	30	0.12	S	37	10.23	W	GPS	2326	2325				1		20.1C	
49MR03K04_4	A10	16	1	ROS	111203	0531	BO	30	0.15	S	37	10.29	W	GPS	2326	2327	13	2316	2335				
49MR03K04_4	A10	16	1	ROS	111203	0657	EN	30	0.24	S	37	10.49	W	GPS	2329	2330							
49MR03K04_4	A10	X23	1	ROS	111203	0846	BE	30	0.26	S	36	52.68	W	GPS	2007	2014				23	1-8,23,24,26,27,34,35,46,48	#11=#19 DUPLICATE SMPLS (1800DB), #1-3 FOR BIO (110DB, 5DB)	
49MR03K04_4	A10	X23	1	BUC	111203	0853	UN	30	0.27	S	36	52.69	W	GPS	2016	2020				1		20.0C	
49MR03K04_4	A10	X23	1	ROS	111203	0927	BO	30	0.33	S	36	52.71	W	GPS	2042	2036	14	2025	2042				
49MR03K04_4	A10	X23	1	UNK	111203	0948	BE	30	0.35	S	36	52.73	W	GPS	2045	2048						SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	X23	1	UNK	111203	1027	EN	30	0.38	S	36	52.82	W	GPS	2076	2080							
49MR03K04_4	A10	X23	1	ROS	111203	1035	EN	30	0.37	S	36	52.87	W	GPS	2101	2101							
49MR03K04_4	A10	18	1	ROS	111203	1209	BE	29	59.98	S	36	29.84	W	GPS	1777	1776				19	1-8,23,24,26,27	#10=#16 DUPLICATE SMPLS (1600DB)	
49MR03K04_4	A10	18	1	BUC	111203	1214	UN	29	59.96	S	36	29.82	W	GPS	1772	1775				1		20.0C	
49MR03K04_4	A10	18	1	ROS	111203	1239	BO	29	59.93	S	36	29.74	W	GPS	1771	1772	12	1761	1774				







49MR03K04_4	A10	38	1	ROS	111703	0320	BE	29	59.91	S	26	42.86	W	GPS	5280	5278				35	1-8,12,13,15,23,24,26,27,45,46	#4=#22 DUPLICATE SMPLS (5250DB)					
49MR03K04_4	A10	38	1	BUC	111703	0325	UN	29	59.94	S	26	42.85	W	GPS	5280	5277				1		18.6C					
49MR03K04_4	A10	38	1	ROS	111703	0441	BO	30	0.14	S	26	43.09	W	GPS	5275	5278			10	5289	5368						
49MR03K04_4	A10	38	1	ROS	111703	0714	EN	30	0.35	S	26	43.71	W	GPS	5099	5090											
49MR03K04_4	A10	39	1	ROS	111703	1024	BE	29	59.92	S	25	51.60	W	GPS	4529	4512											
49MR03K04_4	A10	39	1	BUC	111703	1029	UN	29	59.89	S	25	51.59	W	GPS	4515	4517											
49MR03K04_4	A10	39	1	ROS	111703	1135	BO	29	59.67	S	25	51.68	W	GPS	4546	4544			13	4538	4599						
49MR03K04_4	A10	39	1	UNK	111703	1201	UN	29	59.62	S	25	51.77	W	GPS	4556	4557						SOLAR LIGHT MEASUREMENT					
49MR03K04_4	A10	39	1	UNK	111703	1235	UN	29	59.54	S	25	51.85	W	GPS	4571	4577											
49MR03K04_4	A10	39	1	ROS	111703	1339	EN	29	59.33	S	25	51.84	W	GPS	4618	4620											
49MR03K04_4	A10	39	1	FLT	111703	1346	DE	29	59.34	S	25	51.75	W	GPS	4611	4600						ARGO/SOLO#264					
49MR03K04_4	A10	X16	1	UNK	111703	1645	BE	30	13.10	S	25	3.23	W	GPS	4213	4300						9,22,47					
49MR03K04_4	A10	X16	1	ROS	111703	1651	BE	30	13.21	S	25	2.71	W	GPS	4350	4350						32	1-8,12,13,23,24,26,27,34,35	#8=#21 DUPLICATE SMPLS (4250DB), #2 FOR BIO (120DB) 90L THROUGH HULL PUMP FOR R.N.			
49MR03K04_4	A10	X16	1	UNK	111703	1730	EN	30	13.09	S	25	2.71	W	GPS	4336	4343											
49MR03K04_4	A10	X16	1	ROS	111703	1759	BO	30	13.03	S	25	2.77	W	GPS	4351	4349			11	4330	4411						
49MR03K04_4	A10	X16	1	BUC	111703	1800	UN	30	13.03	S	25	2.78	W	GPS	4353	4348							1,34,35,48	19.1C, 18L FOR BIO			
49MR03K04_4	A10	X16	1	ROS	111703	2018	EN	30	12.54	S	25	2.83	W	GPS	4447	4443											
49MR03K04_4	A10	41	1	ROS	111703	2336	BE	30	0.07	S	24	9.93	W	GPS	4742	4745						31	1-6				
49MR03K04_4	A10	41	1	BUC	111703	2341	UN	30	0.09	S	24	9.89	W	GPS	4749	4747						1		19.8C			
49MR03K04_4	A10	41	1	ROS	111803	0049	BO	30	0.07	S	24	9.86	W	GPS	4757	4747			10	4735	4810						
49MR03K04_4	A10	41	1	ROS	111803	0313	EN	30	0.42	S	24	9.42	W	GPS	4896	4893											
49MR03K04_4	A10	42	1	ROS	111803	0612	BE	30	0.26	S	23	18.81	W	GPS	4599	4599											
49MR03K04_4	A10	42	1	BUC	111803	0617	UN	30	0.27	S	23	18.73	W	GPS	4600	4603											
49MR03K04_4	A10	42	1	ROS	111803	0724	BO	30	0.33	S	23	18.69	W	GPS	4600	4602			11	4595	4663						
49MR03K04_4	A10	42	1	UNK	111803	0912	BE	30	0.33	S	23	18.75	W	GPS	4617	4601								SOLAR LIGHT MEASUREMENT			
49MR03K04_4	A10	42	1	ROS	111803	0936	EN	30	0.30	S	23	18.75	W	GPS	4601	4600											
49MR03K04_4	A10	42	1	UNK	111803	0940	EN	30	0.29	S	23	18.75	W	GPS	4600	4600											
49MR03K04_4	A10	42	1	FLT	111803	0943	DE	30	0.19	S	23	18.64	W	GPS	4598	4601								ARGO/SOLO#261			
49MR03K04_4	A10	43	1	ROS	111803	1236	BE	30	0.05	S	22	28.85	W	GPS	4600	4601								35	1-8,12,13,15,23,24,26,27,34,35,45,46,48	#7=#20 DUPLICATE SMPLS (4500DB), #2-4 FOR BIO (135DB, 5DB)	
49MR03K04_4	A10	43	1	BUC	111803	1241	UN	30	0.04	S	22	28.83	W	GPS	4597	4597							1		19.6C		
49MR03K04_4	A10	43	1	UNK	111803	1320	BE	29	59.90	S	22	28.85	W	GPS	4592	4591									SOLAR LIGHT MEASUREMENT		
49MR03K04_4	A10	43	1	ROS	111803	1347	BO	30	0.04	S	22	28.96	W	GPS	4609	4611			13	4595	4659						
49MR03K04_4	A10	43	1	UNK	111803	1438	EN	29	59.90	S	22	29.16	W	GPS	4568	4566											
49MR03K04_4	A10	43	1	ROS	111803	1554	EN	30	0.07	S	22	29.76	W	GPS	4565	4567											
49MR03K04_4	A10	44	1	ROS	111803	1906	BE	29	59.87	S	21	36.96	W	GPS	4766	4782											
49MR03K04_4	A10	44	1	BUC	111803	1911	UN	29	59.84	S	21	37.00	W	GPS	4789	4784											
49MR03K04_4	A10	44	1	UNK	111803	1919	BE	29	59.84	S	21	37.06	W	GPS	4785	4791									SOLAR LIGHT MEASUREMENT		
49MR03K04_4	A10	44	1	UNK	111803	1956	EN	29	59.88	S	21	37.41	W	GPS	4825	4825											
49MR03K04_4	A10	44	1	UNK	111803	2010	BE	29	59.79	S	21	37.44	W	GPS	4823	4821									9,22,47		
49MR03K04_4	A10	44	1	ROS	111803	2023	BO	29	59.69	S	21	37.42	W	GPS	4816	4819			10	4827	4878						
49MR03K04_4	A10	44	1	UNK	111803	2028	EN	29	59.67	S	21	37.43	W	GPS	4818	4816									90L THROUGH HULL PUMP FOR R.N.		
49MR03K04_4	A10	44	1	ROS	111803	2248	EN	29	59.58	S	21	38.09	W	GPS	4836	4832											
49MR03K04_4	A10	45	1	ROS	111903	0159	BE	30	0.17	S	20	45.84	W	GPS	4712	4716											
49MR03K04_4	A10	45	1	BUC	111903	0204	UN	30	0.22	S	20	45.88	W	GPS	4715	4711											
49MR03K04_4	A10	45	1	ROS	111903	0313	BO	30	0.41	S	20	46.40	W	GPS	4818	4823			13	4777	4825						
49MR03K04_4	A10	45	1	ROS	111903	0529	EN	30	0.53	S	20	47.08	W	GPS	4848	4848											
49MR03K04_4	A10	46	1	ROS	111903	0840	BE	29	59.97	S	19	54.84	W	GPS	4780	4770											
49MR03K04_4	A10	46	1	BUC	111903	0845	UN	29	59.96	S	19	54.80	W	GPS	4774	4772									35	1-6,34,35,48	#1-3 FOR BIO (150DB, 5DB)
																										1	20.0C

49MR03K04_4	A10	46	1	ROS	111903	0954	BO	29	59.86	S	19	54.41	W	GPS	4824	4825	15	4813	4871			
49MR03K04_4	A10	46	1	UNK	111903	1120	BE	29	59.69	S	19	53.80	W	GPS	4881	4877				SOLAR LIGHT MEASUREMENT		
49MR03K04_4	A10	46	1	ROS	111903	1157	EN	29	59.65	S	19	53.49	W	GPS	4868	4865						
49MR03K04_4	A10	46	1	UNK	111903	1201	EN	29	59.66	S	19	53.39	W	GPS	4873	4870						
49MR03K04_4	A10	46	1	FLT	111903	1203	DE	29	59.68	S	19	53.32	W	GPS	4867	4863				ARGO/SOLO#263		
49MR03K04_4	A10	X15	1	ROS	111903	1512	BE	30	6.67	S	18	59.92	W	GPS	4610	4607		35	1-8,12,13,15,23,24,26,27,34,35,45,46,48	#9=#18 DUPLICATE SMPLS (4000DB), #2-4 FOR BIO (160DB, 5DB)		
49MR03K04_4	A10	X15	1	BUC	111903	1517	UN	30	6.68	S	18	59.90	W	GPS	4619	4608				1		
49MR03K04_4	A10	X15	1	UNK	111903	1520	BE	30	6.67	S	18	59.91	W	GPS	4613	4615				9,22,47		
49MR03K04_4	A10	X15	1	UNK	111903	1540	EN	30	6.70	S	18	59.90	W	GPS	4612	4612						
49MR03K04_4	A10	X15	1	ROS	111903	1622	BO	30	6.47	S	19	0.06	W	GPS	4614	4612		10	4605	4670		
49MR03K04_4	A10	X15	1	UNK	111903	1654	BE	30	6.43	S	19	0.00	W	GPS	4607	4609					SOLAR LIGHT MEASUREMENT	
49MR03K04_4	A10	X15	1	UNK	111903	1748	EN	30	6.48	S	18	59.84	W	GPS	4615	4615						
49MR03K04_4	A10	X15	1	ROS	111903	1842	EN	30	6.33	S	18	59.66	W	GPS	4610	4610						
49MR03K04_4	A10	48	1	ROS	111903	2101	BE	29	59.89	S	18	23.14	W	GPS	4125	4145				29	1-6	
49MR03K04_4	A10	48	1	BUC	111903	2106	UN	29	59.86	S	18	23.13	W	GPS	4126	4134				1	20.4C	
49MR03K04_4	A10	48	1	ROS	111903	2209	BO	29	59.46	S	18	23.01	W	GPS	4164	4148		16	4172	4203		
49MR03K04_4	A10	48	1	ROS	112003	0007	EN	29	58.88	S	18	23.73	W	GPS	4162	4170						
49MR03K04_4	A10	49	1	ROS	112003	0250	BE	30	0.03	S	17	41.95	W	GPS	3959	3971				29	1-8,23,24,26,27	
49MR03K04_4	A10	49	1	BUC	112003	0255	UN	30	0.02	S	17	42.01	W	GPS	3941	3924				1	#10=#17 DUPLICATE SMPLS (3750DB)	
49MR03K04_4	A10	49	1	ROS	112003	0351	BO	29	59.88	S	17	42.37	W	GPS	3941	3944		10	3898	3935		
49MR03K04_4	A10	49	1	ROS	112003	0547	EN	29	59.54	S	17	42.97	W	GPS	3990	3997						
49MR03K04_4	A10	50	1	ROS	112003	0836	BE	29	59.99	S	17	0.27	W	GPS	3596	3603				30	1-6,34,35,48	
49MR03K04_4	A10	50	1	BUC	112003	0841	UN	29	59.96	S	17	0.35	W	GPS	3590	3595				1	#1-3 FOR BIO (160DB, 5DB)	
49MR03K04_4	A10	50	1	ROS	112003	0934	BO	29	59.56	S	17	0.83	W	GPS	3709	3690		10	3754	3743		
49MR03K04_4	A10	50	1	UNK	112003	0948	BE	29	59.47	S	17	0.88	W	GPS	3710	3716						SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	50	1	UNK	112003	1019	EN	29	59.29	S	17	0.98	W	GPS	3755	3755						
49MR03K04_4	A10	50	1	ROS	112003	1116	EN	29	59.02	S	17	1.40	W	GPS	3802	3816						
49MR03K04_4	A10	50	1	FLT	112003	1122	DE	29	59.02	S	17	1.38	W	GPS	3787	3768						ARGO/SOLO#265
49MR03K04_4	A10	51	1	ROS	112003	1357	BE	30	0.13	S	16	20.04	W	GPS	3697	3695				31	1-8,12,13,23,24,26,27,34,35,46,48	
49MR03K04_4	A10	51	1	BUC	112003	1402	UN	30	0.12	S	16	20.06	W	GPS	3699	3697				1	#11=#16 DUPLICATE SMPLS (3500DB), #2-4 FOR BIO (150DB, 5DB)	
49MR03K04_4	A10	51	1	ROS	112003	1458	BO	30	0.06	S	16	20.34	W	GPS	3700	3701		10	3696	3741		
49MR03K04_4	A10	51	1	UNK	112003	1503	BE	30	0.06	S	16	20.34	W	GPS	3702	3700						SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	51	1	UNK	112003	1557	EN	30	0.02	S	16	20.25	W	GPS	3697	3699						
49MR03K04_4	A10	51	1	ROS	112003	1648	EN	30	0.05	S	16	20.40	W	GPS	3701	3701						
49MR03K04_4	A10	52	1	ROS	112003	1922	BE	30	0.03	S	15	39.85	W	GPS	3265	3254				32	1-6,9,22,47	
49MR03K04_4	A10	52	1	UNK	112003	1925	BE	30	0.01	S	15	39.85	W	GPS	3231	3240				9,22,47	#1-7 FOR R.N.	
49MR03K04_4	A10	52	1	BUC	112003	1927	UN	29	59.99	S	15	39.87	W	GPS	3248	3239				1	100L THROUGH HULL PUMP FOR R.N.	
49MR03K04_4	A10	52	1	UNK	112003	1940	EN	29	59.91	S	15	39.83	W	GPS	3260	3263						20.4C
49MR03K04_4	A10	52	1	ROS	112003	2015	BO	29	59.73	S	15	39.96	W	GPS	3260	3265		10	3245	3265		
49MR03K04_4	A10	52	1	ROS	112003	2158	EN	29	58.95	S	15	40.23	W	GPS	3262	3259						
49MR03K04_4	A10	53	1	ROS	112103	0027	BE	30	0.02	S	14	59.99	W	GPS	3836	3835				29	1-8,15,23,24,26,27,45	
49MR03K04_4	A10	53	1	BUC	112103	0032	UN	29	59.96	S	14	59.99	W	GPS	3836	3837				1	#10=#15 DUPLICATE SMPLS (3750DB)	
49MR03K04_4	A10	53	1	ROS	112103	0128	BO	29	59.57	S	14	59.95	W	GPS	3835	3836		11	3857	3883		
49MR03K04_4	A10	53	1	ROS	112103	0330	EN	29	58.67	S	15	0.22	W	GPS	3846	3849						
49MR03K04_4	A10	54	1	ROS	112103	0606	BE	29	59.90	S	14	19.82	W	GPS	2891	2891				23	1-6	
49MR03K04_4	A10	54	1	BUC	112103	0612	UN	29	59.88	S	14	19.90	W	GPS	2899	2899				1	19.7C	
49MR03K04_4	A10	54	1	ROS	112103	0655	BO	29	59.76	S	14	19.95	W	GPS	2894	2894		18	2865	2886		
49MR03K04_4	A10	54	1	ROS	112103	0824	EN	29	59.49	S	14	19.90	W	GPS	3002	2987						LADCP SOUNDING



49MR03K04_4	A10	63	1	UNK	112303	0811	BE	29	59.74	S	8	9.44	W	GPS	3943	3942				SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	63	1	UNK	112303	0838	EN	29	59.71	S	8	9.30	W	GPS	3954	3952				
49MR03K04_4	A10	63	1	ROS	112303	0847	EN	29	59.65	S	8	9.28	W	GPS	3954	3952				
49MR03K04_4	A10	63	1	FLT	112303	0853	DE	29	59.62	S	8	9.22	W	GPS	3949	3951				ARGO/APEX#1192, DID NOT TURN VERTICAL
49MR03K04_4	A10	64	1	ROS	112303	1203	BE	30	0.09	S	7	19.89	W	GPS	4181	4181		32	1-6,34,35,48	#1-3 FOR BIO (90DB, 5DB)
49MR03K04_4	A10	64	1	BUC	112303	1208	UN	30	0.14	S	7	19.86	W	GPS	4181	4179			1	18.7C
49MR03K04_4	A10	64	1	ROS	112303	1309	BO	30	0.15	S	7	19.87	W	GPS	4175	4178		12	4175 4231	
49MR03K04_4	A10	64	1	UNK	112303	1353	BE	30	0.00	S	7	20.01	W	GPS	4170	4171				SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	64	1	UNK	112303	1426	EN	29	59.86	S	7	20.14	W	GPS	4170	4165				
49MR03K04_4	A10	64	1	ROS	112303	1508	EN	29	59.82	S	7	19.95	W	GPS	4172	4172				
49MR03K04_4	A10	65	1	ROS	112303	1817	BE	30	0.25	S	6	29.68	W	GPS	4596	4603		32	1-8,23,24,26,27,46	#7=#9 DUPLICATE SMPLS (4500DB)
49MR03K04_4	A10	65	1	BUC	112303	1822	UN	30	0.20	S	6	29.62	W	GPS	4602	4595			1	19.4C
49MR03K04_4	A10	65	1	ROS	112303	1929	BO	30	0.23	S	6	29.26	W	GPS	4623	4627		11	4622 4682	
49MR03K04_4	A10	65	1	ROS	112303	2145	EN	30	0.22	S	6	29.03	W	GPS	4629	4631				
49MR03K04_4	A10	65	1	FLT	112303	2152	DE	30	0.33	S	6	28.91	W	GPS	4627	4634				ARGO/APEX#886, DID NOT TURN VERTICAL
49MR03K04_4	A10	66	1	ROS	112403	0052	BE	29	59.99	S	5	40.03	W	GPS	4329	4331		36	1-6,9,22,47	#1-6 FOR R.N.
49MR03K04_4	A10	66	1	BUC	112403	0057	UN	29	59.95	S	5	40.00	W	GPS	4345	4341			1	THERMOMETER BROKEN
49MR03K04_4	A10	66	2	BUC	112403	0122	UN	29	59.77	S	5	39.81	W	GPS	4359	4359				19.1C (TEMPERATURE ONLY)
49MR03K04_4	A10	66	1	ROS	112403	0202	BO	29	59.63	S	5	39.56	W	GPS	4378	4378		10	4375 4415	
49MR03K04_4	A10	66	1	UNK	112403	0220	BE	29	59.53	S	5	39.49	W	GPS	4395	4393			9,22,47	80L THROUGH HULL PUMP FOR R.N.
49MR03K04_4	A10	66	1	UNK	112403	0235	EN	29	59.48	S	5	39.41	W	GPS	4407	4401				
49MR03K04_4	A10	66	1	ROS	112403	0409	EN	29	59.24	S	5	39.21	W	GPS	4417	4415				
49MR03K04_4	A10	67	1	ROS	112403	0714	BE	30	0.02	S	4	49.69	W	GPS	4246	4245		34	1-8,12,13,23,24,26,27,34,35,48	#8=#9 DUPLICATE SMPLS (4000DB), #3-5 FOR BIO (120DB, 5DB)
49MR03K04_4	A10	67	1	BUC	112403	0720	UN	29	59.97	S	4	49.67	W	GPS	4227	4226			1	18.6C
49MR03K04_4	A10	67	1	ROS	112403	0821	BO	29	59.80	S	4	49.30	W	GPS	4248	4247		26	4268 4302	LADCP SOUNDING
49MR03K04_4	A10	67	1	UNK	112403	1006	BE	29	59.60	S	4	48.71	W	GPS	4399	4399				SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	67	1	ROS	112403	1021	EN	29	59.56	S	4	48.60	W	GPS	4405	4403				
49MR03K04_4	A10	67	1	UNK	112403	1027	EN	29	59.70	S	4	48.50	W	GPS	4410	4407				
49MR03K04_4	A10	67	1	FLT	112403	1029	DE	29	59.79	S	4	48.45	W	GPS	4403	4404				ARGO/APEX#1193
49MR03K04_4	A10	68	1	ROS	112503	1053	BE	29	59.65	S	4	0.06	W	GPS	3966	3966		31	1-6,34,35,48	REPLACED BTL, #2-4 FOR BIO (100DB, 5DB)
49MR03K04_4	A10	68	1	BUC	112503	1058	UN	29	59.66	S	4	0.02	W	GPS	3970	3971			1	18.9C
49MR03K04_4	A10	68	1	UNK	112503	1117	BE	29	59.72	S	3	59.85	W	GPS	3970	3971				SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	68	1	ROS	112503	1156	BO	29	59.69	S	3	59.52	W	GPS	3951	3951		11	3976 4016	
49MR03K04_4	A10	68	1	UNK	112503	1158	EN	29	59.68	S	3	59.51	W	GPS	3951	3951				
49MR03K04_4	A10	68	1	ROS	112503	1353	EN	29	59.73	S	3	58.22	W	GPS	4096	4096				
49MR03K04_4	A10	69	1	ROS	112503	1647	BE	30	0.46	S	3	10.20	W	GPS	4344	4341		31	1-8,15,23,24,26,27,45,46	#7=#8 DUPLICATE SMPLS (4250DB)
49MR03K04_4	A10	69	1	BUC	112503	1652	UN	30	0.49	S	3	10.15	W	GPS	4337	4329			1	19.2C
49MR03K04_4	A10	69	1	ROS	112503	1756	BO	30	0.68	S	3	9.74	W	GPS	4305	4307		11	4360 4389	
49MR03K04_4	A10	69	1	ROS	112503	2005	EN	30	0.90	S	3	8.32	W	GPS	4412	4417				
49MR03K04_4	A10	70	1	ROS	112503	2305	BE	30	0.10	S	2	19.51	W	GPS	4333	4346		30	1-6	
49MR03K04_4	A10	70	1	BUC	112503	2310	UN	30	0.18	S	2	19.47	W	GPS	4366	4372			1	18.7C
49MR03K04_4	A10	70	1	ROS	112603	0014	BO	30	0.78	S	2	19.27	W	GPS	4402	4407		11	4423 4446	
49MR03K04_4	A10	70	1	ROS	112603	0233	EN	30	1.85	S	2	18.44	W	GPS	4466	4471				
49MR03K04_4	A10	70	1	FLT	112603	0239	DE	30	1.99	S	2	18.19	W	GPS	4261	4248				ARGO/APEX#1194
49MR03K04_4	A10	71	1	ROS	112603	0531	BE	30	0.14	S	1	29.96	W	GPS	4721	4725		36	1-8,12,13,23,24,26,27,34,35,48	#6=#7 DUPLICATE SMPLS (4500DB), #2-4 FOR BIO (75DB, 5DB)
49MR03K04_4	A10	71	1	BUC	112603	0537	UN	30	0.18	S	1	29.89	W	GPS	4738	4734			1	18.2C
49MR03K04_4	A10	71	1	ROS	112603	0643	BO	30	0.29	S	1	29.42	W	GPS	4749	4749		9	4756 4786	
49MR03K04_4	A10	71	1	ROS	112603	0854	EN	30	0.45	S	1	28.08	W	GPS	4772	4776				

49MR03K04_4	A10	72	1	ROS	112603	1139	BE	30	0.90	S	0	43.89	W	GPS	4815	4813				36	1-6,9,22,34,35,47	#35 FOR BIO (50DB), #1-4 FOR R.N.			
49MR03K04_4	A10	72	1	ROS	112603	1254	BO	30	0.14	S	0	43.80	W	GPS	4826	4823	12	4833	4885						
49MR03K04_4	A10	72	1	BUC	112603	1357	UN	29	59.84	S	0	43.75	W	GPS	4825	4822						1,34,35,48	18.9C, 18L FOR BIO		
49MR03K04_4	A10	72	1	UNK	112603	1420	BE	29	59.68	S	0	43.73	W	GPS	4827	4825						9,22,47	80L THROUGH HULL PUMP FOR R.N.		
49MR03K04_4	A10	72	1	UNK	112603	1428	BE	29	59.62	S	0	43.71	W	GPS	4825	4825							SOLAR LIGHT MEASUREMENT		
49MR03K04_4	A10	72	1	UNK	112603	1440	EN	29	59.53	S	0	43.70	W	GPS	4825	4825							81L THROUGH HULL PUMP FOR R.N.		
49MR03K04_4	A10	72	1	UNK	112603	1502	EN	29	59.21	S	0	43.70	W	GPS	4823	4823							SOLAR LIGHT MEASUREMENT		
49MR03K04_4	A10	72	1	ROS	112603	1508	EN	29	59.07	S	0	43.66	W	GPS	4825	4824									
49MR03K04_4	A10	72	1	FLT	112603	1513	DE	29	58.99	S	0	43.56	W	GPS	4824	4822							ARGO/APEX#1195		
49MR03K04_4	A10	73	1	ROS	112603	1757	BE	29	59.85	S	0	0.25	E	GPS	3882	3887				29	1-8,15,23,24,26,27,45	#5=#10 DUPLICATE SMPLS (3750DB)			
49MR03K04_4	A10	73	1	BUC	112603	1802	UN	29	59.80	S	0	0.25	E	GPS	3887	3902						1	18.7C		
49MR03K04_4	A10	73	1	ROS	112603	1901	BO	29	59.38	S	0	0.48	E	GPS	3964	3969	11	3912	3941						
49MR03K04_4	A10	73	1	ROS	112603	2056	EN	29	58.73	S	0	0.61	E	GPS	3984	3971									
49MR03K04_4	A10	74	1	ROS	112603	2307	BE	29	51.89	S	0	34.06	E	GPS	3276	3272						25	1-6		
49MR03K04_4	A10	74	1	BUC	112603	2312	UN	29	51.85	S	0	34.10	E	GPS	3283	3284						1	18.2C		
49MR03K04_4	A10	74	1	ROS	112703	0001	BO	29	51.64	S	0	34.47	E	GPS	3262	3261		9	3293	3306					
49MR03K04_4	A10	74	1	ROS	112703	0145	EN	29	51.22	S	0	35.09	E	GPS	3217	3220									
49MR03K04_4	A10	75	1	ROS	112703	0355	BE	29	43.91	S	1	7.95	E	GPS	3707	3706						28	1-8,12,13,23,24,26,27,46	#4=#11 DUPLICATE SMPLS (3500DB)	
49MR03K04_4	A10	75	1	BUC	112703	0400	UN	29	43.87	S	1	7.91	E	GPS	3704	3705						1	19.2C		
49MR03K04_4	A10	75	1	ROS	112703	0454	BO	29	43.58	S	1	7.91	E	GPS	3707	3705	10	3708	3747						
49MR03K04_4	A10	75	1	ROS	112703	0643	EN	29	43.20	S	1	8.07	E	GPS	3715	3714									
49MR03K04_4	A10	75	1	FLT	112703	0650	DE	29	43.13	S	1	8.20	E	GPS	3716	3714								ARGO/APEX#1196	
49MR03K04_4	A10	76	1	ROS	112703	0900	BE	29	36.13	S	1	41.94	E	GPS	3647	3648						30	1-6,34,35,48	#1-3 FOR BIO (100DB, 5DB)	
49MR03K04_4	A10	76	1	BUC	112703	0905	UN	29	36.12	S	1	42.00	E	GPS	3647	3647						1	19.1C		
49MR03K04_4	A10	76	1	ROS	112703	0958	BO	29	36.10	S	1	42.16	E	GPS	3646	3646	10	3652	3688						SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	76	1	UNK	112703	1114	BE	29	36.00	S	1	42.35	E	GPS	3645	3645									
49MR03K04_4	A10	76	1	UNK	112703	1141	EN	29	35.98	S	1	42.48	E	GPS	3644	3645									
49MR03K04_4	A10	76	1	ROS	112703	1143	EN	29	35.97	S	1	42.48	E	GPS	3643	3644									
49MR03K04_4	A10	77	1	ROS	112703	1356	BE	29	28.18	S	2	15.75	E	GPS	2717	2716						27	1-8,23,24,26,27,34,35,48	#3=#15 DUPLICATE SMPLS (2600DB), #4-6 FOR BIO (130DB, 5DB)	
49MR03K04_4	A10	77	1	BUC	112703	1401	UN	29	28.20	S	2	15.76	E	GPS	2717	2717						1	19.0C		
49MR03K04_4	A10	77	1	ROS	112703	1441	BO	29	28.30	S	2	15.94	E	GPS	2713	2712	11	2718	2737						SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	77	1	UNK	112703	1517	BE	29	28.27	S	2	15.87	E	GPS	2715	2715									
49MR03K04_4	A10	77	1	UNK	112703	1548	EN	29	28.40	S	2	16.04	E	GPS	2710	2709									
49MR03K04_4	A10	77	1	ROS	112703	1610	EN	29	28.35	S	2	15.95	E	GPS	2712	2712									
49MR03K04_4	A10	78	1	ROS	112703	1824	BE	29	19.96	S	2	49.87	E	GPS	4244	4247						29	1-6		
49MR03K04_4	A10	78	1	BUC	112703	1829	UN	29	19.93	S	2	49.90	E	GPS	4253	4248						1	18.6C		
49MR03K04_4	A10	78	1	ROS	112703	1931	BO	29	19.80	S	2	50.20	E	GPS	4262	4254		11	4270	4304					
49MR03K04_4	A10	78	1	ROS	112703	2129	EN	29	19.61	S	2	50.76	E	GPS	4285	4282									
49MR03K04_4	A10	79	1	ROS	112703	2325	BE	29	28.21	S	3	18.17	E	GPS	4718	4722						32	1-8,12,13,15,23,24,26,27,45,46	#2=#7 DUPLICATE SMPLS (4500DB)	
49MR03K04_4	A10	79	1	BUC	112703	2331	UN	29	28.17	S	3	18.20	E	GPS	4734	4739						1	18.5C		
49MR03K04_4	A10	79	1	ROS	112803	0040	BO	29	28.06	S	3	18.45	E	GPS	4752	4749	11	4750	4816						
49MR03K04_4	A10	79	1	ROS	112803	0248	EN	29	27.76	S	3	18.89	E	GPS	4716	4708									
49MR03K04_4	A10	79	1	FLT	112803	0253	DE	29	27.84	S	3	19.06	E	GPS	4708	4706								ARGO/APEX#887, DID NOT TURN VERTICAL	
49MR03K04_4	A10	80	1	ROS	112803	0445	BE	29	36.82	S	3	46.95	E	GPS	4898	4901						36	1-6,9,22,34,35,47	#35 FOR BIO (50DB), #1-4 FOR R.N.	
49MR03K04_4	A10	80	1	BUC	112803	0450	UN	29	36.83	S	3	46.96	E	GPS	4900	4901						1	18.5C		
49MR03K04_4	A10	80	1	UNK	112803	0600	BE	29	36.51	S	3	46.89	E	GPS	4897	4899							9,22,47	80L THROUGH HULL PUMP FOR R.N.	
49MR03K04_4	A10	80	1	ROS	112803	0601	BO	29	36.51	S	3	46.89	E	GPS	4900	4898	11	4897	4971						
49MR03K04_4	A10	80	1	UNK	112803	0620	EN	29	36.46	S	3	46.92	E	GPS	4896	4895									
49MR03K04_4	A10	80	1	UNK	112803	0738	BE	29	36.09	S	3	47.08	E	GPS	4888	4888								SOLAR LIGHT MEASUREMENT	





49MR03K04_4	A10	X13	1	ROS	113003	1237	EN	29	44.04	S	9	58.65	E	GPS	4876	4872				
49MR03K04_4	A10	X13	1	FLT	113003	1242	DE	29	43.98	S	9	58.76	E	GPS	4879	4873				ARGO/APEX#1200
49MR03K04_4	A10	89	1	ROS	113003	1652	BE	29	44.94	S	10	58.82	E	GPS	4276	4277			1	#1 FOR BIO (60DB)
49MR03K04_4	A10	89	1	BUC	113003	1759	UN	29	44.89	S	10	58.88	E	GPS	4274	4275			1,34,35,48	18.7C, 18L FOR BIO
49MR03K04_4	A10	89	1	ROS	113003	1802	BO	29	44.89	S	10	58.87	E	GPS	4273	4274	10	4278	4333	
49MR03K04_4	A10	89	1	ROS	113003	2003	EN	29	44.56	S	10	58.77	E	GPS	4274	4274				PRIMARY SENSORS SHOWED UNUSUAL PROFILES
49MR03K04_4	A10	89	2	ROS	113003	2138	BE	29	45.01	S	10	58.99	E	GPS	4272	4273			32	CLEANED SENSORS BY TRITON-X, #1,2 FOR BIO (55DB, 10DB)
49MR03K04_4	A10	89	2	BUC	113003	2144	UN	29	45.00	S	10	58.91	E	GPS	4272	4274			1	18.6C
49MR03K04_4	A10	89	2	ROS	113003	2246	BO	29	44.87	S	10	58.67	E	GPS	4280	4276	10	4279	4334	
49MR03K04_4	A10	89	2	ROS	120103	0047	EN	29	44.80	S	10	58.22	E	GPS	4272	4276				
49MR03K04_4	A10	90	1	ROS	120103	0449	BE	29	44.99	S	11	49.19	E	GPS	4001	4001			28	1-6
49MR03K04_4	A10	90	1	BUC	120103	0454	UN	29	45.00	S	11	49.13	E	GPS	4039	4001			1	18.5C
49MR03K04_4	A10	90	1	ROS	120103	0554	BO	29	44.77	S	11	48.69	E	GPS	4003	4003	9	4017	4053	
49MR03K04_4	A10	90	1	ROS	120103	0739	EN	29	44.45	S	11	48.05	E	GPS	4006	4003				
49MR03K04_4	A10	90	1	FLT	120103	0745	DE	29	44.47	S	11	47.97	E	GPS	4003	4000				ARGO/APEX#1201
49MR03K04_4	A10	91	1	ROS	120103	0938	BE	29	37.32	S	12	10.25	E	GPS	3811	3811			36	#10=#19 DUPLICATE SMPLS (3750DB), #2-8 FOR R.N.
49MR03K04_4	A10	91	1	BUC	120103	0943	UN	29	37.31	S	12	10.22	E	GPS	3811	3811			1,34,35,48	18.7C, 18L FOR BIO
49MR03K04_4	A10	91	1	UNK	120103	0945	BE	29	37.31	S	12	10.20	E	GPS	3811	3811			9,22,47	80L THROUGH HULL PUMP FOR R.N.
49MR03K04_4	A10	91	1	UNK	120103	0955	BE	29	37.24	S	12	10.11	E	GPS	3812	3812				SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	91	1	UNK	120103	1005	EN	29	37.21	S	12	10.00	E	GPS	3813	3812				81L THROUGH HULL PUMP FOR R.N.
49MR03K04_4	A10	91	1	UNK	120103	1030	EN	29	37.18	S	12	9.72	E	GPS	3816	3815				SOLAR LIGHT MEASUREMENT
49MR03K04_4	A10	91	1	ROS	120103	1046	BO	29	37.11	S	12	9.56	E	GPS	3814	3814	12	3843	3856	
49MR03K04_4	A10	91	1	ROS	120103	1229	EN	29	36.71	S	12	8.73	E	GPS	3821	3821				
49MR03K04_4	A10	92	1	ROS	120103	1409	BE	29	29.90	S	12	28.06	E	GPS	3643	3640			27	1-6
49MR03K04_4	A10	92	1	BUC	120103	1414	UN	29	29.86	S	12	28.03	E	GPS	3643	3641			1	18.7C
49MR03K04_4	A10	92	1	ROS	120103	1509	BO	29	29.50	S	12	27.68	E	GPS	3644	3641	10	3663	3683	
49MR03K04_4	A10	92	1	ROS	120103	1706	EN	29	28.76	S	12	27.54	E	GPS	3639	3639				
49MR03K04_4	A10	93	1	ROS	120103	1846	BE	29	22.31	S	12	47.37	E	GPS	3348	3346			27	1-8,12,13,23,24,26,27
49MR03K04_4	A10	93	1	BUC	120103	1851	UN	29	22.25	S	12	47.34	E	GPS	3347	3347			1	#8=#12 DUPLICATE SMPLS (3250DB)
49MR03K04_4	A10	93	1	ROS	120103	1940	BO	29	22.19	S	12	47.41	E	GPS	3346	3344	11	3346	3382	
49MR03K04_4	A10	93	1	ROS	120103	2123	EN	29	21.72	S	12	47.74	E	GPS	3338	3337				
49MR03K04_4	A10	94	1	ROS	120103	2257	BE	29	14.88	S	13	6.25	E	GPS	3109	3107			25	1-6
49MR03K04_4	A10	94	1	BUC	120103	2302	UN	29	14.84	S	13	6.25	E	GPS	3104	3102			1	18.3C
49MR03K04_4	A10	94	1	ROS	120103	2348	BO	29	14.68	S	13	6.39	E	GPS	3103	3102	10	3102	3126	
49MR03K04_4	A10	94	1	ROS	120203	0124	EN	29	14.50	S	13	6.90	E	GPS	3103	3102				
49MR03K04_4	A10	95	1	ROS	120203	0253	BE	29	7.25	S	13	25.18	E	GPS	2669	2666			24	1-8,12,13,23,24,26,27,46
49MR03K04_4	A10	95	1	BUC	120203	0257	UN	29	7.23	S	13	25.20	E	GPS	2668	2664			1	#15=#17 DUPLICATE SMPLS (2600DB)
49MR03K04_4	A10	95	1	ROS	120203	0335	BO	29	7.09	S	13	25.29	E	GPS	2661	2661	12	2670	2686	
49MR03K04_4	A10	95	1	ROS	120203	0501	EN	29	6.77	S	13	25.70	E	GPS	2650	2648				
49MR03K04_4	A10	96	1	ROS	120203	0629	BE	28	59.93	S	13	43.75	E	GPS	2143	2140			21	1-6
49MR03K04_4	A10	96	1	BUC	120203	0633	UN	28	59.94	S	13	43.73	E	GPS	2141	2140			1	#15 FOR DO MIN (666DB)
49MR03K04_4	A10	96	1	ROS	120203	0708	BO	28	59.77	S	13	43.79	E	GPS	2141	2140	9	2145	2155	
49MR03K04_4	A10	96	1	ROS	120203	0815	EN	28	59.79	S	13	43.90	E	GPS	2136	2135				
49MR03K04_4	A10	97	1	ROS	120203	0945	BE	28	52.67	S	14	2.63	E	GPS	1506	1509			18	1-8,12,13,23,24,26,27
49MR03K04_4	A10	97	1	BUC	120203	0951	UN	28	52.63	S	14	2.58	E	GPS	1515	1520			1	#16=#21 DUPLICATE SMPLS (1400DB)
49MR03K04_4	A10	97	1	ROS	120203	1016	BO	28	52.57	S	14	2.45	E	GPS	1536	1536	17	1528	1531	
49MR03K04_4	A10	97	1	ROS	120203	1104	EN	28	52.43	S	14	2.33	E	GPS	1568	1566				
49MR03K04_4	A10	98	1	ROS	120203	1235	BE	28	45.27	S	14	21.32	E	GPS	489	490			9	1-6

49MR03K04_4	A10	98	1	BUC 120203 1237	UN 28 45.27 S	14 21.32 E	GPS	487	489				1	18.3C
49MR03K04_4	A10	98	1	ROS 120203 1245	BO 28 45.25 S	14 21.33 E	GPS	489	489	11	478	481		
49MR03K04_4	A10	98	1	ROS 120203 1304	EN 28 45.20 S	14 21.34 E	GPS	489	488					
49MR03K04_4	A10	99	1	ROS 120203 1438	BE 28 37.32 S	14 41.16 E	GPS	168	168				4 1-6	
49MR03K04_4	A10	99	1	BUC 120203 1439	UN 28 37.31 S	14 41.18 E	GPS	168	168				1	18.3C
49MR03K04_4	A10	99	1	ROS 120203 1444	BO 28 37.31 S	14 41.20 E	GPS	169	169	10	153	154		
49MR03K04_4	A10	99	1	ROS 120203 1452	EN 28 37.24 S	14 41.23 E	GPS	170	169					
49MR03K04_4	A10	100	1	ROS 120203 1618	BE 28 30.18 S	14 59.98 E	GPS	176	177				4 1-6	
49MR03K04_4	A10	100	1	BUC 120203 1619	UN 28 30.17 S	14 59.99 E	GPS	178	178				1	17.7C
49MR03K04_4	A10	100	1	ROS 120203 1623	BO 28 30.15 S	15 0.07 E	GPS	177	178	11	162	163		
49MR03K04_4	A10	100	1	ROS 120203 1632	EN 28 30.05 S	15 0.15 E	GPS	178	178					

I04/I03 REV R/V MIRAI CRUISE MR03K04 LEG5

SHIP/CRS EXPCODE	WOCE SECT	STNNBR	CAST CASTNO	TYPE	DATE	TIME	EVENT CODE	LATITUDE	LONGITUDE	NAV	UNC DEPTH	COR DEPTH	HT ABOVE BOTTOM	WIRE OUT	MAX PRESS	NO. OF BOTTLES	PARAMETERS	COMMENTS
49MR03K04_5		1001	1 UNK		121003	0440	BE 37	5.28 S	23 16.40 E	GPS	5289	-9						CTD CABLE RESPOOLING
49MR03K04_5		1001	1 UNK		121003	0647	BO 37	5.22 S	23 13.59 E	GPS	5279	-9		6839				
49MR03K04_5		1001	1 UNK		121003	0925	EN 37	5.90 S	23 12.23 E	GPS	5289	-9						
49MR03K04_5	I04	610	1 ROS		121303	0857	BE 24	39.97 S	35 21.94 E	GPS	123	124				7 1-6,34,35,48		#16-18 FOR BIO (5DB, 45DB)
49MR03K04_5	I04	610	1 BUC		121303	0858	UN 24	39.98 S	35 21.93 E	GPS	123	124				1		27.3C
49MR03K04_5	I04	610	1 ROS		121303	0902	BO 24	40.02 S	35 21.88 E	GPS	122	124	10	109	109			
49MR03K04_5	I04	610	1 ROS		121303	0913	EN 24	40.09 S	35 21.83 E	GPS	123	123						
49MR03K04_5		1002	1 XCT		121303	0939	DE 24	39.99 S	35 25.71 E	GPS	205	211						XCTD01
49MR03K04_5	I04	609	1 BUC		121303	1003	UN 24	39.96 S	35 29.18 E	GPS	298	301				1		27.4C
49MR03K04_5	I04	609	1 ROS		121303	1003	BE 24	39.97 S	35 29.18 E	GPS	298	301				7 1-6		
49MR03K04_5	I04	609	1 ROS		121303	1012	BO 24	40.06 S	35 29.13 E	GPS	296	300	11	284	287			
49MR03K04_5	I04	609	1 ROS		121303	1027	EN 24	40.22 S	35 29.02 E	GPS	294	299						
49MR03K04_5		1003	1 XCT		121303	1043	DE 24	40.12 S	35 31.09 E	GPS	396	404						XCTD02
49MR03K04_5	I04	608	1 BUC		121303	1111	UN 24	40.17 S	35 33.06 E	GPS	592	592				1		27.5C
49MR03K04_5	I04	608	1 ROS		121303	1112	BE 24	40.17 S	35 33.05 E	GPS	592	592				10 1-6		
49MR03K04_5	I04	608	1 ROS		121303	1127	BO 24	40.32 S	35 32.93 E	GPS	588	588	11	577	579			
49MR03K04_5	I04	608	1 ROS		121303	1155	EN 24	40.60 S	35 32.69 E	GPS	580	579						#18 UNMOUNTED BOTTLE PLUNGER ON UPPER ADAPTER PLATE
49MR03K04_5		1004	1 XCT		121303	1224	DE 24	40.09 S	35 38.18 E	GPS	792	792						XCTD03
49MR03K04_5	I04	607	1 ROS		121303	1259	BE 24	39.99 S	35 43.28 E	GPS	937	932				14 1-8,23,24,26,27		#23=#25 DUPLICATE SMPLS (800DB)
49MR03K04_5	I04	607	1 BUC		121303	1304	UN 24	40.06 S	35 43.24 E	GPS	935	930				1		27.9C
49MR03K04_5	I04	607	1 ROS		121303	1320	BO 24	40.24 S	35 43.13 E	GPS	931	927	10	917	921			
49MR03K04_5	I04	607	1 ROS		121303	1356	EN 24	40.65 S	35 42.89 E	GPS	935	930						
49MR03K04_5		1005	1 XCT		121303	1428	DE 24	39.98 S	35 48.14 E	GPS	1030	1026						XCTD04
49MR03K04_5	I04	606	1 ROS		121303	1512	BE 24	40.03 S	35 53.46 E	GPS	1220	1219				15 1-6		
49MR03K04_5	I04	606	1 BUC		121303	1517	UN 24	40.06 S	35 53.41 E	GPS	1217	1212				1		27.9C
49MR03K04_5	I04	606	1 ROS		121303	1540	BO 24	40.28 S	35 53.18 E	GPS	1206	1207	10	1194	1203			
49MR03K04_5	I04	606	1 ROS		121303	1621	EN 24	40.63 S	35 52.74 E	GPS	1188	1183						
49MR03K04_5		1006	1 XCT		121303	1655	DE 24	40.28 S	35 56.74 E	GPS	1468	1461						XCTD05
49MR03K04_5	I04	605	1 BUC		121303	1800	UN 24	40.01 S	35 59.92 E	GPS	1632	1632				1		27.8C
49MR03K04_5	I04	605	1 ROS		121303	1801	BE 24	40.01 S	35 59.92 E	GPS	1632	1632				18 1-8,23,24,26,27		#12=#24 DUPLICATE SMPLS (1400DB)
49MR03K04_5	I04	605	1 ROS		121303	1833	BO 24	40.34 S	35 59.64 E	GPS	1623	1623	11	1617	1624			
49MR03K04_5	I04	605	1 ROS		121303	1925	EN 24	40.79 S	35 59.29 E	GPS	1616	1615						
49MR03K04_5		1007	1 XCT		121303	2006	DE 24	39.92 S	36 7.45 E	GPS	1935	1935						XCTD06
49MR03K04_5	I04	604	1 ROS		121303	2052	BE 24	39.69 S	36 14.85 E	GPS	2159	2163				20 1-6		
49MR03K04_5	I04	604	1 BUC		121303	2057	UN 24	39.76 S	36 14.76 E	GPS	2172	2168				1		28.2C
49MR03K04_5	I04	604	1 ROS		121303	2128	BO 24	40.02 S	36 14.42 E	GPS	2140	2143	10	2168	2166			
49MR03K04_5	I04	604	1 ROS		121303	2239	EN 24	40.24 S	36 13.65 E	GPS	2080	2082						
49MR03K04_5		1008	1 XCT		121303	2324	DE 24	39.62 S	36 22.55 E	GPS	2152	2140						XCTD07
49MR03K04_5	I04	603	1 ROS		121403	0002	BE 24	39.52 S	36 30.11 E	GPS	2112	2113				21 1-8,15,23,24,26,27,45		#10=#25 DUPLICATE SMPLS (2000DB)
49MR03K04_5	I04	603	1 BUC		121403	0008	UN 24	39.56 S	36 30.02 E	GPS	2112	2114				1		27.6C
49MR03K04_5	I04	603	1 ROS		121403	0039	BO 24	39.61 S	36 29.63 E	GPS	2113	2114	9	2123	2125			
49MR03K04_5	I04	603	1 ROS		121403	0145	EN 24	39.78 S	36 28.71 E	GPS	2117	2120						
49MR03K04_5		1009	1 XCT		121403	0229	DE 24	39.76 S	36 37.54 E	GPS	2052	2054						XCTD08
49MR03K04_5	I04	602	1 ROS		121403	0321	BE 24	40.06 S	36 44.97 E	GPS	2173	2173				23 1-6,34,35,48		#1-3 FOR BIO (5DB, 90DB)
49MR03K04_5	I04	602	1 BUC		121403	0332	UN 24	40.17 S	36 44.85 E	GPS	2165	2166				1		26.7C

49MR03K04_5	I04	602	1	ROS	121403	0400	BO	24	40.32	S	36	44.56	E	GPS	2153	2154	10	2160	2165				
49MR03K04_5	I04	602	1	ROS	121403	0509	EN	24	40.70	S	36	43.78	E	GPS	2142	2143							
49MR03K04_5		1010	1	XCT	121403	0552	DE	24	40.11	S	36	52.59	E	GPS	2419	2433					XCTD09		
49MR03K04_5	I04	601	1	ROS	121403	0632	BE	24	40.05	S	37	0.11	E	GPS	3062	3063				25	1-8,12,13,23,24,26,27	#14=#21 DUPLICATE SMPLS (2800DB)	
49MR03K04_5	I04	601	1	BUC	121403	0637	UN	24	40.17	S	37	0.03	E	GPS	3061	3062				1		26.3C	
49MR03K04_5	I04	601	1	ROS	121403	0722	BO	24	40.40	S	36	59.47	E	GPS	3075	3075	10	3099	3084				
49MR03K04_5	I04	601	1	ROS	121403	0904	EN	24	40.78	S	36	58.06	E	GPS	3145	3146							
49MR03K04_5		1011	1	XCT	121403	1017	DE	24	40.01	S	37	15.09	E	GPS	3338	3341						XCTD10	
49MR03K04_5	I04	600	1	ROS	121403	1123	BE	24	39.92	S	37	29.99	E	GPS	3360	3361				33	1-6,9,22,47	#1-7 FOR R.N.	
49MR03K04_5	I04	600	1	UNK	121403	1125	BE	24	39.93	S	37	29.96	E	GPS	3360	3366						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I04	600	1	BUC	121403	1126	UN	24	39.95	S	37	29.93	E	GPS	3369	3370				1		26.0C	
49MR03K04_5	I04	600	1	UNK	121403	1208	EN	24	40.02	S	37	29.44	E	GPS	3403	3405							
49MR03K04_5	I04	600	1	ROS	121403	1216	BO	24	40.02	S	37	29.40	E	GPS	3405	3407	10	3408	3431				
49MR03K04_5	I04	600	1	ROS	121403	1353	EN	24	40.17	S	37	28.41	E	GPS	3335	3335							
49MR03K04_5	I04	599	1	ROS	121403	1605	BE	24	40.05	S	37	59.17	E	GPS	3183	3182				26	1-8,23,24,26,27,46	#13=#20 DUPLICATE SMPLS (3000DB)	
49MR03K04_5	I04	599	1	BUC	121403	1610	UN	24	40.02	S	37	59.05	E	GPS	3185	3184				1		26.7C	
49MR03K04_5	I04	599	1	ROS	121403	1657	BO	24	39.61	S	37	58.54	E	GPS	3174	3173	14	3223	3206				
49MR03K04_5	I04	599	1	ROS	121403	1831	EN	24	39.01	S	37	57.77	E	GPS	3176	3176							
49MR03K04_5	I04	598	1	ROS	121403	2048	BE	24	39.86	S	38	30.01	E	GPS	3370	3369				26	1-6		
49MR03K04_5	I04	598	1	BUC	121403	2053	UN	24	39.80	S	38	29.94	E	GPS	3372	3369				1		26.6C	
49MR03K04_5	I04	598	1	ROS	121403	2143	BO	24	39.31	S	38	29.60	E	GPS	3358	3358	13	3424	3407				
49MR03K04_5	I04	598	1	ROS	121403	2328	EN	24	38.66	S	38	28.77	E	GPS	3385	3384							
49MR03K04_5	I04	597	1	ROS	121503	0139	BE	24	39.96	S	38	59.95	E	GPS	3474	3473				27	1-8,15,23,24,26,27,45	#12=#19 DUPLICATE SMPLS (3250DB)	
49MR03K04_5	I04	597	1	BUC	121503	0145	UN	24	39.92	S	38	59.88	E	GPS	3478	3473				1		26.3C	
49MR03K04_5	I04	597	1	ROS	121503	0233	BO	24	39.55	S	38	59.73	E	GPS	3476	3476	11	3489	3508				A FISH IN PRIMARY TC DUCT AT DEPTHS SHALLOWER THAN 800DB ON UP-CAST
49MR03K04_5	I04	597	1	ROS	121503	0411	EN	24	38.96	S	38	59.24	E	GPS	3470	3469							
49MR03K04_5	I04	596	1	ROS	121503	0618	BE	24	40.00	S	39	30.11	E	GPS	3571	3570				30	1-6,34,35,48	#1-3 FOR BIO (5DB, 75DB)	
49MR03K04_5	I04	596	1	UNK	121503	0620	BE	24	39.97	S	39	30.09	E	GPS	3571	3570						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I04	596	1	BUC	121503	0623	UN	24	39.95	S	39	30.05	E	GPS	3569	3570				1		26.9C	
49MR03K04_5	I04	596	1	UNK	121503	0644	EN	24	39.94	S	39	30.00	E	GPS	3568	3567							
49MR03K04_5	I04	596	1	ROS	121503	0713	BO	24	39.92	S	39	30.08	E	GPS	3569	3570	11	3600	3605				SOLAR LIGHT MEASUREMENT
49MR03K04_5	I04	596	2	UNK	121503	0728	BE	24	39.89	S	39	30.10	E	GPS	3565	3564							
49MR03K04_5	I04	596	2	UNK	121503	0807	EN	24	39.75	S	39	30.20	E	GPS	3563	3562							
49MR03K04_5	I04	596	1	ROS	121503	0857	EN	24	39.47	S	39	30.24	E	GPS	3563	3563							
49MR03K04_5	I04	595	1	ROS	121503	1102	BE	24	39.92	S	39	59.96	E	GPS	3532	3531				27	1-8,12,13,23,24,26,27,46	#12=#18 DUPLICATE SMPLS (3250DB)	
49MR03K04_5	I04	595	1	BUC	121503	1105	UN	24	39.90	S	39	59.93	E	GPS	3533	3532				1		27.8C	
49MR03K04_5	I04	595	1	ROS	121503	1158	BO	24	39.67	S	39	59.77	E	GPS	3543	3543	10	3546	3578				
49MR03K04_5	I04	595	1	ROS	121503	1336	EN	24	39.20	S	39	59.74	E	GPS	3535	3533							
49MR03K04_5	I04	594	1	ROS	121503	1542	BE	24	40.01	S	40	30.03	E	GPS	3583	3580				33	1-6,9,22,47	#1-7 FOR R.N.	
49MR03K04_5	I04	594	1	BUC	121503	1545	UN	24	39.99	S	40	30.02	E	GPS	3581	3579				1		27.6C	
49MR03K04_5	I04	594	1	ROS	121503	1639	BO	24	39.73	S	40	29.89	E	GPS	3564	3563	8	3566	3603				
49MR03K04_5	I04	594	1	ROS	121503	1816	EN	24	39.24	S	40	29.82	E	GPS	3576	3578							
49MR03K04_5	I04	593	1	ROS	121503	2027	BE	24	40.03	S	40	59.91	E	GPS	3635	3632				28	1-8,23,24,26,27	#11=#17 DUPLICATE SMPLS (3500DB)	
49MR03K04_5	I04	593	1	BUC	121503	2032	UN	24	39.99	S	40	59.92	E	GPS	3632	3633				1		27.6C	
49MR03K04_5	I04	593	1	ROS	121503	2124	BO	24	39.79	S	40	59.92	E	GPS	3638	3637				11	3641	3669	
49MR03K04_5	I04	593	1	ROS	121503	2310	EN	24	39.14	S	41	0.00	E	GPS	3635	3634							
49MR03K04_5	I04	592	1	ROS	121603	0124	BE	24	39.96	S	41	29.87	E	GPS	3678	3680				30	1-6,34,35,48	#1-3 FOR BIO (5DB, 60DB)	
49MR03K04_5	I04	592	1	BUC	121603	0131	UN	24	39.91	S	41	29.80	E	GPS	3677	3677				1		27.6C	
49MR03K04_5	I04	592	1	ROS	121603	0224	BO	24	39.70	S	41	29.67	E	GPS	3675	3678	12	3701	3717				

49MR03K04_5	I04	592	1	ROS	121603	0402	EN	24	39.41	S	41	29.14	E	GPS	3673	3674			
49MR03K04_5	I04	591	1	ROS	121603	0619	BE	24	39.87	S	41	59.86	E	GPS	3760	3761	31	1-8,23,24,26,27,34,35,46,48	#2-4 FOR BIO (5DB, 55DB)
49MR03K04_5	I04	591	1	BUC	121603	0624	UN	24	39.82	S	41	59.78	E	GPS	3762	3763	1		27.5C
49MR03K04_5	I04	591	1	UNK	121603	0625	BE	24	39.81	S	41	59.76	E	GPS	3769	3765			SOLAR LIGHT MEASUREMENT
49MR03K04_5	I04	591	1	UNK	121603	0658	EN	24	39.71	S	41	59.50	E	GPS	3762	3764			
49MR03K04_5	I04	591	1	ROS	121603	0718	BO	24	39.70	S	41	59.38	E	GPS	3763	3766	10	3758 3804	
49MR03K04_5	I04	591	1	ROS	121603	0912	EN	24	39.21	S	41	58.49	E	GPS	3801	3806			
49MR03K04_5	I04	590	1	ROS	121603	1134	BE	24	39.97	S	42	29.91	E	GPS	3573	3575	26	1-6	
49MR03K04_5	I04	590	1	BUC	121603	1147	UN	24	39.92	S	42	29.73	E	GPS	3571	3573	1		27.9C
49MR03K04_5	I04	590	1	ROS	121603	1232	BO	24	39.76	S	42	29.31	E	GPS	3555	3557	11	3580 3604	
49MR03K04_5	I04	590	1	ROS	121603	1408	EN	24	39.16	S	42	28.38	E	GPS	3567	3565			
49MR03K04_5	I04	589	1	ROS	121603	1629	BE	24	39.95	S	43	0.09	E	GPS	3692	3696	24	1-8,12,13,23,24,26,27	#11=#15 DUPLICATE SMPLS (3500DB)
49MR03K04_5	I04	589	1	BUC	121603	1641	UN	24	39.93	S	43	0.06	E	GPS	3691	3697	1		27.8C
49MR03K04_5	I04	589	1	ROS	121603	1727	BO	24	39.90	S	42	59.84	E	GPS	3702	3695	10	3680 3724	
49MR03K04_5	I04	589	1	ROS	121603	1915	EN	24	40.20	S	42	59.38	E	GPS	3732	3732			
49MR03K04_5	I04	588	1	ROS	121603	2053	BE	24	39.78	S	43	20.18	E	GPS	3864	3857	35	1-6,9,22,47	#1-7 FOR R.N.
49MR03K04_5	I04	588	1	BUC	121603	2104	UN	24	39.77	S	43	20.20	E	GPS	3857	3857	1		27.8C
49MR03K04_5	I04	588	1	ROS	121603	2153	BO	24	39.53	S	43	20.22	E	GPS	3854	3855	10	3868 3899	
49MR03K04_5	I04	588	1	ROS	121603	2341	EN	24	39.23	S	43	20.26	E	GPS	3852	3853			
49MR03K04_5	I04	587	1	ROS	121703	0405	BE	24	40.50	S	43	33.15	E	GPS	2979	2992	25	1-8,15,23,24,26,27,45	
49MR03K04_5	I04	587	1	BUC	121703	0416	UN	24	40.46	S	43	33.22	E	GPS	2982	2986	1		28.0C
49MR03K04_5	I04	587	1	ROS	121703	0455	BO	24	40.29	S	43	33.10	E	GPS	3024	3023	13	3010 3042	
49MR03K04_5	I04	587	1	ROS	121703	0628	EN	24	40.12	S	43	32.97	E	GPS	3058	3060			
49MR03K04_5		1012	1	XCT	121703	0712	DE	24	40.19	S	43	40.66	E	GPS	2700	2747			XCTD11
49MR03K04_5	I04	586	1	ROS	121703	0800	BE	24	40.04	S	43	48.24	E	GPS	2018	2014	23	1-8,23,24,26,27,34,35,48	#10=#13 DUPLICATE SMPLS (1800DB), #22-24 FOR BIO (5DB, 65DB)
49MR03K04_5	I04	586	1	UNK	121703	0800	BE	24	40.04	S	43	48.24	E	GPS	2018	2014			SOLAR LIGHT MEASUREMENT
49MR03K04_5	I04	586	1	BUC	121703	0812	UN	24	40.05	S	43	48.17	E	GPS	2010	2011	1		27.9C
49MR03K04_5	I04	586	1	UNK	121703	0828	EN	24	39.98	S	43	48.15	E	GPS	1996	1999			
49MR03K04_5	I04	586	1	ROS	121703	0836	BO	24	39.94	S	43	48.15	E	GPS	1963	1963	9	2001 2013	
49MR03K04_5	I04	586	1	ROS	121703	0940	EN	24	39.79	S	43	47.88	E	GPS	2034	2030			
49MR03K04_5		1013	1	XCT	121703	1008	DE	24	39.94	S	43	50.28	E	GPS	1614	1626			XCTD12
49MR03K04_5	I04	585	1	ROS	121703	1057	BE	24	39.90	S	43	52.29	E	GPS	1095	1098	14	1-6	
49MR03K04_5	I04	585	1	BUC	121703	1057	UN	24	39.90	S	43	52.30	E	GPS	1101	1098	1		28.0C
49MR03K04_5	I04	585	1	ROS	121703	1123	BO	24	39.97	S	43	52.13	E	GPS	1168	1164	18	1145 1160	
49MR03K04_5	I04	585	1	ROS	121703	1200	EN	24	40.09	S	43	51.83	E	GPS	1307	1308			
49MR03K04_5	I03	562	1	ROS	121903	0646	BE	20	0.08	S	48	54.96	E	GPS	231	231	9	1-6,34,35,48	#1-3 FOR BIO (5DB, 60DB)
49MR03K04_5	I03	562	1	BUC	121903	0650	UN	20	0.15	S	48	54.91	E	GPS	228	231	1		27.5C
49MR03K04_5	I03	562	1	ROS	121903	0655	BO	20	0.25	S	48	54.85	E	GPS	232	233	8	223 222	
49MR03K04_5	I03	562	1	ROS	121903	0707	EN	20	0.39	S	48	54.74	E	GPS	237	238			
49MR03K04_5		1014	1	XCT	121903	0726	DE	20	0.03	S	48	57.25	E	GPS	909	860			XCTD13
49MR03K04_5	I03	561	1	ROS	121903	0743	BE	20	0.14	S	48	59.48	E	GPS	1105	1097	16	1-8,23,24,26,27	#11=#12 DUPLICATE SMPLS (1000DB)
49MR03K04_5	I03	561	1	BUC	121903	0747	UN	20	0.22	S	48	59.46	E	GPS	1131	1136	1		27.7C
49MR03K04_5	I03	561	1	ROS	121903	0808	BO	20	0.45	S	48	59.30	E	GPS	1299	1290	10	1277 1278	
49MR03K04_5	I03	561	1	ROS	121903	0847	EN	20	0.87	S	48	59.02	E	GPS	1143	1148			
49MR03K04_5		1015	1	XCT	121903	0921	DE	20	0.13	S	49	4.26	E	GPS	1665	1666			XCTD14
49MR03K04_5	I03	560	1	UNK	121903	0952	BE	20	0.26	S	49	9.09	E	GPS	2280	2278			SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	560	1	ROS	121903	0957	BE	20	0.31	S	49	9.04	E	GPS	2254	2255	23	1-6,34,35,48	#1-3 FOR BIO (5DB, 95DB)
49MR03K04_5	I03	560	1	BUC	121903	1000	UN	20	0.37	S	49	9.00	E	GPS	2229	2230	1		27.8C
49MR03K04_5	I03	560	1	UNK	121903	1017	EN	20	0.55	S	49	8.83	E	GPS	2154	2154			





49MR03K04_5	I03	550	1	BUC	122203	1513	UN	19	59.95	S	53	19.99	E	GPS	4907	4906				1	27.5C		
49MR03K04_5	I03	550	1	ROS	122203	1622	BO	19	59.94	S	53	19.78	E	GPS	4905	4906	12	4897	4972				
49MR03K04_5	I03	550	1	ROS	122203	1825	EN	19	59.23	S	53	19.37	E	GPS	4907	4905							
49MR03K04_5	I03	549	1	ROS	122203	2042	BE	19	59.98	S	53	53.05	E	GPS	4876	4876				33	1-8,23,2426,27	#1=#6 DUPLICATE SMPLS (4750DB)	
49MR03K04_5	I03	549	1	BUC	122203	2047	UN	19	59.96	S	53	53.07	E	GPS	4876	4875				1		27.4C	
49MR03K04_5	I03	549	1	ROS	122203	2159	BO	19	59.66	S	53	52.90	E	GPS	4878	4878	11	4868	4938			#8 ILLEGAL TRIP	
49MR03K04_5	I03	549	1	ROS	122303	0003	EN	19	59.09	S	53	52.69	E	GPS	4883	4880							
49MR03K04_5	I03	X07	1	ROS	122303	0234	BE	19	59.83	S	54	30.18	E	GPS	4571	4573				35	1-8,23,24,26,27,34,35,46,48	#5=#7 DUPLICATE SMPLS (4500DB), #1-3 FOR BIO (5DB, 110DB)	
49MR03K04_5	I03	X07	1	BUC	122303	0240	UN	19	59.81	S	54	30.22	E	GPS	4571	4570				1		27.3C	
49MR03K04_5	I03	X07	1	ROS	122303	0345	BO	19	59.89	S	54	30.33	E	GPS	4570	4570	11	4561	4629				
49MR03K04_5	I03	X07	1	ROS	122303	0544	EN	19	59.95	S	54	30.68	E	GPS	4566	4565							
49MR03K04_5	I03	547	1	ROS	122303	0739	BE	20	0.03	S	54	59.20	E	GPS	4397	4402				33	1-6,9,11,34,35,48	#1-3 FOR BIO (5DB, 100DB)	
49MR03K04_5	I03	547	1	BUC	122303	0745	UN	20	0.05	S	54	59.28	E	GPS	4389	4386				1		27.0C	
49MR03K04_5	I03	547	1	UNK	122303	0839	BE	20	0.19	S	54	59.43	E	GPS	4413	4403						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I03	547	1	ROS	122303	0850	BO	20	0.19	S	54	59.32	E	GPS	4411	4410	11	4376	4436				
49MR03K04_5	I03	547	1	UNK	122303	0909	EN	20	0.22	S	54	59.52	E	GPS	4456	4455							
49MR03K04_5	I03	547	1	ROS	122303	1040	EN	20	0.26	S	54	59.79	E	GPS	4428	4428						#32 DISCONNECTED MIDDLE AND LOWER LANYARD	
49MR03K04_5	I03	546	1	ROS	122303	1248	BE	19	59.97	S	55	32.20	E	GPS	4394	4393				30	1-6	#8 ILLEGAL TRIP	
49MR03K04_5	I03	546	1	BUC	122303	1253	UN	19	59.94	S	55	32.24	E	GPS	4394	4393				1		27.2C	
49MR03K04_5	I03	546	1	ROS	122303	1356	BO	19	59.89	S	55	32.26	E	GPS	4392	4392	12	4387	4447				
49MR03K04_5	I03	546	1	ROS	122303	1552	EN	19	59.63	S	55	32.71	E	GPS	4392	4393							
49MR03K04_5	I03	545	1	ROS	122303	1759	BE	20	0.00	S	56	5.15	E	GPS	4387	4385				31	1-8,12,13,23,24,26,27	#4=#8 DUPLICATE SMPLS (4250DB)	
49MR03K04_5	I03	545	1	BUC	122303	1804	UN	19	59.96	S	56	5.20	E	GPS	4386	4386				1		27.2C	
49MR03K04_5	I03	545	1	ROS	122303	1906	BO	19	59.94	S	56	5.53	E	GPS	4385	4385	10	4381	4441				
49MR03K04_5	I03	545	1	ROS	122303	2104	EN	19	59.28	S	56	5.63	E	GPS	4385	4386							
49MR03K04_5	I03	544	1	ROS	122303	2316	BE	20	0.16	S	56	37.92	E	GPS	4366	4366				36	1-6,9,22,47	#1-6 FOR R.N.	
49MR03K04_5	I03	544	1	BUC	122303	2322	UN	20	0.14	S	56	38.01	E	GPS	4366	4369				1		27.0C	
49MR03K04_5	I03	544	1	ROS	122403	0023	BO	20	0.06	S	56	38.02	E	GPS	4358	4367	12	4367	4419				
49MR03K04_5	I03	544	1	ROS	122403	0232	EN	19	59.62	S	56	38.16	E	GPS	4367	4367							
49MR03K04_5	I03	543	1	ROS	122403	0417	BE	19	59.89	S	57	2.96	E	GPS	4370	4371				34	1-8,15,23,24,26,27,34,35,45,46,48	#3=#8 DUPLICATE SMPLS (4250DB), #4-6 FOR BIO (5DB, 100DB)	
49MR03K04_5	I03	543	1	BUC	122403	0422	UN	19	59.84	S	57	2.97	E	GPS	4369	4370				1		27.1C	
49MR03K04_5	I03	543	1	ROS	122403	0526	BO	19	59.67	S	57	2.45	E	GPS	4372	4372	11	4419	4424				
49MR03K04_5	I03	543	1	ROS	122403	0740	EN	19	59.47	S	57	1.59	E	GPS	4370	4370							
49MR03K04_5	I03	542	1	ROS	122403	0921	BE	19	59.96	S	57	16.96	E	GPS	3420	3419				26	1-6		
49MR03K04_5	I03	542	1	BUC	122403	0927	UN	19	59.90	S	57	16.97	E	GPS	3428	3427				1		27.3C	
49MR03K04_5	I03	542	1	UNK	122403	1013	BE	19	59.70	S	57	16.81	E	GPS	3467	3469						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I03	542	1	ROS	122403	1018	BO	19	59.62	S	57	16.82	E	GPS	3492	3489	13	3458	3478				
49MR03K04_5	I03	542	1	UNK	122403	1041	EN	19	59.52	S	57	16.70	E	GPS	3514	3515							
49MR03K04_5	I03	542	1	ROS	122403	1207	EN	19	58.78	S	57	16.17	E	GPS	3563	3568							
49MR03K04_5	I03	541	1	ROS	122403	1256	BE	19	59.93	S	57	25.01	E	GPS	2609	2615				23	1-8,23,24,26,27	#2=#16 DUPLICATE SMPLS (2400DB)	
49MR03K04_5	I03	541	1	BUC	122403	1301	UN	19	59.89	S	57	24.97	E	GPS	2621	2620				1		27.2C	
49MR03K04_5	I03	541	1	ROS	122403	1341	BO	19	59.71	S	57	24.70	E	GPS	2680	2681	15	2648	2652				
49MR03K04_5	I03	541	1	ROS	122403	1457	EN	19	59.53	S	57	24.39	E	GPS	2732	2733							
49MR03K04_5	I03	540	1	ROS	122403	1610	BE	19	59.95	S	57	29.14	E	GPS	1665	1683				17	1-6		
49MR03K04_5	I03	540	1	BUC	122403	1615	UN	19	59.94	S	57	29.16	E	GPS	1668	1666				1		27.0C	
49MR03K04_5	I03	540	1	ROS	122403	1645	BO	19	59.88	S	57	29.24	E	GPS	1656	1651	4	1674	1681				
49MR03K04_5	I03	540	1	ROS	122403	1738	EN	19	59.81	S	57	29.24	E	GPS	1660	1660							
49MR03K04_5	I03	539	1	ROS	122503	0004	BE	20	21.90	S	57	58.01	E	GPS	1729	1722				19	1-8,23,24,26,27	#1=#10 DUPLICATE SMPLS (1600DB)	

49MR03K04_5	I03	539	1	BUC	122503	0010	UN	20	21.85	S	57	58.08	E	GPS	1723	1715				1		26.9C
49MR03K04_5	I03	539	1	ROS	122503	0037	BO	20	21.77	S	57	58.12	E	GPS	1732	1750	13	1712	1722			
49MR03K04_5	I03	539	1	ROS	122503	0131	EN	20	21.64	S	57	58.31	E	GPS	1738	1742						
49MR03K04_5	I03	538	1	ROS	122503	0234	BE	20	22.02	S	58	0.39	E	GPS	2566	2569				25	1-6,34,35,48	#1-3 FOR BIO (5DB, 115DB)
49MR03K04_5	I03	538	1	BUC	122503	0238	UN	20	21.98	S	58	0.43	E	GPS	2557	2568				1		26.9C
49MR03K04_5	I03	538	1	ROS	122503	0317	BO	20	21.91	S	58	0.60	E	GPS	2631	2630	13	2571	2589			
49MR03K04_5	I03	538	1	ROS	122503	0439	EN	20	21.34	S	58	0.67	E	GPS	2378	2372						
49MR03K04_5	I03	537	1	ROS	122503	0532	BE	20	21.88	S	58	9.38	E	GPS	4358	4358				31	1-8,23,24,26,27,46	#8=#23 DUPLICATE SMPLS (4250DB)
49MR03K04_5	I03	537	1	BUC	122503	0539	UN	20	21.79	S	58	9.35	E	GPS	4360	4356				1		26.8C
49MR03K04_5	I03	537	1	ROS	122503	0643	BO	20	21.24	S	58	8.90	E	GPS	4337	4333	11	4408	4398			
49MR03K04_5	I03	537	1	UNK	122503	0717	BE	20	21.18	S	58	8.57	E	GPS	4345	4342						SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	537	1	UNK	122503	0745	EN	20	21.18	S	58	8.30	E	GPS	4326	4328						
49MR03K04_5	I03	537	1	ROS	122503	0839	EN	20	20.95	S	58	7.71	E	GPS	4301	4300						
49MR03K04_5	I03	536	1	ROS	122503	1041	BE	20	21.97	S	58	37.08	E	GPS	4531	4533				36	1-6,9,22,47	#1-6 FOR R.N.
49MR03K04_5	I03	536	1	BUC	122503	1046	UN	20	21.93	S	58	37.09	E	GPS	4513	4537				1		27.2C
49MR03K04_5	I03	536	1	ROS	122503	1151	BO	20	21.52	S	58	36.92	E	GPS	4535	4540	14	4570	4601			
49MR03K04_5	I03	536	1	ROS	122503	1354	EN	20	20.92	S	58	36.50	E	GPS	4523	4522						
49MR03K04_5	I03	535	1	ROS	122503	1617	BE	20	22.20	S	59	13.65	E	GPS	4792	4775				33	1-8,12,13,23,24,26,27	#7=#22 DUPLICATE SMPLS (4500DB)
49MR03K04_5	I03	535	1	BUC	122503	1623	UN	20	22.25	S	59	13.74	E	GPS	4788	4793				1		26.9C
49MR03K04_5	I03	535	1	ROS	122503	1733	BO	20	22.80	S	59	13.65	E	GPS	4776	4777	14	4784	4823			
49MR03K04_5	I03	535	1	ROS	122503	1944	EN	20	23.68	S	59	13.24	E	GPS	4762	4768						
49MR03K04_5	I03	534	1	ROS	122503	2206	BE	20	22.12	S	59	49.38	E	GPS	4102	4105				29	1-6	
49MR03K04_5	I03	534	1	BUC	122503	2211	UN	20	22.14	S	59	49.41	E	GPS	4117	4120				1		27.1C
49MR03K04_5	I03	534	1	ROS	122503	2311	BO	20	22.33	S	59	49.44	E	GPS	4156	4160	11	4127	4173			
49MR03K04_5	I03	534	1	ROS	122603	0143	EN	20	22.89	S	59	49.33	E	GPS	4188	4205						
49MR03K04_5	I03	534	1	FLT	122603	0150	DE	20	22.87	S	59	49.42	E	GPS	4199	4200						ARGO/APEX#1077
49MR03K04_5	I03	533	1	ROS	122603	0357	BE	20	21.97	S	60	22.69	E	GPS	3915	3916				32	1-8,23,24,26,27,34,35,46,48	#10=#21 DUPLICATE SMPLS (3750DB), #2-4 FOR BIO (5DB, 110DB)
49MR03K04_5	I03	533	1	BUC	122603	0402	UN	20	21.90	S	60	22.71	E	GPS	3906	3925				1		27.0C
49MR03K04_5	I03	533	1	ROS	122603	0503	BO	20	21.60	S	60	22.57	E	GPS	3923	3902	12	3930	3951			
49MR03K04_5	I03	533	1	UNK	122603	0620	BE	20	20.87	S	60	22.34	E	GPS	3870	3880						SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	533	1	UNK	122603	0650	EN	20	20.52	S	60	22.29	E	GPS	3989	3995						
49MR03K04_5	I03	533	1	ROS	122603	0703	EN	20	20.31	S	60	22.30	E	GPS	4033	4034						
49MR03K04_5	I03	532	1	ROS	122703	2308	BE	20	21.91	S	61	1.81	E	GPS	3767	3759				27	1-6	
49MR03K04_5	I03	532	1	BUC	122703	2313	UN	20	21.84	S	61	1.78	E	GPS	3786	3786				1		26.7C
49MR03K04_5	I03	532	1	ROS	122803	0015	BO	20	21.37	S	61	1.69	E	GPS	3784	3777	17	3870	3892			
49MR03K04_5	I03	532	1	ROS	122803	0208	EN	20	20.12	S	61	1.42	E	GPS	3771	3775						
49MR03K04_5	I03	531	1	ROS	122803	0440	BE	20	22.11	S	61	38.41	E	GPS	3579	3573				32	1-8,12,13,23,24,26,27,34,35,48	#12=#20 DUPLICATE SMPLS (3250DB), #2-4 FOR BIO (5DB, 115DB), #6 FOR FREONS (10DB)
49MR03K04_5	I03	531	1	BUC	122803	0445	UN	20	22.15	S	61	38.33	E	GPS	3579	3585				1		26.5C
49MR03K04_5	I03	531	1	ROS	122803	0539	BO	20	22.08	S	61	37.87	E	GPS	3673	3673	13	3640	3648			
49MR03K04_5	I03	531	1	UNK	122803	0542	BE	20	22.07	S	61	37.85	E	GPS	3680	3679						SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	531	1	UNK	122803	0614	EN	20	21.99	S	61	37.63	E	GPS	3686	3688						
49MR03K04_5	I03	531	1	ROS	122803	0733	EN	20	21.98	S	61	37.21	E	GPS	3612	3612						
49MR03K04_5	I03	530	1	ROS	122803	1010	BE	20	22.07	S	62	14.25	E	GPS	3051	3055				33	1-6,9,15,22,34,35,45,47,48	#8-10 FOR BIO (5DB, 120DB), #2-7 FOR R.N.
49MR03K04_5	I03	530	1	BUC	122803	1017	UN	20	22.07	S	62	14.22	E	GPS	3059	3065				1		26.7C
49MR03K04_5	I03	530	1	ROS	122803	1102	BO	20	21.96	S	62	14.00	E	GPS	3118	3112	12	3085	3106			
49MR03K04_5	I03	530	1	ROS	122803	1236	EN	20	21.59	S	62	13.79	E	GPS	3117	3098						
49MR03K04_5	I03	529	1	ROS	122803	1508	BE	20	22.01	S	62	50.99	E	GPS	3360	3360				27	1-8,23,24,26,27,46	#12=#19 DUPLICATE SMPLS (3250DB)
49MR03K04_5	I03	529	1	BUC	122803	1513	UN	20	21.93	S	62	51.02	E	GPS	3358	3358				1		26.5C

49MR03K04_5	I03	529	1	ROS	122803	1603	BO	20	21.57	S	62	51.07	E	GPS	3333	3334	8	3353	3373				
49MR03K04_5	I03	529	1	ROS	122803	1741	EN	20	21.22	S	62	51.22	E	GPS	3340	3341							
49MR03K04_5	I03	529	1	FLT	122803	1746	DE	20	21.16	S	62	51.36	E	GPS	3341	3341							
49MR03K04_5	I03	528	1	ROS	122803	1955	BE	20	21.98	S	63	22.78	E	GPS	2940	2943				24	1-6		
49MR03K04_5	I03	528	1	BUC	122803	2000	UN	20	21.91	S	63	22.80	E	GPS	2918	2917					1		
49MR03K04_5	I03	528	1	ROS	122803	2042	BO	20	21.82	S	63	22.78	E	GPS	2921	2917	9	2914	2942			26.8C	
49MR03K04_5	I03	528	1	ROS	122803	2214	EN	20	20.98	S	63	22.76	E	GPS	2936	2935							
49MR03K04_5	I03	527	1	ROS	122903	0030	BE	20	16.46	S	63	53.80	E	GPS	2932	2950				25	1-8,23,24,26,27		
49MR03K04_5	I03	527	1	BUC	122903	0035	UN	20	16.38	S	63	53.79	E	GPS	2953	2963					1	#14=#18 DUPLICATE SMPLS (2800DB)	
49MR03K04_5	I03	527	1	ROS	122903	0120	BO	20	15.96	S	63	53.90	E	GPS	2975	2978	8	3028	3020			26.4C	
49MR03K04_5	I03	527	1	ROS	122903	0256	EN	20	15.37	S	63	53.77	E	GPS	3019	3014							
49MR03K04_5	I03	526	1	ROS	122903	0509	BE	20	10.91	S	64	25.05	E	GPS	3039	3035				27	1-6,34,35,48		
49MR03K04_5	I03	526	1	BUC	122903	0514	UN	20	10.80	S	64	25.05	E	GPS	3034	3031					1	#1-3 FOR BIO (5DB, 110DB)	
49MR03K04_5	I03	526	1	ROS	122903	0558	BO	20	10.62	S	64	24.72	E	GPS	3030	3031	11	3032	3049			26.4C	
49MR03K04_5	I03	526	1	UNK	122903	0600	BE	20	10.93	S	64	25.05	E	GPS	3034	3030						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I03	526	1	UNK	122903	0632	EN	20	10.66	S	64	24.45	E	GPS	3046	3042							
49MR03K04_5	I03	526	1	ROS	122903	0733	EN	20	10.53	S	64	23.85	E	GPS	3010	2985							
49MR03K04_5	I03	525	1	ROS	122903	0947	BE	20	5.51	S	64	56.02	E	GPS	2927	2921				25	1-8,12,13,15,23,24,26,27,45,46		
49MR03K04_5	I03	525	1	BUC	122903	0953	UN	20	5.49	S	64	56.04	E	GPS	2910	2912					1	#14=#17 DUPLICATE SMPLS (2800DB)	
49MR03K04_5	I03	525	1	ROS	122903	1035	BO	20	5.35	S	64	56.05	E	GPS	2909	2909	11	2910	2934			26.5C	
49MR03K04_5	I03	525	1	ROS	122903	1207	EN	20	5.09	S	64	56.05	E	GPS	2870	2871							
49MR03K04_5	I03	524	1	ROS	122903	1411	BE	20	0.08	S	65	25.88	E	GPS	2567	2553				22	1-6		
49MR03K04_5	I03	524	1	BUC	122903	1415	UN	20	0.05	S	65	25.92	E	GPS	2556	2543					1	26.3C	
49MR03K04_5	I03	524	1	ROS	122903	1452	BO	19	59.85	S	65	25.90	E	GPS	2583	2578	8	2533	2539				
49MR03K04_5	I03	524	1	ROS	122903	1603	EN	19	59.64	S	65	25.79	E	GPS	2554	2551							
49MR03K04_5	I03	523	1	ROS	122903	1821	BE	20	0.17	S	65	58.96	E	GPS	2338	2353				22	1-8,23,24,26,27		
49MR03K04_5	I03	523	1	BUC	122903	1826	UN	20	0.17	S	65	58.95	E	GPS	2345	2352					1	#16=#18 DUPLICATE SMPLS (2000DB)	
49MR03K04_5	I03	523	1	ROS	122903	1902	BO	20	0.09	S	65	58.83	E	GPS	2471	2473	24	2362	2378			26.5C	
49MR03K04_5	I03	523	1	ROS	122903	2018	EN	19	59.82	S	65	58.69	E	GPS	2612	2610							
49MR03K04_5	I03	523	1	FLT	122903	2023	DE	19	59.85	S	65	58.88	E	GPS	2588	2562						ARGO/APEX#1080	
49MR03K04_5	I03	522	1	ROS	122903	2241	BE	20	0.10	S	66	31.98	E	GPS	2509	2513				21	1-6		
49MR03K04_5	I03	522	1	BUC	122903	2245	UN	20	0.09	S	66	31.96	E	GPS	2527	2527					1	26.6C	
49MR03K04_5	I03	522	1	ROS	122903	2324	BO	19	59.90	S	66	31.89	E	GPS	2481	2484	14	2536	2551				
49MR03K04_5	I03	522	1	ROS	123003	0037	EN	19	59.59	S	66	31.78	E	GPS	2410	2404							
49MR03K04_5	I03	521	1	ROS	123003	0300	BE	20	0.07	S	67	5.97	E	GPS	2436	2430				25	1-8,23,24,26,27,34,35,46,48		
49MR03K04_5	I03	521	1	BUC	123003	0306	UN	20	0.07	S	67	5.96	E	GPS	2460	2412					1	#15=#17 DUPLICATE SMPLS (2200DB), #1-3 FOR BIO (5DB, 115DB)	
49MR03K04_5	I03	521	1	ROS	123003	0340	BO	20	0.01	S	67	5.82	E	GPS	2389	2390	11	2377	2394			26.4C	
49MR03K04_5	I03	521	1	ROS	123003	0457	EN	20	0.03	S	67	5.53	E	GPS	2459	2457							
49MR03K04_5	I03	520	1	UNK	123003	0719	BE	20	0.02	S	67	39.06	E	GPS	2912	2922						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I03	520	1	ROS	123003	0721	BE	20	0.02	S	67	39.07	E	GPS	2920	2930				27	1-6,34,35,48		
49MR03K04_5	I03	520	1	BUC	123003	0725	UN	19	59.99	S	67	38.99	E	GPS	2950	2952					1	#4-6 FOR BIO (5DB, 120DB)	
49MR03K04_5	I03	520	1	UNK	123003	0748	EN	19	59.91	S	67	38.87	E	GPS	2909	2905						26.3C	
49MR03K04_5	I03	520	1	ROS	123003	0813	BO	19	59.77	S	67	38.75	E	GPS	2886	2876	14	2993	2947				
49MR03K04_5	I03	520	1	ROS	123003	0936	EN	19	59.50	S	67	38.25	E	GPS	2983	2988							
49MR03K04_5	I03	519	1	ROS	123003	1210	BE	19	59.96	S	68	12.95	E	GPS	2531	2524				23	1-8,12,13,23,24,26,27		
49MR03K04_5	I03	519	1	BUC	123003	1214	UN	19	59.95	S	68	12.96	E	GPS	2525	2526					1	#14=#16 DUPLICATE SMPLS (2400DB)	
49MR03K04_5	I03	519	1	ROS	123003	1256	BO	19	59.87	S	68	12.80	E	GPS	2572	2572	?	2521	2541			26.8C	
49MR03K04_5	I03	519	1	ROS	123003	1419	EN	19	59.76	S	68	12.64	E	GPS	2590	2589							

49MR03K04_5	I03	518	1	ROS	123003	1642	BE	20	0.07	S	68	47.99	E	GPS	2634	2626				28	1-6,9,22,47	#1-3,5-7 FOR R.N.	
49MR03K04_5	I03	518	1	BUC	123003	1647	UN	20	0.08	S	68	47.98	E	GPS	2627	2625				1		26.6C	
49MR03K04_5	I03	518	1	ROS	123003	1725	BO	20	0.01	S	68	47.89	E	GPS	2656	2651	10	2616	2639				
49MR03K04_5	I03	518	1	ROS	123003	1842	EN	19	59.86	S	68	47.53	E	GPS	2663	2663							
49MR03K04_5	I03	523	1	FLT	123003	1847	DE	19	59.81	S	68	47.66	E	GPS	2674	2670						ARGO/APEX#1079	
49MR03K04_5	I03	517	1	ROS	123003	2105	BE	20	0.07	S	69	22.03	E	GPS	3309	3324				26	1-8,15,23,24,26,27,45,46	#11=#13 DUPLICATE SMPLS (3000DB)	
49MR03K04_5	I03	517	1	BUC	123003	2110	UN	20	0.01	S	69	21.98	E	GPS	3337	3321				1		26.4C	
49MR03K04_5	I03	517	1	ROS	123003	2159	BO	19	59.78	S	69	21.93	E	GPS	3346	3332	8	3342	3372				
49MR03K04_5	I03	517	1	ROS	123003	2332	EN	19	59.06	S	69	21.44	E	GPS	3344	3344							
49MR03K04_5	I03	516	1	ROS	123103	0126	BE	20	0.04	S	69	48.01	E	GPS	3618	3618				30	1-6,34,35,48	#1-3 FOR BIO (5DB, 130DB)	
49MR03K04_5	I03	516	1	BUC	123103	0132	UN	20	0.00	S	69	48.03	E	GPS	3617	3617				1		26.2C	
49MR03K04_5	I03	516	1	ROS	123103	0225	BO	19	59.60	S	69	47.99	E	GPS	3635	3598	13	3625	3640				
49MR03K04_5	I03	516	1	ROS	123103	0412	EN	19	58.63	S	69	47.79	E	GPS	3439	3440							
49MR03K04_5	I03	515	1	ROS	123103	0606	BE	20	0.07	S	70	14.98	E	GPS	3282	3282				29	1-8,23,24,26,27,34,35,48	#12=#13 DUPLICATE SMPLS (3000DB), #1-3 FOR BIO (5DB, 130DB)	
49MR03K04_5	I03	515	1	BUC	123103	0611	UN	20	0.01	S	70	15.01	E	GPS	3318	3288				1		26.2C	
49MR03K04_5	I03	515	1	UNK	123103	0611	BE	20	0.01	S	70	15.01	E	GPS	3318	3288						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I03	515	1	UNK	123103	0640	EN	19	59.85	S	70	14.87	E	GPS	3359	3357							
49MR03K04_5	I03	515	1	ROS	123103	0658	BO	19	59.73	S	70	14.78	E	GPS	3349	3340	4	3333	3338				
49MR03K04_5	I03	515	1	ROS	123103	0837	EN	19	58.59	S	70	14.17	E	GPS	3342	3335							
49MR03K04_5	I03	514	1	ROS	123103	1042	BE	19	59.95	S	70	44.82	E	GPS	3638	3636				27	1-6		
49MR03K04_5	I03	514	1	BUC	123103	1050	UN	19	59.89	S	70	44.80	E	GPS	3643	3627				1		26.6C	
49MR03K04_5	I03	514	1	ROS	123103	1143	BO	19	59.41	S	70	44.62	E	GPS	3545	3540	9	3677	3665				
49MR03K04_5	I03	514	1	ROS	123103	1337	EN	19	58.60	S	70	44.12	E	GPS	3514	3518							
49MR03K04_5	I03	513	1	ROS	010104	1402	BE	19	59.98	S	71	15.31	E	GPS	4187	4185				30	1-8,12,13,23,24,26,27,46	#9=#11 DUPLICATE SMPLS (4000DB)	
49MR03K04_5	I03	513	1	BUC	010104	1412	UN	19	59.94	S	71	15.33	E	GPS	4186	4184				1		26.1C	
49MR03K04_5	I03	513	1	ROS	010104	1512	BO	19	59.82	S	71	15.35	E	GPS	4192	4189	10	4183	4239				REPLACED CAROUSEL FROM #0391 TO #0278
49MR03K04_5	I03	513	1	ROS	010104	1708	EN	19	59.69	S	71	15.32	E	GPS	4184	4185							
49MR03K04_5	I03	512	1	ROS	010104	1903	BE	20	0.13	S	71	41.99	E	GPS	3639	3655				34	1-6,9,15,22,45,47	#1-9 FOR R.N.	
49MR03K04_5	I03	512	1	BUC	010104	1909	UN	20	0.12	S	71	41.94	E	GPS	3692	3690				1		26.1C	
49MR03K04_5	I03	512	1	ROS	010104	2003	BO	19	59.80	S	71	41.78	E	GPS	3640	3650	8	3673	3703				
49MR03K04_5	I03	512	1	ROS	010104	2145	EN	19	59.00	S	71	41.55	E	GPS	3771	3753							
49MR03K04_5	I03	512	1	FLT	010104	2150	DE	19	58.97	S	71	41.65	E	GPS	3678	3633						ARGO/APEX#1097	
49MR03K04_5	I03	511	1	ROS	010104	2352	BE	20	0.11	S	72	11.86	E	GPS	3973	3963				32	1-8,23,24,26,27,34,35,48	#1=#10 DUPLICATE SMPLS (3750DB), #2-4 FOR BIO (5DB, 125DB)	
49MR03K04_5	I03	511	1	BUC	010104	2358	UN	20	0.08	S	72	11.83	E	GPS	3976	3976				1		25.8C	
49MR03K04_5	I03	511	1	ROS	010204	0056	BO	19	59.85	S	72	11.71	E	GPS	3994	4000	0	3907	3956				DOUBTFUL ALTIMETER VALUE AS NEGATIVE
49MR03K04_5	I03	511	1	ROS	010204	0305	EN	19	59.02	S	72	11.27	E	GPS	4008	4006							
49MR03K04_5	I03	510	1	ROS	010204	0517	BE	20	0.11	S	72	42.79	E	GPS	4160	4159				32	1-6,34,35,38,48	#1-3 FOR BIO (5DB, 125DB)	
49MR03K04_5	I03	510	1	BUC	010204	0522	UN	20	0.05	S	72	42.76	E	GPS	4184	4184				1		26.2C	
49MR03K04_5	I03	510	1	UNK	010204	0527	BE	20	0.00	S	72	42.73	E	GPS	4197	4202						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I03	510	1	UNK	010204	0604	EN	19	59.62	S	72	42.68	E	GPS	4216	4227							
49MR03K04_5	I03	510	1	ROS	010204	0625	BO	19	59.44	S	72	42.64	E	GPS	4209	4214	12	4261	4257				
49MR03K04_5	I03	510	1	ROS	010204	0826	EN	19	58.25	S	72	42.42	E	GPS	4242	4242						REPLACED ALTIMETER FROM #1026 TO #0396	
49MR03K04_5	I03	509	1	ROS	010204	1034	BE	19	59.94	S	73	11.90	E	GPS	4542	4530				32	1-8,23,24,26,27,46	#1=#9 DUPLICATE SMPLS (4000DB)	
49MR03K04_5	I03	509	1	BUC	010204	1038	UN	19	59.85	S	73	11.85	E	GPS	4517	4513				1		26.2C	
49MR03K04_5	I03	509	1	UNK	010204	1128	BE	19	59.36	S	73	11.93	E	GPS	4650	4650						SOLAR LIGHT MEASUREMENT	
49MR03K04_5	I03	509	1	UNK	010204	1136	EN	19	59.26	S	73	11.97	E	GPS	4618	4617							
49MR03K04_5	I03	509	1	ROS	010204	1144	BO	19	59.21	S	73	12.00	E	GPS	4585	4570	15	4597	4604				
49MR03K04_5	I03	509	1	ROS	010204	1347	EN	19	58.32	S	73	12.28	E	GPS	4568	4570							



49MR03K04_5	I03	500	1	ROS	010404	1816	BE	19	59.96	S	79	4.99	E	GPS	4857	4856			32	1-6				
49MR03K04_5	I03	500	1	BUC	010404	1821	UN	19	59.93	S	79	4.95	E	GPS	4857	4858			1		25.2C			
49MR03K04_5	I03	500	1	ROS	010404	1931	BO	19	59.52	S	79	4.87	E	GPS	4841	4833	10	4876	4928					
49MR03K04_5	I03	500	1	ROS	010404	2136	EN	19	58.73	S	79	4.80	E	GPS	4973	4967						CTD CABLE CUT (450DB)		
49MR03K04_5	I03	X08	1	ROS	010504	0138	BE	20	0.00	S	79	59.99	E	GPS	4869	4872					36	1-8,12,13,23,24,26,27,34,35,46	#4=#6 DUPLICATE SMPLS (4750DB), #1 FOR BIO (120DB)	
49MR03K04_5	I03	X08	1	BUC	010504	0143	UN	20	0.00	S	79	59.95	E	GPS	4865	4864					1		25.8C	
49MR03K04_5	I03	X08	1	ROS	010504	0252	BO	19	59.75	S	79	59.85	E	GPS	4864	4867	11	4867	4927					
49MR03K04_5	I03	X08	1	BUC	010504	0446	UN	19	59.31	S	79	59.86	E	GPS	4852	4855					34, 35, 48		BIO-OPTICAL SAMPLING (BUCKET)	
49MR03K04_5	I03	X08	1	ROS	010504	0511	EN	19	59.19	S	79	59.81	E	GPS	4848	4845								
49MR03K04_5	I03	498	1	ROS	010504	0730	BE	19	59.90	S	80	32.18	E	GPS	4833	4831					35	1-6,15,34,35,45,48	#2-3,34 FOR BIO (5DB, 140DB)	
49MR03K04_5	I03	498	1	UNK	010504	0733	BE	19	59.90	S	80	32.21	E	GPS	4842	4842								SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	498	1	BUC	010504	0735	UN	19	59.91	S	80	32.23	E	GPS	4835	4846					1		26.5C	
49MR03K04_5	I03	498	1	UNK	010504	0755	EN	19	59.81	S	80	32.27	E	GPS	4857	4857								
49MR03K04_5	I03	498	1	ROS	010504	0846	BO	19	59.54	S	80	32.32	E	GPS	4894	4880	15	4878	4930					
49MR03K04_5	I03	498	1	ROS	010504	1113	EN	19	58.47	S	80	32.61	E	GPS	4985	4986								
49MR03K04_5	I03	498	1	FLT	010504	1119	DE	19	58.41	S	80	32.72	E	GPS	4978	4973								ARGO/APEX#1076
49MR03K04_5	I03	497	1	ROS	010504	1409	BE	20	0.05	S	81	16.09	E	GPS	4604	4607					32	1-8,23,24,26,27	#3=#7 DUPLICATE SMPLS (4500DB)	
49MR03K04_5	I03	497	1	BUC	010504	1414	UN	20	0.04	S	81	16.14	E	GPS	4607	4595					1		26.4C	
49MR03K04_5	I03	497	1	ROS	010504	1519	BO	19	59.86	S	81	16.29	E	GPS	4545	4544	9	4579	4635					
49MR03K04_5	I03	497	1	ROS	010504	1724	EN	19	59.16	S	81	16.45	E	GPS	4633	4633								
49MR03K04_5	I03	496	1	ROS	010504	2019	BE	20	0.00	S	82	0.06	E	GPS	4942	4937					32	1-6,11		
49MR03K04_5	I03	496	1	BUC	010504	2024	UN	19	59.97	S	82	0.12	E	GPS	4937	4932					1		26.6C	
49MR03K04_5	I03	496	1	ROS	010504	2137	BO	19	59.69	S	82	0.11	E	GPS	4894	4884	8	4938	5003					
49MR03K04_5	I03	496	1	ROS	010604	0003	EN	19	58.93	S	81	59.93	E	GPS	4885	4882								
49MR03K04_5	I03	495	1	ROS	010604	0259	BE	20	0.00	S	82	44.13	E	GPS	5232	5229					36	1-8,12,13,23,24,26,27,34,35,46	#2=#5 DUPLICATE SMPLS (5000DB), #1 FOR BIO (100DB)	
49MR03K04_5	I03	495	1	BUC	010604	0312	UN	19	59.97	S	82	44.22	E	GPS	5216	5220					1		26.8C	
49MR03K04_5	I03	495	1	ROS	010604	0419	BO	19	59.76	S	82	44.18	E	GPS	5118	5120	9	5227	5304					
49MR03K04_5	I03	495	1	UNK	010604	0500	BE	19	59.59	S	82	44.07	E	GPS	5162	5102								SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	495	1	UNK	010604	0548	EN	19	59.41	S	82	44.04	E	GPS	5099	5099								
49MR03K04_5	I03	495	1	BUC	010604	0556	UN	19	59.37	S	82	44.03	E	GPS	5116	5118					34, 35, 48			BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	495	1	ROS	010604	0648	EN	19	59.26	S	82	44.14	E	GPS	5115	5116								
49MR03K04_5	I03	494	1	ROS	010604	0929	BE	20	0.00	S	83	24.07	E	GPS	5261	5264					36	1-6,9,22,47	#1-2 FOR R.N.	
49MR03K04_5	I03	494	1	BUC	010604	0935	UN	19	59.97	S	83	24.14	E	GPS	5267	5279					1		26.9C	
49MR03K04_5	I03	494	1	UNK	010604	0951	BE	19	59.92	S	83	24.21	E	GPS	5279	5276								SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	494	1	UNK	010604	1024	EN	19	59.86	S	83	24.39	E	GPS	5275	5277								
49MR03K04_5	I03	494	1	ROS	010604	1052	BO	19	59.83	S	83	24.49	E	GPS	5291	5291	12	5271	5349					
49MR03K04_5	I03	494	1	ROS	010604	1322	EN	19	59.52	S	83	24.67	E	GPS	5292	5298								
49MR03K04_5	I03	494	1	FLT	010604	1328	DE	19	59.53	S	83	24.76	E	GPS	5298	5316								ARGO/APEX#1094
49MR03K04_5	I03	493	1	ROS	010604	1557	BE	19	59.95	S	84	1.97	E	GPS	4805	4811					33	1-8,23,24,26,27	#1=#6 DUPLICATE SMPLS (4750DB)	
49MR03K04_5	I03	493	1	BUC	010604	1601	UN	19	59.88	S	84	2.02	E	GPS	4801	4803					1		26.7C	
49MR03K04_5	I03	493	1	ROS	010604	1709	BO	19	59.36	S	84	2.14	E	GPS	4932	4930	11	4819	4852					
49MR03K04_5	I03	493	1	ROS	010604	1921	EN	19	58.58	S	84	2.66	E	GPS	4894	4892								
49MR03K04_5	I03	492	1	ROS	010604	2156	BE	19	59.96	S	84	39.88	E	GPS	4947	4937					35	1-6,34,35,48	#1-3 FOR BIO (5DB, 115DB)	
49MR03K04_5	I03	492	1	BUC	010604	2201	UN	19	59.94	S	84	39.87	E	GPS	4945	4947					1		26.4C	
49MR03K04_5	I03	492	1	ROS	010604	2312	BO	19	59.87	S	84	39.94	E	GPS	4957	4941	12	4938	5012					
49MR03K04_5	I03	492	1	ROS	010704	0213	EN	19	59.08	S	84	40.57	E	GPS	4991	4992								
49MR03K04_5	I03	491	1	ROS	010704	0448	BE	20	0.00	S	85	17.99	E	GPS	4895	4889					36	1-9,12,13,15,22-24,26,27,34,35,45,46,48	#6=#23 DUPLICATE SMPLS (4750DB), #2-4 FOR BIO (5DB, 80DB)	

49MR03K04_5	I03	491	1	BUC	010704	0454	UN	19	59.94	S	85	18.05	E	GPS	4882	4885					1				26.7C
49MR03K04_5	I03	491	1	UNK	010704	0456	BE	19	59.90	S	85	18.07	E	GPS	4880	4881									SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	491	1	UNK	010704	0527	EN	19	59.67	S	85	18.14	E	GPS	4887	4889									
49MR03K04_5	I03	491	1	ROS	010704	0605	BO	19	59.40	S	85	18.26	E	GPS	4923	4898			11	4923	4951				
49MR03K04_5	I03	491	1	ROS	010704	0829	EN	19	58.75	S	85	18.59	E	GPS	4943	4938									
49MR03K04_5	I03	490	1	ROS	010704	1107	BE	19	59.99	S	85	56.19	E	GPS	4380	4388							30	1-6	
49MR03K04_5	I03	490	1	BUC	010704	1112	UN	19	59.93	S	85	56.21	E	GPS	4404	4392							1		26.6C
49MR03K04_5	I03	490	1	ROS	010704	1218	BO	19	59.41	S	85	56.28	E	GPS	4433	4442			10	4451	4477				
49MR03K04_5	I03	490	1	ROS	010704	1428	EN	19	58.56	S	85	56.38	E	GPS	4467	4467									
49MR03K04_5	I03	489	1	ROS	010704	1646	BE	19	59.94	S	86	29.05	E	GPS	4352	4352							31	1-8,23,24,26,27,	#8=#22 DUPLICATE SMPLS (4250DB)
49MR03K04_5	I03	489	1	BUC	010704	1651	UN	19	59.91	S	86	29.04	E	GPS	4350	4351							1		25.8C
49MR03K04_5	I03	489	1	ROS	010704	1754	BO	19	59.49	S	86	28.79	E	GPS	4347	4348			9	4387	4405				
49MR03K04_5	I03	489	1	ROS	010704	1954	EN	19	58.56	S	86	28.04	E	GPS	4336	4338									
49MR03K04_5	I03	489	1	FLT	010704	2000	DE	19	58.51	S	86	28.15	E	GPS	4337	4338									ARGO/APEX#1073
49MR03K04_5	I03	488	1	ROS	010804	1857	BE	19	59.76	S	86	54.43	E	GPS	3534	3533							27	1-6	
49MR03K04_5	I03	488	1	BUC	010804	1903	UN	19	59.70	S	86	54.41	E	GPS	3535	3535							1		25.5C
49MR03K04_5	I03	488	1	ROS	010804	1956	BO	19	59.41	S	86	54.34	E	GPS	3531	3532			9	3551	3577				
49MR03K04_5	I03	488	1	ROS	010804	2143	EN	19	58.82	S	86	54.13	E	GPS	3544	3544									
49MR03K04_5	I03	487	1	ROS	010804	2336	BE	20	0.03	S	87	20.01	E	GPS	2012	2011							23	1-8,12,13,23,24,26,27,34,35,46,48	#19=#21 DUPLICATE SMPLS (1800DB), #2-4 FOR BIO (5DB, 130DB)
49MR03K04_5	I03	487	1	BUC	010804	2341	UN	20	0.03	S	87	20.00	E	GPS	2009	2010							1		25.7C
49MR03K04_5	I03	487	1	ROS	010904	0021	BO	19	59.98	S	87	19.99	E	GPS	2012	2013			10	2007	2020				
49MR03K04_5	I03	487	1	ROS	010904	0131	EN	19	59.79	S	87	19.78	E	GPS	2032	2030									
49MR03K04_5	I03	486	1	ROS	010904	0318	BE	19	59.98	S	87	45.08	E	GPS	1813	1811							21	1-6,34,35,48	#1-3 FOR BIO (5DB, 100DB)
49MR03K04_5	I03	486	1	BUC	010904	0321	UN	19	59.97	S	87	45.09	E	GPS	1813	1813							1		25.9C
49MR03K04_5	I03	486	1	ROS	010904	0349	BO	19	59.84	S	87	45.03	E	GPS	1820	1822			11	1808	1816				
49MR03K04_5	I03	486	1	UNK	010904	0355	EN	19	59.81	S	87	45.04	E	GPS	1826	1823									SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	486	1	UNK	010904	0432	EN	19	59.66	S	87	45.05	E	GPS	1839	1837									
49MR03K04_5	I03	486	1	ROS	010904	0455	EN	19	59.51	S	87	45.03	E	GPS	1843	1844									
49MR03K04_5	I03	485	1	ROS	010904	0640	BE	20	0.01	S	88	10.09	E	GPS	2327	2332							22	1-8,23,24,26,27	#17=#20 DUPLICATE SMPLS (2200DB)
49MR03K04_5	I03	485	1	BUC	010904	0644	UN	19	59.97	S	88	10.15	E	GPS	2339	2336							1		26.3C
49MR03K04_5	I03	485	1	ROS	010904	0719	BO	19	59.83	S	88	10.19	E	GPS	2327	2324			11	2331	2347				
49MR03K04_5	I03	485	1	ROS	010904	0840	EN	19	59.61	S	88	10.40	E	GPS	2336	2338									
49MR03K04_5	I03	484	1	ROS	010904	1008	BE	20	0.05	S	88	31.04	E	GPS	3160	3160							25	1-6	
49MR03K04_5	I03	484	1	BUC	010904	1013	UN	20	0.03	S	88	31.11	E	GPS	3159	3159							1		25.8C
49MR03K04_5	I03	484	1	ROS	010904	1058	BO	19	59.83	S	88	31.18	E	GPS	3159	3159			10	3164	3188				
49MR03K04_5	I03	484	1	ROS	010904	1239	EN	19	59.22	S	88	31.28	E	GPS	3157	3157									ALTIMETER UNSTABLE
49MR03K04_5	I03	483	1	ROS	010904	1416	BE	20	0.00	S	88	55.03	E	GPS	5000	5002							33	1-6	
49MR03K04_5	I03	483	1	BUC	010904	1421	UN	19	59.98	S	88	55.10	E	GPS	4999	4998							1		25.7C
49MR03K04_5	I03	483	1	ROS	010904	1533	BO	19	59.64	S	88	55.45	E	GPS	4992	4996			11	5021	5065				
49MR03K04_5	I03	483	1	ROS	010904	1754	EN	19	58.76	S	88	55.71	E	GPS	4931	4928									
49MR03K04_5	I03	482	1	ROS	010904	2010	BE	19	59.96	S	89	27.96	E	GPS	5196	5192							34	1-8,23,24,26,27,46	#5=#19 DUPLICATE SMPLS (5000DB)
49MR03K04_5	I03	482	1	BUC	010904	2015	UN	19	59.92	S	89	27.96	E	GPS	5189	5180							1		
49MR03K04_5	I03	482	1	ROS	010904	2129	BO	19	59.74	S	89	27.95	E	GPS	5149	5144			7	5157	5230				
49MR03K04_5	I03	482	1	ROS	011004	0020	EN	19	59.05	S	89	28.58	E	GPS	5122	5092									
49MR03K04_5	I03	481	1	ROS	011004	0224	BE	19	59.99	S	89	59.06	E	GPS	5091	5079							33	1-6,34,35	#1 FOR BIO (115DB)
49MR03K04_5	I03	481	1	BUC	011004	0228	UN	19	59.94	S	89	59.08	E	GPS	5082	5076								1,34,35,48	26.0C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	481	1	ROS	011004	0350	BO	19	59.35	S	89	59.38	E	GPS	4728	4737			20	4950	4994				
49MR03K04_5	I03	481	1	UNK	011004	0401	BE	19	59.28	S	89	59.41	E	GPS	4707	4713									SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	481	1	UNK	011004	0427	EN	19	59.14	S	89	59.43	E	GPS	4669	4665									



49MR03K04_5	I03	481	1	ROS	011004	0613	EN	19	58.58	S	89	59.56	E	GPS	4571	4576			
49MR03K04_5	I03	481	1	FLT	011004	0620	DE	19	58.53	S	89	59.72	E	GPS	4559	4542			ARGO/APEX#947
49MR03K04_5	I03	480	1	ROS	011004	0733	BE	20	0.04	S	90	17.07	E	GPS	5388	5397	36	1-8,12,13,15,23,24,26,27,34,35,45	#4=#18 DUPLICATE SMPLS (5250DB), #2 FOR BIO (145DB)
49MR03K04_5	I03	480	1	BUC	011004	0738	UN	20	0.04	S	90	17.09	E	GPS	5403	5402		1,34,35,48	25.6C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	480	1	ROS	011004	0857	BO	19	59.52	S	90	17.27	E	GPS	5420	5421	9	5452 5515	
49MR03K04_5	I03	480	1	ROS	011004	1129	EN	19	58.06	S	90	17.97	E	GPS	5445	5446			
49MR03K04_5	I03	479	1	ROS	011004	1334	BE	20	0.07	S	90	48.93	E	GPS	5141	5134		36 1-6,9,22,47	#1-3 FOR R.N.
49MR03K04_5	I03	479	1	BUC	011004	1339	UN	20	0.07	S	90	48.94	E	GPS	5135	5135		1	25.3C
49MR03K04_5	I03	479	1	ROS	011004	1453	BO	19	59.68	S	90	49.09	E	GPS	5137	5135	10	5154 5214	
49MR03K04_5	I03	479	1	ROS	011004	1718	EN	19	58.80	S	90	49.73	E	GPS	5100	5106			
49MR03K04_5	I03	478	1	ROS	011004	1923	BE	20	0.51	S	91	19.40	E	GPS	4791	4798		32 1-6	
49MR03K04_5	I03	478	1	BUC	011004	1927	UN	20	0.48	S	91	19.39	E	GPS	4800	4802		1	25.1C
49MR03K04_5	I03	478	1	ROS	011004	2038	BO	20	0.22	S	91	19.43	E	GPS	4812	4813	9	4823 4879	
49MR03K04_5	I03	478	1	ROS	011004	2258	EN	19	59.64	S	91	19.53	E	GPS	4825	4828			
49MR03K04_5	I03	477	1	ROS	011104	0103	BE	20	0.08	S	91	49.05	E	GPS	5032	5035		34 1-8,23,24,26,27,34,35,46	#6=#17 DUPLICATE SMPLS (3750DB), #2 FOR BIO (85DB)
49MR03K04_5	I03	477	1	BUC	011104	0108	UN	20	0.06	S	91	49.03	E	GPS	5031	5034		1,34,35,48	25.4C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	477	1	ROS	011104	0223	BO	19	59.80	S	91	48.90	E	GPS	5025	5028	9	5037 5105	
49MR03K04_5	I03	481	1	UNK	011104	0330	BE	19	59.53	S	91	48.88	E	GPS	5029	5032			SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	481	1	UNK	011104	0351	EN	19	59.42	S	91	48.88	E	GPS	5026	5023			
49MR03K04_5	I03	477	1	ROS	011104	0442	EN	19	59.08	S	91	48.81	E	GPS	4949	4953			
49MR03K04_5	I03	476	1	ROS	011104	0653	BE	20	0.03	S	92	21.24	E	GPS	5144	5143		34 1-6	#1 FOR BIO (125DB)
49MR03K04_5	I03	476	1	BUC	011104	0658	UN	20	0.03	S	92	21.29	E	GPS	5142	5142		1,34,35,48	25.3C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	476	1	ROS	011104	0812	BO	19	59.80	S	92	21.45	E	GPS	5128	5130	11	5141 5212	
49MR03K04_5	I03	476	1	ROS	011104	1034	EN	19	59.04	S	92	21.63	E	GPS	5170	5172			
49MR03K04_5	I03	475	1	ROS	011104	1223	BE	20	0.05	S	92	48.03	E	GPS	5046	5051		33 1-6	
49MR03K04_5	I03	475	1	BUC	011104	1228	UN	20	0.03	S	92	48.01	E	GPS	5033	5039		1	24.5C
49MR03K04_5	I03	475	1	ROS	011104	1341	BO	19	59.68	S	92	48.27	E	GPS	5079	5081	11	5058 5110	
49MR03K04_5	I03	475	1	ROS	011104	1553	EN	19	58.82	S	92	48.30	E	GPS	5172	5172			
49MR03K04_5	I03	475	1	FLT	011104	1558	DE	19	58.80	S	92	48.40	E	GPS	5164	5173			ARGO/APEX#946
49MR03K04_5	I03	474	1	ROS	011104	1849	BE	19	59.98	S	93	31.93	E	GPS	5317	5312		35 1-8,12,13,23,24,26,27	
49MR03K04_5	I03	474	1	BUC	011104	1854	UN	19	59.93	S	93	31.94	E	GPS	5323	5320		1	24.6C
49MR03K04_5	I03	474	1	ROS	011104	2010	BO	19	59.47	S	93	31.97	E	GPS	5329	5325	10	5361 5408	
49MR03K04_5	I03	474	1	ROS	011104	2300	EN	19	58.92	S	93	32.08	E	GPS	5178	5177			CTD LOWERED 50M ILLEGALLY AFTER THE SAMPLING AT 5000DB
49MR03K04_5	I03	473	1	ROS	011204	0200	BE	20	0.08	S	94	18.16	E	GPS	5111	5108		36 1-6,9,22,34,35,47,48	#3 FOR BIO (110DB), #1-2 FOR R.N.
49MR03K04_5	I03	473	1	BUC	011204	0205	UN	20	0.07	S	94	18.23	E	GPS	5107	5109		1,34,35,48	25.3C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	473	1	ROS	011204	0318	BO	19	59.88	S	94	18.49	E	GPS	5134	5133	10	5108 5177	
49MR03K04_5	I03	473	1	UNK	011204	0400	BE	19	59.77	S	94	18.65	E	GPS	5163	5162			SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	473	1	UNK	011204	0428	EN	19	59.71	S	94	18.73	E	GPS	5191	5188			
49MR03K04_5	I03	473	1	ROS	011204	0546	EN	19	59.68	S	94	19.15	E	GPS	5204	5201			
49MR03K04_5	I03	X09	1	ROS	011204	0831	BE	20	11.99	S	95	0.15	E	GPS	5267	5264		35 1-8,23,24,26,27,46	#4=#15 DUPLICATE SMPLS (5250DB)
49MR03K04_5	I03	X09	1	BUC	011204	0836	UN	20	11.99	S	95	0.26	E	GPS	5264	5264		1	26.0C
49MR03K04_5	I03	X09	1	ROS	011204	0952	BO	20	11.70	S	95	0.74	E	GPS	5270	5273	9	5309 5352	
49MR03K04_5	I03	X09	1	ROS	011204	1224	EN	20	11.43	S	95	1.51	E	GPS	5275	5271			
49MR03K04_5	I03	471	1	ROS	011204	1624	BE	20	0.08	S	96	4.01	E	GPS	5140	5128		33 1-6,15,45	
49MR03K04_5	I03	471	1	BUC	011204	1629	UN	20	0.06	S	96	4.04	E	GPS	5143	5137		1	25.8C
49MR03K04_5	I03	471	1	ROS	011204	1742	BO	19	59.81	S	96	3.99	E	GPS	5138	5126	10	5125 5196	
49MR03K04_5	I03	471	1	ROS	011204	2005	EN	19	59.40	S	96	3.90	E	GPS	5163	5165			



49MR03K04_5	I03	461	1	ROS	011704	0314	BO	19	59.24	S	104	53.69	E	GPS	5781	5784	10	5853	5866				
49MR03K04_5	I03	461	1	UNK	011704	0401	BE	19	58.97	S	104	53.90	E	GPS	5787	5787					SOLAR LIGHT MEASUREMENT		
49MR03K04_5	I03	461	1	UNK	011704	0433	EN	19	58.83	S	104	54.02	E	GPS	5790	5792							
49MR03K04_5	I03	461	1	ROS	011704	0610	EN	19	58.26	S	104	54.43	E	GPS	5786	5793							
49MR03K04_5	I03	460	1	ROS	011704	0934	BE	19	59.98	S	105	44.93	E	GPS	5331	5329				34	1-6		
49MR03K04_5	I03	460	1	BUC	011704	0940	UN	19	59.99	S	105	45.01	E	GPS	5327	5325					1	24.6C	
49MR03K04_5	I03	460	1	ROS	011704	1056	BO	19	59.57	S	105	45.50	E	GPS	5307	5305		8	5372	5402			
49MR03K04_5	I03	460	1	ROS	011704	1316	EN	19	58.80	S	105	46.25	E	GPS	5317	5311							
49MR03K04_5	I03	459	1	ROS	011704	1639	BE	20	0.09	S	106	37.05	E	GPS	5538	5535					36	1-8,12,13,15,23,24,26,27,45	
49MR03K04_5	I03	459	1	BUC	011704	1644	UN	20	0.03	S	106	37.10	E	GPS	5537	5535						1	#3=#12 DUPLICATE SMPLS (5500DB) 24.2C
49MR03K04_5	I03	459	1	ROS	011704	1805	BO	19	59.77	S	106	37.48	E	GPS	5527	5527		13	5550	5616			
49MR03K04_5	I03	459	1	ROS	011704	2043	EN	19	59.23	S	106	38.42	E	GPS	5508	5515							
49MR03K04_5	I03	458	1	ROS	011804	0012	BE	20	0.10	S	107	30.06	E	GPS	5386	5388					35	1-6,34,35	
49MR03K04_5	I03	458	1	BUC	011804	0017	UN	20	0.10	S	107	30.10	E	GPS	5391	5391						1,34,35,48	#1 FOR BIO (85DB) 25.7C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	458	1	ROS	011804	0135	BO	20	0.04	S	107	30.33	E	GPS	5390	5391		11	5406	5472			
49MR03K04_5	I03	458	1	UNK	011804	0253	BE	20	0.03	S	107	30.30	E	GPS	5393	5391							SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	458	1	UNK	011804	0313	EN	19	59.99	S	107	30.33	E	GPS	5393	5393							
49MR03K04_5	I03	458	1	ROS	011804	0416	EN	19	59.75	S	107	30.36	E	GPS	5389	5390							
49MR03K04_5	I03	457	1	ROS	011804	0721	BE	20	18.84	S	108	8.82	E	GPS	4995	5000					34	1-8,23,24,26,27	
49MR03K04_5	I03	457	1	BUC	011804	0726	UN	20	18.78	S	108	8.84	E	GPS	4997	5003						1	#5=#11 DUPLICATE SMPLS (5000DB) 24.9C
49MR03K04_5	I03	457	1	ROS	011804	0838	BO	20	18.44	S	108	9.37	E	GPS	5008	5007		10	5059	5073			
49MR03K04_5	I03	457	1	ROS	011804	1058	EN	20	18.03	S	108	10.35	E	GPS	5016	5018							
49MR03K04_5	I03	456	1	ROS	011804	1405	BE	20	37.85	S	108	47.93	E	GPS	5058	5060					33	1-6	
49MR03K04_5	I03	456	1	BUC	011804	1409	UN	20	37.81	S	108	47.96	E	GPS	5060	5061						1	24.8C
49MR03K04_5	I03	456	1	ROS	011804	1522	BO	20	37.53	S	108	48.32	E	GPS	5060	5059		10	5096	5134			
49MR03K04_5	I03	456	1	ROS	011804	1745	EN	20	37.22	S	108	48.89	E	GPS	5030	5022							
49MR03K04_5	I03	455	1	ROS	011804	2038	BE	20	49.97	S	109	26.43	E	GPS	5066	5066					34	1-8,12,13,23,24,26,27,46	
49MR03K04_5	I03	455	1	BUC	011804	2043	UN	20	50.01	S	109	26.45	E	GPS	5065	5066						1	#5=#10 DUPLICATE SMPLS (5000DB) 25.7C
49MR03K04_5	I03	455	1	ROS	011804	2155	BO	20	49.93	S	109	26.67	E	GPS	5071	5069		10	5074	5140			
49MR03K04_5	I03	455	1	ROS	011904	0043	EN	20	48.90	S	109	26.90	E	GPS	5067	5066							
49MR03K04_5	I03	454	1	ROS	011904	0404	BE	21	8.97	S	110	9.04	E	GPS	5065	5068					36	1-6,9,22,34,35,47	
49MR03K04_5	I03	454	1	BUC	011904	0409	UN	21	8.88	S	110	9.09	E	GPS	5063	5067						1,34,35,48	#3 FOR BIO (90DB), #1,6 FOR R.N. (5635DB, 600DB) 25.0C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	454	1	ROS	011904	0523	BO	21	8.61	S	110	9.68	E	GPS	5066	5068		13	5134	5135			
49MR03K04_5	I03	454	1	UNK	011904	0539	BE	21	8.48	S	110	9.91	E	GPS	5067	5068							SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	454	1	UNK	011904	0607	EN	21	8.38	S	110	10.15	E	GPS	5067	5069							
49MR03K04_5	I03	454	1	ROS	011904	0807	EN	21	8.03	S	110	11.11	E	GPS	5064	5068							
49MR03K04_5	I03	X10	1	ROS	011904	1122	BE	21	26.95	S	110	50.38	E	GPS	5058	5057					34	1-8,23,24,26,27	
49MR03K04_5	I03	X10	1	BUC	011904	1127	UN	21	26.86	S	110	50.41	E	GPS	5057	5056						1	#5=#9 DUPLICATE SMPLS (5000DB) 24.5C
49MR03K04_5	I03	X10	1	ROS	011904	1240	BO	21	26.86	S	110	50.52	E	GPS	5055	5058		9	5053	5130			
49MR03K04_5	I03	X10	1	ROS	011904	1502	EN	21	26.65	S	110	50.66	E	GPS	5057	5054							
49MR03K04_5	I03	452	1	ROS	011904	1744	BE	21	39.99	S	111	21.92	E	GPS	5057	5057					33	1-6,15,45	
49MR03K04_5	I03	452	1	BUC	011904	1749	UN	21	39.97	S	111	21.89	E	GPS	5059	5056						1	24.6C
49MR03K04_5	I03	452	1	ROS	011904	1902	BO	21	39.73	S	111	22.23	E	GPS	5056	5058		10	5074	5130			
49MR03K04_5	I03	452	1	ROS	011904	2134	EN	21	39.56	S	111	23.09	E	GPS	5056	5055							
49MR03K04_5	I03	451	1	ROS	012004	0007	BE	21	49.83	S	111	53.94	E	GPS	4949	4948					34	1-8,12,13,23,24,26,27,34,35,46	
49MR03K04_5	I03	451	1	BUC	012004	0013	UN	21	49.78	S	111	53.95	E	GPS	4949	4946						1,34,35,48	#6=#8 DUPLICATE SMPLS, #2 FOR BIO (75DB) 24.7C, BIO-OPTICAL SAMPLING (BUCKET)
49MR03K04_5	I03	451	1	ROS	012004	0125	BO	21	49.49	S	111	54.11	E	GPS	4941	4942		9	4953	5018			
49MR03K04_5	I03	451	1	UNK	012004	0245	BE	21	49.27	S	111	54.30	E	GPS	4941	4938							SOLAR LIGHT MEASUREMENT
49MR03K04_5	I03	451	1	UNK	012004	0310	EN	21	49.20	S	111	54.44	E	GPS	4937	4934							



## Figure caption

Figure 1 Observation lines for WHP P6, A10 and I3/I4 revisit in Blue Earth Global Expedition 2003 (BEAGLE2003) with bottom topography based on ETOPO5 (Data announcement 88-MGG-02, 1988).

Figure 2 Station locations for WHP P6, A10 and I3/I4 revisit in BEAGLE2003 with bottom topography based on Smith and Sandwell (1997).

Figure 3 Bathymetry measured by Multi Narrow Beam Echo Sounding system. Cross mark indicates CTD location.

Figure 4 Surface wind measured at 25 m above sea level. Wind data is averaged over 1-hour and plotted every 1 degree in longitude.

Figure 5 Sea surface temperature and salinity. Temperature and salinity data are averaged over 1-hour.

Figure 6 Difference in the partial pressure of CO<sub>2</sub> between the ocean and atmosphere,  $\Delta p\text{CO}_2$ .

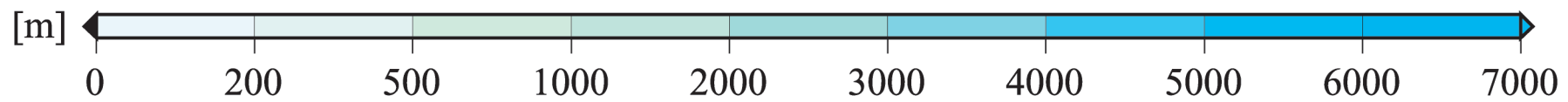
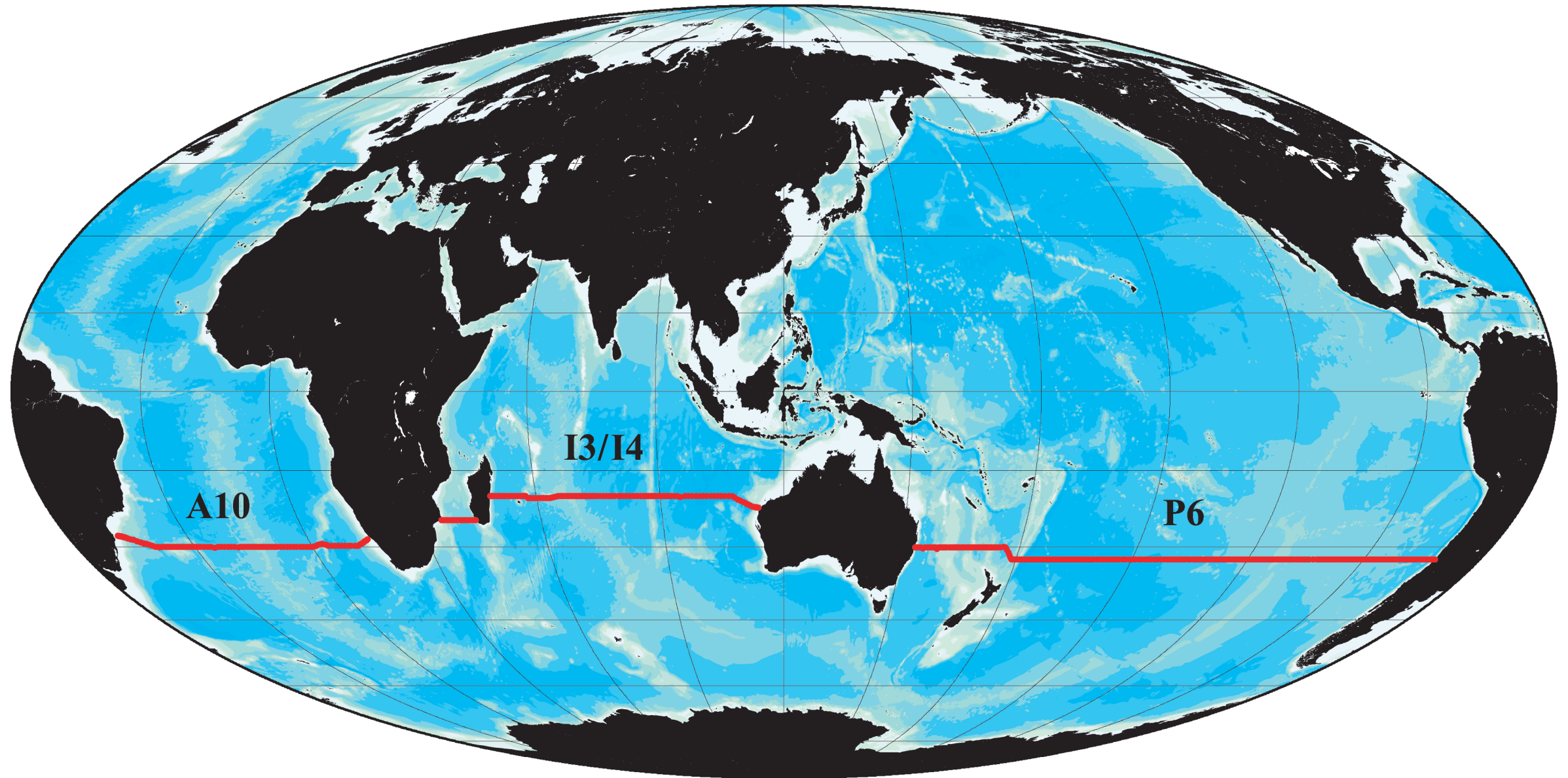
Figure 7 Surface current at 100 m depth measured by shipboard acoustic Doppler current profiler (ADCP).

### References

Data Announcement 88-MGG-02 (1988): Digital relief of the Surface of the Earth, NOAA, National Geophysical Data Center, Boulder, Colorado.

Smith, W. H. F. and D. T. Sandwell (1997): Global seafloor topography from satellite altimetry and ship depth soundings, *Science*, 277, 1956-1962.

Figure 1

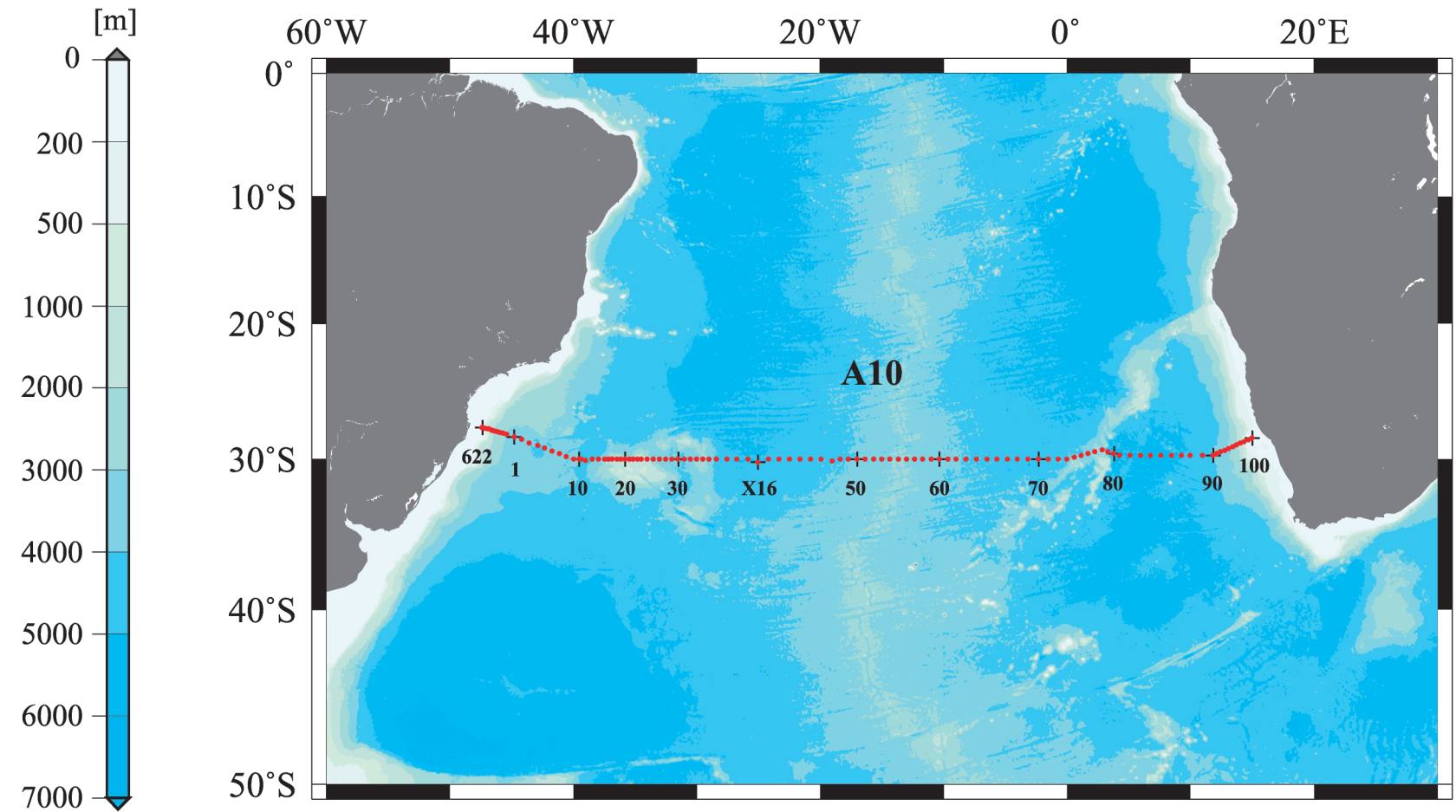


OBSERVATION LINES FOR WHP P6, A10, I3/I4 REVISIT IN 2003

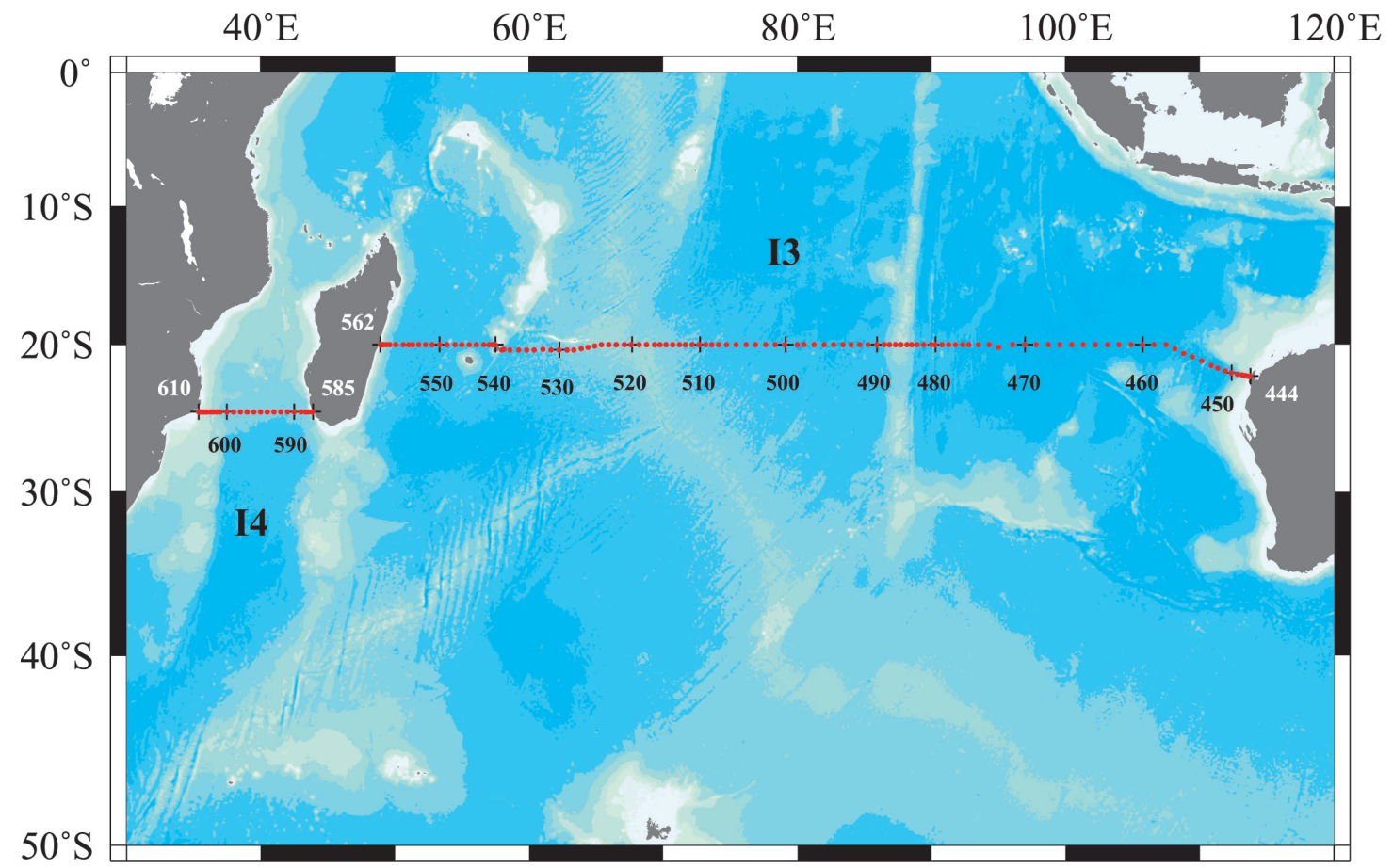


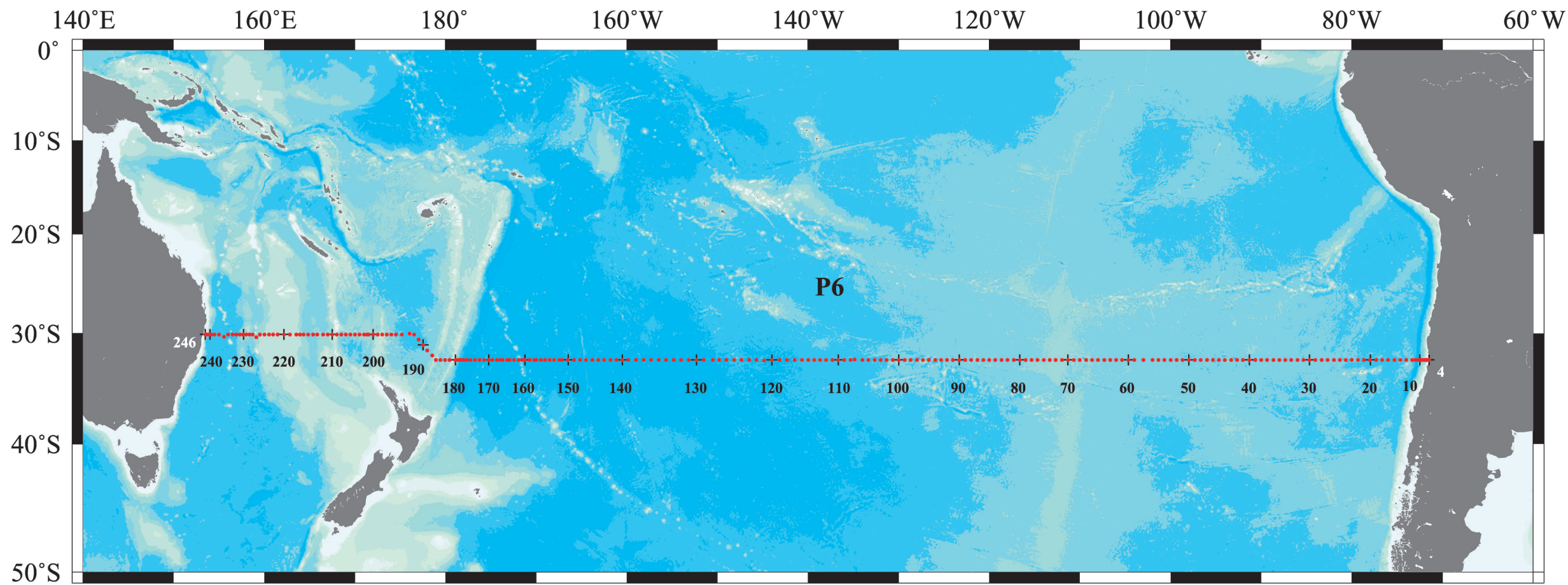
Figure 2

STATION LOCATIONS  
FOR WHP P6, A10, I3/I4  
REVISIT IN 2003



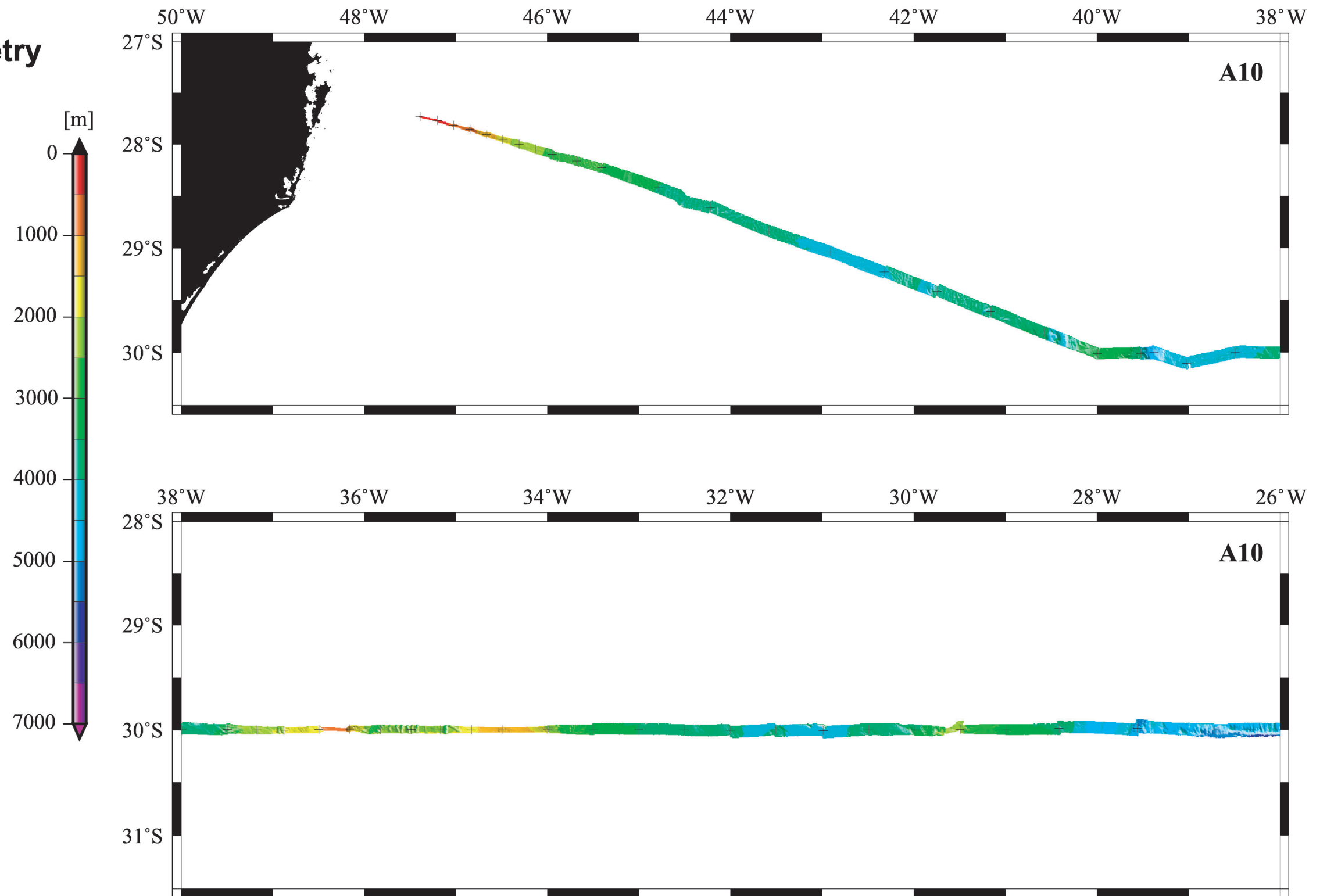


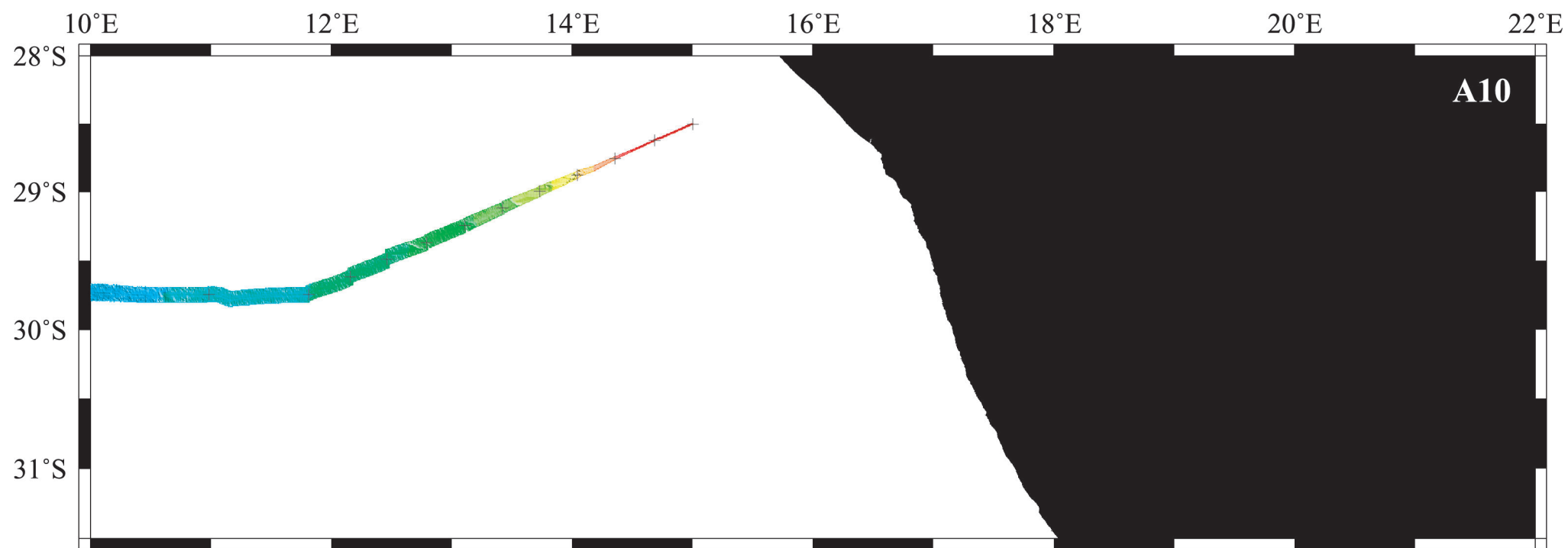
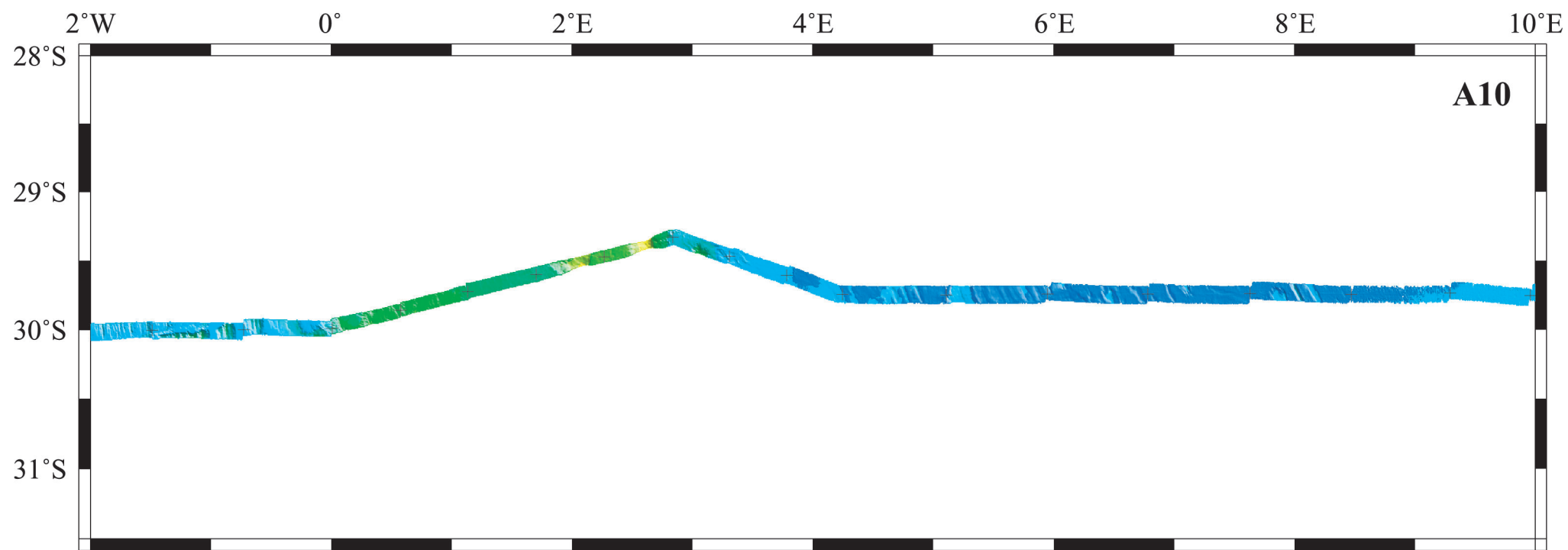




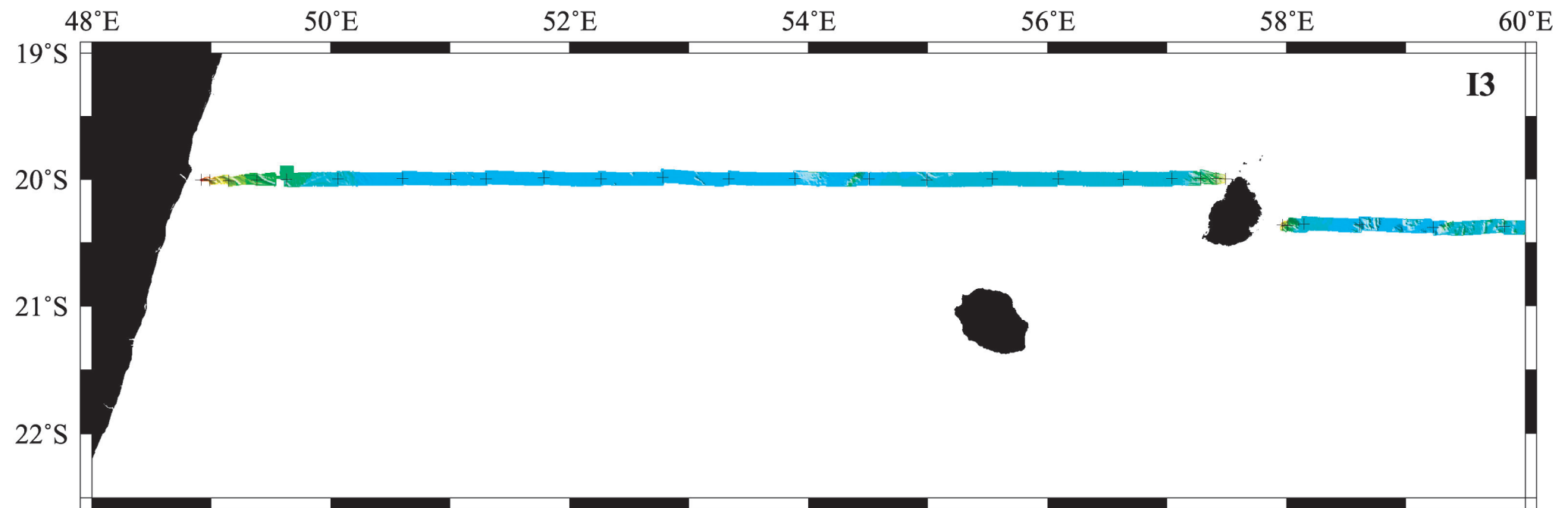
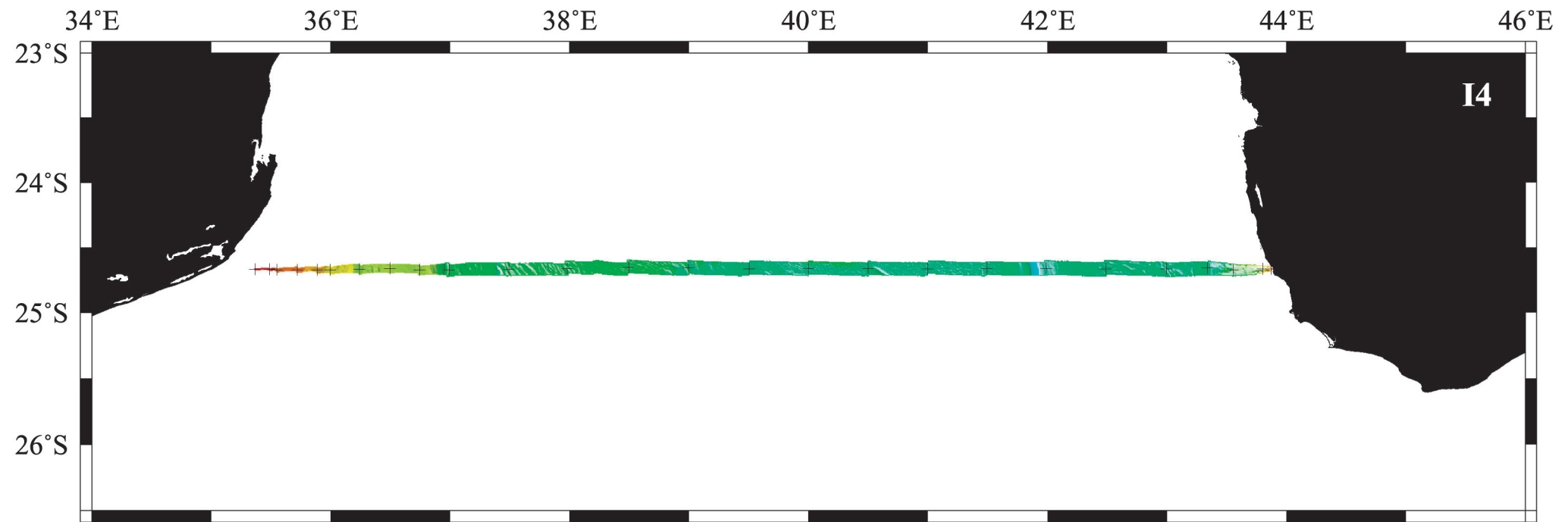
**Figure 3**

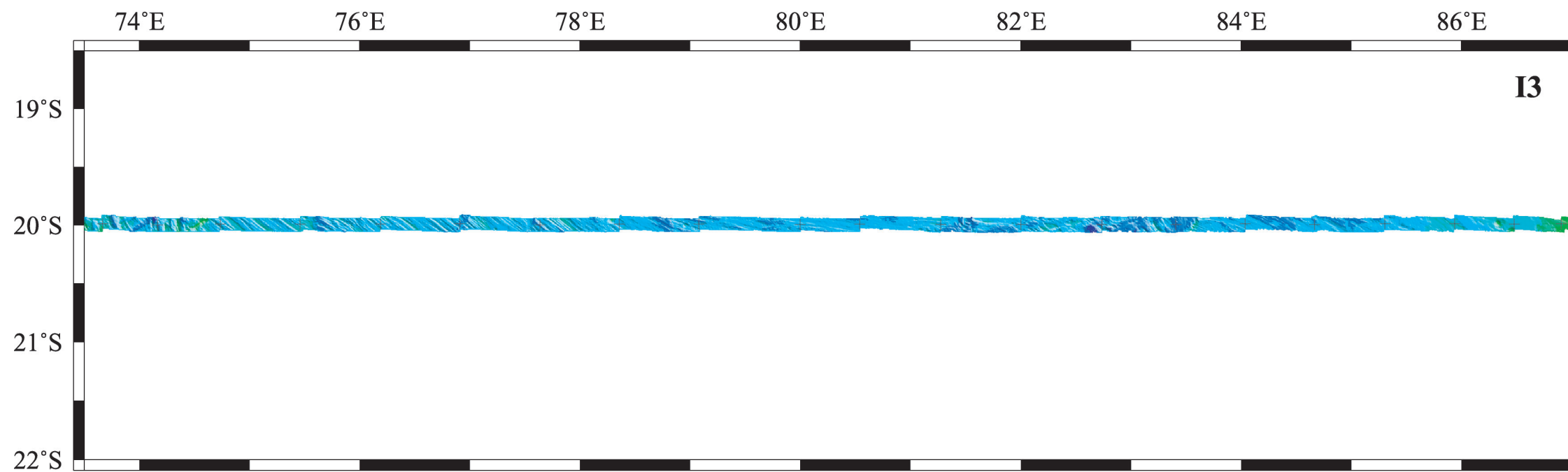
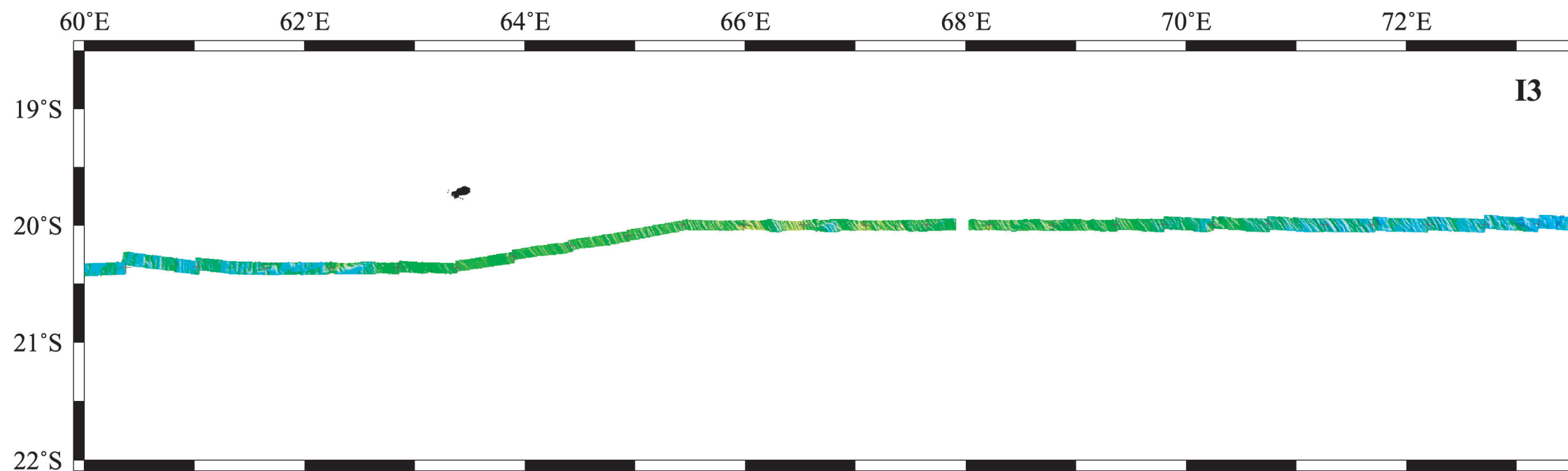
**Bathymetry**



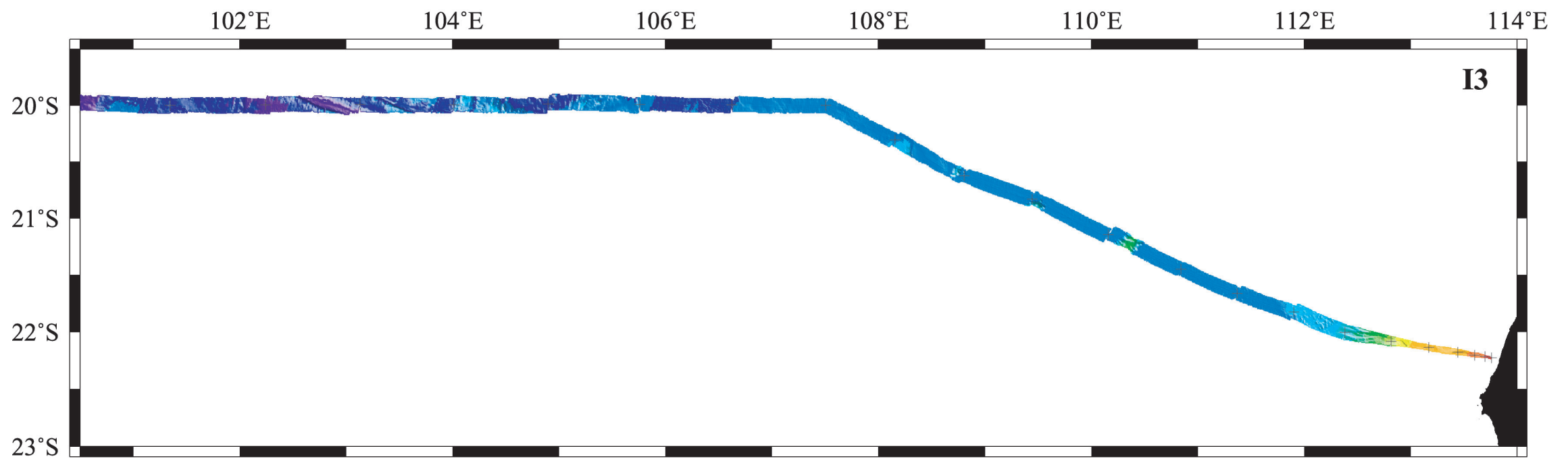
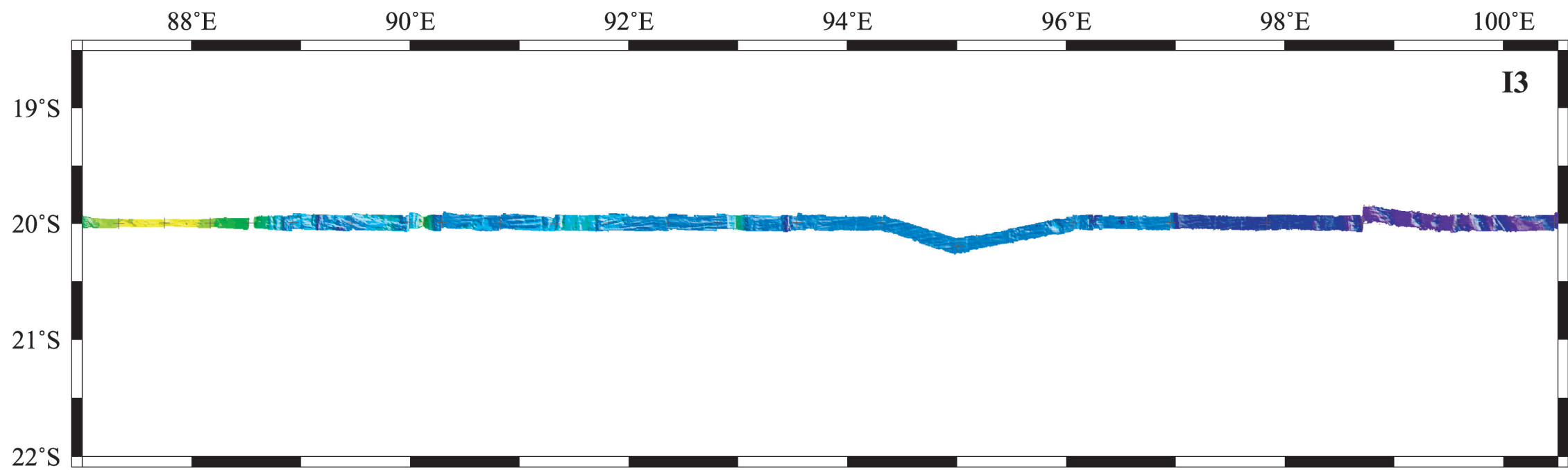


**Figure 3 (continued)**



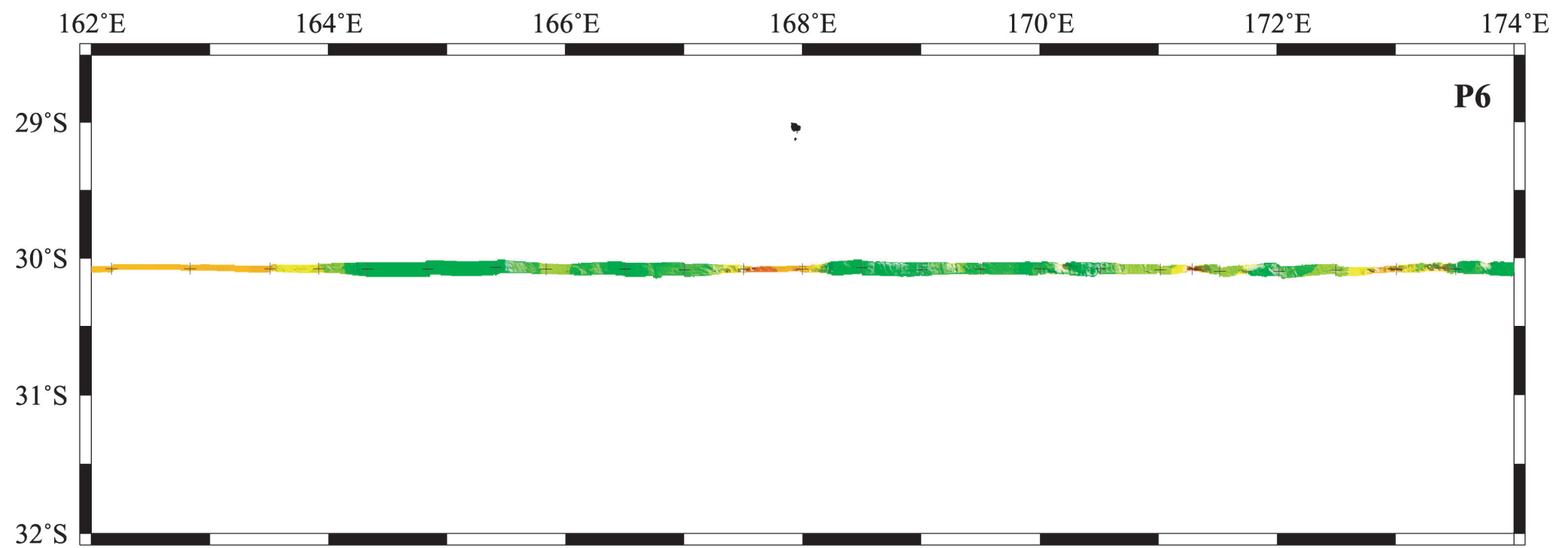
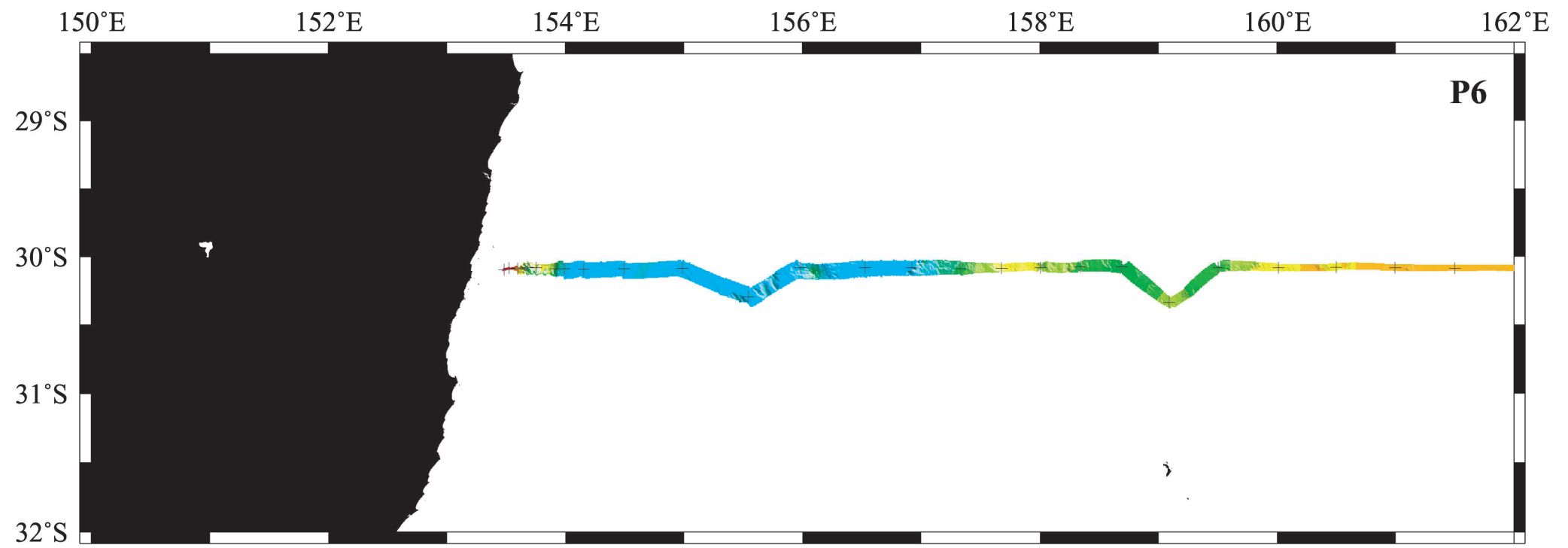


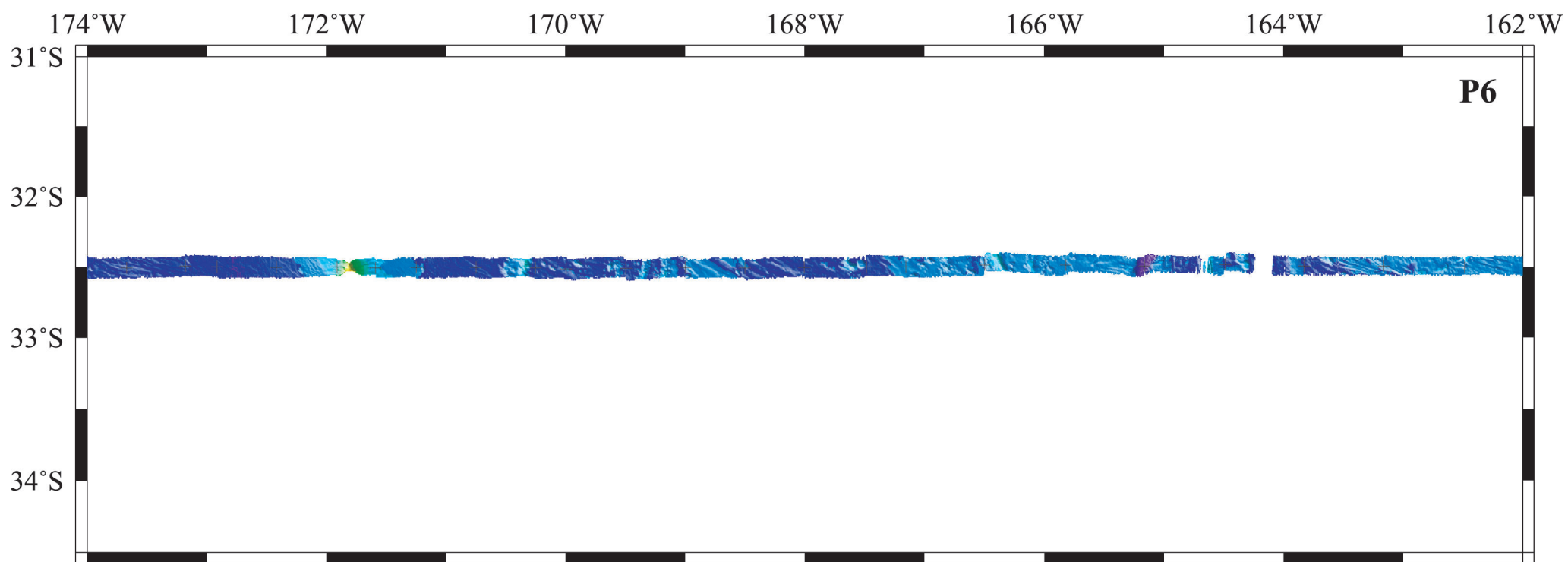
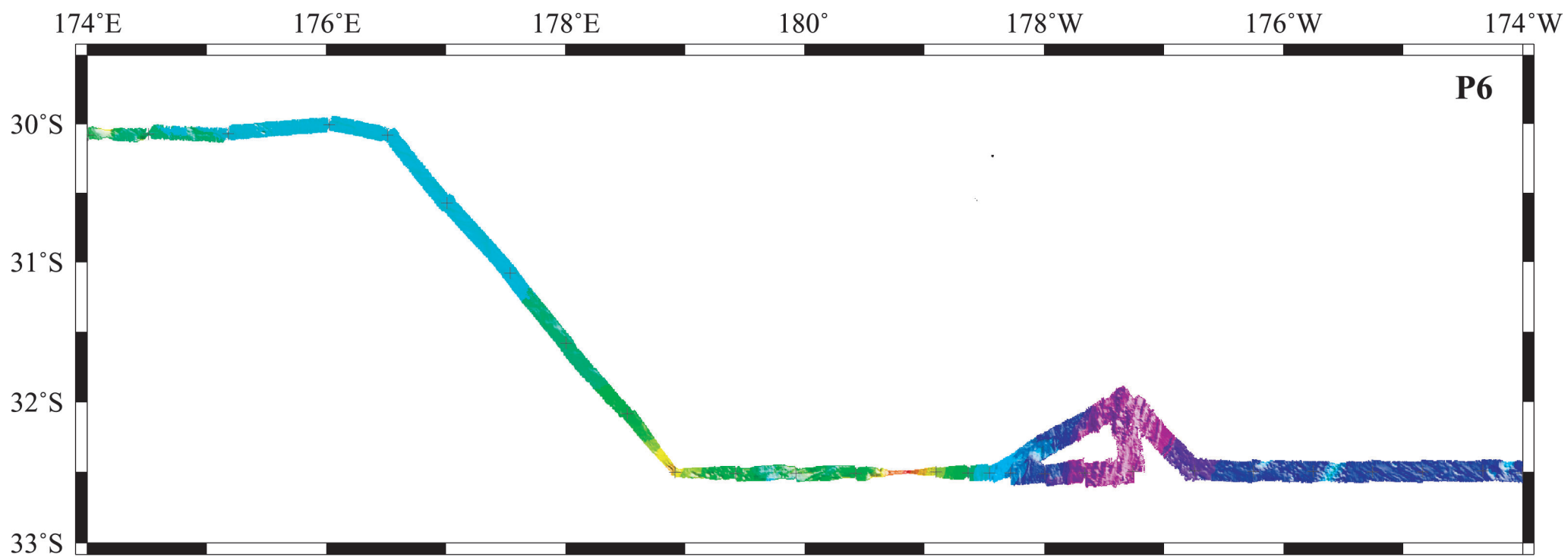


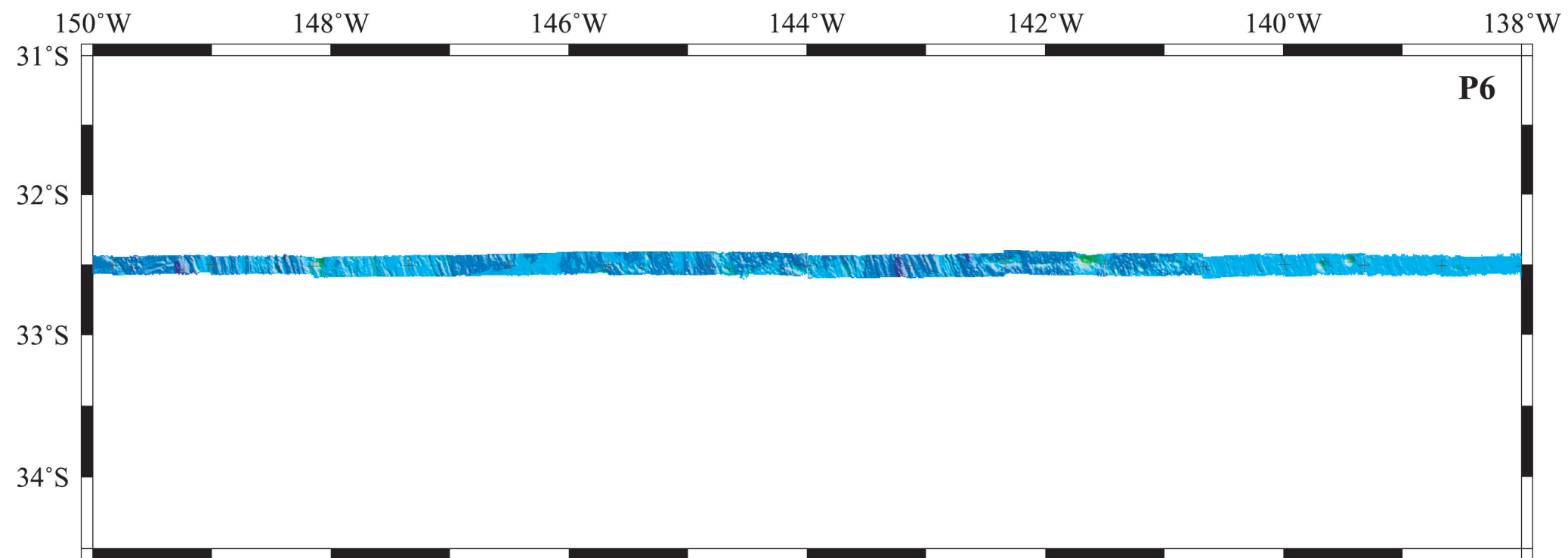
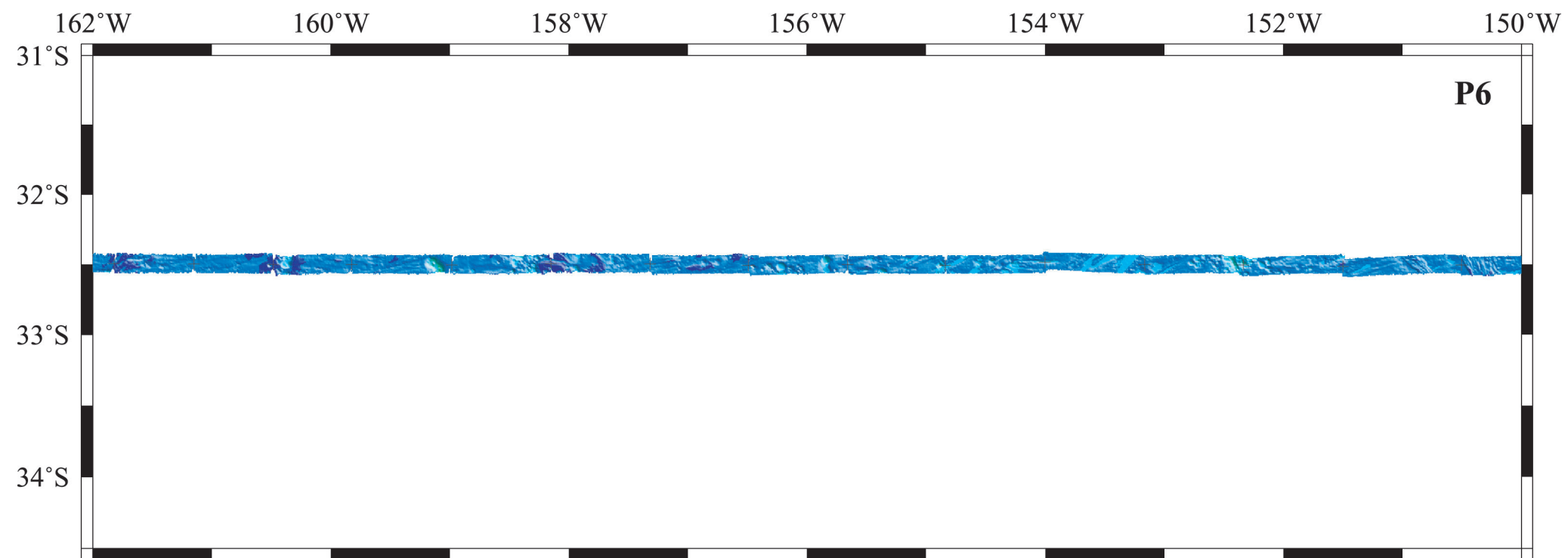




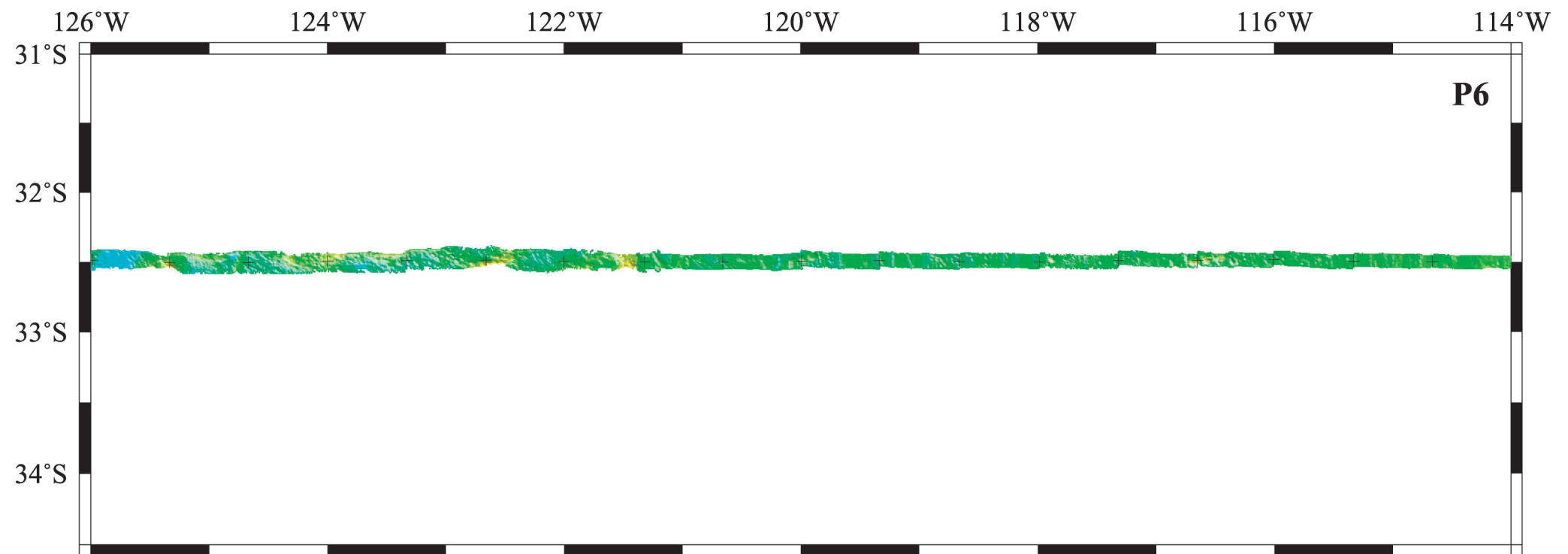
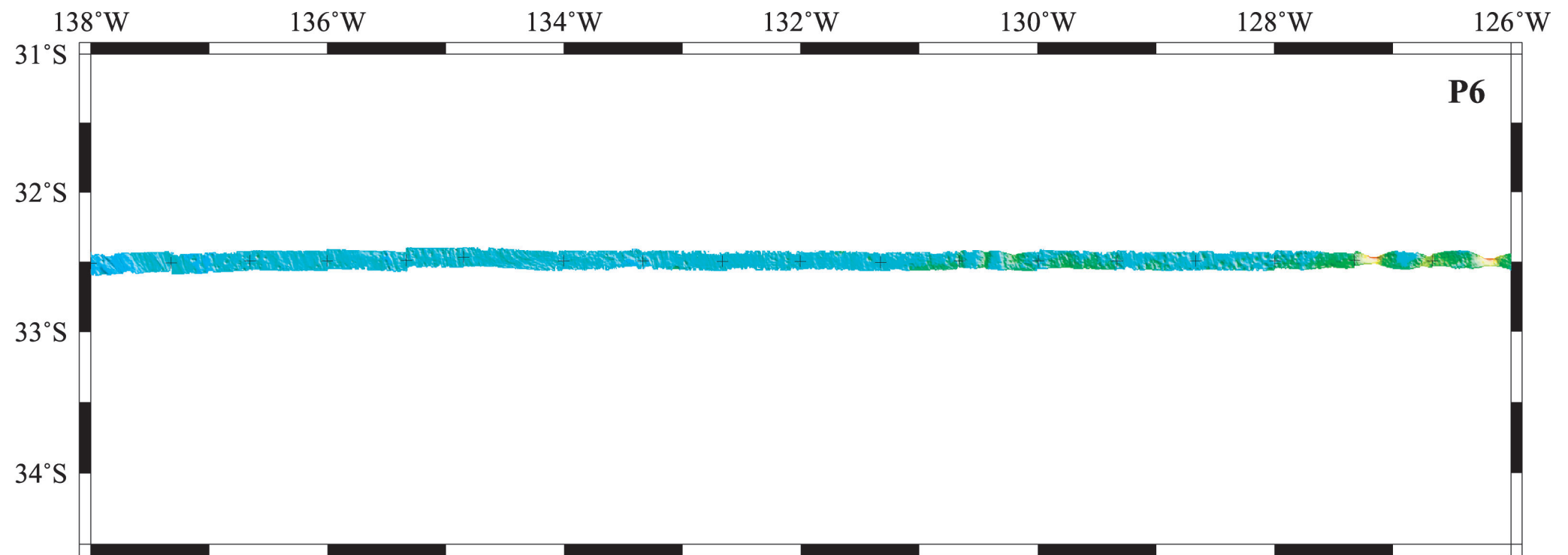
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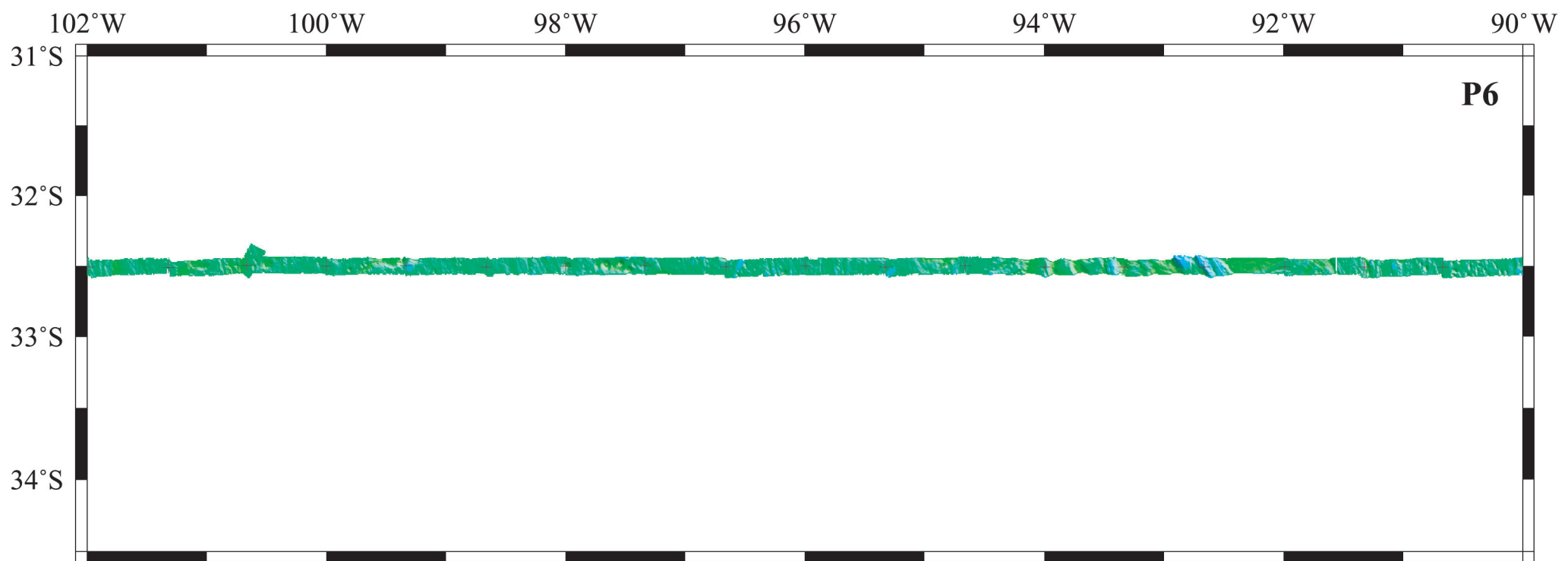
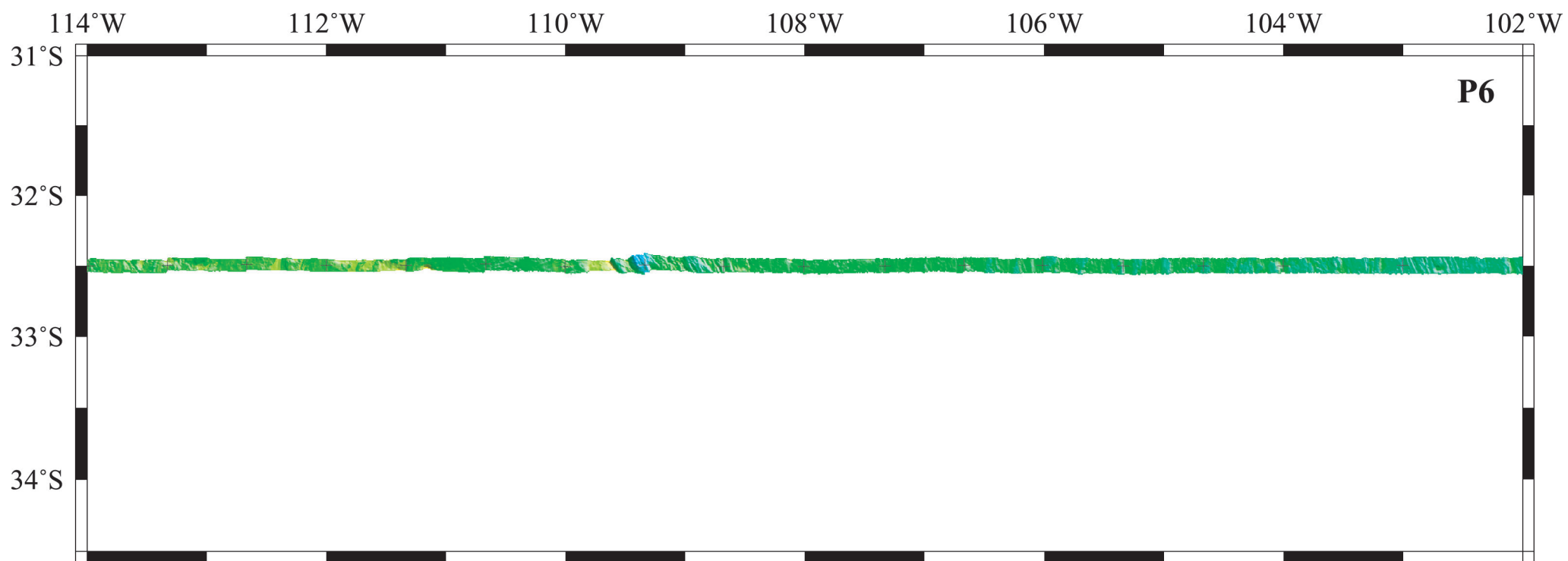


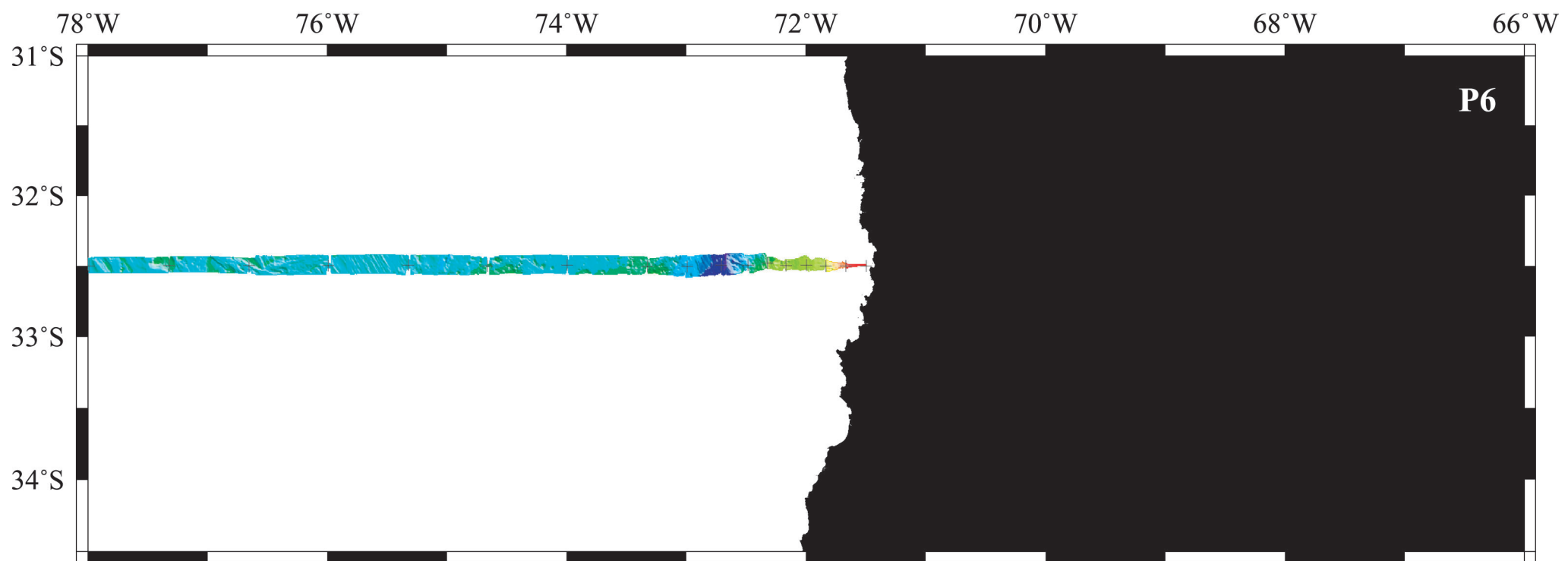
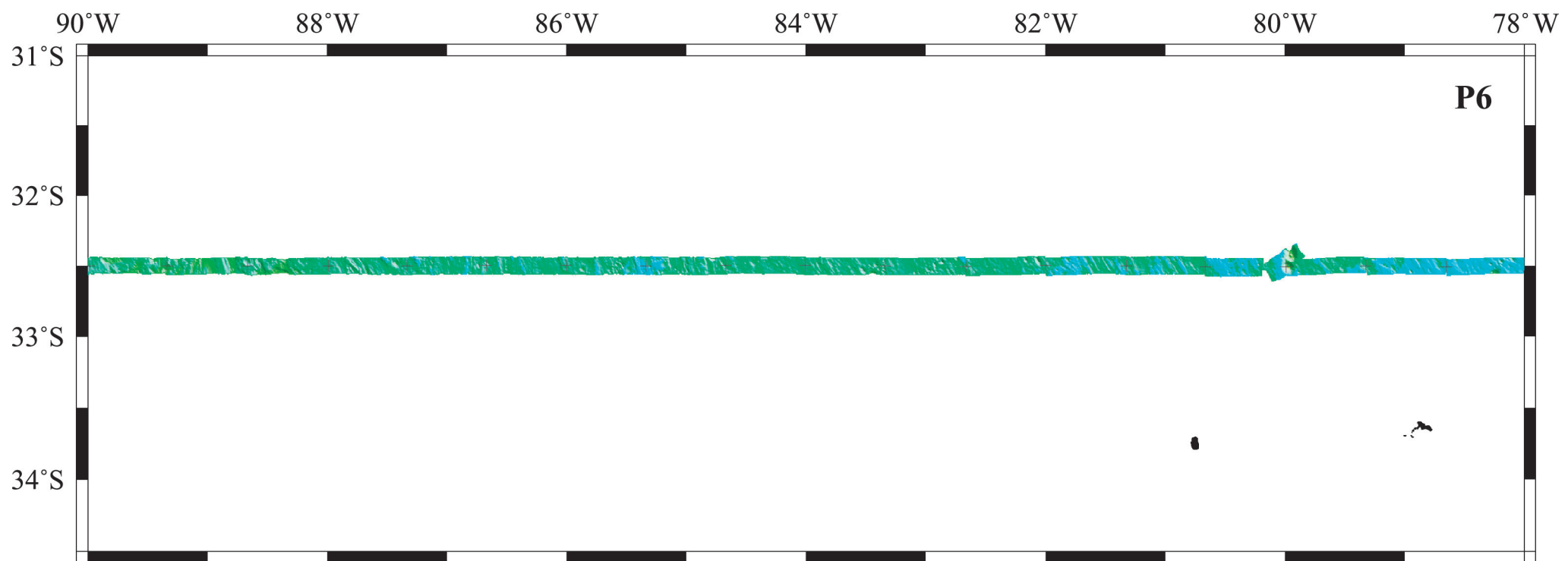




**Figure 3 (continued)**

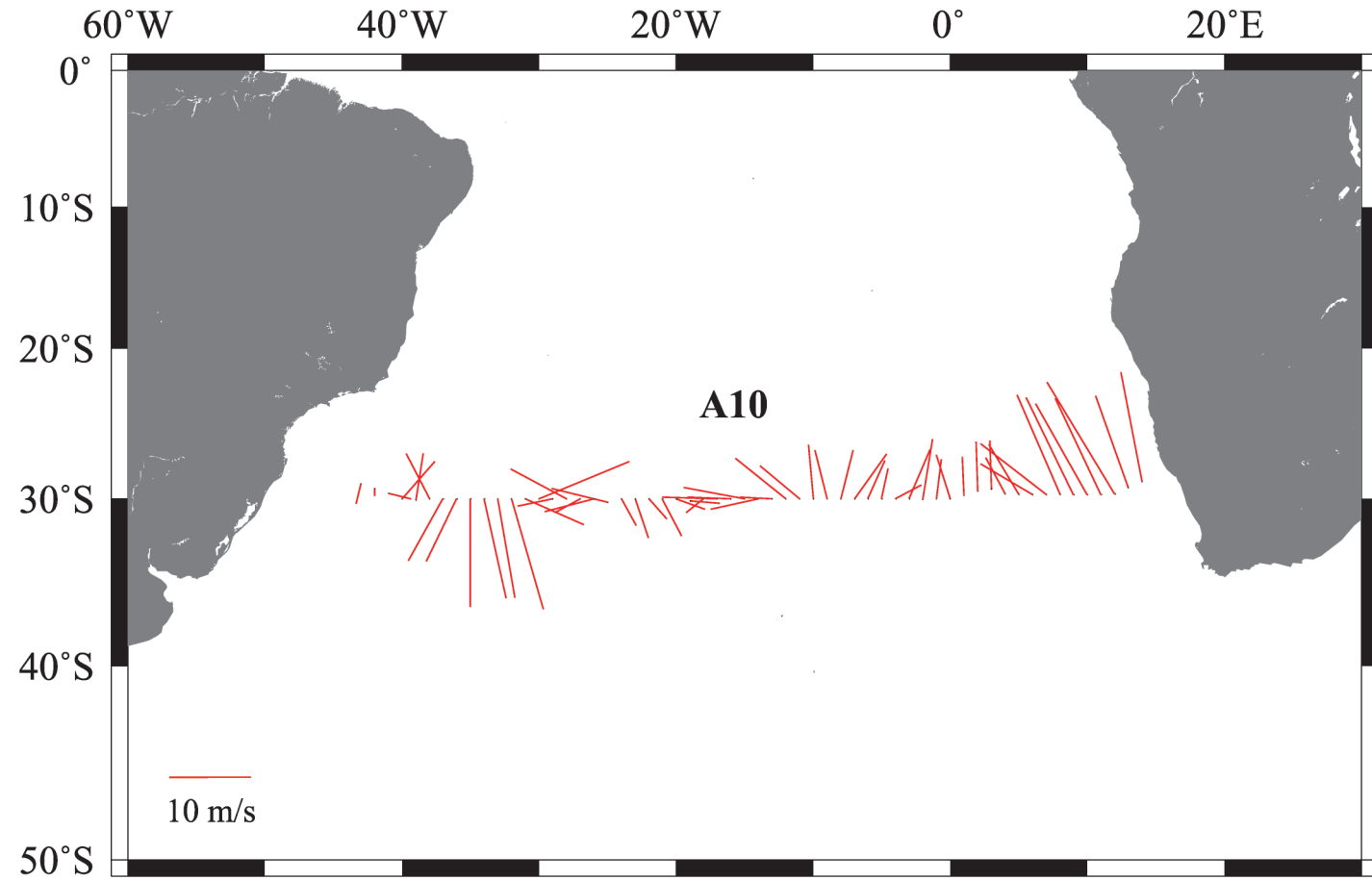




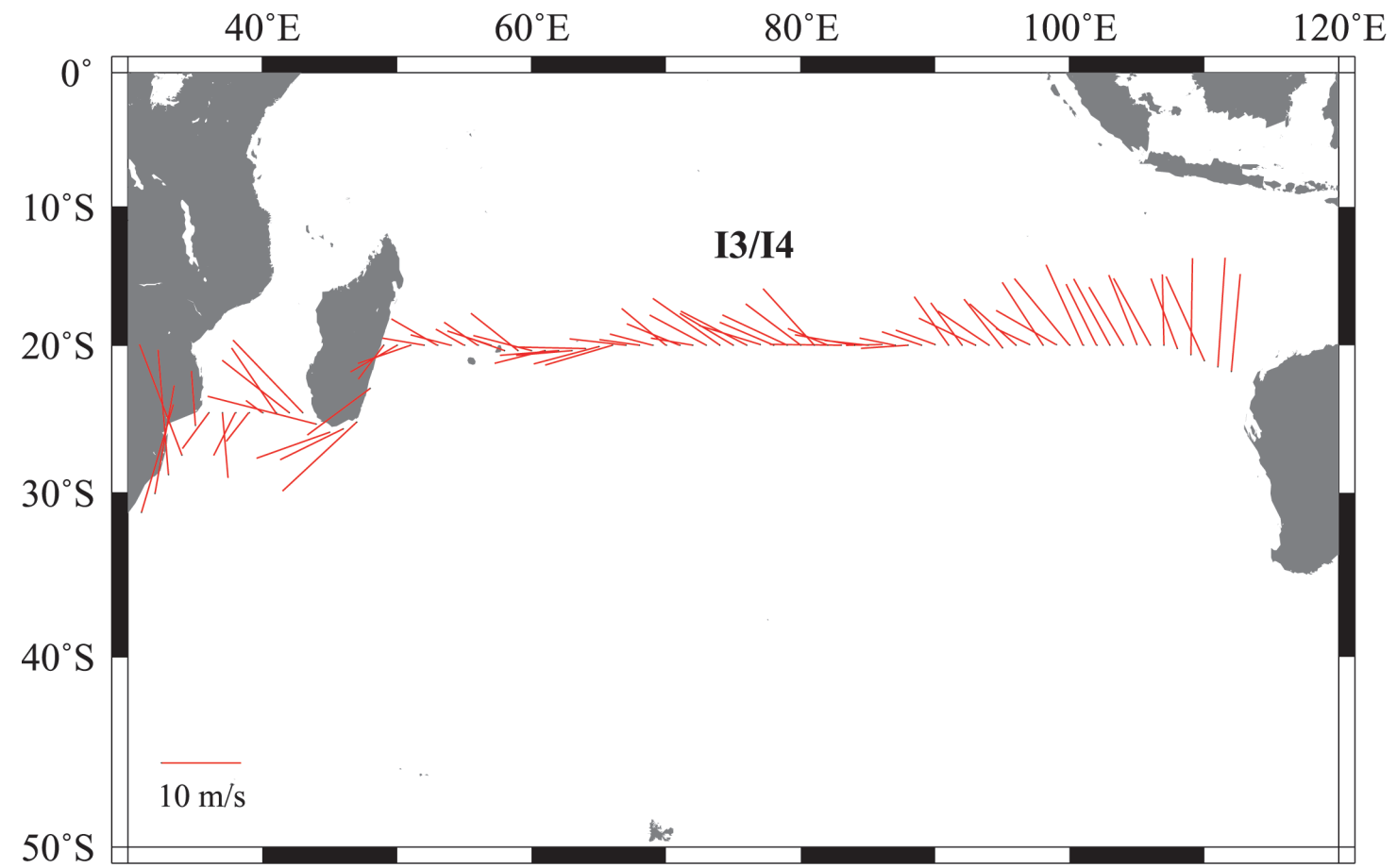


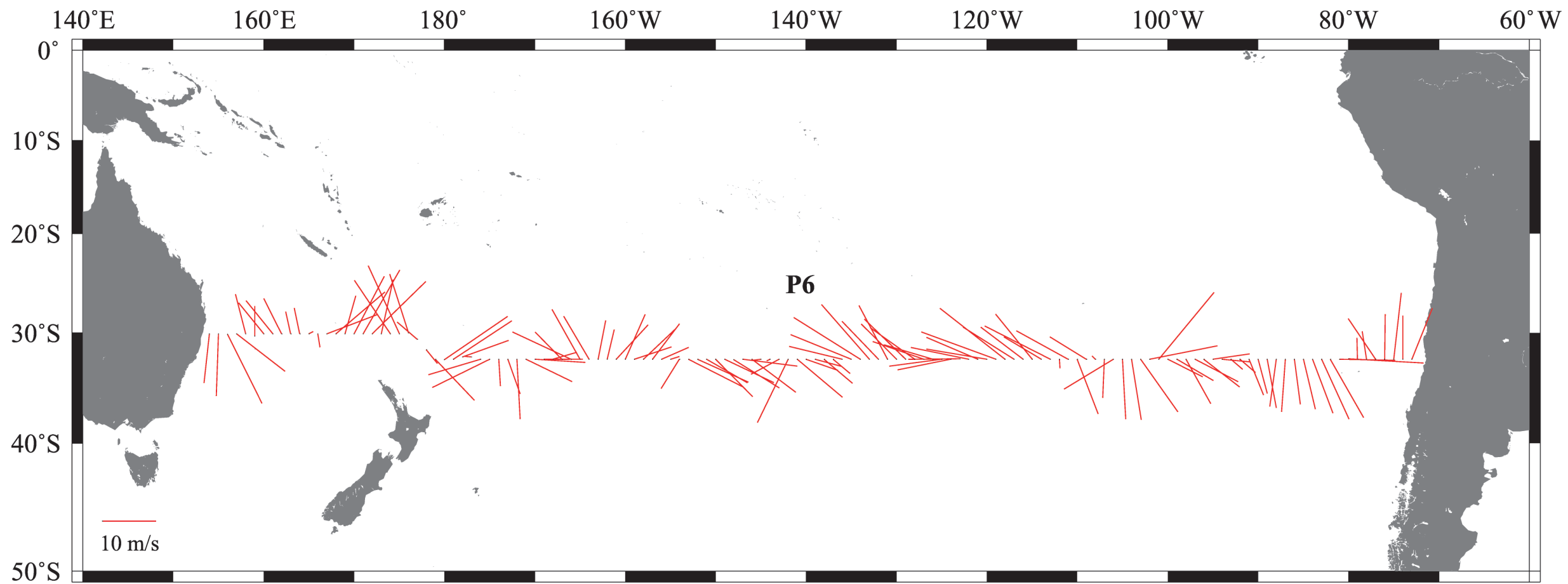
**Figure 4**

**SURFACE WIND MEASURED  
AT 25 M ABOVE SEA LEVEL**



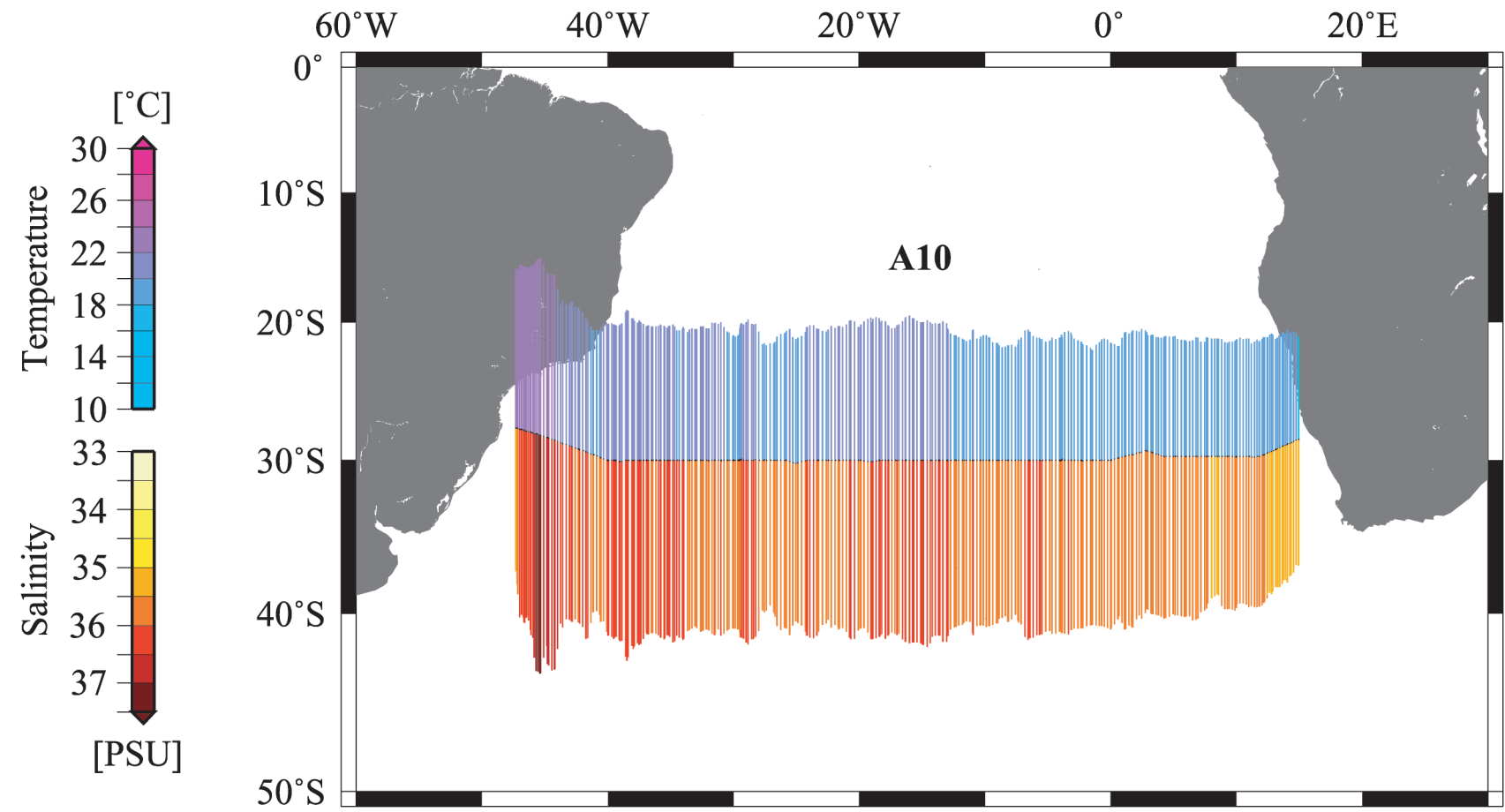


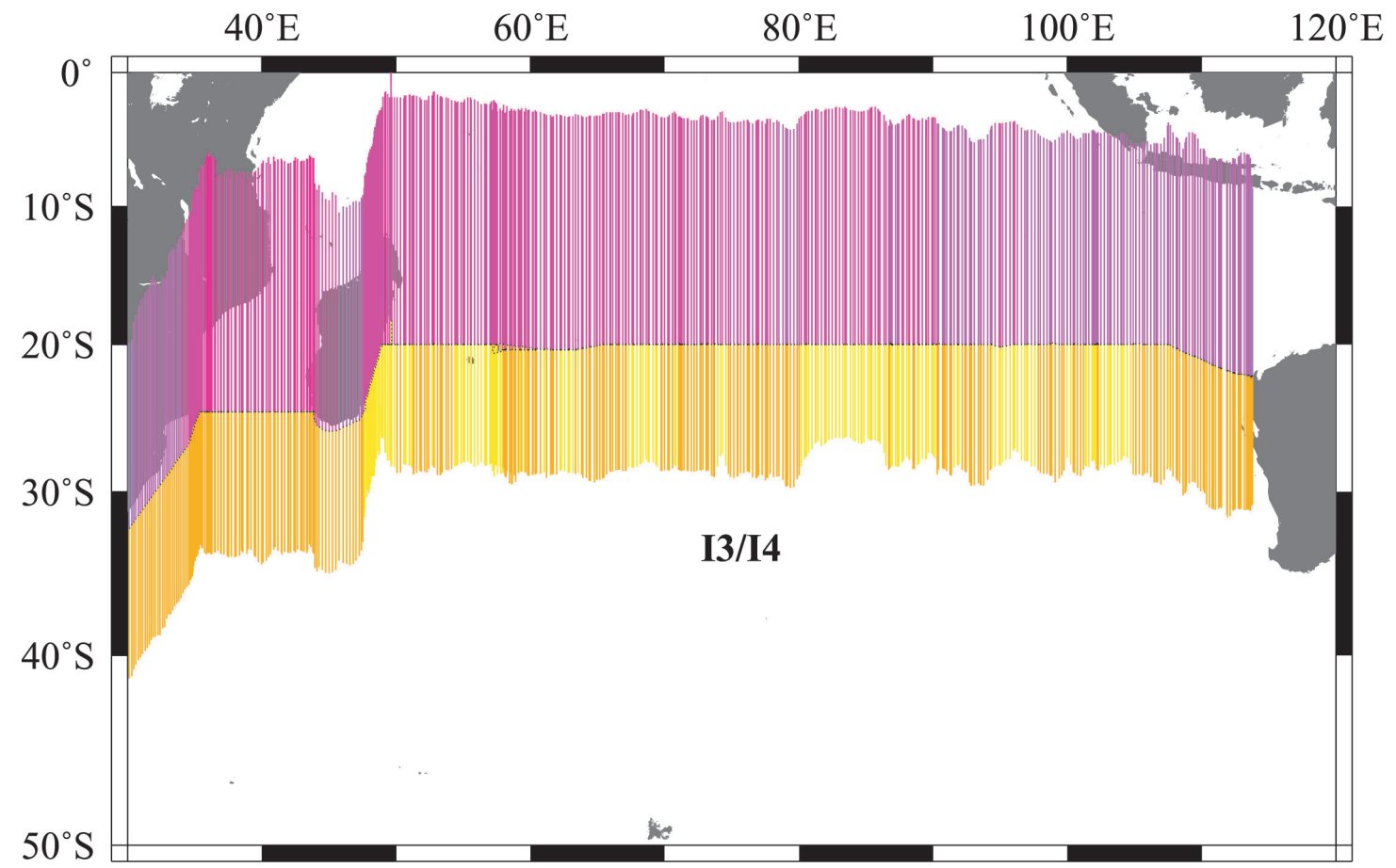




**Figure 5**

**Sea surface temperature and salinity**





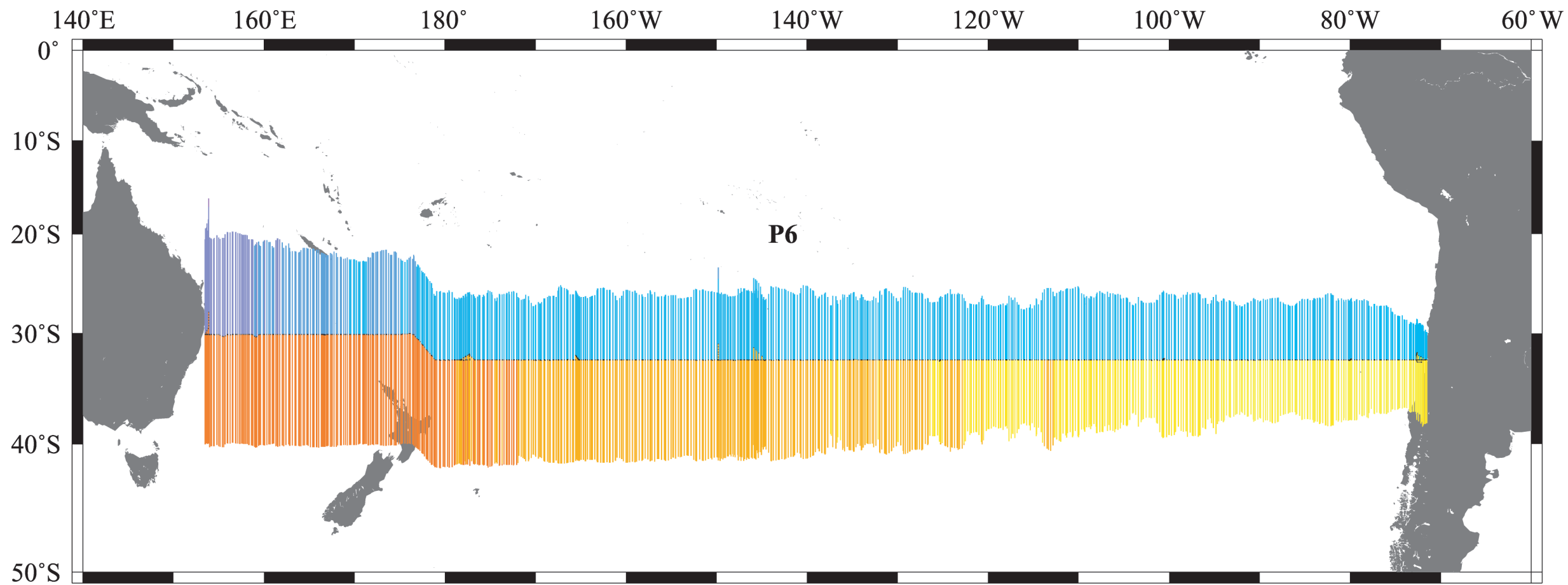
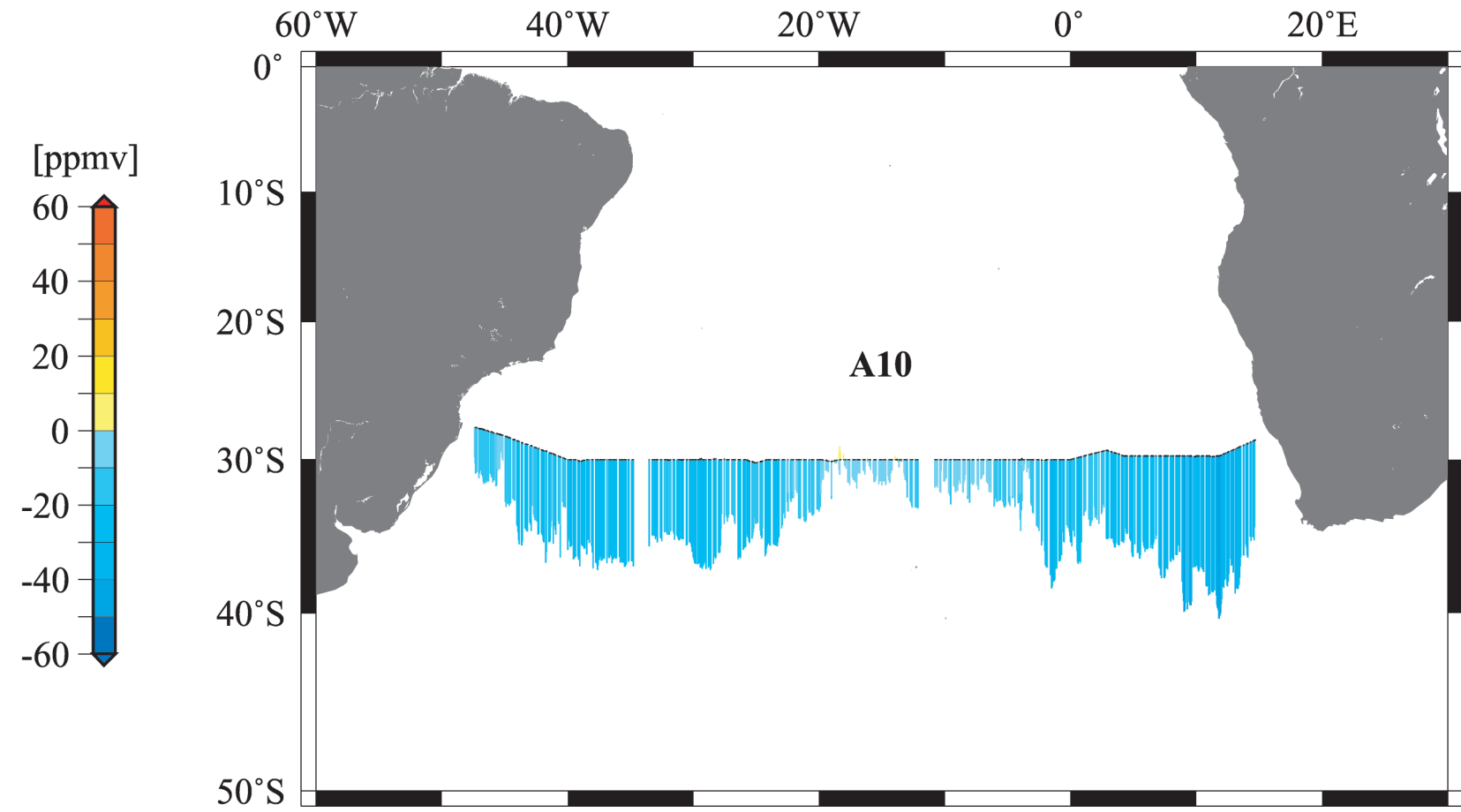
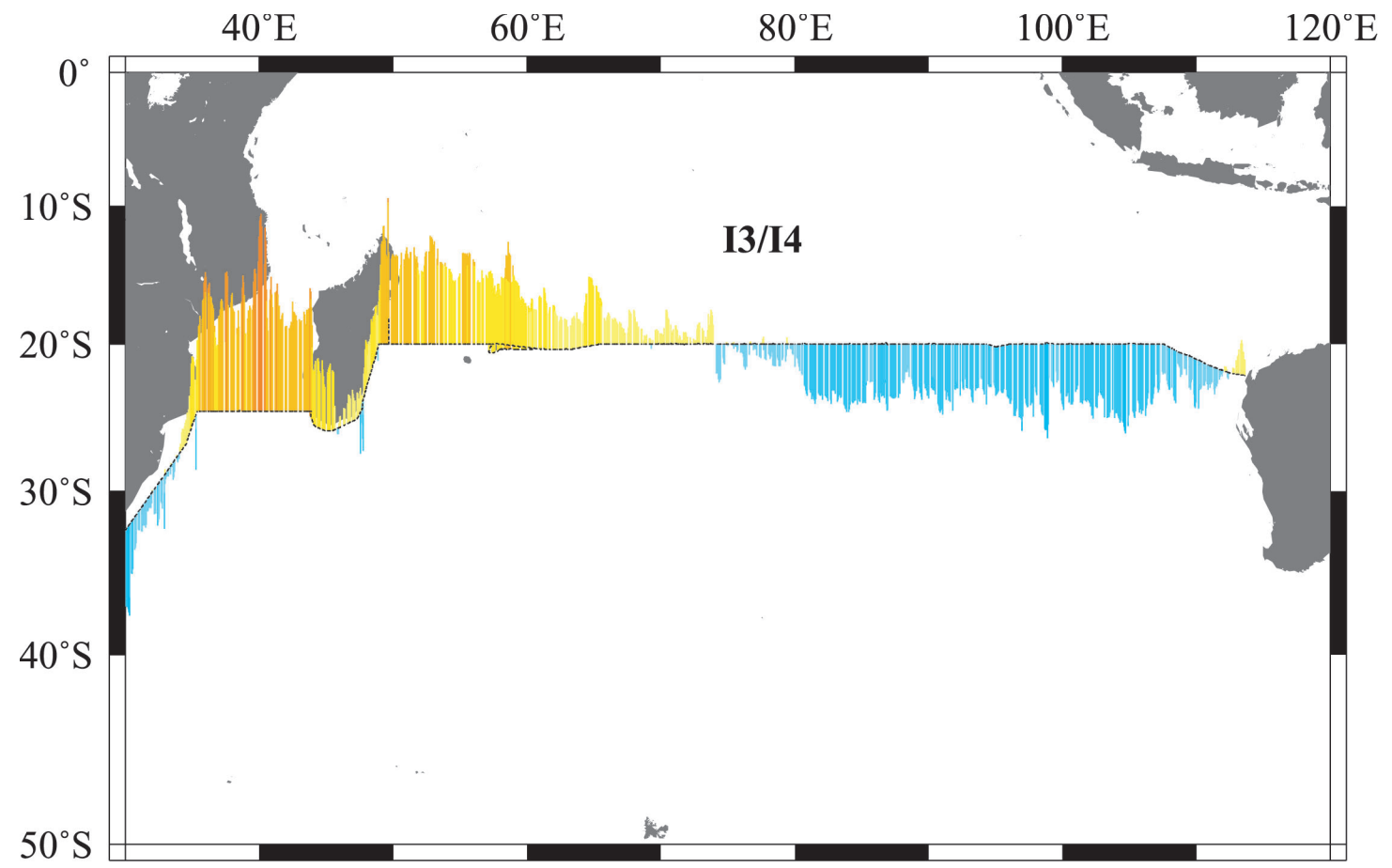


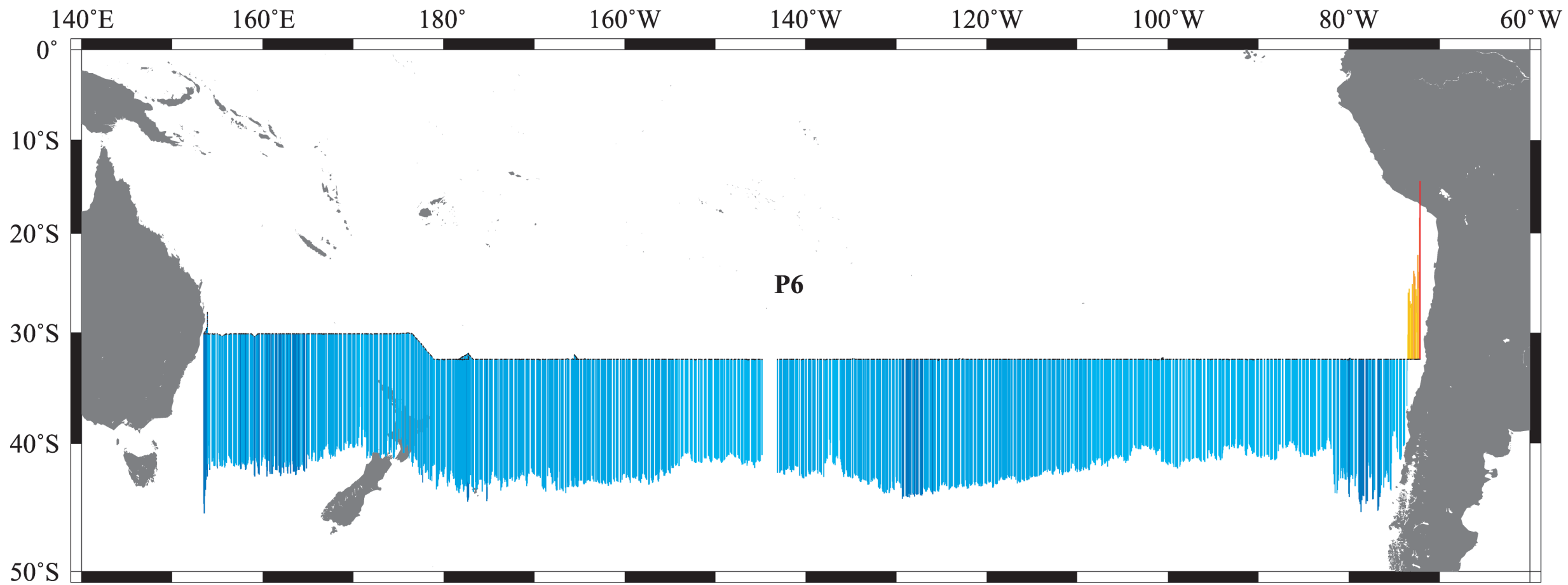
Figure 6

$\Delta p\text{CO}_2$









**Figure 7**

**SURFACE CURRENT  
AT 100 M DEPTH**

