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Kuroshio Extension Regional Experiment (KERE) 1992 Field Program

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1 Introduction

The primary focus of the KERE oceanographic field program is the observation of the hypothetical Pacific Deep Western Boundary Current (DWBC), analogous to the DWBC found in the Atlantic. The model of Stommel and Arons (1960) suggests that a Pacific DWBC should exist but that near Japan it could be northward or southward, depending on model parameters. Observations in this region are relatively sparse. This objective is being addressed with five current meter moorings (CMMs) deployed across the Japan Trench east of Honshu and by a hydrographic section conducted during the deployment cruise in July 1992.

A secondary focus of the KERE field program is to monitor the variability of the Kuroshio Extension in the vicinity of the CMMs; this is being addressed with an array of inverted echo sounders (IESs). Furthermore, two of the five CMMs have instruments in the thermocline (500m) in support of this objective.

2 Cruise Itinerary and operations

Leg I (9-29 June 1992): During transit from Seattle to Yokosuka, Japan, 3 acoustic sources (for RAFOS floats), 7 shallow (1000m) and 4 deep (3000m) RAFOS floats and 23 ARGOS surface drifters were deployed. The RAFOS deployments are a component of KERE being conducted by Steve Riser of the University of Washington. The surface drifters were deployed for Rick Thomson of the University of British Columbia; his experiment is a WOCE component. The approximate locations are shown in Figure 1.

Leg II (8-23 July 1992): On this leg, 5 CMMs and ten IESs were deployed and 18 CTD/hydrographic stations were conducted. Water samples were collected at depth intervals ranging from 50m above the thermocline, to 400m below 3000m. About 500 samples were collected. The water samples were analysed for salinity, dissolved oxygen, silica and other nutrients. The seawater chemistry was a KERE component conducted by Alan Shiller of the University of Southern Mississippi. Except for 4 IESs, all moorings and CTD stations lay along a TOPEX groundtrack. XBTs were dropped at IES sites for calibration purposes. 24 XCTD probes were dropped across the Kuroshio and at a CTD station, as a test. Additional RAFOS floats (2 shallow, 13 deep) were also deployed on this leg. Mooring and float deployments went very well. There were some minor difficulties with the CTD/hydrographic work but data return was quite good. Approximate locations of CMMs, IESs and CTD stations are shown in Figure 2 (station 14 and 15 were combined into one and station 20 was omitted for a total of 18 stations). A schematic of the CMM configuration is depicted in Figure 3. CMMs and IESs are to be recovered and redeployed for a second year in July 1993.

3 Station/Mooring Summary

The following tables contain actual GPS positions and times (as well as other pertinent data) for all mooring and float deployments and for all CTD stations.

CTD SUMMARY					
Cast	Day	Lat	Lon	Ztop	Zbot
001001	191.103	36.919	141.833	4.	1013.
002002	191.447	36.805	141.905	20.	2131.
003003	191.619	36.677	142.000	4.	2449.
003004	191.776	36.668	141.987	19.	2427.
004005	192.410	36.570	142.068	21.	2315.
004006	192.573	36.558	142.080	4.	2652.
005007	193.359	36.432	142.152	4.	3520.
005008	193.938	36.432	142.150	4.	499.
006009	194.024	36.312	142.210	4.	3800.
009010	194.642	35.885	142.458	4.	4496.
007011	195.387	36.203	142.302	4.	4009.
008012	195.617	36.080	142.369	4.	4504.
011013	196.403	35.467	142.679	4.	2171.
011014	196.549	35.483	142.640	6.	6094.
011015	196.782	35.514	142.754	23.	2011.
010016	197.268	35.717	142.603	25.	3475.
012017	197.611	35.275	142.864	8.	5814.
012018	197.851	35.285	142.930	24.	408.
013019	198.486	35.033	143.019	6.	5416.
013020	198.740	35.014	143.102	25.	300.
114021	199.234	34.637	143.270	11.	4974.
016022	199.553	34.267	143.467	8.	5508.
016023	199.753	34.270	143.509	8.	399.
017024	200.205	33.900	143.687	9.	4253.
018025	200.506	33.437	143.930	9.	5398.
018026	200.766	33.449	143.940	9.	299.
019027	201.000	32.965	144.212	26.	5312.
019028	201.283	32.963	144.217	15.	2203.
004029	203.072	36.570	142.065	9.	2420.
003030	203.231	36.683	142.002	21.	2402.

CURRENT METER SUMMARY					
Array	Day	Lat	Lon	Meter Depth	Bottom Depth
A	192.169	36.811	141.905	2000.	2600.
A	192.169	36.811	141.905	2500.	2600.
B	193.222	36.442	142.112	2000.	3400.
B	193.222	36.442	142.112	3000.	3400.
C	194.058	36.085	142.366	2000	4700.
C	194.058	36.085	142.366	3000	4700.
C	194.058	36.085	142.366	4000	4700.
D	196.321	35.515	142.722	500.	6500.
D	196.321	35.515	142.722	2000.	6500.
D	196.321	35.515	142.722	3000.	6500.
D	196.321	35.515	142.722	5000.	6500.
E	199.135	34.493	143.379	500.	5600.
E	199.135	34.493	143.379	2000.	5600.
E	199.135	34.493	143.379	3000.	5600.
E	199.135	34.493	143.379	5000.	5600.

IES SUMMARY				
IES	Day	Lat	Lon	Bottom Depth
1	192.304	36.567	142.067	2630.
2	195.219	36.198	142.300	4075.
3	197.192	35.718	142.600	4175.
4	198.039	35.267	142.868	6000.
5	198.341	35.750	143.184	5330.
6	200.009	34.270	143.383	5600.
7	202.883	36.508	142.755	4700.
8	202.510	35.732	143.272	6135.
9	202.219	35.317	143.520	5485.
10	201.983	34.832	143.785	5710.

XBT SUMMARY					
Cast	Day	Lat	Lon	Ztop	Zbot
1	192.336	36.573	142.068	0.	800.
2	192.341	36.575	142.068	0.	800.
3	192.345	36.575	142.070	0.	800.
4	192.351	36.577	142.072	0.	800.
5	195.238	36.198	142.298	0.	800.
6	195.247	36.198	142.297	0.	800.
7	195.254	36.198	142.297	0.	800.
8	195.260	36.198	142.295	0.	800.
9	197.201	35.720	142.605	0.	800.
10	197.215	35.722	142.613	0.	800.
11	197.221	35.722	142.615	0.	800.
12	197.226	35.720	142.610	0.	800.
13	198.123	35.263	142.877	0.	800.
14	198.126	35.257	142.873	0.	800.
15	198.130	35.252	142.872	0.	800.
16	198.133	35.245	142.872	0.	800.
17	198.364	34.750	143.193	0.	800.
18	198.376	34.752	143.197	0.	800.
19	198.379	34.752	143.198	0.	800.
20	198.387	34.752	143.200	0.	800.
21	200.017	34.272	143.465	0.	800.
22	200.049	34.272	143.470	0.	800.
23	200.053	34.273	143.470	0.	800.
24	200.056	34.273	143.473	0.	800.
25	201.989	34.830	143.787	0.	800.
26	201.996	34.830	143.788	0.	800.
27	202.003	34.830	143.792	0.	800.
28	202.009	34.830	143.795	0.	800.
29	202.223	35.315	143.520	0.	800.
30	202.230	35.315	143.523	0.	800.

XBT SUMMARY					
Cast	Day	Lat	Lon	Ztop	Zbot
31	202.238	35.315	143.532	0.	800.
32	202.244	35.313	143.533	0.	800.
33	202.524	35.732	143.278	0.	800.
34	202.530	35.732	143.278	0.	800.
35	202.535	35.732	143.275	0.	800.
36	202.540	35.732	143.275	0.	800.
37	202.894	36.510	142.758	0.	800.
38	202.900	36.510	142.757	0.	800.
39	202.904	36.512	142.757	0.	800.
40	202.911	36.510	142.758	0.	800.

XCTD SUMMARY					
Cast	Day	Lat	Lon	Ztop	Zbot
1	201.993	34.833	143.783	0.	1000.
2	202.062	34.935	143.750	0.	1000.
3	202.085	35.017	143.708	0.	1000.
4	202.088	35.022	143.707	0.	1000.
5	202.103	35.058	143.677	0.	1000.
6	202.124	35.138	143.643	0.	1000.
7	202.147	35.220	143.600	0.	1000.
8	202.256	35.320	143.523	0.	1000.
9	202.326	35.420	143.490	0.	1000.
10	202.358	35.512	143.430	0.	1000.
11	202.398	35.643	143.342	0.	1000.
12	202.428	35.732	143.280	0.	1000.
13	202.516	35.732	143.275	0.	1000.
14	202.582	35.798	143.272	0.	1000.
15	202.665	36.065	143.155	0.	1000.
16	202.708	36.200	143.035	0.	1000.
17	202.922	36.512	142.760	0.	1000.
18	203.072	36.570	142.065	0.	1000.
19	203.079	36.572	142.063	0.	1000.
20	203.086	36.573	142.062	0.	1000.
21	203.093	36.575	142.062	0.	1000.
22	203.100	36.578	142.062	0.	1000.

RAFOS Acoustic Source Mooring Deployments

USNS Desteiguer 6/92

<i>Mooring</i>	<i>Launch Date and Time (UT)</i>	<i>Nominal Bottom Depth (Corrected m)</i>	<i>Position</i>	<i>Transmission Time (UT)</i>
S1	6/23/92 0016	5610	40°02.7N 166°09.5E	0014 1214
S2	6/26/92 0452	5550	39°59.6N 150°04.1E	0100 1300
S3	6/27/92 2237	5755	33°29.1N 145°54.3E	0144 1344

Note: in each case the nominal depth of the sound source is 1000 m and the frequency is 251 hz.

RAFOS Float Launch Data

USNS Desteiguer 6/92-7/92

<i>Float Serial Number (Cruise Leg)</i>	<i>Target Depth (m)</i>	<i>Start Time (UT)</i>	<i>Launch Time (UT)</i>	<i>Launch Position</i>	<i>Comments</i>
NP001 (1)	1000	0004 6/25/92	0931 6/25/92	39°59.8N 154°00.2E	OK; start 3 min. late
NP002 (1)	1000	1201 6/25/92	0500 6/26/92	39°59.7N 150°04.3E	OK
NP003 (1)	1000	1200 6/26/92	1751 6/26/92	37°47.2N 148°30.4E	OK; start 1 min. early
NP004 (2)	3000	0001 7/18/92	0817 7/18/92	33°52.4N 143°44.3E	OK
NP006 (1)	1000	0001 6/27/92	1348 6/27/92	34°32.0N 146°30.0E	OK
NP008 (2)	3000	1201 7/16/92	0929 7/17/92	34°39.1N 143°18.0E	OK
NP009 (1)	1000	1201 6/27/92	2258 6/27/92	33°28.9N 145°54.6E	OK
NP010 (1)	1000	0001 6/28/92	1708 6/28/92	34°23.5N 141°59.6E	OK
NP011 (2)	3000	1201 7/17/92	1709 7/17/92	34°16.1N 143°30.1E	OK; no lanyard hole
NP012 (2)	3000	0001 7/18/92	1616 7/18/92	33°22.6N 143°59.3E	OK
NP013 (2)	3000	1201 7/18/92	0822 7/19/92	32°56.6N 144°12.4E	OK
NP015 (2)	3000	0001 7/14/92	1723 7/14/92	35°30.0N 142°44.2E	OK
NP016 (2)	3000	0001 7/14/92	0949 7/15/92	35°44.1N 142°41.7E	OK; rough launch
NP017 (2)	3000	0001 7/16/92	0041 7/16/92	35°16.0N 142°52.2E	OK
NP018 (2)	3000	0001 7/13/92	1221 7/13/92	36°11.9N 142°18.4E	OK
NP019 (2)	3000	0001 7/13/92	1806 7/13/92	36°04.9N 142°21.0E	OK
NP021 (2)	3000	1201 7/12/92	1917 7/12/92	35°51.4N 142°35.3E	OK
NP022 (2)	3000	1201 7/10/92	1208 7/11/92	36°26.1N 142°11.2E	OK
NP023 (1)	3000	0001 6/28/92	0343 6/28/92	33°41.9N 144°50.1E	OK
NP024 (1)	3000	0001 6/28/92	1659 6/28/92	34°23.6N 141°59.7E	OK

<i>Float Serial Number (Cruise Leg)</i>	<i>Target Depth (m)</i>	<i>Start Time (UT)</i>	<i>Launch Time (UT)</i>	<i>Launch Position</i>	<i>Comments</i>
NP025 (1)	3000	0001 6/24/92	1219 6/24/92	39°59.6N 158°59.9E	OK
NP026 (1)	3000	1201 6/27/92	2248 6/27/92	33°29.0N 145°54.4E	OK
NP028 (2)	1000	1201 7/9/92	1655 7/9/92	36°40.1N 141°59.2E	OK
NP029 (2)	3000	1201 7/11/92	0505 7/12/92	36°15.7N 142°12.8E	OK; rough launch
NP030 (2)	1000	1201 7/9/92	1550 7/10/92	36°32.5N 142°05.2E	OK
NP031 (1)	1000	1201 6/22/92	0047 6/23/92	40°01.9N 166°10.3E	OK

Deployments total 9 1000 m floats and 17 3000 m floats, for a total of 26 float deployments on the Desteiguer cruises.

ARGOS Surface Drifter Launch Data

USNS Desteiguer 6/92

<i>ID #</i>	<i>Time Start (UT)</i>	<i>Nominal Position</i>	<i>Actual Launch Position</i>	<i>Deployment Time (UT)</i>	<i>Comments</i>
4850	0315 6/12/92	51°N 137.5°W	50°17.1N 137°28.9W	1018 6/12/92	OK
4851	0526 6/13/92	52°N 145°W	48°51.8N 145°00.0W	1544 6/13/92	OK
4852	1808 6/14/92	51°N 152.5°W	46°19.2N 152°29.3W	0031 6/15/92	OK
4853	0336 6/16/92	50°N 160°W	43°39.6N 159°59.4W	1106 6/16/92	OK
4854	0129 6/17/92	50°N 164°W	42°15.0N 164°00.0W	0638 6/17/92	OK
4855	0134 6/17/92	50°N 164°W	42°14.9N 164°00.2W	0628 6/17/92	OK
4857	0122 6/17/92	50°N 164°W	42°15.2N 163°59.5W	0618 6/17/92	OK
4858	0121 6/17/92	50°N 164°W	42°15.0N 163°57.6W	0606 6/17/92	OK
2119	0020 6/19/92	48°N 175°W	40°00.1N 174°59.8W	0812 6/19/92	no beep at startup?
2120	0027 6/19/92	48°N 175°W	40°00.1N 175°00.6W	0818 6/19/92	OK
1413	0030 6/19/92	48°N 175°W	40°00.2N 175°01.3W	0826 6/19/92	OK
1414	0034 6/19/92	48°N 175°W	40°00.2N 175°01.9W	0835 6/19/92	OK
2109	0147 6/20/92	47°N 180°	39°59.3N 179°58.3E	0641 6/20/92	no beep at startup?
2116	0143 6/20/92	47°N 180°	39°59.3N 179°58.2E	0643 6/20/92	OK
8093	2221 6/20/92	45°N 175°E	40°00.9N 175°00.2E	0314 6/21/92	no beep at startup?
8094	2223 6/20/92	45°N 175°E	40°00.9N 175°01.0E	0304 6/21/92	no beep at startup?
1415	2230 6/20/92	45°N 175°E	40°01.1N 174°58.4E	0334 6/21/92	OK

<i>ID #</i>	<i>Time Start (UT)</i>	<i>Nominal Position</i>	<i>Actual Launch Position</i>	<i>Deployment Time (UT)</i>	<i>Comments</i>
1416	2228 6/20/92	45°N 175°E	40°01.0N 174°59.1E	0327 6/21/92	OK
8097	1025 6/22/92	40°N 165°E	40°02.0N 166°10.2E	0045 6/23/92	OK
8098	1029 6/22/92	40°N 165°E	40°01.8N 166°10.4E	0053 6/23/92	OK
4859	1022 6/22/92	40°N 165°E	40°01.4N 166°10.5E	0101 6/23/92	OK
1417	2359 6/22/92	40°N 165°E	40°02.5N 166°10.1E	0035 6/23/92	OK; cable fouled
4856	1221 6/25/92	40°N 150°E	39°59.8N 150°04.4E	0503 6/26/92	OK

Figure 1

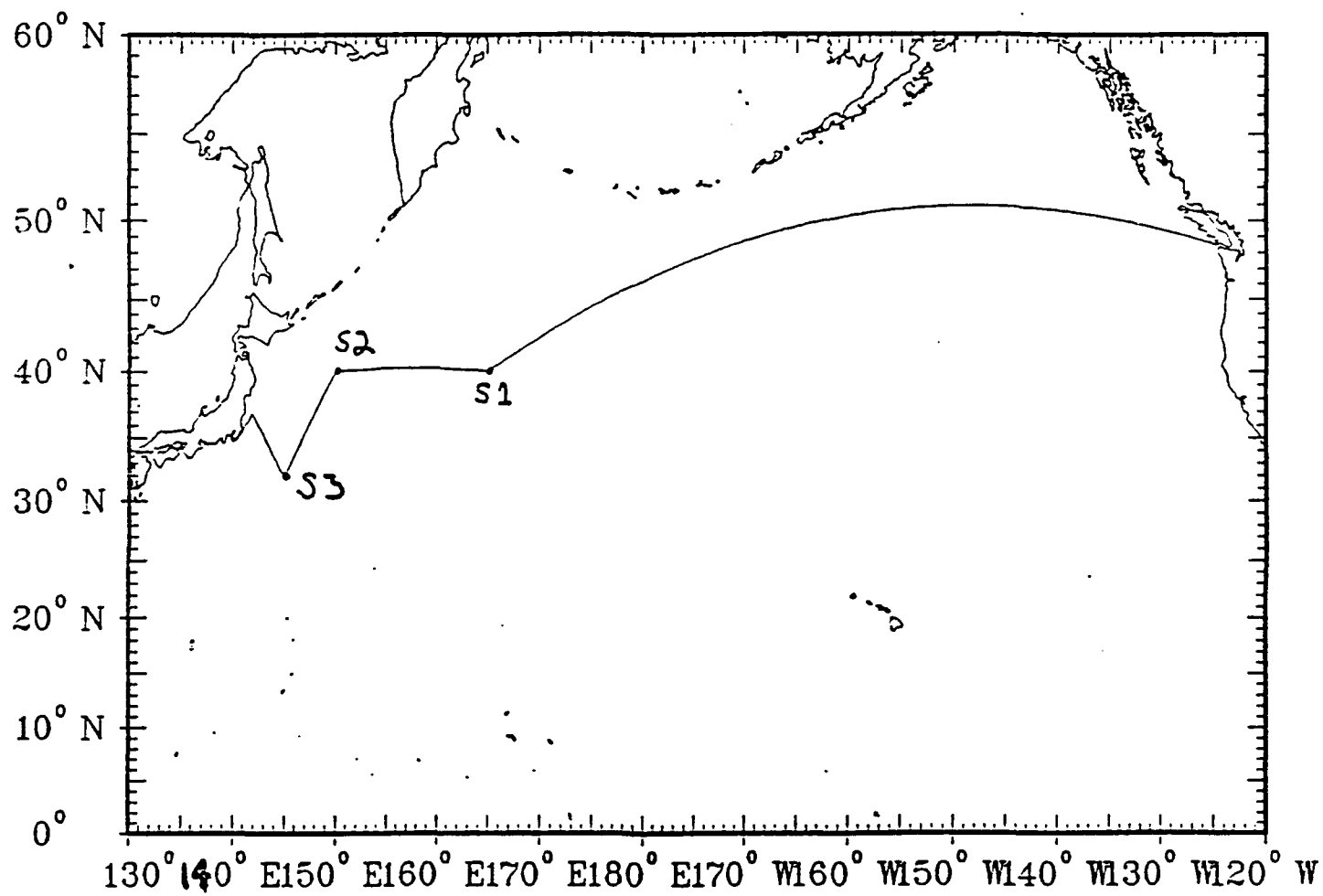


Figure 2

