MENDO 94 - Ewing Shiptrack Data

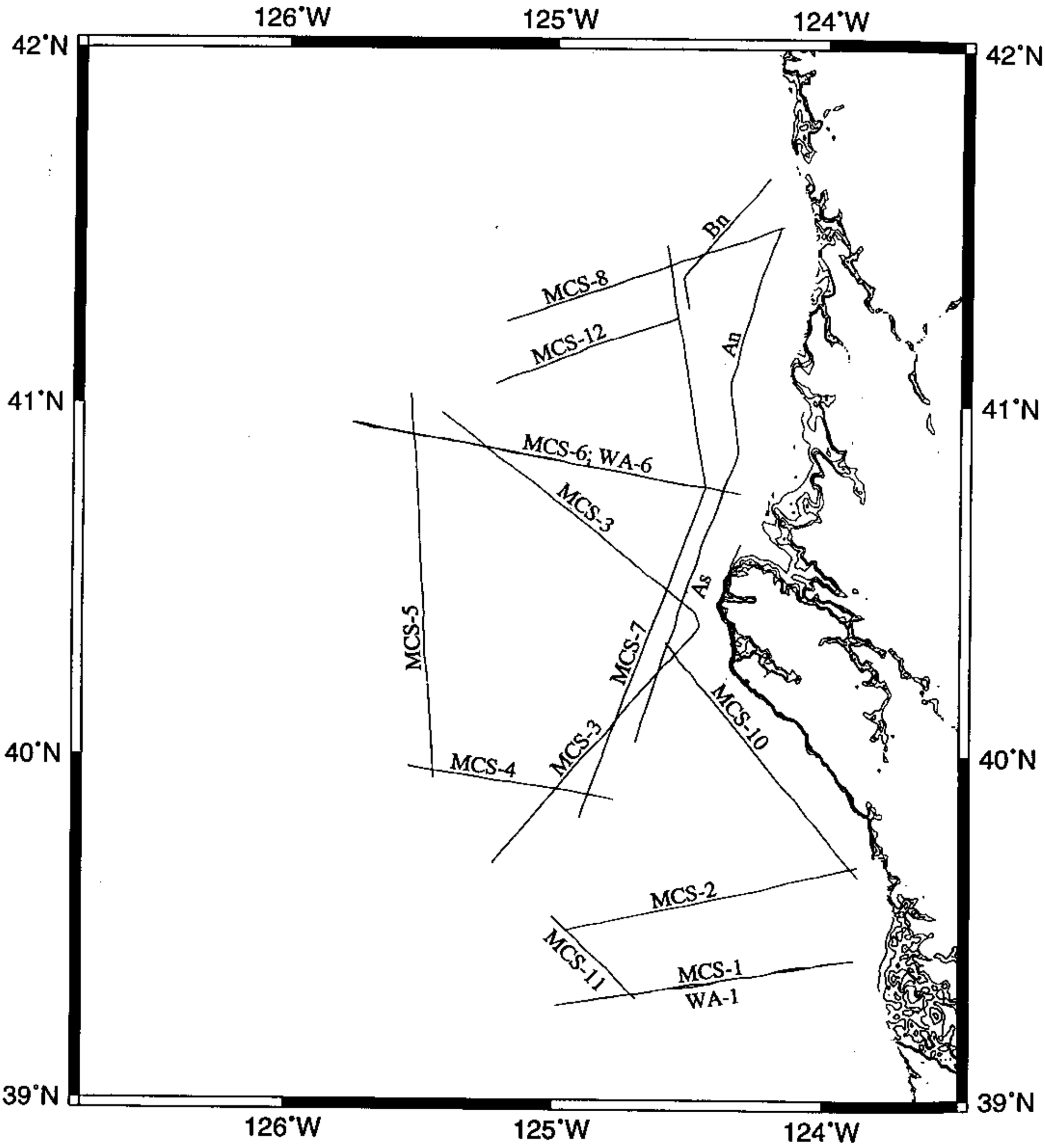


Fig 1

MENDO 94 - OBS and OBH Locations

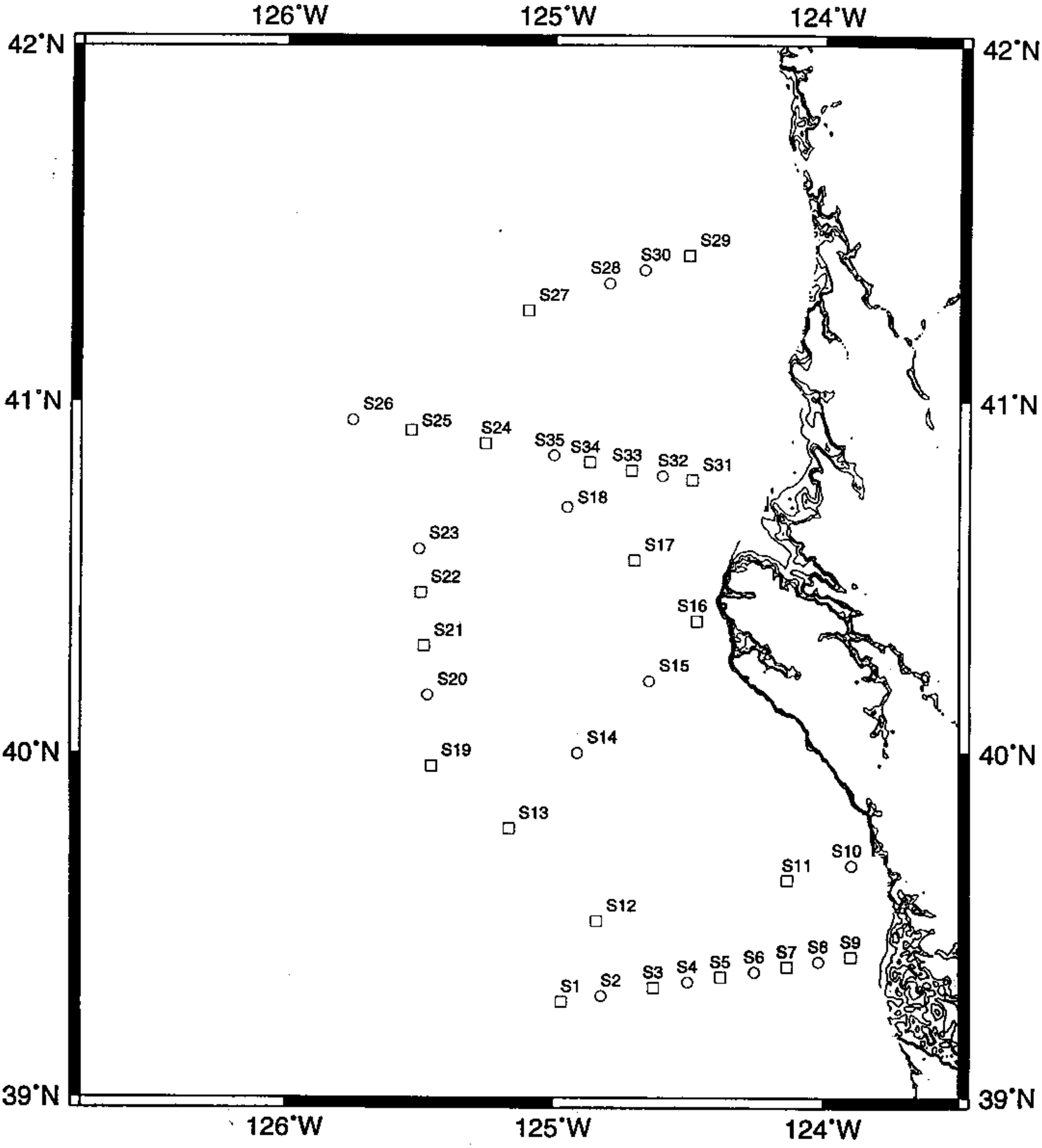


fig. 2

MENDO 94 - Wecoma Shiptrack Data

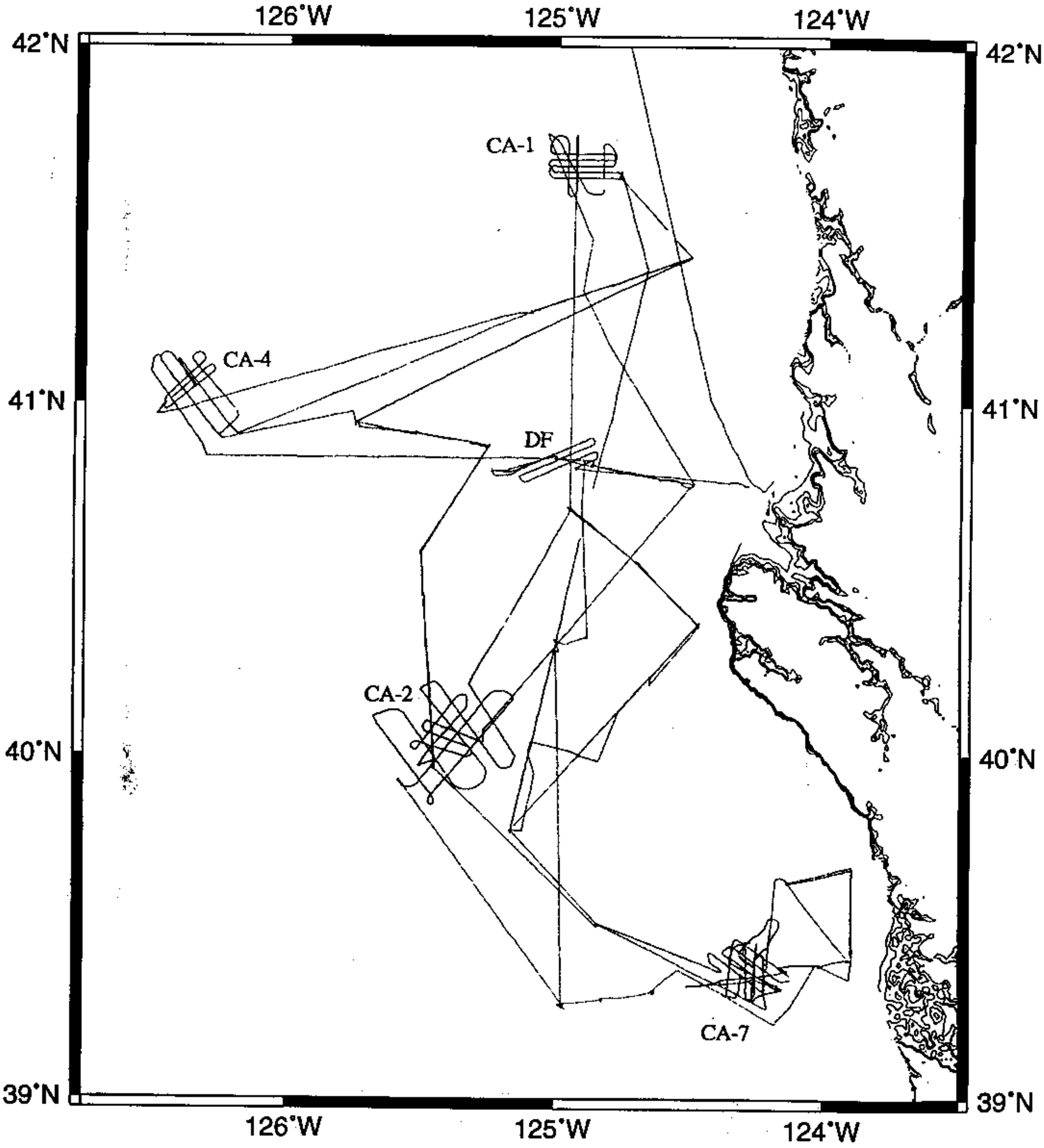
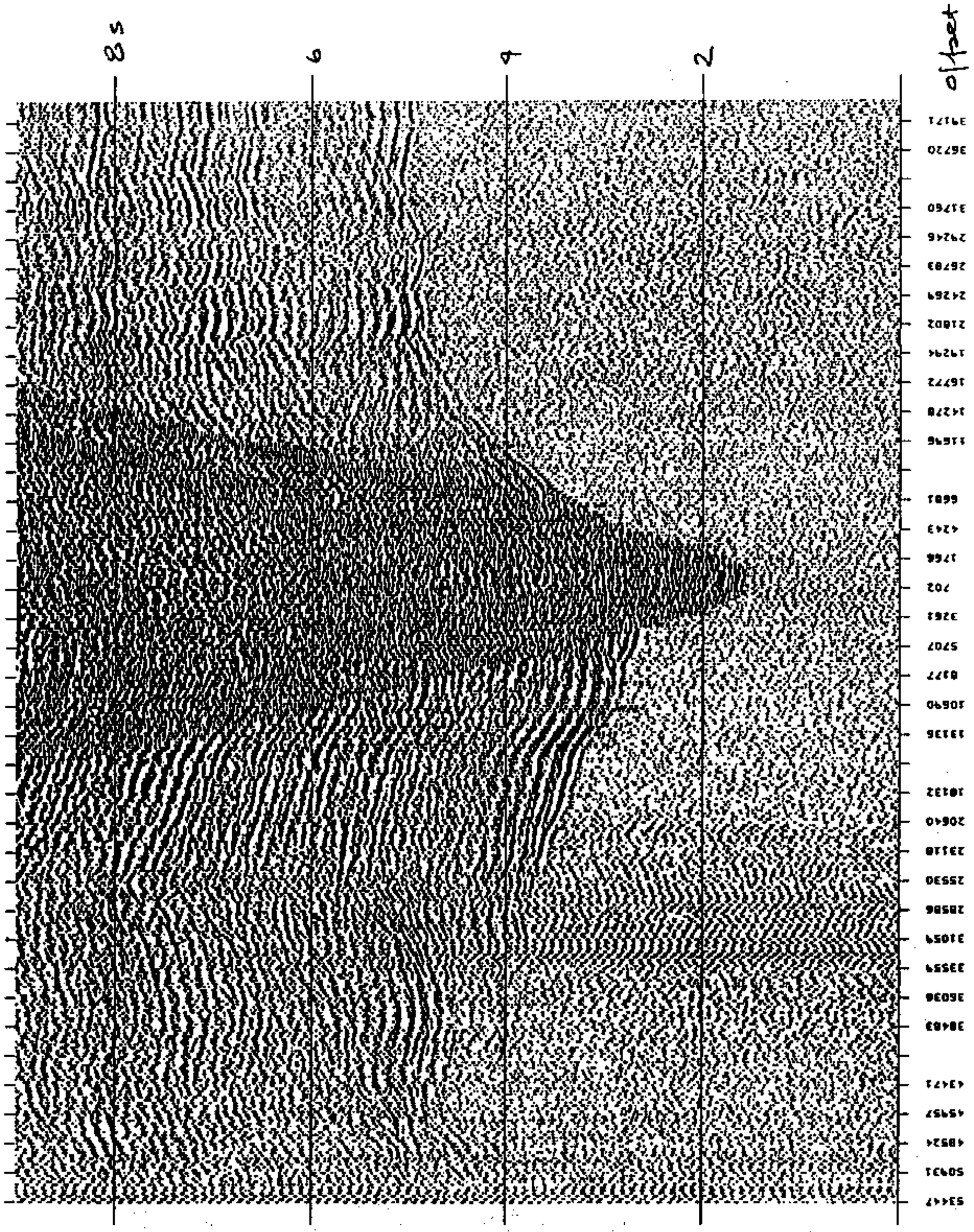
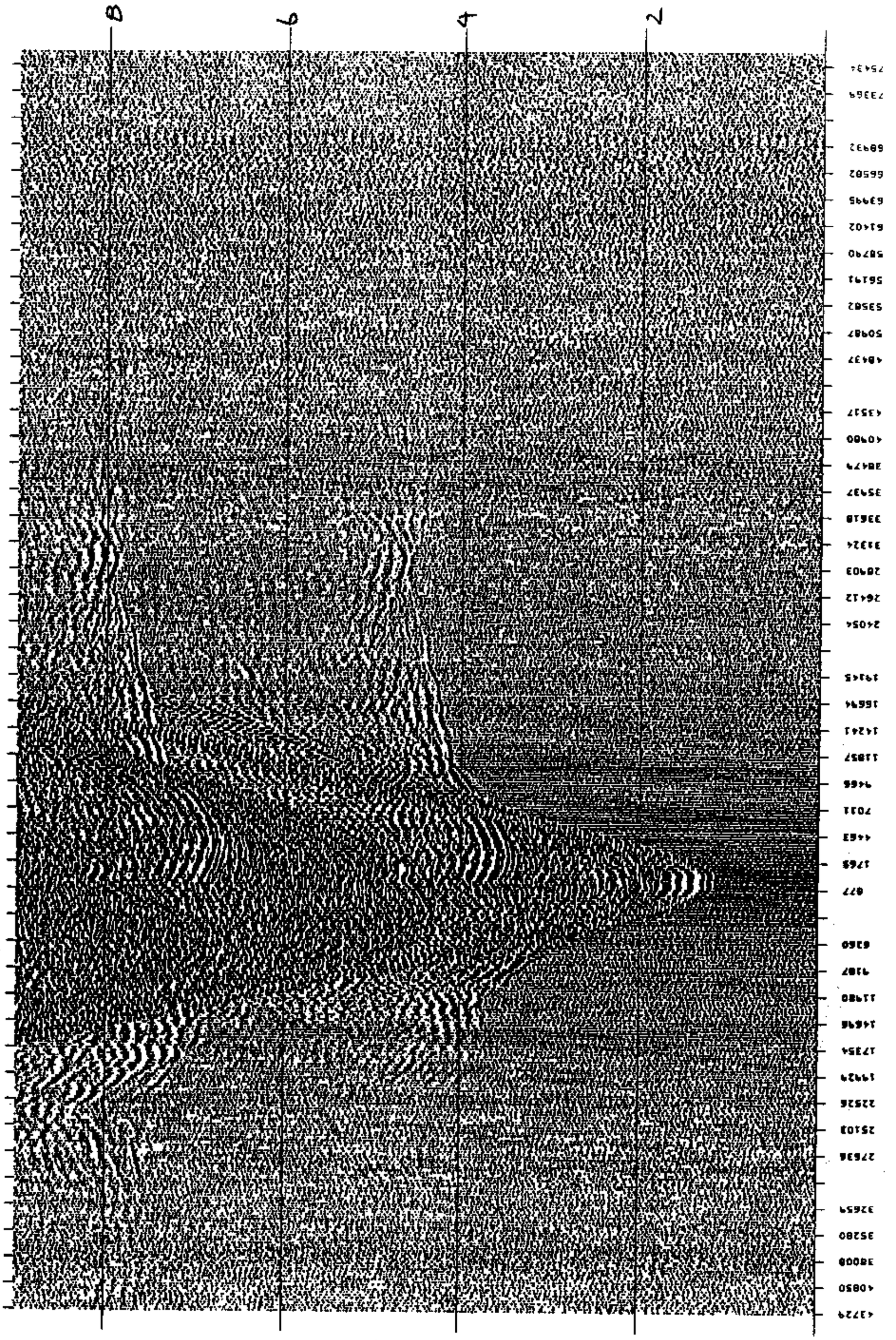


Fig. 3



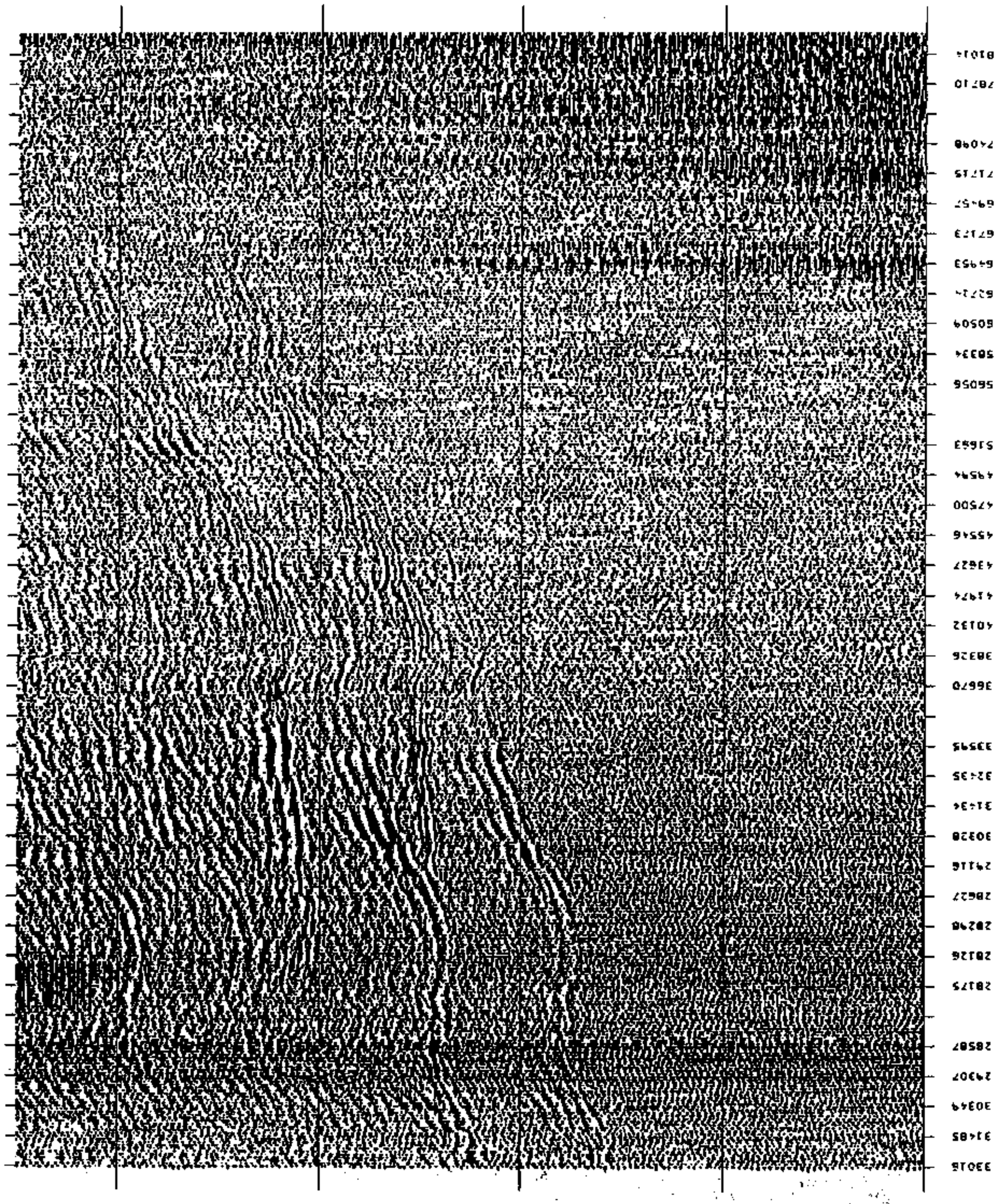
OBSC9 on WA1; reduction velocity = 8.0 kms.

fig. 4



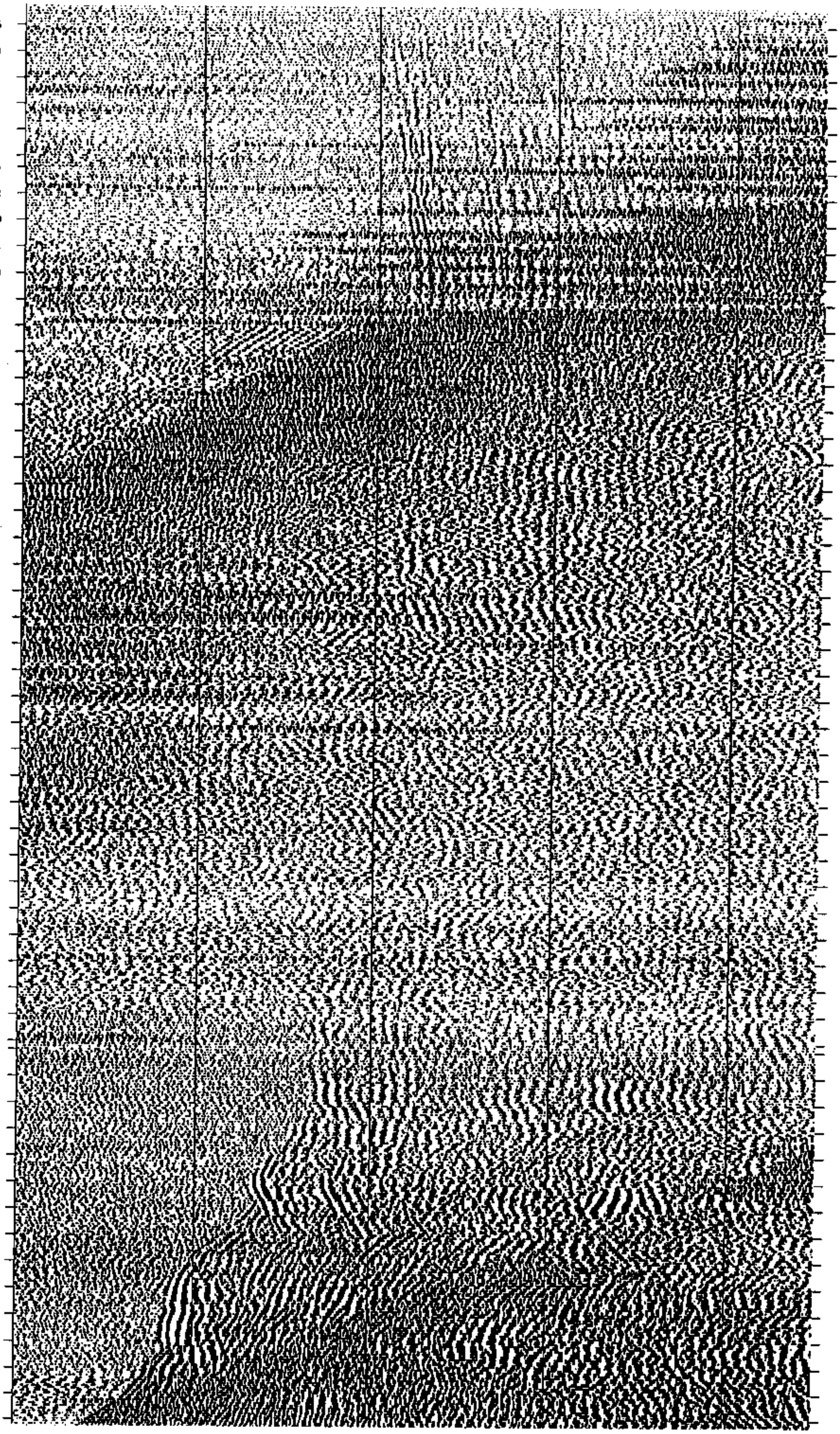
OBH 26 on WA-6, r.v. 8.0km/s.

fig 5



OBH22 recording WA-1., r.v. 8.0 km/s –

fig 6.


62816
61513
60204
57524
56221
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51721
50500
48005
46691
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44223
43088
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39648
38424
36343
35305
34403
33557
32778
31995
31239
30459
29745
28587
28103
27660
27348
27119
26325
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12206
10728
9332
7819
6273
4837
3325

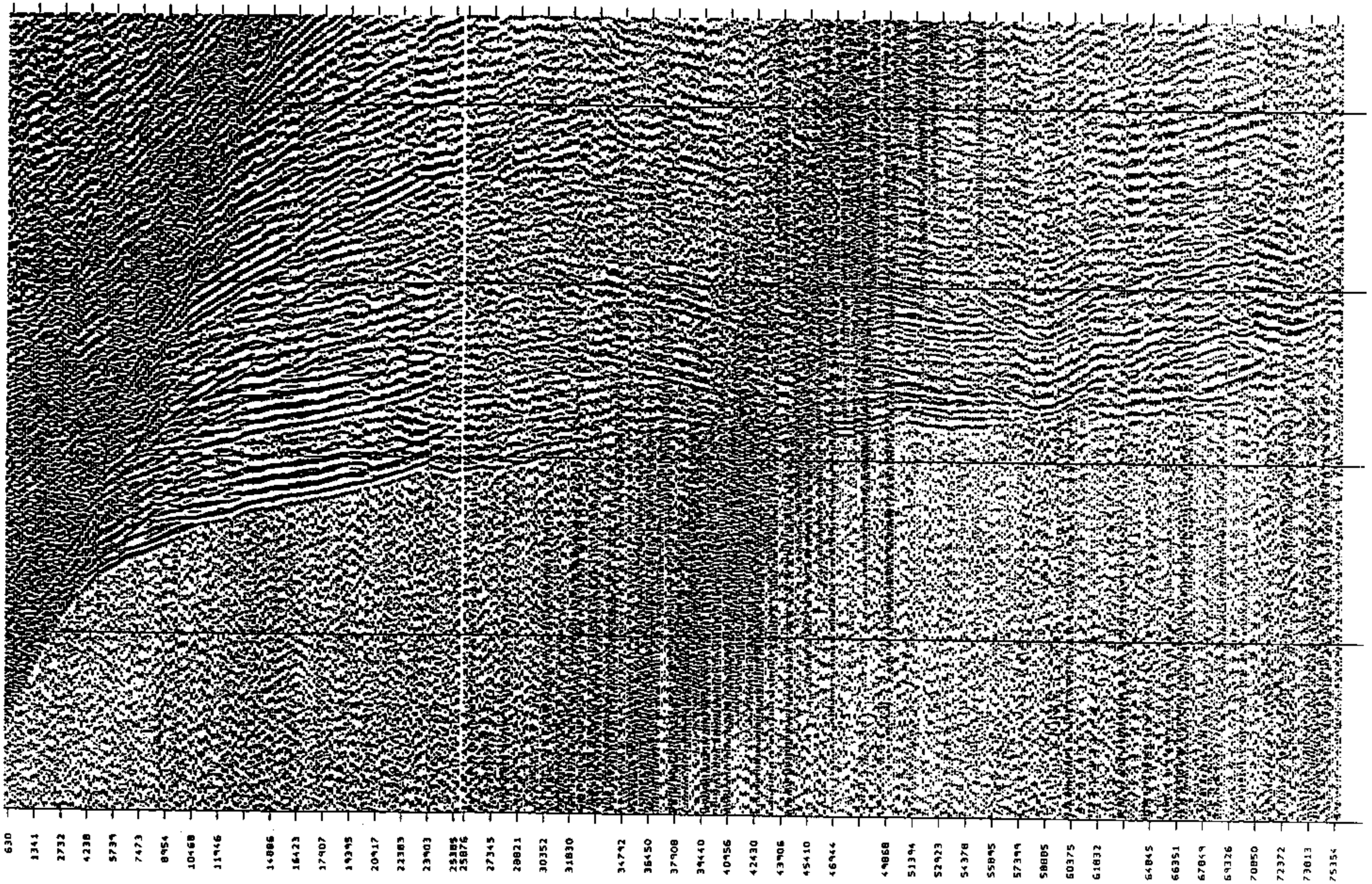

Fig. 8. OBS A1 on MCS 3 R.V. 6.5

Appendix A
OBH Operations

Summary:

Ten systems with support equipment were shipped to Newport, Oregon for loading on R/V Wecoma. The cruise involved a series of deployments along with USGS OBSs to instrument lines to be shot by R/V Ewing as part of land, onshore/offshore, and marine observations of the Mendocino triple junction.

A total of 20 OBH deployments were performed with all instruments recovered. Approximately 2,379 Mbytes of data were collected and much of it processed to SEG-Y format using navigation data transmitted from R/V Ewing using a modem connection via cellular telephone. Table A1 is a record of these deployments. Table A2 shows additional information about the data collected.

Deployments and recoveries were performed using either the ship's crane or a removable articulating crane mounted on the fantail. The latter proved more convenient in most circumstances but was inoperable during the first few days of the cruise. Deck space was adequate for storage and handling of the 12 OBH and 8 OBS instruments.

The Wecoma laboratory setup proved very convenient. The ship has a recently enlarged wet laboratory on the starboard side that extends to the rail, all but eliminating the external waist deck. Also the ship based marine technician functions and all ship equipment are completely removed from the main laboratory leaving a large very usable space.

We used the wet laboratory for WHOI deck support and all USGS OBS operations. The main laboratory was used for main science operations, data processing, OBH preparations and USGS single channel seismics acquisition.

Two OBH storage racks plus a work bench were used for OBH preparation. In addition, a desk-height table housed the PC used in this process. The racks held the pressure cases complete with electronics between deployments. All units were wired so they could be powered and their clocks checked during this period. When a unit was to be prepared for deployment it was removed to the work bench for battery changing, final tests and programming. Then O-ring preparation and purging was performed followed by transport to the deployment frame.

Some quick look plots of the data acquired are included for reference without regard to source range. Figures A1a through A1d show a range of first arrivals. Figure A1e shows the effect of ocean surface waves on a shallow mooring. Figure A1f shows data from the same mooring at a later time when we know the seas were larger! Figures A1g and A1h show in detail the asymmetry seen on some first arrivals.

Timing for the OBH instruments was performed using a Trak Microwave Systems 8810 Station Clock in conjunction with a Seascan Inc. SAIL clock referenced by an Efratom Inc. rubidium standard. Figure A2a shows the drift of the SAIL clock (actually the rubidium) through the cruise. The SAIL clock was used to perform the OBH clock checks. Each time a check was performed, the SAIL clock offset relative to GPS was logged, allowing the data to be corrected to GPS time. Figures A2b through A2k are the clock drift plots for the instruments.

The USGS instrument clock checks were performed against an Ashtech Inc. model XII GPS receiver using its 1 PPS (one pulse per second) output. Throughout the cruise, 1 PPS outputs from the Ashtech and the Trak were observed on an oscilloscope. Initially the separation was large and variable (+- 5 msec) - it was determined that the Ashtech setup was incorrect. Once this was corrected the pulses were consistently separated by 2 usec (+- 0.5 usec) throughout the cruise.

Record keeping and the use of standard procedures have proved to be important in acquiring good quality OBH data. On this cruise the detailed OBH predeployment and post recovery checkout procedures were further refined and documented. Examples of some of the check sheets that were used are attached (Tables A3 to A6; additional sheets documenting battery voltages, instrument rise times, and reployment and retrieval chronology are also available at WHOI for each instrument). The corresponding instructions are available as a separate document. Note also the sheet titled "OBH Identification Numbers" (Table A7) which explains the numbers used in the documentation.

OSU, WHOI, and USGS computers were installed and added to the ship's network. A fairly extensive data processing capability was thus available and operated without problems. Table A8 shows the systems on the network.

The primary focus of the shipboard processing was converting the raw OBH data files (from Onset's OFFLD6 program) to SEG-Y-compatible files using a program (called obh-to-segy) written by Jim Dolan. The program takes as input the raw OBH data and a navigation file with shot time, date, shot number and ship location, and generates a SEG-Y output file, with associated navigation, time, date, shot information in the trace header.

In addition, a source-to-receiver range is calculated and can be used to generate a "reduced velocity" time trace effectively reducing the size of the SEG-Y output file without loss of useful data. The navigation files were generated on the Ewing and transferred to the Wecoma. The SEG-Y data were processed and organized by line number and archived to Exabyte tapes. Log files for each conversion run was also generated and archived. The archived data are listed in table A9 .

Problems:

The new hydrophone cables purchased to eliminate a potential source of problems were less than successful. Apparently the mechanical tolerances on the connectors themselves are quite wide. The cables did not consistently fit the hydrophone and the OBH end cap Meccas - generally the fit on the hydrophone was too tight and the fit on the end cap Meccas was too loose. Acceptable cables to use were found by selecting a specific cable from the stock of cables purchased to go with a specific OBH. In one case it is believed that this process failed and bad data were collected as a result (OBH 26 EID 26 site 13).

In the OBH electronics, a special device is used to convert internal logic signals to SAIL protocol for communication with the PC during instrument testing and programming. The device is provided by WET Instrument Systems - part number SM100. A new series (serial numbers in the 200 range) were found to provide marginal operation at 19200 baud. In most cases they cause bad characters but work can proceed. When the problem is extreme, it can stop testing and preparations. A stop-gap was improvised using a different computer connection which allowed work to proceed except for clock checks. Working replacements will be obtained.

This is the requisite "EG&G deck unit" paragraph - with a difference. On this cruise the WHOI EG&G deck unit performed nearly perfectly. It now appears that the problems experienced on previous cruises can be attributed to a flaw in the deck unit: it cannot be used at full output power. During this cruise it was used at less than full power and only a few of the previous problems were encountered.

Three OBH deployments failed. OBH 27 EID 19 at site 17 returned with a dead hydrophone preamplifier. The normal predeployment test showed no problem but the test performed on recovery showed no output. The recorded data indicated that failure occurred at turn-on so no useful data was recorded. Repair was effected by replacement of the op amp in the preamplifier (TLC2201).

OBH 20 EID 23 at site 16 did not operate due to operator error. The last computer operation prior to disconnection is to set the start time and observe that the system is waiting for this time. By mistake a control C was entered causing the system to cancel the acquisition and return to the operation menu. The correct procedure at this point is simply to disconnect. A change to disable the control C function would be difficult and expensive to implement because it is basic to the Tattletale operation.

OBH 26 EID 26 at site 13 apparently had two problems: a bad hydrophone cable and a bad preamplifier causing unusable data to be recorded. The preamplifier problem showed only in the recovery test since the recorded data were bad. The symptoms are asymmetric output which attenuates the negative side of symmetric input signals. The condition develops slowly during operation. The coupling capacitor C3 in the preamplifier is suspected - no spare was available on the cruise.

During one recovery a tag line hit the hydrophone and broke the boot. Many of the flashers and radios show corrosion at the sharp radius near the end caps. One flasher did not function apparently due to pressure switch failure.

Recommendations:

New SM100 WET modules are on order. If these are not better than the current batch, we should make them ourselves.

Use the standard short Onset cable between the Model 6 and the disk. On one occasion it appeared that the long cable currently in use shorted against the chassis causing bad disk writes during testing.

The power switch on the Design Mate signal generator causes serious problems (resets the SAIL clock). A better signal generator should be used.

The failed flasher switch should be returned for repair. A solution to the corrosion problem on all units should be found.

The damaged hydrophone should be returned to be rebuilt.

Additional recovery aids should be purchased to provide more spares.

Table A-1

TABLE OF OBH DEPLOYMENTS

MEND 01

GROUP 1

LINE 1

SITE	OBH #	EID #	H S/N	DEPLOYMENT DATE/TIME	DEPLOYMENT LAT.	DEPLOYMENT LON.	DEPTH(m)	START TIME	RECOVERY DATE/TIME	RECOVERY LAT.	RECOVERY LON.
1	23	24	1386	6/10/94 14:22	39° 16' 47" N	124° 58' 11" W	3045	6/12/1900	6/14/94 14:24	39° 16' 33" N	124° 58' 11" W
3	21	25	GF-6	6/10/94 17:48	39° 19' 17" N	124° 37' 35" W	3090	6/12/1900	6/14/94 19:30	39° 18' 48" N	124° 37' 29" W
5	24	22	GF-9	6/10/94 21:30	39° 21' 06" N	124° 22' 41" W	1706	6/12/1900	6/15/94 15:36	39° 20' 46" N	124° 22' 38" W
7	17	17	GF-14	6/11/94 00:11	39° 22' 54" N	124° 08' 01" W	825	6/12/1900	6/15/94 13:29	39° 22' 43" N	124° 08' 00" W
9	16	20	1501	6/11/94 02:22	39° 24' 41" N	123° 53' 48" W	105	6/12/1900	6/15/94 06:56	39° 24' 32" N	123° 53' 53" W
				LINE 2							
11	18	16	1503	6/11/94 05:58	39° 38' 05" N	124° 07' 56" W	995	6/12/1900	6/15/94 04:51	39° 38' 03" N	124° 07' 51" W
12	22	27	1502	6/12/94 13:33	39° 30' 53" N	124° 50' 18" W	2825	6/12/1900	6/16/94 08:52	39° 30' 36" N	124° 50' 16" W

GROUP 2

LINE 3

13	26	26	GF-8	6/12/94 16:20	39° 47' 01" N	125° 09' 58" W	2953	6/15/0700	6/19/94 05:59	39° 46' 54" N	125° 09' 53" W
16	20	23	1385	6/12/94 22:03	40° 22' 34" N	124° 28' 03" W	640	6/15/0700	6/18/94 21:44	40° 22' 02" N	124° 27' 56" W
17	27	19	GF-11	6/12/94 23:50	40° 33' 00" N	124° 41' 59" W	404	6/15/0700	6/18/94 19:32	40° 33' 03" N	124° 41' 54" W

MEND 02

GROUP 3

LINE 5

19	24	22	GF-9	6/16/94 13:33	39° 57' 47" N	125° 27' 17" W	2950	6/17/1700	6/23/94 05:44	39° 58' 11" N	125° 27' 05" W
21	18	16	1503	6/16/94 16:23	40° 18' 23" N	125° 28' 59" W	1890	6/17/1700	6/23/94 01:34	40° 18' 27" N	125° 28' 59" W
22	17	17	GF-14	6/16/94 17:48	40° 27' 31" N	125° 29' 44" W	2810	6/17/1700	6/22/94 23:24	40° 27' 23" N	125° 29' 47" W
				LINE 6							
24	21	25	GF-6	6/16/94 21:19	40° 52' 50" N	125° 15' 14" W	2990	6/17/1700	6/22/94 18:28	40° 53' 06" N	125° 15' 10" W
25	22	27	1502	6/16/94 22:55	40° 55' 05" N	125° 31' 58" W	3075	6/17/1700	6/22/94 16:09	40° 55' 00" N	125° 31' 43" W

GROUP 4

LINE 8

27	23	24	1386	6/17/94 18:29	41° 15' 29" N	125° 05' 47" W	3100	6/18/0000	6/21/94 19:16	41° 15' 36" N	125° 05' 56" W
29	16	20	1501	6/17/94 21:40	41° 24' 45" N	124° 30' 02" W	345	6/18/0000	6/22/94 00:17	41° 24' 40" N	124° 30' 21" W

GROUP 5

LINE 6

31	20	23	1328	6/20/94 10:58	40° 46' 34" N	124° 29' 11" W	250	6/20/1800	6/23/94 22:43	40° 46' 06" N	124° 29' 22" W
33	27	19	GF-11	6/20/94 12:40	40° 48' 11" N	124° 42' 42" W	1079	6/20/1800	6/24/94 01:16	40° 48' 17" N	124° 42' 35" W
34	26	26	GF-13	6/20/94 13:46	40° 49' 36" N	124° 51' 59" W	2493	6/20/1800	6/24/94 03:16	40° 49' 54" N	124° 51' 51" W

Table A-2

TABLE OF OBH DATA QUALITY

MEND 01

GROUP 1

LINE 1

SITE	LAST TRACK START	# TRACKS	ERRORS	OBH CORRECTION (ms) DATE/TIME	PREDEPL	DATE/TIME	POSTRECOV	COMMENTS
1	6/14/15:26:56	64-0	0	6/10/04:29:40	1.938	6/14/15:49:24	43.043	
3	6/14/19:40:48	70-1	0	6/10/02:54:10	1.875	6/14/20:24:37	-2.567	
5	6/15/15:25:52	98-1	2	6/10/15:59:32	4.961	6/15/16:15:00	5.039	
7	6/15/13:18:56	96-0	0	6/10/19:28:53	18.063	6/15/14:23:01	32.948	
9	6/15/06:58:08	86-1	7	6/10/22:43:54	12.367	6/15/07:41:58	22.302	

LINE 2

11	6/15/04:51:12	83-1	0	6/11/02:56:12	8.783	6/15/05:35:01	27.356	
12	6/16/08:21:20	123-0	0	6/12/02:42:20	13.255	6/16/09:27:33	17.652	

GROUP 2

LINE 3

13	6/19/05:31:44	136-0	0	6/12/04:17:31	13.486	6/19/06:36:53	25.123	No usable data? Bad preamp.
16	No data.	None	0	6/12/17:05:12	6.858	6/18/22:39:01	-2.644	Negative phone lead not seated properly in OBH endcap.
17	6/18/19:38:40	121-1	0	6/12/17:52:09	4.188	6/18/20:22:29	-6.435	No data. Operator error.
								No usable data. Bad preamp chip.

MEND 02

GROUP 3

LINE 5

19	6/23/05:36:00	189-1	10	6/16/05:27:37	5.035	6/23/06:20:55	4.236	
21	6/23/01:22:08	183-1	7	6/16/04:12:06	30.750	6/23/02:07:01	61.528	
22	6/22/23:15:12	180-1	2	6/16/16:03:18	35.143	6/23/00:00:05	54.807	

LINE 6

24	6/22/19:01:20	174-1	0	6/16/19:20:37	-5.752	6/22/19:46:12	-11.202	
25	6/22/16:12:48	170-0	0	6/16/20:57:43	18.057	6/22/16:35:18	17.694	

GROUP 4

LINE 8

27	6/21/18:59:12	130-1	0	6/17/15:39:52	71.490	6/21/19:43:02	110.348	
29	6/21/23:55:44	137-1	8	6/17/19:43:05	8.118	6/22/00:40:36	17.533	

GROUP 5

LINE 6

31	6/23/22:52:48	110-0	0	6/20/03:18:31	2.552	6/23/23:16:20	-3.458	
33	6/24/00:59:44	113-1	0	6/19/22:51:50	10.226	6/24/01:45:41	2.834	
34	6/24/03:06:40	116-1	0	6/19/12:19:17	4.008	6/24/03:51:33	7.648	