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Sawyer PI

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August 3, 1989

M E M O R A N D U M

TO: Dr. Arthur E. Maxwell

FROM: Yosio Nakamura

SUBJECT: OBS Experiment Report, EDGE-Alaska Experiment

We participated in the EDGE project experiment in the Gulf of Alaska by deploying ocean-bottom seismographs ahead of the seismic vessel, GeoTide operated by Digicon, and by recording seismic signals from an air-gun array of GeoTide conducting a multichannel seismic reflection survey. The mode of operation was similar to that of our offshore-Louisiana experiment last year or of the Carolina Trough experiment. Namely, we operated in a 'piggy-back' mode, recording data while a commercial seismic vessel was conducting a regular seismic reflection survey without regard to our presence.

The experiment was supported by an NSF grant through a subcontract from Rice University, with Dr. Dale Sawyer of Rice University as the Principal Investigator. The scientific party consisted of Dale Sawyer and myself with two UTIG technicians: Phil Roper and Gary Lux.

Relevant technical details of the experiment are as follows:

Seismic Lines:	Beginning of line 301:	59°16.50'N, 153°48.00'W
	End of line 301:	58°34.49'N, 149°29.46'W
	Beginning of line 302:	58°37.00'N, 149°35.50'W
	End of line 302:	57°14.98'N, 147°38.48'W
Signal Source:	Digicon air-gun array; 50 m shot spacing.	
Shooting Times:	Line 301:	183/11:05:31 - 185/14:55:10 UT (July 2/03:05:31 - 4/06:55:10 Local)
	Line 302:	185/18:37:23 - 186/23:27:18 UT (July 4/10:37:23 - 5/15:27:18 Local)
Detectors:	UTIG OBS with either (A) a single 4.5 Hz vertical geophone, Mark Products L-1B, or (B) a gimbal-mounted set of three 4.5 Hz geophones (2 horizontals and a vertical), Mark Products L-15B.	
Recording:	(A) 20.4-second single-component recording every minute for approximately 20 hours using Qantex	

recorder at 10.008 ms sampling rate, or (B) nearly continuous three-component recording for 49 hours using Tandberg recorder at 7.992 ms sampling rate.

Because we had no control over when the shooting took place and because of the very limited facility on board to service the instrument, we programmed all OBS's with identical schedules and started each OBS at different times shortly before deployment. Specifically, each of type (A) OBS was programmed to start recording $1^h:30^m$ after the clock start and to record for $21^h:20^m$ or until the tape ran out (about 20 hours), and type (B) OBS was programmed to start recording 30^m after the clock start and to record for $2^d:01^h:00^m$ or until the battery to power the tape drive was exhausted. All OBS's were programmed to release $2^d:12^h:29^m$ after the initial clock start.

OBS Locations:

Site	OBS	Type	Deployment Location	Recovery Location	Depth
3	83-1	A	59°01.61'N 152°08.43'W (31890.1, 43559.7)	59°01.71'N 152°08.32'W	97 fms
4	85-1	B	59°00.06'N 151°58.85'W (31887.8, 43523.0)	not recovered	110 fms
5	83-2	A	58°58.45'N 151°48.80'W (31884.9, 43487.7)	58°58.48'N 151°48.99'W	89 fms
6	81-5	A	58°56.85'N 151°38.96'W (31882.6, 43453.7)	58°56.81'N 151°38.85'W	55 fms

Locations are from the display on the Loran-C unit on board Northern Light. Loran-C TD values (North Pacific Chain - GRI 9990, YTD and ZTD) are given in parentheses.

Our original plan was to make a total of 12 deployments covering the seaward 80% of the seismic transect line, where it crosses the Chugach terrain, the Contact fault and the active accretionary prism. We planned to do this by using 8 instruments: deploying two groups of 4 instruments each, recovering the first group and redeploying them further down the line. However, we had to abandon this scheme when it became clear that no ships large enough to provide us adequate on-board facility were available. We were told that all ships in the area that were larger than 50 feet in length had been hired by Exxon for the clean-up operation following the Exxon Valdez oil spill. With Northern Light, a 43 foot seine fishing boat, the largest available in the area, all we could possible hope for was to deploy eight instruments once at locations not far from her home port of Homer, Alaska.

It turned out that of the eight instruments we brought to the field site we were able to deploy only four of them. Of these four, one failed to come back to surface and another failed to record seismic signals, leaving only two instruments that recorded full data. The following is a brief summary of the performance of the eight instruments:

OBS 81-5: – The clock board failed during the initial check out and had to be replaced with one from OBS 85-2. Deployed at station 6 in sphere 15054, and recorded full data. The sphere leaked water after returning to the surface.

OBS 81-6: – The initial check out was O.K. but showed a symptom of system board failure after exposed to cold temperature on the deck. Deployment aborted. Returned to normal when warmed up by the sun light later.

OBS 83-1: – The system board failed during the initial check out and had to be replaced with one from OBS 85-2. Deployed at station 3 in sphere 15050, and recorded full data.

OBS 83-2: – Deployed at station 5 in sphere 19693. Lost analog signal before deployment and recorded only amplifier noise while on the sea floor.

OBS 83-3: – The initial check out was O.K. but failed after brought on board - did not pull the tape when expected. Deployment aborted. Also sphere 29036 had a dead geophone.

OBS 83-4: – The initial check out was O.K. but the clock failed after exposure on deck. Deployment aborted.

OBS 85-1: – Deployed at station 4 in sphere 23634. Not recovered.

OBS 85-2: – Not yet functioning when shipped to field. Not deployed.

The last two OBS's, 85-1 and 85-2, were equipped with high-density cartridge tape drives.

It was extremely disappointing to have such a high rate of equipment failure. The failures may be attributed to several possible causes, some of which are:

(1) Insufficient time to check out the instruments after arriving at the field base. The shooting was unexpectedly advanced with short notice.

(2) Humid and dusty environment at the field base. We had to do the equipment check out in a garage.

(3) Humid and cramped space on the fishing boat to prepare the instruments for deployment.

(4) Personnel shortage due to (a) loss of a technician and (b) running two experiments simultaneously.

Based on this experience, I might suggest the following to minimize failures in future experiments:

(1) Avoid running two experiments simultaneously, if at all possible. This may be difficult if the current situation in NSF funding is such that we do not know till very last minute whether a given field experiment is funded.

(2) Secure a facility appropriate for checking out instruments and prepare them for deployment. This may be either on or off the ship. Low humidity environment appears to be essential. An instrumentation van you suggested a few months ago is a good idea and warrants serious consideration.

A chronological narrative follows, with all times given in local Alaskan daylight time, which is 8 hours behind UT.

Wednesday, June 28

All members of the scientific party arrived at Anchorage (Y.N. from Noumea; D.S. from Houston; P.R. and G.L. from Austin). Rented a truck.

Thursday, June 29

Picked up the equipment at Delta Airline freight terminal and frames at P.I.E. trucking terminal. Drove 220 miles to Homer. Visited GeoTide (the MCS ship) and inspected Northern Light (the fishing boat to be used for OBS operation), meeting the latter's owner (Jim Herbert) and the deck hand (Pete). Unloaded the equipment at Ralph Botkin's garage. D.S. and Y.N. installed and tested the shot-time logger on GeoTide (later joined by G.L.). GeoTide left port shortly after midnight.

Friday, June 30

Spent all day checking out and preparing OBS, while GeoTide was conducting a bathymetry survey and balancing the streamer.

Saturday, July 1

Moved OBS and support equipment from Bonkin's garage to Northern Light and set them up.

21:00 Sailed from Homer on Northern Light with Ralph Botkin, captain.

Sunday, July 2

03:00 Arrived at station 4, but the seas were too rough to allow working on OBS on board. Decided to seek a shelter near Barren Islands.

05:40:00 (183/13:40:00 UT) Started the main clock of OBS 85-1 for station 4.

07:10:00 (183/15:10:00 UT) Started the main clock of OBS 83-1 for station 3.

11:55:00 Deployed OBS 85-1 at station 4.

12:55:08 Deployed OBS 83-1 at station 3.

Sailed back to the sheltered area at Barren Islands.

14:00:00 Started the main clock of OBS 81-6 for station 5.

15:30:00 (183/23:30:00 UT) Started the main clock of OBS 83-2 for station 6.

17:00:00 Started the main clock of OBS 83-4 for station 7, but the clock failed shortly thereafter.

18:00:00 (184/02:00:00 UT) Started the main clock of OBS 81-5 for station 7.

20:04:45 Finding that OBS 81-6 failed to function properly, deployed OBS 83-2 at station 5.

21:06:25 Deployed OBS 81-5 at station 6.

Monday, July 3

02:55 Returned to Homer.

Tuesday, July 4

08:40 Sailed from Homer.

15:15 Arrived at Ushagat Island in the Barren Islands to wait for the release of OBS 85-1.

17:45 Arrived at station 4. OBS 85-1 did not surface at the expected time. Waited till 18:48 and decided to proceed to station 3.

19:25 Arrived at station 3.

19:55 OBS 83-1 surfaced; recovered on board at 20:00.

20:45 Returned to station 4, but no sign of OBS 85-1.

Wednesday, July 5

03:40 Arrived at station 5

04:10:30 OBS 83-2 surfaced; recovered on board at 04:14:30.

06:42 OBS 81-5 surfaced: recovered on board at 06:45:30.

08:20 Returned to station 4; searched for OBS 85-1 north of the station; no sign of OBS. Terminated the search at 10:00.

14:45 Returned to Homer.

Thursday, July 6

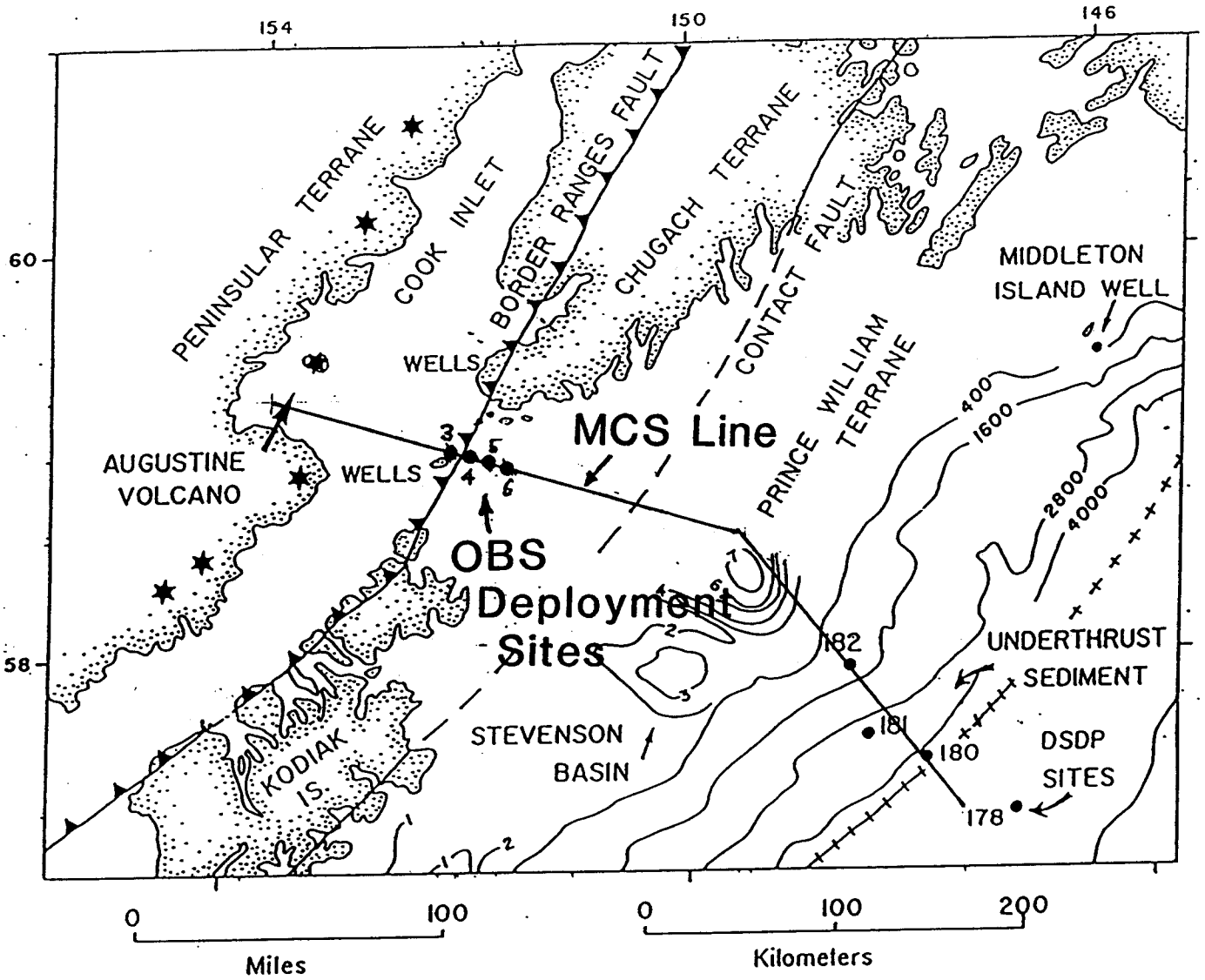
Packed the equipment. D.S. and Y.N. returned to Anchorage.

Friday, July 7

P.R. and G.L. took the equipment and leftover frames to Anchorage on Ralph Botkin's truck, shipped the equipment air-freight back to Austin and frames surface-freight to Corvalis, Oregon for the upcoming experiment. Y.N. left for Noumea and D.S. left for Houston.

Saturday, July 8

P.R and G.L returned to Austin.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MCS Line
PRINCE WILLIAM TERRANE
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OBS Deployment Sites
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