79014

CRUISE REPORT

D.R. Hutchinson

Ship: R/V NEECHO

Cruise no: NE-4-79

Project: GREAT LAKES (9-9450-32421)

Location: WESTERN LAKE ONTARIO

Dates: 19 JUNE - 10 JULY 1979

Ports:

Beccue Boat Basin
Edwin J. Beccue
Box 237
Wilson, New York 14172
716-751-6466

Harbor Breeze Marina
Bill Anderson
Point Breeze Road
Kent, New York 14477
716-682-3300

Scientific Party: Deborah Hutchinson, Chief Scientist, U.S.G.S.
Paul Loud, Boat Operator, U.S.G.S.
Frank Jennings, Technician, U.S.G.S
Ken Parolski, Technician, U.S.G.S.
William Brennan, Visitor, S.U.N.Y., Geneseo, N.Y. (July 8)

Purpose of Cruise:

(1) To collect high-resolution and airgun seismic reflection profiles and magnetic profiles over western Lake Ontario to identify geologic hazards (specifically fault structures and disturbances within the lacustrine sediments) that might be related to the low-intensity earthquake activity in western New York.

(2) To collect Alpine piston cores (24 ft, 1.5" diam.) to correlate lithology with acoustic stratigraphy, and measure paleomagnetic vectors (paleomagnetic work by W. Brennan).

(3) To collect Van Veen grab samples for specific bottom types.

Navigation Techniques:

(1) LORAN C: The northeast (9960) chain was used:

M= Master, Seneca, N.Y.
W= Slave 1, Caribou, Me. (16000)
X= Slave 2, Nantucket, MA (28000)
Y= Slave 3, Carolina Beach, N.C. (45000)
Z= Slave 4, Dana, Ind. (59000)

The NORTHSTAR unit was interfaced to a T.I. Silent 700 terminal and programmed to output every minute: time, lat./long., the TD readings and the signal: noise ratios for each slave. The satellite clock could not be interfaced; hence all time readings are relative to the time power was turned on each morning, ie., when the internal clock zeroed itself. Slaves 1 and 4 (WZ) were used to compute the lat./long. positions. All data were recorded on magnetic cassette tapes in the T.I. terminal.

(2) SATELLITE NAVIGATOR: A portable satellite reciever was carried along to calibrate the LORAN C readings. Comparison of the dockside Satellite fixes with the LORAN position showed the WZ slaves yielded the closest solution (i.e. had the minimum overland correction). Underway satellite fixes were in good agreement with the LORAN fixes.

Scientific Equipment

NORTHSTAR 6000 LORAN C Reciever (Digital Marine Electronics Corp.)
DMEC NORTHSTAR 6700 General Purpose Interface adapter
Texas Instruments Silent 700 ASR terminal with Cassette tape recorder
JMR-4 Sealand Surveyor Satellite Receiver

EDO WESTERN Fish Model 604150 (Side-scan and 2.5 kHz subbottom system)
EDO WESTERN Tranceiver Model 248 with 10 kw booster amplifier
EDO WESTERN Recorder Model 606A

RAYTHEON RTT-100A 7kHz system with EPC Model 3200 recorder

BOLT 1" Airgun Model 5000 with Tinkerbell
DEL NORTE hydrophone
TELEDYNE amplifier Model 300
HEWLETT-PACKARD 3960 Instrumentation Recorder

VARION Proton Magnetometer Model V-75 with strip chart recorder Model 7128A

VAN VEEN grab sampler
ALPINE piston core, 300 lb weight, 24' barrel, 1.5" diameter

Tablulated Information:

No. days at sea: 9 (seismics)
3 (coring)

Km of data:

7 kHz	577 km
2.5 kHz	577
1" Airgun	577
Sidescan	12
Magnetometer	542

No. of Stations: 11
No. of Piston Cores: 15
No. of Grabs: 6

TABLE OF STATION DATA

Sample Number	Water Depth(m)	Total Length (m)	(ft)	Uncorrected Latitude	Longitude
* 7021-PC-01	98	5.4	17'7.5"	43° 22.32'	78° 53.83'
7021-PC-02	98	6.0	19'8.5"	43° 22.38'	78° 53.84'
* 7022-PC-01	106	7.3	24'	43° 22.02'	79° 06.05'
7022-PC-02	106	6.7	22'	43° 22.05'	79° 06.05'
* 7023-PC-01	142	7.3	24'	43° 31.35'	79° 06.00'
7023-PC-02	142	7.2	23'7"	43° 31.37'	79° 06.01'
* 7024-PC-01	145	6.8	22'3"	43° 32.59'	78° 54.08'
7024-PC-02	145	7.0	22'10"	43° 32.53'	78° 54.05'
* 7025-PC-01	175	7.3	24'	43° 29.89'	78° 30.57'
7025-PC-02	175	6.5	21'3"	43° 30.00'	78° 30.69'
* 7026-PC-01	165	7.2	23'6"	43° 37.64'	78° 17.02'
7026-PC-02	164	7.1	23'5"	43° 37.70'	78° 16.91'
* 7027-PC-01	163	6.9	22'8"	43° 29.34'	78° 17.00'
7027-PC-02	169	7.3	24'	43° 29.35'	78° 16.83'
7028-PC-01	126	3.5	11'7"	43° 25.28'	78° 44.99'
7021 - vv - 01	98			43° 22.43'	78° 53.79'
[illegible]29 - vv - 01	51			43° 23.61'	78° 30.42'
[illegible]9 - vv - 02	51			43° 23.55'	78° 30.29'
7030 - vv - 01	12			43° 22.66'	78° 26.90'
7031 - vv - 01	125			43° 26.95'	78° 20.55'
7031 - vv - 02	119			43° 26.92'	78° 20.48'

* Co[illegible]s taken by W. Brennan for Paleomagnetic Analysis

Motels: Dollingers Motel
Albion, N.Y. 14411
716-589-5541

Twin Oaks Motel
Lockport, N. Y. 14094
716-433-2447

Daily Logs:

19 June: NEECHO in transit
Jennings, Parolski, Loud and Hutchinson transit to Lockport (U.S.G.S. van)

20 June: NEECHO arrived in Wilson and launched

21 June: NEECHO mobilized for seismics, transit to Oak Orchard

22 June: Complete lines 1a, 2, 18 (34.7 km)

23-24 June: Stormy weather; repair; NORTHSTAR interface unit, T. I. terminal plug, magnetometer winch chain, and antennae connection on Satellite receiver; reconfigure airgun; change flags and initialization parameters on satellite receiver

25 June: Complete lines 1, 1b, 2, 14, 15, 16, 17 (90.2 Km)

26 June: Complete lines 3,4,5 (93.1 km)

27 June: High winds, no data collected

28 June: Complete lines 10, ss-1 to ss-6 (66.0 Km)

29 June: Complete lines 10/11, 11 (51.5 Km) shut down 1357 due to building seas

30 June: Complete line 13 (61.1 Km)

1 July: Complete lines 8,9 (72.4 Km)

2 July: Complete lines 7,6, (51.0 Km) shut down 1330 due to building seas

3 July: High Winds, no data collected

4 July: Complete line 12 (57 Km)

5 July: High winds, rerig for coring

6 July: Collect Cores 7021 to 7024 (2/site)

7 July: Collect Cores 7025 to 7028 (2 site/except 7028)

8 July: Collect Grabs 7029 to 7031

9 July: Demobilize NEECHO and load on trailer

10 July: Return to Woods Hole

Comments

CREW PERFORMANCE: The outstanding performance of Paul Loud, for his able and safe operation of NEECHO in rough seas and small harbors, and Frank Jennings and Ken Parolski, for their perseverence and quality operation of the acoustic, magnetic, navigational and sampler equipment deserves to be commended. The operation of the boat and its equipment was essentially smooth.

NEECHO PERFORMANCE:

(a) SPEED: The speech performance of NEECHO was very disappointing. Our top steaming speed varied between 8 and 11 kts depending on sea and wind conditions. A boat with speed limitations such as measured on NEECHO should not be more than 1 hour from a port in areas where the sea state can deteriorate from calm to 2-5 foot seas in the space of ½ to 1 hour, such as we encountered on Lake Ontario. This may be a consideration in using a multichannel system, where deploying and recovering gear further slows an operation.

(b) WEIGHT: It would seem a major and critical evaluation of the weight distribution and equipment being used on NEECHO is necessary to improve the boats performance and response.

(c) STABILIZATION: NEECHO has a tiring and very unconfortable motion in even small seas, This motion does effect the quality of data, particularly the 7kHz and 1" airgun. Whether her enhanced motion is due to solvable problems (e.g. overweight super structure, heavy stern etc.) or unsolvable problems (e.g. flat bottom design) should be investigated.

LOGISTICS FOR FUTURE CRUISES:

(a) NAVIGATION: We gave the LORAN Northstar receiver and its many navigational aid systems a good workout (e.g. steering latitude/ longitude lines, steering computed courses), as well as using course and speed outputs to update the dead-reckoning calculations of the satellite navigator. The ability of the Northstar receiver to calculate latitude and longitude made it relatively simple to estimate the slave pair with the best signal: noise ratios and least overland correction. The satellite receiver served as a valuable check for dockside and underway position checks. I recommend the satellite receiver be permanently or semipermanently installed on NEECHO.

(b) LENGTH OF DAY: Living in motels and dining out takes time and is fatiguing after working long days on NEECHO. From our experience, work days which began between 7:00 - 8:00 (ARRIVE at NEECHO) and ended no later than 18:30 (NEECHO locked up for the night) were the limit of physical and emotional tolerance for operations on successive days. The best regime was to intermix long with short days, although this kind of schedule is very restricting to the amount of data which can be collected on days where long steam are necessary to and from trackline end points.

(c) PORT STOPS: Where ports change within a cruise and transportation to motels is required, and strongly recommend a shore based operation (e.g. 1 person) be arranged in order to transit the ground transportation between docksides. We relied on private taxi service to return us to the van, which proved expensive and time consuming after a long day on the lake.

(d) USE OF NEECHO IN GREAT LAKES: A critical review of the NEECHO should be made for its use in Great Lakes water. Some pertinent points include (1) rapid rate at which seas build; (2) slow steaming speed of NEECHO when caught offshore: (3) time wasted in steaming to line or station sites; (4) lack of abundant ports; (5) extreme deep water; and (6) narrowness of good weather window. While we collected outstanding data and samples on the days we could operate, a combination of the above points rendered the NEECHO considerably less versatile and seaworthy than her initial designs promised.