89015 + 89016

LAURENTIAN LAUR 89-1+2

Colman Lake Michigan

June 13-18, 1989

June 19-22, 1989

GEOPHYSICS LOG ** CHI SCI's NOTES

104697

89015 sei

U.S.G.S.
GEOPHYSICS
LOG

SHIP LAURENTIAN

CRUISE NO. LAUR 89-1

DATE 6/12/89 - 6/22/89

CHIEF SCIENTIST colman

U.S. GEOLOGICAL SURVEY

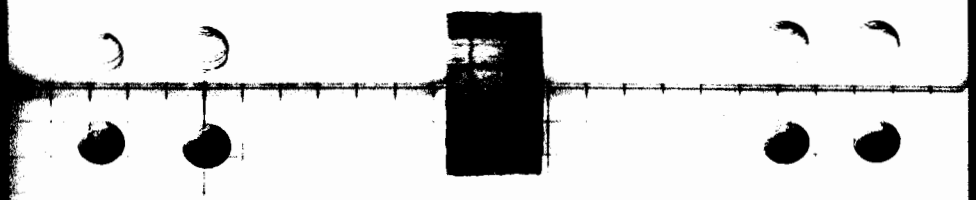
GEOPHYSICS LOG

MISC NOTES

S. Colman

LAUR89-1&2

MISC NOTES



CRUISE LAUR 89-1

June 12. Mobilization, Grand Haven, Michigan

Personnel

Ken Parolski - USGS left WH June 10 AM driving equip truck, arrive Lake June 11

Tom Lavoie - USGS flew, arrived Lake June 11

Steve Colman - USGS geol sci.

Dave Foster - USGS, arrived June 11

Dan Block - USGS

Graham Larson - MSU

R/V Laurentian - Skipper: Bob Nauda

Equipment

1. 3.5 kHz system
   - ORE transducer
   - ORE 140 transceiver
   - EPC 3200 recorder
2. Boomer system
   - ORE Geopulse sled, boomer
   - " " power supply
   - " " 5210 receiver/filter
   - EPC 4800 recorder
3. Other seismic
   - Datum 9300 IRIG-B Time code generator
   - BNC 7010 Delay generator
   - EPC 312 Record annotator
   - Benthos AQ-4 streamer
   - Panasonic AG 6810 VCR
4. Navigation
   - Magnavox Accufix 500 receiver
   - IBM PC control Program (Irwin) and printer / disk storage system
   - Lines 8970-Y
     8970-X
5. Coring
   - WHOI 3-m gravity corer, vertical recovery
   - Sutar Box Corer (Lawrenceburg)

single - side band

WLC Rogers City

517 - 734 - 2146

Maritel Systems (Tenn.)

901 - 789 - 3700

Benton Harbor, Muskegon, Frankfort
marine operators

20 - 24	99 nm
25 - 27	52
28 - 29	35
30 - 32	44
33 - 37	78
38 - 39	147
40 - 42	100
43 - 51	98
	653 nm

1208 km

June 13 AM Finish Mobilization

1130 Leave Dock, Grand Haven

1200 SOL 20

1310 Start SA-1

1458 Stop SA-1, start SA-2

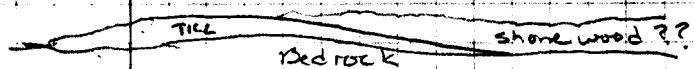
1505 Nav problems, ship off course

1540 start roll 2, geopulse

1611 EOL 20 / SOL 21 1935 Shorewood margin
2040 - pock marks in thick lake sed

2126 EOL 21 / SOL 22 SA-5 32 min

2145 may have crossed Shorewood margin?
small lobe?



2205 Another onlapping unit over Shorewood?

2230 This is the Shorewood margin

2255 change tapes SA-6 in

June 14

0000	EOL 22 / SOL 23 SA-6 105
0055	FINISH TAPE 6 / START TAPE 7
0225	New Navsheet, disk (END NAVST. 1, BEGIN NAVST. 2)
	0210 – Shorewood Margin
0300	~~Tape~~ belt replaced on 3.6
0308	system shut down, generator failed
0325	RKSTAT video at 11 min 52 sec.
0340	system shut down, change in generator video at ?
0344	system up: ship circling back to position
0346:30	ship in position, continue line
0354	video on
	0540 – ditto
0610	EOL 23 / SOL 24
	0650 – deep layered bedding
1014	EOL 24
1020	Steaming to core site 5

0530 deep landward dipping refl. nearshore

June 13-14 99 nm

June 14th (cont.)

1200 Core site 5

GC-5 - gravity core - over penetrated by several feet but ~70 cm of water in top of core; appeared to be a clay plug on cutter that fell out when it cleared the water - not sure if there was compression or we lost material out the bottom

BC-5A & B Box core - went well, good sample ~ 70cm core B frozen

1400 Core site 4

GC-4 - mud on wt stand, ~ 1 or 2 ft of overpenetration; good plug on core cutter - nothing lost out bottom. ~ 38 ~~40~~ cm of water on top of core tho

BC-5A & B - good

B frozen

June 14th (cont)

1530 Core site 2 - photos 1-9

GC-2 similar to GC-4
262 cm - 38 cm water on top

BC-2A only one core from box corer taken - frozen
68 cm

1630 Core site 1

GC-1 - mud on lower part of wt. stand; not as much over-penetration. Only 237 cm recovered tho.

BC-1A & B - 45 cm - clay in lower half definitely stiffer than previous core sites - didn't flow when box corer lifted.
Lots of bivalve and gastropod shells (and worms) on surface.

BC-1B Frozen

1830 Core Site 3

GC-3 - Part of core came out the bottom as it was being brought on deck; put in 3 double core caps — all gray stuff
Recovered length = 265 cm
plus three pieces = 294 cm
Mud on weights only - slight overpenetration

BC-3A - only one sample of box core taken; clear oxidized indurated sand layer ~ 30 cm from top. BC-3A Rosen 51 cm long.

June 14	Resume seismics
1935	SOL 25
2130	SA-11 to SA-12
2225	progradational bedding in lake sed nearshore
2319	EOL 25 / SOL 26 SA13 1:50
June 15	
0255	EOL 26 / SOL 27 SA14 1:26
0610	Shutdown due to weather
	Steam for Waukegan
1100	Ar. Waukegan
	June 14 - 15 52 nm

June 16 Lv. Waukegan 0600

0715 Core site 13

GC-3 - Cable twisted around top & shaken to get loose, could have lost some out bottom altho none seen. No mud on wt. stand. 191 cm recovered, water on top

core cutter was cut off - sample in separate container. Contains 2 cm diam. piece of wood *

No ~~gravity~~ box core taken (somewhat rough and raining)

0900 Core site 9

GC-9 - Slight overpenetration; mud on lower foot of weight stand. Good plug in catcher nothing lost. 221 cm Red at bottom

BC-9A & B - 50 cm
Upper ~20 cm much browner than below, with a slightly iron-indurated and stained 1 cm layer in between
BC-9B Frozen

run 3.5 between site 9 and 12

June 16

1030 Core site 12

GC-12 - Nearly full; prob nothing lost out bottom. Mud on lower wt. stand - ~1 ft over-penetration. Red at bottom
275 cm recovery

BC-12A - Only one taken, not frozen. Similar to site 9 for color and iron stain. Some shells on surface; coquina layer ~ in middle. 50 cm recovered.

1223 SOL 28
see Dan's Log

1510 EOL 28, approach core site #11

June 16, 1989

1530 Core site # 11

GC-11 - Good tip on cutter (fell out at surface) - nothing lost. Mud on lower weights, <1 ft overpenetration. 295 cm recovery. Appears to be all gray.

BC-11A (only one taken) 70 cm recovered - all gray with black streaks

1628 SOL 29

1730 V. good dewatering (?) Structure

1940 Stop line 29, approach Core site #20

June 16

2015 Core Site #20

GC-20 – About 1-1½ feet overpenetration – mud on weight stand. Core barrel overfull – 300+ cm Material at very top saved separately. Reddish brown at bottom

BC-20A & B – 63 cm looks all gray with black streaks on color. B frozen

2200 Core site 22 – very planar shallow reflector not seen

GC-22 – ~1 ft overpenetration mud on lower half of weights; ~290 cm recovered

BC-22A – 44 cm lots of shells – couldn't see color. Only one taken, not frozen

2300 Core site 23 – GC-23 – no
June 16 (35 nm) box core – too dark to see much

June 17, 1989

0107 SOL 30 Off Racine (Wind Pt.)

~0120 Shore-wood margin (?)

0221 Change tape to tape 20

0330 Change course Line 30

0414 EOL 30 / SOL 31

0440 Change to tape 21

0645 Change to tape 22

0505 Shore-wood margin

0756 EOL 31 / SOL 32 SA 22 (1:10)

Line 32 - rerun part of SIMS88 Line 3

0845 Change to tape 23

0944 EOL 32

0950 Steam to core site 7

9/17 AM 44 nm

June 17

1030 Core site #7

GC-7 - Very good core - mud on very bottom of weight stand - little overpenetration. Core almost full ~ 295 cm. Good tip on cutter - looked gray at bottom

BC-7A - 65 cm
Gray with black streaks throughout, brownish (dark) on top. Only one sample, not frozen

1230 Core site # 6

GC-6 - mud only on lower wts, little overpenetration 252 cm recovered, no tip on cutter but prob nothing lost. Gray at bottom

BC-6A & B - 82 cm - very soupy, gray with black streaks; dark brownish gray on top
Sample A frozen

June 17

1440 SOL 33

1500 Shorewood margin — good

1550 EOL 33 SOL 34

34 is ~ ⊥ to margin — till thickens and thins

1735 EOL 34 SOL 35

Shorewood margin at ~ 100m depth contour

2106 EOL 35 SOL 36 Tape 26(103)

2134 Good collapse (?) or dewatering (?) structure

2204 Change to tape 27

June 18

0004 Change to tape 28

0057 EOL 36 / SOL 37

0455 EOL 37

0600 arr. Grand Haven 6/17-18

78 nm

Total leg 1
308 nm
569 km

June 19 LAUR89-2

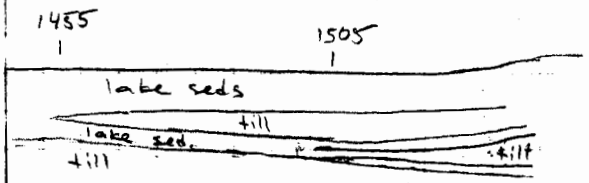
0710 Lv. Port, Grand Haven

0940 SOL 38 Tape 30 started 0944

1255 possible till margin

1445 Greasy till margin (moraine)
- up to 10 m thick stratified sequence beneath till

1505 deeper till margin, at least two surges in moraine ✱



3 tills separated by stratified sequences

1600 Stop to core sites 27 & 28

June 19

1630 Core Site 27

GC-27 - 266 cm recovered
<1 ft over penetration - mud only on bottom of weights. Nothing appears to be lost. Reddish clay at bottom

BC-27A - one only, not frozen
50 cm
- sandy reddish layer ~ 15 cm at top, Gray clay with black streaks below

1730 Core Site 28

GC-28 - 251 cm recovered, mud only on lower weight stand Nothing lost out bottom. Appears gray at bottom

BC-28A - 41 cm - not frozen, one
- Reddish throughout, only with several stiffer layers (the whole core is stiffer than previous ones). One stiff non-stained layer near top. Shells common on several horizons

June 19

1914 Resume Line 38

1947 C/C line 38

2110 Depression in seafloor and lake sed's over b.r. scarp - till (?) also thins @ scarp

2122 C/C line 38

June 20

0025 — possible till margin

0100 C/C line 38

0205 C/C line 38

0440 — till pinches out against b.r. high

0605 EOL 38

Approach core site #29

June 20, 1989 LAUR89-2

0715 Core site 29 (Hough's M-1)
GC-29- 294 cm -
Good core - <1 ft over penetration good trip on cutter - red at bottom

BC-29A & B - 83 cm
Appears gray with black streaks throughout. Two samples; B frozen

1024 SOL 39
1030 nearshore mound ≒ shoreline?
1656 Break line to approach core site #30

1730 Core Site #30
GC-30 - 239 cm
Little over penetration, but sediment settled as it stood; look like nothing lost out bottom. Top section settled at least 7cm - bottom gray

BC-30A - 86 cm - almost full
Very soft and fluid - flowed out bottom when jaws opened
Dark brown on top, gray with black streaks below

lines 38 & 39
147 nm

1823	Resume line 39
2125	EOL 39 / SOL 40
2335	terrace and shoals ~ 70 m deep

June 21, 1989 LAUR89-2

0305	good b.r. cuesta
0635	EOL 40 SOL 41 tape 47
0935	Good Manitowoc margin
0943	C/C line 41
1034	Lost LORAN signals regained in a few minutes
1217	EOL 41 SOL 42
1556	EOL 42

June 21

1730 Core site 24

GC-24 - 229 cm

About 1 ft overpenetration, no tip on cutter but nothing appeared lost. Quite reddish at bottom

BC-24A - 47 cm - one only - not frozen

- Brownish (dark) silty unit over brown sandy, iron-stained thin layer, over gray mud with black streaks

1830 Core Site 25

GC-25 - 238 cm

<1 ft overpenetration, good tip on cutter = gray with black streaks.

BC-25A - 62 cm - one only not frozen. Gray with black streaks throughout, much softer than at site 24

June 21

1920 Core Site 26

GC-26 - 238 cm
About 1M over penetration; no top on cutter, but nothing appears lost. Very reddish clay in cutter

BC-26A & B - 49 cm
Upper ~20 cm reddish brown to gray, over several, dry, cohesive orange clay layers, over gray mud with black streaks. Two taken, B frozen

2205 SOL 43 Tape 51

June 22

0000 EOL 43 / SOL 44 Tape 51 0051

Two Rivers? marsh didn't pinch out - continues to Bedrock scarp

June 22, 1989 LAUR 89-2

0055 EOL 44 / SOL 45

0214 EOL 45/SOL 46

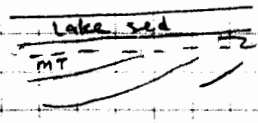
0315 EOL 46/SOL 47

0450 EOL 47/SOL 48

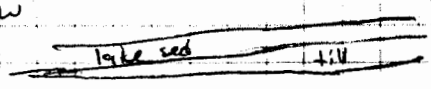
0726 EOL 48/SOL 49

0745 pinchout of Manitowoc (?) Till but it is erosional — truncated by Chip. unconf. (only on a knob; continues)

0810 Possible margin



0825 Till pinches out other direction (to the NW)



0924 EOL 49 / SOL 50 TAPE 57 41 mins

June 22	LAUR 89-2
1303	EOL 50 / SOL 51
1459	EOL 51

SHIP/CRUISE NO./LEG LAUR-89-1

CHIEF SCIENTIST

LINE START / END	TIME Local	YYMMDD	CRS/HDG	SPD	NAVIGATION	SEISMIC SYSTEM
	1130	890613			MEGAPULSE L/C	3.5, 6 BOOMER
	1200					
	1310					
	1458					
	1505					
	1611					
	2126					
	2255					
	0000	890614				
	0055					
	0225					
	0300					
	0308					
	0325					
	0340					
	0349					
	0346					
	[redacted]	890614	~~133~~	~~4.5~~		
23	0420	890614	133	4.5	32684.5/49723.1	3.5, 6 BOOMER
"	0500	"	"	"	32679.9/49750.6	3.5, 6 BOOMER
	0525					
	545					
24	0610				32670.6/49797.4	
	0614					
	0720					
	0844					
	0957					
	1014					

AREA

TIME ZONE

SWP	PROGRAM / SCALE	FILTER HI/LO	TAPE NO. START / END	DATA ROLL# START / END	MAGNETICS	COMMENTS
				3.5 CROQUISE		
1/4	3					DEPART DOCK GRAND HAVEN
						SOL 20
						BEGIN SA-1
						END SA-1 BEGIN SA-1
						OFF COURSE
						EOL 20 SOL 21
						EOL 21 SOL 22
			6			START TAPE 6
						EOL 22 SOL 23
			7			END TAPE 6 / START TAPE 7
						END NAVDISC 1 START NAV 2
						REPLACE 3.5 BELT
						BREAK LINE (CIRCLE).
						GENERATOR LIGHT
						SWITCH TO ALTERNATE
						SYSTEM UP RESTART LINE
						23
						BREAK LINE: SWITCH
						GENERATOR (CIRCLE)
						IN POSITION TO RESTART
						RE-RESTART LINE 23
						SYSTEM UPDATE
1/4	1/2 SEC FIRE	300-3KHZ	8	2/2		
"	"	"	"	"		
			9			CHANGED TAPE
						3.5 kHz BELT CHANGE
						EOL 23 SOL 24
						CHANGE CROQUISE ROLL #3
			10			CHANGED TAPE
						change Δ 3.5 Belt 0844
			11			CHANGED TAPE
						EOL 24

SHIP/CRUISE NO./LEG

CHIEF SCIENTIST

LINE START / END	TIME	YYMMDD	CRS/HDG	SPD	NAVIGATION	SEISMIC SYSTEM
	1127	890614				3.5 kHz
	~~1500:46 890~~					
	1327	890614				3.5 kHz
	1500:46	890614				3.5 kHz
	1616	890614				3.5 kHz
	1809	890614				3.5 kHz
25	1935	"				3.5 KHz 650J/SE
"	2040					
"	2048					
	2130					
	2319					
	0128	890615				
	0321	"				
	0501	"				
	0605	"				
	1100	"				
0015	[redacted]	890616				
	0900	"				
		"				3.5 kHz
	1030	"				
	1223	"	27°	5kt		3.5 kHz, Geopulse
	1330					
	1400					
	~~1440~~					
	~~1440~~					
	1510					
	1550					
	1643					

AREA

TIME ZONE

SWP	PROGRAM / SCALE	FILTER HI/LO	TAPE NO. START / END	DATA ROLL# START / END	MAGNETICS	COMMENTS
						on core site 5
						on core site 4
						on core site 2
						on core site 1
						on core site 3
						SOL 25
						3.5 Belt Change
						Geopulse Belt Change
						Changed Tape (SA-12)
						EOL 25 / SOL 26
			13/14			Changed tape
						CHANGE TO TAPE 15
						CHANGE TO TAPE 16
						BREAK LINE 26 WX.
						Dock Waukegan, IL.
						Gravity core / site 13
						Gravity core, Box core / site
						3.5 kHz site 9 12
						Gravity core / box core / site 12
1/4		300-5000	16	3-3		SOL 28
			17/16			changed tape (SA-12)
				NAVST 4-5		changed ~~print roll~~ navsheet 1,
						problem with printing-no LORAN
						data 1350-1415
						error in LORAN, see 1435 1435 for coords
						~~[illegible]~~
						slow to approach core site #11, stop
						GEOPULSE
						Gravity core, Box core / site 11
			19/18			CHANGED TAPE

SHIP/CRUISE NO./LEG

CHIEF SCIENTIST

LINE START / END	TIME	YYMMDD	CRS/HDG	SPD	NAVIGATION	SEISMIC SYSTEM
30	0707	890647				35 [illegible]
	0221					
	0530				changed course	
	04:14				change to course	
	04:40					
	06:45					
	0756					
	0845					
	0944					
33	1445					
	1550					
33/34	1555				changed line	
34/35	17:36				changed line	
	17:54				[illegible]	
	20:05					
	2106					
	2204					
	0003					
35/37	0057				changed line	
	02[illegible]					
	0443					

AREA

TIME ZONE

SWP	PROGRAM / SCALE	FILTER HI/LO	TAPE NO. START / END	DATA ROLL # START / END	MAGNETICS	COMMENTS
						SOL 30
			19/20			changed tape
						changed course
					SOL 31	~~changed course~~ 8-4
			20/21			~~changed tape~~ to 21
			21/22			changed tape to 22
						EOL 31 / SOL 32
			22/23			change to tape 23
						EOL 32
						SOL 33
			23/24			changed tape
						changed line
						changed line
			24/25			changed tape
			24/25	25/26		changed tape
			25/26			EOL 35 / SOL 36
				26/27		changed tape
				27/28		changed tape
						changed line
				28/29		changed tape
				29/30		changed tape

SHIP/CRUISE NO./LEG

CHIEF SCIENTIST

LINE START / END	TIME	YYMMDD	CRS/HDG	SPD	NAVIGATION	SEISMIC SYSTEM
	0715	890619				
	0940	890619	350°	5kts	326544	3.5 kHz, Geopulse
	1015	"	"			
	1130	"	"			
	1330	"	"			
	1532	"				
	2106	"				
	2308	"				
	0100	890620				
	0100	"				
	0259	"				
	0315	"				
	0344	"				
	0465	"				
	0514	"				
	0605	"				
	1024	"				3.5 kHz, Geopulse
	1142	"				
	1341	"				
	2055	"			1583	
	2125					
	2127					
	2322					
	0143					
	0200					
	0342					
	0400					
	0445					
	0606					
	0632					
	0840					
	1057					
46/47	1217					

AREA

TIME ZONE

SWP	PROGRAM / SCALE	FILTER HI/LO	TAPE NO. START / END	DATA ROLL # START / END	MAGNETICS	COMMENTS
						U/W TO 1st LINE
1/K1	7/31 230 ms	5000-300 Hz	30	5		SOL 38
						Change belt 3.5 KHz
			30/31			Change tape to 31
			31/32			change tape to 32
			32/33			change tape to 33
			33/34			change tape to 34
			34/35			Change tape to 35
						course change
			35/36			change tape to 36
						course change
			36/37			change tape to 37
						TIME CORRECTION ON TAPE 37
						C/C LINE 38
						CHANGE TO TAPE 38
						EOL 38
			37			SOL 39
			38/39			Changed to tape 39
			39/40			changed to tape 40
						change belt - geopulse
						EOL 39
						SOL 40
						change to tape 44
						course change
			44/45			change to tape 45
						course change
						ON LINE, 40
						CHANGE TO TAPE 46
						CHANGE TO TAPE 47 LINE 40
						EOL 40 SOL 41 CHANGE TO TAPE 47
						change to tape 48
						change to tape 49
						EOL 41 SOL 42

SHIP/CRUISE NO./LEG

CHIEF SCIENTIST

LINE START / END	TIME	YYMMDD	CRS/HDG	SPD	NAVIGATION	SEISMIC SYSTEM
	1303	890621				
	1506	"				
	1556	"				
	1730	"				
	1830					
	1920					
	2205					3.5 kHz, Geopulse
	2308					
43/44	2400					
44/45	0055					
	0109					
45/46	0214					
	0313					
46/47	0365					
47/48	0450					
48	0516					
	0718					
49	0726					
49	0842					
50	1104					
51/50	1303					
	1306					
51	1500					
	1530					
	1600					

AREA

TIME ZONE

SWP	PROGRAM / SCALE	FILTER HI/LO	TAPE NO. START / END	DATA ROLL# START / END	MAGNETICS	COMMENTS
			49/50			change tape to 50
			50/51			changed tape to 51
						EOL 42
						Gravity + Box core 24
						Gravity + Box core 25
						Gravity + Box core 26
			51/52			SOL 43
						Change to tape 52
						EOL 43 / SOL 44
						EOL 44/SOL 45
			52/53			change to tape 53
						EOL 45/SOL 46
			53/54			Chang to tape 54
						EOL 46/SOL 47
						EOL 47 SOL 48
			55			CHANGE TO TAPE 55
						CHANGE TO TAPE 56
						EOL 48 SOL 49
			56/57	55/57		Change to tape 57
						Change to tape 58
						EOL 50/SOL 51
			58/59			change to tape 59
						EOL 51 TAPE 59
						Gravity - Box core 31
						Return - Grand Haven