#89015

CRUISE REPORT, LAUR89-1 and -2

Vessel:	R/V Laurentian
Cruise number:	LAUR89-1 and -2
Parent project:	Lake Level and Sedimentation History (LLASH)
Area of operations:	Lake Michigan
Port:	Grand Haven, Michigan
Cruise dates:	leg 1: June 12-18, 1989
	leg 2: ~~Sept.~~ June 19-22, 1989
Chief scientist:	Steve Colman (USGS)
Scientific party:	Dave Foster (USGS)
	Dan Block (NAGT student)
	Tom Davis (WHOI)
	Graham Larson (Michigan State University) leg 1
Technician:	Ken Parolski (USGS)
Ship's captain:	Bob Nauda

Purpose of cruise:

Collection of seismic-reflection data and cores in Lake Michigan to define the stratigraphy and sediment character of the deposits below the lake floor. The last years' seismic-reflection data was used to choose core locations for this cruise, and to define areas where new seismic-reflection data were needed. New gravity and box cores were obtained at most of the sites that were piston cored or vibracored last year, and a number of new core sites were established. These cores will be used to develop a closely dated record of sedimentation and paleoenvironmental conditions in the lake. The cores and the seismic-reflection data together will be used to determine the history of lake-level fluctuations over the last several thousand years.

Navigation:

Positions were determined from Loran-C time delays using the Branch's IBM-PC system and Megapulse receiver, on lines 8970-X and 8970-Y. Coordinates were recorded on disk at ten second intervals and printed at five minute intervals. Coordinates were also recorded by hand on the seismic-reflection records.

Scientific equipment employed:

- Seismic reflection (3.5 kHz)
  - ORE transducer
  - ORE 140 transceiver
  - EPC 3200 graphic recorder
- Seismic reflection (boomer)
  - ORE Geopulse sound source and power supply
  - ORE Geopulse 5210A amplifier/filter
  - Benthos AQ-4 10-element hydrophone streamer
  - Datum 9300 time-code generator
  - BNC 7010 digital delay generator
  - EPC 312 record annotator
  - EPC 4800 graphic recorder
  - Panasonic AG6810 Video cassette recorder
- Navigation
  - Megapulse Accufix 500 Loran-C receiver
  - IBM-PC control program (Irwin) and printer/disk storage

Equipment performance:

The ORE 3.5 kHz and Geopulse seismic systems performed extremely well, with no down time. The Loran navigation system also worked well, except for occasional signal losses. The Sutar box corer provided with the Laurentian and the vertical-recovery gravity core system provided by WHOI worked very well. There were no failures of the coring equipment or of the ships winches, cranes, or other equipment.

Cruise Summary:

The cruise extemely successful, and no time was lost to equipment failures. The weather was mostly cool, foggy, and flat, and only one day was lost to weather. A total of 1200 km of seismic-reflection profiles (3.5 kHz and boomer) were collected. Twenty-two coring stations were occupied, six of which were reocupations of last years' piston or vibracore sites, and the remainder were new sites. At each station, a 3-meter vertical-recovery gravity core was taken, along with a box core. The box cores ranged from 40 to 80 cm long, and at half the stations, dual box core samples were taken and one was frozen. Analysis of the seismic-reflection profiles and cores should provide sufficient data to begin to decipher the history of changes in lake level in Lake Michigan over the last several thousand years and the lake's response to those changes.

Attachment: track chart and core locations

cc: B. Butman
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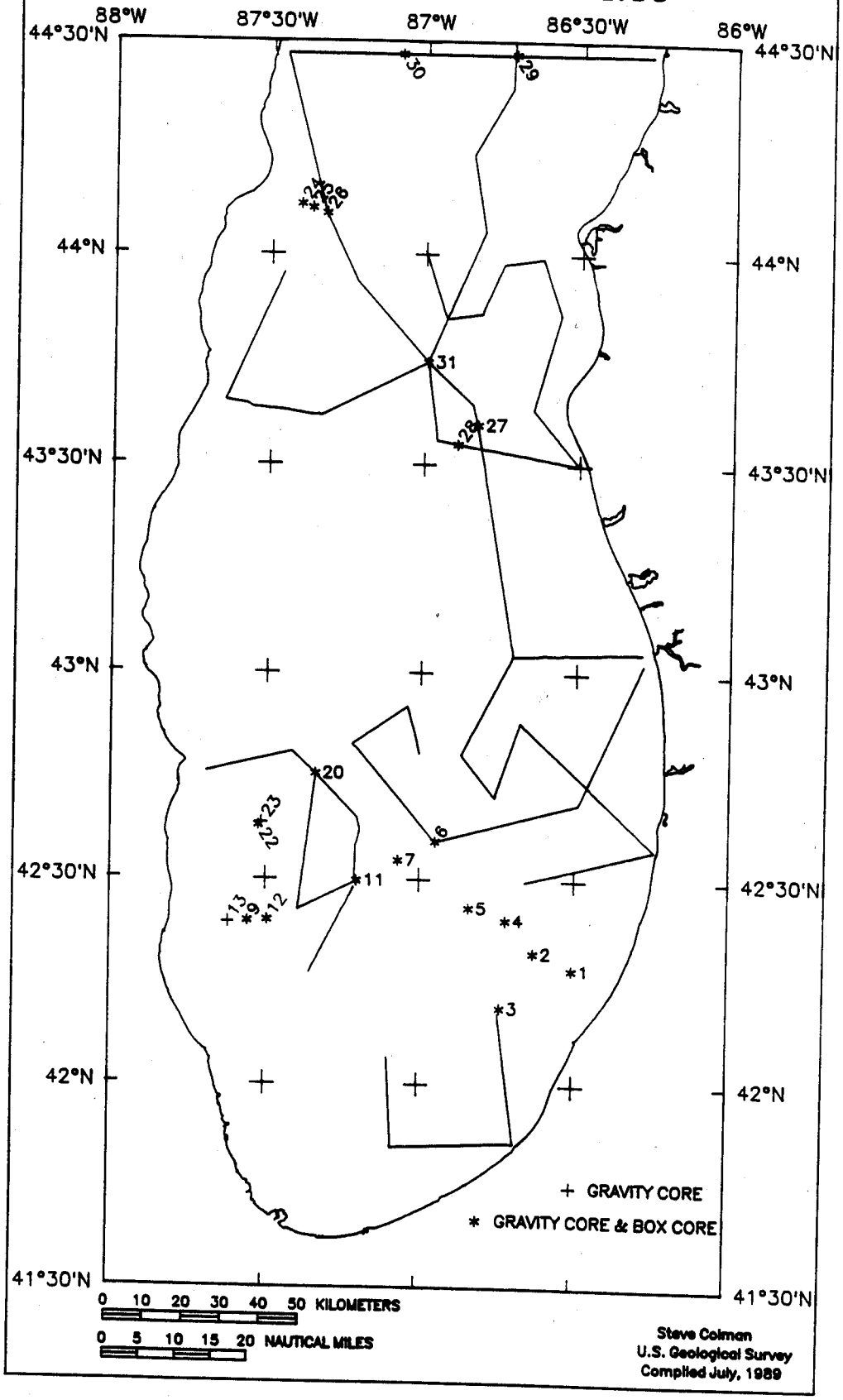
LAKE MICHIGAN – LAUR89



Steve Colman
U.S. Geological Survey
Compiled July, 1989

LAUR89 start and end of lines

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#-b LAUR89-1 LINE 20 6/13/89 1200-1611 3.5 kHz, GEOPULSE
 SOL    164:12:00:00    43.051273       -86.285408      32511.21        49494.96
 EOL    164:16:11:00    43.039860       -86.701775      32655.64        49452.88
#-b LAUR89-1 LINE 21 6/13/89 1611-2126 3.5 kHz, GEOPULSE
 SOL    164:16:11:00    43.039860       -86.701775      32655.64        49452.88
 EOL    164:21:26:00    42.700962       -86.755760      32801.25        49664.43
#-b LAUR89-1 LINE 22 6/13/89 2126-2400
 SOL    164:21:26:00    42.700962       -86.755760      32801.25        49664.43
 EOL    164:24:00:00    42.880371       -86.674889      32706.39        49558.66
#-b LAUR89-1 LINE 23 6/14/89 0000-0610 3.5 kHz, GEOPULSE
 SOL    164:24:00:00    42.880371       -86.674889      32706.39        49558.66
 EOL    165:06:10:00    42.577419       -86.240898      32670.63        49797.89
#-b LAUR89-1 LINE 24 06/14/89 0610-1014 3.5 kHz, GEOPULSE
 SOL    165:06:10:00    42.577419       -86.240898      32670.63        49797.89
 EOL    165:10:14:00    42.495930       -86.654312      32847.47        49808.97
#-b LAUR89-1 LINE 25 06/14/89 1935-2319 3.5 kHz, GEOPULSE
 SOL    165:19:35:00    42.174850       -86.736275      33003.96        50008.93
 EOL    165:23:19:00    41.857296       -86.681549      33116.31        50221.19
#-b LAUR89-1 LINE 26 06/14/89-06/15/89 1935-0255 3.5 kHz, GEOPULSE
 SOL    165:23:19:00    41.857296       -86.681549      33116.31        50221.19
 EOL    166:02:55:00    41.845066       -87.080261      33255.48        50189.30
#-b LAUR89-1 LINE 27 06/15/89 0255-0610 3.5 kHz, GEOPULSE
 SOL    166:02:55:00    41.845066       -87.080261      33255.48        50189.30
 EOL    166:06:10:00    42.064690       -87.095993      33166.90        50040.73
#-b LAUR89-1 LINE 28 06/16/89 1223-1510 3.5 kHz, GEOPULSE
 SOL    167:12:23:00    42.273476       -87.352631      33156.02        49865.54
 EOL    167:15:10:00    42.479836       -87.210678      33030.36        49748.85
#-b LAUR89_2 LINE 29 06/16/89 1628-1940 3.5 kHz, GEOPULSE
 SOL    167:16:28:00    42.499493       -87.208778      33021.87        49736.08
 EOL    167:19:40:00    42.746895       -87.328651      32958.29        49553.94
#-b LAUR89-1 LINE 30 06/17/89 0107-0414 3.5 kHz, GEOPULSE
 SOL    168:01:07:00    42.758713       -87.691139      33051.96        49484.98
 EOL    168:04:14:00    42.754822       -87.339012      32958.13        49547.05
#-b LAUR89-1 LINE 31 06/17/89 0414-0756 3.5 kHz, GEOPULSE
 SOL    168:04:14:00    42.754822       -87.339012      32958.13        49547.05
 EOL    168:07:56:00    42.426643       -87.392967      33104.51        49756.85
#-b LAUR89-1 LINE 32 06/17/89 0756-0944 3.5 kHz, GEOPULSE
 SOL    168:07:56:00    42.426643       -87.392967      33104.51        49756.85
 EOL    168:09:44:00    42.495895       -87.202133      33021.36        49739.43
#-b LAUR89-1 LINE 33 06/17/89 1440-1550 3.5 kHz, GEOPULSE
 SOL    168:14:40:00    42.806084       -87.001823      32838.55        49563.65
 EOL    168:15:50:00    42.915222       -87.040581      32808.52        49486.87
#-b LAUR89-1 LINE 34 06/17/89 1550-1735 3.5 kHz, GEOPULSE
 SOL    168:15:50:00    42.915222       -87.040581      32808.52        49486.87
 EOL    168:17:35:00    42.827011       -87.219063      32895.49        49518.09
#-b LAUR89-1 LINE 35 06/17/89 1735-2106 3.5 kHz, GEOPULSE
 SOL    168:17:35:00    42.827011       -87.219063      32895.49        49518.09
 EOL    168:21:06:00    42.592358       -86.948799      32905.52        49710.71
# -b LAUR89-1 LINE 36 06/17/89-06/18/89 2106-0057 3.5 kHz, GEOPULSE
 SOL    168:21:06:00    42.592358       -86.948799      32905.52        49710.71
 EOL    169:00:57:00    42.685444       -86.489555      32717.87        49705.02
#-b LAUR89-1 LINE 37 06/18/89 0057-0455 3.5 kHz, GEOPULSE
 SOL    169:00:57:00    42.685444       -86.489555      32717.87        49705.02
 EOL    169:04:55:00    43.024994       -86.281174      32519.78        49512.70
#-b LAUR89-2 LINE 38 06/19/89-06/20/89 0940-0605 3.5 kHz, GEOPULSE
 SOL    170:09:40:00    43.043518       -86.702232      32654.44        49450.48
 EOL    171:06:05:00    44.500080       -86.720413      32172.21        48536.61
#-b LAUR89-2 LINE 39 06/20/89 1024-2125 3.5 kHz, GEOPULSE
 SOL    171:10:24:00    44.471169       -86.276146      32045.70        48625.92
 EOL    171:21:24:00    44.470741       -87.451347      32385.41        48421.91
#-b LAUR89-2 LINE 40 06/20/89-06/21/89 2125-0635 3.5 kHz, GEOPULSE
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 SOL    171:21:25:00    44.470692       -87.452469      32385.72        48421.72
 EOL    172:06:35:00    43.740353       -86.992249      32496.09        48963.23
#-b LAUR89-2 LINE 41 06/21/89 0635-1217 3.5 kHz, GEOPULSE
 SOL    172:06:35:00    43.740353       -86.992249      32496.09        48963.23
 EOL    172:12:17:00    43.650597       -87.641769      32707.56        48907.33
#-b LAUR89-2 LINE 42 06/21/89 1217-1556 3.5 kHz, GEOPULSE
 SOL    172:12:17:00    43.650597       -87.641769      32707.56        48907.33
 EOL    172:15:56:00    43.954147       -87.457642      32554.52        48746.40
#-b LAUR89-2 LINE 43 06/21/89 2205-2400 3.5 kHz, GEOPULSE
 SOL    172:22:05:00    44.008255       -87.000015      32408.71        48792.99
 EOL    172:24:00:00    43.847160       -86.926201      32440.49        48906.45
#-b LAUR89-2 LINE 44 06/22/89 0000-0055 3.5 kHz, GEOPULSE
 SOL    172:24:00:00    43.847160       -86.926201      32440.49        48906.45
 EOL    173:00:55:00    43.860367       -86.815567      32403.01        48915.84
#-b LAUR89-2 LINE 45 06/22/89 0055-0214 3.5 kHz, GEOPULSE
 SOL    173:00:55:00    43.860367       -86.815567      32403.01        48915.84
 EOL    173:02:14:00    43.977337       -86.747185      32343.84        48853.59
#-b LAUR89-2 LINE 46 06/22/89 0214-0315 3.5 kHz, GEOPULSE
 SOL    173:02:14:00    43.977337       -86.747185      32343.84        48853.59
 EOL    173:03:15:00    43.992001       -86.621750      32300.73        48864.04
#-b LAUR89-2 LINE 47 06/22/89 0315-0450 3.5 kHz, GEOPULSE
 SOL    173:03:15:00    43.992001       -86.621750      32300.73        48864.04
 EOL    173:04:50:00    43.858112       -86.562584      32325.87        48955.91
#-b LAUR89-2 LINE 48 06/22/89 0450-0726 3.5 kHz, GEOPULSE
 SOL    173:04:50:00    43.858112       -86.562584      32325.87        48955.91
 EOL    173:07:26:00    43.633240       -86.647163      32427.58        49083.86
#-b LAUR89-2 LINE 49 06/22/89 0726-0924 3.5 kHz, GEOPULSE
 SOL    173:07:26:00    43.633240       -86.647163      32427.58        49083.86
 EOL    173:09:24:00    43.500214       -86.500549      32426.24        49187.84
#-b LAUR89-2 LINE 50 06/22/89 0924-1303 3.5 kHz, GEOPULSE
 SOL    173:09:24:00    43.500214       -86.500549      32426.24        49187.84
 EOL    173:13:03:00    43.558567       -86.956116      32548.11        49084.55
#-b LAUR89-2 LINE 51 06/22/89 1303-1459 3.5 kHz, GEOPULSE
 SOL    173:13:03:00    43.558567       -86.956116      32548.11        49084.55
 EOL    173:14:59:00    43.743240       -86.987595      32493.74        48962.16
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LAUR89 CORE LOCATIONS

5	GC,BC	42d25.8451′	-86d50.0978′
4	GC,BC	42d24.0543′	-86d42.9873′
2	GC,BC	42d19.3201′	-86d37.5741′
1	GC,BC	42d16.9169′	-86d30.1849′
3	GC,BC	42d11.2503′	-86d43.8976′
3	GC	42d23.5915′	-87d37.0401′
9	GC,BC	42d23.7743′	-87d33.1996′
12	GC,BC	42d23.9368′	-87d29.5141′
11	GC,BC	42d29.7721′	-87d12.1446′
20	GC,BC	42d45.2817′	-87d20.3712′
22	GC,BC	42d37.7222′	-87d31.2409′
3	GC	42d38.1460′	-87d30.7258′
7	GC,BC	42d32.7295′	-87d04.1058′
6	GC,BC	42d35.5111′	-86d56.8783′
27	GC,BC	43d35.7146′	-86d49.5465′
28	GC,BC	43d32.8822′	-86d53.4432′
29	GC,BC	44d28.2477′	-86d42.9550′
30	GC,BC	44d28.1705′	-87d04.8796′
24	GC,BC	44d07.0280′	-87d24.4095′
25	GC,BC	44d06.4704′	-87d22.1886′
26	GC,BC	44d05.7326′	-87d19.4059′
31	GC,BC	43d44.5990′	-86d59.3337′

GC= GRAVITY CORE, BC= BOX CORE