<table>
<thead>
<tr>
<th>Company</th>
<th>LDEO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vessel</td>
<td>Marcus G. Langseth</td>
</tr>
<tr>
<td>Client</td>
<td>NSF</td>
</tr>
<tr>
<td>Project</td>
<td>MGL1206</td>
</tr>
<tr>
<td>Area</td>
<td>Shatsky Rise</td>
</tr>
<tr>
<td>Start Date</td>
<td>23 March 2012</td>
</tr>
</tbody>
</table>
All measurements in meters

<table>
<thead>
<tr>
<th><strong>Offsets used for acquisition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>NRP-Stern</td>
</tr>
<tr>
<td>NRP-COS</td>
</tr>
<tr>
<td>NRP-CNG</td>
</tr>
<tr>
<td>COS-CNG</td>
</tr>
<tr>
<td>NRP-CMP</td>
</tr>
</tbody>
</table>

NRP  Nav Reference Point
COS  Centre of Source
CNG  Centre of Near Group (Trace # 468)
CMP  Common Mid Point
MSL  Mean Sea Level
All measurements in meters
R/V Marcus G. Langseth "tow" configuration

<table>
<thead>
<tr>
<th>*** Offsets used for acquisition ***</th>
<th>NRP: Stern</th>
<th>29.50 m</th>
</tr>
</thead>
<tbody>
<tr>
<td>NRP: COS</td>
<td>232.00 m</td>
<td></td>
</tr>
<tr>
<td>NRP: CNG</td>
<td>399.10 m</td>
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</tr>
<tr>
<td>COS: CNG</td>
<td>187.10 m</td>
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<tr>
<td>COS: CMP</td>
<td>115.50 m</td>
<td></td>
</tr>
<tr>
<td>CMP: MAG</td>
<td>130 m</td>
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</tr>
<tr>
<td>CMP: PAM</td>
<td>150 m</td>
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</tr>
</tbody>
</table>

NRP: Non Reference Point
COS: Centre of Source
CNG: Centre of Near Group (Trace # 468)
CMP: Common Mid-Point
MAG: Magnetometer
PAM: Pivoting Absorbing Magnet

NOT to Scale
**Sonardyne HGPS Transciever 7987**
- Pressure Sensor
- Depth Sensor

**Guns1-2**
- 40 cu. in.

**Guns4-5**
- 180 cu. in. each

**Gun6**
- 90 cu. in.

**Gun7**
- 60 cu. in.

**Gun8**
- 60 cu. in.

**Gun9-10**
- 220 cu. in. each

**Array total volume (without spares) is 6600 cubic inches.**

**Total volume per string (without spare) 1650 cubic inches.**

**String 1 has guns 9 & 10 in a horizontal cluster; Strings 2, 3, 4, have all clusters hanging vertically.**

**NOTE: drawing not to scale**

**All gun volumes, numbering, locations, and offsets were inspected and verified by Chief Source Mechanic.**

**Array total volume (without spares) is 6600 cubic inches.**

**Cluster Guns are 1m apart.**

**Single guns hang from hanger 1.15m.**

**All measurements in meters.**
Note: All Echosounders are used in Spectra with 6.6m ship’s draft correction applied.
R/V Marcus G. Langseth - Acoustic Offsets
Sonardyne SIPS 1

All measurements in meters
DT = Depth Transducer
A = Acoustic
P = Pressure Sensor - located in front of gun's 1 & 2

Center of Source 1 & 2

Cluster Guns are mounted 1m apart
String 1 cluster 9 & 10 mounted horizontally
String 2, 3, & 4 all clusters mounted vertically.

All measurements in meters
Lead-in:
Outer = 505m
Inner = 465m

R/V Marcus G. Langseth - Streamer Front End

CNG is 75m from head of section
Spectra timing for r/v Marcus G. Langseth