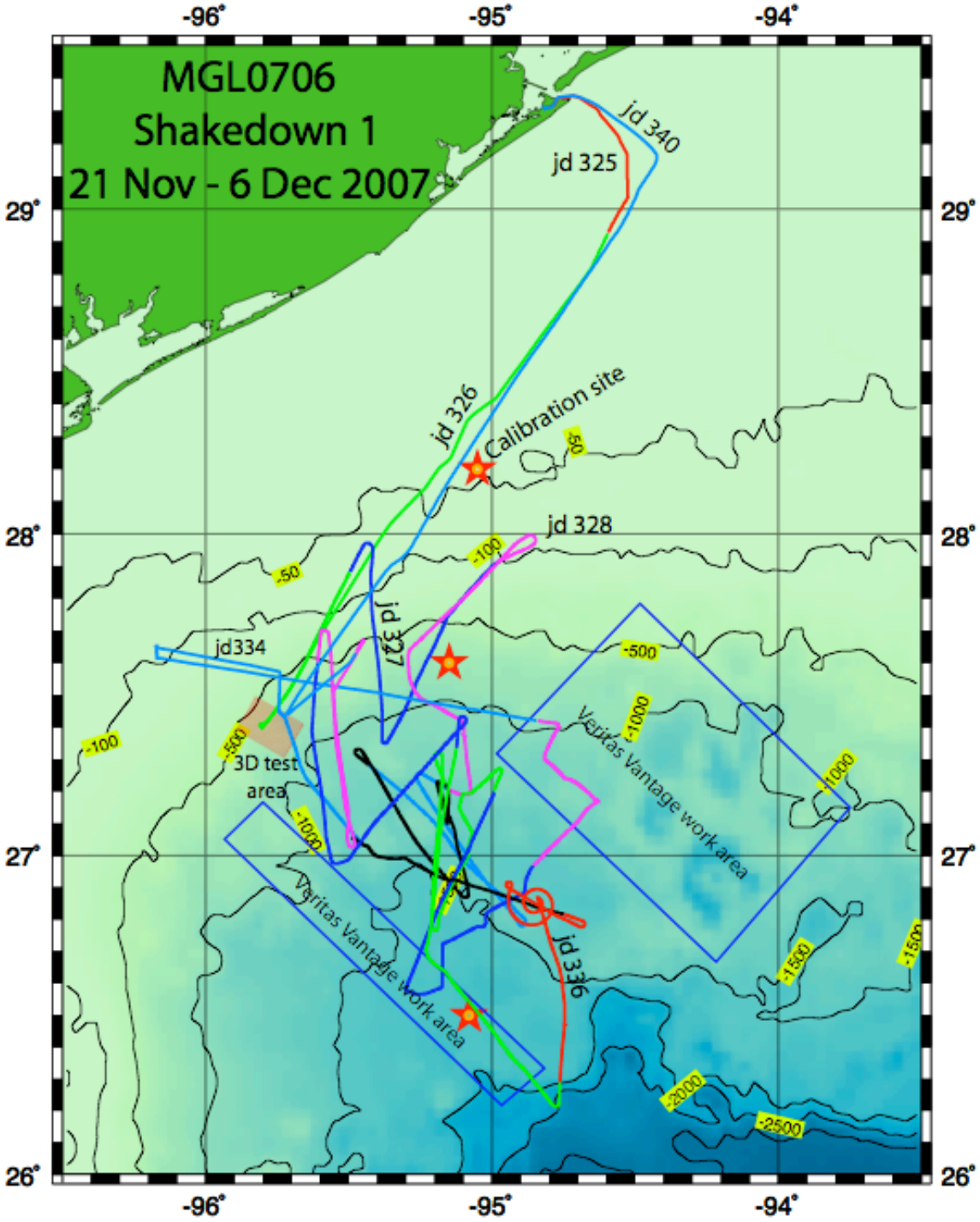
R/V Marcus G. Langseth cruise MGL0706
Cruise Report
John Diebold



Summary

During MGL0706, 21 November – 6 December 2007, we completed the following initial shakedown tasks:

Unspooled and rewound all source umbilicals, deployed and tested all four source array strings individually and together, in 2D/refraction mode.

Ramped-up and test fired gun strings 1, 2, 3, and 4 using I/O Digishot controller.

Deployed to full spread, maneuvered and recovered port and starboard
Baro 16 paravanes.

Completely deployed, re-tensioned and recovered three of four hydrophone arrays.

Attached bird/acoustics collars, ballasted hydrophone arrays – 1.5 of four cables done.

Not completed:

Retensioning, collars and ballasting of hydrophone array # 2.
Remove slack from tow leader, hydrophone array #1
Install bird, acoustics collars on shipboard half of array#1
Complete ballasting of all arrays.

3D hydrophone and source array towing arrangements.

- In port - 16 November Conference call

Deck:

Need a D-Kart CD, - D-Kart being set up by Johnstone and McKiernan 19 Nov.
Trash compactor – delivered 17 Nov. – where to install?
Science techs have provided video feed to bridge, but deck has not provided any monitors – using the science spare.
Additional cameras need to be mounted
Science techs to provide air gun shutoff switch. – installed & ready 17 Nov.

Engine:

Lubes aboard, fueling Sunday [?] Didn't happen, Monday either
Fisher Valve reps from Control Associates/Rosemont Fiisher coming.
Unspecified problem with Starboard Ariel – resolved as per C/E Karlin 17 Nov

Evap – piping going in, need strainer. Malin workers coming in Monday-Tues to finish – strainer & basket delivered 17 Nov. Monday 19 Nov – no yard workers.
Salt Water pump is waiting for pickup in LaMarque
Good idea to get a diver to check intakes on seachest [probably won't happen – could have a diver look at the MB Transducers, too.]
#2 cooler no salt water

Science:

Digicourse DMU controller needs upgrade – complete 17 Nov
Posnet coming today [they did] – need the Posnet License
Gun Jumpers needed – trying to get a quote/PO
STICs done, need Scotchcast, on order.
Brian Goodick not coming now
Two temps – Barney & Robbie coming Tuesday
NCS subsea starting for 10 Dec?
Need Spectra licenses
Hardware for towing 3 tailbuoys and 1 paravane on order/in the mail
Waiting on keyboard adapter for SIPS controller

MMO:

Need Lat, Lon, water depth feed on tower – data/plan in place, cables in place, need monitors

Narrative:

21 Nov 2007 Julian Day 325 Engineers finished and tested piping for evaps yesterday, and the weather report became less dire, it was decided to sail at 11:00. There was further delay due to problems with stbd pitch control, and sailing deferred until 2:00. This will not matter much because sr science officer has decreed that we can only work a single shift due to lack of backdeck personnel and we might as well make that daylight hours. Transit should be no more than 12 hours. I have loaded a "practice" calibration spiral into the DP system and have recommended that the bridge try out the DP autotrack while we're waiting for daylight. There continues to be perceptable resistance up there to having any electronic device actually do the steering.

22 November 2007 JD 326
07:00 on site, assembling birds.
09:40 tailbuoy launched, tail stretch going in. Tail stretch for #1 was stored on reel #2 due to lack of space on #1 – transferring it over.
10:20 F&M, A.S. drills.
11:00 the guys are tapiing up a 6'-long section near the tail where the covering got torn from rubbing below the winch..

13:00 forward bird inner collars seem much too small. They are approx. 2.25" and they need to be 2/.5". I set up the lathe and spent the rest of the day boring them out. Meanwhile, the birds cannot be talked to through the cable two leadin and sliprings. Debugging that as they go.

Our collars are: rear – Concord Technologies P/N 07-100054
Forward – JRC Concord Technologies P/N 07-523251

But there's another number that does not show on the collar – the id. We apparently Got the forward collars at 228 [2.28"] and intended to order 245. I bored to 250.

20:30 – quitting time for me.

23 November 327
Weather bad again, but good enough to work. Still laying out streamer # 1, boring collars, gunners completing the strings.
13:15 – break lining on #1 streamer winch comes loose – apparently it was glued on, and the glue got tired. The lining itself seems to be intact. Will try and finish spooling out quickly and recover, to tighten the wrap.
16:30 time out to set up to wind bad section onto wooden reel on OBS deck.
17:00 Gunners are rigging a large float to support the #1 tow leader. Will deploy tomorrow morning. Tonight, will test cable 1 comms bypassing sliprings and deck leader.
19:00 – The good news for the evening is that when #1 deck leader and slip rings are bypassed using #3 deck leader cabling, #1 bird comms are OK. Suggests problems with #1 deck lead or slip rings. To remove these slip rings requires oxyacetylene surgery.

From Jay Johnstone:
Started deploying streamer 1 (Stbd outer) on thursday morning, a few teething problems getting underway (tools, procedures, new boat and first time doing streamer work), got that sorted out and progressed to about 15 sections deployed by first evening.

Today, continued deploying streamer 1, changed 2 sections and a couple modules troubleshooting no bird comms on streamer and some telemetry issues. Brake band on reel 1 started coming apart (shedding brake pad material) when we had about 25 sections in the water, so we decided to rapidly deploy the remaining cable off the reel to tension it up before parking the reel until we are back in port and can fix the brake. Got the cable out and found the leadin has forced a loop up from deep in the reel. Gunners started rigging a couple floats to allow us to deploy most or all of the leadin with the cable in tow, finished that at end of work day. In the mean time, we continued troubleshooting no bird comms on streamer 1 and found (after much searching) that we have a bad channel in the Line Interface Unit connected to the Digicourse system. We do not have a spare, I have a request out to customer support for a work-around.

Summary:

Streamer 1 currently towing behind vessel at start of leadin.
Telemetry - we can communicate out 21 modules before one fails to initialize, this went bad after we went past it. We will troubleshoot during recovery.
Ballast - cable looks VERY light, will probably need much more weight added, but we will leave that for another time given the state of the brake.
Bird comms - look good now that we're on a working DMU channel

Plan:

Deploy leadin and cable as required to "fix" looping issue on leadin, attaching floats to avoid sinking the leadin.
Recover streamer to tailbuoy and start working on Streamer 4 (port outer).
During recovery, change one section (12) and clean connectors on one module (19). We will not perform any other work on this cable until we have a working brake on this reel.

24 November 328

Weather worsened as morning approached. Weather is warm, and wind from SE. Attached a bird to the lead stretch so as to monitor depth.

Gunners rigged a PV2000 streamer head float, attached it to the #1 tow leader, and we reeled out the tow leader to the inner wraps. The loop increases in size. 10:00 – started to rig a second, PV1500 float. Lead bird is at 7 – 8 meters.

We loaded the tow leader with as much floatation as we could organize, but as we approached the inner turns, the lead bird began to submerge, due to the weight of the 1500' tow leader. We hurredly started to pull in, and after bottoming out at 77 ,meters, the bird indicated a rise. The loop is still wrapped within the otherwise tight leader and streamer. Telemetry is still good – will continue this way, aware that before long this tow leader should be reterminated at the ship end. Some oil leakage is apparent in the winch 1 motor.

Upon recovery of #1, a lengthy process was undertaken to discover a fault about midway down the streamer. I turned out, in the end, to result from a bad fiber optic ferrule, which was replaced. The streamer was then recovered and stopped off at active section 12, for diagnosis and repair in the morning.
From Jay Johnstone:

Started today at the sea end of lead-in on streamer 1. Rigging up flotation to deploy with leadin (one PV3000, one PV2000 and then some A6 and F11 buoys as we realized we needed more). Deploying and connecting floats, managed to define that the loop on reel 1 is coming directly from the onboard end of the leadin where it passes through the base of the reel. During deployment, ran out of useable flotation (due to lack of supplies, did not rig a third PV float). Figured we had enough lift to get to the end of the lead in and fix the loop, which proved wrong. Had installed a bird at the head of the streamer and was watching it as

we deployed the last of the leadin. Bird began dive which prompted a rapid recovery of the leadin - we did not fix the loop and it now lies under the re-tensioned leadin. Bird made it down to 80m depth before flotation recovered by PV floats and the streamer re-surfaced. We still have full comms with the streamer, and so in the current state, that leadin may be good for some time to come as it is. Decided that given our float situation, we would not try again and would recover the streamer. During recovery, have fixed the problem at module 19 (water in connector and possibly some issues with fiber optic centering sleeve not working properly, it came off with the section when we opened the connection) and are currently stopped for the night at section 12, which is producing some telemetry issues.

Summary:
Leadin 1 re-tensioned with a loop not repaired laying under most of the leadin. This can be dealt with at some point in the future.
Streamer 1 working to module 28 with hopefully one remaining telemetry issue
Streamer 1 ballast not improved, still very light
Streamer 1 shows no obvious signs of damage from it's attempted trip to the depths, we could suspect some buoyancy loss to the first 2 or 3 active sections but otherwise no problems. The only loss in the diving incident was that we crushed 4 tailbuoy floats we were using to try to help hold up the leadin.

Plan:
While recovering the remainder of streamer one, we will repair the last telemetry problem we are aware of, which should give us a full working streamer.
Once Streamer 1 is back onboard (hopefully before noon) we will move the tailbuoy to streamer 4 and begin deployment.

25 November 329

Starting out a gray and colder day – we must be on the other side of the front – but the wind and waves are down. The team sets off to debug and fix telemetry problems at active 12.

#1 streamer builds completely, but there are occasional glitches – mainly while turning the winch, so these may be slipring – related. We recovered #1, transferred the tail buoy over to #4.

11:00 I was asked to give engineers a lesson in operating the lathe. Since I had used it for the first time a couple of days earlier, it turned out to be a mutual voyage of discovery, but I think we got far enough along for the tasks at hand. It seems to be a pretty good tool, capable of cutting both inch and metric threads. Luckily, thread-cutting was not today's task.

18:15 - #4 streamer is about 1/3 of the way out, in general, looking better than #1. But then with a loud crunching noise, the brake lining of #4 winch broke loose. In the next few minutes, the entire upper half of the band fragmented and fell away. Slowed the ship to recover the streamer. Wrote an email setting up next step:

From: johnd@ldeo.columbia.edu
Subject: **Streamer winch brakes**
Date: November 25, 2007 7:29:47 PM EST
To: alwalsh@ldeo.columbia.edu, pwl@ldeo.columbia.edu, mpurdy@ldeo.columbia.edu, captain@ldeo.columbia.edu
Cc: jjohn@ldeo.columbia.edu, rupert@ldeo.columbia.edu, tedski@ldeo.columbia.edu

All;

We have a fairly serious problem on our hands. We finished recovering #1 streamer this morning, despite the dilapidation of the brake band material. We started with streamer #4, and with 1/3 of it out, suffered what looks like a similar, but more extensive failure of the #4 winch brake band. Pieces falling off, etc, hopefully enough remaining and sliding around in there that we can recover the streamer without damaging the brake drum surface.

It is now obvious that it is foolish to consider the possibility that this won't happen again with the other winches, and we need to organize a plan to have the brake bands refurbished and reinstalled. It is not a trivial job to remove them, particularly the outboard ones, though we can probably accomplish this at sea.

The first thing that comes to my mind is to work on the other things, paravanes and source arrays, while waiting for parts and shops to be lined up in Galveston, but there is now a certain level of paranoia that makes us worry about the brake linings on the gun and wide tow winches.

We'll get back to you in the morning for a conference call. please get started on the refurbishing plan right away.

John

From Jay:

Hi, All

As of this writing, we have successfully recovered streamer 4 to the tailbuoy and parked it in the towing clamp, we are waiting for morning light to recover the tailbuoy and begin to consider our options. John's synopsis of the events of the day are concise enough that I don't need to reiterate.

Following recovery of the tailbuoy in the morning, we will make preparations for launching and testing of the gun strings. We have performed visual inspections of those brake bands in place, and they look ok. We will dismantle a gun winch brake in the morning and further inspect the state of the braking material, and if it looks ok we will move ahead with doing some gun testing.

The wide tow winches have a different braking system (plate style rather than bands) and we will inspect those as well before making a decision on whether or not to continue with attempting to launch a vane.

Will talk to you in the morning.

Regards,
Jay

Monday, 26 November 330

The day dawned sunny and clear, but the NW wind is still strong and seas high. We had our call with Lamont, recovered the tailbuoy. Gunners getting ready with strings 1 and 2. There is still a fair amount of work to do on 3 and 4 – slip rings. Will dismount one brake and check it out. Will probably get to launching and shooting in the morning. Shreds of #4 brake lining are lying in a pile underneath the winch.

13:00 ran up compressor 1, blew out air lines on arrays 1 and 2.

16:00 deployed PAM array.

From Al:

John,
It is an option that I am considering on advice of G&M and what is often done on ships. We need to know if the brake band is in good enough shape to even go down this road. I am awaiting information from the Engine Room on their estimate of what it will take to get the bans out. Working on all options, which is nothing to get upset about. When decision time comes we can discuss the best course.
al

> -----Original Message-----_**From:** John Diebold [mailto:johnd@ldeo.columbia.edu] _**Sent:** Monday, November 26, 2007 4:03 PM_**To:** Al Walsh; Paul Ljunggren_**Cc:** Jay Johnstone; Jeff Rupert_**Subject:** Brake linings
>
> Al;

I hope I don't have this wrong, and am getting all upset about nothing, but here goes...

Jay tells me you're suggesting sending brake lining material out here and having us
do the relining at sea. I think this is a bad idea in that it can only (a) produce a less-than-satisfactory product and (b) take up at-sea days, which we cannot possibly
afford to waste, on repair. My guess is that it'll take two or three people at least two
days just to remove the old brakes -

John

Tues, 27 November 331

Overcast morning, predictions of low seas, 2 – 3 feet today and tomorrow.

0:700 – getting gun strings, winch & compressor controls ready
09:00 – stbd compressor goes offline, starting up port compressor
I discussed dismounting procedure for streamer winch brakes, with C/E Karlin - how drums pinned to clear removal access for the brake pivot pins.
11:00 source array #1 in the water and firing
12:15 – Prepping array 2 before recovering array 1
Electrician and 3/E begin dismounting #3 brake
1:00 recovering array 1
1:30 – delay on compressors
2:15 – beginning to deploy array #2
16:15 – Array # 2 onboard
Engineers have completed removal of top band of #3 brake – lining is pulling away at trailing edge, fairly thin at the leading edge. Finishing removal of bottom band should be quick – just have to remove the two lower guide brackets.

28 November 332

Calm day – so calm that Robbie decides to launch doors, at least the Port door, directly. News that the Veritas Vantage is in the area and has heard us shooting. We may have to move before beginning source work again. I got the veritas boxes from Jay, plotted them up.
The currently occupied box includes the deep cal. Site.

On Nov 28, 2007, at 3:29 AM, Nav.Veritas-Vantage@cggveritas.com wrote:

Good Morning,

Thank-you for your information early this morning. We are a seismic vessel, with towed gear approximately 9km long. We have two supply vessels working with us; M/V Father John Keller and the M/V Hal Calais.

We are working for the next three to five days in the area defined by the following coordinates;

27°10'N, 095°48'W
27°03'N, 095°56'W
26°20'N, 094°49'W
26°13'N, 094°58'W

After this we will be moving to a new survey defined by the following coordinates;

27°47'N, 094°29'W
27°19'N, 094°59'W
27°09'N, 093°45'W
26°40'N, 094°13W

Could you please provide us with your survey area and duration of your stay?

Thanks for your cooperation,

Regards,

Rick Mosher

Veritas Vantage Navigation
CGGVeritas
Tel :- (+1)-832-351-8738
Fax:- (+1)-832-351-8799
E-mail:- nav.veritas-vantage@cggveritas.com

07:00 readying Port paravane
10:00 - waiting on hydraulics
11:00 – deploy Port paravane
12:00 – out to full extent, recovering to operational length
12:30 – Engineers finish #3 brake removal, start on #4. Rigging Stbd paravane
14:30 - Stbd paravane launched and going out
16:15 – Stbd paravane fully extended and reeled back into operating position – Maneuvering.
16:45 – recovering Stbd paravane

17:15 – paravane on board - recovering Port paravane
18:15 – paravane on board
moving ENE away from Vantage position

My daily routine:
6 – 6:30 – wake up, shower, get dressed, take Glucosamine/MSM, B complex, fish oil, Mobic and 2 aspirin
7:00 lab meeting
7:30 breakfast
Metamucil
11:30 – 12:00 lunch
2 aspirin
6:00 pm Dinner
Glucosamine/MSM, B complex, Fish oil
2 aspirin if needed
9:00 4 RX pills
bed

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29 November 333

Calm but overcast morning. Gunners are taping and otherwise preparing strings 3 and 4.

08:45 – engineers removed upper band, #4 winch brake.

09:30 conf call between "technical side" and OMO re brakes – decision is Al's previous decision to send material out and do the work onboard. According to Captain, out-of-service days are now off the table as per NSF.

10:30 still working on #4, have started removal on #2 Guns ready to go after lunch.

From Veritas Vantage Nav:

Hi John,

Thank you for moving NE of our present survey area, we will contact you if your activities are causing disruptive SI on our records.

Our Lines run 315° and 135°, in both surveys.

The survey areas include a nominal turning area, which we will remain inside of, except for turning around rigs, streamer work, running from weather, crew change, etc.

If you would continue to contact us before you are going to begin firing air guns, that would be greatly appreciated.

Thanks very much for your cooperation, hope your testing goes well.

Regards,

Rick Mosher

Veritas Vantage Navigation

12:00 compressor starts, fails after ca. 10 minutes
12:30 working with gun controller – little or no documentation in hand
13:30 air is up

email exchange:

> -----Original Message-----_**From:** John Diebold [mailto:johnd@ldeo.columbia.edu] _**Sent:** Thursday, November 29, 2007 11:02 AM_**To:** Al Walsh; Paul Ljunggren_**Subject:** charge days
>
> What happened to "maintenance" days?

On Nov 29, 2007, at 2:37 PM, Paul Ljunggren wrote:

John:

I am missing something. Don't know the source of this question.

Paul

Paul Ljunggren

Lamont Doherty Earth Observatory

Phone:845-365-8845 Fax:845-359-6817

Sorry, Paul;

I didn't mean to be opaque.

a) Capt. Jim told me that it was stated during the conf. call that all days, in port or out, would be
charged as op days and this was one of the reasons to do these repairs at sea.

b) last I heard from NSF, there are no more "out-of-service" days, only "maintenance days" - so at least the
concept is still valid.

c) it was said from the beginning, and agreed to by NSF that the 30 op days for shakedown would be spread
out over an elapsed time of 45 - 60 days, with "maintenance days" interspersed as needed for supply, resupply
and repair. if (a) is true, then (c) is no longer true.

- under the (c) rules, one of the options in the cost-benefit analysis would be to run into port during one of
our down [nighttime] periods, have the repairs done there, and when done, get back on site during another
of our down periods.. This only makes sense if the repair would take time which otherwise would be used for
shakedown.

However _if_ we get the material, say, today, and _if_ repair of a single brake is done and the brake
installed by, say, Saturday morning, then we would lose little or no shakedown time and all is well.
It's troubling of course, that Al doesn't know how long the bonding takes.

- don''t forget that we've already thrown away nearly half our days by only having a single crew working
out here. No matter what Al might think, it takes all of us to do the work we're doing during a single shift.
at least so far. - and there's the teaching aspect. In any case, I hope you can understand why I am nervous.

John

John Diebold
Chief Scientist for Marine Ops,
aboard R/V Langseth
www.ldeo.columbia.edu/res/fac/oma/langseth

14:00 – Phil Neis and the engineers have #4 and #2 brakes dismounted, working on #1, new material to come out by boat from Corpus Cristi

14:30 air leak in the manifold. Recover string 4 to locate and repair.

15:00 – string 4 going out

16:00 firing – all 10 sensors working, one DT not, towing string from aft port paravane boom. It pulls too far into the center – will have to pull the umbilical to the outside, as well.

Practiced gun controller auto soft start

18:45 – String 4 on board

Email from Vantage:

From: Nav.Veritas-Vantage@cggveritas.com
Subject: Re: Current Position
Date: November 29, 2007 6:35:25 PM EST
To: johnd@ldeo.columbia.edu

John,

Thanks for the update. We're currently on our last line in this area. We should finish around 19:30 local. Then we're heading NE (roughly) about 100km to around 26° 56' N 94°09' W to start a line. It should take us 17 -18 hours to make this transit. I believe Rick sent you guys the boundry of the survey we will be going to but for clarity sakes here are the coordinates again.

27°47'N, 094°29'W
27°19'N, 094°59'W
27°09'N, 093°45'W
26°40'N, 094°13W

Cheers,

Erik

Veritas Vantage Navigation
CGGVeritas

30 November JD 334

Brake banding and glue delivered approx. 05:00 – ship transiting back east. I reminded the captain of the Veritas Vantage move, and he curtailed the transit, turning south at about 07:00.

Apparently, only 1 quart each of catalyst and resin were delivered with the brake bands. This cannot be enough. Also, the instructions on the can say 24 – 48 hours for 85% strength. Al says he ordered 8 cans of fast-acting glue, and that we must have the wrong material. I emailed the particulars of what was delivered back to him at 08:15 local.

Rumors are now abounding about the idea, put forth informally by Al in emails to Jay [not to me] that if the work is not "done" Jay and I would be removed by boat on the 6th, and the ship would stay out. I suppose this constitutes the first response to my inquiry of 16 November for comments on my draft schedule, which showed our return on the 6th, and the extra days prepended to the 3D test period in January.

Anticipating starting source array work at 09:00 – will put out strings 1 and 4, then 2 and 3. 3 is the only one untested so far.

We have a response from I/O confirming that the Digishot controller software can only handle two arrays.

On Nov 30, 2007, at 7:28 AM, Al Walsh wrote:
Hi Jay,

In your spare time, if you would project ahead a bit I would like your thoughts on finishing up streamer work without you. If we get close toward the end of the week but have more streamer work to do, then can we do it without you? I know that this might depend on how much, but I want to know all your feelings on this one.
Thanks Al

Hi, John

I think the best way to plan this is to look at best case and worst case scenarios for the coming 5 days and beyond.

Some new brake knowledge we have now that we have the parts: We received

two quarts of the glue (one quart of each half of the epoxy), and enough band material to complete the job. The question is whether we have enough glue to finish the job. The glue takes 24-48 hours to reach 85% strength. If we split that time down the middle and say 36 hours after application we can use the reel, then the timeline for reel 3 is: install the pads on the bands before noon today - that work is ongoing as I write this - install bands tomorrow afternoon, and begin streamer work on sunday morning. This would have me onboard for 4 more days of streamer work.

Streamer status:

Streamer 1: can power up to tail, but needs ballast and collar work completed.
Streamer 2: can power up to tail, but needs ballast and collar work completed.
Streamer 3: powers to mid-streamer, needs troubleshooting. Have not started on it.
Streamer 4: has two known telemetry problems, needs collars and ballast for 2/3rds of cable.

All four cables need PMI rods and yale grips installed on leadin. This is a 2-4 hour job for each leadin once the cable is deployed and working.

Best case: We get the brakes on streamer 3 fixed and they work, and we have enough epoxy to complete the repair job on all reels. In this case, we would begin streamer work sunday morning, and if everything goes smoothly we could be at the front of streamer 3 by tuesday morning and have it onboard and working tuesday night. On wednesday we could redeploy streamer 4, troubleshoot our first telemetry issue and keep going on ballast and collars, I think there is probably 2-3 more days on that streamer to complete the necessary work. Streamer 2 needs about 1.5 days to ballast, install collars, and put on the PMI rods / grips. Streamer 1 needs ballast, the remaining collars (1/3rd of the streamer) and PMI rods / yale grips, probably another 1.5 days.

This is assuming 12 hour days, which is the only way we can work with our current staffing levels.

So, to put this into a timeline:

Nov. 30 (today) - finish gun work, fix and install brake bands on reel 3
Dec. 1 - waiting for cure to occur, spend the day practicing vane deployments / recoveries / manouvering
Dec. 2 - 4 - Streamer 3 deployment and recovery
Dec. 5 - 7 - Streamer 4 deployment and recovery
Dec. 8 - 9 - Streamer 2 deployment and recovery
Dec. 9 - 10 - Streamer 1 deployment and recovery, all streamers operational.

Remember, this is BEST CASE. It all goes downhill from here as we encounter issues.

John and myself need to get off on the 6th by supply boat to make our flights. Tom is also suggesting he gets off then, as Robbie is onboard and able to handle relief duty, especially given that we are not doing any further gun or vane work.

We need to be sure that undertaking this adventure with our minimal crew is the best decision. I would also suggest that Ted comes out to help with the streamer work when I get off, if the decision is to stay at sea.

Regards,
Jay

10:00 local - Phil et al. got the first band glued & clamped. Ran out of clamps on this one half-brake - an unforseen inventory problem, I suppose.

According to Phil there's enough glue here for two full brakes. Al has reported that in fact, this is the correct glue – it's just that we don't have enough of it.

11:00 - we have strings #1 and #4 in the water. preparing to put #3 in, which needs initial in-water testing, and then #2, so all 4 can be fired at once. Air manifold check valves have been bypassed. MMOs on duty all morning, no mammals of significance sighted in the past several days.

From: Erick.Escondo@iongeo.com
Subject: **Fw: Digishot pressure transducers not being identified**
Date: November 30, 2007 11:09:39 AM EST
To: jjohn@ldeo.columbia.edu
Cc: johnd@ldeo.columbia.edu, Warren.Savoy@iongeo.com

Hello Jay,__I have talked to the Engineers. The software is being release shortly that will allow 4 sources for alternate array flip flop firing. Beta release went to WesternGeco yesterday.__Best regards,_Erick

11:10 – sounds as if the compressor cut out again.. – it turned out to be undrained interstage condensate. Back up at 11:30

11:40 – compressor off again.

Calls to and from Lamont. Upshot is: this leg ends as scheduled 6 December. Paul will draft a progress report for NSF, which will be submitted next week in support of a

request for clarification of the desire expressed by Sandy Shor – importance of 3D test high enough that time be taken from deep/slope calibration effort if need be, those calibrations subsequently re-funded and rescheduled. I note that this desire is reflected in the March 2007 MLSOC meeting minutes. If this approach is not approved, we will request that our January efforts be concentrated instead on preparation for 2D work and the 3D test rescheduled for the downtime preceeding Mutter.

14:30 all 4 strings in the water, all guns firing. There are about 8 non-functioning firing sensors, however, and we need to work out a scheme for simultaneously towing PAM array.

17:30 – 4 strings recovered.

1 December JD 335

Sun is shining, but weather is picking up. Crew is gluing brakes for #4 winch, begin to re-mount #3. Tech side chasing faults in airgun sensors. I am working on graphic representations of rampup sequences so that Meike Holst can evaluate the choices offered by the Digishot system.

It appears that the Digishot "Gulf of Mexico" rampup scheme matches the NMFS rules almost perfectly – I went over this with Meike and she approves. It turns out that although the Digishot software seems to offer about 6 choices, there are in fact only two variants, the
GOM/HESS pattern, which doubles Db in a specified time period, and the
JNCC/Australia/Sakhalin pattern, which is a gun-by-gun linear increase.

The problem with Digishot pressure transducers has been tracked down to the fact that we have the wrong jumpers – need straight-through, and are using the same ones as for the depth transducers, which are for some obscure reason, different.

15:00 – the #3 brake is mounted and ready. We gave it a brief test – seems OK. Will deploy the #3 tail buoy tonight, and start with the streamer in the morning.

19:00 deployed tailbuoy, STIC and two tail stretch sections of #3 cable. Brake looks OK.

I loaded another test spiral pattern into the DP for Dave tonight, if he agrees to try it.

20:50 – I re-made the waypoints with a start closer to our current position and oriented in the same direction we are traveling. 2nd mate consulted captain, put Autotrak into action.

2 December JD 336

Sunday - Sunny and bright, the wind is slowly rising, as predicted.

07:00 From the track on the MB console, the autotrak worked. According to the

2/M, it was not a large problem – confidence increases
The tail stretch sections on cable 3 have apparently leaked badly, so we are removing them. We need but do not have, a supply of streamer oil and a method of injecting it..
08:00 We managed to clear several very large loose loops of streamer on the reel by pushing on them.
Engineers are mounting #4 winch brake, still working to remove #1, which is the hardest to get at.
09:45 – about to break streamer 3 at active #10
11:30 – 20 cans build OK.
13:30 – 30 sections out, found the fault, streamer builds, downloaded microcode, going out with last 10, adding collars & weights, 4 per section
15:00 – all actives in the water. Engineers have finished mounting #4 brake.
17:30 - Tow leader is extended to max length [1.75 wraps left on winch] using 3 large floats. Still towing mostly at the surface
19:30 – pulled in two float's worth, leave the rest for the AM.

3 December JD 337

As predicted, a front started through during the night – at 06:00, it is blowing 30 – 35 kt, Raining hard, and seas are rising. Ship is headed 330 with somewhat chaotic motion. When we begin work at 07:00, will ask to turn onto a northerly heading, more directly into the wind.

We retrieved the first 5 sections, re-ballasted, re-deployed with about 100m of tow leader [each tiuun of the tow leader on the drum at this point is about 6.9 meters)

11:00 - begain recovering, with a revised ballasting plan in hand.
13:30 call with Ljunggren & Al Walsh – I rewrote a paragraph of NSF summary and sent it b ack.
14:00 – cable # 3 aboard, without most of the second set [2/section] of weights, due to lack of screws. Transferring tailbuoy to cable # 4.
15:00 – cable # 4 going out with such weights as we can muster.
19:00 13 sections, 6 birds out, at the end of our weight-screw supply, Section 12 is bad.

4 December JD 338

A great improvement in the weather – skies are clear and the waves are down.
We hung a heavy shackle from can # 14, to check ballasting of the first 13 sections. The tail [4 – 5 birds] is fine – forward of that it's light.
9:30 conf call with Lamont
11:00 cable 4 is halfway out.
12:00 a loop of tow leader has popped out of the drum.
14:00 30 sections out – this one is going slowly, due to a large number of patches required.
18:45 – all 40 sections out, attaching the first float. The tow leader loop is huge, and something of a bother when turning the drum. We discussed a new tactic to try on

streamer #2 before deployment – tie the end and roll the drum in the inhaul direction, to drive the slack loops to the outside before deploying, which drives slack into the inside. Depth-wise, the streamer is towing in Nessie fashion – the center is fine, the tail is fine, in between, there are 3 light birds.
20:00 – tow leader is 2/5 out, with one large float. Will add two more and extend fully in the morning.

5 December JD 339

Another beautiful day. We commenced by attaching a Yale grip to the #4 tow leader, as a towing point for the second 3000 liter float.
08:45 - #4 tow leader to full extent, stopped it off with a Yale grip, took out the slack and started rewinding. Bare winch drum circumference is 6.7 meters. Tow leader diameter is 1.45" = 3.683 cm . on wrap 4 there were 30 turns per wrap. Total length 5.5 wraps.
10:30 tow leader in, beginning on actives.
13:00 – swapped out section 30
15:00 - swapped out section 12 – telemetry complete, recovering last 12 sections.
16:00 – streamer #4 on board, retrieving tail buoy.
17:00 all aboard. Steaming towards 3D test site for MB pass on the way to Galveston
17:45 – broke off potential survey to head to Galveston

6 December JD 340

9:00 pilot
11:00 tied up

I think that perhaps my personal highest moment in this thing was when the Chief Engineer came to me and asked for lessons in how to run the lathe – a tool I had not encountered until 2 days before. – But my having figured out how to make the thing do the single small job I needed it to do made me the expert within the entire ship.

I think that my presence on the back decks led to more rapid operations, and I think that a few of my naïve suggestions may have furthered our progress.

We were fortunate to have a good crew on the technical as well as the deck and engineering sides – and the food was great.

Considering the constraints, I feel that we did more than "well."

<u>Recommendations</u>

C/E Karlin wants training in new systems – I agree. Compressor controls, engine room alarm system. Pitch control system, Fisher Valve controls

Science techs have spent several man-days working on bridge nav systems – why is this necessary?

Planning to shorten keels on tailbuoys – they hardly fit through the tailgate openings.

Need bath soap, hand cleaner

TV line & screen to Ch. Sci. Cabin

Rails inside paravane rest positions, bumpers outside

Mini-doors to spread source arrays in 2D mode

Bird collar screws, weight screws [10-24?] streamer oil, pump, nozzle

Repair port side tailgate doors.

Display MB screen on Bridge

Appendices:

R/V Marcus Langseth

NATIONALITY - U.S.A. PORT OF REGISTRY - NEW YORK, NEW YORK

IMO# 9010137 GROSS TONS – 3834 NET TONS - 1150

At: Galveston, Texas DATE – Nov. 21, 2007

CREW LIST

#	NAME	POSITION	Nationality + Passport #	D.O.B.
1	O'Loughlin, James E.	Master		
2	Zeigler, Stanley P. Jr.	Chief Mate		
3	Wolford, David H.	2nd Mate		
4	Gasper, Nicholas K.	3rd Mate		
5	Tyson, Douglas M.	Boatswain		
6	Rimando, Inocencio B	AB		
7	Baxter, Gordon M.	AB		
8	Redito, Ricardo M.	AB		
9	Applewhite, Nicky, R.	OS		
10	Magnan, Richard R.	OS		
11	Karlyn, Albert D.	Chief Engr.		
12	Tucke, Matthew S.	1st Engr.		
13	Kenny, Brian T.	3rd Engr.		
14	Vetting, Ryan P.	3rd Engr.		
15		Oiler		
16	Thibault, Louis J.	Oiler		
17	Gray, Pearle	Oiler		
18	Neis, Philip D.	Electrician		
19	Glenn, Richard D.	Steward		
20	Cannon, Jeffrey J.	Cook		

R/V MARCUS G. LANGSETH

At: Galveston, Texas DATE – Nov. 21, 2007

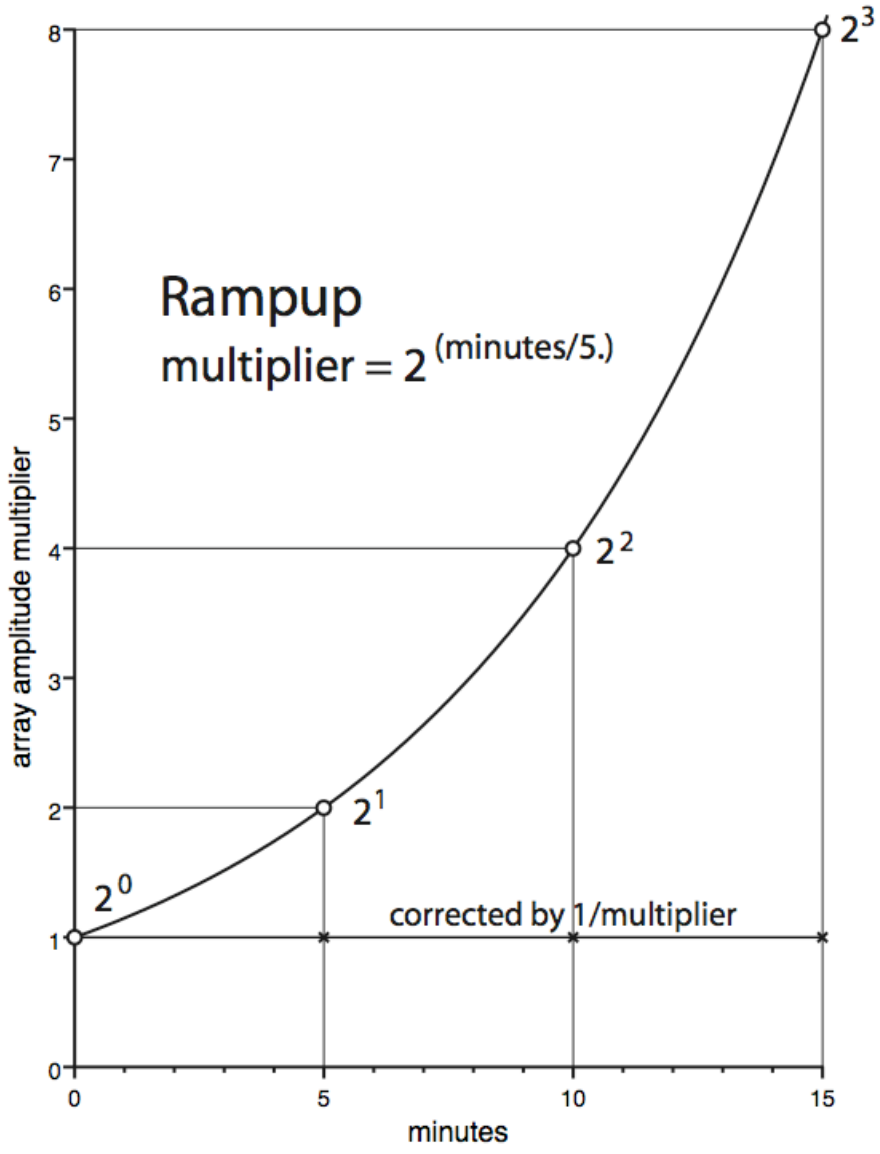
SCIENCE LIST

#	NAME	POSITION	Nationality + Passport #	D.O.B.
1	Dawe, Bradley E.	MMO		
2	Gutierrez, Carlos D.	Science Tech		
3	Johnson, Anthony	Science Tech		
4	Johnstone, Jay	Science Off.		
5	Diebold, John B.	Ch/Scientist		
6	Holst, Meike	MMO		
7	Nicholas, John R.	MMO		
8	Spoto, Tom	Science Tech		
9	Caltavuturo, Giovanni	MMO		
10	McKiernan, Bernard	Science Tech		
11	Walsh, Justin	Science Tech		
12	Gunn, Robert C.	Science Tech		
13	Kane, Robert B.	Science Tech		
14				
15				

TOTAL CREW & SCIENTISTS – 33

Appendix: Rampup procedure evaluation

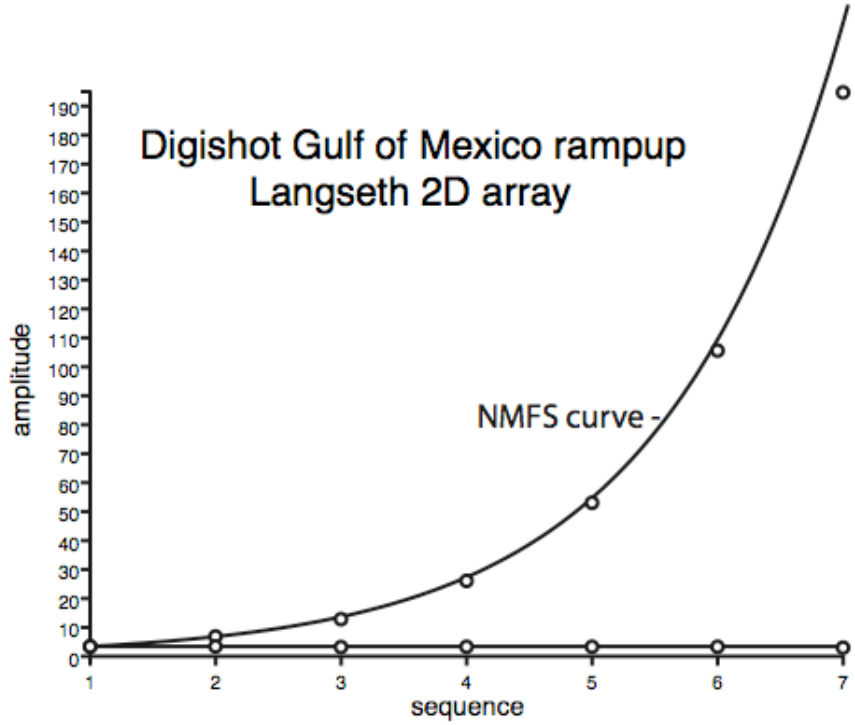
The DigiShot source controller, for all its weaknesses, has a useful automatic rampup sequence. The user specifies the type, and the extent in time or number of "sequences." The program offers about six different rampups, but in fact there are only two – US style and British [JNCC] style. In order to evaluate them and to demonstrate to our lead MMO that the one I chose to use was correct, I devised a graphical method. The sum of the cube roots of total airguns firing at any time are plotted against time. By applying a correction based on the NMFS criterion of 6 dB per five minutes elapsed time, a flattened, "acceptable" threshold can be plotted:

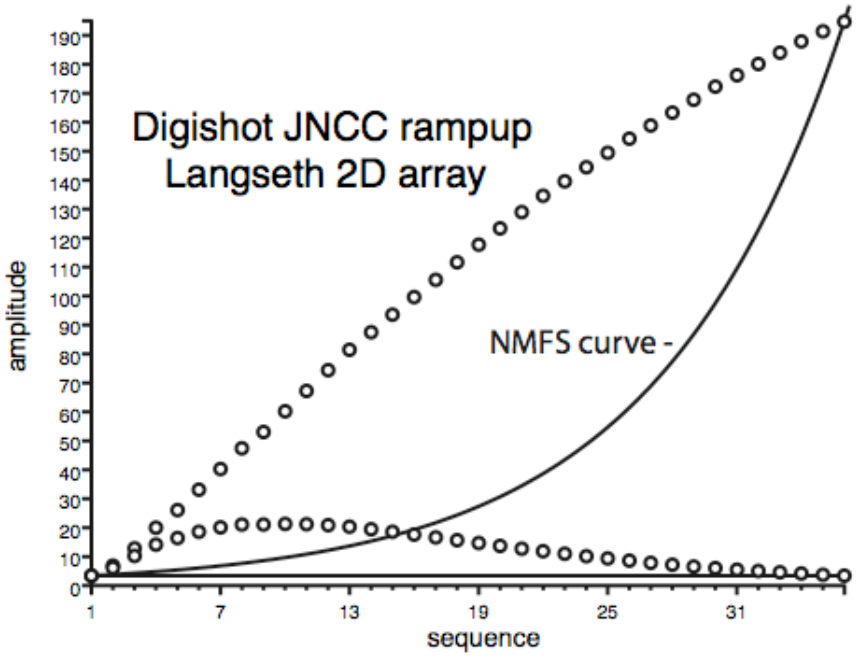


I created tables of the two rampup procedures, as created by DigiShot for the Langseth 2D array:

"JNCC"	
Seq.	Vol.
1	40
2	40
3	220
4	360
5	220
6	360
7	360
8	360
9	180
10	360
11	360
12	360
13	360
14	220
15	220
16	220
17	220
18	220
19	220
20	180
21	180
22	180
23	120
24	120
25	120
26	120
27	90
28	90
29	90
30	90
31	60
32	60
33	60
34	60
35	40
36	40

"GOM"	
Seq.	Vol.
1	40
2	40
3	220
4	360
4	220
5	360
5	360
5	360
5	180
6	360
6	360
6	360
6	360
6	220
6	220
6	220
6	220
7	220
7	220
7	180
7	180
7	180
7	120
7	120
7	120
7	120
7	90
7	90
7	90
7	90
7	60
7	60
7	60
7	60
7	40
7	40


Digishot Gulf of Mexico rampup
Langseth 2D array
NMFS curve -
amplitude
sequence
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
1
2
3
4
5
6
7


Digishot JNCC rampup
Langseth 2D array
NMFS curve -
amplitude
sequence
0
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180
190
1
7
13
19
25
31

APPENDIX: evaluation of Kongsberg DP system AutoTrak mode

Two methods for transferring waypoints to the Kongsberg DP system were tried. The first, based on a brief successful experiment by Anthony Johnson, involved transmission of NMEA strings via a serial connection:

```
$GPRTE,011,001,w,001,002,003,004,005,006,007,008,009,010*0E
$GPWPL,2659.4150,N,9453.9833,W,001*5A
$GPWPL,2654.0000,N,9454.0000,W,002*52
$GPWPL,2648.3142,N,9454.0175,W,003*59
$GPWPL,2648.3142,N,9454.0175,W,004*5E
$GPWPL,2648.2067,N,9454.0427,W,005*5A
$GPWPL,2648.1170,N,9454.1133,W,006*5C
$GPWPL,2648.0599,N,9454.2178,W,007*53
$GPWPL,2648.0447,N,9454.3390,W,008*5B
$GPWPL,2648.0740,N,9454.4570,W,009*51
$GPWPL,2648.1429,N,9454.5523,W,010*53
$GPRTE,011,002,w,011,012,013,014,015,016,017,018,019,020*0F
$GPWPL,2648.2401,N,9454.6092,W,011*57
$GPWPL,2648.3496,N,9454.6185,W,012*5C
$GPWPL,2648.4534,N,9454.5786,W,013*55
$GPWPL,2648.5344,N,9454.4960,W,014*55
$GPWPL,2648.5857,N,9454.3184,W,015*58
$GPWPL,2648.7030,N,9453.5000,W,016*5C
$GPWPL,2648.8289,N,9452.9795,W,017*54
$GPWPL,2649.0017,N,9452.4613,W,018*55
$GPWPL,2649.2234,N,9451.9521,W,019*59
$GPWPL,2649.4951,N,9451.4593,W,020*59
```

We never got this to work properly, though it might if we solved all the potential problems [serial format conversion, Mac -> DOS conversion, etc. Instead, I found that the Autotrak track editor could read and write its own files, with formats like this:

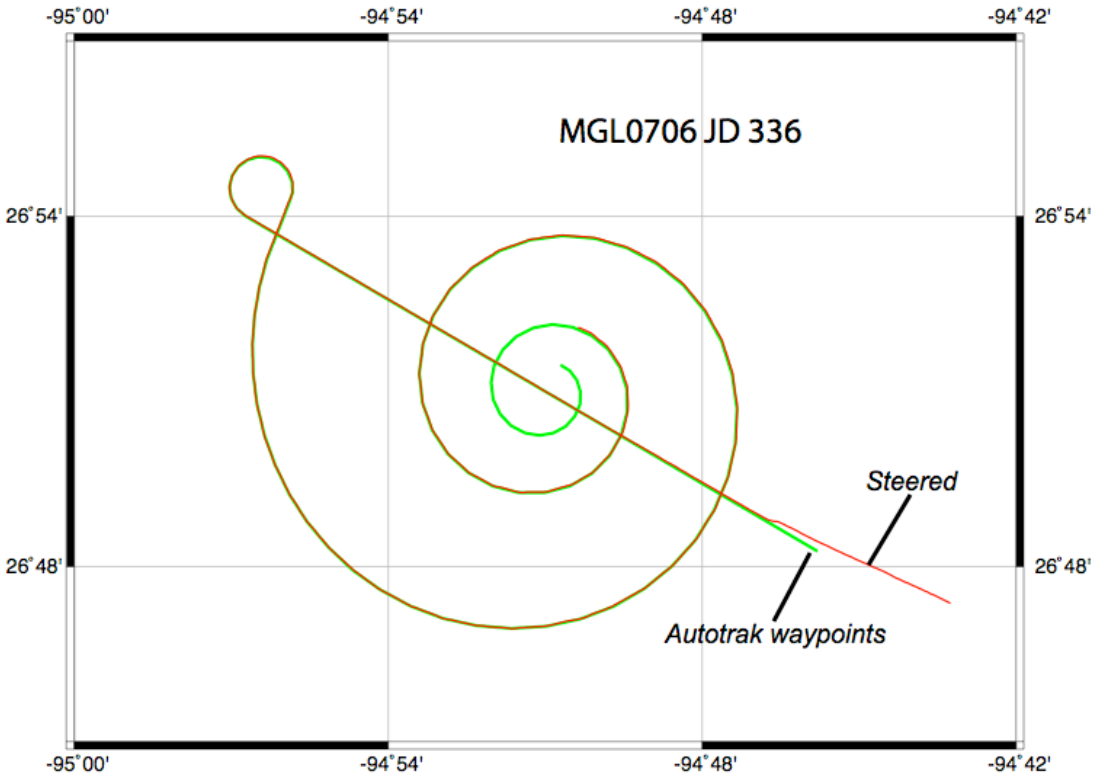
```
CreateDate (UTC),Tuesday, December 1, 2007 16:38:09
Version,4
TrackName,Dec_1_spiral
NoOfWp,107
Datum,WGS84
WPFormat,WPId,WPHemisNS,WPLatDeg,WPLatMin,WPHemisEW,WPLonDeg,WPLo
nMin,WPLegType,WPHead,WPSpeed,WPTurnRad
WP,  1,N,26,59.415000,W,094,53.983300,0,  0.000, 2.5000,  500.00
WP,  2,N,26,54.000000,W,094,54.000000,0,  0.000, 2.5000,  500.00
WP,  3,N,26,48.314200,W,094,54.017500,0,  0.000, 2.5000,  500.00
WP,  4,N,26,48.314200,W,094,54.017500,0,  0.000, 2.5000,  500.00
WP,  5,N,26,48.206700,W,094,54.042700,0,  0.000, 2.5000,  500.00
WP,  6,N,26,48.117000,W,094,54.113300,0,  0.000, 2.5000,  500.00
WP,  7,N,26,48.059900,W,094,54.217800,0,  0.000, 2.5000,  500.00
WP,  8,N,26,48.044700,W,094,54.339000,0,  0.000, 2.5000,  500.00
WP,  9,N,26,48.074000,W,094,54.457000,0,  0.000, 2.5000,  500.00
```

```
WP,  10,N,26,48.142900,W,094,54.552300,0,   0.000, 2.5000,   500.00
WP,  11,N,26,48.240100,W,094,54.609200,0,   0.000, 2.5000,   500.00
WP,  12,N,26,48.349600,W,094,54.618500,0,   0.000, 2.5000,   500.00
WP,  13,N,26,48.453400,W,094,54.578600,0,   0.000, 2.5000,   500.00
WP,  14,N,26,48.534400,W,094,54.496000,0,   0.000, 2.5000,   500.00
WP,  15,N,26,48.585700,W,094,54.318400,0,   0.000, 2.5000,   500.00
WP,  16,N,26,48.703000,W,094,53.500000,0,   0.000, 2.5000,   500.00
WP,  17,N,26,48.828900,W,094,52.979500,0,   0.000, 2.5000,   500.00
WP,  18,N,26,49.001700,W,094,52.461300,0,   0.000, 2.5000,   500.00
WP,  19,N,26,49.223400,W,094,51.952100,0,   0.000, 2.5000,   500.00
WP,  20,N,26,49.495100,W,094,51.459300,0,   0.000, 2.5000,   500.00
```

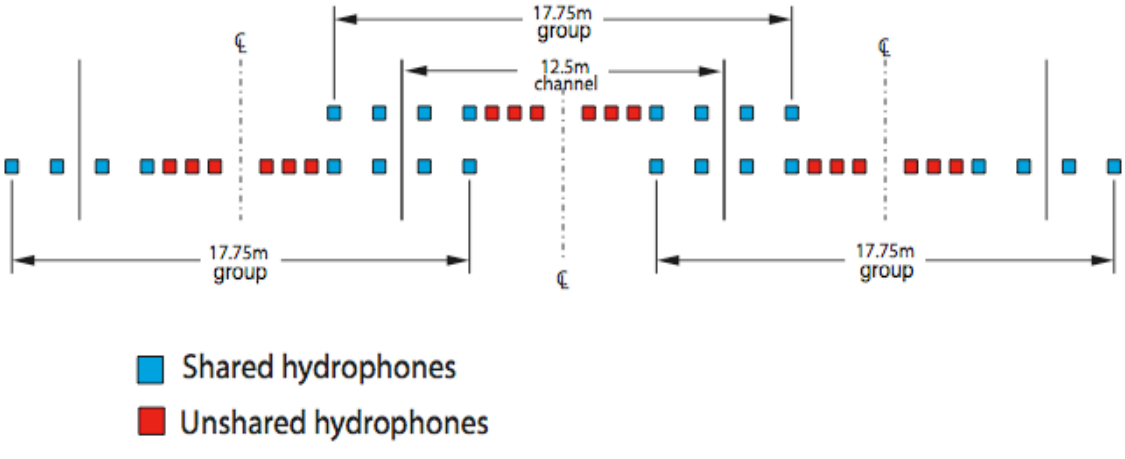
The method I used for creating these files was:

Create a file of x,y waypoints in meters, on an orthogonal grid.
Use Gmtproject to project these into latitudes and longitudes.
Reformat the GMT output files to the KDP format [kdp.f]

We succesfully tested the result:



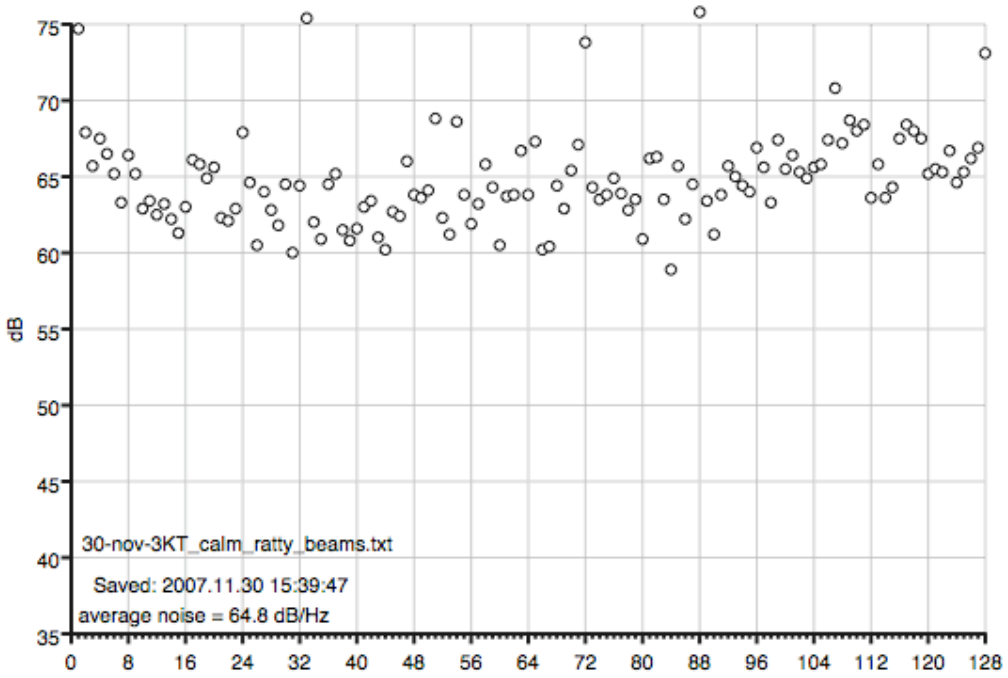
Appendix: Syntrak MCS streamer hydrophone layout

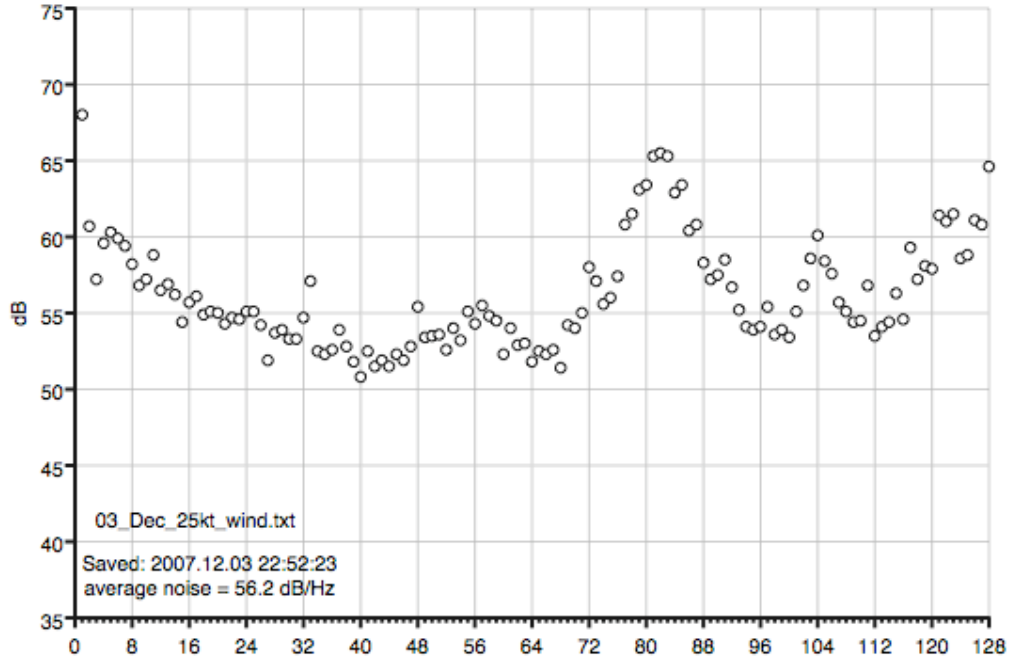


Hydrophone layout - R/V Langseth MCS streamers

Appendix: Kongsberg EM120 multibeam performance

The multibeam was kept running for the entire cruise, and data were logged, though little effort was made to conduct systematic survey data. Data quality varied a lot, often, seemingly, dependent on weather and sea state. During the course of the leg several self-noise tests were run, and some of those tests seem to contradict this apparent dependence. No further investigation into causal relationships between ships machinery and self-noise were carried out.


dB
75
70
65
60
55
50
45
40
35
0
8
16
24
32
40
48
56
64
72
80
88
96
104
112
120
128
30-nov-3KT_calm_ratty_beams.txt
Saved: 2007.11.30 15:39:47
average noise = 64.8 dB/Hz


dB
75
70
65
60
55
50
45
40
35
0
8
16
24
32
40
48
56
64
72
80
88
96
104
112
120
128
03_Dec_25kt_wind.txt
Saved: 2007.12.03 22:52:23
average noise = 56.2 dB/Hz