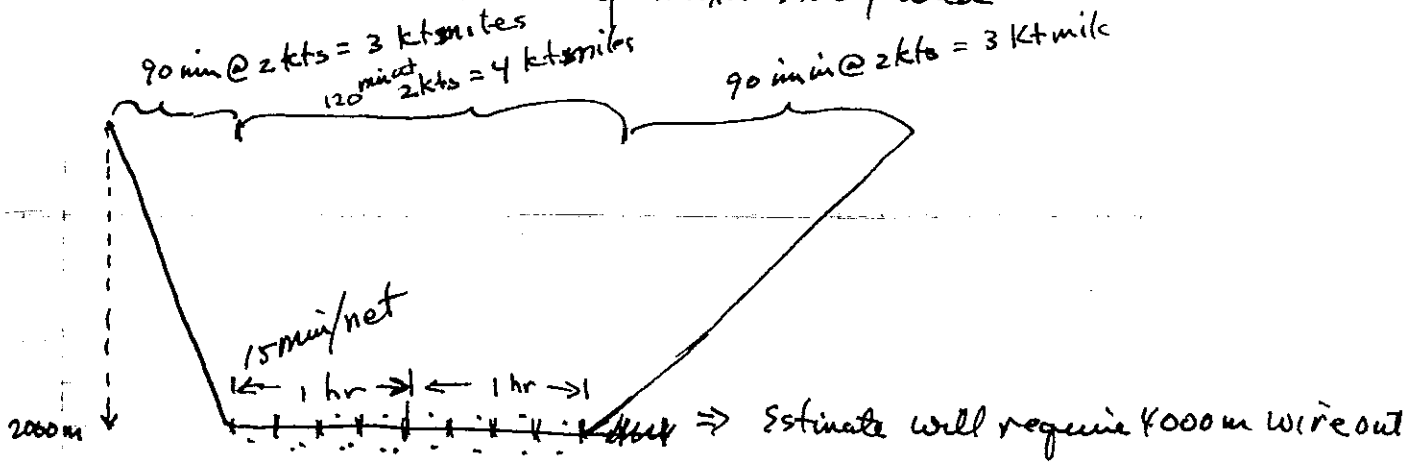


25 July 1985

plan for first deep tow in Gulf of CALIFORNIA
Deep-Sea Vents Region off Guaymas

→ tow to be about 100 m above the bottom

→ start to south west of main study area



⇒ pay wire out
at 50 m/min (as soon as possible)
⇒ vertical velocity 20 to 25 m/min

⇒ so about 90 min to lower net
120 min towing
90 min to recover net

300 min or 5 hours

$$\begin{array}{r} 8 \\ 50 \overline{) 4000} \\ \underline{400} \\ 62 \\ \underline{15} \\ 310 \\ \underline{630} \\ 430 \end{array}$$

⇒ each net open for 15 min =
 $15 \times 62 = 930 \text{ m}^3$

Ready for tow about 23 26

- in water about 1130 but had to bring it back to surface to fix angle -
- into water again just after midnight
- system seems to be sending data alright - including ping
- program not working well - several errors in typing program from Harry via teletype - Flow not working and neither is volume calculation.

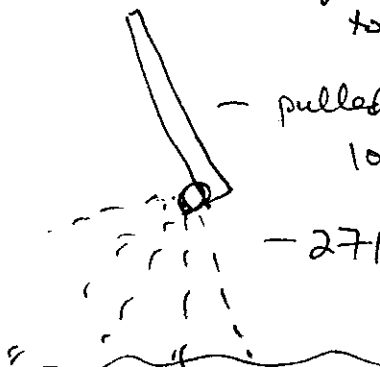
26 July 85

Made program change to fix Volume filtered
at 0118 - stopped program - did
and end of file on MOC-6Y-001
did patch of then ran ACQUIT again

Started MOC-6Y-001a in about 1 min or so
Winch stopped at 0123 because wire going
under hull

Start winch paying wire out at 0127

0145 → got very close to the bottom @ win 20 or 30 m
- winch stopped because wire against ship
ship being set to the east and we are towing
to the northeast or were trying to



- pulled net up to 1400 m depth - about
100 m above the bottom

- 2714 m WO at 020213 with net
at 1295

021101 bottom getting to close, so hauled net
up to 1860 m below surface - bottom
pressure 86 m

0213 - net 2 closed/net 3 opened
- during net 3 open wire hauled in

0228 - net 3 closed/net 4 opened -
about this time had to start wire being paid
out - net coming up even though wire constant
(wire stopped - under ship's hull).

0243 Net 5 opened - still can't lower net down because
wire under hull.

0258 net 6 opened - a few minutes ago, we were able
to start paying wire out to get net closer to the
bottom.

Final net closed at 0343 -

This tow worked by problems

- ① couldn't make course - ended up going along the flank of the valley
- ② flow meter stopped early during tow and did not start again during horizontal part of tow
- ③ had to keep net @ in 100 m of bottom because of wire under hull due to course we choose
- ④ But all nets were hard to close after 1st net took 4 commands - all others took 3 commands.

→ Towed on at 0411 hrs last side of six sides

→ Flow started working at 600 m - typical of a pressure sensitive reed switch.

sample #	type of sample
* Net # 0	some mud - lots of animals (Cupressoids)
# 1	lots of mud clams / bottom showing
# 2	Slight sediment on bottom of jar + jellies + Red shrimp
# 3	clean sample - @ Red shrimp
# 4	Some sediment (more than 2) - No big rods - <small>nothing particular notable</small>
# 5	No shrimps - slight sediment - like 2
# 6	Slight sediment - lots of shrimps + jellies
# 7	Slight sediment - like 2 lots of shrimps + jellies
# 8	Slight sediment - some jellies - no big Reds

26 July 2200

- looking back at the printout one can see where we touched bottom with net 1 open.
- Grosse / + Brain sieved the sample from net #1 and put remains in 1 yellow jar.

26 July 2200 cont
Went to bed at 0630 this morn & woke up at 1330

- spent afternoon working on AQUI program trying to get flow/spad to work & salinity calculation ~~done~~ corrected - Fixed spad but salinity algorithm has a problem which I think is due to the calculation of conductivity from frequency counts. Loren's program has 5 constants whereas I have only four constants - he seems to be using the newer conversion routine. - We need to get the old one from Boyd

27 July 85

MOC-6Y-002 + 002A

started tow about 1 AM - Fernando Mourguie & I decided to do oblique tow to 1000m rather than deep horizontal because of the lack of time - (sub repairs to the batteries took until 10 PM) - No problem with launch although wind was ^(is) stiff (20kts or so) + plenty of lighting on the horizon

- lowered net to 1050m and stopped wind and had ship's speed increased. Net kited up rapidly, so had wind pay wire out slowly during net's 1 (2 on proutant) ascent.

I screwed up firing net 1 close/net 2 open - intended to do it at 850m, but fired it instead at 900m.

Most of tow uneventful - Nets opened & closed on command wire rate in kept at 100m/min for most of tow & wire angle and net speed within desired range

- fired Net 8 closed at surface - deck unit read 8 meters

- Very nice tow -

Caught 2 large (6" diameter Bells) jelly fish in Net 0

Caught 2 large jelly fish as above in Net 1 (1000-900m)

900-700	Cyclothone in net 2 + lots of shrimps
700-550	Net mesh in net 3
550-400	More in Net 4 - start myctophids
400-300	large # of myctophids in Net 5
300-200	more myctophids in Net 6 + <i>M. difficilis</i>
200-100	lots of <i>difficilis</i> in Net 7
100-0	not many if any in net 8 but much plankton because 0700

27 July 85 (1906)

→ started 3rd 190CN85 tow of this cruise while sun still up - Net in water about 1849 - This is to be a long horizontal tow above the bottom about 100m

- finally got plotting routine to work → so getting plot of 4 US depth but salinities still eluding me - must get code from Boyd via telemail.

→ 1910 increase wire rate out to 90 mpm

→ 2009 Very close to 100m above the bottom - now doing fine tuning - Net angle & speed wire too low

2013 → Course changed to 225
stopped wire - 3362

2042 → Bottom trace on the pinger looks very good
This trajectory will take us right down the middle of the vents working area

→ 2102 4453MWO and still paying out slowly 40 mpm
Have now opened and closed

2215 → last net closed and started hauling back to surface at about 50 m/min - Tow started near North Hill and came south west (225) between West Hill and East Hill - I have some question about how far behind the ship the frame actually was. With the net at 1900m below the surface and with 5200 MWO, I calculate that the net was $\sqrt{5200 - 1900}$ m behind the ship or about 5000 m. This needs to be taken into account when plotting position of tow over bottom.

28 July
- 0046

- Note that buckets 3 & 6 leaked water out bottom - cracks at seams very small. I don't think animals were lost however

27/28 July

Notes on samples from tows Moc-67-003

Net 0 - Delphine tow - surprising that there was not much in it

Net 1 - Small jellies - not many shrimp and fair amount brown aggregates

Net 2 - Atolla like jelly + a number of shrimp (Reds) + small jelly fish

Net 3 - 1 Big Red + several others - some small jellies

Net 4 - 6 Reds - 1 big Brown bulbous hyperiid amphipod

Chaetognathus Net 5 - 1 Atolla 2 big Reds - 1 Brown hyperiid like in Net 4
Some small jellies

Net 6 - 1 Atolla - 2 big Reds - several small jellies

Net 7 - 4 Reds Several small jellies

Net 8 - several small jellies - 2 clear jellies
several Reds - Orange Nevertion about 2" long
x 3/8" wide + flat

Net 9 -

28 July (1929)

- Start of MOC-GY-004 - another deep long horizontal tow in Guaymas basin
doing 2.0 Kts

- Salinity probe started out noisy - yes we got the Sal program code working - Alit sent it to me on Telexmail.

down at
SD mph

for most
of shooting
to depth

1840 Start Recorder depth 600 meters
doing 2.4 - 2.5 Kts

1932 2850 MWO - flying over bottom about 100m
doing 2.7 Kts

1939 Net 1 open but having trouble getting speed of net over bottom up - ship's speed increased to 3.0 Kts

1944 1990 MWO - depth of Net 1872

1951 Set Net 1 Closed Net 2 open at 1950 - had to let this one go a bit longer to filter enough water to get a good catch (ca. $> 500 m^3$)

2014 - 3740 MWO - Net at 1955
about 80m above bottom Net 3 open

2027 - 3864 MWO - Net at 1917
about 100m above bottom Net 4 open
still have a pretty low angle ^{32°} and slow net speed 1.0 Kts
paying wire out at 14 to 16 mph

2041 - Net 5 open 4079 MWO (still paying out)
net angle ^{34°} coming up slowly and speed increasing - 1.2 Kts

2059 4220 MWO Net 6 open - about 100m above bottom
Net at 1930 m depth

2127 4350 MWO Net 8 open - about 100m above bottom

- 39
- Net 1 - 5 Reds on number of small jellies
2 or 3 larger Red amphipods -
Siphonophore
- Net 2 - No Reds - No jellies very sparse
catch - couple of amphipods
- Net 3 - 10 or so jellies - 3 or 4 Red Shrimps
- Net 4 - white amphipod - 2 atollas - several small
brown jellies - 4 or 5 Red Shrimps
- Net 5 - 16 or so small brown jellies - 1 Atolla
- 6 or 7 small Red Shrimps
- Net 6 - 8 or 9 small Red Shrimps - 1 large stenopore
(breaking up) - several small brown jellies
- Net 7 - 4 or 5 small shrimps - 8 or so brown jellies
white chaetognaths stand out. white amphipod
- Net 8 - 1 large Red Shrimp - 6 or so small shrimps
10 or so small brown jellies "earwig"
white amphipod

20 JULY 85

0058

MOX-GY-005

Started this tow about 0020 night after the deep horizontal tow -

- Very fast pay out of wire reached 1000 m in 40 min but too little MWO - only about 1300 so increased ship speed from 2.6 to 2.4 and kept wire going out
- 0109 increased ship speed to 2.7 kts. Still paying out wire slowly because net speed ~ .8 kts + angle 25° was too low

0125 max wire out - 1753 as net 1 open + coming up

0137 started wire coming in with net 2 open + at 880M

0152 increased wire rate into 15 mph @ 1644 MWO + net at 773 m

0229 so far a very smooth tow
Ship speed now 2.1 kts. Wire rate in 25 mph
Net 5 open about 700 MWO

0312 near the end of a very nice tow -
10 meters below surface

nets - hogshead

net 1 - 1 naechin size jelly - 6 star cycloPronas
lots of copepods and small crustaceans + red shrimps

net 2 red shrimps lots of cyclothons + mysidoplutei type 1
+ brown mummy + silver fish

net 3 - no shrimps or fish - mostly copepods

net 4 - mostly copepods - couple small red shrimps

net 5 - still many copepods + a couple mysidoplutei type 2
+ couple red shrimps + few euphausiids

net 6: large mass of colorless eggs? + 12 or so mysids
and a few euphausiids + copepods

net 7 - Still large mass of colorless eggs? + lots of euphausiids
and 1 large shrimp

net 8 - tremendous biomass mostly copepods & jellies - some
euphausiids - but also quite a few pteropods

29 July 85

MOC-GY-006

start down at 2156

This tow intended to sample from bottom to about 1000m to fill in the gap between upper 1800m and long bryozoals on deep sea floor.

"First tow in long while that Jim running by myself Martin left for Guaymas on the B&P" Jim staying on for 4 more days

- 2232 increase MW out rate to 50/min and ships speed increased to 2.7 kts (we started at 1.5 and increased it in steps of 2.0 + 2.4 to get to 2.7 Net now at 878 + MWO 1260
- 2250 2010 MWO Net at 1335 wire rate out is 50mpm ships speed 2.7 kts net not moving ahead .1 kts at best.
- 2317 2976 MWO Net at 1800 wire rate out at 30mpm ships speed 2.7 kts angle + net speed up a bit. 20-21° + 2.5 kts
- 2326 3289 MWO Net at 1905 net within 150m of the bottom. ships speed 2.7
- 2333 3503 MWO Net at 1966 net within 90m of bottom stopped which here but net coming up too fast so started paying out a 15mpm.
- 2335 Net 1 opened at 1941m
2340 3571 MWO - net coming in
2349 3611 MWO - net coming in } had to pay wire out to keep it from kiting up too fast, but stopped it finally at 2349
- 0000 Net 2 opened five at 1800m
- 0006 hauling in dead slow 4.5mpm
0024 increase wire in just a bit
0035 increase wire in 5mpm net 3 open + at 1655m
0039 increase wire in 5mpm net 3 open + at 1636m

0047 increase wire in 5 mph net 4 open + at 1595
wire coming in about 16 m pm

0208 - No changes since 0047 - net system
came up very very nicely for
virtually the whole tow without
having to change ship speed or wire rate in
→ now net 5 has just been opened - depth 982
1987 MWD

0226 - fired last net (8) closed and started
net coming back to surface at 40 mph
- slowed ship down to 2.5 kts ~1700 MWD
when we started up.

42
44 1700
1510

net 1 - 8 or so big Reds - 1 attolla - 1 ostracod
lots of brown munge - copepods - looks like
a typical bottom catch. - not many small jellies

net 2 - 1 5 to 6" long cucumber (Black) about size
of soft ball - 10 to 15 Red shrimps
lots of copepods - some chaetognaths
not many small jellies

net 3 - 3 or 4 shrimps - 1 attolla - copepods -
lots of brownish munge

net 4 - 6 or 7 Reds - a euphausiid - 2 fish copepods chaetognath
brownish munge - but less of it.

net 5 - 4 fish - 6 or 7 Reds - 1 Munge greenish brown
+ others as above

net 6 - 2 fish 4 or 5 Reds - 1 small cucumber (I think) only
about 1/2 golf ball size + others

net 7 - 7 or 8 fish 2 Big Acanthoparia - + other Reds - 1 jelly fish
lots of brownish munge + assortment

net 8 - 15 to 20 fish - Big jelly fish (3 or 4" diameter) 2 or 3
Big Acanthoparia + other Reds - + assortment of
copepods + chaetognaths etc

fix this
Bucket
leak

30 JULY 1985

MOC-GY-007

Start tow at

1731

- Deep horizontal tow at an oblique angle to the axis of Vents region

- light sensor not working and wasn't working on the last tow - all plugs checked and they were properly positioned - checked to see if case flooded, but no water came out when pump plug removed. - Possibly batteries drained?

Using Radson depth recorder instead of Bift can see scattering layer 150 to 300 meters as well as bottom at 1950m

Time

1751 - 1050 MWD - Net at 612 m - paying out at 50 mph
Ship's speed 2.6 Kts

1821 - 2520 MWD - net at 1096 - paying out at 50 mph

1834 - 3045 MWD Net at 1258 - paying out at 50 mph
Ship's speed 2.7 kts1847 - 3500 MWD Net at 1413 - paying out at 50 mph
Ship's speed 2.7 kts

1850 - drop speed of ship to ~ 2.4 Kts

Sunset
about
now1914 - 4510 MWD Net at 1794 - pay out at 50 mph
Ship's speed 2.4 kts1924 4850 MWD Net at 1900 - paying out at 50 mph
→ 1925 slow wind to 25 mph

1933 Stop The wind

1949 long stretch without any good pinger depths, like 10 minutes
Wonder why? we pulled net up to 1900m just where bottom
was much closer than we figured
stop wind

1955 got first bottom depth of 131 m - started paying out slow

- 2011 - got another ping after long wait of 108 m - It seems that this towing configuration is not conducive to pinging off the bottom.
- 2016 51 2/3 MWO 1859 - bottom starting to come up faster than net.
- 2017 start in at 10 mpm
- 2023 5093 MWO stop winch
- 2035 start paying out at 10 mpm - bottom not coming up as fast as net rising.
- 2103 increase payout rate to 15 mpm.
- 2118 5605 MWO - stop winch - bottom now about 100 m below net & net at 1776 m
ship speed 2.5 Kts.
net & open - very near end of tow.
- 2124 start haul in at 10 mpm - then a minute or two later after the net & closed - brought winch rate in to 50 mpm
- 2316 Passed the 500 mwo mark still coming in at 50 mpm but slowed ship down to 1.5 Kts
- up at 2326 - lovely tow good samples
1 fish caught in net bars between Nets 6 & 8 could have been caught anywhere in the water column.
1 snipe eel - beauty caught in net zero
- Net 1 about a dozen Red shrimp (two large females @ eggs - eggs about 2 mm or two in diameter - 1 large amphipod (brown)
No jelly fish or very few - No fish - Many copepods & chaetognaths - possibly mollusc larvae - greenish brown crustacean?
- Net 2 1 big red 5 medium Reds - 1 greenish brown crustacean
White amphipod - lots of chaetognath. (1 large one) No jellies or fish

31 July 85 wee hours

MOC-64-008

0-1000m oblique

Second tow tonight - full moon up for
most of tow

- Buckets/cood end of nets need tapping -
- one hose clamp on pump broken and had to be replaced before this tow started - light sensor still not working but no time to play with it.
- 0105 Start down
- 0149 now paying out at 50 upm -
MWD = 1530 Net depth = 663 Ship's speed 1.9
having some trouble getting net down during first part of lowering net angle (50°) was high and net speed high (1.9 kts)
- 0205 Winch stopped - net at 1079 7260 MWD
Net 0 is Net 1 in display because I reset the flow at the surface before net started down.
- 0211 Start in at 10 upm Net at 1051
- 0229 increase wire rate to 20 upm -
I screwed up with trying to open net 1 - I inadvertently hit the left/right command when resetting flow at start of tow and when we gave command to close net 0 and open 1 nothing happened - we almost gave up and hauled the net in when I remembered hitting that switch - I toggled it again and then gave the net command - in 3 steps the net bar was dropped AT 983 - at Net depth of 983 m.
- 0303 Slow wind to 20 upm - Net at 653 Ship's speed 1.8
- 0330 MWD 689 net at 381 Ship's speed 2.1 k
Net 5 open
slow wire rate to 15 upm
- 0342 increase wire rate to 20 upm.

31 JULY 85

MOC-6Y-009

Deep dive to 2000m - oblique tow to characterize
zooplankton between 2000 + 850 m

Tow started just as sun setting below horizon

- start out at 20 mpm

1915 - increase wire out to 35 mpm - net at 55 m

1930 - increase ship's speed from 2.0 to 2.4 ^{kts} and
wire rate out from 35 to 45 mpm

2026 - stop winch
MWO = 3300 net at 1685 ship's speed 2.3 kts

2037 - MWO = 3862 ^{winch} ~~winch~~ slowed to 25 mpm net at 1900⁺ m
still paying out at 20 mpm

2048 increase wire rate to 25 mpm - net at 1871 m ^{MWO 4076}
ship's speed 2.6 - but bridge just called ~~1800~~
to say that they could not hold this speed
- either must go faster or slower - I
choose faster for now - will control
speed up by winch wire rate out

2055 increase wire out to 30 mpm - net at 1846 m
MWO = 4280 ship's speed 3.0 kts

2100 slow wire out to 25 mpm - net at 1830 m
MWO = 4420 m ship's speed 3.0

2102 slow to 20 mpm - net stalled out about 1830 m

2104 slow to 15 mpm out

2106 slow to 10 mpm out

2122 slow to slow out 25 mpm

2125 stop winch 4707 net at 1713

2130 ask to have .2 kt taken off ship's speed; clutches cooled

2133 start in at 10 mpm net at 1673 ship's speed 2.2

2135 up to 20 mpm / 2136 - up to 30 mpm

2139 slow to 20 mpm

2211

something happened to the net command system - we tried
to open the Net 4 but no matter how many commands
given, the nets did not appear to drop - so we
hauled the system in at 40 mpm - I tried to
switch from left to right - in case switch inadvertently
hit - then turn off the deck unit & back on again

with IEEE & data line turned off - but this did
nothing either - So haul away & in about 20 min
we will know what went wrong.

No hang up of the net command toggle release - so
it must be the batteries

Net on deck about midnight.

Washed samples - got 4 samples
2 oblique & 2 stratified down deep

1 August (1934)

Batteries in underwater unit were lead acids
and measured 18.6 Volts - I put
in the other battery pack (NICADs) which
measured 19.7 volts. I think lead acid
pack was not charged up to peak voltage and
cold at depth sapped battery strength
causing motor drive to fail - System
worked fine on deck with NICAD pack.

Also put recharged pack into light sensor
and did a check to make sure it was
working - AOK - volts on small pack
was 4.7 before charging and 13.4
once charged.

1 August

MOC-64-010 - (last tow of buoy basin Series

- This is a shallow tow to 200 m - nets to be opened & closed at 25 m intervals.
- Made scattering layer observations just before tow was started - Ratheon recorder turned on ~~at~~ about 1 hour before tow started
 - This tow started in vicinity of West Hill and we ~~steamed~~ ^{willed} a 145° course to southeast across south trough
 - Net system in water at 2017 started paying wire out at 15 upm at 2019
 - 2021 - increase wire out to 25 upm.
 - 2028 - MWO 189 ^{net at} 134 m ship speed 2.4 kts
 - 2032 MWO = 300 net at 190 ship speed 2.4 kts
 - 2035 MWO = 370 net at 218 ship speed 2.5
 - 2036 stop wind MWO = 391 net at 228 Sally on Wind
 - 2040 start coming in at 10 upm net at 221
 - 2049 start paying out at 10 upm - net 1 coming up to fast. Need to filter more water
 - 2052 stop wind @ net at 189 & start coming back in at 5 to 10 upm. "Joe on Wind"
 - 2055 put on dead slow
 - 2101 "increase just a little"
 - 2102 "a little faster than that"
 - net stalled out in 158-155 range
stop speed up to 2.7
 - 2123 cut ship speed to 2.3 - 100 mwo @ net at 55
 - 2134 - pressure read 10 m at surface