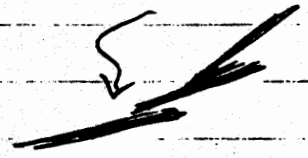
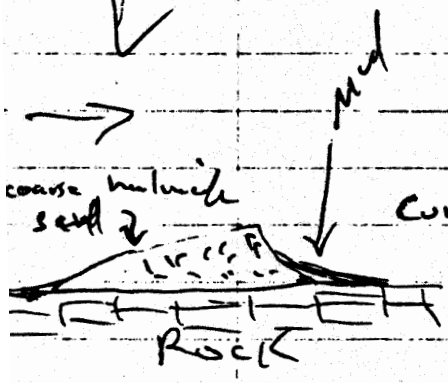
DIVE LOG

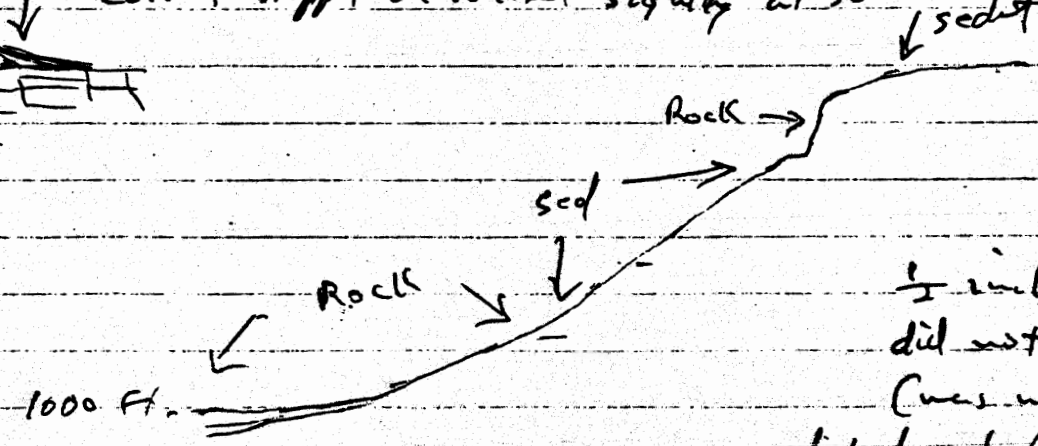
POWELL SU2-388 / DELTA
Halley / Wilbur / Willman
BAHAMAS SHELF
May 13-20, 1988

Dive #1005 26° 43.5' 79° 19.2'
4:00PM 5/14/88
Slater/Shinn — Dive to 1000 ft - begining at @ 800 ft 20-30 degree slope. Flattens to @ 15° w/ smooth hard rock surfaces appear between coarse sand ripples. Patches of mud occur on Lee (North) side of ripples. From 900 - 1000 ft areas of bare rock increased to the point where sand ripples covered less area than bare rock. strong current from south to north all the way down. a lot of garbage on bottom (Bimini must dump garbage here. coarse Halimeda sand even contains fragments of beer bottle glass. on way up we noticed several small discontinuous ledges of rock. ledges parallel slope w/ lay shingle-like on a house roof.



Took sample (put in bin 1 w/ 2) at 750 ft. also took sample at 620 ft w/ 400 ft. Rodolith sample 4"-5" across was taken at last sediment sampling site at 400 ft.
Encountered a rock wall at 180 ft which ended at 110 ft.
Current stopped w/ reversed slightly at 500 ft on way up.





½ inch video did not record (was not turned on) did do selected 8 mm tape

Dive 1006 25° 48.0' 79° 17.7'
6:15pm 5/14/88
Slater / Wilber

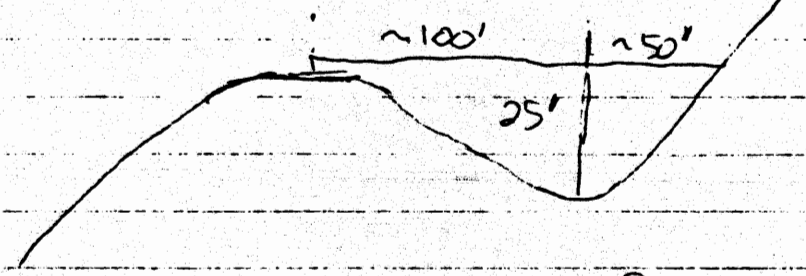
Descent to 650'. Bottom of fine bioturbated sediment. Many surface tracks and trails and penetrating burrows and mounds. 19.1°C @ 650' We headed down slope to 760'. "Pits" in surface identified as holothurian excavation by Gene Shinn (from video) although no holothurians sited during dive. Still #29 @ 740'. Date on video data pack says 5-15 but dive was made on 5-14/88. Bottom was same all the way down to 760' and appeared to continue indefinitely. Sediment sample (grab) taken @ 765' placed in chamber 4. Some sample contamination into bottom of chamber 1. We then began heading up slope. Bottom same fine muddy? sand with tracks, trails, pits & burrows. Still #37 @ 650', #38 @ 640', #39 @ 630' #40+41 @ 600' 20.2°C @ 600'. Sed sample taken @ 600' placed in chamber 1. Some spill over into chamber 4. 15° slope angle @ 590' Δ in slope angle @ 560' (18°). Slope steepening going up. Still #44 @ 560', #45 @ 525'. Slope angle 25° @ 515', 28° slope @ 500' Bottom type still same as we went up slope but with more coarse sand visible on surface. Near 525' we could see ahead that the slope was flattening out. At 485' we were on the top of a positive relief depositional feature (the "dump bump"). Top of bump was basically flat but had small sand waves (or megaripples) with approximately 1' relief 5-6' spacing between. Slip faces to west? Bedforms "highlighted" by accumulation of organic matter (Thallassia

throughout this whole lower slope surface was littered with

Still #35 At sample

Thallassia and Syringodium. 5 10% surface coverage. 100% surface coverage in holothurian pits. A mangrove leaf also spotted.

And Syringodium) and coarser seds in troughs. We did a 360° spin on top of "bump". Bump 50-70' across. Slope drops away to west and to east (looking toward WGBB). Sample taken at crest of bump. Placed in chamber 2 (495'). 22.3° C at 485'. Sample was coarse sand. We headed east down the slope. Slope angle >15° going down. Stills # 49 and 50 taken at sample site on crest. Stills # 51, 52 didn't expose (no strobe). We went down into the "swale" area between the dump bump and the start of a rocky steep slope to the east. 510' at base of swale.



Rich estimates total distance from crest of bump to trough of swale to be ~100'. Relief of bump/swale is ~25' at this site. Seismic lines 2 and 3 taken later confirm low relief dump bump in this area both to north and south of dive site 1006. Lines 2 and 3 "bracketed" site 1006. Slight current to south in swale. Sediment in swale was a "lag" deposit of pebbles & cobbles of rock with coarse sand. Sediment sample taken and placed in chamber 3. Also a cobble-sized piece of rock was taken from swale area (sample "5"). Rich's impression was that swale sloped slightly to south. We then started up slope which was rocky with sediment veneer and accumulation in pockets and holes. Rock may have been submarine-lithified material cemented at clay angle? Rock slabs

"conform" to slope angle. 35° slope @ 400'. Still #59 taken @ 400'. Video blackout occurred in this area briefly. Still #60 @ 350' 35° slope @ 350'. 40° slope at 340'. The slope became vertical (90°) @ 320'. Stills #62 and #63 @ 320'. We ascended vertically up the "wall" wall with overhangs and undercuts. Encrusted with sponges etc. Still #65 @ 250'. Still #67 @ 180'. Top of wall @ 160'. Still #68 at 160'. Slope flattens out at 160' feet. E. Acm is sediment over rock. We ascended vertically at this point to end dive.

Dive # 1007
10:15A, 5/15
Slater / Halley Max Depth 650'

Dive to 450 ft Travel downslope to 650'. Slope 15-20°. Generally smooth, fine sand, tracks and trails, crater-like burrows. 10-20 ft patches of grass + sediment forming "flocculent" surface layer 3-4" thick
20.1° ± 650 ft Up 15° smooth sand slope, dead grass patches. No grass
20.3° 600 ft patches above 570 ft. Slope increases to 23° at 555 ft.
20.3° 525 ft Middle water layer at 525 ft. Slope 26° at 520 ft.
Sea pens between 550 and 520 ft. Slope 35° at 480 ft.
20.8° 500 ft Top of "dump bump" and sides down to 50 ft below the top covered by sand waves (megaripples) 1-2 m wide, 10-20 m long parallel to the crest of the bump. Sand waves steepest on west side. Smaller ripples oriented E-W cross top of sand waves. Sand waves appear to come up east side, over the top and down the west slope.

Travelled several hundred meters south along crest of dump bump. Depth of crest varied 450±10 ft. Width
23.7° 450 ft varied ~75'-100' width. Sand waves have clear slip slope on west side including those on east side of bump.

Tested exposure range of still camera.

17° slope on east side of bump. Sand waves oriented up inside slope (west slope) of bump. Erosional moat 545 ft deep. Travelled south in moat. Skattered coral debris in moat. Sandy sediment laps ~30 ft up rock slope.

Rock slope pocked with shallow holes filled with sand, 3-10 ft wide. Rock appears to conform to 35° slope, forms slabs and ledges. Lots of life on it. Sample from 300 ft. Sediment chutes and spur and groove features. Spurs ~1 m wide, 2-3 m long. Wall, vertical between 255 and 145 ft. Gentle slope, mostly sand covered to 100 ft.

Dive # 1009 Wilber / Slater
1400 5-15/08 Max depth 710'

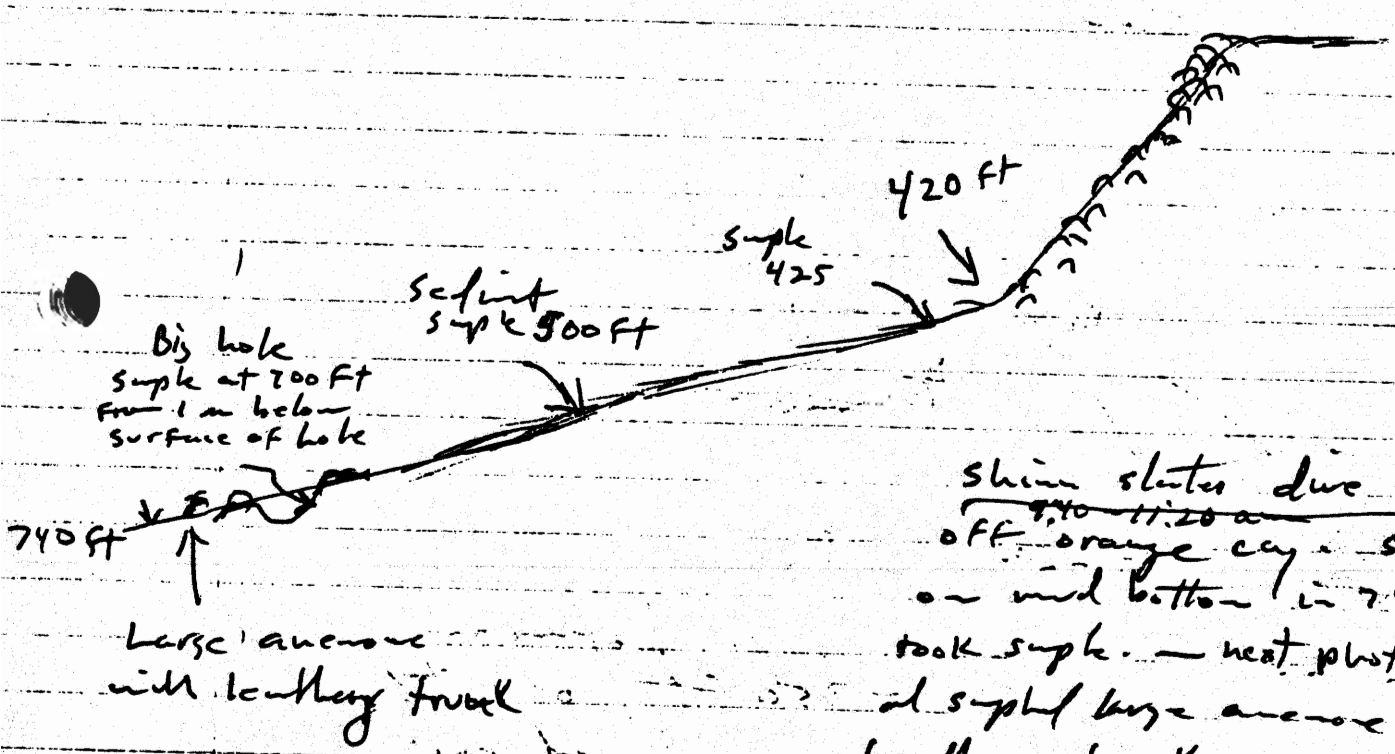
Descent to 650'. Landed on flat terrace-like feature at point of onlap. Very subdued "bump bump". We could clearly see the rock veneer of the upper slope in contact with sedimentary bottom. We turned and headed west across terrace. Fine sandy bottom as per earlier dives. Slope became steeper going down at edge of terrace. We measured this slope on way back up. We drove down to 710' over monotonous fine sandy bottom. Stills # 17 and #18 taken at 710'. Current slightly to south (left - P.S.) 20° slope at 710' 20.1°C at 710'. Sediment sample taken @ 710' placed in chamber #3. Headed up-slope. 22° slope at 690', 22° slope @ 670'. Slope begins to flatten at at 660' (heading east). High point of terrace ("bump") @ 640'. "Appears" flat across terrace looking east. Still #20 taken at 640' at lip of terrace. Still #21 on terrace flat. Terrace ~ 90' across. Slight slope going down toward east off terrace as we approach rocky slope. Settled down to 655'. Relief on terrace (bump) was 15'. Sample taken at base of rocky slope. Very coarse Holimedt sand with some fines. Sample @ 655' placed in chamber #4. Very little current during sampling. Stirred up sediment settles straight down. We started up-slope. Stills # 22, 23 taken at base of rocky slope. Slope angle 27° @ 620'. Still #24 taken @ 600'. Slope angle 35° @ 600'.

The rocky slope appears to be lightly biologically encrusted hardgrounds comparable to slope angle. Sponges, Alcyonarians, gorgonians etc. Stop @ 590' to attempt to sample rock. 20.3°C @ 590' 35° slope @ 590'. I got a good grip on a ledge of rock but could not snap it off. Sediment sample of very coarse Halimeda sand taken from pocket @ 590'. Placed in Chamber #1. Still #25 taken @ 580'. 36° slope angle @ 560'. 38° slope angle @ 535'. Still #26 taken at 535'. 20.7°C at 535'. Still #27 taken at 500'. 38° slope angle @ 470'. Still #28 @ 425'. Bottom is the same hardground surface with little undercuts and ledges. Increasing surface encrusters above 450' Slope angle 30° @ 375' 24.7°C @ 375'. Current increases (from south) going up slope. Strong current from south @ 305'. 305' marks base of "wall". Sample taken @ 305'. Placed in chamber #2. Still #29 taken at 300' at base of wall. Slope vertical (90°) @ 270'. Still #29 taken @ 270' 24.9°C @ 270'. Still #31 taken @ 270'. Still #32 (no strobe). Vertical wall with undercuts and overhangs at 235'. Still #33 @ 235'. Still #34 @ 180'. Live Halimeds and a very "live bottom" in general @ 145'. Top of wall @ 135'. 25.6°C @ 135'. Strong current from south (>1knot) at 135'. Slope flattens out to east with slight rise. Bottom away to east is rocky, heavily encrusted with patches of sand. Ascent to surface. End Delta #4008.

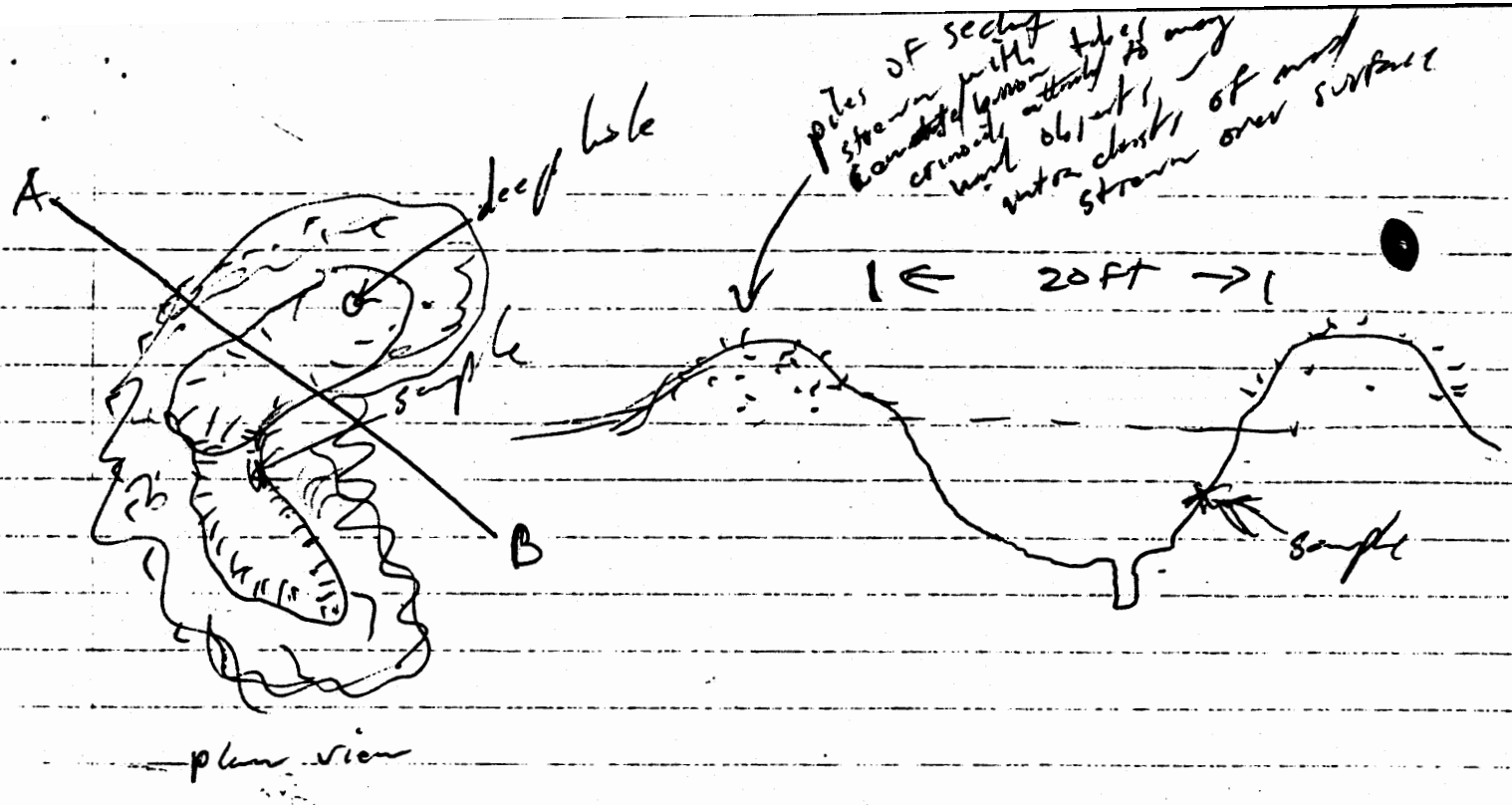
Coarse Halimeda Sand →

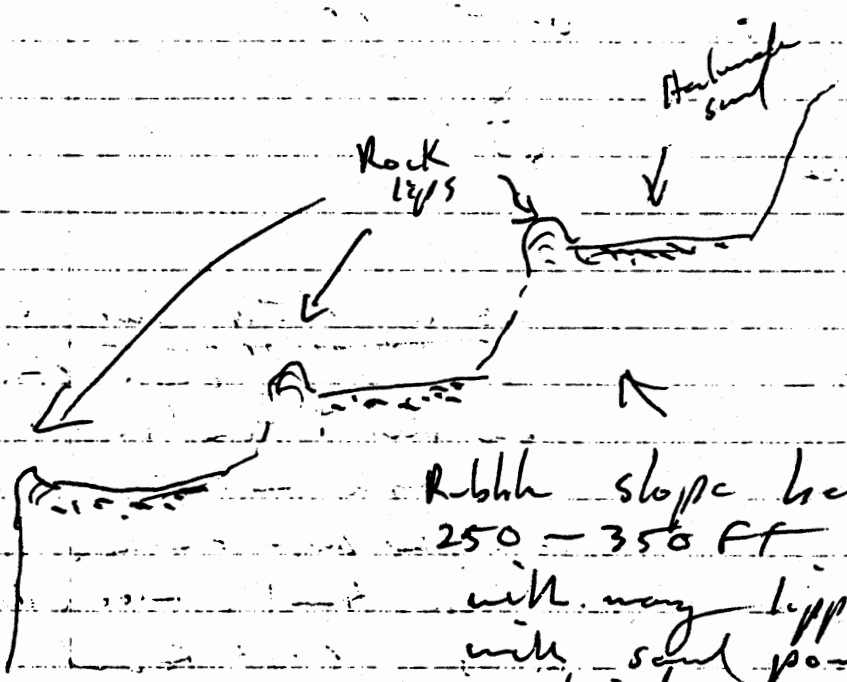
* On this dive, on the sedimentary slope we passed a number of large open burrows. In looking →

directly down into one of these I saw what appeared to be coarse/fine bedding on the burrow wall. Almost looked like beach bedding. Did not get a chance to investigate in detail. Burrow was "big enough to stick your fist in". May be artifact of construction of burrow wall by whatever organism made it but it sure looked like a primary sedimentary structure.



Shinn slates dive 1010 ~~9:40 - 11:20 am~~ off orange cay. started on mud bottom in 740 ft. took sample. — next photographed and sampled large anemone with leathery trunk. — see video and photos. Next found large hole large enough to put sub in. took sample from wall of hole @ 1 m below surrounding terraces. ~~and~~ saw other holes later (also saw true red snappers) took sediment sample at 500 ft. and rock sample near base of steep rubble slope in 425 ft. sediment very coarse (Halimeda plates etc) within 25 m of bottom of rubble slope - rubble slope 35° and has many lips or terrace lips that hold back halimeda sand.





Rubble slope between
250 – 350 ft ornamented
with many lipped rock
with sand pondered
behind

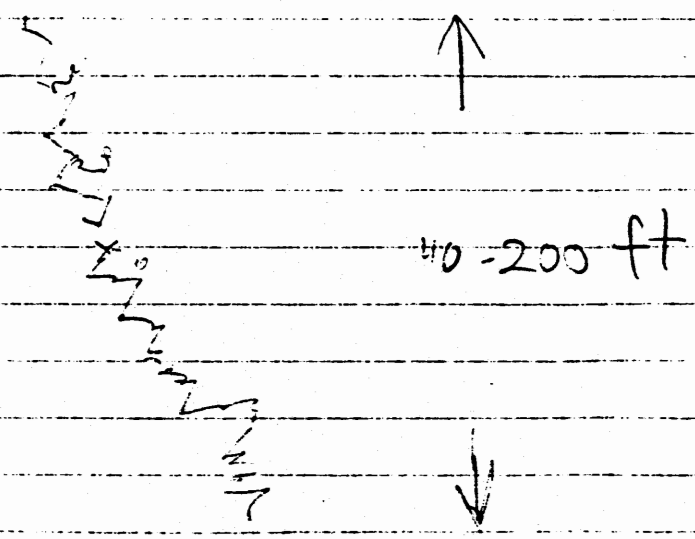
Dive 1012
5/16/89 5:00 PM
Slater/Halley

Maximum depth 960 ft. Up muddy slope. Samples at 960 ft and 600 ft. Smooth surface with small mounds, crater burrows, file fish burrows, tracks and trails similar to muddy slope of dives 1010 and 1011.

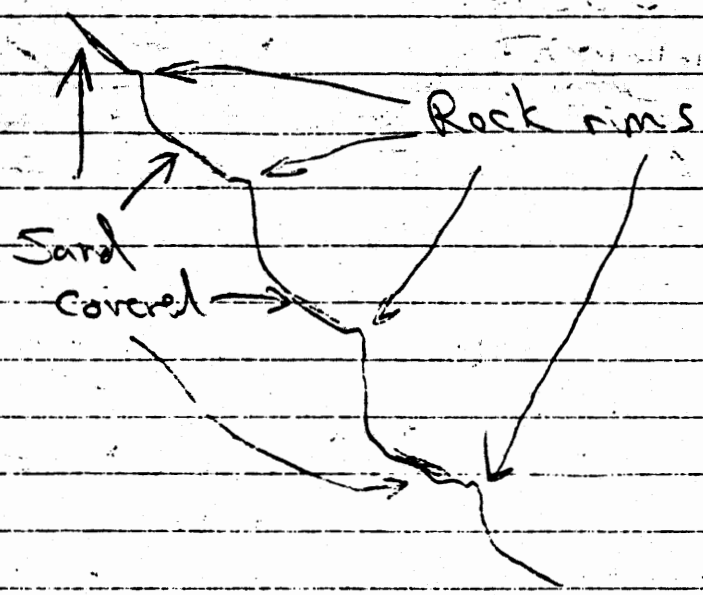
Crest area of bump at 450' covered with coarse rounded lumps and cemented tubes. Rocks on both sides of moat. Eroded mud layer exposed in moat floor. Moat floor at 550 ±. Mud layer very firm, burrowed, contains cemented burrows. Large blocks of limestone in moat at base of wall. Largest diameter are 10m (33 ft). Boulder covered rock slope (40°) from 540 ft to 380 ft. Vertical or almost vertical from 380 to 180 ft.

My impression is that we've seen ~~4~~ 5 types of rock slopes:

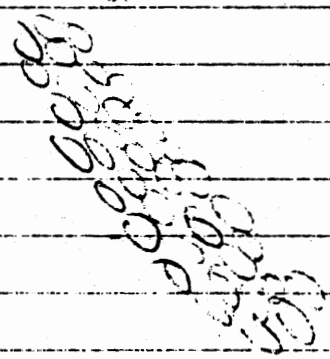
1. Vertical walls



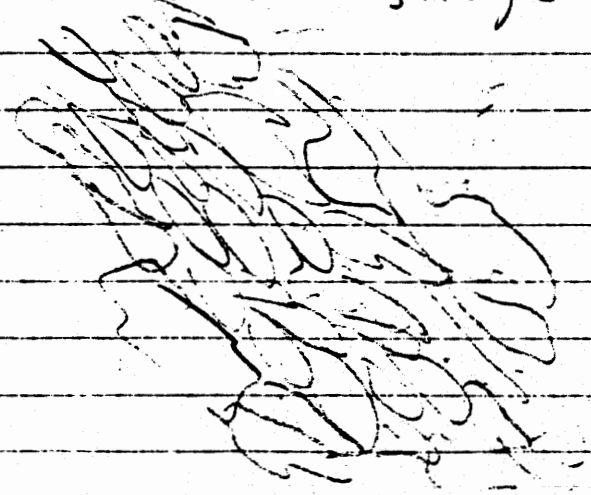
2. Terraced slopes

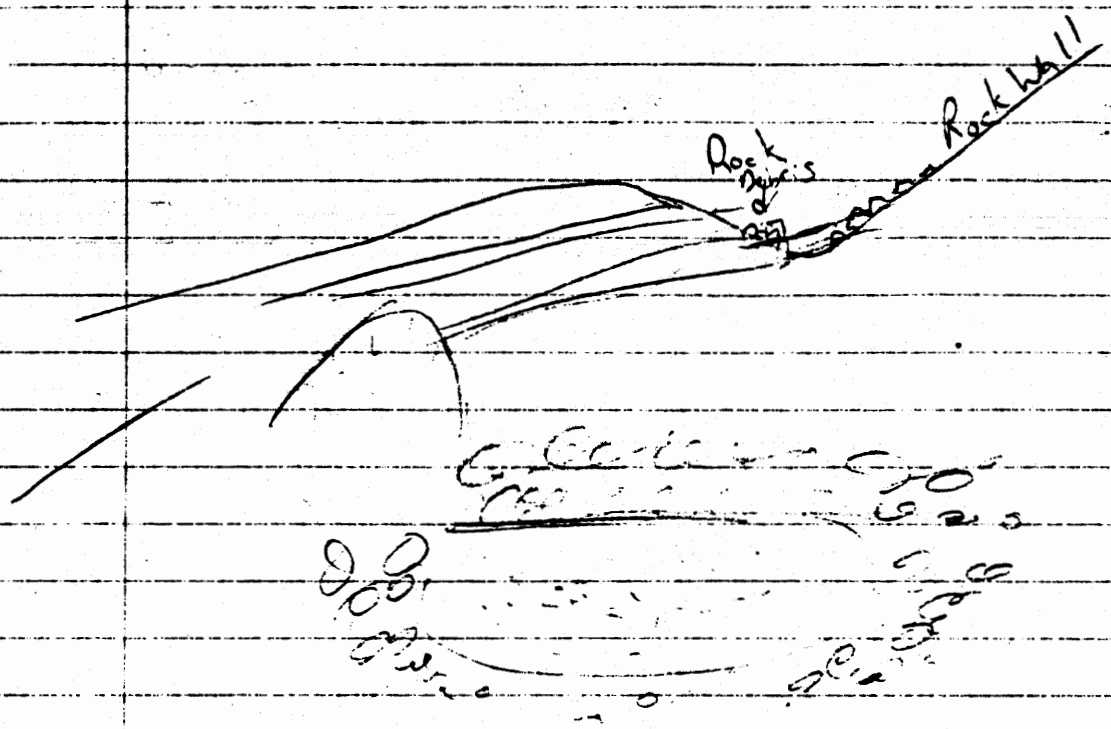


3. Boulder slopes



4. Slope conformable "shingles" and ledges





5. Smooth rockslopes

Dive 1014
2:30 pm 5/17/88 23° 38.5'

Slater/Halley

Dive to examine erosional moat. Start at 600 ft.
21.6°C 590 ft Slope 10-12° Smooth bottom Smooth bump top; no ripples or bedforms. Top of bump 505'. Top of bump 40-50 ft wide Rounded top. Inner slope of bump 15°. Ledges and outcrops of metured dipping rock in erosional moat. Bottom of erosional moat 580'. Ran north in moat for 1 mile±. Continuous outcrops of rock forming ledge on east slope of bump. Bottom of moat varied from 600' to as shallow as 540'. Ledge on east wall of bump exposed in deep parts of moat. Ledge is buried in saddler parts of moat, then outcrops for several hundred yards at a
21.3°C 600 ft strech in deeper parts of moat. ~~See diagram on previous page~~

Rock slope 30°. Smooth between 600 and 540. Bumpy surface between 540 and 495. "Boulder" size knobs (~1m) 495' to 400 ft. Small steps at 400 ft
23.8° 400 ft with rims 6" to 1 ft high. Terraces 3 to 4 ft high at 350 ft, Slope 25°. Terraces 6-8 ft high at 320 ft. 15 ft high at 250 ft. Edge of slope at 180 ft.

Delta Dive 1011 5-16/88 Slater/Wilber

On bottom @ 910' Muddy sand bottom, similar to dive 1010. Still #2,3 taken @ 900'. 12° slope angle @ 900'. Sediment sample taken placed in bin #2. Headed up depositional slope, Slope angle 15° @ 865' Still #4 taken at 865'. Bioturbated, monotonous muddy bottom. Still #5 taken @ 820'. 18°-20° slope angle at 800'. Still #6 taken @ 770' 25°C @ 750'. Big "hole" (excavation pit) investigated at 750' Still up to #10 taken at site of hole. 19.6°C at 750'. After circling hole we resumed up slope transect (heading east). Slope angle 20° at 710' Still #11 taken at 700', 20°C at 700'. We investigated another hole at 675'. Burrowing organisms (sponges?) with attached crinoids in bottom of hole. Snapper surrounding hole. Still photos up to #14 taken at this site. We continued up-slope. Bottom similar and monotonous. Still #15 taken at 655'. Slope angle 20°-22° at 650'. Still #17 taken at 640'. Sample taken at 600' put in bin #4. Still #18 taken at 600', 21°C at 600'. Change in slope angle at 500', 10°-16° slope at 500' Stills #19, 20 at 570'. Slope flattens out further at 550'. Still #21 at 550'. Slope flattened to (12°?) at 535'. Still #22 taken at 520' 21.2°C at 520°. More coarse material present at 475' Still #22 taken at 475', 22.4°C at 475'. Very coarse material present on surface as slope flattens out toward the east. We are approaching top of dump bump. 8° slope at 450'. Still #24 taken at 450'. Top of bump at 430' approximately 100' across. We could see slopes to east and to west from top of bump. Stills #25 and 26 taken at 430' at top of bump. Sediment sample

Dive 1013 5-17/88 ~23°50' N along WGBB
Wilber / Slater

On bottom at 970' Noticeable current from S→N. We headed down slope. Deep-water slit shells "zone" seen at 910' Still #1,2,3,4 @ 930-940'. Thallasia and Syringodium seen on bottom @ 960'. Bottom has noticeable current striation and ripples. Stopped at 970', Took sediment sample. Placed in Bin #2. Still #7 clicked but did not expose (photo still #s 1 to high from horizon) Still #8 taken at 970'. Current-striations in fine sand oriented S→N. Leeside tailings north of larger bottom objects. Still #9 taken at 935' Still #10 at 915', slit shell zone again at ~910'. 12° slope at 890' Plastic Bag on bottom "waving" in current at 860' = still # 11, 18.3°C at 860' Still # 13 taken at 850'. 2nd partially buried plastic bag at 850' = still # 14, 15° slope at 850'. Current was N-S throughout this whole dive on this lower slower. Current estimate ~.25 knots. Could clearly see the shallow water grasses moving across the bottom at this speed and we were "side-slipping" (to north) up-slope. Surface is rippled throughout this part of dive. Stills # 16, 17 taken at 800'. Pit with lumpy white clays balls around it at 750'. Still # 19 at 750'. 19.1°C at 750'. Still # 20 taken at fish hole at 730'. 11:25 at 720'. Slope angle 18° at 720'. We continue to side-slip to north as we head east up slope. (Advanced clicker twice with no exposure so stills are now off by #3). #23 taken at 670'. Increasingly rippled bottom at 660'. Sea pen zone starts at 660', 11:30 at 650'. Ripples are very low relief (1-2cm) "sinuous" ripples with

some small barchans(?) All oriented with slip faces to north. Many sea pen @ 620' 20.7°C @ 600'. Still #24 taken @ 600'. Slope angle of 12° @ 600'. Still #25 taken @ 590'. Still #26 @ 590'. Slope angle 16° at 575'. Still #27 taken at 575. Sea pens zone continues at 575'. Still #28 at 540'. Sea pens still present at 540'. Coarser material present on the surface @ 535'. Still #29 @ 520'. Slope angle decreases to 7° as we near crest of "bump". 22.1°C at 520' (11:39). Very wide crest of bump 100-150' across. Sea pens continue across the bump. Top of bump is at 500'. Surface is coarse rippled sand. Slip faces to north. Still #30, 31 at 500' at top of bump. Sandier bottom. Sample taken and placed in Bin #3. Still #33 at sample site at 505' at top of bump. (#34 clicked without exposure so still #s are off by +4 from here). Still #35 taken going down slope into trough. 15°-18° slope to east at 11:52 at 545'. Still #36, 37 at ~550'. 10° slope at 550'. Still #38 at 560'. Still #39 at 570'. The bottom going down slope to east is coarse sand and rock. Still #40 taken at 500'. Many of the rocks are rounded cobble-sized pieces. Did not appear to outcropping ledges but rather nubble or "discontinuous" hardground surface. Still #41, 42 taken in rocky trough area @ 580'. Third plastic bag = Stills # 43?. Still # 44 45 46 taken on very smooth hardground surface covering lobate feature extending from the base of the rocky slope to east. Encountered a rock dam or lateral ridge as we moved north in trough. Its a boulder field in the trough as we head north. Still #47 is of 4th plastic bag (white). Still #48 is

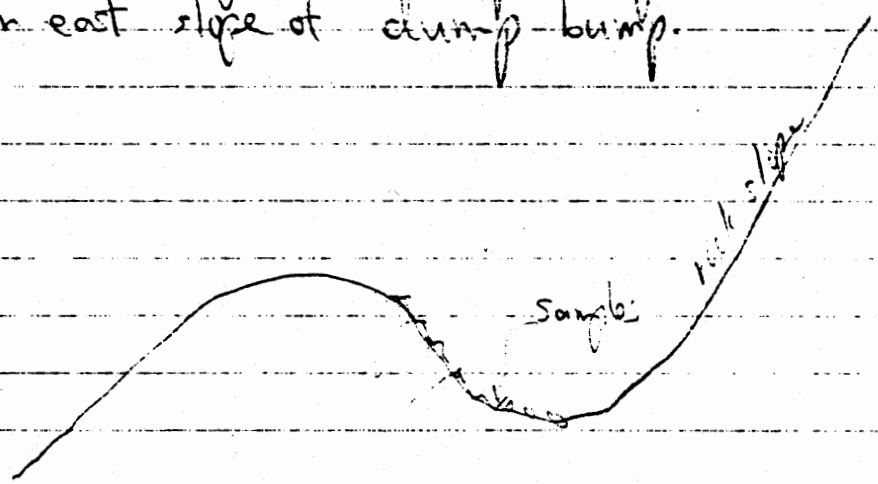
further north in boulder field in trough. Up to stills # 50 as we go over 2nd rock dam or lateral ridge. We settled to 560'(?) in trough. Took sediment sample and placed in Bin #4. After this we started up-slope to east. Picked up what appeared to be a flat slab of cemented material but was in fact old truncated conch shell with overgrowths and cemented underside. Carried this up in scoop to surface. Still # 51 @ 555' lower rocky slope, smooth flat cemented. Stills # 53, 54 at ~540' feet on rocky slope. Still # 55 @ 535'. Slope angle is 35°. Still # 56 at 520' 30° slope angle at 500'. Slope changes to low-relief "hummocky" slope. 10cm of relief on hummocks. Still # 57 taken at 465'. 30° slope at 450' 23.2°C at 450', Continue to side-slip north as we go up-slope to east. 22° slope (slight flattening) at 400'. Stepped slope begins at 350'. 25° average slope angle. Still # 58 at 330'. Large steps at 320'. Stills # 59+60 @ 300'. These are vertical rises 1-3m high with lips and pooling coarse sediment behind them. Still # 61 @ 265', Still # 62, 63 at 250' Still # 64 at 230' at 12:34, Slope flattens out at at 210' with a few small steps going up and away to east. Stills # 66 and 67 taken at 200'. We ascended vertically to end Delta Dive 1011

taken at 430' placed in bin #3. Up to #22 on the still photos taken. After sampling we headed down east side of bump. 10°-13° slope going down to east. Still #28 taken at 450' on east slope of bump. Still #31 taken at 460'. 465' at base of trough. Sediment sample taken and placed in bin #1. Stills #32 and 33 taken at sample site. 22.4° At 465' at base of trough. Rock in trough also taken and brought up in sample scoop. Sample "5". After sampling we come up rocky slope. Still #36 taken at base of rocky slope. Slope angle 35° at 460'. Sea fans and other fan-shaped colonial organisms on this slope. And other slopes we've seen are oriented perpendicular to slope angle i.e. they are "fanned-out" east-west. 23.9°C at 380'. Still #38, 39 taken at 370'. Still #40 at 340'. Current to north 24.5°C at 340. Overall the slope angle is ~45° but as we go up the slope becomes "stepped". Small vertical rise with flats where sediment is accumulating and then another step up. Steps originally small (<1m) but get bigger upslope. 2m steps + flat from 250-200'. End of stepped slope at ~200' 10°-15 slope up from there to 180' slight steps. We ascended vertically to end Delta Dive 1011

Delta Dive 1015

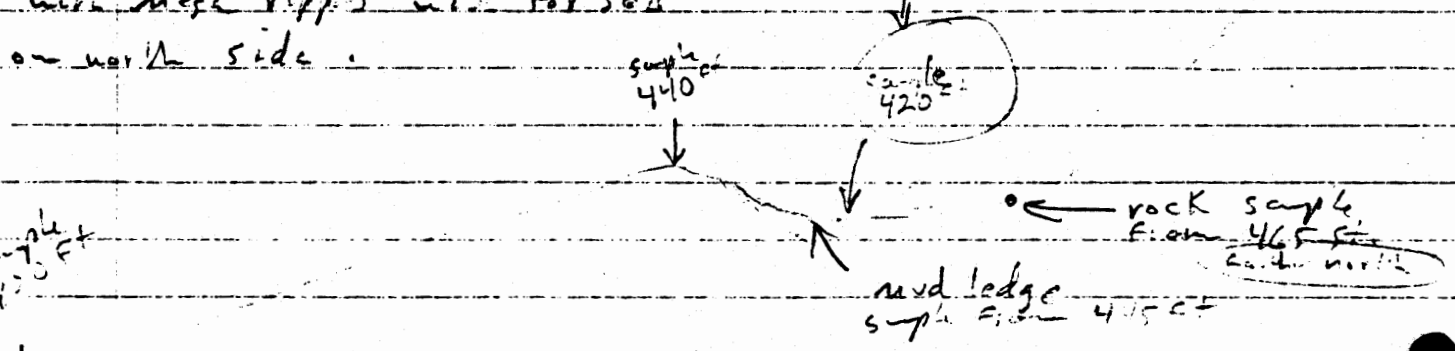
8:30 AM 5/18/88
Parolski/Slater

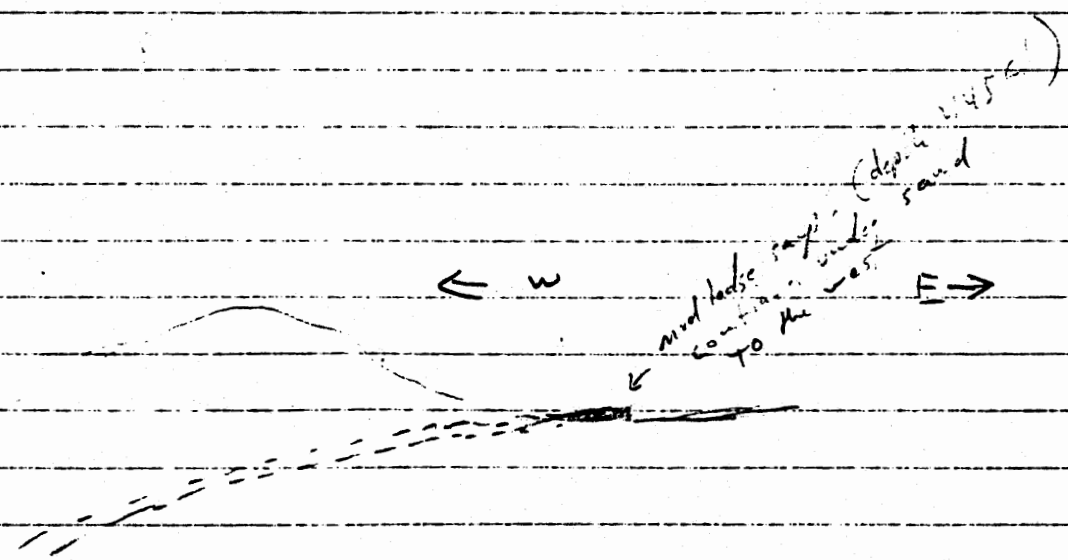
Dive directly to erosional moat to collect chalk samples. Collected samples from deepest exposed ledge on east slope of clump bump. Observed 8-12 ledges on east slope of clump bump.

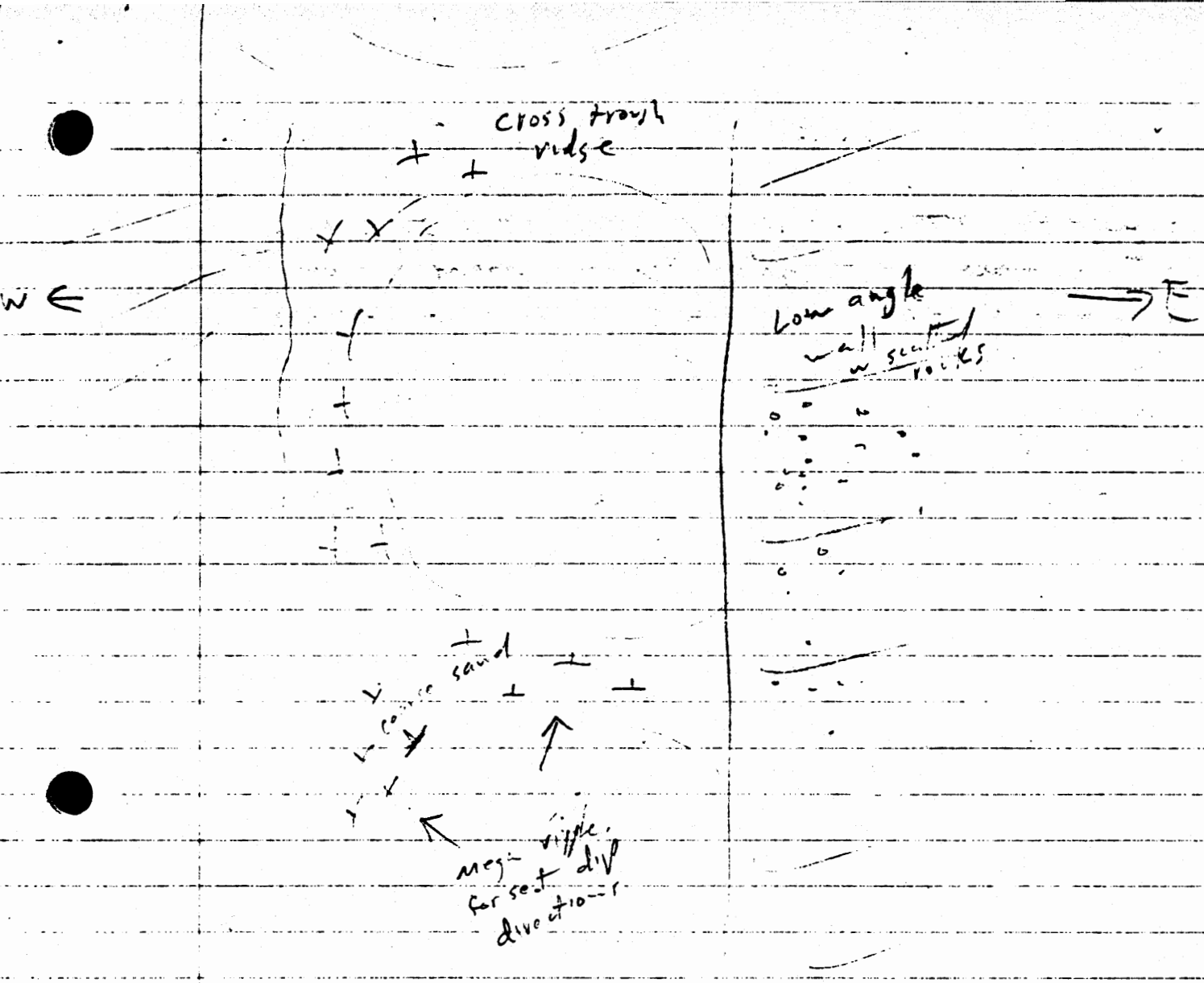


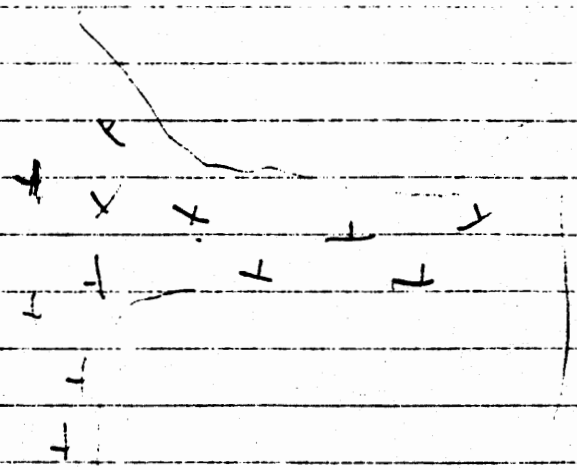
Dive 1016 Shinn/Slater

After long transect across mud bottom for 720 ft. reached crest of "dump bump" - swale on east side of dump bump was not deep - so we cruised north in the swale - discovered cross trough ridges @ 3-4 hundred ft across. Dump bump depth varies as does depth of swale. cross trough ridges are associated with mega ripples with forset on north side.






cross trough ridge
W
E
Low angle wall w scattered rocks
coarse sand
Mega ripple for sect dip directions



Delta Dive 1017 Wilber/Slater. Wednesday 5-18/88

Descent to 740'. Bioturbated fine sandy bottom. Surface is littered with consolidated (cemented?) burrows with attached crinoids. Also white mud lumps or clay balls litter the surface. Still #111 and 112 at 740'. 19.1°C at 740'. Surface sediment taken at 740'. Placed in Bin #2. Crinoids are attached to cemented burrow tubes which cover surface. Mud lumps and clay balls litter surface. Still #115 at 700'. Very little noticeable current. Slope angle is 18° at 700'. Stills #116, 117 @ 690'. It appears as though there is a thin slightly coarser layer overlying a cream-white consolidated layer and that all the burrows have been eroded (excavated?) out of the under lying consolidated layer. At 675' we found a fish hole and a trail across which exposed the underlying consolidated mud. Sample taken of consolidated mud along burrow wall at 675'. Placed in Bin # 3. Up to 122 on still shot recorder but probably one # ahead of actual film #. Continued upslope. 18° slope angle at 640', 20.4°C at 640'. Fewer crinoids at 620'. Still #125 at 605'. Subtle ripple pattern at 590'. The bottom type is still a thin layer of sand over consolidated mud. Increasing coarse surface material at 580'. Still #127 at 570'. Slope decreasing at 570'. Slope angle of 12° at 570'. Overall coarser surface. Thalassia and Syringodium on slope at 570'. Still #129 at 570'. Halimeda seds visible at 560'. Still #129, 130 at 540'. Horizon

Forward (to east) visible at 520'. Surface sediment becomes increasingly coarse. Stills 131 and 132 at 510'. 21.5°C at 500'. Coarse sand on surface over consolidated mud layer. Wide flat "bump" 100-200' across with reversal in slope to east. Up to stills #134 taken. Crest of bump at 490'. Sample taken and placed in Bin #4. Very coarse sand with cemented tubes. Fish had made piles of cemented burrow tubes on this bump. We proceeded east into the trough. Still #140 taken on east side going down. Thin veneer of coarse sand over consolidated mud. 510' in trough. We headed north along trough. Major bottom type is the white stiff mud. Stills #146 and #147 taken. We went up to 470' as we crossed over a transverse ridge. Still #148 at 470'. The lateral ridge appears to link bump with lower rocky slope. We went down to 520'. Still #149 at 520'. Sample taken in clay in fish burrow hole 15' from base of rocky slope. Placed in Bin #1. Still #151 taken at sample site. Still #152 at base of rocky slope. Surface sediment is coarse bank-top sand. Appear to be a cemented slope as per previous dives. Still #153 at 510' 25° slope angle at 510', 22.1°C at 500'. Rock is slab-like covering of slope. Still #155 at 490'. Still #156 is sponge shot at 480'. Still #157 at 470'. Still #159 is another sponge shot at 470'. Slope angle 25° at 470'. Up to #163 on stills at 410'. Sample #5 taken on "step" at 400'. Coarse bank top sand which was piling in fans and cones on lipped steps. Video tape cut off after sample. We went up

over steps and ledges with small chutes and cones. Small vertical walls with flats trapping sediment. Top of rocky slope at 180-150 feet. More gradual rocky/sandy slope to east to sand flat. I shot up to still #174 on my way up rest of dive.

Dive 1018 5:30PM 5/18/88

Bounce dive to obtain samples from terrace rim. Terraces more robust than those examined further south on previous dives. Attempts to break rocks from terrace rim with submarine failed. Collected bag of loose rocks from terrace rim at 208 ft. Terraced slope ended at 180 ft where gentle slope ramped up to sand flats of bank margin.

Delta Dive 1020 Wilber/Slater
Thursday 5-19/88

On bottom at 1556. 840'. Stills #1, 2, 3 taken at 840'. 19.4°C at 840'. Good visibility. 12° slope angle at 840'. Sample taken at 840'. Placed in Bin #4. Fine muddy sand from surface. 12° slope angle heading up. Leeside tailings were visible on the north side of many of the little volcano-shaped burrows present on slope. Stills #4, 5 taken at 825'. We come to a large (1 meter across) sponge on slope at ~800'. Took 6 hand-held photos two at f-8, 11, 16 each. Shortly thereafter we encountered a large "foxhole" type fish pit. A series of 3 large (10 foot deep) depressions in sedimat slope. Excavated material around it and fresh walls of pit is clearly "sticky" consolidated mud with burrows. 19.4°C at 800'. Still #12 (maybe one shard of roll) taken at 790. Leeside tailings still visible indicating current to north. Stills #13, 14 at 740. The little volcanoes are fish burrows. We can see small thin fish darting into the top of them. Many of the larger (cm's across "pits" are in clusters of 7-10). Rich says they are tile fish pits. Still #15, 16 at 710'. 20°C at 700'. Slope angle 12° at 700'. Still #17 at 680'. Big Hole at 660' with excavated burrows and mud lumps. It was clear at this site that these large pits are composite pits made up of a series of large holes which overlap. At this one we could see the original hole to south & faster middle

hole and the modern active hole at the north end of the overall excavation. I got a glimpse of fish down in the very core of the excavation so these do appear to be fish pits. Composite pit is 15-20' across. We pulled the sub into the north end of pit and took a of fresh scarp ~ 4' below surface of slope. Placed in Bin #2, 20.3° at 660'. Up to still #24 by 630' going up slope. The bottom is the same bioturbated material with leeside tailing to north. Stills #25, 26 at 600', 20.8°C at 600'. Slope angle 12° at 600'. Still #27 taken at 590'. Still #28 at 575'. Slope angle 12° at 540'. Coarser material visible on surface at 530'. Thallasia and Syringodium on surface at 530'. Still #30, 31 at 520'. Increasingly coarser surface sediment. Crinoids, anemones, sea pens etc. Very coarse surface at 505'. Still #32 at 505' 21.6°C at 500'. Still #33 at 500'. Still #34 at 495', Still #35 at 485'. Very coarse surface with clasts of rock. There was no bump on this transect as we encountered base of rocky slope at 460'. Still #36, 37 at 450' at base of rocky slope. Good layer of sediment over rocky material. Still #38, 39 taken at 480' just below point of onlap. Placed in Bin #1 Up to still #40 at simple site #1. Still #41 at 480', #42 at 470', 25° slope angle at point of onlap. Up to still #46 at 460' ~10' above onlap. Rock taken on lower slope, ~450'. 25° slope angle at 450'. Slab-like conformable hardgrounds, 5-10 cm thick. ~20° slope angle

At 425'. 22.5°C at 425'. Stills #47, 48 at 425'
"Live" bottom - sponges, crinoids, alcyonarians, sea pens etc. Still #49 at 400'. Still #50 at 395'.
55° slope angle at 360'. Beginning of "lipped-steps" at 340'. Still #51 and 52 at 340'.
24.8°C at 290'. Sample in Bin #3 taken from step at 290'. Still #53 at 290'. The "lips" of steps with lots of live organisms but no massive skeletal encrusters. Stills #54 and 55 at 280'. The step at 260' appears laterally continuous in both north and south direction.
Stills #58 and #59 at 250'. Still #60 at 230'.
Steps continue. Average slope angle > 50°. The sediment building up on steps is at angle of repose as it pours down onto steps. Stills #61, #62 taken at 200'. "Edge" at 190'. Slope decreases to <10°. We continued transect east along gradual slope. At 175' bottom is mostly rocky with numerous encrusters. Still #63 at 170'. Still #64 at 165'. 10-12° slope angle.
Codiacem algal bottom (Halimeda, Penicillus, Udotea etc) at 160'. Stills #65 and 66 at 155'.
Still #67 at 130'. Bottom flattens out near 120'
Still #68 at 120'. Large Barrel Sponge at 110'.
Still #69 at 110'. Rocky butcrop at 85'. Stills #70, 71 at 85'. Less algae at 80'. Still #73 at 80'. Patch reef (scleractinians etc) at 80' Up and over reef at 70'. Sand flat to east of reef. Reef 30-40 feet wide. Some linearity N-S to this reef. Still #75 on reef at 65'-70'. Still #76 at 65-70'. Still #77 taken on reef. Sand flat surface at 70' Still #78, 79, 80 at ~75'. Vertical ascent to end dive 1020