Melvin S. Rodolfo
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22202

Capt. Cayetano Palma
c/as
421 Barraca St
San Nicolas, Manila

Tungku Adbul Raman —
Prince of Malaysia

— Hindi —

[Ná ma stě - ji] — gtng. —

Bahut. Shá'kriya — Menk- yoo

Jai - Hind

(Jay - hind) — Victory for India!

[illegible]

MANILA TO JESSELTON 1

Manila, March 16th

At 1100 promptly the anchor started in, and the Pioneer was underway from the inner harbor at Manila bound for Jesselton on North Borneo — or Sabah, Maylasia, as it is now known. By 1300 Corregador and the Bataan Peninsula were off our starboard bow, and we began to get a slow gentle roll. The day is warm, the sky clear, the sun hot, and a cooling breeze blows from the south.

The week in Manila seemed to go quickly. I arrived Saturday about 4PM after a 32-hour plane trip from Washington with stops at New York, Chicago, Seattle, Tokyo, and Okinawa. Both Tokyo and Okinawa are a lot different from the bombed-out shells I knew in 1945 & 6.

In Manila I checked into the Filipinas Hotel on Dewey Blvd right across from the Embassy. They gave me a windowless inside room (for ~~₱~~ 25 pesos per day) and I slept from 8 PM until 3:30

the following afternoon I had a bite to eat, then back to sleep until seven the next morning. I guess I really was tired.

Monday I checked with the U.S. Embassy. ~~Acd~~ A CDR Davis was the Navy Attaché & he knew the Pioneer was due into Sangley Point on Tuesday. I met Randall Roberts of the Econ. section who had been designated "Action Officer on the Pioneer" – we were to be his baby. He introduced me to Martin Muchinsky & Al Johnson of USIS who got right to work setting up a press conference aboard for Thursday, a lecture for me to give at the Thomas Jefferson library on Friday eve, and a radio interview that day. It was taped & a copy will go back to Washington. That afternoon I went down to 421 Barraca St. in the San Nicolas section of Manila where the Bureau of Coast and Geodetic Survey of the Philippines has its office. There I met the Acting Director, Capt Cayetano Palma

~~the~~ my friend Capt Legaspi who was at the last IOC meeting, Mr. Claro Martin (Marteen, he calls it) Director of Research of the Philippine Fisheries Commission, and Mario Manansala, BC&GS, who is now aboard as their representative on the Manila-to-Singapore ~~Calcutta~~ leg. We talked over what was in the offing and compared notes on our respective C&GS's, and as we broke up, Martin offered me a ride back to the hotel via Intramuros. The old walled city was one big pile of old rubble after the shelling when I last saw it in 1945. It has been cleaned up some – but only some.

I called Sangley Point on Tuesday and talked to Capt. Brown, skipper of the Pioneer. I told him of the two UN men who wanted to be aboard to photograph and to tape record for an hour-long film on the IIOE being done

for the United Nations. He agreed to have them for this leg, so I sent a cable to Maxwell Dunn at the UN in NYC to send his men out for a March 16 sailing. I also arranged for the mail to go out to the Ship at Sangley Point, went over the invitation list for the Thursday night reception aboard, and got in touch with Melvin Rodolfo, the grad. student in marine geology at U.S.C. who lives in Manila and was to join the ship here.

Had a good dinner that eve. with Rodolfo & his wee wife ~~Cherry~~ Cheri at the Jade Vine then a nightcap at the Mabuhay Hotel - owned by ~~Cherry's~~ Cheri's father - Dr. Arcadio M. Santos (1430 A. Mabini). He in turn invited the whole wardroom - some 20 of us for CT's and dinner any evening we could make it - and we did, Saturday.

Wednesday AM I worked on the summary of the stenotype

record of the 13-14 Feb sessions on air/sea interaction, so that I could get them off to the office for typing and distribution - they were finally finished late Sunday night.

I went aboard on Wednesday for a big press conference arranged by USIS - there were some 20 reporters & photogs there, & we held forth for them for over an hour. I stayed that night at the hotel, had a few "brandee sodah" at the Ming of Clubs on Av. M. H. del Pilar and was at the Embassy early to wind up the reception and open house details. I moved aboard the ship - now anchored about 500 yards off the Embassy pier - that afternoon & helped greet people for the 6 PM reception aboard. Ambassador Stevenson came aboard - which the Embassy told us was a great honor - and he

seems like a fine guy. The Capt. and I had paid a call on him that morning with R. Roberts, and he'd seen the press release so knew I was also Princeton - he was '22 - and we had a fine chat. The reception went well except that the launch that came to take the last guests home brought - yet - the Deputy Minister of Defense and his wife. The Captain made a dive for the galley and frantically brewed up a new batch of fruit punch & I guess we got away with it. Of 50 invited, some 40 came. The gilt-lettered guest book I had sent to the ship was started that eve - by Saturday night there were some 470 names in it.

~~Thursday and~~ Friday ~~the~~ and Saturday the 13th & 14th was our open house, and it really went quite well. We had mainly Univ. of Philippines, government people, BC&GS, etc. with a smattering of the

local prostitutes that members of the out-for-one-month-with-no-women Pioneer had invited in a moment of drunken passion, but it really went well, & I think we made some brownie points for the Coast Survey and for the United States. The Embassy and USIS people were happy anyway.

Friday night at 5 PM I met Dr. John Hamilton & Kuchinsky in the worlds biggest cheeze grater which is the Embassy Office Building here (they call it the Second Office Building, or SOB for short), and with their wives and Hamilton's mother-in-law, a loquacious 80 year old Charleston Lady!, was driven out through the rush hour traffic, past the presidential palace where cousin Cameron Forbes lived when he was Governor (they pronounce it For'-bus) to the Thomas

Jefferson Library. On the fourth floor there they have a small auditorium - maybe 150 people - but there was standing room only. Was introduced by Prof. Salvador Gonzales, Director of Developmental Services, Program Implementation Agency and spoke about 45 minutes on "The Importance of Oceanography."

Afterwards I went with the IT's & H's to a CT party being thrown by the Bain's of the British Embassy for the Colombo Pact scholarship people - all most nice in a lovely lantern-lit garden with lots to eat & drink. We stopped briefly at the IT's for a nightcap - [where I discovered that the Verners & Hamiltons were great friends of Carrie & Ellie Gauds -] and they dropped me off at the boat landing.

omit

Saturday was another full day

of iced tea and visitors and endless repetative explanations, and that evening a very nice barbacued chicken dinner with the Santos and Rodolfo tribes.

Sunday I spent nearly all day finishing up the summary of the minutes, then worked with Barbee planning for this leg of the expedition. The two UN men arrived - an Indian named Ramakan the Sarma (sounds Shar-ma) as director, and a Swedish cameraman, Bill Borglund who photographed the Budapest Rebellion and the Agadir quake.

Monday I wound up the plan with Barbee & Burns, got the Capt. to let the UN men stay on to Calcutta - it will mean cots, no bunks after Singapore - checked my fire and abandon ship stations, and got off

one last letter to Leslie before the anchor came up at ~~1130~~ 11:00 AM on the nose.

We had taken aboard Manuel Llorca of the Phil Fisheries Commission for this leg in addition to Manansala, Bob Burns & Geo. Peter, Melvin Rodolfo, the two UV's and me to bring the ward room now to 15 over and above the officers. The others are Vicente Alvarez & Dick Stephen- ~~Hassard~~ of the Univ. of Hawaii doing the plankton tows and productivity work for BCF and Max Doty, two Weather Bureau men: Mel Field and ~~Bert~~ Soileau, and Omar DeWald (geophysicist, USC&GS, who shares this hot little cabin with me), and Byron Hale,

Once past Corregador at 1330 we slowed for fire and abandon ship? drills, ~~and~~ put over the magnetometer and started up the gravity meter. Both are

clicking away nicely back in the dry lab ~~right~~ now. This new automatic gear seems to be working well. We'll hold off the first balloon release until 0730 AM tomorrow, as we are still too close to land. BT's are now being lowered every 2 hours at quarter of the odd hour, and from ~~at~~ 8:30 to 9 PM, we ~~had to~~ had our first plankton tow. Vic and Dick use the fantail winch with about 60 m of 3/8" cable cut from the big winch cable, and tow a 1-meter net for 30 minutes at 4 knots. The ship slows to four knots, then ahead slow on one engine, and it seems to work well. They lost two nets on the way out - one was while they were using too light wire and it parted, the other was when they pulled out a kink in the 3/8"'s cable.

I've had a long session with

Ramakant & Bill Borglund trying to give them some feel for what we will be doing for the next week.

It is now a few minutes after 11 PM, I will leave a call for when ~~they~~ we reach the 1st dredging site (Seahorse Shoal) at about 10° 50' N, 117° 36' E — probably about six in the morning. We'll dredge twice tomorrow — it will be good to be at it again. It is a clear night and has cooled off some since the sun went down. The stars are clear and multitudinous. We have a long lazy roll, and the rat-a-tat of a pencil rolling across the three-inch ~~comp~~ cubbyhole here at the desk sounds so good, I just think I will let it roll all night. It is a welcome sound.

Tuesday, March 17th - 1964 —

It's now 7:30 PM after a good day - a really good one. We have dredged limestone and igneous rocks from a damn steep seamount. I have been down for 35 minutes on the crest of it in 52 fms, diving with Cmdr. Paul Larsen & Ens. Boyers, and have a fair sunburn that should be the base for a good tan. Tennis shoes - dirty, of course - shorts & a sport shirt - my favorite sea-going uniform, and all's well with the world.

My pocket alarm went off a bit before 0600, and I was up in the chart room with the PDR about 6:15. At ten minutes past midnight (1610 GMT) we had crossed the crest of a nice seamount at 170 fms rising from general depths of about 2000 fms. It was at approximately 12° 45' N x 119° 02' E and was not shown on our existing chart. It is 52 n. miles due west of the NW tip of Busuanga I. in the Calamian Group.

It had a double peak on the one line across it, and we had a good magnetic anomaly along with it. It would have been a really good one to survey with both magnetometer and PDR, to dredge on both slope and on top, but the ship was headed for Seahorse Shoal, so on we went!! I wish I had been called, we'd have done a job on it. I hope that the Bureau will be able to reorient its approach to expeditions like this so that we will look at these as targets of opportunity instead of ploughing on to the Seahorse Shoals of this world just because we had known it was there and needed something to head for. We were lucky – no, skillful is a better description – and did a good job on Seahorse Shoal (My Advisory Committee on Undersea Features of the Board on Geographic Names would insist it be called Seahorse Seamount, and I will call it Seahorse Seamount here, ACUF would also say it is a reef on top of a seamount).

omit

We were due there about 0830 by our DR track of the night before, but by 0930 (0130 GMT) we had, we felt, strayed west of it and came left to 090° and reduced speed to 1/3rd. Immediately the bottom started to shoal from the 760 fms at the time of the turn. We had lookouts with glasses looking for discolored water or a change in the texture of the sea surface, and the Captain was in the crows nest doing likewise. By 9:45 it had risen to 500 fms, it was 240 fms 3 minutes later as we decided to pull in the magnetometer fish. In two more minutes – with the mag. fish started in – it was up to 30 fms and as LCDR Barbee raced to the Bridge to signal "all stop" we heard someone cry "bottom in sight!" I raced to the starboard wing of the

bridge and looked straight down to see alternating light and dark patches sliding past in what was then only 8 fathoms or less than 50 feet (below keel depth). The bottom had risen like the front of the Empire State Building and we were coasting along in darn shallow water 66 naut miles from the nearest land — Palawan Is., the westernmost of the Philippine archepeligo, bearing 120°.

Piedras pt. on

I figured as long as we were on top, let's dredge there first. I talked it over with Bill Barbee & Capt. Brown - all of us had our color back and had stopped shaking by then - and we agreed to do it. While others went to start the already-rigged dredge, Barbee and I turned to check the fathometer again. Stokes, the seaman on the fathometer, was bent down in front of ~~it~~ the shallow water set, and even as we watched in horror, the flat bottom trace at 7 fathoms

began to climb very rapidly toward the top of the fathogram!! We expected the sickening crunch any second when we realized that Stokes had one hand at the controls and was merely raising the zero mark (and the trace!) manually so that it read total depth rather than depth beneath the hull. Bill and I grinned at each other, but they were green and sickly grins.

The rock dredge went over at 1400 on the button. It was one that had been made aboard and was somewhat lighter framed than the ones we have built on the outside. The bottom then was at 36 to 40 feet (6-7 fms), and we put out 60 feet at first. We had a good pull almost immediately and then a really good one that lifted the tension dial on the big winch console off the peg for the first time. Barbee ordered more

cable out to release the tension, and we put out a maximum of 325 feet. We then sneaked up on the dredge as we hauled in the cable, and with nearly all hands lining the rail, the dredge broke the surface and it looked empty and badly broken up. The pull had opened the seams of the frame and the inner wire mesh was badly torn, but way down inside were a few pieces of coral. It had been successful.

As we started this dredge haul, Capt. Brown asked me if we would like to dive here. I answered "yes," but would like to reserve judgment as to whether we should or not until I had some feel for the currents over this thing. I did not want us swept off into the South China Sea and lost by the diving launch. By 1015 I could see there appeared to be little current, although the set the night before had been to the south and southeast. of

about 2 knots. I checked with Burbee and the Captain, and Rogers was sent off to collect the diving gear, check tanks, etc, while we finished the dredging.

at 1025,

By 1100, we were ready, Ens. Paul Larsen, Rogers, and I. The first two had recently completed the Navy divers school at Key West, and I felt they would be pretty good. Larsen is a darn fine diver, dependable and cool headed. Rogers is impulsive with a hero-complex showing when the rail is lined with his shipmates - perhaps overly cocky is the best phrase for it. I had suggested, for example, that he might want to shave his 2 to 3 ~~day~~ day growth of beard so his face plate would fit tightly, but he assured me he had dived with a longer beard than this and would be OK. However, once under water, I was checking him constantly to be sure he was OK after seeing him time and again tripping his

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head sideways to blow air into his mask to clear the steady stream of water that leaked in around his beard.]

There was a long long wait until we got into the water. The UN photographer wanted a shot from the water as we jumped in from the ship, so a whaleboat was put over for him (Bill Borglund) and Byron Hale. For a diving tender, the Boston Whaler was lowered, but the outboard had not been used for a year and a half and it would not start. They had cast off before it was running well and drifted farther and farther astern while they tried to get it going and the photo launch bobbed in the now-increasing seas. By 1220 the photo launch had it in tow and brought it back, but by then the wind had picked up, frothing whitecaps hissed by the anchored Pioneer, and Borglund and Hale felt they should come aboard as their

camera gear was getting wet. Their launch went around to port to unload them, Ens. Hotter left the Boston Whaler and it was hoisted on starboard. Hale and Borglund then showed up with us at the starboard rail ready to shoot from there. It was now ~~past noon~~ fast nearing 1115, we had been suited up and ready since noon and were hot and lame from holding those heavy double sevenites. The photo launch returned as a diving launch, Ens Hotter climbed down the jacobs ladder into it, and it stood off waiting for us to make the 15-foot leap into the water. Then I held us up until Borglund was tied to the ladder overside and his camera was lowered to him. When he and B. Hale were both ready I jumped first, Larsen went straight out, and Rogers forward. We had made and gone over our underwater plan many times between 1200 when

we were ready and 1:39 when we went in. I had geology hammer, collecting bag, wrist compass, leg knife, watch, writing slate, inflatable life preserver, tanks, fins, mask, etc. and the other two had as much. Larsen and I stayed under and Rogers popped up to get his camera - a French Calypso with flash - from the boat. Then we all met at about 20 feet, checked our watches and headed for the bottom so wonderfully ~~clearly~~ visible in the warm clear water some 30 feet below us. Once on the bottom we could see the full 311 feet of the Pioneer, and horizontally the visibility was a good 200 feet.

We saw no rock other than coral and algae, but there was lots of that. This was not the luxurient reefs of Swan Island in the Caribbean but more open, more coral rubble with isolated patches of intense and varied growth. The topography was gently rolling with an occasional

impression of NW-SE trending broad gentle swales. In between these were flat slightly meandering valleys which might not have been noticed except that here ~~was~~ were concentrated the course white sands and gravels made up of coral detritus, some halameda segments, and lots of the big coral reef foraminifera (Marginulina ??).

After looking in vain for some sign of sedimentary or igneous rock, I resigned myself to being a biological specimen collector - and indeed beautiful they were. There were occastional beautiful crinoids. The two I collected for the sack were about 8 inches high, perhaps 50 feathery arms each, one a brilliant yellow, the other a black and white. One holothurian (Sticopus ??) measured two feet long and a good 5 inches in diameter. He was a brilliant red but lost both his

shape and color once he was aboard and into the formalin. Several really fine corals were collected, some of which should end up in Taro's museum back in Washington.

By the time our dive was over, Rogers had shot some 24 of his 36 shots with the camera. I hope they come out, as he was taking good pictures. After the planned 30 minutes, we started up with the three of us pulling on the bag which weighed about 100 lbs by then. My pockets had been used as bags for sediment samples, and we just could not get up. We unhooked our lifebelts, hooked them to the top of the bag and inflated them. This gave just enough buoyancy to it and we broke the surface just 34 minutes after we started.

The boat towed us to the

ladder. Rogers went up first after we had used the diving ladder to bridge the gap between the bottom of the starboard jacobs ladder and the water - now with 4-5 feet waves. Larsen went up next, and since I had left my belt and tanks in the boat I went up last with no trouble.

While we opened the sample bag for the photographers, the anchor came up, and we moved toward 080° into deeper water to try a deeper dredge down on the flank in order to - hopefuly - get a sample below the reef level to see what this seamount was made of.

By the time I had showered and dressed and was back up at the winch console - the big bow winch was used for this - it was

3 PM and the depth was going back down, and at ~~to 840 fms~~. ~~At~~ 3:22 we started lowering a second ship-made dredge in 840 fms on the east flank of the seamount. By 3:50 we had 3700 feet out (617 fms) and the ship had drifted back up into 730 fms of water. We were lowering still at about 200 ft/min, as the dredge was light and we didn't want the cable to outrun it. By 4:25 the ship was in 600 fms with 4800 ft (800 fms) of cable out and no bottom. We were still drifting upslope, but as yet no welcome tugs. We then pulled in some cable hoping to hit the slope and stopped with 3815 feet out (636 fms) to continue drifting. At 4:50 with 170 fms below the ship, the dredge hit the bottom somewhere on the steep wall up which we had drifted. It was a good tug and there were several more.

At 5:00 PM we started the long

haul in with only 160 fms below us, and there were several more fine tugs before I went below for chow at 5:30 — how cavalierly confident can I get?

When I came back up at 5:50, the dredge had been aboard for five minutes and we were under way. For the record, we had moved 1.15 n.miles between 1550 and 1650 on a ~~bearing~~ course of 276°. As nearly as we can tell, the samples came from 250 to 400 fms, and we did have samples. There were four chunks of black rock — not coral, so we had indeed sampled the basic stuff of the seamount. One piece about 6"x4"x2" inches was a yellowish brown with one of the 2-inch sides dense white. It was a limestone, very dense with large circular fossils showing. By "large", I mean maybe 1/8 inch in diameter. One side had a ~~boring~~ borehole of some

organism of the boring mollusk type (Pholad or Lithophaga?). It was a no-mistake limestone, and I hope the Geological Survey can put an age on it from the fossils. There was only one piece of this, and a chunk was broken off for Rodolfo to take back to U.S.C. for analysis. There was a clean-break side, so it had been in place.

The other pieces - of which the biggest measured about 11" x 5" x 3" inches was irregularly shaped, covered with a heavy encrustation of manganese - even an attached shell had a patina of manganese. The crust in places was 1/4-inch thick and followed the shape of the rock, even lining the numerous cavities. Where it had been broken from the outcrop the rock appeared to be igneous. Some of it appeared to have fairly large phenocrysts. It was obviously of igneous origin, rotted in places.

I broke off a chunk for USC,

and the break opened up a cavity that was plugged with what appeared to be sediment. Perhaps it was only decomposed feldspar or some other mineral, but it appeared to me to be a plug of sediment. I lifted it out with a knife, and it is in a separate envelope with the rest of the sample from Geol. Dredge haul No. 2. Unfortunately this dredge also was badly torn up, but like the one first used, it too had been fabricated aboard out of fairly light material. It had stood up just long enough. This was a singularly successful dredge haul even though the dredge itself is useless from here on.

Spent the evening talking with Burns and others who have come into the wardroom while I have been working on this. It is now 11:15 PM & I'll see where we are, what the PDR shows, and be off for the sack.

March 18, 1964

I don't mean to give the impression that I'm relaxed, but the only thing I really had to do today was to meet with the Captain, Exec, and Operations Officer at 3 PM in the Captain's cabin to go over the plans for tomorrow. It was the one thing for today, March 18th, and I forgot — just plain forgot all about it!!

Since we had banged up two dredges in two tries — but got samples on each — we talked it over and decided to knock off the one planned for this morning. It was mainly a time filler, but it developed we were behind time and passed it by.

We pulled off an oceanographic station from about 1:15 to 3:00 PM. Ens. Shimke ran it with Ens. Larson doing the oxygens, Rogers will do the salinities tomorrow — a far cry from

the Explorer Transfer trip, and I have just kept out of it and let it run along smoothly. The main reason for the oceo. station and the core taken here — and we are still "here" with the deep-sea camera down at 9:00 PM — was to demonstrate for Manansala and Llorca, the two Filippino observers, some of our techniques. The station was routine to about 1300 m, but it was the first time I had seen the mini-pinger on a cast. It worked well to about 1000 m and then was outside the cone — that is, we were outside its cone — with a wire angle of about 35°. The weather balloon shack aft makes quite a sail, and the drifting characteristics of the ship have been changed considerably.

The big PVC piston corer with an outside barrel added to keep the liner from breaking is taken

overside on the after starboard part of the boat deck between # 1 and 3 launches. It is lowered there with the big boat crane, the large pinger is attached above it and a snap hook on the end of a manila hawser reaved through a monsterous block is snapped on. The strain is held by the ~~boat boom~~ manila while the boat boom cable is unhooked and the cable from the big anchor winch forward is led back outboard and secured, above the pinger. ~~The strain is then transferred to the manila~~ The manila then lowers the corer, the main winch takes up a strain and pulls the corer foreward under water. Once at the gallows frame forward, the strain is all on the big winch cable, and the manila is unhooked, secured foreward until recovery time, and the rig is lowered by the big winch. All this is necessary, since there is

inadequate working room for gear of this size forward.

At 1600 local time, the corer was at - we thought - the bottom with 6236 ~~feet~~ feet of line out in a depth of 650 fms. The pinger worked well, and we had a good trace down. There was the direct ping from the pinger, the reflected ping from the corer, and the reflected ping from the bottom all showing up nicely on the PDR. We had the pinger 12 fms above the corer, and the big corer was rigged for a ten-foot free-fall with a small Phleger-type gravity corer as the trip weight.

When we advanced the PDR paper after the corer and bottom traces had met and we had started recovery, we could see that the traces were really just 12 fms apart, and we probably had stepped inches from

Phleger corer ~~we~~ use as a trip-weight we

the bottom. We put it back down until these two traces merged and the direct pinger moved down to within 6 fms of the surface, then she started in. The position was 6° 50' N, 115° 19 E, 990 fms.

Once up, the transfer to the boat boom was as before but in reverse. In the ~~we~~ had a 2-foot core of light olive clay with occasional ~~sand~~ sand-sized ~~flecks~~ flecks, but the big corer had almost nothing. The core nose was full, and some had oozed past the piston, but the rest was all water, and the piston had not pulled through. Perhaps the bottom was just too soft to release, we don't know. Penetration was about 18 feet however judging from the clay on the outside.

Next came the deep sea camera. It was rigged in a triangle with the two lights at the apex, and cameras at the two other corners. Driver for the lights, pinger, batteries, and delay timer were all between

the two cameras. We were able to lower it at 200 ft/min once it too had gone from the boat deck aft, along the starboard side, to the bow.

Byron Hale, on the basis of last year's experience had set the delay timer at 2 hrs. It started down at 6:20 PM in 1018 fms. It was ~~there~~ at the bottom by 7:45, some 35 minutes before the delay timer was due to start the lights flashing every 12 seconds. The PDR - pinger arrangement worked well, and we could watch the two traces approaching nicely. The bottom trace was quite mushy - perhaps it was too soft to trip the corer - and when the two traces merged at 8:25 PM on the PDR, the oscilloscope showed it still to be nearly six fathoms off the bottom. The lights and cameras were set for 15 feet - a bit under three fathoms, so we let it down to just 3

fathoms on the scope. There was a bit of adjusting of wire out as the wire angle changed, but by 9:10, we had just 6900 ft of cable out with a zero degree wire angle. The sea was calm, and all went well. One final adjustment put 6908 feet of cable out, and there she sat until 1018 PM when we started the pull in. The traces separated almost immediately, and it was on its way up. There had only been 8 feet of adjustment in the cable to keep the camera at the same height for two whole hours.

It is now after 11:00 PM, & I am ready for a bit of sleep. We're due into Jesselton on the morrow to collect Dr. Alexander, Director of the Geological Survey of Malaysia and to drop off some mail.

March 19, 1964 —

Jesselton has come and gone, and we are rolling nicely on 230° along the Sabah Trough edge at about 700 fms. Our track from Jesselton to Singapore was worked out today in the Captain's Cabin with Dr. Alexander, (now aboard), Director of the Geological Survey, Malay Region, Malaysia, Dr. N.S. Haile, Dr. H.J.C. Kirk, and Mr. P. Collenette, all geologists with the Geological Survey, Borneo Region, Malaysia, ~~headquartered~~ in Jesselton. Their headquarters is in Kuching, Sarawak.

How to win friends! Some idiot sent a message to Jesselton (Malaysia) ~~asking if there were~~ inviting Indonesian (yet!) scientists and dignitaries aboard the ship!! With these two new nations almost at war, Sarawak borders being

infiltrated by Indonesian guerrillas, and somebody invites Indonesian dignitaries aboard in Malaysia. Ick!!

Anyway, we are now working our way southwest and will be making several crossings of the Brunei-Sabah shelf, will split some cross-slope profiles made by the HMS ~~Dampier~~ Dampier, and then work down the Sarawak Shelf crossing the submarine valley off the mouth of the Lupar River. In this area is the probable extension of the sharp break on Borneo between the crystallines to the south in Kalimantan and the thick Sarawak section of Tertiary eugeosynclinal deposits. We hope to pick up some sort of discontinuity approaching Tanjong Datu (Datu Point) and will zig-zag it to the northwest before ducking between the islands for a straight profile run across

the Sunda Shelf into Singapore.

Promptly at 0900 this morning, the Pioneer dropped the hook in the lovely harbor at Jesselton, Sabah, on the northwestern side of Borneo. We put over the LCVP so the UN photogs could get some footage they needed, and we waited for the boat to come out from our agent, Harrison Crisfield Ltd., bringing Dr. Alexander. He arrived about 0930 with Haile, Kirk, Collentte, and a Mr. ~~Hausman~~ Huijsman of Shell Oil who came out of geophysical interest. We had a good session in the cabin with them, Barbee, & the Capt., they had a tour, and then invited us plus Peter & Rodolfo to lunch ashore. The Capt. gave off-duty people liberty until 2PM, and we all went in in the 2nd launch.

I went with Haile in his snappy red triumph convertable through Jesselton out to the Geological Survey

offices across from the new modern Government building. The town of Jesselton is a busy hot town, clean, neat-looking, with a good deal of new construction underway. I obtained from Haile a photostat of the British Admiralty chart showing the HMS Dampier's track and – incidentally – a whole of a lot better chart than we had gotten from Hydro, the great "unsurveyed area" on the H.O. chart which we approached so cautiously has indeed been surveyed – the Mogo in 1962 went right through the middle, and Dampier has been in to Spratly Island just in 1963.

They are to be put on our reprint list for IFOE pubs and for all Bureau pubs. as

The ~~Deputy~~ Director
Geological Survey, Borneo Region
~~Sara~~ Kuching, Sarawak, Malaysia

IFOE data should also go to

Deputy Director
Geological Survey, Borneo Region
Jesselton, Sabah, Malaysia
Huijsman

and to Mr. Frits ~~Housman~~
Brunei Shell Petroleum Co., Ltd.
Seria, State of Brunei

Director, Geological Survey, Malaya Region
Ipoh, Malaysia (i.e. J.B. Alexander)

Director, Bureau of Coast & Geodetic Survey
421 Barraca St., San Nicolas
Manila, ~~P.I.~~, Philippines

Director, Research Branch
Philippine Fisheries Commission
Manila, Philippines

Haile then picked up Nellie Jones, a nice Peace Corps girl from Minnesota who works part time with them when not at the medical tech. lab. at the local hospital, and

we had a delisciouS chinese dinner - some 10 of us. Soup, pigs knuckles, sweet-sour pork, won-ton with a great fruit-chicken-pork sauce, vegetables (?), shrimp roll, bamboo shoots with chabay's, all washed down with glasses of good Danish Carlsburg beer. It was an awfully good lunch, and we were nearly two hours at it. Then back to the dock to get the boat back, and we were off at 3PM.

Had a good long talk with Alexander - family in Scotland, some 27 years out here doing geology. Short, stocky, ruddy, and most pleasant. Will be good to have aboard.

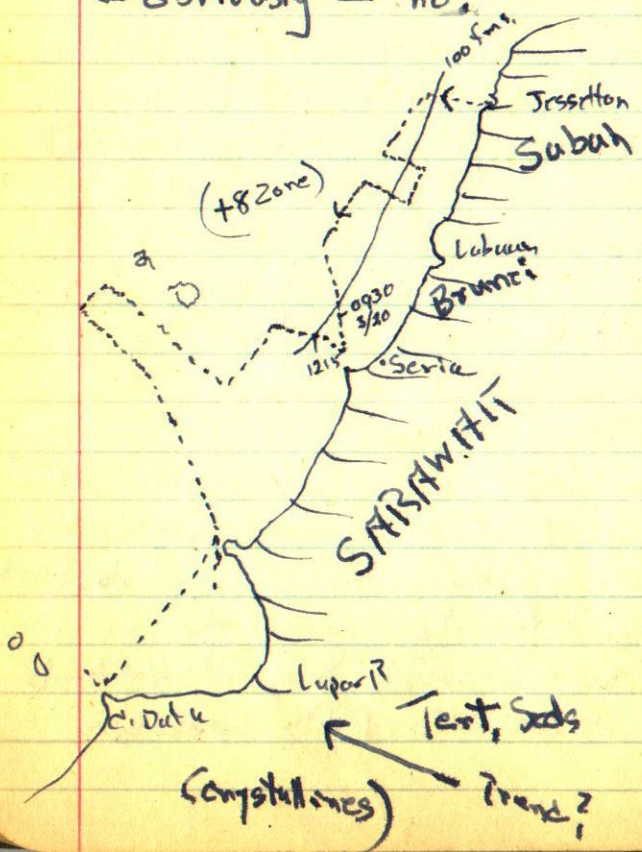
Llorca has a badly infected wisdom tooth that bothers him a good deal. Borglund, the U.V. cameraman has really bad burns - sun type - on his forearms - he was a very

fair and very white Swede when he came aboard, and is now fair cooked. ~~Dock~~ Doc has him pretty well pasted and bandaged, but he is a mess.

The biologists - Alvarez and Stephen - Hassard - lost 2 nets in the first few days out of Honolulu, have ordered and gotten two more, but one of these ripped last night. Chief Lavery will mend it up tomorrow, but I'd feel better with a few spares. Will see tomorrow about ordering some (@ $30 per!) sent to Calcutta to meet us.

Weather balloons go up on schedule at 1200 and 2400 GMT - now about 7:30 day and night. We do our vertical haul for productivity measurements 1/2 hour after sunrise and a 1/2-hour horizontal tow at 4-knots about 8:30 PM. BT's continue

every ~~four~~ two hours on the 15 minute before the odd hour. The gravity meter has worked very well, as has the magnetometer and PDR. Things really are going like clockwork other than asking Malaysia if they have any Indonesian scientists and dignitaries that would like to visit the ship. Their answer was — obviously — no!

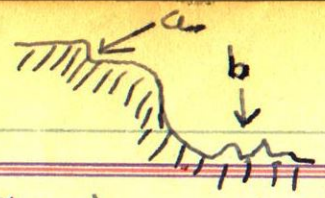


20 March 1964 — On Sarawak Shelf

Last night Geo Peter trimmed up the PDR. He shortened the ping length and reduced the gain, so we are now getting an excellent trace. For part of last night we were getting up to 20 fms. penetration in a bit over 150 fms of water with the second layer outcropping where it was cut by a canyon or valley.

We had a good deep-scattering layer last night too, and it started down about 0600 (2200 GMT). We double up on the PDR's during the plankton tows to get a record of these.

Coming down the Sarawak coast, we have made ~~two~~ three and now at 0440 are making our fourth crossing of the shelf edge. In each case we have picked up a nice ~~appearing~~ fault (?)



a = fault
b = mag. anom

scarp just shoreward of the major shelf break. It came at about 65 fms last time, and now is at 85 fms. It is now 12:45 PM, and at 1215 3/20/64 (0415 GMT), we crossed it again on the way out of the vee into Pt. Baram. This time it was bottomed at 82 fms but less relief. There seems to be a magnetic anomaly of about 40 gammas associated with the base of the slope. Where the base meets the sea floor, the topography becomes rugged, and it is here the magnetic anomaly is found.

Hale had some problems with a role of color he tried to develop. The water temperature — fresh out of the tap — was 92° and the emulsion literally ran off the film. He will be using an ice-cube system from here on.

I have started — or have given to others to start — the special forms devised by ORI to get some feel for instrument reliability, causes of failures, losses, etc. They are being used for dredges, corer, gravity meter, magnetometer, thermoprobe, and biological nets. They will be sent off as completed.

We are radioing ~~Housman~~ Huijsman of Brunei Shell Pet., Ltd. for the position of his offshore rig so we can back plot our positions off Pt. Baram where for a long time all we could get were bearings on that rig. Will also radio Mr. Soong Min Kong, Director of Fisheries of the Ministry of Agriculture in Malaysia as to our Singapore arrival time, so Mr. Ong can come aboard for the run to Penang.

Barbee, Alexander, Burns, Rodolfo,

and I worked out the details of our Singapore to Penang leg down in the plotting room. It comes to this: 120 hours SEP or sonic profiling at 5 knots, 101 hours of running at 15 knots, 12 hours for 3 camera stations, and 16 hours for cores and dredges, for a total 249 hours or just 10 days. It should be a good run and a busy one. We spotted in the SEP work especially to cross the contacts of the extensions into the Malacca Strait of the granitic trends along the Malay Peninsula. The coring is to supplement the samples obtained by the USS Serrano in 1961 & 1963.

It was a beautiful tropical sunset tonight, the sea is still fairly calm with a gentle roll, and all seems to be going well.

21 March, 1964

When we went down over the shelf edge at about 6° 10' N, 112° 10' E, just west of North Luconia Shoals, there was no fault ~~this trip~~ ~~north~~ nor on the return one early this morning — these ~~on~~ ~~the~~ two north-south lines we set up to split those of the HMS Dampier in 1963. The run to the north — just west of North Luconia Shoals off Brunei — was done at reduced speed, but it proved to be pretty flat at about ~~65~~ 65 fms without a sign of a shoal.

The deep scattering layer last night was very pronounced — even on this mere 60- ~~to~~ ~~fifty~~ fathom shelf. It extended from 29 to 52 fms as a solid mass.

[redacted] — outgoing ping
[redacted] — Deep Scattering layer
[redacted] — Bottom

omit

Spent a good deal of time with Ramakantha Sarma and Bill Borglund — the two UNTV men — today setting up scenes for them and trying to tell them what we are up to, so they ~~cand~~ can do the best job possible for UNTV — and, more importantly — for the Coast Survey. There really is not adequate space aboard after Singapore for them, but we will put up two cots somewhere and will get along. I feel that their hour-long TV film on the IIOE centered around the Pioneer can do a world of good for the Bureau. Frankly, we still have a big selling job to do — both to the Congress and to the public. An hour-long film like this, shown on the 60 or so educational TV stations in the US, can do a world of good for us. The hoped-for results are worth all the bother of extraneous people peering over your shoulder with cameras, the

takes, re-takes, and run-throughs (runs-through?), then do it all over because the light slipped part way through, or the sound recorder run out of tape. Capt Borown and I were down in the plotting room for 3 hours last night getting a mere 4 or 5 minutes done well.

But science surges ahead too. The contact on the island of Borneo between the so-called Continental Core (or Sunda Shield) of Kalimantan ~~and the~~ to the south and the Cretaceous-Tertiary geosynclinal sediments of Sarawak and Brunei to the north runs across the island at about 1°N. The western end of this contact is along the Lupar River valley, and its seaward extension ~~to the northwest~~ has been postulated as running northwest from the mouth of the Lupar and passing

northeast of Tanjong (Cape) Datu, the westernmost tip of Borneo. (See 1960 Annual Report of the Geological Survey Department, British Territories in Borneo, F.H. Fitch, Director, 1960, ~~plate~~ figure 2., p.6).

Our line into Cape Datu was run specifically to see if we could pick up such a contact with the magnetometer or gravity meter. Running into the point late this afternoon, we crossed a nice V-shaped ~~[illegible]~~ channel, but other than a few bumps on the magnetometer, there was no change at all. Off Cape Datu after dark we swung northwest. As we approached the point on what surely must have looked like a collision course, we could see the lights of a ship off to port that turned as though to intercept us. When we reached our turning point — we turned back. ~~The~~ To those aboard what turned out to be a British

man-of-war, it must certainly have appeared that we realized we were about to be intercepted and turned tail. They swung around after us and gave chase while blinking to ask what ship we were. There was a long wait while we got Chief Greenberg up to the bridge, and his answer US Ship Pioneer must have satisfied them, for they fast dropped astern and went back to their patrol. I could visualize them all muttering "bunch of crazy Americans mucking about."

We ran north making our biological tow about 11PM. Normally we do it earlier, but in only about 20 fms, we did not want to stop, as the magnetometer fish was an essential part of this structure search, and it was probably too shallow to ~~[illegible]~~ retrieve

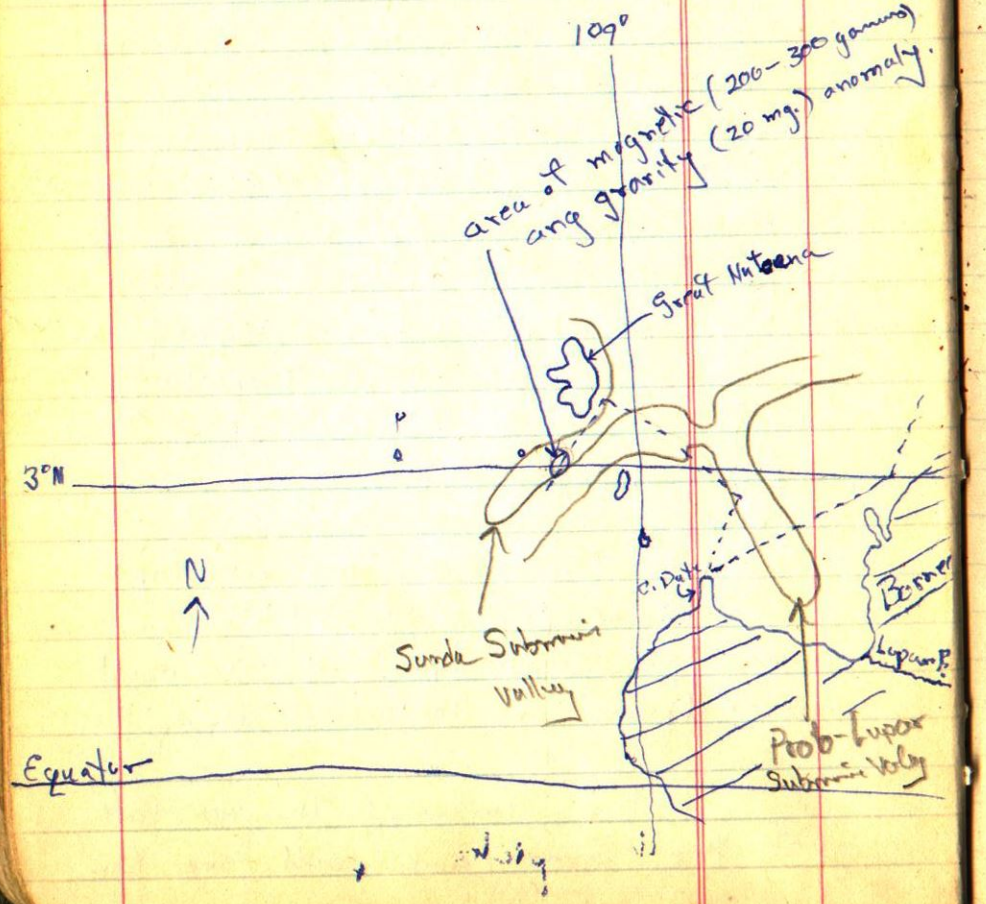
it and then put it out again. We have no real knowledge of the depth at which the magfish tows, but we know she slowly sinks when we stop. As we came up onto ~~[illegible]~~ Seahorse Shoal she was dragged over the bottom on recovery, but that was at less than 10 fms.

The tow was completed, and as midnight passed, we were headed on a WNW ~~[illegible]~~ course toward Great Natoena Island in hopes of picking up some indication of the anomaly.

22 March, 1964 - Sunday - On the Sunda Shelf -

About one this morning we picked up a small magnetic anomaly of about 20 gammas, probably reflecting something relatively shallow, but the magnetometer soon settled down again to its steady climbing now that we are in the southern magnetic hemisphere. Values were about 40,000 gammas. We were getting some bum print-outs and bum values on the analog trace, especially when the next-to-the-last digit was a 3. Fortunately the punch tape is taken off the equipment before the print-out (which also drives the analog chart), so the right numbers are on the punch tape, and we could see them on the visual display too.

I had contoured the HO-chart of the area and could see the



so-called Proto-Lupar Submarine Valley and the North Sunda Submarine Valley (See Haile, N.S., A.J. Meij, and A.C. Pimm, 1964 Preliminary Report on the Oceanographic Cruise of the HMS Dampier in the South China Sea, 1963, Geological Survey - Borneo Region - Malaysia, Fig. 1)

Right up to Great Natoena Island there was no indication of any anomaly. We picked up a course of 202° to cross the North Sunda Submarine Valley again, and between 8:10 and 8:50 local time this morning, we picked up a nice magnetic anomaly of about 200 to 300 gammas at about 3°N, 108°E at about the mid-point - perhaps a bit south - of the valley axis. The gravity meter also showed an anomaly - about 20 miligals residual. In all probability this is the contact with the crystallines, as both the gravity and the magnetics are still up. (now 11:30 AM). We picked up our pilot

early on the morning of the 23rd of March off Peake Island & were tied up at one of the cable company piers at Keppel Harbor, Singapore about 10:30 AM. The pier is on Bukit Chermin off Keppel Road.

27 March, 1964 – at the mouth of Malacca Strait –

It was raining as we slipped our lines at Singapore this morning about 11:30. The S.H.B. tug Skillful (spelled just like that, too) pulled our bow out from the pier. She kept pace with us for a spell and then slipped aft, ~~and~~ made a show-off turn, and headed back. We worked our way out, dropped our pilot, and ~~began~~ began threading our way through the many islands off the southern tip of Johor at the entrance to the Strait. The rain was hard but brief and patches of sunlight now made ~~the water~~ fake "shoals" all around us – moving patches of light jade green water on the otherwise leaden colored sea.

It is now ~~4:35~~ 2:35 PM and we are stopping to pull in the magnetometer

fish. The water has been about 10-15 fms, and we had it off only about 100 ft. We still do not know the depth of towing - don't know how far below the surface it is at various speeds. Even though it is well within the ship's own magnetic field at 100 ft aft, we will be able to get some feed for the variations even though not of the total field.

(Later) We found 100 ft to be too short. The magfish rode just on the front of the first wave of our wake and would occasionally hop clear of the water. We stopped ~~aap~~ and put out line to put her aft of that first wave and it seems to work OK.

About 2:30 this afternoon we put out the string of hydrophones and the electro-sonic profiler. It was a complex rigging job and took 1½ hours. ~~It~~ It was hot, everyone was pretty wet

and dirty when it was over, and Reggie Harbison and Austin Weeks were ready to be keelhauled if it hadn't worked. It was fired up and worked like a charm. There were some recorder problems about dinner time, but these were operators' fault. They had not shut down sufficiently while working on another part and had shorted out a condenser. Now working OK.

Vicente Alvarez has agreed to eliminate his morning vertical plankton tow tomorrow, as it would require a 3-hr. additional wait to put the ESP hydrophones and sparker back aboard.

At midnight the ESP was not functioning - nor had it other than sporadically. For a spell it merely shredded paper, then the sound source was out - I quit at ~~mign~~ midnight.

28 March 1964 Malacca Strait —

Harbison was up all night with his sick friend, and at 0800 this morning, it was still not working adequately for a good record. The Electronics officer (Lt. Kotler) CET Work, Keller from Hydro, Reggie Harbison, & Austin Weeks all had worked on it — & it still was poor. Once the recorder was fixed — the trouble was in adjusting the knife blade, a poor mechanism — then she fired every 2 secs. instead of every four. They now (1130 NM) suspect that some DC current is getting into the system, and are trying to track it down.

We continue on at 4 kts on our track — we'd have to pull in the string of 'phones if we stopped, and then couldn't work on the gear, so we poke along. I've kept pretty much out of their way back there at the

ESP shack, as I can be of no technical help, and don't want them to feel I'm breathing down their necks —

At a bit before three this afternoon we hauled in the 'phones & sparker (arcer, boomer, thumper, seismic profiler, Geological Echo Profiler, Electro-sonic Profiler — or what have you) We'd reached the end of the line without really getting any good record at all. Reggie Harbison & Austin Weeks, Lt. Kotler, & ET. Work had put in a long session on it. — We cut out the planned evening GEP and added three grab samples ~~in the strait of B~~ inland from our core station. Since we had the time, we went in almost to Indonesia's 3-mile limit off the east coast of Sumatra. Actually, we were just east of Ropat Island approaching Tanjong Leban at the entrance to Bengkalis Strait, or — to be more precise — about 1°55' N,

101°40' E. Geo Heller was interested in getting in close to do some surface sampling to see if he could get some feel for the origin of the heavies found in the Sarrano samples collected in deeper water. We worked into about 6 fms and all three grabs with the new shipek snapper — a real bear trap — were a dark gray clay with a few grains of sand mixed in. We then moved back out into deeper water — about 7 fms! — for a core using the light gravity corer with a 10-ft free-fall mechanism. The first time it didn't trip, 2nd time it tripped but never hit bottom as the trip chain hung up on the corer's fins. The 3rd time, we removed the tripper, really let her run out & got a few inches only of the same clay but with more sand. The shipek grab was tried next & yielded about 2" on top of the clay

some clay, sand, and a few small chunks of wood - probably pretty new with worm borings.

About 10 PM Lt Mother said he had found the AC problem with the sparker - there was a loose wire with an intermittent charge. He announced it to be fixed & ready to work. I'd have said, the record is now clear of the AC horse, now lets see if it will work, but such is the caution of old age.

It's now 1115 PM & B. Hale has his camera going over in about 20 fms. off Cape Rachado on the Malay Peninsula.

On the 2nd of the grab samples on the pre-camera station, there were some pyritized twigs - just the bark with the wood rotted away.

I've seen the same things in the Magothy Clay formation in the New Jersey coastal series. They are - I believe - formed in place rather than berry washed in from shoreward. Probably is - or was - a reducing environment down there.

The sand in this last core was clean, well rounded, and well sorted. We'd had the asymmetrical shapes just before - suggestive of geo Shoal sand waves, so this is probably a similar sand.

29 March, 1964 Easter Sunday - Malacca Strait

The 28th (Camera lowering #2)

The camera was over at 11:40 PM with a bottom depth of 13-15 fms - a strong offshore wind kept us drifting west & the bottom changed markedly as we drifted over what I feel must be sand ridges. Byron Hale had the phone line to the winch and was at the oscilloscope, and I was at the PDR & the 723. We would raise and lower the camera as the pinger indicated the bottom to be coming up or down, but I am sure that there were quite a few times when it was out of range of the bottom. This water seems turbid, at times almost coffee colored, so the pictures may be anything but clear. At 0200 this morning, after a standard 2-hour lowering she was brought up.

I'm quite convinced that at

these very shallow depths we could lower it directly from the ~~that~~ big crane amidships rather than horsing it way up to the bow. The Alden Recorder which is supposed to give us such a fine blow-up of the record from the pinger does not give any meaningful trace whatsoever. No instructions came with it. Toller saw it at Beltsville and said "Gee, it worked OK on the bench at Beltsville". It is in many ways unfortunate that a ship at sea is not "the bench at Beltsville", but it just isn't. When the Alden was on, not only did we get no trace on the 723 fathometer, but also no return signal on the oscilloscope from the pinger. Perhaps the leads are reversed, so the Alden grounds out the other two - I don't know. There are enough electronics people aboard without me, so I'll keep out of it.

We had our productivity run this morning, and are now steaming along with hydrography, gravity and short tow-line magnetics as we're still in pretty shallow water - ca. 15-20 fms. We core about 1130 then try another sparker run late this afternoon in hopes of picking up the straitward extension of one of the Malay ~~[illegible]~~ granite ranges which would enter the strait in the general area of Malacca.

After a small poorly-attended (maybe 15 out of the 106 aboard) Easter Sunday service, Bottale told me that when he finished working over the camera after the midnight-to-2AM station this morning, he discovered that the film re-wind drive in one of the cameras had come off after the

roll was about 4/5 of the way through. It is a neoprene O-ring drive belt, and it ~~had~~ had broken and was lying in the bottom of the case. Other than that the cameras seemed OK.

The core station about 10:30 this morning — Shipek grab and then a core, actually — gave up more of the same gray clay. It is apparently this same clay that the Serrano found at a depth of about 2 feet below a surficial sand in some of their cores. It appears to be quite extensive.

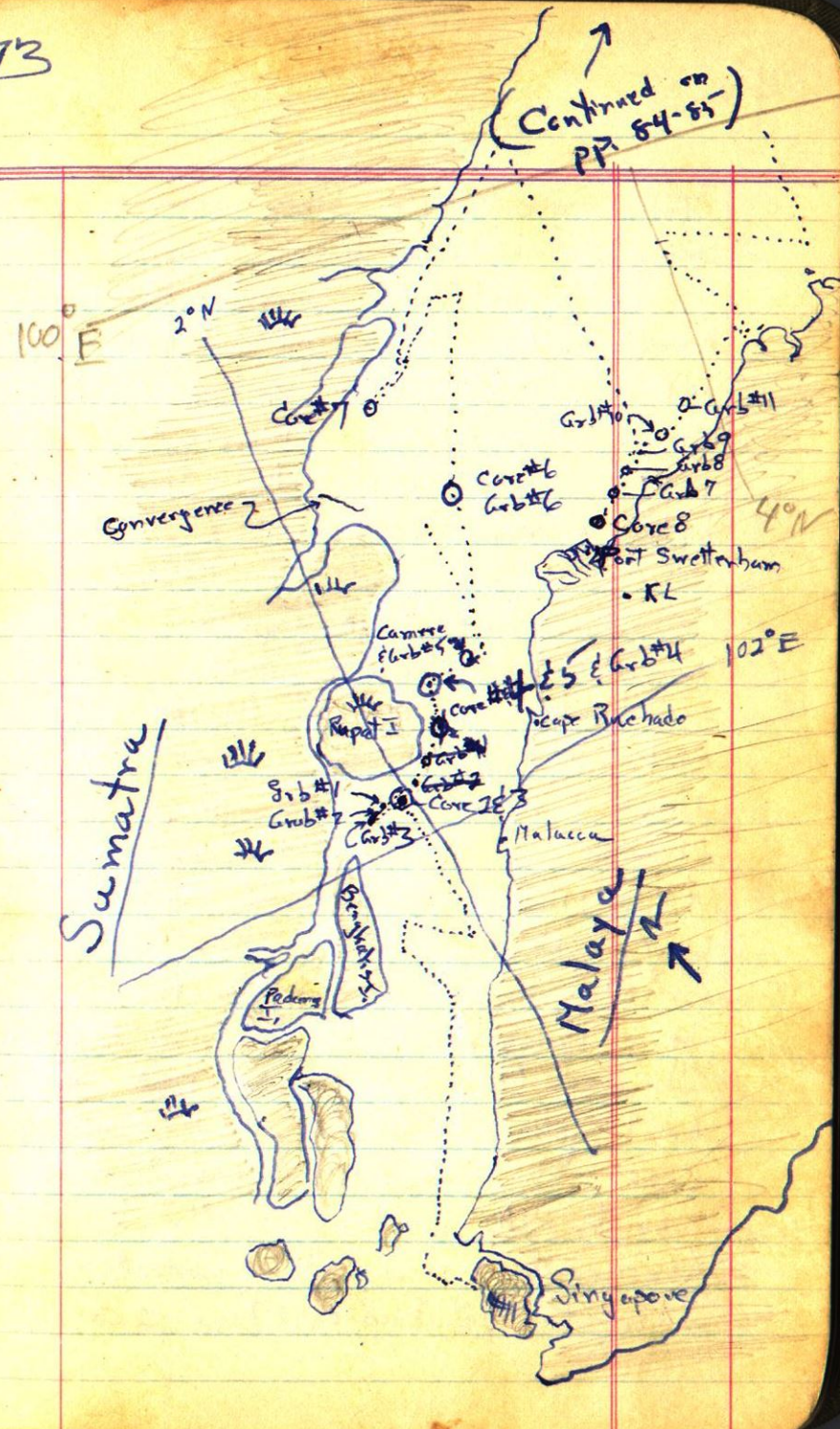
I'm still concerned about the depth at which the mag. fish flows when the full 750 ft of cable are out. Putting a BT on it would give us a trace of the depth, but we would never know how much the weight and shape of the BT itself fouled up the depth-of-tow characteristics of the fish. Even if we buoyed it to make it neutrally buoyant, the extra drag would throw in enough doubt to make it all inconclusive. I will propose to Capt. Brown that when we first get into clear and deep (over 30 fms) water that we put the skiff with a good outboard over the side with me and Paul Larsen suited up. We'd hang on to the skiff in the water, let the ship roar by at 235 RPM (about 16 knots), and we would go down, Larsen with the camera, me with depth gages to follow the mag. cable down to see just how deep it does tow.

At noon I saw the Captain & he agreed to this plan and added that this would be a good way to get the away from the ship

shots the UN people have been wanting.

At 11:55 we passed a long sinuous streak of plankton with a very definite color change on either side – apparently a convergence of some sort. When we come back up here from the core in Sungai Rehan (2°30'N, 100°30'E), we'll plan a series of BT and surface salinities across it, 3 to 4 on each side, then plot them up & see what it looks like. These should – & will – be done stopped, going very slowly through it all. Talked with Alvarez, & he would like to tow his net for 10 mts. either side. May be all very much the same at these depths and with the currents that go through here, but we'll try it.

That came off from about 1:30 PM to 2:15 PM. There were several sea snakes seen in the green turbid water south of the convergence, plus large jelly fish, stumps, bamboo and a heavy dirty gray organic trash



The core early this afternoon in Sungai Rekon (Ca. 2°15'N, 100°15'E) was a 9½-foot one using a 10-foot barrel - and again the same old clay but somewhat softer. We used this time the heavy PVC corer without piston or trip weight & from the hydro wire.

Somehow Singapore never got mentioned in all this. It was not as hectic a stop as Calcutta will be, but it was ~~very~~ indeed hectic. There was a big press conference aboard on the 23rd arranged by Wolf Reade & Howard Single of USIS. There were a couple of articles in the Straits Times and the Malay Mail, but it was the Chinese language papers that did the best job - I was told! The 24th was the Captain's reception aboard - about 40 people - mostly from the University and the Consulate General. Sam P. Gilstrap is the C.G. there,

and he and his wife both showed up. I went into town that first night to mail some letters. The local (Tanjong Harbor) Post Office could not change U.S. dollars, but the clerk suggested I go into town (Singapore) to the main P.O. which stayed open till six. All I had was a $20. bill, so he offered to lend me a buck malaysian (about 3.2 malay = 1 U.S.). I accepted & bussed into the heart of Singapore getting off a block from Raffles Square & worked my way over to Change Alley to get my $20 converted, then to the P.O. where I held up traffic for some time while I bought "four of those, three of those, and one of that 50¢ one there" etc. They are good looking stamps, and over the next few days I sent off quite a few collectors items envelopes just loaded with them. Singapore is

It was the S'pore Jr. Chamber of Commerce that had done all the inviting, bussed all the kids way out to the ship, and generally did a good job.

the farthest one of our ships has ever been from the U.S., so Maro & Tison both got envelopes. Dinner that eve with B. Hale, Ramakantha, & Borglund at a fine chinese place above the Capital Theatre.

The 25th was the open house, & it was a real rat race - there were over 470 aboard in groups of 15-20 & we were all pooped. The 26th was my one day off in S'pore, & I first hit up the bank, then USIS to see if they would duplicate our underwater photos from Seahorse Shoal (they would), then I answered an add in the Malay Mail and went to "Jeans" for a good haircut, steam bath, manicure, & massage. The last by a cute Filippina named Victoria Garcia!! Picked up knick knacks for Lee & Dodes, a few first day covers, a beer with George Miller (that

Wee Poh Huang is the S'pore JC President, and the main organizer was H. H. Ching. They put up a big banner on the boat deck rail and were mighty proud of it

was lunch), more just roaming about in S'pore's China town - crowded, laundry out of the windows on bamboo poles, strange eats, many and different smells, peddlecabs but no more rickshaws, Indians, Chinese, Malays, and all the many mixtures that give Malaysia its motto "Strength in diversity".

Dinner at the American Club with Bert Soiteau, Rodolfo, & Crs. Dave Hough, then a night on the town - tame but fun, the Singapura, Shamrock Inn, and finally to a place where Dave wanted to see some girl, & home about 1 AM.

The ESP went back in the water about 4 PM this afternoon. By midnight it still was not working satisfactorily. I quit at midnight for some sleep.

About 8 PM I had a long talk with Reggie Harbison & Austin Weeks, Lt. Potter, then LCDR Barbee & CDR Cole about a message back to D.C. to get A.C. Hill or Bill Huckaby from Rayflex out here to get that thing working. Hill was on from San Francisco to Honolulu, & they had problems even then. He's about to be married, so maybe ~~H. H.~~ Bill can come. We want ~~#~~ whomever it is to meet us at Penang, so we'll have the gear operating for the special Andaman Sea work. I got agreement and the following message was sent to Naro marked for Max's attention, so it doesn't sit in the wrong in-basket for a day.

"No meaningful ESP records in 20 hours of operation despite continuous adjustment and repairs. Imperative that Rayflex techrep join Pioneer at Penang by 9 April for high priority work prior to Calcutta." We hope he can make it.

30 March, 1964 – Off Port Swettenham, Malaya

Sarma (pronounced Sharma) and Bill Borglund from the CBN and Byron Hale nailed me last eve., and they do have a problem. It is important that they get good footage for their films, but everyone else aboard has a camera – or two – is interested in what's going on, and crowds in to watch every operation. This makes their job impossible. We can not keep men below in 100° temperature, and there are always people off watch, people who are bored and of course want to watch at the one place aboard where something different is going on. I heard them out & then suggested that they give me a list of the operations they still wanted to cover, and somehow we would see that they got what they

needed. These are:

1. Coring operation
2. BT operation
3. rock dredging
4. heat probe operation
5. ESP streaming, recovery, & shack

It was arranged with Cole & Barbee that the core station at about 8:30 this morning would be for them. We'd announce it in advance as a movie operation, would keep people – extraneous ones, that is, – out of the area, would be willing to hold up & ~~re-shoo~~ re-do things so they could get a different angle, even put over a boat so they could get an off-ship angle on it. I then talked to Capt. Brown & he agreed, but it developed that Borglund had discussed all this with him yesterday. The Capt. had gotten Barbee to set it up for yesterday AM, but Borglund was asleep when we

got there, and anyway was all set up to film the Easter Sunday church service – so it goes.

When I got up this morning – just after breakfast was over – I learned that the ESP had not really worked all night. They got a wee bit, but then there was no incoming signal – not even ship noise, so it was pulled in and secured about 8:00 AM this morning. Someone had better get out here from Royffen, or we'll have "zilch", as Bob Burns says. We then held a long planning session revising our track from here on in view of being able to do 15-16 kts rather than the 4½ with the ESP out.

It was decided that we would add three grab samples farther up into the bay at Port

Swettenham. Teller is especially interested in finding where the tin ends up. The upper Klang River is tin country, and they have blocked off sections up there where they are recovering tin from secondary fluvial deposits. We decided to go all the way in so we could get a good fix on the buoy at the northern mouth of the Klang River, get that one first, then start out. That would also be the station for the movie boys, and now (11:15 AM) the boat has just gone over for their shooting from seaward, and the squak box has just told everyone to keep off the main deck forward of the wardroom and off the boat deck forward of the Captain's cabin.

Now at 1:45 we are making our run of grabs along the Kulay Peninsula north of Port Swettenham

in about 12-15 fms of water.

We have re-arranged tomorrow's work so we will stop for a core and camera station at a bit after 11 AM so the biologists can make their first 3-hr. in situ productivity run. We'll run and grab and/or core all night.

Ong's address is
Mr. Ong Kah Sin
Fisheries Research Laboratories
Glugor, Penang, Malaysia
he should be sent copies of all reports, etc. and especially copies of the biological work. He is interested in everything and good to have aboard.

When the GEP hydrophones were brought in this morning, there was a 2½-foot pale gray on top, white on bottom, seasnake tangled in the lines. His triangular shaped head, swollen sacks along his jaws, and fangs all led me to believe him poisonous.

Phuket
Malay Pen
Sumatra
Toba Sea
Great Nicobar
Little Nicobar
Bards - see p. 96
Grab #22
Grab #16
Grab #20 Core #14
Grab #21 Core #15
Grab #19, Core #13
Grab #17 Core #11
Grab #16
Core #7 (see p 73)
4/2/64 11:30
Dredge #3
8°N
4°N
96°E
98°E
100°E

As a matter of fact, I think all seasnakes in these waters are. He is now nicely pickled in a big glass jar, so we'll know who he is after we get back.

BT's have been suspended since before Singapore, as we have been in water less than 50 fms ever since we first climbed up onto the Sunda Shelf a few days out of Jesselton. We are, however, recovering surface samples for salinity analysis and getting a surface temperature every 2 hours.

Satellite went over clear and bright moving from NW to SE at a maximum altitude of about 50°. This was at about 7:45 PM. Don't know which one he was, but it was indeed bright – of planet. magnitude.

Penang

31 March, 1964 – in mid-Malacca Strait, SW of Penang.

It's now 2:30 PM & we have been stopped on station since about 11:15. We got a shipek grab (the beartrap we call it) sample of ~~me-to-coarse~~ medium-to-coarse dark sand but no core – it was too coarse. The camera was over about noon in 47 fms – the deepest we've been for some time. The record on the PDR shows that we put ~~it on~~ the camera on bottom briefly, but then it sat at 17 feet off the bottom with the bottom staying like a billiard table.

This has been a hot hot hot stop. There is no breeze. The sea is like glass. Our refuse is not moving off, but garbage, paper cups, toilet paper, etc. are accumulating in an ever-growing semi-circle off our starboard side. One very big whale shark nosed lazily in to our stern with two pilot fish keeping good formation with him.

The sun screams at us and is reflected back brilliantly by the mirror of the sea. The ship seems almost to steam. B. Hale said it was so hot the emulsion was melting on the color film in his camera. The steel decks radiate heat, and even with rubber-soled tennis shoes, you can not stay long in one spot on any of the exposed decks. Barbee and I did our 1-hour stint of exercise and sunworshipping up on the flying bridge & we were dripping within minutes, sweat just poured out of every pore.

The water - since this morning after breakfast - has been a very clear blue. When Alvarez & Dick Stephen-Hassard put down their sample bottles for their in-situ productivity work, I could see them clearly down ~~to~~ 21 meters - almost 70 feet - It is quite a change from the ~~dirtier~~ water of the last 4 days. But

still the flag hangs limp & we broil

omit

[For next season - Pioneer should pull the shorun stations for the gravity range calibration runs, while the Surveyor puts them in. This will obviate the Bryant - Brown friction on this. Pioneer has pull these stations in 2½ years running. Capt. Brown feels it's Surveyor's term.]

Spent a bit of time listing the dope on our geological samples. Rodolfo & Teller ~~are~~ are doing a fine job of the sediment grab & core samples. The logs are - now - being well kept, & I just sit back and enjoy the trip letting others do it all. It is indeed a far cry from the Explorer trip in '60! At first I felt that I should feel guilty about doing so little aboard → my daily sessions with the Captain & planning sessions with Barbee - I am really a tourist on a well-run

Santos letter

omit

Serial No.	Sampl.	Lat(N)	long(E)	Date	Position	Depth	Description
339	Core #1	06-50	115-19	3/18	73 B	970 fms	14" in trap corer - 1ft. clay - piston didn't trip
358	Core #2	01-55.4	101-50.2	3/28	105-D	18 fms	Phleger corer 8" clayey sand, med. yel-gn stiff clay
359	Core #3	01-54.9	101-50.3	3/28	106-D		7½" silty clay. drk grayish. - 9 ft Phleger
360	Grab #1	01-50.5	101-51.5	3/28	107	16 fms	Shipek grab - stiff sandy clay
361	Grab #2	01-46.6?	101-52	3/28	109	18 fms	" " stiff clay, rare sand grains - pyritized stems
362	Grab #3 *	01-42.4	101-52.8	3/28	111	11 fms	" " soft silty clay - med. greenish gray sandy
364	Core #4	02-14.1	101-36.8	3/28	132-D	~~21.5~~ 19.2 fms	PBS, 9-ft bbl 4" well washed sand (2") stiff clay
365	Core #5	02-14.1	101-36.8	3/28	133 D	16.5 fms	PBS, 3-ft bbl - 3½" clean white sand (3") over ½" stiff clay
366	Grab #4	02-14.1	101-36.8	3/28	134 D	16 fms	Shipek grab - md-coarse white sand w/ bark & wood frags.
367 3/28	Camera #2	02-18	101-42	3/28	142 D		
368	Grab #5	02-18	101-42	3/29	143-D	14.5 fms	Shipek grab - sand over stiff silty clay w/ worm holes.
371	Grab #6	02-48	100-48	3/29	184-D	27 fms	" " silty - sand, grayish olive, black sand grains
372	Core #6	02-48	100-48	3/29	185-D	28 fms	PVC corer 10' bbl, 240 lbs wgt. 18" (like Grab #6) lost overboard
373	Core #7	02-30	100-29	3/29	193-D	12 fms	PVC corer 10' bbl, 300 lbs wgt, no free-fall 8' 10" core soft gray silty clay
381	Core #8	03-15.5	101-10.25	3/30	284-D	12.5 fms	PVC corer - gvty - no free-fall 2.8' penetration, 17" core sandy shells & wood & peat
382	Grab #7	03-15.4	101-10		285-D	12.5 fms.	Shipek grab, - shell & md-crs ~~black~~ sand w/ many black particles
383	Grab #8	03-19	101-6		289-D	12 fms	" " gray olive green silty sand
384	Grab #9	03-23.5	101-1		295-D	16 fms	" " soft silt over pre-consolidated silty-clay w/ lots of wood or peat
385	Grab #10	03-27	100-57		297-D	14 fms	" " yellow green sandy-silt
386	Grab #11	03-37	100-48		301-D	21 fms	" " sand with some silt, shells, & shell frags.
387	Grab #12	03-46	100-41		307-D	20 fms	" " dirty sand with shell frags. & some fines
388	Grab #13	04-09.5	100-29.5		319-D	27 fms	" " lld. to crs. Snd - Alexander says locally derived from granite
389	Core #9	04-10	100-33		322-D	16 fms	PVC corer - no sample, hard bottom
390	Grab #14	04-10	100-33		323-D	28.5 fms	Shipek Grab - md to crs Sand light olive gray
393	Grab #15	04-09.5	99-52		336-D	31 fms	" " - silty sand with lots of dark mins.
394	Core #10	04-09.5	99-52		338-D	30.5 fms	PVC corer. 1.9' penetration, 11-inch core

omit

Serial No.	Smpl No.	Lat	Long	Posit No.	Depth	Description
396	Grb# 16	04-01	99-24	349-D	13 fms	Shipek Grab - silty sand w/ crs. shell frags. pelecypods, gastropods & sand dollars
398	Grb# 17	04-29.5	99-51	367-D	32 fms	" " " - clean, crs. to md. sand w/ shell frags
399	Core# 11	04-29.5	99-51	367-D	32 fms	PBS - no sample -
400	Grb# 18	04-53	100-15	381-D	18 fms	Shipek Sampler - fine to md. sand - + brittle stor
401	Core# 12	04-53	100-15	382-D	18 fms	PVC - 10' bbl, gravity - 3'8" core
404	Grb# 19	04-42	99-07	402-D	41 fms	Shipek Grab - fn to md snd
405	Core# 13	04-42	99-07	402-D	41 fms	No Sample in PBS
410	Grb# 20	04-45.5	98-13.8	430-D	31 fms	Shipek Grab - silty sand, shell frags greener & darker than on Malay side of the Strait
411	Core# 14	04-45.5	98-13.8	431-D	29.5 fms	PVC - 10' bbl #425, 3'6" silty clay - stiffer at bottom
416	Grb# 21	05-31	99-19	453-D	42 fms	Shipek Grab - silty sand w/ fine shell frags.
417	Core# 15	05-31	99-19	454-D	42 fms	PVC - 10' bbl, #425, no free-fall, 3'4" core grysty clay to md-crs snd
422	Grab# 22	05-47	97-30	493-D	117 fms	Shipek Grab - 2 pieces of rock, possibly quartzite,
429	Core# 16	05-48	96-28	517-D	700 fms	PVC - 20' bbl, 10' free fall, Piston, Pinger, No trip. PBS = 6" silty clay
423*	Grab# 23	05-47	97-30	493-D	118 fms	Shipek Grab - coral chunk, some sand, rock of sandstone - rotten
424	Grab# 24	05-47	97-30	496-D	148 fms	" " md. clean sand with shell frags
429	Core# 16	05-48	96-28	517-D	700 fms	(see #429 above)
440	Dredge# 3	06-12	94-57	571-D		
472	Core# 17	05-53	92-34	615-D		
474	Theromoprobe# 1	05-53	92-34	617-D		

expedition. On more sober reflection, however, I realize that this merely means that the oceanographic operations of our ships have ~~progress~~ progressed a very long way in the past four years; and after all, that's just what I have been working for. So -- I am sitting back and darn well enjoying it.

It is now 11:30 PM & I have just had a session with B Hale on his deep-sea camera. The lowering today was a daylight one in fairly shallow water, so he had to use the automatic shutters on the cameras, this was b/w & white film for a change. He'd just finished the test run, and - at least at the end of the reel - one shutter had stuck open & the film was badly blurred - too much natural light at that shallow depth.

Then, too, this evening's plankton tow resulted in a net

torn off. Vic didn't know how it happened. We are now down to two repaired and one new net. We've gone through half the supply in much less than half the trip. Will have to get the Honolulu D.O. to have some more made. We can't ask BCF for any more.

Fortunately it cooled off a bit this evening & it is a gorgeous night. Even the little stars were let out tonight.

Talked to Vic Alvarez and he feels we are OK for nets for the time being - so we'll hold off trying to get more sent out.

Sumatra

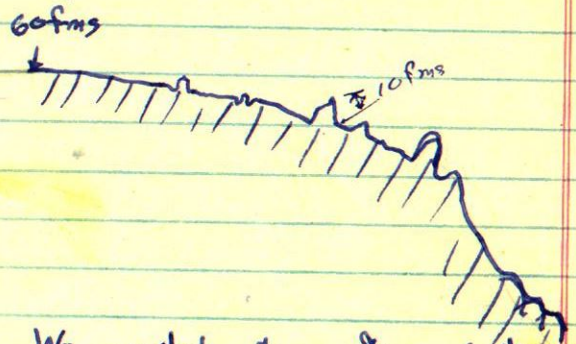
1 April, 1964 - NE of the N. tip of ^

At 0930 this morning we passed through a series of perhaps ten bands of darker water - made darker by the small wavelets which were limited to these bands. Each one was perhaps 150 feet wide and they came at intervals of ½ to 3 miles. We were on course 281°, & these trended about 180°. This is the general area where we leave the shallow shelf area we have been on since the 19th of March southwest of Jesselton, and these may be related to some topographic control of the water movement. We'll cross the trend again on our way to Phuket from our sally west to 91° in the Indian Ocean. On checking the PDR, we had crossed a series of six quite pronounced bumps

(See P.135-7)

- probably ridges (?) - at the edge of the slope

omit



We wanted to get grab #22, in 100fms so we turned around & went back up. As we approached the break, we could see that the bands of rippled water did indeed tie in with the bumps we encountered at the shelf break. Dredging is - of course - the answer. I talked with Barbee, and he doesn't like to break out all hands to put the ESP over after dark - and a delay for dredging would do just that. He did agree to come back here after the long run to Phuket & before Penang. This will give us two more crossings of the shelf break

and a dredge. Rocks from here could be pretty significant.

Their grab attempt suggested a hard bottom - Grabs #22 & 23 both brought up rocks - small chunks though they were. Both grabs yielded old-looking rock - almost rotten looking. One chunk was brown worm-holed sandstone(?), the other appeared at the broken face to be quartzite. We'll know more on dredging.

On leaving the station, I had the bridge continue on into and across the marked 200-ft band of turbulent water (even whitecaps) we had been drifting down on during the grabbing. The bottom had been rising while drifting continued to do so as we started through it, and then it dropped off fast to about 150 fms (from 117 fms). I am now convinced that these "bumps" are indeed shelf-edge ridges and

that the bands of turbulent water are topographically controlled where the water from the west impinges on the slope and is forced upwards. The very same phenomenon I have seen from the Hydrographer during our work on Georges Bank off Cape Cod. There, however, they were made by sand ridges.

Just to prove me a liar, we ran through another turbulent zone in the early afternoon, the bottom there was something over 500 fms, and the "bump" - and there was one - was nearly 5 fms., so I'm inclined to rule out topographic control - at least for that one.

About 3:30 we stopped for what we hoped would be a 20-foot piston core - in the deeper water, we felt this was now justified. When she came aboard about

5:PM, she had a good core in the trip weight, but the big piston ~~corer~~ corer had not tripped. It is the big mystery so far. The same rig worked in the North Pacific all last year. They - the boys under Lavery - will trim off part of the trip-arm to make it a bit more hair-triggery & we'll try again. (see p. 153 for 6 April)

The GEP went back into the water about 5:30. It's now a bit after 11:00 PM and there is still no record. Barbee was playing chess with the Doc, so I went below with Burns, Heller, & Rodolfo and worked out an alternative plan. Barbee wants to leave it in tonight - I don't understand his ~~reticence~~ reluctance to have the deck force broken out at night - but we'll leave her in on the off chance Heller, Beggs, and Austin Weeks can get it

going. We'll then pull it in at the time of the biological tow and darn well leave it in until Penang and - hopefully - someone from Mayflower is waiting for us on the dock. What we plan is this: Dredge off the northern tip of Sumatra on the shoal-head WSW to the deep part of the basin west of ~~Pen~~ Sumatra where we'll put down a cast for bottom temp, core with the 20-ft piston, then thermoprobe. Then on to 1500 fms west of the basin at about 91°E. Then come back hell bent for election with mag, grty, & hydrography - no BT's, no tows, just 235 rpm all the way on a good geophysical run into Phuket off the Malay Coast. Then Zig & Zag SSW along the break in slope where we picked up the ridges under the turbulent bands today. Then off to the deep area to get the

core we missed today, get a heat probe if there's time, on to the Langkawi Is. where ~~we~~ we swing around them in a clockwise direction, then down into Penang.

It's now 11:45 PM & I've just gone over all this with Barbee. The GEP is still out. I certainly hope someone from Bayflex meets us at Penang. I do hate to lose all that sub-bottom data.

The dredge was in the water (next to the photographers) at 1123 AM and started down in 130 fms. Our drift was up-slope from west to east, so our chances looked good for a successful haul. We made first contact at 1131 in 115 fms with a 20-25° wire angle and 759 feet of cable out. Sixteen minutes later we started hauling in at 100 fms depth, 1073 feet of cable out and a wire angle of about 15 degrees. At 1150 AM we made our last contact with the bottom with 700 feet out, and five minutes later it was on deck - with a sample

2 April, 1964 - off Northern Tip of Sumatra

April Fool's day yesterday, was just that! The GEP out and the big piston corer not tripping. Maybe it will go better today.

With the GEP brought in, we had our ~~1st IIOE net tow this morning - a vertical one from 200 m - then our~~ normal vertical productivity ~~one~~ tow, and with no GEP slowing us to 4 knots, we got to the dredge station (Number 3) about 10:30. It was a slow one, as we put over a skiff for the photographers to get the off-ship footage they wanted.

(insert)

The Stewart hypothesis of the topographic control of surface turbulance got a new shot in the arm this morning. As we approached the 30-fm top of a seamount in line with the northern tip of Sumatra and

just north of Rondo Island

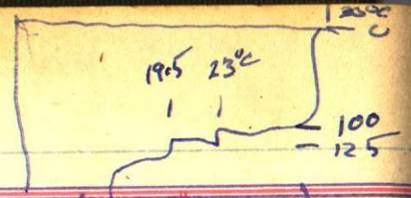
10:15

Great Nicobar Island, the bottom was at 1155 fms at ~~10:30~~ ~~10:15~~ AM., by 10:30 - at 1/3 speed - it was up to 100 fms. It was still rising when Lt. Rotler came in from the bridge to say that there were "ripples" as he called it - the same turbulence with whitecaps we'd seen yesterday - ahead. Just as we entered the area of turbulent water the bottom peaked at 90 fms and started down again. Here a topographic feature 540 feet below the surface resulted in a surface turbulance that was very marked.

It is now 12:30 PM, the dredge & its samples are aboard, and we are going back east to get a clear magnetic, gravity, & hydrographic run over this great rockpile. The dredge took some great pulls. There was one hang-up that put a real strain on the cable, then came that snap that means either that the

rock has broken off from the outcrop or that the dredge has broken off the cable. A third alternative is that the weak link has parted & dumped whatever was in the dredge. A lesser strain a minute later indicated we still had a dredge. The UN photog. & B. Hale were in a small skiff and took their footage. When the dredge was up, we pawed through it & found it mostly coral but with two very definitely not-coral and not-sedimentary rocks. Beyond that the opinions range from metamorphosed sediments, quartzite, and volcanic material, to syenite, & granite, I belong to the igneous school on this one. One chunk was dull pink with large red phenocrysts. The other - and all agreed this one was igneous - was gray with very distinct crystals - looked like tourmaline.

Anyway this does not appear to



be of volcanic origin, Alexander has thin-section gear at ~~Ipoh~~ Ipoh, and we'll get a determination on it.

A BT taken at the dredge station showed a pretty well-mixed layer of 29°c water down to about 85 meters. Between there and 115m the temp dropped to 23°. Right at 125m, there was a sharp drop from 23° to 19.5°C. Possibly in this area of mixing what we are looking at is a series of these mixed layers where the warmer Andaman Sea water overrides the cooler Indian Ocean water.

Our turn has been made (1:30 PM) and we are moving west again along 5°30' headed for the basin where we will cast, core, and thermoprobe this evening.

It is now nearly 10:30 PM E' we are working our way down into the basin that is the

northerly extension of the Java trench. The magnetics on the way down were at first the sharp anomalies of shallow features, but as we get deeper, they have become broader and less steep. The gravity seems to follow pretty closely the topography. When we get to the deep part of the basin (2300 fms) we'll take first a deep cast with extra bottles on the bottom so that Bob Burns will have a good bottom temperature from which he will know which resistor to use in his thermoprobe. Then we'll try the 20-ft piston core — with a different release mechanism, and then his probe will go over. That will probably be about 04:00 AM tomorrow.

As we broke out into the Indian Ocean this noon

I felt for the first time since about March 18 that we were back at sea. There is a goodly swell running from the Southeast, and the Pioneer in response has picked up a nice slow roll, like an old man nodding his head in ~~time~~ time to a ~~tune~~ familiar melody remembered from his youth. Everyone aboard felt the difference too, the almost steamy heat and smoothly reflecting waters of the Malacca Strait are behind us, and we all have a feeling of being back in a more familiar environment. The door curtains are swaying again, somewhere a pencil rolls in an otherwise empty drawer, and the almost-forgotten creaks that every ship seems to have are now back with us. It is indeed a good feeling.

As though carried away by it

all, there is a move to put our Indian Ocean Expedition medallions in a bag attached to the cast-weight when the Nansen bottles go down ~~this~~ early tomorrow morning. This way we can say that these medals have been lowered to the bottom of the Indian Ocean. Mine? - I'll leave them in my drawer, but thanks anyway. I may not be completely carried away by the coin trick, but I've made quite a fetish of making IIOE collectors' items of the envelopes I send back. One complete set has gone to Lester and one to Father. Each of these has the Captains & my signatures on the front and each is loaded with the local stamps. The ones from S'pore were especially appropriate with their set of brightly colored fish stamps. I have a set ready to go from Penang, The envelopes are ready for Calcutta and Colombo, and Capt. Brown has agreed - as has Rodolfo - to fire off a set from Djakarta the end of June.

3 April, 1964 Over the northwestern extension of the Java Trench.

It was a busy night last night - not for me, however, as I slept from about half after midnight to a bit after 6:00 this morning. Ens. Shinke did the oceo. station, Rodolfo was there on the big piston corr, and Burns sweat out the thermoprobe, so I slept - what a great organizational plan!

The ship stopped on station at 1623 GMT or 11:53 PM local time at 5°53'N, 92°35'E In just 2300 fms of water at the bottom of the rugged slope down from northern Sumatra to the northwesterly extension of the great Java Trench. The station was a good one, and the bottom temperature was 1.5 °C. By 04:05 the big piston corer with the CG&G pinger above it was in the water. She had her full 20-foot barrel and carried an additional 300 lbs of lead lifted onto the weight stand after the corer was

over and lashed to the rail. The deck force does a most efficient job at all this. It is quite a difference from Scripps or Lamont or Woods Hole where it's the PhD's that do so much of the gear handling themselves. These boys under Chief Lavery know their business and are good at it. Even Lavery is more relaxed, and there are seldom more than two or three "God-damn it"s per operation. As a sidelight, a few days ago Sarma and Borglund were getting motion pictures with what they call sync-sound; that is, a tape recorder and magnetic strip on the film to take sound motion pictures. They were filming and recording a rigging and lowering of the ~~bear trap (Shipek grab sampler)~~ light PBS gravity corer rigged with a free-fall ~~tripping an~~ release mechanism. As the film & tape recorder rolled, the picture looked good, and

Chief Lavery's raspy voice giving orders to Sweatt on the winch was coming through nicely. The contented smile on Sarma's implacable Indian face meant that this would be a good sequence, and he could mentally picture his boss at the UNTV studio complementing him as they watched the rushes. Then as the coring rig started down, the steel release arm swung slowly through 180 degrees and fetched Lavery a good clout just above his left ear. "<u>God DAMN it</u>" he shouted, then realizing that the tape was running he turned full camera and rasped "Did you get that on your f---ing tape recorder?" Sharma - totally inscrutable - lifted his dark ~~eyebrows~~ eyebrows and with a look of resignation to the unkind fates quietly said "yes, Chief, we did". The scene dissolved into a mass of laughter from all of

us. I hope that filmed and taped sequence is kept in toto. It will be priceless!

But back to this morning's big piston core --, Since the ~~releach~~ release mechanism did not release the last time, Ralph Ulrich's boys had been at it. They used the other release mechanism from the gravity corer - the one that clouted Lavery - and added a longer trip arm. It seemed better on inspection, but they tried it out on deck, and it worked OK. Well, so do a lot of things, so we waited to see how this modification worked out.

At five minutes after four this morning under lights on the after boat deck the big crane lifted the big corer off its two sawhorses, ~~and it~~ the weights were added at the rail, and she was in the water. The big pinger was

attached to the cable above it, and she was lowered in 2360 fms. The pinger worked well - there was absolutely no wire angle - and the now-familiar crazy plaid pattern on the PDR made by a pinger going up or down began to ~~show~~ evolve. By 5:20 AM the pinger showed that the corer below it was indeed on bottom with 14,120 feet (2353 fms) of cable out - that is, cable above the pinger, ~~which~~ which is itself some 72 feet (12 fms) above the corer. So it was pretty straight down this trip with no apparent drift. As the plaid PDR pattern started in reverse, there was a longer echo from the corer than on the way down, so we knew that she had tripped.

By 0630 she was back ~~on~~ at the surface. ~~deck~~. We could all see by the upraised arm of the release mechanism ~~that~~ - as though signaling "I made it" - that it had indeed released.

There is something about this big corer that people seem to like. It may be the same anticipation that confirmed fishermen have, or it may be the lure that slot-machines have for the confirmed addict, but there is always - in addition to those involved in the operation - a handful of eager lookers-on. When they realized that this one had tripped, a satisfied sigh could be heard, as though they themselves had been responsible. Dr. Alexander was like a small boy who had gotten a charm with his red ball of bubble gum from the penny machine. The Captain, Exec, LCDR Barbree & LT Moses were all out and even I had roused from sleep and was leaning against Number 2 launch with my camera at the ready.

As the big boat crane raised the corer high, we could all see the shiny olive gray "mud"

covering the dark core barrel up at least eight feet from the bottom. It was then lowered — almost lovingly — onto the two saw horses, the nose removed, the bottom capped, and the polyvinyl chloride liner was slipped out. George Keller probed down from above with a length of 1½-inch core liner, found the top, and laid off the distance on the side. Our core was 11 feet 8 inches of medium olive colored silty clay. Actually the color in less dramatic but considerably more precise terms was 5Y 4/2 on the Geological Society of America's Rock Color Chart.

Even as Rodolfo and Keller were removing the core liner, Lavery and his boys were standing by to lower the thermoprobe while Bob Burns having made his final adjustments

to the recorder was slipping the shiney metal cannister into the yellow cylinder in which it would ride to the bottom some 2297 fathoms below us. This was our first lowering of the thermoprobe on this expedition, and the first one since Ted Ryan and Bob Burns had had so much trouble with it during initial tests out of Honolulu last summer.

This is Alpine Geophysical's thermoprobe, and in his days of preparing it for this first lowering, Bob has time and again come below (from the 1st locker where he has been working on it) to rail against Alpine. The engineering, he says, is excellent; but the actual construction was very poorly done. The recorder was wired incorrectly, and no bench

tests could have been ~~were~~ made before it left the factory, or at least that would have been found. He was quite annoyed at the various things that were wrong in the assembly stage, but he still had faith in the equipment.

The thermoprobe measures the heat gradient between the ocean bottom sediments and the overlying bottom water. It is with this device and its various predecessors that we have learned what little we know of the geographical variations in the amount of heat flowing outward into the sea from the crust of the earth. This deep we were about to measure in is part of the arcuate trend of deeps, islands, and volcanoes that extends from east of Java through Sumatra, the Nicobar and Anduman Islands, under the advancing Irrawaddi

Delta and up along the Arakan coast of Burma. A good measurement here in this outer foredeep — the first ever made in this area — could be quite an important bit of data to use in working out the nature and origin of island arcs.

Bob Burns fully realized the importance of this lowering, and his efforts since Singapore ~~where he had~~ had been directed primarily towards making sure that it would work early this morning. ~~At 3:55 hrs~~ At 3:55 AM he had started the laborious calibration job. He checked at 5.2 K and at increments of 0.2 K up to 6.4 K. Then just at 7:00 AM he slipped the unit into the thermoprobe. It was like a well run operating room with me "scrubbing" for him. I took the several plug ~~cores~~

covers as he removed them to join the probe wires to those protruding from the recorder. Then he asked "battery" as a surgeon might have asked for "kelly clamps" or a "hemostat." Once connected, the recorder unit was pushed way inside, the yellow cover was put on and wired down, and he was ready.

Lavery then took over. The whole rig with its release mechanism was eased to the combing at the starboard rail, and Johnson on signal started up with the long arm of the boat crane. It went over and was lowered into the water, it was moved forward to the gallows frame on the bow where the big pinger was attached to the lowering cable just 900 feet above the probe. Then with Bill Barbee on the headphones at the PDR, we watched ~~those~~

that delightful machine start again to make the familiar crazy-plaid pattern of a pinger operation.

At 8:52 AM it was clearly on the bottom. By putting the pinger well above the probe, we could make darn sure that ship drift did not put a strain through the cable onto the top of the thermoprobe now well stuck into the soft ~~clay~~ ~~silty~~ clayey bottom. The probe must remain in the bottom for five minutes to allow the thermal units to come to equilibrium with the existing temperatures. At 0905 AM, Barbee called the winch man, and the big deep-sea winch started the long pull to recover the more than two and a half miles of cable below us.

One hour and a quarter later, the pinger had been removed at the bow, and the thermoprobe was being eased ~~into~~ onto the cradle on the boat deck.

All seemed to be OK. The release arm had tripped satisfactorily and Burns knelt at the top and began to remove the recorder. Byron Hale was right there with his movie camera and has ~~got~~ the whole operation on film. Bob took the film from below and ducked into the photo lab to develop it. This thermoprobe records ~~by~~ temperature by means of recording ~~the~~ on film the position of a minute light beam whose position is a function of how far a heat-actuated unit turns. He was one dissapointed guy as he emerged sweat-covered from the hot darkroom about

his recorder

15 minutes later. "We got zilch", he said. "Zilch" is ~~a~~ uniquely a Burnsism meaning "nothing", "zero", "nada"!

The calibration records were perfect. These had been made on the BT shack just before the lowering, but one half hour after them — or just about the time the rig entered the water — all ceased to function. The inevitable "why?" is hard to answer. The battery which had been a good strong 7 volts at the start was down to only 1 volt, and the needle hardly got off the peg. Apparently there was a short of some sort, possibly grounding out the battery circuit. We all shared Bob's disappointment but admired the way he and Ralph Ulrick set at it to devise a new rig that will be light

enough to lower twice from the lighter oceanographic wire during the same time it would take for one lowering from the big winch. I have just had a long talk with him about it, and he has gone off to get some sleep - it was a long and disappointing night for him.

We are now heading west out of the deep area to a point at 91°E and about 1500 fms where we will turn to ~~about~~ 073° for the long straight, no slow-downs for BT's or tows, run to Phuket. This will be straight gravity, magnetics, and hydrography across the entire island arc complex and should provide an excellent profile.

omit

[It's now 6:15 PM. I guess I'll just have to start ~~keeping~~ paying more attention to details. I had talked with Barbee yesterday over the detailed Hydro bottom contour chart of this area and had carefully pointed out the trough area where we cored, cast, and heat probed, and then explained why we ~~were~~ were to run west: in order to get out of the deep area and up onto the 1500-fathom west bank before we turned and headed on our long run to the east. That would start our geophysical profile west of the deep and give us the complete profile. Barbee figured we would get into 1500 fms about 5 PM today, and by God at 5 PM we turned!! Not at 1500 fms, but at 5 PM! I have just checked the PDR, and it had been slowly rising to ~~right~~ at 2000 fms ever since we left the station about 10:30 this morning,

omit

at 05°30'N, 91°00'E

and it started up onto the rise about 4:35 this afternoon. By 5 PM it had come up only 65 fms to 1935 fms, but it had started up! But came 5 PM and we turned!! It's too late now to go back, but had I thought he would turn in less than the 1500 fms we were headed for, we could have saved the whole six and a half hours and not come out ~~here~~ here at all!! We'll have a good profile, OK, but if we'd waited for 1500 fms to make the turn as I had wanted, it would have been a much better one.

omit

I'm in a strange position aboard. In effect, I am responsible for the scientific program, but I have no authority to see that it is done properly. I can "advise" the captain, and I "suggest" to LCDR Barbee,

but that's all. It is a skinny tightrope I walk, and there is nothing I can do when Barbee decides to turn at 5 PM and I want for scientific reasons to turn at 1500 fathoms — whenever it is that we get there. Actually it is a dually shared blame on this. He knew we wanted the 1500 fms when ~~we~~ turned and thought it would be at 5 PM and ~~would~~ used that as a time to shoot for. I goofed in not catching him before 5 PM and "suggesting" that we go on ~~to~~ until we got into the depth of water we wanted. I'll just have to keep on my toes; but responsibility which I have implicitly in my position as chief scientist without any authority is a most difficult way to operate. Other than this one incident, however, we have accomplished all I wanted so far, merely by "advising" and "suggesting",

omit

Checking the PDR at 4:45 and in not

After the movie tonight — all about American commandos in Burma — the Captain wanted to see me. I went in & he was worried about the apparently poor charting just south of Great Nicobar Island. Our geophysical profile now being run at 235 RPM for about 16 knots runs ~~so~~ over the Nicobar Ridge in water between 30 and 100 fms — by the chart. But the soundings are sparse, and the 100-fm contour is not completed in a great blank area on the chart. It would be about 4 AM tomorrow when we crossed, and I could hardly object when he said that for the safety of the ship he wanted ~~to~~ slow ~~to~~ 12 knots through there. He knew that the change in speed would foul up our gravity meter records for about 15 minutes when we slowed and for an equal time when we returned ~~to~~ 16 knots on the other side. He wanted to know — where — from the scientific point of view — ~~at~~ would the changes in speed be the least problem for the gravity meter. That is, where could the gravity profile take these changes with the least amount of disruption. I rounded up George Peter, and we poured over the chart and the profile of the topography, gravity and magnetics he had drawn up of our run west yesterday afternoon. It seemed best ~~to~~ change speed where the gravity was changing the least, and this appeared ~~to~~ be about one hour (at 16 kts) off the crest of the ridge. I went back to the cabin and we laid off on the chart a section from 16 miles west ~~to~~ 16 miles east of the 100-fathom

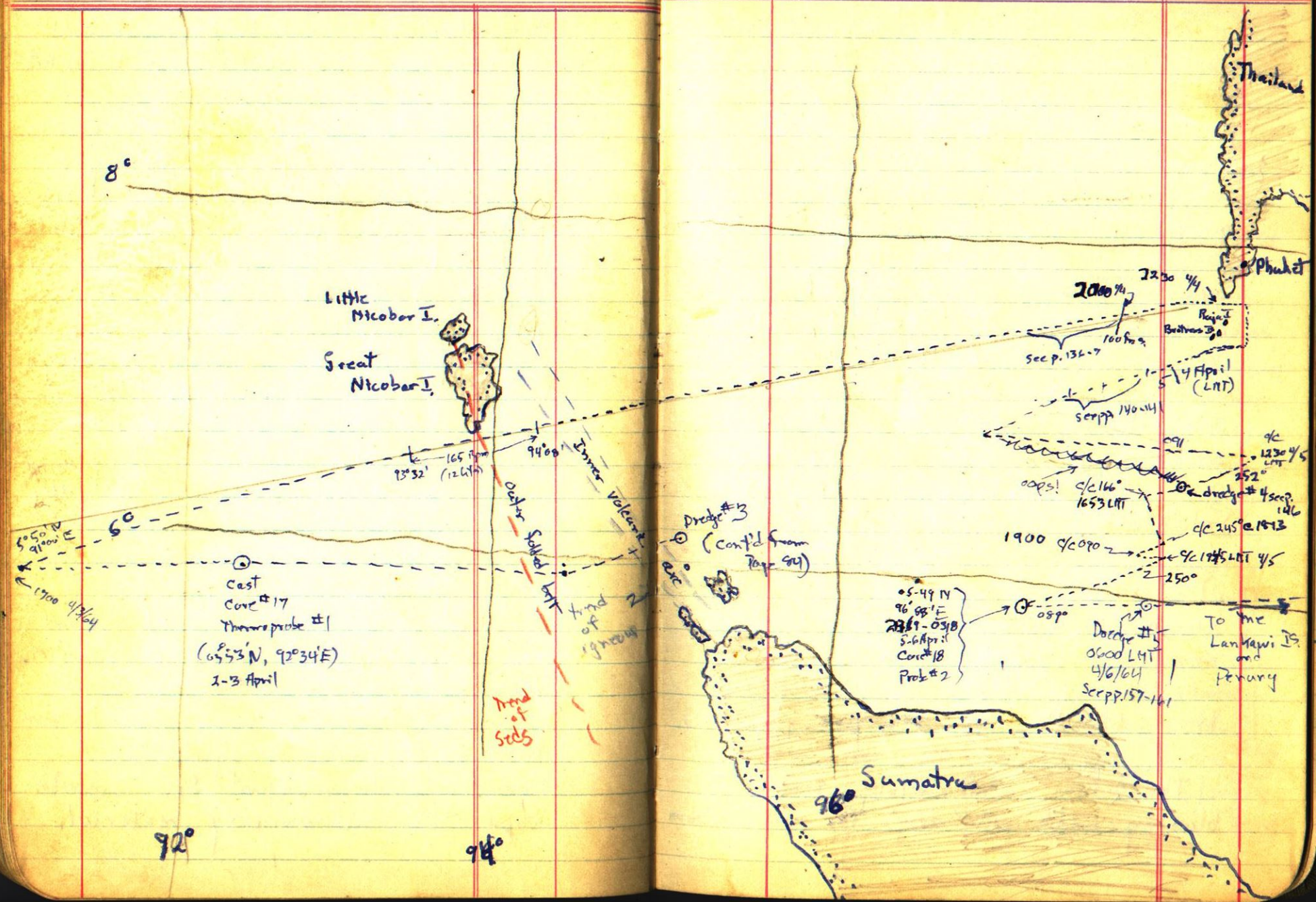
on either side of the ridge. George feels he can move the trace up as needed to make the profile complete. Here, for example, the Captain — Chief Scientist relationship worked well. It probably would have earlier today to if Barbee and I had been awake.

~~As~~ Someone said today at the height of the heat "I'd like something tall and cool with lots of gin in it — and wearing a slit skirt." I'm afraid these Burmese maidens are getting through to some of us! Those high (to high thigh) slit skirts are really darned good looking — and I've only been away a month.

4 April, 1964 — On our long geophysical run over the Nicobar Ridge to Phuket.

There were two minor course changes — about 4-5° — during the night plus the slowdown in the shallow water just south of Great Nicobar, but we are now (12:45 PM) batting along at 235 RPM with the gravity, magnetics, and hydrography all recording nicely. It looks as though this will be a good profile.

Geo Peter has been keeping track of our profile and is making a graph of the values along this run. The volcanic trend of the Barisan range of Sumatra was picked up in the area of our dredge #3 off the tip of Sumatra on April 1st and showed as two distinct gravity anomalies. To the west (about 94° 30' E), however, even though the bottom topography was rugged, the gravity values gave the smooth slope of sedimentary material.


8°
6°
Little Nicobar I.
Great Nicobar I.
165 fm (12 Lifts)
93°32'
94°08'
Outer folded belt
Inner volcanic arc
trend of igneous
trend of seds
Dredge #3 (Cont'd from Page 84)
5°50'N 91°00'E
1700 4/3/64
Cast Core #17 Thermoprobe #1 (05°53'N, 92°34'E) 2-3 April
92°
94°
96°
Sumatra
Thailand
Phuket
2230 4/4
2000 4/4
Raja I
Brothers I
100 fms
See p. 136-7
4 April (LMT)
See pp. 140-141
091
c/c 1230 4/5 LMT
252°
oops! c/c 166° 1653 LMT
dredge #4 see p. 146
c/c 245° @ 1813
1900 c/c 090
c/c 1945 LMT 4/5
250°
05-49 N 96°58'E 2319-0318 5-6 April Core #18 Prob #2
089°
Dredge #5 0600 LMT 4/6/64 See pp. 157-161
To the Lankawi Is. and Penang

In the long run back east from our turning point at 91°E, we found that the smooth sedimentary part was lined up with the southern tip of Great Nicobar, whereas the distinctive two-bump gravity anomaly was farther east. This indicates that the Sumatra volcanic arc ~~trend~~ does not pass through the Nicobars but rather to the east of them. We plan dredging on seamounts east of the Nicobars and Andamans plus some zigs & zags after Penang and can perhaps show this relationship more clearly. ~~These~~

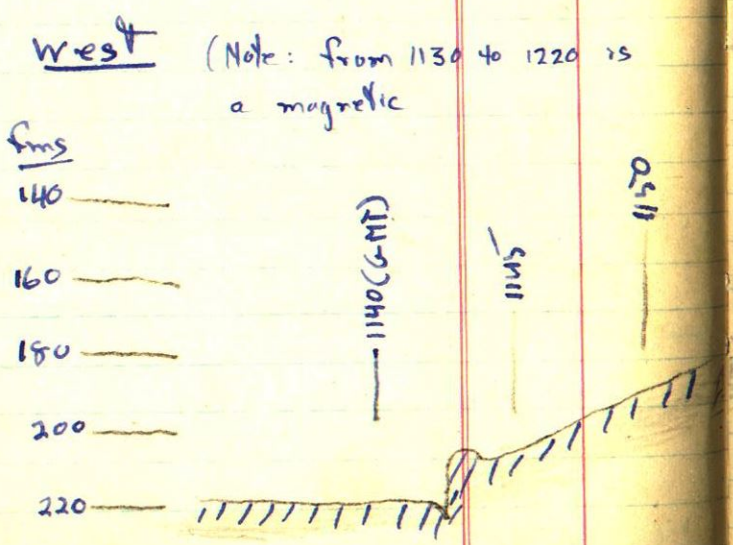
omit

The relationship of the Sumatra-north igneous material, and the more westerly Nicobar-south sedimentary trend is shown on the chartlet on ~~the page~~ page 132-3.

The geophysical run went along through blazing heat all day. By mid-afternoon

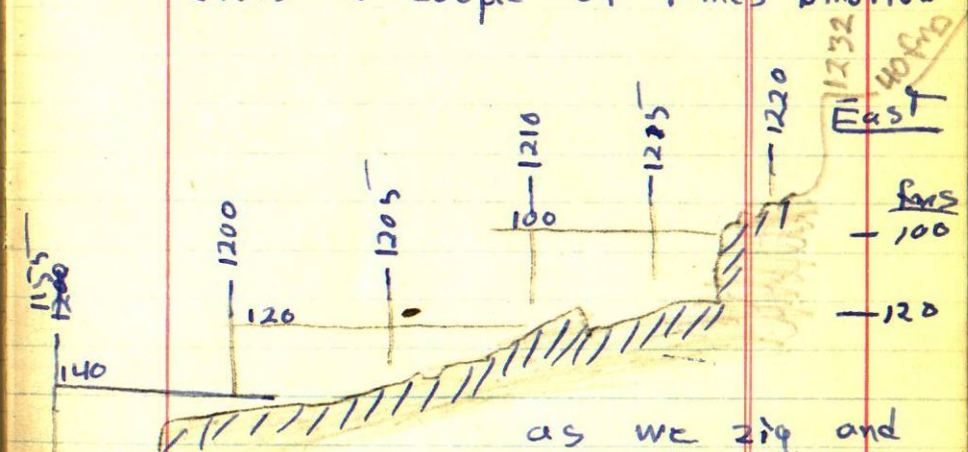
we were well into the southern Andaman Sea headed toward Phuket on the west coast of Thailand. (7°40'N, 98°15'E). The bottom was about 220 fms for quite a spell. Then at 7:12 PM (1142 GMT), Ray Moses called me out to see what he called "magnificent upwelling". It was indeed that! There were active boils up to 50 or 100 feet across, and on the almost glassy surface, you could actually see the water spreading outward from these boils. I knew that we had been at 220 fms for quite a while and found it inconceivable that any topographic feature could be causing this. I went up the two decks to the chart house, and sure enough, there was a vertical cliff of 18 fms, and the bottom over the next 40 minutes (11 miles) rose to 100 fms, & we were back up on the shelf along the northeasterly extension of the

area of ridges and upwelling we found April 1st (See p. 97). At the base of the scarp - and it was just that - was a clear depression some 2 fms deep. At 7:28 PM we ran over another scarp from 179 to 145 fms with a 5-fm. depression below that one, but by then it was too dark to see any turbulence if it was there to see. The very ↓



pronounced depressions may be related to faulting - certainly these scarps look to be step or block faulting - or

they may be caused by scouring by the currents that impinge against this cliff with sufficient strength to keep the bottom of the scarp free of sediments. This is on the trend which we will cross a couple of times tomorrow



as we zig and zag southwest back to the general area of Grabs # 22, 23, & 24 on April 1st (see p. 96). There we expect to do some dredging on these ridges.

Now (1115 PM) we have passed south of Phuket and north of Raja I. and Brothers Islands off

the Thailand coast and will soon turn south then back on our first zig. I've left word on the bridge to call me when we get back to the 100-fm curve on the way out.

Dick Stephen, Hassard and Vic Alvarez held the 2nd of the Pioneer Lecture Series this afternoon. It was on their productivity work, and we all now know a good deal more of their program.

5 April, 1964 - Zigging & Zagging along shelf break in S. Andaman Sea.

The OM on watch woke me about 0115 AM this morning (4 April at 1745 GMT). We had not yet reached the 100-fm curve, but did - quite abruptly - at 1:40 (1810 GMT). I have the next two hours of fathograms drawn on pp. 140-141, so it is all shown in detail.

There was a 15-fm steep scarp at the shelf break with two 10-fm bumps below, and at the surface were three of the turbulent streaks we have come to recognize as indicating such bottom features. As the early morning hours moved along, there were 12 more such streaks that the bridge people could see in the moonlight, and they were with one exception over pronounced topographic bumps down to 150 fms. The one exception in the series was at 1825 to 1827 (GMT)

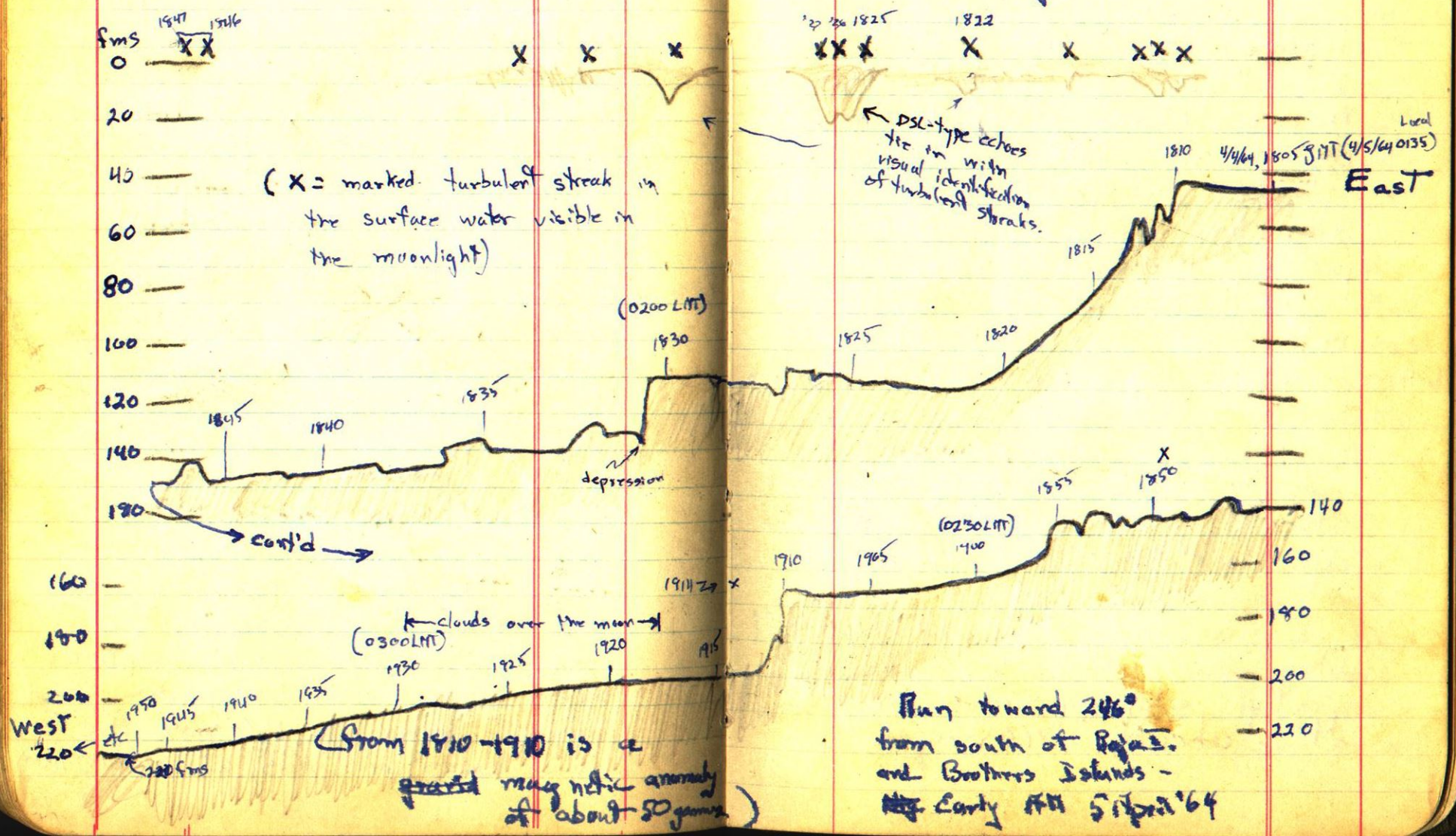
ASR – 150 fms @ 0345, 50 fms –
GK – 140 fms @ 350, 10 fms

Prediction on the future at 03:22 & 170 fms

17 mls – 0340 N135
depth / 158 fms – turb.
15 fms scap

read →

Although there were surface fathometer indications of nearly all the other streaks, this one (with no bump below it) was especially pronounced as a marked dip in the general area of the deep scattering layer. In the first place, this suggests a possible convergence zone to carry downward all the water



(From 1810–1910 is a ~~gravid~~ magnetic anomaly of about 50 gammas)

Run toward 246° from south of Raja I. and Brothers Islands – ~~Mg~~ Early AM 5 April '64

brought up on either side of it. In the second place, it is interesting that there was a definit correlation between the turbulent streaks showing on the surface and marked ~~depression~~ indications of them in the DSL. Most probably this is the turbulence itself being picked up by the PDR. In the area of the supposed convergence, plankton from the DSL being pulled downward may have accentuated the echo. At any rate we know that (1) most bottom bumps down to about 150 fms on this run ~~gave~~ caused a surface turbulence above them and (2) most of these surface streaks of turbulence showed up on the fathogram.

I knocked off about 4:00 AM when the bottom was very gently sloping and smooth at about 260 fms. I was

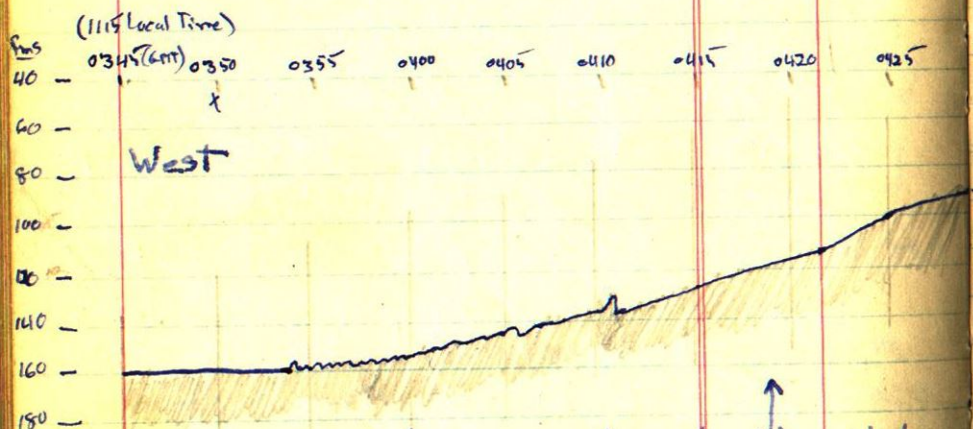
up at 7:30 and had a talk with George Peter after breakfast. He has plotted already the gravity, magnetic, and bottom profiles for the run in early last evening and the run out early this morning. The gravity is generally smooth in both sections, but there is in each case a magnetic anomaly localized between the shelf break and where it smooths out at about 220 fms. On the 073° run in to Phuket is was about 100 gammas, on the 246° run out today it was less — about 50 gammas — but in the same part of the profile.

We turned southeast (at 2235 GMT at 06°50'N, 97°00'E) while I was sacked out and now (10:30 AM) are about to head back up this slope a bit farther south. We hope to dredge both the upper break

in slope and on the steep scarps in the magnetic anomaly.

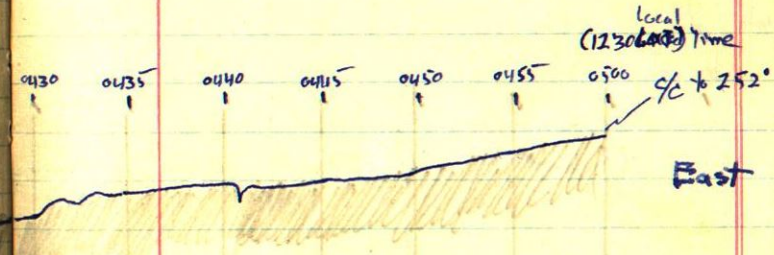
As we approached the bottom of the scarp on this run, we got several streaks of turbulent water not associated with any bumps.

In our naiveté we assumed that



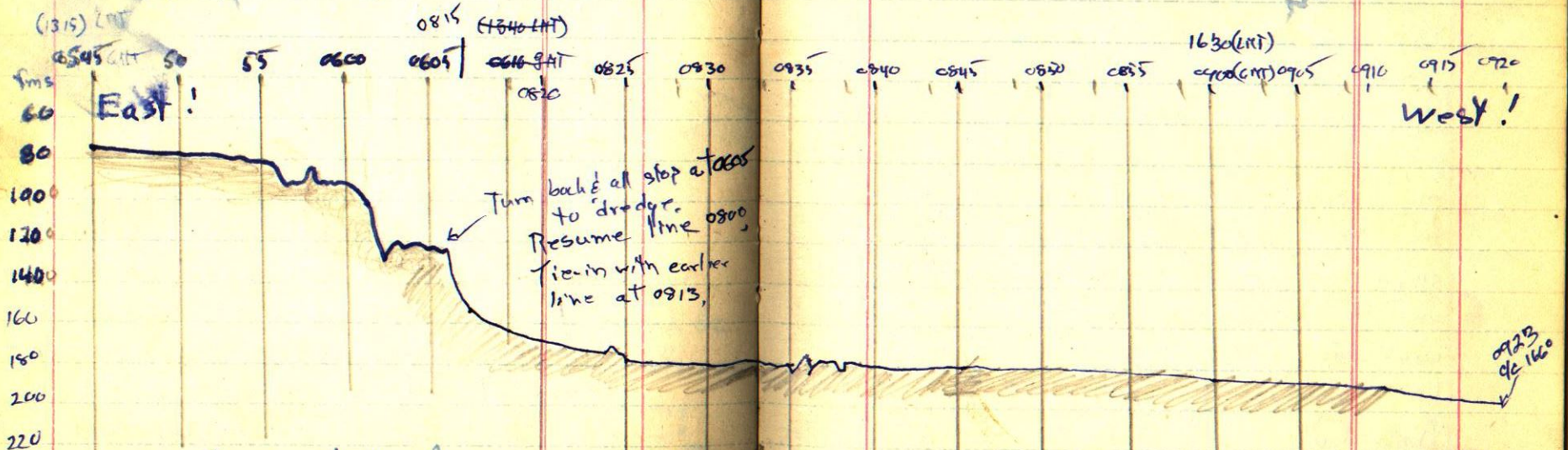
the run up the slope this trip would be comparable to the one yesterday afternoon approaching Phuket and the one running out early this morning, or at least a bit like the ~~one~~ crossing to the south where we first picked up the ridges and associated turbulence on April 1st.

Obviously, we had neglected to take into account the all-important law of the perversity of inanimate objects. We were so sure not only that it would jump up sharply but even felt sufficiently confident of when it would happen, that Rodolfo, Teller, and I had a wager on it. I estimated 158 fms at 0340,



Rodolfo put his bet on a start-up depth of 150 fms at 0345, and George said 140 fms is where it would start at 0350. There never was any real scarp at all on this run. The only feature even slightly dredgeable was a 10-fm sharp bump at a depth of 130 fms that we ran over at 0411. Other than a wee vee valley at 0441, it was a pretty steady rise.

At 1230 PM (0500 GMT) we turned to course 252°. This will give us one more run out. Hopefully we will get a good dredge spot on this crossing. If not, we'll make another zig and zag to get us out to the position where we want to core and heat probe, and - if there's time - to dredge one of the bumps we found April 18 on the break in slope at about 80 fms.



At 1935, we had found a good 35-foot cliff face, stopped and returned to dredge. The heavy rock dredge was slung over on the gallows frame forward and started down at 1354 in 126 fms. By 1402, with 800 ft of cable out, she was on bottom with a heading of 279°. We jockeyed and backed, let out more line, backed some more, and generally worked upslope. By 1428, we were at 100 fms with 1329 feet of cable out. There were a few minor tugs, but nothing even suggestive of a big bite.

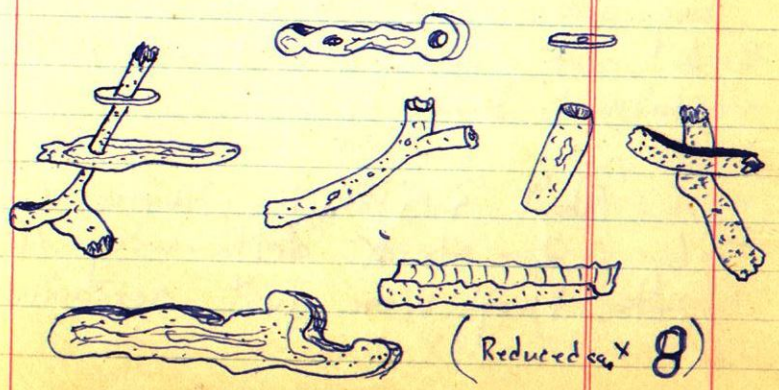
At 1458 we started in with 1479 feet out and the depth reading 95 fms when it cleared bottom, Barbee

and I popped into the Captain's cabin some 20 minutes late for our usual 3 PM session with him and the exec. By the time we got out, the dredge was just being manhandled through the gallows frame and onto the ~~tea~~ peak of the bow between the two ~~by~~ big hydraulic cylinders that ~~move~~ swing the heavy gallows frame outboard.

I got one glimpse through the solid phalanx of fat bottoms and Singapore cameras and could see that we had a full load - couldn't see what is was, but there was lots of it. With my major concern satisfied, I waited for the pentaxes, nikons, hasselblads, single lens reflexes, minoxes, ~~and~~ ikons, and occassional Kodaks to finish their work. Byron Hale was also waiting, as he wanted to shoot a larger sample than we had collected for him earlier.

Lavery and I, and two burly seamen, lifted the bottom of the chain bag and dumped forward an amazing

collection. It looked as though a small boy had been out collecting concretions below the Cretaceous sandstone cliffs at La Jolla or from the New Jersey gun barrel sands. There was some stiff gray clay, but Dredge Haul #4 was made up almost exclusively of ~~so~~ irregularly shaped - even wierdly shaped - sandstone concretions plus the hollow (many of them) tubular (but many branching) pieces that were comparable to cemented root casts. The root casts - if that is what they are - had a metalic ring to them very suggestive of the gun barrel ~~action~~ concretions made of iron. The other sandstone concretions were generally flat well rounded edges with numerous round holes - typical sandstone concretions.



(Reduced ca. x 8)

By rough guess, there were probably 150 - 200 different pieces. There was nothing to suggest that any of it was anything other than float - material weathered out of the scarp (?) and just sitting on top of the bluish gray clay. I'd never quite seen a haul like this one before. There is enough so everyone who wants to work with it can. - Rodolfo, Heller, Alexander, C&LS, etc.

We continued on along 252° for a spell to see how the rest of the feature looked, (it ~~leveled~~ smoothed out at about 180 fms and sloped gently downward) and at 4:53 PM we came left to 166° to make one more zig-zag crossing before we head out to our core and thermoprobe station tonight.

About 5:15 PM we were buzzed by 2 sleek delta-wing USN jets. They were just screaming along at about 200 feet above the water and rose in a steep climbing turn off our bow to climb up and aft out of sight. They were probably from a U.S. carrier attached to the 7th fleet - no wonder the Ceylonese don't want us in Trincomalee.

Then about 10:30 PM their airfield went by - the lights looked like Manhatten! It was one or more big carriers plus some escorts, and it made quite a show as it passed us.

At 6:13 PM we had only come up to 106 fms where we expected to be up on the shelf again. The bridge had the turn position and turned to 245° even though we had not gotten up onto the shelf. At 7:00 PM we turned back to 090° and ran up onto the shelf, and in 62 fms at 7:45 PM we turned to 250° to ~~pick~~ head out for our core and dredge station. I went to the movies (Poe's Pit & the Pendulum)

in 196 fms

and was in bed about 11:15 PM after making up a special souvenier envelope with the signature of everyone of the civilians in the wardroom.

I left a call to be awakened when the heat probe was coming in so I could be up for that, for the core to follow, and for the run in to the dredging station. The Captain had asked me to be up for this last, so I could pick the actual dredge site.

6 April, 1964 - S. Andaman Sea -

I was called at 2:45 AM, and it is now 4:30 AM with the heatprobe and big corer both back aboard, and we are under way on 089° headed for the dredge site.

Old Robbie Burns had another rough go with the thermoprobe. It was an improvement over the last time, but it was still not functioning properly. We had stopped on station at one minute to midnight (1629 GMT) in 625 fms at 05°49'N, 96°58'E a bit east of where we had tried core #16 on April Fools' Day (see pp 99-100). That is where we tried to core before but the trip weight had not released.

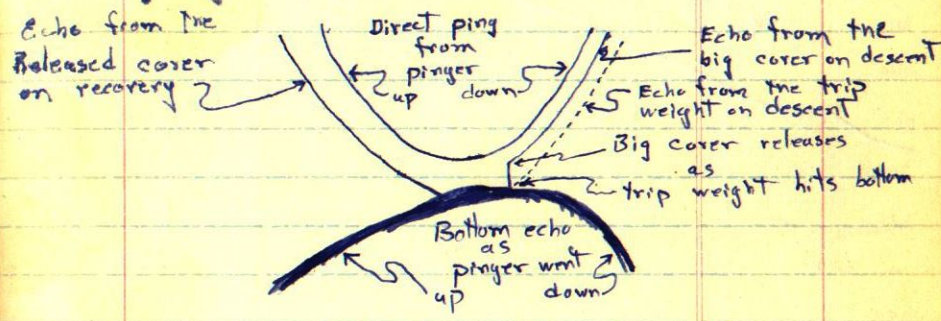
Since the last try with the thermoprobe, the rig had been rebuilt by Ralph Ulrick and his boys. The probe units were attached to a core barrel made of 2" pipe on top of which a single cage would hold

the recorder unit. This meant that it could be used on the oceanographic winch instead of the big one, so the lowering time would be considerably less.

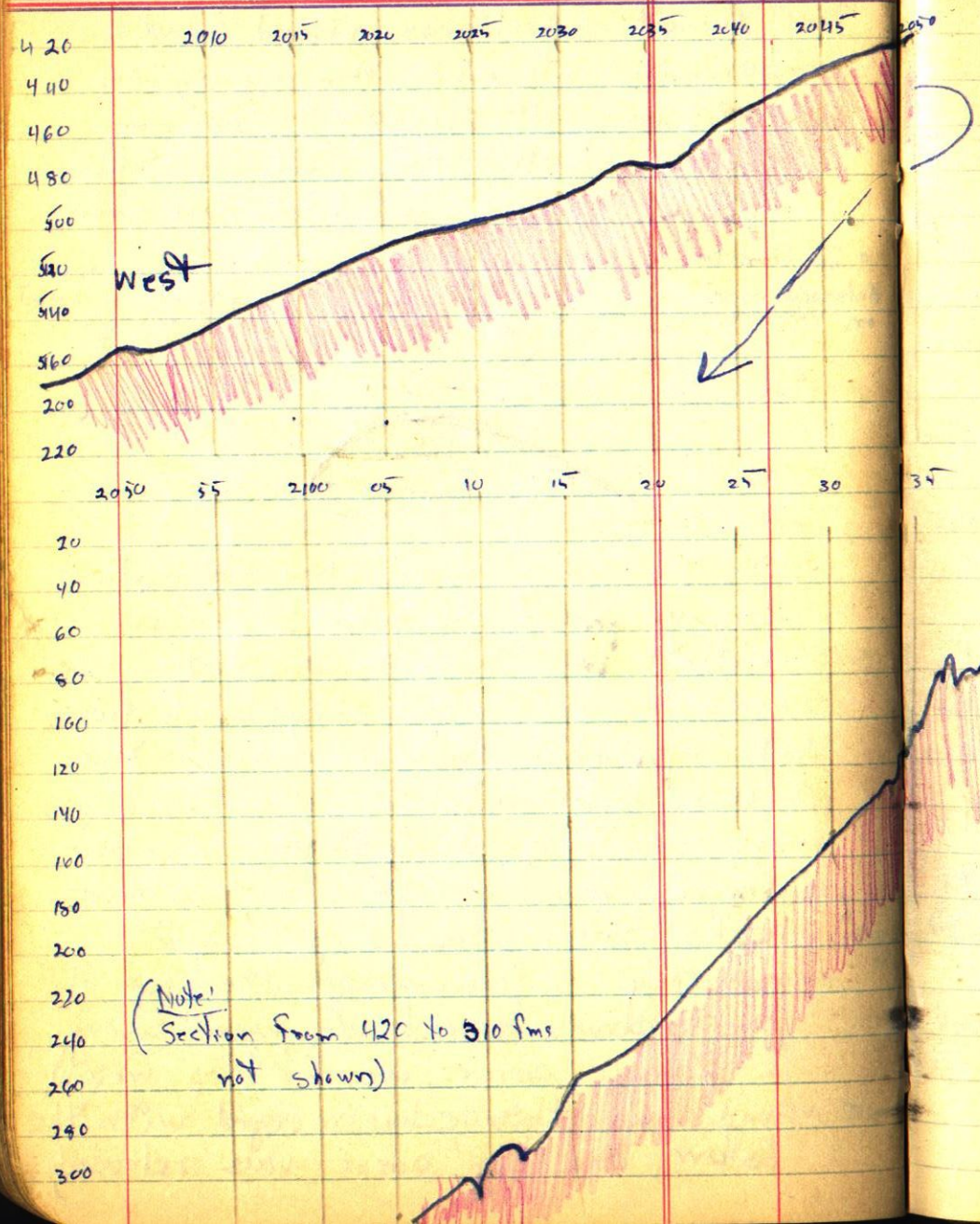
The probe was on bottom at 0036 in 625 fms and was back aboard by 1 AM – a one-hour lowering. When he developed his film, however, even though the probe units were working OK, his calibration marks did not record after the original calibration checks aboard. He was still working on it when I came up a bit before 3 AM. This was a giant step in the right direction, for he now knows that the recorder <u>will</u> work submerged. But why the calibration marks did not is still a mystery. We'll try to get in the extra test lowerings he wants before we get into Penang tomorrow morning.

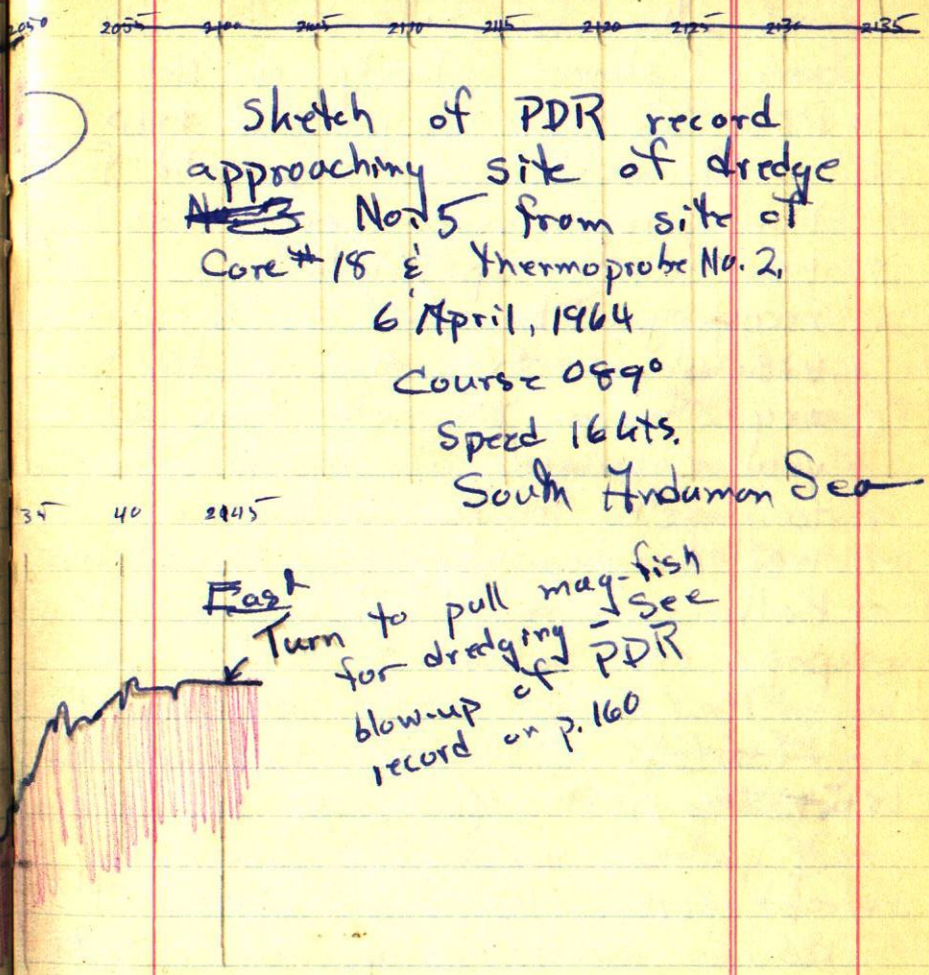
The big piston corer with the

20-foot barrel was rigged and overside at 2:07 this morning in 624 fms. At 2:28 AM it was on bottom with the most beautiful pinger record I have ever seen.



On the way down, the familiar crazy-plaid pattern had an extra line in it. We got – as usual – the direct ping back from the pinger, the echo from the corer below it, and the echo from the sea floor. In addition, however, there was a thin but clear echo from the trip weight hanging 10 feet below the tip of the core barrel. We were using a Phleger corer as a trip weight, and as this echo merged with the bottom, the big corer was released,





Sketch of PDR record approaching site of dredge ~~No.~~ No. 5 from site of Core # 18 & Thermoprobe No. 2, 6 April, 1964

Course 089°

Speed 16 kts.

South Andaman Sea

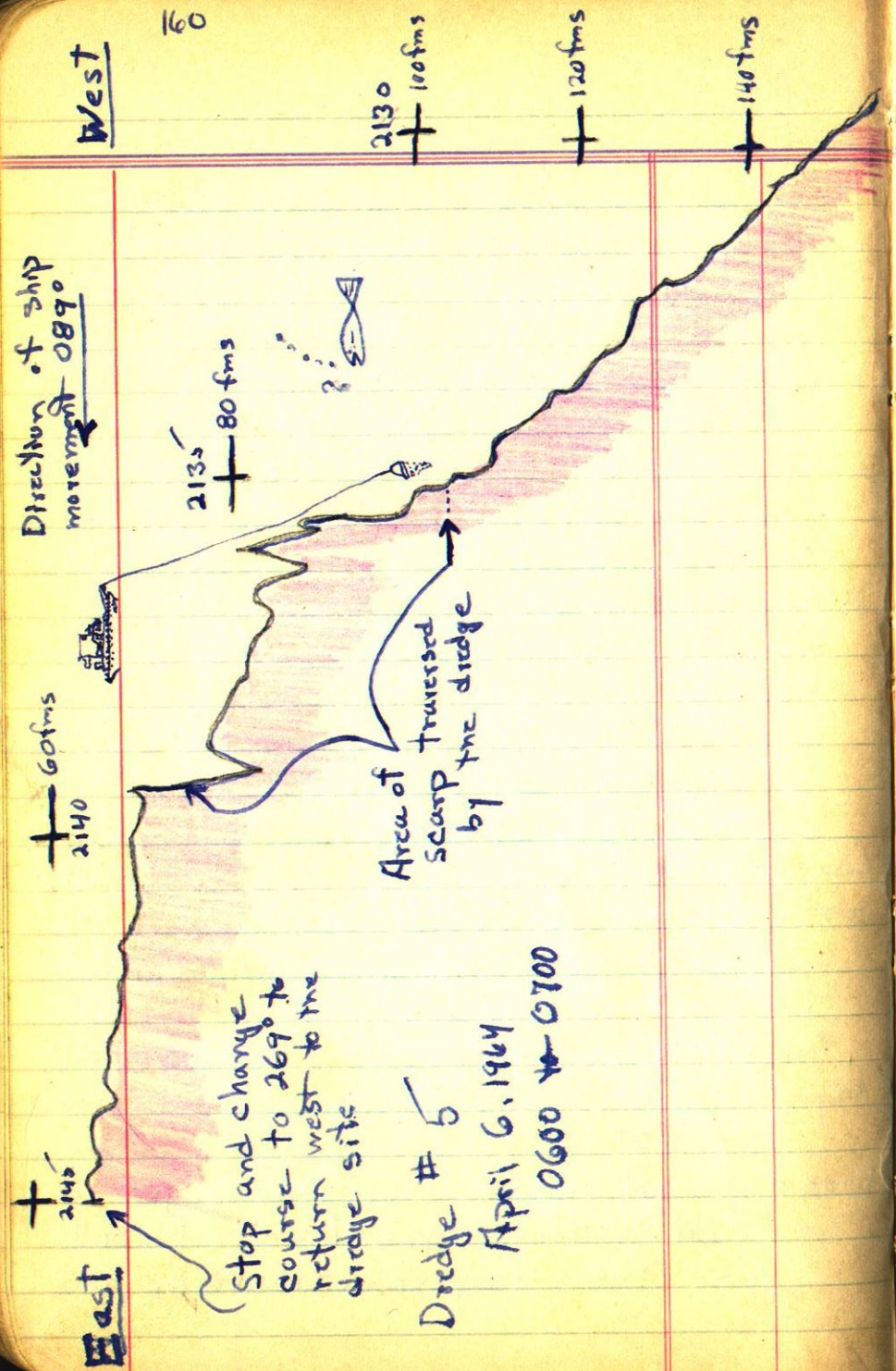
and the free-fall of the big corer showed clearly on the PDR. On recovery, the trip weight echo and the echo from the big corer merged – as the two come up together on recovery. It was an excellent visual record, and a far far cry from the old days when you guessed at the line needed to get to the bottom or waited – hopefully – for the glass ball in a ball-breaker to pop on bottom contact.

The corer was aboard at ~~1730 GMT~~ 3:54 AM, and we had 18 ft. ~~[illegible]~~ feet of core, the bottom of which was the blue-gray cohesive clay we have all come to know. Trigger core was lost when the cap came off the bottom & all oozed out!

With these two missions accomplished, we were underway at 4:18 AM on course 089° and a depth of 605 fms.

I wrote up the ~~day~~ doings so far today – a good deal considering it's not yet 5:30 – as I kept an eye on the PDR to see when we approached the slope up onto the shelf again. (See Profiles page 156-7 and page 160). With the exception of minor bumps at 555 fms, 475 fms, and at 290 fms, it was a smooth upslope to depths of 100 fms, where a steep scarp rose to 85 fms and peaked at 81 fms. There was a second scarp of about 15 fms starting at the bottom of a depression at 85 fms. The top was at 65 fms and relatively smooth. (See traced PDR profile on p. 160).

We rode along the top for about six minutes just to be sure it was the top, and at 0515 AM (2145 5 April GMT) we turned around to ~~089~~ 269° to go back to the base of steepest part of the slope at about 100 fms. We slowed to pull in the magnetometer fish, and



at 0547 AK we were back at 110 fms and stopped all engines. Since we dredge from the bow and might want to move back up-slope, we left the ship headed on 269°.

The bare log I kept at the time reads as follows:

0547 - all stopped, 269°, 110 fms
0551 - astern 1/3
0559 - all stopped, drifting astern, 117 fms
0600 - dredge over and start down 249°, 114 fms
0603 - 110 fms 225°
0605 - 106 fms 209° On bottom, 780 feet out
0606 - Slow lowering to 50 ft/min, 106 fms, 215°
0608 - 111 fms, 237°
0611 - 104 fms, 236°
0612 - 102 fms, 236°
0613 - 90 fms, 239°
0614 - 87 fms, 234°, stop winch w/ 1148 ft. out
0617 - 85 fms, 223°, good jerks
0619 - 81 fms, 213°
0623 - 86 fms, 199° (fwd 1/3 port, back 1/3 stbd briefly)
0628 - 84 fms, 245°
0630 - 86 fms, 267° (all back 1/3 for ca. 2 mts.)
0644 - 75 fms, Start hauling in
0700 - Dredge on deck and loaded!

There was a beautiful sunrise while we dredged. Dugan was on the winch, Barber on the phones, and Heller in a deck chair that somehow had ended up on the forward port of the boat deck near the console for the big Western Gear deep-sea winch we were using. It was a good looking daybreak, the breeze was already warm, but the moving air felt good, and the jumping of the head sheave and ~~its~~ the occasional strident clang as it was pulled into the narrow top of the gallows frame told us we were on bottom and dredging. There were no great hangups while it was down, but there were enough bumps to tell us we would be getting whatever was there to be gotten.

As the dredge broke the surface, I could see that it was indeed

full. We hauled & tugged at the clayey mass, and Heller, Melvin, and I were real messes by the time we had sorted out the pile of rocks from the great clods of blue-gray clay that made up about half the haul. The rest was all strangely shaped, irregular, holed concretionary(?) ~~limestone~~ sandstone - I think.! It was pretty strange looking stuff. In a fresh break surface - where I broke it, that is, there were no clean breaks seen, as though it were all float material - the rock appeared to be a fine-grained sandstone. The shapes were indeed weird, and the individual chunks had the outer appearance and general texture of clinkers. I saw none of the root-casts (?) so common in dredge No. 4 of yesterday, and many of the chunks had a heavy growth

of serpulid (?) worm tubes and bryozoa, so they had been exposed at the surface of the bottom, not buried in the clay which now covered everything - rocks, deck, me, everything.

After breakfast, I had a session with the Captain and Bill Barbee on the track from here into Penang. We plan now to make a circuit of the Lankawi Islands as suggested by Alexander. They are right on the Thailand - Malaysia border and are part granite and part sedimentary. We hope our gravity meter and magnetometer will help ~~outline it~~ delineate some of the underwater extensions of these rock types or of the faults the Malaysian geologists have postulated around these

islands. By scooting there at 235 RPM, we should be able to make the circuit 3/4 of the way around by 2000 and the last of our light. With depths as little as 5-6 fms in the narrows between the islands, doing it in daylight would appear wise - good though our radar is, we'll get Bob Burns' lowerings of his thermoprobe sometime late tonight and hope to be picking up our pilot at Penang about 0800 in the morning.

It's now 1120 AM, and since I have been up since 2:45 this morning with only 3 1/2 sleep prior to that, I am headed for the sack.

We are always glad to cooperate with Sarma and

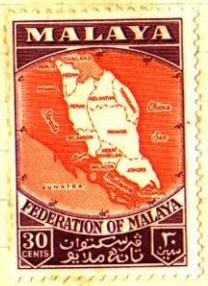
Borglund of the UN TV unit. We've put over boats for them, done endless retakes of interviews, have tried to help them get some ship-turning-at-sunset footage they wanted, and have in general been cooperative. But today when Sarma asked if we would turn the ship so that the wind would carry the balloon into the rising sun, we had to howl. I'm glad he has that much faith in our ability, anyway.

At present (5 PM) we are running eastish along the border between Thailand to the north - in the form of rugged limestone Terutau Island and the tiny islands near it - and Malaysia to the south - in the form of lovely Langkawi Island. Jones of the Malaysian Geological Survey - working with the Thais has been working on the

geology of these islands. The western ends of both Terutau and Langkawi are quartzites, granites throughout, with steeply dipping Ordovician limestones and just enough Permian to foul up the geological picture. He has postulated a low thrust plane dipping eastward at a low angle.

There is a following breeze that must be just our speed, for there is not a breath stirring. The American flag - at ½ mast today for Gen. MacArthur - hangs limply even though there are what the weatherbirds would classify as incipient whitecaps. Langkawi's main settlement is on the other - south - side where a good harbor is formed in behind the many close-in mountainous islands.

7-8 April, 1964 - Penang -



As were Manila and Singapore, Penang was for me another stamp stop. I seem to have become a real nut at this stamp business, and from Penang I sent off about 10 letters each absolutely loaded with various of the local stamps. Father and Lee each got several. The local post office would not even register the fine souvenier envelope I developed which was signed by all the civilians aboard. I then tried to get them to hand cancel it and return it to me, but that too failed. Finally I folded the envelope in half so the address

showed more clearly, put a 1¢ stamp across the fold to hold it, and with a silent offering to the Philatellic Gods, dropped it into the air-mail slot. It may or may not every arrived at 2187 Bandraft place.

About 8 AM on the 7th, we picked up our pilot ~~at~~ and shortly after 9:00 dropped the hook in the roadstead between the ~~Is~~ island of Penang and the ~~mainland of~~ mainland of the Malay Peninsula. It had been only a moderately successful night with the thermoprobe. Burns made several lowerings with each recorder, and although he was getting a trace, his calibration pips were not coming through. These were just in-water checks, not complete lowerings, as he is trying to isolate the problem.

Apparently there was some bum wiring in it. The selector switch was grounded so that if any of the thermisters went out, the whole rig went out. LtCdr Potter discovered this, and he & Burns believe it can be fixed prior to the first lowering a day or so after we leave Penang.

Our agent in Penang - Sime Darby, Ltd - was aboard shortly after we dropped the hook, and a few minutes later, ~~George~~ George Porter of USIS - the only U.S. official here - came on with about a dozen of the local press. Penang has papers in four languages: English, Chinese, Tamil, and Malayan. Capt Brown, LCDR Barbee, and I gave them a rundown on what we were up to. Dr. Alexander and Ong Kah Sin gave them the ~~storay~~ story from Malaysia's viewpoint, and

they left on a tour with Ens. Jones. The story in the Straits Times was about 50% accurate, about par for newspapers anywhere. The Chinese press added a nice detail on their own, saying that the public was invited to come out to tour the ship!! This is a two-day stop only & is to be the only one planned where the ship gets a break, but in true spirit, the watch aboard broke out the punch bowl and brochures and gave the full treatment to the 50 or so that came out.

Alexander had arranged at Singapore to have a Landrover and a car meet the ship, and Jones and Bill Procter of the Geol. Survey were soon aboard. Ong's wife was due to present him with their first child sometime between S'pore and Penang, so I sent him off in

the 1st available boat to the beach. Alex agreed to pick me up at the P.O., and I managed to get my envelopes stamped up to a fair-thee-well before he met me, and we stopped by the Cold Storage for a bite of lunch before the long run of about 100 miles to Ipoh where the Geological Survey has its headquarters. Capt. Brown, Alex, Bill Proctor, and I rode in the car, while Barbee, Rodolfo, Burns, Teller, Harbison, and Peter rode in the Geological Survey's Landrover with their seal of crossed Iris and geological hammer on the door.

The ride up was as interesting as it was hair-raising, although the latter term is perhaps inappropriate for one with as few to raise as I have, where the road is straight Proctor drove about 70. As we started up through the foothills along the winding road to the pass at Bukit Berapit in the granite mountains, he slowed to

60. The road was filled with bicycles, ox-carts driven by beturbaned Indians, stray cattle, an occasional caribou, moter-bikes, and big lumbering lorries. The mean speed of these was perhaps 20 mph, so our run was a continuous slalom run and just as exciting. I saw Captain Brown's knuckles go white more than once. I finally decided that watching it come wouldn't help, as I could do nothing anyway, so I concentrated on the scenery.

The country was most interesting. We ran south and then southeast along the flat coastal plain. Here were small kampongs (settlements) of several thatch-roofed houses on stilts, each with its coconut palms, papayas, mangos, mangoshines, bananas, and rice, each quite neat with flowers growing along the narrow walks. Women squatted by the

ditch filled with dirty water washing clothes, rice on mats was spread out to dry, and here and there blue-bloused and conical-hatted women winnowed rice in the fields. As we raced along, we could see that that ditch was used ~~for~~ not only as a clothes tub, but also as a swimming pool, fish pond, bathinette, duck pond, garbage can, sewer, and toilet. Wherever a good stand of nipa palm grew, several people could always be seen seated weaving the ~~sup~~ fronds into the thatch for covering the roofs of their houses. On we raced, past small groves of feathery tapioca plants, past a few poor rubber groves — the good rubber estates are at higher elevations — past coconut groves — one with a solid mass of growing pineapple below the umbrella of palm fronds, across one pontoon bridge, one Bailey bridge, and a big new

post-war bridge, and up into the granite range. Here were the more mature rubber estates with their neat columns of identical trees, many with the diagonal slash draining the white sap into the half coconut used as a rubber cup. Here too grew the teak. There is not enough of it to make a real industry, but some is cut, and there were occasional logging trucks on the road. The teak has leaves like our sycamore tree, and the few I saw standing each had great clumps of the lighter green leaves of orchids growing as epiphytes high in their branches.

We stopped briefly at one of the tin dredges working in the thick alluvium covering a valley floor. Malay produces about 30 percent of the world's tin. Here it occurred as alluvial cassiterite derived from the weathering and erosion of the

limestones where it occurred along the contacts with the post-limestone intrusions of granite. This one dredge was working to a depth of 120 feet, and a steady stream of muddy water and gravel poured out the stern. Inside, shaking tables allowed the heavier tin to settle out.

On we raced through the busy towns of Kuala Kangsar and Taiping and finally down into the Kinta Valley and Ipoh. Here we were out of the granites and into the limestone country. Great white cave-studded cliffs rose steeply several hundred feet above the rice fields. In one cave was an elaborate chinese temple. In others, Alex told us, bandits holed up during what he referred to as the "emergency of a few years ago". They would swoop down on anyone on the road to plunder and kill, only to melt away into the lush rain forest to

their caves. It was, he said, a long campaign to rout them out. Just west of Ipoh the limestone is being quarried and crushed by the recently-built Pan-Malaysia Cement Co., and other plants are planned in the area.

Ipoh is a city of tree-lined streets, open square before the veddy veddy colonial looking municipal buildings, arcaded sidewalks before the ~~predominetly~~ predominently chinese shops, and a strange ~~mixing~~ melange of east and west. This mixture was to me intriguing. The trishas or pedicabs propelled by thin muscular chinese competed with european cars for the right of way. A sedate punjabee ~~punjabe~~ with a full beard and proud turban scooted along on a stuttering motorbike with his wife sitting sidesaddle behind him with her sari streaming out behind like the parachute brake on a landing

jet fighter. A chinese food store selling everything from lichi nuts, dried squid, and shark fins to Tiger Balm, and luridly packaged aphrodesiacs (sp?) would be right next to an Indian store selling radios, vacuum cleaners, and air conditioners.

The others stayed at the best hotel in town - with the nice oriental name of "Hollywood Hotel". Capt. Brown and I stayed with Alex. He has a nice modern three-bedroom house in the cul-de-sac behind the big new building that houses the Geological Survey.

His wife, a former chinese model, and from her photographs quite beautiful, is in Scotland with a 16-year old daughter (by a previous marriage to a Canadian engineer) and their own 11-year old son. Presently a young fat Malaysian girl acts as amah to keep house for him. She brought

us tea, cookies, and bananas and later what Alex calls "shandy". It is half beer and half ginger beer and just as awful as it sounds. Capt. Brown and I showered and got cleaned up, and the others arrived to meet us for drinks, a tour of the Survey's new building, and we were off to town about 8:30 for dinner.

The spot was the one "western style" night club in Ipoh. A band, two girl singer, floor show & food. The singers were actually good of voice. One was - we were told - part ~~that~~ Siamese and part Eurasian. The effect was startling. She was taller than most Siamese, standing about 5-9 or 10. Of classic face, ~~she~~ of straight back, high breasts and narrow hips, her ~~her~~ hair fell straight and full to the small of her back. She sang in a small voice full of mellowness and

warmth with no stage affectation. She knew that the thigh high split in the side of her tight Siamese dress was revealing, and she used it to advantage. The other girl, looked as Nina Medina might have been of any race. The consensus was Eurasian and Malay. Dinner was tea, fried chicken (the head included), shark-fin soup, shrimp, sweet & sour meat of unknown origin, bamboo shoots and vegetables and danish beer. We all had only chopsticks, and it fast became the messiest table there, as we all dipped into the central dish. The ordering was done by Mr. Tong, a chemist at the Survey who was brought along a number one liason man between the table and the waiter

The floorshow consisted of some excellent Chinese tumblers and a magician. His best was a trick none of us had

ever seen before. He had a big cape which was shown to conceal nothing, his sleeves held nothing. After much cape-swirling, he did a sommersault and as he stood up he pulled the cape away from his previously empty right hand to disclose a full-to-the-brim fishbowl with two goldfish swimming inside. How it got there unspilled is a good question. There was dancing too. One european had a lovely short doll-like Malay girl in the native shirt and blouse. Chinese boys in sport shirts and pegged pants danced with Chinese or Malay girls in short skirts and very tight sweaters, and danced the twist yet. On the far side a fat Chinese sat drinking beer with an absolutely beautiful young

Eurasian girl who poured his drink, and attended to his every want.

The Captain and I had twin beds under a large mosquito bar. Breakfast was tea, egg, bacon, toast and ~~#~~ honey. We picked up the collection of Malay rock samples he had had made up the day before when I explained about the Director's interest in getting samples for Mathieson, and the group split up into those that wanted to get back to Penang – Brown, Barbee, Burns, and Stewart – and the others who wanted to stay longer for a complete tour of a tin dredge.

First, though, we all stopped at the tin mine at Meng Lembu in the Kinta Valley not too far from Ipoh, to the south. Here before the war all the work had been done by coolie labor. Now a steam shovel and ~~two~~ big earth movers were busy stripping away overburden. The tin was along a narrow seam where the ~~intruded~~ granite had metamorphosed the limestone into which it had been intruded. Large hydraulic jets at the bottom of the steep pit washed out the ore which was in two stages ~~carried up~~ pumped as a water-gravel slurry up to what they call palongs or sluices. Here the water and gravel wash down over a series of steps where the heavier cassiterite is collected in depressions. It then goes to the tin shed where careful final washing concentrates the tin even more. This was a good producer, we were told, for the palongs are cleaned out about every four days. Others go a week or even a month

before a cleaning is justified.

With Alex driving on the trip back, the ride was less of an adventure than on the way up, and we were able to enjoy it more. We made a brief stop at the Sultan's palace at Kuala Kangsar to photograph his palace with its great pink onion-like domes, the nearby mosque, supposed to be the most beautiful in the State of Perak, and the mosauleum (sp?) where the Sultans of Perak have traditionally been buried.

Back through Taiping, back past the Kampongs with the houses on stilts, through the orderly rubber estates, the disorderly nipa groves, weaving in and out of the slower traffic, back along the used-for-everything ditch, the tin dredge, through the pass at Bukit Berapit, across the flat coastal plain to Butterworth and the stubby ferrys that ply the channel between the mainland and Penang Island.

It had been a good trip, but all of us also wanted to see Penang a bit. We did some shopping. Burns and I got some good Selangor Pewter made from the local tin, Barbee got some Chinese brocade for his wife, and the Captain snooped for something to replace his old Kodak Bantam, for which he can no longer find any of the 828 film it takes.

The Captain stopped to see Capt. Gee, the Director of Marine whose office is in the old fort on the waterfront, while the rest of us went on back to the ship. What really made the day complete was finding that while we were away, the man from Rayflex had flown in and was

omit

[Save for my voucher on return!

March 5 –	5:30 PM Lv. Home for Ceylon Embassy and National Airport	1/2 day (en route)
	6:15 PM Ar. Nat'l Airport – Taxi $3.75	
	6:50 PM EST Lv. Nat'l Flg# NA 226	
	(March 6 lost crossing int'l date line)	
March 7 –	3:00 PM Manila Time – Arrive Manila on NW# 31	3/4 day (en route) 1/4 day (per diem)
	(Note last possible NW flight Tokyo – Manila to get me there in time for March 9 meeting with Phil. c/c's)	
March 8, 9, 10, 11 –	Per diem in Manila – arranging for mail, open house, etc.	
March 12 –	Report aboard ship – 1400 –	3/4 day (per diem)
	March 12 – Cable to UNTV –	23.50 (pesos)
	Local business calls –	.50 "
		₱24.00 = $6.32
March 12 to May	TDY aboard Pioneer	
	Mess Bills – March	$33.75
	April –	
	May –	
	Total	
May	Leave Pioneer	

already hard at it putting our GEP gear back into shape. My, but I was glad to see him.

It is now about 10:30 PM. on the 8th, & we sail about 9:00 in the morning. Most of the others are ashore for a last dinner and beer, but I traded my remaining $30 (Malayan) for $10 (US) and will feel much better in the morning for not going back ashore tonight.

Melvin S. Rodolfo
MYN Manila
Mn. L.
739 22nd S.
Arlington
22202

Capt. Cayetano Palma
c/as
421 Barraca St
San Nicolas, Manila

Tungku Adbul Raman —
Prince of Malaysia

— Hindi —

[Ná ma stě - ji] — gtng. —

Bahut. Shá'kriya — Menk- yoo

Jai - Hind

(Jay - hind) — Victory for India!

[illegible]