DREDGE 20

USGS DREDGE LOG

SHIP/LEG FARNELLA

STATION # 33

DREDGE # 20

DEPTH INTERVAL(m) 2140 - 1920

DEPTH(m)corrected 2140 - 1920

DATE JD 269 LOCAL 26 sept.

TIME GMT 08.40 LOCAL 20.40

LATITUDE 10.48.0 TO 10.48.3

LONGITUDE 160.29.6 TO 160.29.1

TOTAL WEIGHT: DREDGE 40 CRUST 25

PERCENTAGE OF ROCK COVERED BY CRUST 100

PERCENT BROKEN FROM: OUTCROP 100 TALUS 0

THICKNESS OF MN CRUST: MAXIMUM 80 MINIMUM 5 AVERAGE 35

DOMINANT SURFACE TEXTURE Botryoidal; granular

SUBSTRATE LITHOLOGY Breccia w/ phosphorite cement

pile of basalt cobbles + pebbles were clasts that were removed from the breccia by the dredging

Couple of 1ms fragments

NODULES PRESENT 0

REMARKS: Bamboo Coral + silico sponge

C Gorgonian Coral

Dredge S ple Summary Sheet

Sample ID	Bulk CC	Layer CC	Pt & Au	REE	OC	DPTS/TS	XRD	35mm Ph	Archive	Paleo
D20-1					✓	✓				
D20-2	✓									
D20-3	TO KORDI									
D20-4	✓						✓			
D20-5										
D20-6	TO KORDI									
D20-7										
D20-8	surface ✓	1/2	to KORDI							
D20-9	1/2 to KORDI									
D20-10	1/2 to Sy Schlanger									
D20-11	1/2 to KORDI									
D20-12	1/2 to KORDI									
D20-13	1/2 to KORDI									
D20-14	ALL TO MALCOLM PRINGLE FOR TS/CHEMISTRY									

USGS DREDGE LOG

Depth Interval ~~[illegible]~~ 2145-2040

Julian Date 269

Cruise I.D. F10-89-CP

Local Date (m/d/y) _____

Station No. 33

Chief Scientist Hein/Kang

Dredge No. 20

Tech on Watch O'Toole

	On Station	Dredge on Btm	Dredge off btm	Off Station
GMT	0345	~~0443~~ 0629	0750	0825
LATITUDE	1048.1	~~1048.2~~ 1048.0	1048.3	1048.3
LONGITUDE	16030.0	~~16030.3~~ 16029.6	16029.7	16028.9
WATER DEPTH	2155	~~2115~~ ~~1850~~ 2145?	1920	1930

Site Description and Target : _____

OPERATION*	GMT	DEPTH (m)	WIRE OUT (m)	TENSION	HDG/SPD	COMMENTS
Wire out to 2400m	0426	2150?	2400	—	—	bad record on the 10KHz brought wire in to 2200 & went furth up
Dropped dredge again	0438	2130?	2200			
On bottom	0443	2115	2460			letting out scope
Taking up slack	0452	1970	~~[illegible]~~ 2750			scope is out
Starting to pull	0511	1870	2750			
Bite - ~~Hung~~	0514	1860				Hung up
Off snag Off bottom?	0546	2300?	2450			Reeling in to 2000m going to try again.
Stopped -	0600	1930m	2000m			Waiting for wire to settle before dropping dred
Moving up line	0613		2000m			~~[illegible]~~ waiting for it to
On bottom	0629	1850	2145m	—	—	Letting out scope
Scope is out	?	No one ever called	down	to tell	us.	
Slack is taken up	0658	1810	2500			starting to dredge
Bite	0659	1815	2490	4.1		Broke off
Bite	0701	1815	2485	4.2		Broke off
Bite	0702	1815	2483	3.8		Broke off
"	0707	1810	2485	4.0		"
"	0708	1810	"	3.8		"
"	0709	1810	"	3.3		

*on/off bottom, bites, etc.

OTHER COMMENTS:

USGS DREDGE LOG

Depth Interval _____ Julian Date _____

Cruise I.D. _____ Local Date (m/d/y) _____

Station No. 33 Chief Scientist _____

Dredge No. ~~[illegible]~~ 20 Tech on Watch _____

	On Station	Dredge on Btm	Dredge off btm	Off Station
GMT				
LATITUDE				
LONGITUDE				
WATER DEPTH				

Continued

Site Description and Target : _____

OPERATION*	GMT	DEPTH (m)	WIRE OUT (m)	TENSION	HDG/SPD	COMMENTS
Bite	0711	1810	2485	2.6, 2.7, 2.7		
"	713	1805	"	5.7		
"	714	1805	2485	(2.6)(2.8)(3.0)		
"	715	1800	"	2.4, 2.7, 2.3		
"	718	1800	"	5.1, 2.2, 2.5		
"	0722	1800		up to 6½		Hung/going back down 072
Unhooked/rehooked	0746	1920	2040	5½		Straight up & down lead.
off snag/Off bottom	0749	1920	2000			

*on/off bottom, bites, etc.

OTHER COMMENTS:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 32x18x12 (cm) Location: F Seamount

Sample Id: D20-1 Weight: ~7 (kg) Depth: 2145~1920 (m)

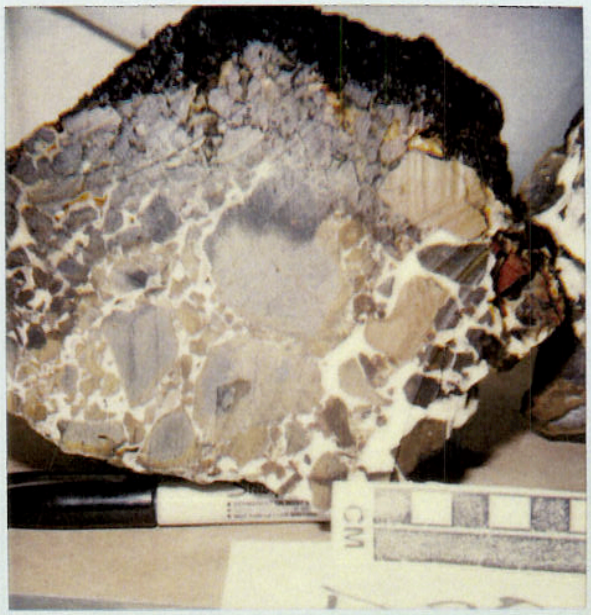
Mn Crust Description

Surface Texture: Granular, brown & black

Mn Crust Thickness (mm):
Min: 7 Max: 17 Ave: 12

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				



F10-89-CP

D20-1

Comments and XRD Mineralogy:
- Highly porous texture
- Pores filled with iron oxide

ANALYS

Subsample Number	Analysis	LayerThickness
D20-1	OC	Bulk Substrate
"	TS	" "

(44gm)

Substrate Description

Rock Type: Breccia

Description: pale brown, dark brown, gray
- altered basalt clasts (max. 8cm) cemented by calcite plus cement in places replaced by phillipsite
- basalt fragments contain altered olivine phyrics

Biology ?: foraminifera

Angular to subrounded
Grain supported
phillipsite
by ~~phosphate~~ and final void filled with carbonate mud, in places replaced by phillipsite + phosphate + in places remaining void filled w/ sparry calcite

Described By: Yoon Subsampled By:

HEIN

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 30×18×11 (cm) Location: F Seamount

Sample Id: D20-2 Weight: ~10 kg (kg) Depth: 2145~1920 (m)

Mn Crust Description

Surface Texture: Botryoidal to granular

Mn Crust Thickness (mm):
Min: 8 Max: 25 Ave: 16

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:
- Highly porous texture
- Pores filled with iron oxide and rarely with phosphorite

Substrate Description

Rock Type: Breccia

Description:
- olivine-pyroxene breccia fragments cemented by phosphorite
- Some clasts encrusted by calcite

Biology ?: Forams

ANALY

Subsample Number	Analysis	Layer Thickness
D20-2	CC	Bulk 0-2mm

Clays in pores, cleaned most may have missed some

Dense chocolate brown phosphate cement, yellow-brown to pale brown soft calcite-phosphate cement. Calcite rim cement - drusy calcite. Angular to subrounded grain supported

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 18x13x6.5 (cm) Location: F Seamount

Sample Id: D20-3 Weight: ~2.5 (kg) Depth: 2145~1920 (m)

Mn Crust Description

Surface Texture: Botryoidal (subdued)

Mn Crust Thickness (mm):
Min: 4 Max: 8 Ave: 6

No photo
see #2

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:
- Massive and dense / partially porous

ANALYSES

Subsample Number	Analysis	LayerThickness
	TO HORDE	

Substrate Description

Rock Type: Breccia

Description: altered olivine (orange color) basalt (brown) fragments (max. 12cm) cemented by phosphorite and volcanic glassy (yellow color) debris (altered yellow-brown) chocolate phosph.

Biology ?: Forams

Described By: Yoon

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 20 x 12 x 7 (cm) Location: F Seamount

Sample Id: D20-4 Weight: ~1.5 (kg) Depth: 2145~1920 (m)

Mn Crust Description

Surface Texture: Botryoidal to granular
~ Older part of crust remained

Mn Crust Thickness (mm):
Min: Max: 62 Ave: 40

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
gradational 1.	8	12	10	Massive and partially porous and laminated
gradational 2.	9	13	11	Slightly porous and crudely laminated
sharp 3.	11	15	13	Highly porous
sharp 4.	5	7	6	Massive and partially porous
5.	15	19	17	Highly porous
6.	lower part cut off		5	Massive and slightly porous

Comments and XRD Mineralogy:
- Layer 1: lamination wavy along surface botryoids
- Layer 2: pores filled with phosphorite
- Layer 4: partially laminated
- Layer 5: Some pores filled with iron oxide and phosphorite

F10-89-CP
D20-4

ANALYS

Subsample Number	Analysis	LayerThickness	
D20-4	CC	0-62	Bulk
	XRD		

Substrate Description

Rock Type: Absent

Description:

Biology ?: encrusting foram

Described By: Yoon Subsampled By:

HEIN

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 13 x 9 x 7 (cm) Location: F Seamount

Sample Id: D20-5 Weight: ~1 kg (kg) Depth: 2145-1920 (m)

Mn Crust Description

Surface Texture: Botryoidal to granular

Mn Crust Thickness (mm):
Min: _____ Max: 75 Ave: 75

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
gradational 1.	8	10	9	Slightly porous and crudely laminated
gradational 2.	8	10	9	Slightly porous
gradational 3.	5	6	6	Slightly porous and crudely laminated
sharp 4.	11	13	12	Highly porous
sharp 5.	5	7	6	Massive and slightly porous
sharp 6.	19	21	20	Highly porous
7. lower part cut off	8 mm			Massive and dense

F10-89-CP
D20-5

Comments and XRD Mineralogy:

- Layer 1: Surface pores filled with iron oxide
- Layer 3: pores filled with phosphorite
- Layer 5: pores filled with iron oxide and phosphorite
- Side of crust fragment encrusted with 2nd generation of highly porous manganese (2-4 mm thick)

ANALYS

Subsample Number	Analysis	Layer Thickness

Substrate Description

Rock Type: Absent

Description:

Biology ?: Encrusting forams

Described By: Yoss Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 13×9×5.5 (cm) Location: F Seamount

Sample Id: D20-6 Weight: 0.7 kg (kg) Depth: 2145-1920 (m)

Mn Crust Description

Surface Texture: Botryoidal (with low relief)

Mn Crust Thickness (mm):
Min: _____ Max: 54 Ave: 50

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
sharp	1. 4	6	5	Massive or crudely laminated
gradational	2. 9	10	10	Slightly porous and laminated
sharp	3. 10	11	10	Highly porous
sharp	4. 4	6	5	Massive and dense
sharp	5. 11	14	12	Highly porous and crudely laminated
	6. 6	9	8	Massive and dense

NO Photo.

Comments and XRD Mineralogy:
- Pores in layers 3 and 5 filled with iron oxide and phosphorite
- crust fragment wholely surrounded by 2nd generation (layer 1) of manganese ~1~3 mm thick in side and bottom of crust fragment

ANALYSES

Subsample Number	Analysis	LayerThickness
	TU TOXRDI	

Substrate Description

Rock Type: Absent

Description:

Biology ?: Encrusting forams

Described By: Yoon Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 10 small cobble sized fragments (cm) Location: SEAMOUNT F

Sample Id: D20-7 Weight: 5 (kg) Depth: 2145-1920 (m)

Mn Crust Description

Surface Texture: Botryoidal, ~ 1cm wide; <1cm deep. Botryoids have a granular texture

Mn Crust Thickness (mm):
Min: 20 Max: 55 Ave: 30

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.	Various	2	to 4	layers
2.				
3.				
4.				
5.				
6.				

NO photo

Comments and XRD Mineralogy:

ALL FRAGMENTS HAVE BEEN RIPPED FROM THE SUBSTRATE. MOST SHOW TWO TO THREE LAYERS. COLUMNAR LAYERS CONTAIN A YELLOWISH MUD. SOME IRON STAINING IN POROUS LAYERS

ANALYSES

Subsample Number	Analysis	LayerThickness
D20-7	CE	≤0.5mm (5-7gm)

Substrate Description

Rock Type: —

4 pieces Scraped

Description:

½ TO HORDI

Biology ?: ENCRUSTING FORAMS

Described By: RD Subsampled By: HEIN

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: @ pebble to small cobble sized (cm) Location: Seamount F

Sample Id: D20-8 Weight: 1.5 (kg) Depth: 2145-1960 (m)

Mn Crust Description

Surface Texture: Irregular, and very porous mostly, granular

Mn Crust Thickness (mm):
Min: <1 Max: 22 Ave: 10

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

NO Photo

Comments and XRD Mineralogy:

Samples consist of crusts on fragments of sed. breccia. Crusts are irregular granular on surface, very porous, some iron staining. Crust thickness vary from thin to relatively thick (22mm)

ANALYSES

Subsample Number	Analysis	LayerThickness

½ TO HORDI

Substrate Description

Rock Type: Sedimentary Breccia

Description:
Composed ~~mainly~~ of volcanic clasts: some of which are altered, grey to rust-red, medium pebble to sand sized, angular to subrounded, grain supported, calcite rim cement, ~~carbonate mud~~ infilling voids

Biology ?: two pieces were cemented by phosphorite

Described By: R.D. Subsampled By:

SAMPLE DESCRIPTION

Pebbles & Small Cobbles

Cruise Id: F10-89-CP Size: Assorted (cm) Location: Seamount F

Sample Id: D20-9 Weight: 1 (kg) Depth: 2145-1960 (m)

Mn Crust Description

Surface Texture: Thin irregular crust or patina

Mn Crust Thickness (mm):

Min: <1 Max: _____ Ave: _____

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

NO Photo See #1

Comments and XRD Mineralogy:

Most fragments are broken bits of breccia with thin crusts or patina

ANALYSES

Subsample Number	Analysis	LayerThickness

Substrate Description

Rock Type: Sedimentary Breccia

Description:

composed of volcanic clasts; some of which are altered, grey to rust-red, medium pebble to sand sized, angular to sub-rounded, grain supported, calcite rim cement with carbonate mud infilling remaining pore space; portions of some fragments are finer grained and cemented with calcite or phosphorite.

½ TO HORDI

Biology ?:

Described By: RD Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: 6x6x2 ± small pieces (cm) Location: SEAMOUNT F

Sample Id: D20-10 Weight: <1 (kg) Depth: 2145-1960 (m)

Mn Crust Description

Surface Texture: small amount of patina

Mn Crust Thickness (mm):

Min: <1 Max: _____ Ave: _____

Layers (Outer to Inner)(mm):

Min	Max	Ave	Texture & Color
1.			
2.			
3.			
4.			
5.			
6.			

NO Photo

Comments and XRD Mineralogy:

ANALYSES

Subsample Number	Analysis	LayerThickness

½ TO Sy Schlanger

Substrate Description

Rock Type: LIMESTONE - Chalk

Description:

WHITE to Cream DENSE, SUPPORTING A FEW CALCITE RIMMED VOLCANIC CLAST PEBBLES, MANGANESE DENDRITES DIFFUSING FROM small cracks and pebble impressions, some ~~Biology~~?: iron staining.

Described By: RO Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: ASSORTED FRAGMENTS (cm) Location: SEAMOUNT F

Sample Id: D20-11 Weight: 5 (kg) Depth: 2145-1960 (m)

Mn Crust Description
Surface Texture: Granular

Mn Crust Thickness (mm):
Min: 10 Max: 45 Ave: 20

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

NO Photo

Comments and XRD Mineralogy:
FRAGMENTS OF SIDE CRUSTS WITHOUT SUBSTRATE - UPPER LAYERS ARE LARGELY POROUS WITH IRONSTAINING - RARE LOWER LAYERS ARE DENSE, MASSIVE, ALMOST METALLIC IN APPEARANCE

~25 pieces cut
= 50

ANALYSES

Subsample Number Analysis LayerThickness

½ TO HORDI.

Substrate Description
Rock Type: —

Description:

Biology ?: —

Described By: RO. Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: ASSORTED (cm) Location: SEAMOUNT F

Sample Id: D20-12 Weight: 2 (kg) Depth: 2145-1960 (m)

Mn Crust Description
Surface Texture: Irregular, and very porous

No Photo

Mn Crust Thickness (mm):
Min: <1 Max: 20 Ave: 7

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:
Samples consist of fragmented pieces of basalt with side crusts with the exception of two pieces that look like top crusts. The side crusts are very porous, and have some iron staining. The top crusts are smooth dense (~ 5mm thick)

Substrate Description
Rock Type: BASALT

Description:
Brownish-grey to rusty-brown, aphanitic, small vesicles filled with iron-oxide like material, manganese dendrites diffusing from small fractures

Biology ?:

ANALYSES

Subsample Number	Analysis	LayerThickness

1/2 TO NORD

Described By: RD Subsampled By:

SAMPLE DESCRIPTION

small pebbles to small Cobbles

Cruise Id: F10-89-CP Size: ASSORTED (cm) Location: SEAMOUNT F

Sample Id: D20-13 Weight: 3 (kg) Depth: 2145-1960 (m)

Mn Crust Description

Surface Texture: granular, rare botryoidal

Mn Crust Thickness (mm):
Min: 5 Max: 35 Ave: 10

NO Picture

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

Comments and XRD Mineralogy:

Bits and fragments - mostly granular and porous resembling side pieces - no substrate

150 fragments

ANALYSES

Subsample Number	Analysis	LayerThickness
½ TO HORDI		

Substrate Description

Rock Type:

Description:

Biology ?:

Described By: R.D.

Subsampled By:

SAMPLE DESCRIPTION

Cruise Id: F10-89-CP Size: Assorted 2-9cm (cm) Location: SEAMOUNT F

Sample Id: D20-14 Weight: ~2 (kg) Depth: 245-1960 (m)

Mn Crust Description

Surface Texture: none → dating

Mn Crust Thickness (mm):
Min:_____ Max:_____ Ave:_____

Layers (Outer to Inner)(mm):

	Min	Max	Ave	Texture & Color
1.				
2.				
3.				
4.				
5.				
6.				

NO PHOTO

Comments and XRD Mineralogy:

ANALYSES

Subsample Number	Analysis	LayerThickness
MALCOLM TOOK ALL FOR TS / CHEMISTRY (+ DATING BUT DOUBTFUL)		
ROCK TAKEN Ar-Ar, ISOTOPES STRONTIUM		

Substrate Description

Rock Type: massive, sparsely ~~[illegible]~~ olivine + plagioclase - pyx, ~~[illegible]~~ moderately altered

Description: assorted cobbles, olivine ~~[illegible]~~ altered orange, plag not too fresh all appear to be same lithology

Biology ?:

check breccia for other cobbles? some may be pyx-phyric

Described By: MS PRINCE Subsampled By: MS PRINCE