USGS DREDGE OPERATIONS LOG

D2

JD LOCAL

CRUISE KODOS 98-3 DATE 226 8/15/98 2:18pm

STATION 05 CHIEF SCIENTIST

DREDGE NO. D2 TECH ON WATCH

on-off bottom

DEPTH INTERVAL (m): 1862–1600 corrected

	ON STATION	DREDGE ON BOTTOM	DREDGE OFF BOTTOM	OFF STATION
GMT	03:47.94	03:57:52.93	07:51.32.93	08:24:17
latitude	8°11.967'N	8°11.793'N	8°10.114N	8°10.907
longitude	160°35.181'E	160°34.476 E	160°34.573 E	160°33.930
water depth	1870	1862	1600	1887

Site Description and Target:

Operation*	GMT	Depth (m)	Wire Out (m)	Tension	HDG/SPD	Comments
wire out		1859	2300	1.1	269.6 / 0.7	
	04:25:47.	1.949	2,364	1.2	187.4 / 1.1	
small bite	04:30:17	1.913	2393	1.7 – 1.9	177 / 1.4	
	04:50.32	1,988	2399		144 / 1.5	
	05:09.47	1916	2346	1.1	109 / 1.8	
small bite	05:14.17		2309	1.7, 1.5	125 / 2.0	
	05:16.32	1903	2298	2.1 – 2.3.5	2.6 3.1	
Big bite.	05:17.47		2285	3.6, 3.7, 3.9	121.6 / 1.7	
Big bite	05:34.32	1861	2143	3.0	160.0 / 1.9	
wire out.	06:19.47	1850	2450	0.5	118.7 / 1.3	
Small bite	06:32.32	1872	2411	1.6 ~ 1.9	124.8 / 1.4	
Small bite	06:32:47	1852	2406	2.0	126.6 / 1.4	
bite	06:35:47	1857	2383	1.9 2.2	126.0 / 1.5	
bite	06:38:17	1854	2360	2.0	139.2 / 1.5	

*on/off bottom, bites, etc.

Other Comments:

– Pulling ship backwards at the 4nd bite

USGS DREDGE OPERATIONS LOG

JD LOCAL

CRUISE __KODOS 98-3_____ DATE 226 8/15/98 6:49 PM

STATION _____ CHIEF SCIENTIST _____

DREDGE NO. D2 continued TECH ON WATCH _____

on-off bottom

DEPTH INTERVAL (m) _____

	ON STATION	DREDGE ON BOTTOM	DREDGE OFF BOTTOM	OFF STATION
GMT				
latitude				
longitude				
water depth				

Site Description and Target: _____

[illegible] ~~1480 m~~ 1.480 m

Operation*	GMT	Depth (m)	Wire Out (m)	Tension	HDG/SPD	Comments
Small bite	06:50	1766	2279	2.7	137.6 / 1.2	
"	06:53	1756	2267	3.0, 3.1	120.5 / 1.1	
	07:00	1680	2205	1.8 ~ 2.1, 2.4, 2.7	119 / 1.3	
Repositioned Ship	—			3.1,		
Small bite	07:11	1,610	2116	2.5, 2.6, 2.7	124.5 / 1.3	
"	07:30	1.455	1947	2.5, 2.3	124 / 1.4	
Big bite	07:32	1.468	1938	3.4, 3.6	124 / 1.2	
"	07:35	1.468	1936	4.4, 4.6	149.2 / 0.8	
Bottom off	07:50	1.600	~~1736~~ 1.690	1.4	228 / 1.1	
on deck	08:12	1882				

*on/off bottom, bites, etc.

Other Comments:

DREDGE LOG

JD LOCAL

CRUISE KODOS 98-3 DATE 226 8/15/98

STATION 05

GMT (on-off bottom) LOCAL (on-off bottom)

DREDGE D2 TIME 03:57:02.93 - 07:51:32.93 2:57 pm - 6:51 pm

DEPTH INTERVAL (m) (on-off bottom) 1862-1690 LATITUDE (on-off bottom) 8°11.793'N - 8°10.774'N

DEPTH (m) CORRECTED 1840-1770 LONGITUDE 160°34.476'E - 160°34.593'E

TOTAL WEIGHT: DREDGE 200 (220 measured) CRUST 90kg

% OF ROCK COVERED BY CRUST ~~90%~~ 66% 66%

% BROKEN FROM: OUTCROP 99% TALUS 1%

THICKNESS OF CRUST: MAX 150 MIN 0 AVG 40

DOMINANT SURFACE TEXTURE small botryoidal on basalt
lg mod. botryoidal to granular on lmst

SUBSTRATE LITHOLOGY #1 lmst w/out crust 25%
#2 lmst w/ crust 55%
#3 basalt w/ crust 20%

NODULES PRESENT 0

REMARKS: initial lg bites recovered lmst & basalt w/ crust
Dredge up & ship repositned = collected lmst w/out crust
Basalt has thick crusts → 120 mm
lmst has thin crust ≈ 40 mm

KODOS 98-3
D2

DREDGE 2

Sample #	CC	PGE	REE	OC	CFA	PTS	Paleo	XRD
D2-1A	X					X		
D2-1B	X							
D2-1C	X							
D2-1D	X							
D2-1E	X							
D2-2A	X					X		
D2-2B	X							
D2-2C	X							
D2-2D	X							
D2-2E				X				
D2-3A	X	X	X					
D2-4A	X					X		
D2-4B				X				
D2-5A	X							
D2-5B	X							
D2-6A	X							

SAMPLE DESCRIPTION

Cruise Id: KODOS 98-3 Size (mm): 195 x 180 x 150 Location: 8°11.784'N 160°34.56'E

Sample Id: D2-1 Weight (kg): 5 Depth (m): 1862-1690, 1840-1770 CC

Mn Crust Description

Surface Texture: Botryoidal

granular on sides

Mn Crust Thickness (mm):

Min: 140 Max: 154 Ave: 148

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			10	black massive
2		55	50	porous to vuggy; most
3				porous at center, decreasin
4				up/down sectivil
5			85	massive dense,
6				black; CFA dissemin

D2-1 KODOS 98-3

Comments and XRD Mineralogy:

Thickest Crust collected in 97-98 - No substrate, could be thicker

Substrate Description

Rock Type: NONE

Description:

Biology (?):

Described by: Hein

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D2-1A	CC Bulk	0-142mm	84.1
D2-1A	PTS	0-142mm	
D2-1B	CC layer	0-10	5.3
D2-1C	CC layer	10-60	36.7
D2-1D	CC layer	60-100	33.0
D2-1E	CC layer	100-150	36.0

XRD

CC = MER-REE, Te, H_2O^-

50% HORD1

50% USGS

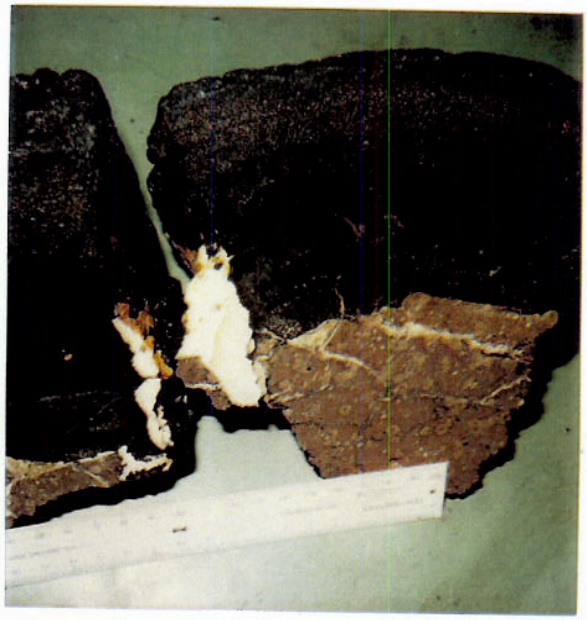
Subsampled by: Dowling

SAMPLE DESCRIPTION

Cruise Id: KODOS 98-3 Size (mm): 220x188x138 Location: 8°11.784'N
Sample Id: D2-2 Weight (kg): 5.5 Depth (m): 160° 34.56'E
→ 1862-1690; 1840-1770 CO2

Mn Crust Description

Surface Texture: black botryoidal



Mn Crust Thickness (mm):

Min: 75 Max: 110 Ave: 85

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			3	black, massive
2	20	28	24	V. Porous To vuggy.
3				w/out/sed; Fe stained
4			15	massive, dense, black
5			45	Massive, w/much
6				CFA in what was porous layers

D2-2 KODOS 98-3

Comments and XRD Mineralogy:

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D2-2A CC	Bulk	0-98 mm	40.8
D2-2A	PTS	0-98 mm	
D2-2B CC	layer	0-30 mm	22.7
D2-2C CC	layer	30-47 mm	17.7
D2-2D CC	layer	47-82 mm	31.1
D2-2E OC	Substrate		16.3

CC = MER, Te, H_2O^- and XRD
OC = XRF-102, FeO, CO_2, H_2O^+, H_2O^- + XRD

50% KORDI
50% USGS

PGE = D2-2A = 27.6 D2-2D = 25.4
D2-2B = 26.0
D2-2C = 15.0

Substrate Description

Rock Type: altered basalt

Description: large, yellow-green amygdules in a red-brown basalt, possible high Fe content - ironstone?

Biology (?): encrusting forams

Described by: J. Dowling

Subsampled by: Dowling

Amygdules

SAMPLE DESCRIPTION

Cruise Id: KODOS 98-3 Size (mm): 245 x 140 x 310 Location: 8° 11.784'N 160° 34.56'E

Sample Id: D2-3 Weight (kg): 9 kg Depth (m): 1840-1770

Mn Crust Description

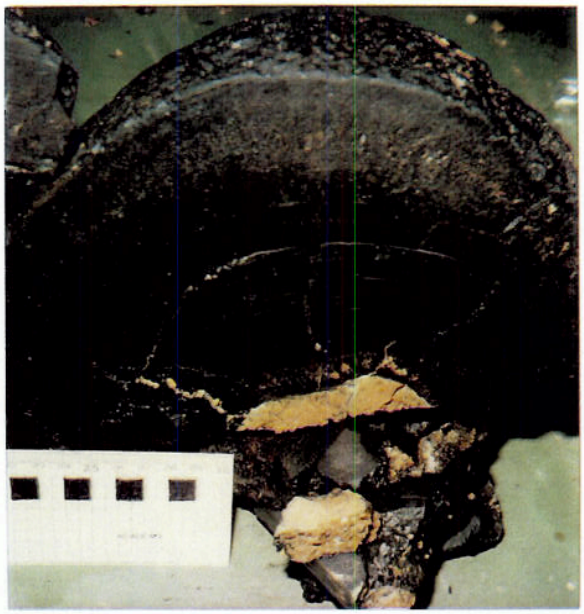
Surface Texture: modified botryoidal to smooth

Mn Crust Thickness (mm):

Min: 90 Max: 117 Ave: 100

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	3	6	5	Blk, massive few fractures
2	20	32	25	Porous, Blk + Brown columnar, Fe-ox
3	20	25	25	Blk, massive
4	45	62	55	Blk, CFA filled fine veinlets // to bedding
5				lots of CFA in
6				lowest 15 mm



D2-3 KODOS 98-3

Comments and XRD Mineralogy:

Layr 4 = lg ⊥ fractures, some lined w/ CFA

Substrate Description

Rock Type: Highly altered basalt

Description: Brown, completely altered; laced w/ CFA + Fe-Mn oxides Fe-rich - ironstone?

Biology (?): Planktonic forams encrusting forams

Described by: M. Burrows

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D2-3A cc	BULK Pt, REE	0-110	1466

(cc = MER, Te, H_2O^-; XRD

60% ICPMS

40% USGS

PGE = D2-3A = 31.2

Subsampled by: M Burrows

SAMPLE DESCRIPTION

Cruise Id: KODOS 98-3 Size (mm): 283 x 153 x 180 Location: [illegible]

Sample Id: D2-4 Weight (kg): 3 Depth (m): 1840-1770

Mn Crust Description

Surface Texture: Botryoidal, large

Mn Crust Thickness (mm):

Min: 20 Max: 34 Ave: 25

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1	20	34	25	Blk, massive, fractured,
2				some lg. vugs; base
3				of crust lined w/
4				lg. vugs
5				
6				

D2-4 KODOS 98-3

Comments and XRD Mineralogy:

Substrate Description

Rock Type: Foram Lmst. - Phosphorite
Phosphatized

Description: Yellow-brown, fine grained, laced w/ Mn dendrites & blebs, + fills veins & vugs

Biology (?): Planktonic Forams & Encrusting Forams

Described by: Burrows

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D2-4A	Bulk CC	0-25 mm	39.7
D2-4B	Substrate CC		15.2g 71.1
D2-4A	PTS	0-25 mm	

CC = MER-REE, Te, H_2O^- ; XRD

OC = XRF-102, FeO, CO_2, H_2O^+, H_2O^- ; XRD

60% HORD

40% USGS

Subsampled by: Burrows

SAMPLE DESCRIPTION

Cruise Id: KODOS 98-3 Size (mm): 140 x 70 x 130 Location: 8°11.784' N 160° 33.5' E

Sample Id: D2-5 Weight (kg): 1.6 Depth (m): 1862-1690', 1840-1770 Cor.

Mn Crust Description

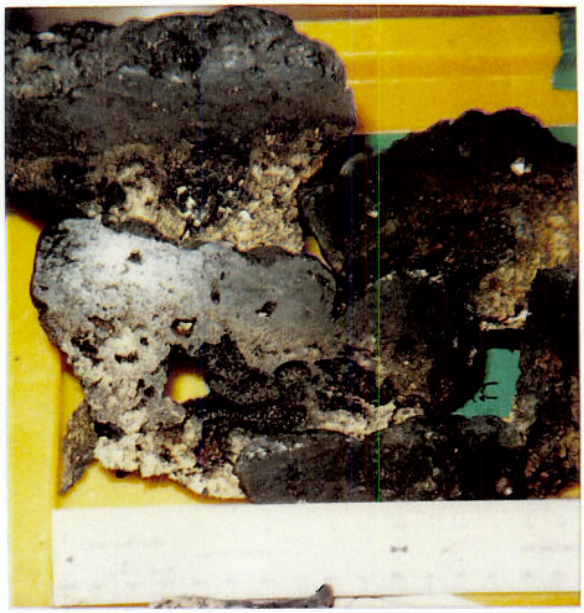
Surface Texture: large botryoidal

Mn Crust Thickness (mm):

Min: 25 Max: 35 Ave: 30

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			20	massive, few vugs - fractured
2			10	massive, CFA
3				impregnated - or
4				Reef. hust - or
5				phosphorite
6				



D2-5 KODOS 98-3

Comments and XRD Mineralogy:

Substrate Description

Rock Type: Phosphorite

Description: Soft, vuggy, brown, laced w/ Mn dendrites & mn in vugs

Biology (?): encrusting foram ?

Described by: Hein

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D2-5A	layer cc	0-20 mm	25.2
D2-5B	layer cc	20-35 mm	11.3

CC = MER-REE, Te, H_2O^-; XRD

70% (CORD)

30% USGS

Subsampled by: M Burrows

SAMPLE DESCRIPTION

Cruise Id: KODOS 98-3 Size (mm): 300X160X 50 Location: 8°11.784' N 160° 33.5' E

Sample Id: D2-6 Weight (kg): ~ 2 Depth (m): 1862 – 1690; 1840-1774 Co

Mn Crust Description

Surface Texture: modified botryoidal

Mn Crust Thickness (mm):

Min: 25 Max: 35 Ave: 30

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			5	massive black
2			18	Porous, few vugs, blk
3		20	10	vuggy w/much CFA
4				repl. Phosph.
5				
6				

D2-6 KODOS 98-3

Comments and XRD Mineralogy:

Slab of crust – vuggy lower surface

Substrate Description

Rock Type: Phosphorite

Description: minor, yellow-brown

Biology (?): Encrusting forams

Described by: Hein

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
D2-6A	Bulk CC	0-32 mm	60.1

CC=MER, Te, H_2O^-; XRD

50% HORD1

50% USGS

PGE = D2-6A = 28.6

Subsampled by: Burrows

SAMPLE DESCRIPTION

8° 11.784' N
160° 33.5

Cruise Id: KODOS 98-3 Size (mm): 9 Cobbles max 23X10X10cm Location:
Sample Id: D2-7 Weight (kg): 20 kg Depth (m): 1840-1770

Mn Crust Description

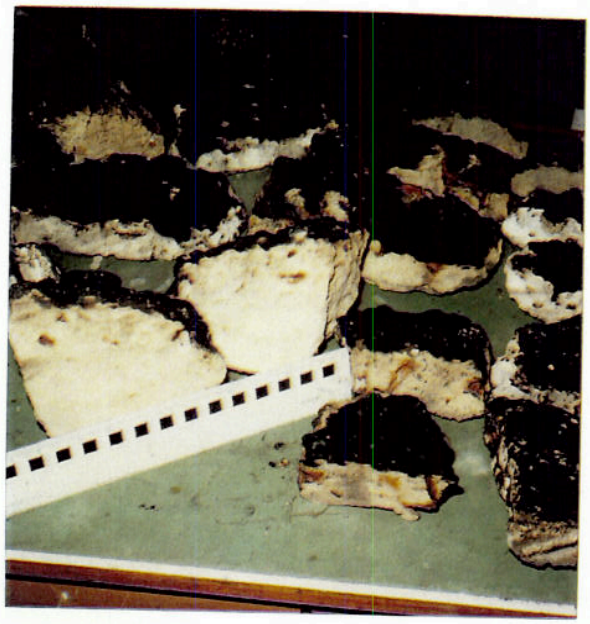
Surface Texture: Botryoidal To modified Botryoidal To granular

Mn Crust Thickness (mm):

Min: 1 Max: 12 Ave: 8

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			8	massive Black
2				
3				
4				
5				
6				



D2-7 KODOS 98-3

Comments and XRD Mineralogy:

Botryoids follow irregularities of substrate

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	100% XRDI		

Substrate Description

Rock Type: Foraminiferal Limestone

Description: mottled pale browns + gray - forams prestine in some and leached in others

Biology (?): Encrusting forams + Hold fasts

Described by: Hein

Subsampled by:

SAMPLE DESCRIPTION

16 Cobbles

Cruise Id: KODOS 98-3 Size (mm): Max 140×170×350 Location: 8° 11.7841 N 160° 33.5' E

Sample Id: D2-8 Weight (kg): ~~140×170×350~~ 25 Depth (m): 1862 – 1690; 1840-1776 Cor

Mn Crust Description

Surface Texture: large Botryoidal To modified botryoidal, irregular

Mn Crust Thickness (mm):

Min: 3 Max: 35 Ave: 24

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			24	Massive, black
2				Lg vugs in places
3				
4				
5				
6				

D2-8 KODOS 98-3

Comments and XRD Mineralogy:

Subsample No. Analysis Layer Thick. Wt.(g)

90% HORDI
10% USGS

Substrate Description

Rock Type: Phosphorite

Description: Differentially phosphatized Limestone w/ lg. vugs filled w/ Fe-Mn oxides + brown CFA lines many –

Biology (?): Encrusting forams

Described by: Hein

Subsampled by:

Thin Crusts w/out substrate

SAMPLE DESCRIPTION

5 Cobbles

Cruise Id: KODOS 98-3 Size (mm): 140x130x30 MAX Location: 8°11.784'N 160° 33.5' E

Sample Id: D2-9 Weight (kg): 2 Depth (m): 1862-1690, 1840-1770 Cor.

Mn Crust Description

Surface Texture: Botryoidal To smoothed botryoidal

Mn Crust Thickness (mm):

Min: 20 Max: 35 Ave: 25

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1			3	massive black
2			10	Porous w/ CFA
3			10	massive black
4				
5			but	varies somewhat
6				

D2-9
KODOS 98-3

Comments and XRD Mineralogy:

Substrate Description

Rock Type: NONE or Trace of phosphorite

Description:

Biology (?): Encrusting forams

Described by: HEIN

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	85% KORDI 15% USGS		

Subsampled by:

SAMPLE DESCRIPTION

15 Cobbles

Cruise Id: KODOS 98-3 Size (mm): 125X75X120 MAX Location: 8° 11.784' N 160° 33.5' E

Sample Id: D2-10 Weight (kg): 12 Depth (m): 1862 - 1690; 1840-1770

1/2 on each photo

Mn Crust Description

Surface Texture: Botryoidal, modified botryoidal, smoothed botryoidal – surface removed

Mn Crust Thickness (mm):

Min: 40 Max: 110 Ave: 75

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
1				up to 6 layers
2				laminated to
3				massive; CFA
4				veins at base of
5				some
6				

D2-10 (I) KODOS 98-3

Comments and XRD Mineralogy:

Group of Thick Crusts

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	90% KORDI		
	10% USGS		

Substrate Description

Rock Type: NONE to Basalt & Phosphorite, ironstone

Description: All Lithologies are brown & laced w/ CFA veins

Biology (?): encrusting forams

Described by: Hein

Subsampled by:

KODOS
98-3 D2-10(II)

SAMPLE DESCRIPTION

Coated Cobble

Cruise Id: KODOS 98-3 Size (mm): 130 x 130 x 130 Location: 8°11,784' N 160° 33.5' E

Sample Id: D2-11 Weight (kg): 2 Depth (m): 1862-1690; 1840-177

Mn Crust Description

Surface Texture: Slightly smoothed botryoidal = Top

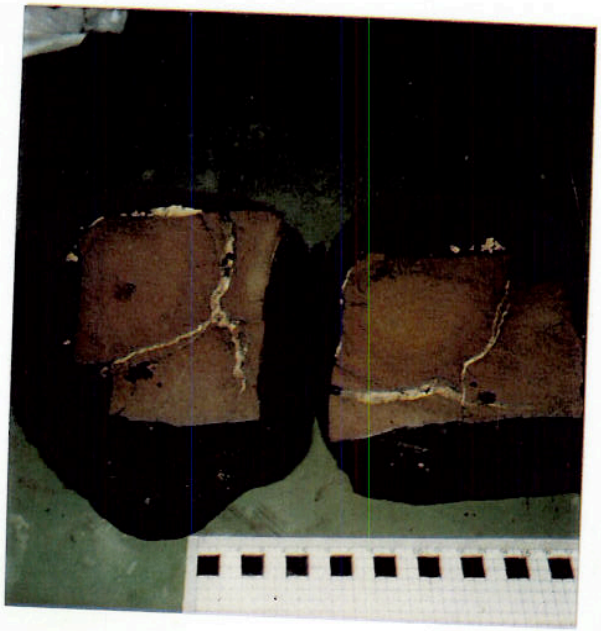
Bottom = irregular

Mn Crust Thickness (mm):

Top / Bottom Min: 28 / 15 Max: 33 / 20 Ave: 32 / 18

Outer to Inner Layers (mm)

	Min	Max	Ave	Texture & Color
Top 1			6	Acicular blacks
2			15	Black, massive,
3				fractured
4			12	massive w/ CFA
5				veins & vug fill
6				



D2-11 KODOS 98-3

Comments and XRD Mineralogy:

Substrate Description

Rock Type: Basalt

Description: Brown, completely altered w/ 2 lg CFA veins

Biology (?): Encrusting forams

Described by: Heim

Analyses

Subsample No. Analysis Layer Thick. Wt.(g)

100% FORDI

Subsampled by:

misc. Rx samples

SAMPLE DESCRIPTION

3 Cobbles

Cruise Id: KODOS 98-3 Size (mm): 90x90x80 MAX Location: 8°11.784' N 160° 33.5' E

Sample Id: ~~D2~~ D2-12 Weight (kg): 2.5 Depth (m): 1862-1690; 1840-1770 cm

Mn Crust Description

Surface Texture: granular & smooth & NONE

Mn Crust Thickness (mm):

Min: _____ Max: 2 Ave: <1

Outer to Inner Layers (mm)

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

D2-12 KODOS 98-3

Comments and XRD Mineralogy:

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	100% TORDI		

Substrate Description

Rock Type: (1) Phosphorite (2) Basalt (3) Phosphorite

Description: (1) Repl. foram sand laced w/ Mn oxides (2) Brown highly altered (3) Cigar-shaped cream, laced w/ Mn oxide

Biology (?): NONE

Described by: HEIN

Subsampled by:

SAMPLE DESCRIPTION

4 Cut
4 Not cut

5 boulders, 3 cobbles

Cruise Id: KODOS 98-3 Size (mm): 500x500x200 MAX Location: 8°11.784' N 160° 33.51' E

Sample Id: D2-13 Weight (kg): 59 kg Depth (m): 1862-1690; 1600-1501 C.

1g boulder = 35 kg
rest = 24 kg

Mn Crust Description

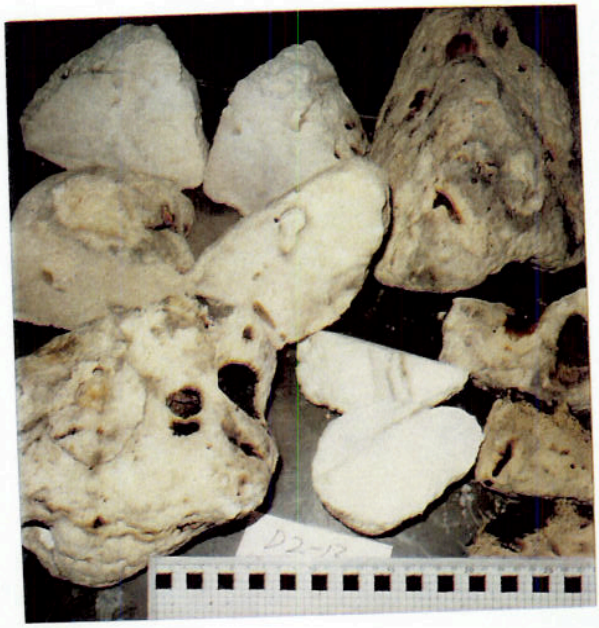
Surface Texture: Sparce granular Crust

Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave: < 1 mm

Outer to Inner Layers (mm)

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



D2-13 Pt. 1
KODOS 98-3

Comments and XRD Mineralogy:

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	98% HORD1		
	2% USGS		

Substrate Description

Rock Type: Foraminiferal Limestone

Description: Tan To off white - 1g vugs, some lined w/ Mn oxide More brown forams in Tan samples

Biology (?): NONE

Described by: HEIN

Subsampled by:

2D-13

KODOS 98-3

Pt. 2

~250 pebbles + Cobbles in second bucket

SAMPLE DESCRIPTION

~100 uncut

Cruise Id: KODOS 98-3 Size (mm): Cobbles in 1 bucket Location: 8°11.784' N 160° 33.5' E

Sample Id: ~~D2-14~~ D2-14 Weight (kg): 22 kg #1 Depth (m): 1862 - 1690; 1840 - 1500 Cor.

45 kg #2

67 kg

Mn Crust Description

Surface Texture: All Types described in D2-1 → D2-13

Mn Crust Thickness (mm):

Min:_____ Max:_____ Ave:_____

NO Photo

Outer to Inner Layers (mm)

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

Comments and XRD Mineralogy:

Substrate Description

Rock Type: All Types as described in D2-1 → D2-13

Description:

Biology (?):

Described by: HEIN

Analyses

Subsample No.	Analysis	Layer Thick.	Wt.(g)
	100% HORDI		
	100% HORDI		

Subsampled by: